Kilmar Environmental Appraisal Report

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Abbreviations

3LPP	3 Layer Polypropylene
AHV	Anchor Handling Vessel
AIS	Automatic Identification System
BACs	Background assessment concentrations
BAP	Biodiversity Action Plan
BCs	Background concentrations
BGS	British Geological Survey
BGT	Bacton Gas Terminal
BRIG	Biodiversity Reporting and Information Group
BSL	Below Sea Level
CA	Comparative Assessment
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation, and Storage
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalents
CoP	Cessation of Production
dB re 1 µPa	Decibels relative to one micro-Pascal
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DP	Decommissioning Programme
DSV	Diving Support Vessel
EA	Environmental Appraisal
EBS	Environmental Baseline Survey
EUL	Energean UK Ltd
EPS	European Protected Species
ERL	Effects Range Low
ERRV	Emergency Response and Rescue Vessel
ESAS	European Seabirds at Sea
ESDV	Emergency Shutdown Valve
ETS	Esmond Transmission System
EUNIS	European Nature Information Systems
FCS	Favourable Conservation Status
FOCI	Features of Conservation Interest

GMG	Global Marine Group
HCF	Hydrocarbon Free
HSE	Health Safety and Environment
Hz	Hertz
ICES	International Council for the Exploration of the Sea
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
JUWB	Jack-up Work Barge
kHz	Kilohertz
Km	Kilometre
Km^2	Kilometres Squared
LAT	Lowest Astronomical Tide
LV	Lift Vessel
MBES	Multi Beam Echo Sounder
MCV	Monohull Crane Vessel
MEG	Monoethylene Glycol
mg/l	Milligrams per litre
m	Metres
m^2	Square metre
m^3	Cubic metres
mm	Millimetres
MMMU	Marine Mammal Management Unit
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPA	Marine Protected Area
m/s	Metres per second
MSV	Multi-Purpose Support Vessel
MUs	Management Units
N_2O	Nitrous Oxide
NFFO	National Federation of Fishermen's Organisations
NiFPO	Northern Irish Fish Producer's Organisation
NO_x	Nitrogen Oxides
NORM	Naturally Occurring Radioactive Material
NSTA	North Sea Transition Authority
NUI	Normally Unmanned Installation
OEUK	Offshore Energies UK
OMR	The Conservation of Offshore Marine Habitats and Species Regulations
OPEP	Oil Pollution Emergency Plan

OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo and Paris Commission
P&A	Plug and Abandonment
PAH	Polycyclic Aromatic Hydrocarbons
PETS	Portal Environmental Tracking System
PEXA	Practice and Exercise Area
PON	Petroleum Operations Notice
PSD	Particle size distribution
PUK	Perenco UK Limited
PWL	Proposed Well Location
ROV	Remotely Operated Vehicle
RSD	Relative standard deviation
RSR	Radioactive Substance Regulation
SAC	Special Area of Conservation
SCANS	Small Cetacean Abundance of the North Sea
SEA	Strategic Environmental Assessment
SEAL	Shearwater Elgin Area Line
SEMS	Safety and Environmental Management System
SFF	Scottish Fishermen's Federation
SLV	Shear Leg Vessel
SMU	Seal Management Unit
SNCBs	Statutory Nature Conservation Bodies
SNS	Southern North Sea
SO_2	Sulphur Dioxide
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SoW	Scope of Work
SPA	Special Protection Area
SSCV	Semi-Submersible Crane Vessel
SSS	Side Scan Sonar
THC	Total Hydrocarbon Content
TOC	Total Organic Carbon
TOM	Total Organic Matter
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
USBL	Ultra Short Baseline
VOC	Volatile Organic Compounds
WMP	Waste Management Plan

WPRL	Waldorf Petroleum Resources Limited

1 Non-Technical Summary

1.1 Project Background

This non-technical summary provides an overview of the findings of the Environmental Appraisal (EA) conducted by Waldorf Petroleum Resources Limited (WPRL) as previous Field Operator for the decommissioning of the Kilmar installation and pipelines located in United Kingdom Continental Shelf (UKCS) Blocks 43/22, 43/23 and 43/24 in the Southern North Sea (SNS) (Figure 1.1). The Kilmar Field Operator is now Energean UK Ltd (EUL). The appointed Installation and Pipelines Operator is ODE Asset Management and the appointed Wells Operator is Exceed Torridon Limited.

The Kilmar field, located in UKCS Block 43/22a in Licence P683, was discovered in 1992 by appraisal well 43/22-1 and confirmed in 1994 by a second appraisal well 43/22-2. Three producing wells have been drilled to develop the Kilmar field. The two suspended appraisal wells were re-entered and side tracked in 2006, production wells 43/22a-K1w (K1) and 43/22a-K2x (K2) respectively, with a third production well, 43/22a-K3 (K3), drilled in 2007.

The platform, designated as a Normally Unattended Installation (NUI), was installed in 2005 and is located approximately 94 km to the east north east of the nearest landfall at Flamborough Head on the Yorkshire coast and 95 km west south west of the median line between the UK and Dutch sectors of the North Sea (Figure 1.1). Production from the Kilmar wells was exported via a 21.26 km long, 12 inch gas export pipeline (PL2162) to the Perenco UK Limited (PUK) operated Trent platform complex, located in UKCS Block 43/24. A 3 inch service pipeline (PL2163) is piggybacked to the export line. The two pipelines were installed as piggybacked pipelines into the same trench, crossing over the 34 inch SEAL pipeline (PL1570), 5.3 km from the Kilmar platform. Where the pipelines were not trenched (at the platform approaches and at the SEAL pipeline crossing) a combination of concrete mattresses and rock dump were installed over the pipelines to provide protection.

Since first gas in 2006, production from Kilmar has been gradually declining and ceased in June 2020 when PUK closed the Kilmar export route at Trent. The remaining reserves in Kilmar are not thought sufficient to support an investment to return the facilities to production and cover the costs of an alternative export solution. Waldorf Production Resources Limited (WPRL), Field Operator at that time therefore submitted a Cessation of Production (CoP) notification to the North Sea Transition Authority (NSTA), declaring CoP on the 2nd June 2020.

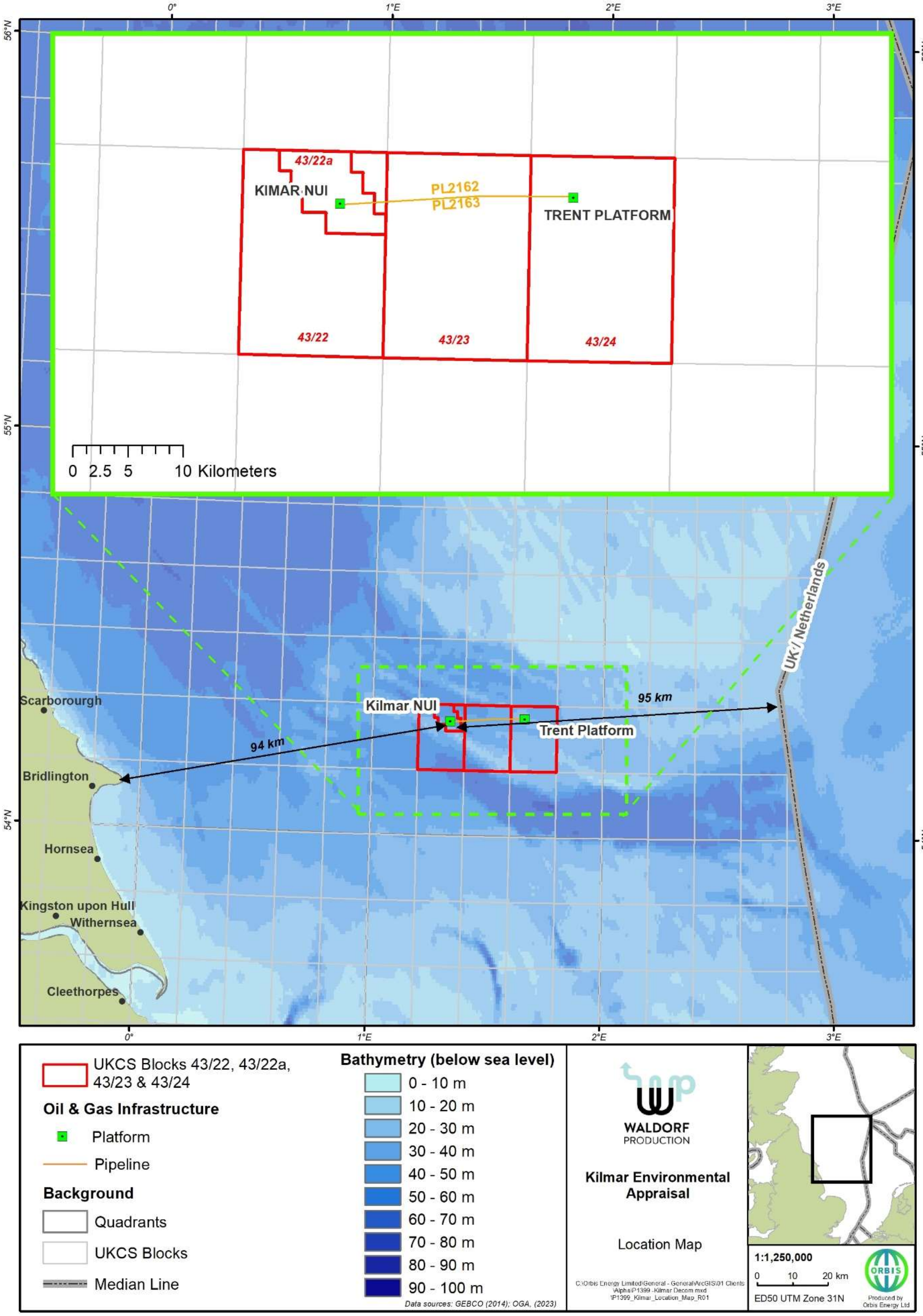
Of note is that the Kilmar platform and pipelines are located within the boundary of the SNS Special Area of Conservation (SAC), designated for the protection of harbour porpoises.

A summary of the Kilmar infrastructure being decommissioned and therefore within the scope of the Kilmar Decommissioning EA is provided in Table 1.1.

Table 1.1. Summary of Kilmar Infrastructure Being Decommissioned

Installation	Weight		UKCS Block	Co-ordinates (WGS84)
Kilmar platform (small steel platform)	450 tonnes (topside weight) 1,425 tonnes (jacket weight)		43/22a	54° 17' 26.22"N 01° 20' 10.35"E
Pipeline	**Length**	**From – To End Points**		**Burial Status** Note 1
Gas Export Pipeline (PL2162)	21.26 km	Kilmar Platform – Trent Compression Platform		Trenched, mat/rock dumped at ends and at SEAL crossing.
Service Pipeline (PL2163)				
Note 1: Approximately 97.6% of the route is trenched with 1.6% surface laid at the platform approaches and at the SEAL crossing. The remainder of the pipelines are in the jacket risers and topsides pipe sections. Of the surface laid sections ~45% is mattress protected and ~55% is rock dump protected. In total <1.9% of the route is rock protected either within or outside the trenched sections.				

Figure 1.1. Kilmar Infrastructure Location Map



1.2 Regulatory Background

The Petroleum Act 1998 (as amended by the Energy Act 2008 and 2016) is the principal legislation governing decommissioning in the UKCS. The Act requires the operator of an offshore installation or pipeline to submit a draft Decommissioning Programme (DP) for statutory and public consultation and to obtain approval for the DP from Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) before initiating decommissioning work.

The DP outlines in detail the infrastructure being decommissioned and the method by which the decommissioning will take place and is supported by the EA report. For Kilmar, the EA report supports the combined DP for the Kilmar Field Installation and the Kilmar Pipelines.

The purpose of the EA report is to document the potential for, and significance of, environmental and societal impacts resulting from the combined DP and summarise the proposed mitigations and control measures required to minimise any impacts to an acceptable level.

1.3 Proposed Decommissioning Activities

1.3.1 Kilmar Platform

OSPAR decision 98/3 specifically prohibits the dumping or leaving in place of installations in the marine environment and requires that the topsides of all installations must be returned to shore and all steel installations with a jacket weight less than 10,000 tonnes in air, which is the case for the Kilmar platform, must be completely removed for re-use, recycling, or final disposal on land.

The removal methods which are currently being considered by EUL for the Kilmar platform are summarised in Table 1.2. A final decision on the removal method will be made following an engineering feasibility and commercial tendering process. As the preferred removal option has not yet been selected, the EA has assessed the option which results in a worst-case scenario in terms of environmental and societal effects.

Table 1.2. Decommissioning Strategy and Removal Options for Kilmar Platform

Installation	Decommissioning Strategy	Removal Options	Worst-case Scenario Assessed
Topside	The topside will be removed by a lift vessel and returned to shore. Re-use followed by recycle and then landfill will be the prioritised options for disposal.	1. Single lift removal along with jacket using a Semi-Submersible Crane Vessel (SSCV), Monohull Crane Vessel (MCV) or Shear Leg Vessel (SLV) 2. Single lift removal using a SSCV, MCV or SLV 3. Piece-small or piece large removal using a Jack-up Work Barge (JUWB)	The topside structure will be removed by an anchored lift vessel (LV). The LV will be towed to site using tugs and a separate anchor handling vessel (AHV) will be used to moor the LV in place. To separate the topside from the jacket an oxygen acetylene torch will be used. The LV will then lift the topside off and place it onto a barge for transport to shore.
Jacket	Once the topside has been removed the piles will be cut 3 m or greater below the seabed, slings attached, and the jacket lifted and returned to shore to be dismantled at an onshore location. Re-use followed by recycle will be the prioritised options.	1. Single lift removal along with the topside using a SSCV, MCV or SLV 2. Single lift or double lift removal using a SSCV, MCV ,SLV or JUWB 3. Piece-small or piece large removal using JUWB	The piles will be cut internally using an abrasive cutting tool system. Prior to this the piles will be dredged to remove the soil inside the jacket skirts. The dredging tool will be deployed from a Diving Support Vessel (DSV). A remotely operated vehicle (ROV) will be used for assistance when running the dredging tool into the jacket sleeves. The jacket will then be removed by an anchored LV, which will be towed to site using tugs. A separate AHV will be used to moor the LV in place. The LV will lift the jacket and place it onto a barge for transport to shore.

In preparation for removal of the Kilmar facilities a series of preparatory works will be undertaken, including well plug and abandonment and topside and pipelines hydrocarbon freeing activities. These activities are outside the scope of this EA report and will be consented under appropriate environmental permits and consents.

1.3.2 Kilmar Pipelines and Associated Protection Material

OSPAR decision 98/3 does not include the decommissioning of pipelines, and there are no international guidelines on the decommissioning of disused pipelines. WPRL, the previous Field Operator has therefore undertaken a Comparative Assessment (CA) in order to arrive at an optimal decommissioning solution for the Kilmar pipelines and associated protective material (rock, mattresses and grout bags). The selected decommissioning options derived from the CA, based on consideration of safety, environmental, technical, societal and economic factors, are summarised in Table 1.3.

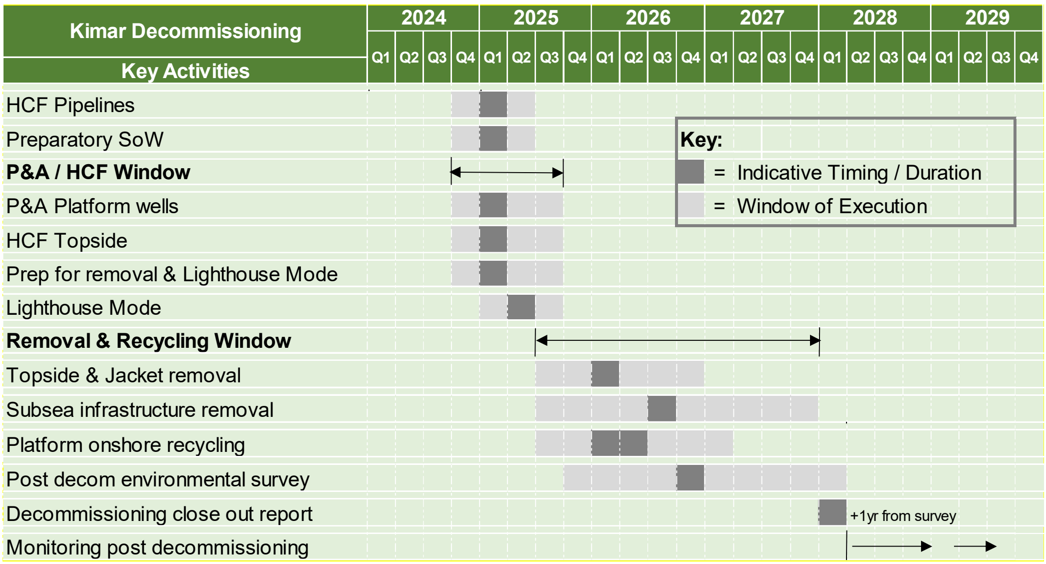
Table 1.3. Decommissioning Strategy for Kilmar Pipelines and Associated Subsea Infrastructure

Infrastructure	Decommissioning Strategy	Main Reasons for Selection
Gas Export Pipeline (PL2162) and Service Pipeline (PL2163)	Pipelines cleaned with main trenched and buried sections, including those sections protected by rock dump (at the platform approaches and at the SEAL pipeline crossing), to be left in situ.	The pipelines are already trenched and fully buried to a depth in excess of 0.6 m below the natural seabed. The Comparative Assessment (CA) concludes minimal seabed disturbance, lower energy usage and reduced risk to personnel is the practicable solution compared to complete removal. No pipeline exposures have been seen in the operational life of the pipelines which have remained buried. Minimal seabed movement has been seen which is not sufficient to expose buried pipelines. In a flooded condition (as would be the decommissioned left in situ state) the pipelines are negatively buoyant and so no upward movement of the pipelines would be expected.
The remaining surface laid tie-in spools and pipeline sections, their associated stabilisation features (mattresses and grout bags) will be removed, returned to shore, and recycled.	Surface laid tie-in spools, platform approach pipeline sections and pipeline stabilisation features removed, returned to shore, and recycled. Pipeline sections and pipeline stabilisation features under rock dump to remain in situ. A single mattress at each cut end may also remain to prevent a snagging hazard if the cut end is exposed and not easily covered by the existing rock dump. The pipelines will be cut using either shear cutting or diamond wire cutting tools. The mattresses will be stacked subsea and bulk lifted to the deck of a Multi-Purpose Support Vessel (MSV) or DSV reducing the number of lifts required and the risk of break-up of individual mats during the recovery process.	Although the seabed will be temporarily disturbed by the recovery work, this option allows the seabed surface to be returned to its natural status, apart from in those areas where rock dump overlies the pipelines. The equipment and technologies required to recover and break up the materials are well known to the industry and are not technically challenging.

1.3.3 Project Schedule

EUL anticipates executing the Kilmar decommissioning activities between 2024 and 2029 An indicative schedule for the work is shown in Figure 1.2, which is subject to approval of the combined DP and unavoidable constraints such as contractor availability (e.g., vessel availability), as well as synergies with other operations for cost savings.

Figure 1.2. Indicative Kilmar Decommissioning Schedule



1.4 The Baseline Environment

An overview of the key environmental and societal features in the vicinity of the Kilmar infrastructure that may be affected by the proposed decommissioning works is provided in Table 1.4. This information has been compiled from a number of published sources, as well as data collected during the Kilmar pre-decommissioning environmental baseline and habitat assessment survey conducted in April 2023.

Table 1.4. Summary of Environmental and Societal Features in the vicinity of the Kilmar Infrastructure

Feature	**Description**
Physical Features	
Location	The Kilmar NUI is located within UKCS Block 43/22a, approximately 94 km east northeast from Flamborough Head on the Yorkshire coast and 95 km west southwest of the UK / Netherlands median line. The Kilmar pipelines also cross UKCS Block 43/22 and 43/24 (to Trent). The Trent platform is located in UKCS Block 43/24, approximately 116 km east from Flamborough Head, and 72 km west southwest of the UK / Netherlands meridian line
Bathymetry	Water depth along the proposed pipeline route varies between 40.9 metres and 56.7 metres and is approximately 48.1 metres at the Trent Compression platform location and 54.8 metres at the Kilmar NUI location.
Seabed Sediments	Surface sediments within the Kilmar survey area were dominated by the sand fraction, with a low total organic carbon content and varying proportion of fines. One station, ST05 (125m SE of the platform) displayed evidence of a low toxicity oil based mud and had higher concentrations of all metals, although there was no evidence of this effecting macrofaunal communities. Along the pipeline route the seabed is also predominately sandy with loose sand in the upper metre, lying on dense silty sand.
Oceanography	Tides in the SNS are predominately semi-diurnal and tidal waters offshore in this area of the SNS flood southwards and ebb northwards. Surface tidal streams in the vicinity of the Kilmar infrastructure are a maximum of 0.25 and 0.19 m/s respectively for spring and neap tides and the annual mean significant wave height ranges from 1.51 m to 1.80 m.
Meteorology	Winds in this region of the SNS are generally from between south and north-west. From July to September south-westerly winds dominate. Wind strengths are generally between Beaufort scale 1- 6 (1 – 11 m/s) in the summer months, with a greater proportion of strong to gale force winds of Beaufort scale 7 – 12 (14 – 32 m/s) in winter.
Biological Sensitivities	
Marine Protected Areas (MPAs)	The Kilmar infrastructure lies within the boundary of one marine protected area (MPA), the Southern North Sea Special Area of Conservation (SAC), designated for protection of harbour porpoise. There is one other MPA located within 40 km of the proposed decommissioning work, the Dogger Bank SAC, designation for the protection of the Annex I habitat ‘sandbanks which are slightly covered by seawater all the time’. In addition, the Greater Wash SPA, which lies along the adjacent coastline approximately 92 km from the Kilmar platform at the closest point, has also been scoped into the assessment as vessels transiting through this site on the way to the Kilmar location have the potential to disturb overwintering birds (red-throated diver and common scoter
Plankton	The phytoplankton community in the Regional Sea 2 area is dominated by the dinoflagellate genus *Tripos (T. fusus, T. furca, T. lineatus)* along with higher numbers of the diatom, *Chaetoceros* (subgenera *Hyalpchaete* and *Phaeoceros*) than are typically found in the northern North Sea. The zooplankton community is dominated by copepods including *Calanus helgolandicus* and *C. finmarchicus* as well as *Paracalanus* spp., *Pseudocalanus* spp., *Acartia* spp., *Temora* spp. and cladorcerans such as *Evadne* spp.
Seabed Communities	The sediment type identified during the 2023 pre-decommissioning survey has been classified as the EUNIS biotope complex ‘Faunal communities in Atlantic offshore circalittoral sand’ (MD521), which is included within the UK Biodiversity Action Plan priority habitat and habitat Features of Conservation Interest (FOCI) ‘subtidal sands and gravels’. Benthic epifauna was generally sparsely distributed and consisted of starfish *Asterias rubens*, *Astropecten irregularis* and *Luidia sarsii* and hermit crabs (Paguridae). Analysis of sediment macrofauna from the 2023 survey found that the macrofaunal community was relatively homogenous across the survey area. The most dominant taxa were echinoderms, annelids and molluscs. The taxa encountered in the current survey were considered representative of a background SNS community. There was no evidence of biogenic or rocky reefs within the survey area. Reef forming taxa were not observed in the macrofaunal data.

Feature	Description
Fish	Species likely to spawn within the vicinity of the Kilmar infrastructure include cod, herring, lemon sole, mackerel, *Nephrops*, plaice (high intensity spawning ground), sandeel (high intensity spawning ground), sole, sprat and whiting. The location is also likely to be a nursery ground for anglerfish (white monkfish), blue whiting, cod, European hake, herring, *Nephrops* lemon sole, ling, mackerel, sandeels, sprat, spurdog and whiting (high intensity nursery). Juvenile fish more likely to be found in the area include herring, horse mackerel and haddock.
Seabirds	The offshore waters of the SNS are visited by seabirds, mainly for feeding purposes in and around the shallow sandbanks. The most abundant species present are guillemot in the breeding season, kittiwake over winter, and guillemot during the post breeding dispersal period. The following species have previously been recorded as present on the Kilmar platform during maintenance visits: 6 x herring gulls in March 2023; 3 x herring gulls in February 2023; 40 x herring gull in September 2022; 200 x gulls, 100 x kittiwake, 2 x sparrow hawk, 1 x kestrel in August 2022; 20 x herring gull and 5 x kittiwakes in June 2022 and 5 x herring gull in March 2022. No nests were observed during any of these visits.
Marine Mammals	Harbour porpoise and white-beaked dolphin are considered to be regularly occurring in the SNS and both species have been observed in the vicinity of the Kilmar infrastructure. Minke whale is also a frequent seasonal visitor. The Kilmar platform is located within the northern two thirds of the SNS SAC which is recognised as important for harbour porpoises during the summer season (April to September). The at-sea distribution of grey seal and harbour seal in the vicinity of the Kilmar infrastructure is moderate to high (between 0.00501-0.05% of the population per 25 km^2) and low (< 0.001 % of the population per 25 km^2), respectively.
Societal Aspects	
Fisheries	The Kilmar infrastructure is located within ICES Rectangles 37F1. Fishing effort within ICES Rectangle 37F1 is low, with an average of 63 days fished per year between 2018 and 2022. Fishing effort is highest in May and August, but a deceasing trend has been seen between 2018 and 2022. The mean annual fish landings (by weight) between 2018 and 2022 was 310 tonnes, with a mean value of £579,152. The annual value (£) of fisheries in ICES Rectangle 37F1 has decreased substantially between 2018 and 2022. Landings data demonstrate that catches within the time frame (by weight) are largely composed of shellfish (69%), followed by demersal species (31%). The most frequently caught species are crabs (702 tonnes), sandeels (235 tonnes) and whelks (178 tonnes).
Shipping	Shipping activity is relatively low in the vicinity of the Kilmar infrastructure, predominantly comprised of cargo ships and offshore support vessels.
Oil and Gas Activity	The Kilmar field is located within a mature gas province with a comprehensive network of typically unmanned installations, larger processing hubs and associated interfield and export pipelines.
Offshore Renewables & CCS Activity	The closest windfarm to the Kilmar platform is the Hornsea Project Four (Operator: Ørsted) which is in the consented stage, located approximately 12 km to the south west of the Kilmar NUI. The operational Hornsea Project Two wind farm turbine area (Operator: Ørsted Hornsea) is located approximately 32 km south of the Kilmar platform. Additionally, the operational windfarm is the Hornsea Project One (Operator: Ørsted) is located approximately 43 km southeast from the Kilmar platform and 39km from the Kilmar pipelines at its nearest point. The Dogger Bank Southwest and Southeast sites (Operator: RWE Renewables) located 30 km north and 34 km northeast respectively of the Kilmar platform are in the pre-planning application phase. The consented Dogger Bank export cable is located 45 km northwest to the north of the Kilmar NUI at its closest point. UKCS Blocks 43/22, and 43/24 lie within the Endurance Carbon Capture and Storage (CCS) licence which is owned by BP Exploration Operating Company Limited. The Kilmar and Trent infrastructure additionally lies within a carbon storage licence area offered for application (SNS Area 1). The Trent platform and Kilmar pipelines lie within CS006, a current UKCS License Block.
Military activities	The Kilmar infrastructure is located within an area designated as a Ministry of Defence Royal Airforce Practice and Exercise Area.

Feature	Description
Wrecks	No protected wrecks or non-designated wrecks are located in the vicinity of the Kilmar infrastructure. Two wrecks classified as dangerous lie within the 40 km vicinity of Kilmar; one is 24km southwest of the Kilmar NUI at a depth of 33 m, the other is 30 km north of the Kilmar NUI at a depth of 31 m. Both wrecks are always submerged
Cables	The disused 'UK-GERMANY 6 telecom cable (Operator: TAMPNET) is located 46 km north northeast of the Kilmar NUI
Aggregate and Dredging Activity	There are no aggregate or dredging areas within 40 km of the Kilmar infrastructure.

1.5 Impact Assessment

1.5.1 Environmental Impact Identification

In order to identify the potential environmental issues and impacts on the marine environment, which may arise from the proposed Kilmar decommissioning activities (both from planned (routine) activities and unplanned (accidental) events), the WPRL decommissioning team, as previous Field Operators, undertook a preliminary scoping exercise.

The scoping exercise identified that the following sources of impact could potentially result in significant environmental effects and were therefore subject to comprehensive assessment, along with the potential for transboundary and cumulative impacts:

- Physical presence;
- Seabed disturbance;
- Underwater noise.

In addition, as the Kilmar infrastructure is located within the boundary of the SNS SAC, an assessment was undertaken to determine whether there will be any likely significant effects on the conservation objectives of this MPA as a result of the proposed Kilmar decommissioning activities, either alone or in-combination with other plans or projects. The Greater Wash SPA, which lies along the adjacent coastline approximately 92 km from the Kilmar platform at the closest point, has also been scoped into the assessment as vessels transiting through this site on the way to the Kilmar location have the potential to disturb the qualifying features of this site, namely overwintering birds (red-throated diver and common scoter).

A summary of the results of the comprehensive assessment is provided in Section 1.5.2.

The following sources of impact were not considered to result in significant environmental effects and were therefore scoped out from detailed assessment:

- Energy use and atmospheric emissions;
- Waste management;
- Marine discharges;
- Accidental events.

The justification for this is provided in Table 1.5 below.

Table 1.5. Justification for Aspects Scoped out from Comprehensive Assessment

Aspect	Justification
Energy Use and Atmospheric Emissions	Atmospheric emissions will be produced during the proposed Kilmar decommissioning activities as a result of the fuel consumed by offshore vessels, diesel-powered equipment and generators. It is predicted that these emissions will only result in localised and short term impacts on air quality, with prevailing metocean conditions expected to lead to the rapid dispersion and dilution of the emissions. The contribution to UKCS and global atmospheric emissions will be negligible.
Marine Discharges	Routine marine discharges from the vessels proposed to be used to decommission the Kilmar infrastructure will not result in significant environmental effects on the marine environment. Food waste will be macerated to increase the rate of dispersion and biodegradation at sea and waste water will be treated appropriately before being discharged to sea, in accordance with the requirements of the MARPOL convention. Ballast water discharges will be in accordance with the International Maritime Organisation Ballast Water Management Convention. As the export pipeline and service pipeline will be flushed and depressurised as part of the preparatory works, any release of residual chemicals / condensate during pipeline cutting operations will be minimal and is anticipated to dissipate before it reaches the surface with no long-term persistence expected. It is acknowledged that as the pipelines will be decommissioned in situ they will degrade overtime and contaminants contained within the pipeline material (e.g. coating) may be released into the marine environment. However, any releases are expected to occur in very small quantities, over a long period of time. Additionally, since the pipelines are fully trenched and buried, the pathway for contaminant releases will be limited.
Waste Management	The impacts of waste management are largely onshore and therefore outside the scope of the EA; however, EUL will ensure: • The principles of the Waste Management Hierarchy are followed, focusing on the reuse and recycling of wastes where possible; • Licensed waste contractors will be used; • A project Waste Management Plan will be in place to ensure compliance with relevant waste regulations; • Good housekeeping standards will be maintained on board all vessels; • Any waste disposed of outside of the UK will be in accordance with the Transfrontier Shipment of Waste Regulations 2007; • If NORM is encountered, WPRL will ensure appropriate Radioactive Substance Regulation (RSR) permits are in place; • Marine growth will be removed by high pressure cleaning offshore, only where necessary and practicable, with the majority of marine growth removed onshore at a dismantling yard, with appropriate odour control measures implemented.
Accidental Events (accidental releases and dropped objects)	Prior to the proposed decommissioning activities commencing, the Kilmar facilities will be made hydrocarbon free (HCF). As such, the source of a worst case accidental release of hydrocarbons to sea will be from the loss of diesel inventory from a vessel used during the decommissioning activities in the unlikely event of a collision. However, diesel is a light oil, containing a large percentage of light and volatile compounds. Once spilt diesel is likely to remain on the sea surface and be subject to high rates of evaporation. It is therefore not expected to persist in the marine environment for a prolonged period of time. The risk of collision is considered low as the majority of vessels required for the proposed decommissioning activities will be present on location within the existing 500m safety exclusion zone surrounding the Kilmar and Trent platforms. An approved OPEP will be in place prior to the proposed Kilmar decommissioning activities commencing and any spills from vessels in transit or working outside of existing 500m zones are covered by separate Shipboard Oil Pollution Emergency Plans (SOPEPs). The proposed Kilmar decommissioning activities require the use of subsea hydraulic cutting tools and ROVs that could fail and result in a release of a small number of litres of hydraulic fluid into the marine environment. However, in the event this did occur, it is anticipated that the hydraulic fluid would be rapidly dispersed in the marine environment given the highly dynamic nature of the area. To minimise the risk of a release, appropriate maintenance and pre-use checks on hydraulic equipment and ROVs will be undertaken. Where possible equipment with automatic hydraulic shut-off will be used to minimise the volume of fluid released in the event of a hydraulic line failure. Dropped object procedures are industry-standard and will be employed throughout the proposed operations. Post-decommissioning debris clearance surveys will aid in the identification of any dropped objects should they occur.

1.5.2 Summary of Assessment Results

1.5.2.1 Physical Presence

The majority of vessels utilised for the proposed decommissioning activities will be present on location within the existing 500 m safety exclusion zones surrounding the Kilmar and Trent platforms. These zones are clearly marked on navigation charts and have been in place for a number of years. If an anchored LV is used to remove the platform, the anchor lines are likely to extend outside the exclusion zone, although this should not present a significant hazard to shipping or fishing vessels as vessels are unlikely to transit immediately adjacent to an existing exclusion zone. Activity outside the existing exclusion zones will represent a short-term increment in vessel presence over that which the area normally receives and it is not considered that this will result in a significant effect on other sea users. In addition, once the Kilmar platform has been removed, the 500 m safety exclusion zone surrounding the platform will be withdrawn. This will result in a positive impact as an area of circa 0.79 km^2 will be made available to other sea users.

The potential for significant impacts to other sea users is therefore limited to the risk of fishing gear snagging on infrastructure that is being decommissioned in situ. To minimise the risk of snagging, EUL is proposing to remove any exposed subsea infrastructure. The majority of the pipelines are currently buried to a depth well in excess of 0.6 m and no pipeline exposures have been seen in any of the operational surveys. The rock which has been deposited along the pipelines is very stable and there has been no migration due to seabed currents or fishing activity over the area. As the pipelines will be left in situ in a flooded condition no upward movement is expected. As such, the residual risk to commercial fishing from the legacy of infrastructure decommissioned in situ, namely the pipelines and associated stabilisation material is therefore predicted to be Low and not significant.

Prior to removal, the physical presence of the Kilmar platform has the potential to provide nesting habitat to breeding seabirds, which forage in the SNS. There is no history of nesting seabirds on the platform; however, the presence of nesting seabirds during the breeding season in future years cannot be ruled out. EUL will continue to check for the presence of nesting birds on scheduled routine visits to the platform. It is acknowledged that it is an offence to deliberately disturb wild birds or take, damage or destroy the nest of any wild bird while that nest is being used or built or take or destroy an egg of any wild bird. Therefore, if the topside is to be removed during the breeding season, data will be reviewed to confirm the absence of nesting birds and, if considered necessary, the platform will be checked by a qualified ornithologist prior to removal. As there is not a history of nesting birds on the Kilmar platform no significant impacts are predicted; however, if nesting birds are observed, OPRED will be consulted to ascertain if it is possible for a Wild Birds Licence to be granted to allow the works to go ahead.

1.5.2.2 Seabed Disturbance

It is estimated that the total area of seabed likely to be disturbed by the proposed decommissioning activities is ca. 78,961 m^2 (ca. 0.076 km^2). Of this total 62,961 m^2 (0.06 km^2) will result in a temporary disturbance and ca. 16,000 m^2 (0.016 km^2) will result in a permanent disturbance.

The majority of the temporary disturbance will be as a result of anchoring of the LV during removal of the platform, footprint of the jack-up vessel used to P&A the wells, and removal of the surface laid pipeline sections / tie-in spools, including the mattresses and grout bags at the approaches to the Kilmar and Trent platforms. The jacket legs will be cut internally, to avoid any additional seabed disturbance from external excavation activities.

Physical disturbance of the seabed can cause displacement or mortality of benthic species, such as sessile organisms, that are unable to move out of the impacted area. However, due to the transient nature of the operations, it is expected that recovery of the affected areas will be relatively rapid once the proposed activities have been completed. Removal of the Kilmar infrastructure will also facilitate the restoration of the seabed back to its natural state.

During the proposed decommissioning activities there will be a temporary increase in turbidity through sediment resuspension resulting in smothering of some sensitive benthic species.

However, the Kilmar infrastructure is located within a highly dynamic area with strong near-seabed currents and highly mobile sediments and, as such, the fauna found here are robust infauna that are adapted to frequent disturbances and natural fluctuations in sediment loading and resuspension.

In addition, there will be a legacy impact in an area of seabed totalling ca. 2,790 m^2 (ca. 0.003 km^2) as result of rock dump along the pipelines which will be decommissioned in situ, as well as any mattresses redeployed to cover the cut pipeline ends, if exposed at the seabed. There will also be a permanent impact in the event rock dump is required to be deposited on the seabed to mitigate scour, which will impact an area of ca. 16,000 m^2 (0.016 km^2). The hard substrate will permanently change the habitat type and associated fauna present; however, the scale of the impact is Negligible considering the very large extent of sandy seabed available in the SNS.

In all cases, the scale of changes to the seabed and its fauna are such that effects on higher trophic levels (e.g. fish and marine mammals), and any related effect on species of commercial interest are Negligible.

In summary, based on the nature of the seabed habitats and species present in the vicinity of the Kilmar infrastructure and the comparatively small area of seabed that will be impacted by the proposed decommissioning activities, residual effects on seabed communities are predicted to be Minor to Negligible and not significant.

1.5.2.3 Underwater Noise Emissions

Vessel operations (in particular the use of dynamic positioning systems) have been identified as the primary sources of underwater noise that will arise from the Kilmar decommissioning operations. The cutting tools used to sever the Kilmar infrastructure are unlikely to result in sufficient levels of noise to cause significant disturbance to marine fauna.

There is potential for fish to be disturbed by the continuous underwater noise emissions generated from the decommissioning vessels, leading to temporary displacement from the area. Demersal spawning species that spawn on specific habitat substrates, such as herring and sandeels, are particularly vulnerable to disturbances. However, given the relatively high level of shipping traffic in this area of the SNS, the additional underwater noise generated by the decommissioning vessels is likely to be insignificant.

The underwater noise emissions generated during the proposed Kilmar decommissioning activities are not predicted to result in injury to marine mammals, but do have the potential to cause disturbance, although any displacement from the area will be localised and temporary.

In summary, there is no evidence to suggest that the underwater noise emissions generated during the proposed Kilmar decommissioning activities would result in injury or significant disturbance to marine fauna. Although there is potential for some behavioural disturbance, any impacts will be localised and temporary. Residual effects are therefore predicted to be Negligible and not significant.

1.5.2.4 Transboundary Impacts

The Kilmar platform is located approximately 95 km west of the UK / Netherlands median line. Impacts arising from emissions, discharges and seabed disturbance generated as a result of the proposed decommissioning activities are predicted to be highly localised and are therefore not expected to result in any significant transboundary impacts. If it is decided to utilise disposal options outside of the UK, EUL will ensure regulations governing transfrontier shipment of waste are complied with.

1.5.2.5 Cumulative Impacts

Cumulative impacts may arise from incremental changes caused by other past, present or reasonably foreseeable projects/proposals together with the proposed Kilmar decommissioning activities. However, as any impacts arising from the proposed Kilmar decommissioning activities will be localised and not significant, no significant cumulative effects on marine receptors are predicted.

1.5.2.6 Marine Protected Areas

The Kilmar infrastructure is located within the boundary of one marine protected area (MPA), the SNS SAC designated for the protection of harbour porpoise. Kilmar is located within the northern two thirds of the SAC which is recognised as important for harbour porpoises during the summer season (April to September).

The underwater noise emissions generated during the proposed Kilmar decommissioning activities are not predicted to result in injury to harbour porpoise. While sound from the decommissioning vessels in particular may result in temporary behavioural impacts on a small number of harbour porpoise, significant adverse effects at the population level are not anticipated.

The majority of disturbance to the seabed habitat that could affect the prey of the harbour porpoise or their prey within the SAC will be localised and temporary. It is acknowledged that there will be a permanent loss of ca. 0.019 km^2 of habitat within the SAC due to the decommissioning in situ of the protection material (rock) along the pipeline route and in the event rock dump is required to be deposited on the seabed to mitigate scour. However, the area impacted is extremely small compared to the extent of habitat in the wider SNS SAC, approximately 0.00005% of the total area of the SAC and is not predicted to impact on harbour porpoise or their prey. Of note, infill of the rock dump areas with natural seabed sediments and flora has been observed during the operational life of the Kilmar pipelines.

The Greater Wash SPA, which lies along the adjacent coastline approximately 92 km to the south west of the Kilmar platform, has also been scoped into the assessment as vessels could be transiting through this site on the way to the Kilmar location. The SPA is designated for the protection of red-throated diver, common scoter, and little gull during the non-breeding season, and for breeding Sandwich tern, common tern and little tern. Of the bird species present within the SPA, common scoter and red-throated diver are vulnerable to disturbance by boats and large aggregations of these species are present within the SPA between November and March. In contrast, little gull and tern species are generally tolerant of vessel activity.

Based on the distribution of red-throated diver and common scoter within the SPA, red-throated diver are most at risk of displacement, albeit temporarily, if vessels mobilise or demobilise from either Hull, Great Yarmouth or Lowestoft. To minimise disturbance, WPRL therefore proposes to implement the following mitigation measures:

- Restricting, to the extent possible, vessel movements within the Greater Wash SPA to existing navigation routes when transiting to / from the Kilmar location;
- Maintaining direct transit routes;
- Avoiding over-revving of engines;
- Briefing vessel crew on the purpose and implications of vessel management practices within the Greater Wash SPA.

It should be noted that the Dogger Bank SAC, designated for the protection of the Annex I sandbanks which are slightly covered by seawater all the time, has been screened out of assessment given that it is located approximately 9 km to the north-east of the Kilmar pipelines and 19 km from the Kilmar platform at its closest point.

Given the above, the EA concluded that the proposed Kilmar decommissioning activities will not have an adverse effect on the integrity of the MPAs either alone or in-combination with other plans or projects.

1.6 Conclusions

The EA has confirmed that the combined Kilmar Field Installation and the Kilmar Pipelines DP can be executed with no significant adverse effects on the marine environment.

An initial screening of the potential impacts to environmental and societal receptors from the proposed Kilmar decommissioning activities concluded that the only aspects considered to be potentially significant and therefore requiring further assessment were physical presence, seabed disturbance and underwater noise. However, following further assessment and upon implementation of the identified mitigation measures, it has been concluded that no significant residual effects are predicted to occur, with the majority of impacts being localised and temporary in nature.

Of note is that the Kilmar infrastructure lies within the boundary of the SNS SAC. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of this marine protected area as a result of the proposed Kilmar decommissioning activities, either alone or in-combination with other plans or projects.

EUL operates under an integrated Safety and Environmental Management System (SEMS) and has established contractor selection and management procedures. As a number of contractors will be involved in the detailed planning and execution of the proposed Kilmar decommissioning activities, EUL will produce a SEMS interface document for the project to help ensure the identified mitigation and control measures are successfully implemented.

2 Introduction

2.1 Background

Energean UK LTD (EUL) is the Licence Operator of the Kilmar gas field, located in United Kingdom Continental Shelf (UKCS) Block 43/22a in the SNS. The Kilmar NUI is located approximately 94 km east of Flamborough Head on the East Riding of Yorkshire coast and approximately 95 km west of the UK/Netherlands transboundary line.

The Kilmar Field Operator is EUL. The appointed Installation and Pipelines Operator is ODE Asset Management and the appointed Well Operator is Exceed Torridon Limited. WPRL has a 17% equity interest in Kilmar, Energean UK Limited has a 68% equity interest and RockRose (UKCS3) Limited has a 15% equity interest.

The development consists of a NUI with 3 wells, tied back to the PUK owned and operated Trent platform complex. The wells are completed with dry production trees and the pipeline systems run between the riser isolation valves on the topsides of the Trent and Kilmar installations. Kilmar also received gas from the Garrow field and Garrow gas was comingled with Kilmar gas and exported onward to the Trent platform complex.

Since first gas in 2006, production from Kilmar has been gradually declining and ceased in June 2020 when PUK closed the Kilmar export route at Trent. The remaining reserves in Kilmar are not thought sufficient to support an investment to return the facilities to production and cover the costs of an alternative export solution. WPRL, as previous Field Operator therefore submitted a CoP notification to the NSTA, declaring CoP on the 2nd June 2020.

2.2 Overview of the Kilmar Infrastructure

The field was discovered in 1992 by appraisal well 43/22-1 and confirmed in 1994 by a second appraisal well 43/22-2. Three producing wells have been drilled to develop the Kilmar Field. The two suspended appraisal wells 43/22-1 and 43/22-2 were re-entered, and side tracked in 2006, production wells 43/22a-K1w (K1) and 43/22a-K2x (K2) respectively, a third new production well 43/22a-K3 (K3) was drilled in 2007.

Prior to drilling the production wells a small steel platform, designated as a NUI, was installed in 2005. It comprises of a fixed steel jacket weighing 1,425 tonnes which is in 54.8 m of water and single topside weighing 450 tonnes. Details of the Kilmar platform, as shown in Figure 2.1, are provided in Table 2.1.

Table 2.1: Kilmar Platform Details

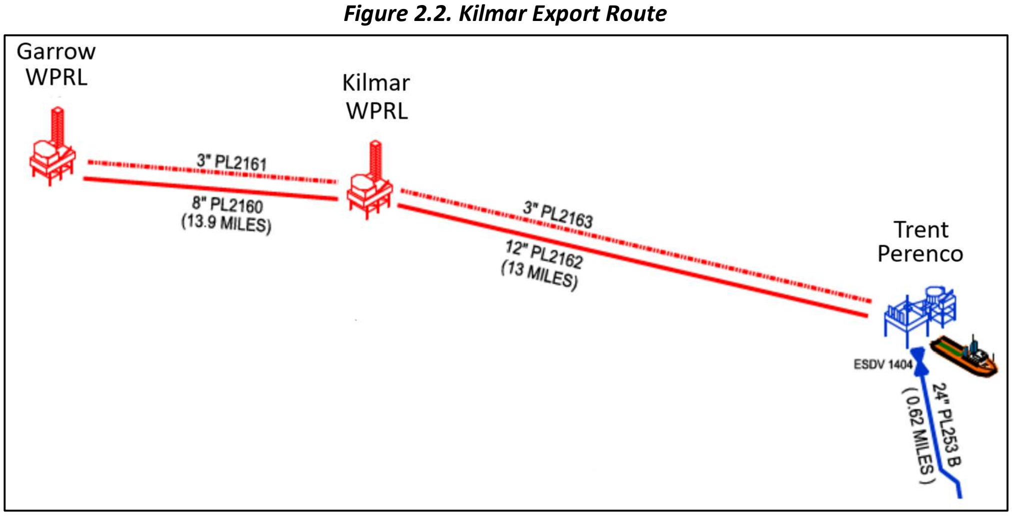
Platform Type	Water Depth (m)	Location (WGS84)	Topside		Jacket Weight			
			Weight (t)	No. of modules	Weight (t)	No. of legs	No. of piles	Weight of piles (t)
Small Steel Platform	54	54° 17' 26.22" N 01° 20' 10.35" E	450	1	1,425	4	8	762

Gas from Kilmar was exported to the Trent Compression Platform via 12", 21.26 km long export pipeline (PL2162). Gas was then further exported from Trent via the Esmond Transmission System (ETS) pipeline to the Bacton Gas Terminal (BGT). Monoethylene Glycol (MEG) for hydrate and corrosion inhibition was supplied from Trent to Kilmar via a 3" service pipeline (PL2163) (Figure 2.2).

The Kilmar pipelines are of a welded carbon steel pipeline construction. Neither pipelines are concrete coated but are corrosion coated with 3 layer polypropylene (3LPP) for the majority of their lengths. The 3" service pipeline (PL2163) was installed simultaneously to the larger export pipeline (PL2162) as a piggyback and lies within the same protection trench for the majority of the route. The pipelines were trenched and backfilled to 1.5 - 1.8m below seabed. There are no upheaval buckling rock dump locations along the pipeline routes. Sufficient backfill was put in place to prevent any upward pipe movement during operational conditions.

Figure 2.1. The Kilmar Platform

Figure 2.2. Kilmar Export Route



There is one crossing of the TotalEnergies Offshore UK Limited operated 34" SEAL pipeline (PL1570) along the route of the Kilmar pipelines, 5.3 km from the Kilmar platform. At the crossing location the PL2162 and PL2163 pipelines were laid over pre-installed mattress bridges to ensure separation between the two pipeline systems. This section of the Kilmar pipelines was subsequently left untrenched and the exposed lengths of pipelines were rock dumped over approximately 193 m.

The pipeline spool sections at the Trent and Kilmar approaches are laid on the seabed surface and protected with concrete mats. At the riser to spool goose necks the pipelines were indicated to have fronded mats placed underneath the goose necks, however, the latest inspection surveys show no indication of these mats below the pipelines. Beyond the spool sections running away from the platform, there are short section of the pipelines (ca. 35 m at Trent, ca. 40 m at Kilmar) that are also laid on the seabed and protected with concrete mats. At each platform approach where the mat protection ends on the outboard side from the platforms, the pipelines have been rock dumped to provide a minimum of 0.8 m cover. This continues for ca. 100 m through the pipeline trench transitions where the pipelines are then buried and backfilled. The pipeline stabilisation features are summarised in Table 2.2.

Table 2.2. Kilmar Stabilisation Material Details [1]

Stabilisation Feature	No.	Weight	Location	Status
Concrete mattresses (6m x 4 m x 0.15m)	29	Various: ~ 6.2 tonnes each	Along PL2162 and PL2163. 14 within the Kilmar 500m safety zone. 13 within the Trent 500m safety zone. 2 at the SEAL pipeline crossing, under rock dump in-between the SEAL & Kilmar pipelines	Exposed at the platform approaches with 2 partially rock dumped at the trench transitions
Grout bags	~ 200	25 kg each	Various buried and exposed around the concrete mattresses and riser goose necks	Majority at the riser goose necks, others occasionally around the concrete mattresses
Rock dump (Kilmar)	1 location	~ 850 tonnes	1 location. 100m of rock stabilisation through trench transition zone. Rock berms typically 8m wide	Exposed
Rock dump (Trent)	1 location	~ 850 tonnes	1 location. 100m of rock stabilisation through trench transition zone. Rock berms typically 8m wide	Exposed
Rock Dump (SEAL crossing)	1 location	~ 2650 tonnes	~193m of rock stabilisation over the crossing location	Exposed

[1] The Kilmar pipeline tie-in spools and associated mattresses within the Trent 500m safety zone will be decommissioned as part of EUL Kilmar decommissioning programmes.

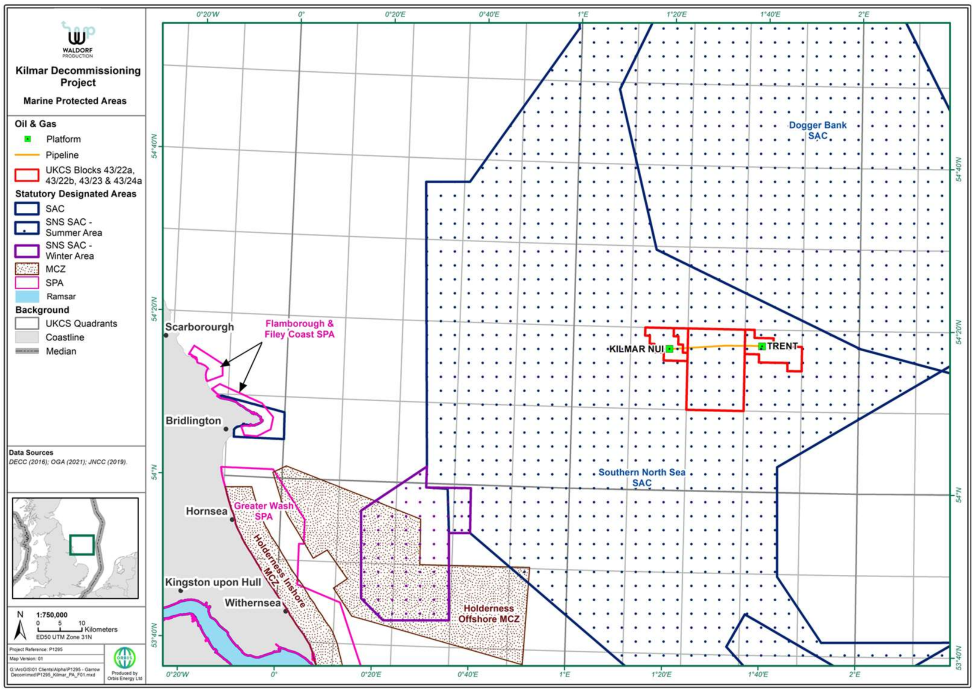
At the Trent installation the Kilmar pipelines will be decommissioned up to the first riser elbow flanges approximately 2m above seabed. The Kilmar risers on the Trent platform are owned by PUK who will decommission them as part of the Trent decommissioning programme. The Kilmar pipeline tie-in spools and associated mattresses within the Trent 500m safety zone will be decommissioned as part of EUL Kilmar decommissioning programmes.

The Garrow risers on the Kilmar Installation and the Garrow pipeline tie-in spools and associated mattresses within the Kilmar 500m safety zone will be decommissioned at the same time as the EUL Kilmar decommissioning programmes. The Kilmar and Garrow facilities have the same Section 29 Notice Holders.

A 34" SEAL pipeline (PL1570) crosses under the Kilmar pipelines 5.3 km from the Kilmar platform. The pipeline is owned by TotalEnergies Offshore UK Limited and is not affected by Kilmar decommissioning.

Note, the Kilmar platform and the pipeline route to Trent are located within the boundary of the SNS SAC, designated for the protection of harbour porpoises (see Figure 2.3 and Section 4.2.6 for further details).

Figure 2.3. Location of Kilmar Infrastructure and Marine Protected Areas



2.3 Regulatory Context

The Petroleum Act 1998 (as amended by the Energy Act 2008 and 2016) is the principal legislation governing decommissioning in the UKCS. The responsibility for ensuring the requirements of the Petroleum Act are complied with rests with OPRED, which sits within the Department for Energy Security & Net Zero (DESNZ).

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

OPRED is also the competent authority on decommissioning in the UK for OSPAR (international regulations) purposes. OSPAR decision 98/3 specifically prohibits the dumping or leaving in place of installations in the marine environment and requires that the topsides of all installations must be returned to shore and all steel installations with a jacket weight less than 10,000 tonnes in air, which is the case for the Kilmar platform, must be completely removed for re-use, recycling or final disposal on land.

OSPAR decision 98/3 does not include the decommissioning of pipelines, and there are no international guidelines on the decommissioning of disused pipelines. However, the Petroleum Act and Pipeline Safety Regulations 1996 provide a framework for the safe decommissioning of disused pipelines. Due to the recognition that each pipeline may have its own specific characteristic and be situated in varying environmental conditions, the OPRED decommissioning guidelines (OPRED, 2018) require all feasible pipeline decommissioning options to be considered and a 'Comparative Assessment' made of the available options.

The Marine Coastal Access Act 2009 introduced a number of measures to deliver the United Kingdom Government's vision of "clean, healthy, safe, productive and biologically diverse oceans and seas", including the introduction of marine plan areas. The Kilmar installation and pipelines lie within the East Offshore Marine Plan area. EUL considers that the proposed Kilmar decommissioning activities are in broad alignment with the objectives and policies of the plan (see Appendix A).

2.4 Scope and Purpose of this Environmental Appraisal Report

This EA report has been written by WPRL as previous Field Operator to support the combined Kilmar Field Installation and Pipelines DP and has been prepared in accordance with the regulatory guidelines (OPRED, 2018). It sets out to describe, in a proportionate manner, the potential environmental and societal impacts resulting from the decommissioning of the Kilmar installation and pipelines and demonstrate the extent to which these impacts will be mitigated and controlled to an acceptable level.

Well plug and abandonment and the flushing and cleaning operations that will be undertaken on the topside and pipelines as part of the preparatory work preceding the proposed decommissioning activities are outside the scope of this EA report and will be consented under appropriate environmental permits and consents submitted via the Portal Environmental Tracking System (PETS).

3 Project Description

3.1 Proposed Decommissioning Solution

EUL is proposing to completely remove the Kilmar platform (topside and jacket) and recover to shore, as described in Table 3.1. A final decision on the removal method will be made following an engineering feasibility and commercial tendering process, but the options currently under consideration are discussed in Section 3.4.

Table 3.1. Summary of Decommissioning Solution for the Kilmar Platform

Installation	Proposed Decommissioning Solution	Reason for Selection
Topside	Complete removal followed by recovery to shore for re-use, recycling, and final disposal to landfill as appropriate. The topside will be made HCF, removed by a lift vessel and returned to shore. Re-use followed by recycle and then landfill will be the prioritised options for the topside.	Complies with OSPAR requirements and OPRED guidelines and maximises recycling of materials.
Jacket	Complete removal and re-use or recycle. Jacket will be removed and dismantled at an onshore location. Re-use followed by recycle will be the prioritised options. Jacket skirt piles will be severed at least 3 m below the seabed.	Leaves clear seabed, removes a potential obstruction to fishing operations and maximizes recycling of materials, to comply with OSPAR requirements and OPRED guidance.
Platform Wells	Plug and Abandonment (P&A) platform wells prior to platform removal in accordance with HSE 'Offshore Installations and Wells Design and Construction Regulations 1996' and 'OEUK Guidelines for the Suspension and Abandonment of wells Issue 7, November 2022'. Conductors will be cut a minimum of 3 m below the natural seabed level.	Meets HSE regulatory requirements and is in accordance with OEUK and NSTA guidelines.

For the remaining subsea infrastructure, namely the pipelines, associated tie-in spools and associated protective material, WPRL as previous Field Operator has undertaken a Comparative Assessment in order to arrive at an optimal decommissioning solution. The Comparative Assessment is described fully in the Kilmar Pipelines (PL2162 and PL2163) Decommissioning Options Comparative Assessment (WPRL, 2023). The selected decommissioning options derived from the Comparative Assessment, based on consideration of safety, environmental, technical, societal and economic factors, are summarised in Table 3.2. Further detail on the decommissioning activities associated with the subsea infrastructure is provided in Section 3.4.4.

Table 3.2. Summary of Decommissioning Solution for the Kilmar Subsea Infrastructure

Infrastructure	Proposed Decommissioning Solution	Main Reasons for Selection
Gas Export Pipeline (PL2162) Service Pipeline (PL2163)	Pipelines cleaned with main trenched and buried sections, including those sections protected by rock dump (including at the SEAL pipeline	The pipelines are already trenched and fully buried to a depth in excess of 0.6 m below the natural seabed and normally between 1.4 m and 1.8 m deep, with the exception of the pipeline approaches at the platform ends and the SEAL pipeline crossing. The Comparative Assessment (CA) concludes minimal seabed disturbance, lower energy usage and reduced risk to personnel is the practicable solution compared to complete removal. Water depth comparisons for the original as backfilled survey in 2005 and the most recent operational survey in 2022 show no

Infrastructure	Proposed Decommissioning Solution	Main Reasons for Selection
	crossing location), to be left in situ.	significant movement of the seabed throughout the pipeline routes. No pipeline exposures have been seen in any of the interim operational surveys in 2008, 2010, 2013 and 2016. In a flooded condition (as would be the decommissioned left in situ state) the pipelines are negatively buoyant and so no upward movement of the pipelines would be expected. Note, this option also requires no commercial agreements with the SEAL pipeline operator or risk to the 'live' SEAL pipeline as no work will be carried out within 200 m of the SEAL pipeline.
The remaining surface laid tie-in spools and pipeline sections, their associated stabilisation features (mattresses and grout bags) will be removed, returned to shore, and recycled.	Exposed tie-in spools and pipeline stabilisation features removed, returned to shore, and recycled. Tie-in spools and pipeline stabilisation features under rock dump to remain in situ. A single Mattress at each cut end may also remain to prevent a snagging hazard if cut end exposed and not easily covered by the existing rock dump. If any practical difficulties are encountered WPRL will consult OPRED.	To leave, as far as reasonably practicable, a clear seabed to comply with OSPAR requirements and OPRED guidance. Although the seabed will be temporarily disturbed by the recovery work, this option allows the seabed surface to be returned to its natural status, apart from in those areas where rock dump overlies the pipelines. The equipment and technologies required to recover and break up the materials are well known to the industry and are not technically challenging.

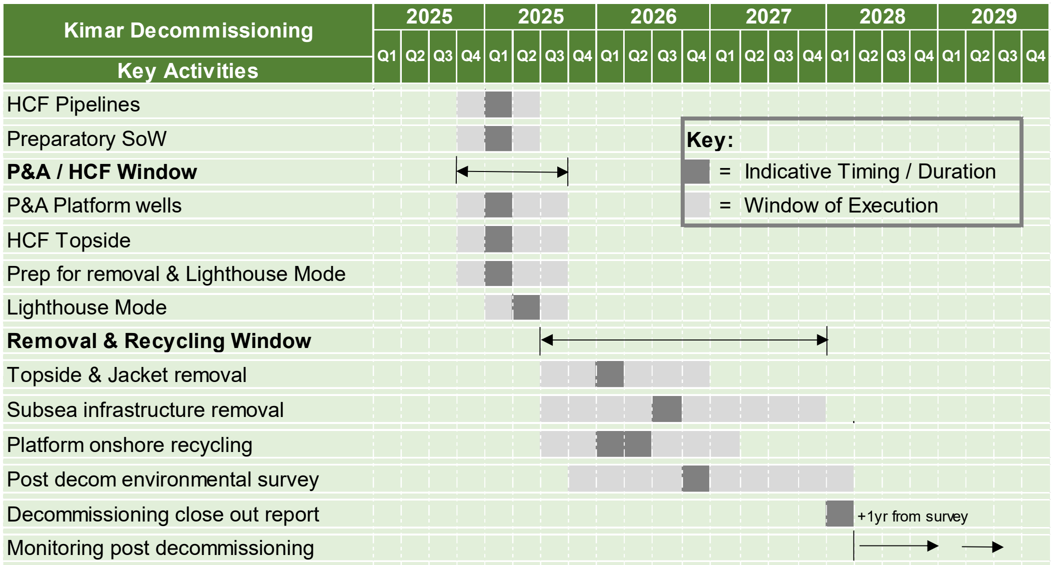
3.2 Potential for Alternative Uses

WPRL as previous Field Operator has explored alternative uses for the Kilmar facilities, using the pipeline as part of another project infrastructure, the use of one of the wells for carbon capture, utilisation, and storage (CCUS) monitoring, use of the platform as a bird sanctuary and relocation of the jacket and/or topside facilities, however, none of these were deemed viable. The platform equipment inventory will be assessed for use as spares for EUL's asset portfolio.

3.3 Project Schedule

EUL anticipates executing the Kilmar decommissioning activities between 2024 and 2029. An indicative schedule for the work is shown in Figure 3.1, which is subject to approval of the combined DP, changes in economics such as gas price which could extend the life of the field and unavoidable constraints such as contractor availability (e.g. vessel availability), as well as synergies with other operations for cost savings.

Figure 3.1. Indicative Decommissioning Schedule



A window has been programmed into the schedule in which a potential decommissioning contractor would be able to remove the platform and subsea infrastructure, following the initial preparation works to make the Kilmar infrastructure HCF. The preferred options will be to prepare the Kilmar jacket for lift, then a) collaborate with other decommissioning or installation projects to share costs, and /or b) to engage in dialogue with lift vessel owners and closely monitor for opportunities where a lift vessel has unplanned availability in the vicinity and can at short notice remove the Kilmar topside and jacket.

3.4 Decommissioning Activities

3.4.1 Preparatory Works

In preparation for removal of the Kilmar facilities, WPRL will undertake a series of preparatory works. These activities fall outside of the scope of the combined DP and this EA report and will be consented via appropriate environmental permits and consents under the OPRED PETS UK Energy Portal. These include the following hydrocarbon freeing activities:

- Topside will be cleaned, with the hydrocarbons (process fluids, fuels and lubricants) either injected into the platform wells or drained to tote tanks for transport and appropriate disposal onshore;
- Export pipeline and service pipeline will be cleaned. The lines will be depressured and flushed with filtered seawater, with the flushing fluids injected into a Kilmar well. Following cleaning the pipelines will be disconnected from Kilmar and Trent platforms;
- Platform wells will be P&A'd in accordance with HSE regulatory requirements and OEUK guidelines (vessels requirements for the P&A operations have been included in Table 3.4).

Once HCF, the Kilmar platform could enter a Lighthouse Mode phase. During this time, the platform will be equipped with solar powered aids to navigation and an automatic identification system (AIS) to mark the structure until such time as it is fully removed.

3.4.2 Topside Removal

The Kilmar topside structure comprises three levels with an ESDV deck underneath, weighs 450 Te and the primary structure measures 12.75m x 24.5m x 8.3m high.

A summary of the removal options under consideration by EUL for the Kilmar topside structure is provided in Table 3.3.

Table 3.3. Topside Removal Options

Option	Description
1. Single lift removal along with jacket using one of the following types of LV: Semi-Submersible Crane Vessel (SSCV), Monohull Crane Vessel (MCV) or Shear Leg Vessel (SLV)	Removal of topside and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
2. Single lift removal using a SSCV, MCV , SLV or JUWB	Removal of topside as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
3. Piece-small or piece large removal using a Jack-up Work Barge (JUWB)	Removal of topside in a series of smaller sub-units making use of the JUWB used for the well decommissioning activities, followed by recovery to shore for re-use, recycling or disposal as appropriate.

The preferred options will be to prepare Kilmar topside for lift, then a) collaborate with other decommissioning or installation projects to share costs, and / or b) to engage in dialogue with lift vessel owners and closely monitor for opportunities where a lift vessel has unplanned availability in the vicinity and can at short notice remove the Kilmar topside. These solutions could involve any of the lift vessel types.

A final decision on the topside removal method will be made following a commercial tendering process and OPRED will be notified. However, as a worst case scenario for assessment purposes, it is assumed the topside structure will be removed by an anchored LV, with eight-point mooring system. The LV will be towed to site using tugs and a separate Anchor Handling Vessel (AHV) will be used to moor the LV in place. An Emergency Response and Rescue Vessel (ERRV) will also be on location in the field. To separate the topside from the jacket an oxygen acetylene torch will be used. The LV will then lift the topside off and place it onto a barge, for transport to shore. The supporting barge will not be anchored but will either be tethered to the LV or to its towing tugs. Alternatively, the topside will be transported to shore on the LV.

In the event a JUWB is used, there is a remote possibility that rock may be required to be deposited to mitigate scour around the JUWB spud cans. However, no significant evidence of scour was observed when the Kilmar wells were initially drilled with a jack-up rig and significant scour has also not been found around the jacket during the operational life of the field. Notwithstanding this, as a worst case contingency scenario against scour either prior to or during the rig/JUWB decommissioning works, a total of up to 85,000 tonnes of rock could be required to be placed over an area of 16,000 m^2 adjacent to the existing jacket legs to prevent sinkage of the rig/JUWB legs into the seabed.

A summary of the vessel requirements for topside removal and their typical fuel consumption is provided in Table 3.4. In addition, although the well P&A activities fall outside of the scope of this EA report, for completeness, Table 3.4 also includes a summary of the vessel requirements for the proposed P&A operations (jack-up vessel, AHV and ERRV).

Table 3.4. Vessel Requirements for P&A Operations and Topside Removal

Vessel	Days on Location	Fuel Consumption Rate	Total Fuel Consumption
LV	2	30 tonnes per day	60 tonnes
AHV	9	15 tonnes per day	135 tonnes
Tugs x 2	5	25 tonnes per day	250 tonnes
Barge	5	25 tonnes per day	125 tonnes
ERRV	77	8 tonnes per day	616 tonnes
Jack-up Vessel	75	10 tonnes per day	750 tonnes

3.4.3 Jacket Removal

The Kilmar jacket weighs approximately 1,425 tonnes, excluding the weight of the eight piles, marine growth and lifting appurtenances. EUL proposes to remove the marine growth offshore, only where necessary and practicable, with the majority of marine growth brought back with the infrastructure and processed and disposed of onshore. The jacket has an 8” gas import riser, 12” gas export riser, 3” service (MEG import) riser, and 3” service (MEG) export riser.

A summary of the removal options under consideration by EULfor the jacket is provided in Table 3.5.

Table 3.5. Jacket Removal Options

Option	Description
1. Single lift removal along with topsides using a SSCV, MCV or SLV	Removal of topside and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
2. Single or double lift removal using a SSCV, MCV, SLV or JUWB	Removal of jacket as a single or double unit followed by recovery to shore for re-use, recycling, disposal as appropriate
3. Piece-small or piece large removal using JUWB	Removal of jacket in a series of smaller sub-units, followed by recovery to shore for re-use, recycling or disposal as appropriate.

The preferred options will be to prepare Kilmar jacket for lift, then a) collaborate with other decommissioning or installation projects to share costs, and /or b) to engage in dialogue with lift vessel owners and closely monitor for opportunities where a lift vessel has unplanned availability in the vicinity and can at short notice remove the Kilmar jacket. These solutions could involve any of the lift vessel types.

It is likely the jacket removal will be a reverse of its installation, two lifts. With the topside removed the piles will be internally cut 3.0m or greater below the seabed, slings attached, the jacket lifted and returned to shore for recycling. If any practical difficulties are encountered EUL will consult OPRED. A final decision on the jacket removal method will be made following a commercial tendering process.

EUL proposes to cut the piles internally using an abrasive cutting tool system. Before the cutting works can commence, the piles will be dredged to remove the soil inside the jacket skirts to a depth of ca. 4 m below the seabed to provide access for the abrasive cutting tool. The dredging tool will be deployed from a Diving Support Vessel (DSV) or JUWB and a remotely operated vehicle (ROV) will be used for assistance when running the dredging tool into the jacket sleeves. No dredging will occur around the exterior of the jacket and no explosives will be used.

For the purpose of this assessment, it is assumed the jacket will be removed by an anchored LV, with eight-point mooring system. The LV will be towed to site using tugs and a separate AHV will be used to moor the LV in place. The DSV, which will be on location to cut the piles, may be used as an ERRV once the LV has arrived on location. The LV will lift the jacket and place it onto a barge, for transport to shore. The supporting barge will not be anchored, but will either be tethered to the LV or to its towing tugs. Alternatively, the jacket will be transported to shore on the LV or JUWB. A summary of the vessel requirements for jacket removal and their typical fuel consumption is provided in Table 3.6.

Table 3.6. Vessel Requirements for Jacket Removal

Vessel	Days on Location	Fuel Consumption Rate	Total Fuel Consumption
DSV	8	20 tonnes per day	160 tonnes
LV	3	30 tonnes per day	90 tonnes
AHV	5	15 tonnes per day	75 tonnes
Tugs x 2	5	25 tonnes per day	250 tonnes
Barge	5	25 tonnes per day	125 tonnes

3.4.4 Pipelines and Stabilisation Material

The recommendation from the CA (WPRL, 2023b) is that for both the gas export and service pipelines that a partial removal option is adopted where the majority of the pipelines are left in situ.

At the Kilmar and Trent platform approaches, EUL proposes to cut and remove the spool sections of pipeline. The pipeline spool sections at the Trent and Kilmar approaches (40 m in length) are laid on the seabed surface and protected with concrete mats. At the riser to spool goose necks the pipelines were indicated to have fronded mats placed underneath the goose necks, however, the latest inspection surveys show no indication of these mats below the pipelines. Beyond the spool sections running away from the platform, there are short section of the pipelines (ca. 35m at Trent and ca. 40m at Kilmar) that are also laid on the seabed and protected with concrete mats. The total mat covered lengths to be removed are therefore ca. 80 m at Kilmar and ca. 75 m at Trent.

It is planned to remove the concrete protection mattresses and grout bags and cut and remove the underlying pipeline sections up until the point where the pipelines are either rock dumped or buried to a depth greater than 0.6m. The tie-in spools and pipeline stabilisation features (mattresses and grout bags) which are located under the rock dump will remain in situ.

The pipelines will be cut using mechanical cutting tools such as hydraulic shears or diamond wire cutters, the latter of which are more likely to be used where access is limited. The cut ends will not be capped but could be covered by reutilising a mattress. In order to recover the mattresses and cut sections of pipework a Multi-Purpose Support Vessel (MSV) or DSV will be required. It is anticipated that the mattresses will be stacked subsea and bulk lifted to the deck of the vessel reducing the number of lifts required and the risk of break-up of individual mats during the recovery process.

The recovered pipeline sections, tie-in spools and associated mattresses and grout bags will be returned to shore for recycling or disposal (Table 3.7). However, in the event of practical difficulties during the removal operations, EUL will consult with OPRED and an alternative method of decommissioning will be examined through a comparative assessment.

Table 3.7: Summary of Stabilisation Features

<table>
<tr><th>Stabilisation Feature</th><th>Number</th><th>Option</th><th>Disposal Route</th></tr>
<tr><td>Concrete mattresses at Kilmar (Kilmar mattresses only. Garrow mattresses are detailed in Garrow DP)</td><td>14</td><td rowspan="2">Full recovery of all exposed and not buried to 0.6m below the seabed. Those covered with rock dump are to be left in situ.
It is intended that exposed or partially exposed mattresses will be recovered to shore (14 at Kilmar; 13 at Trent). It is also intended to remove the pipelines underneath each recovered mattress.
A single mattress may remain to prevent a snagging hazard if the cut end is exposed and not easily covered by the existing rock dump. The mattress will be moved, the pipelines cut, and then the mattress replaced over the cut end. Any remaining mat will be flush with seabed and overtrawlable. If the mattress is not used it will be recovered to shore.
In the event of practical difficulties during the removal execution, OPRED will be consulted, and an alternative method of decommissioning will be examined through a comparative assessment.</td><td rowspan="2">Return to shore for reuse / recycling / disposal</td></tr>
<tr><td>Concrete mattresses at Trent (Kilmar mattresses only)</td><td>13</td></tr>
</table>

Stabilisation Feature	Number	Option	Disposal Route
Concrete mattresses at the SEAL pipeline crossing	2	The mattresses provide physical separation between the Seal and Kilmar pipelines and are buried under protective rock dump.	N/A
Grout bags	~200 around the concrete mats	Leave in situ if buried 0.6m below the seabed. Full recovery if not buried or in the vicinity whilst mattresses are being recovered.	Return to shore for reuse / recycling / disposal
Rock Dump (Kilmar and pipeline)	1 location, ~850 tonnes	Leave in situ.	N/A
Rock Dump (Trent and pipeline)	1 location, ~850 tonnes	Leave in situ.	N/A
Rock Dump (SEAL crossing)	1 location ~2650 Te	Leave in Situ	N/A

The remaining sections of the pipelines, left in their current state, will be marked on sea charts and notifications issued to fishermen / other users of the sea. If the cut ends of the pipelines are exposed at the start of the rock dump at either Kilmar or Trent, then a mattress will be deposited over the ends to prevent a possible snagging point. The mattress will be flush with the seabed and overtrawlable. Note, it would not be practical or good environmental practise to mobilise a rock dump vessel specifically to spot rock dump the two locations at the cut ends of the pipelines, hence the proposal to use an existing concrete mattress (if necessary). Any rock dumping for scour mitigation in the unlikely event this is required for the JUWB (refer to Section 3.4.2) would be carried out ahead of the proposed pipeline cutting operations so would not be completed at the same time.

Table 3.8 summarises the types of vessels required to decommission the pipelines and stabilisation material, their anticipated duration on location and typical fuel consumption rates.

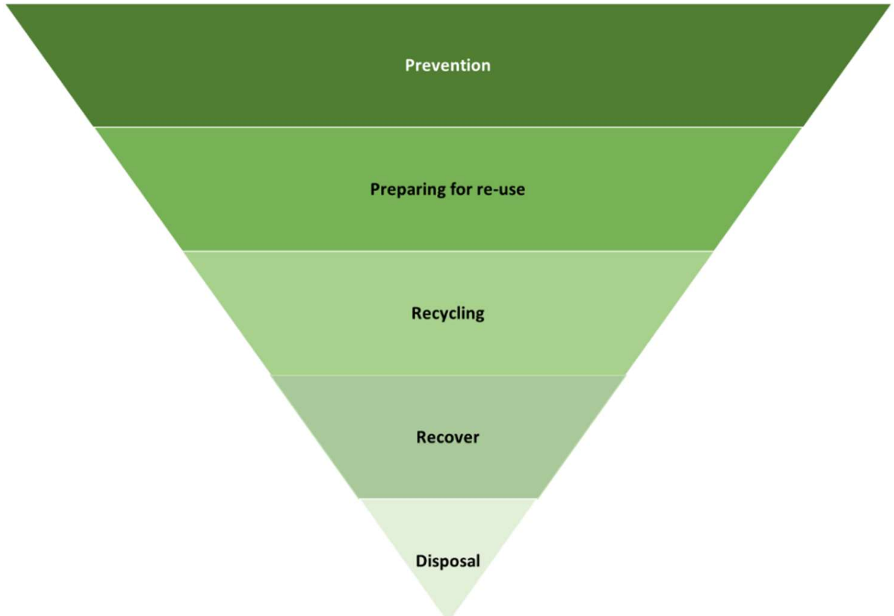
Table 3.8. Vessel Requirements to Decommission Pipelines and Stabilisation Material

Vessel	Days on Location	Fuel Consumption Rate	Total Fuel Consumption
DSV / MSV	13	20 tonnes per day	260 tonnes
Survey vessel	2	12 tonnes per day	24 tonnes

3.5 Waste Management

The Kilmar decommissioning project will have a Waste Management Plan (WMP) in place which will describe and quantify the waste arising from the proposed decommissioning activities and identify available disposal options. The WMP will adhere to the waste hierarchy of reduce, reuse and recycle and disposal to landfill will be the last resort (see Figure 3.2).

Figure 3.2. Waste Hierarchy (EU Waste Framework Directive)

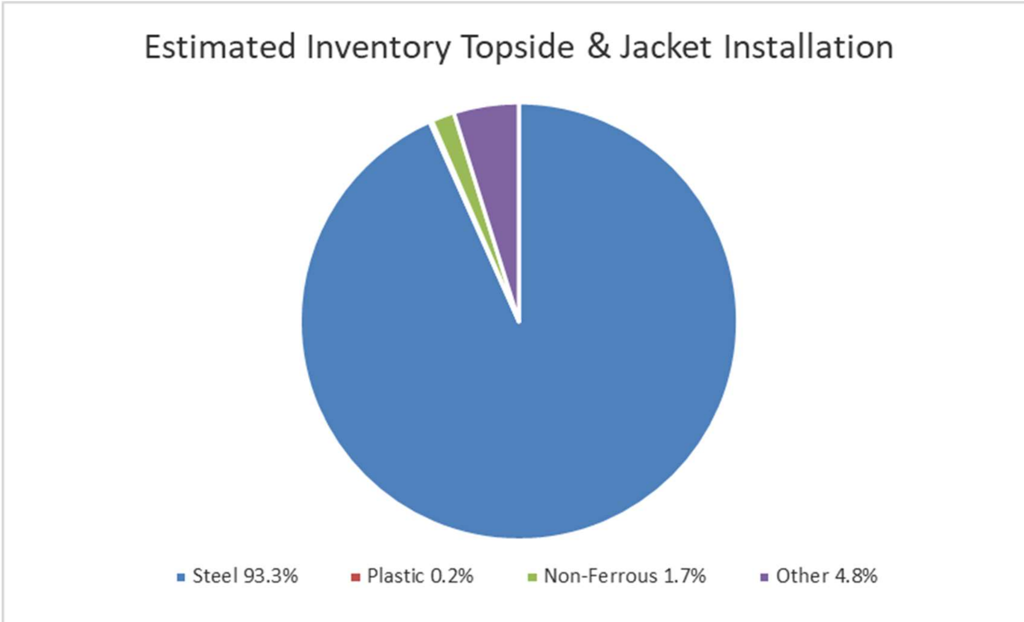


Steel and other recyclable materials are estimated to account for the greatest proportion of the Kilmar materials inventory. The topside and jacket structures will be transported to an onshore decommissioning facility for segregation, re-use and recycling. The potential for transboundary shipment of waste is still under review. All other wastes generated offshore during decommissioning will be segregated by type, before being transported to onshore waste facilities.

EUL will ensure that the licensed waste contractor and chosen onshore dismantling site has a proven track record with regards to the waste stream management and can demonstrate compliance with the waste hierarchy and all applicable waste regulations. The disposal route will be confirmed once removal contracts have been awarded.

Figure 3.3 summarises the estimated breakdown of materials relating to the topside and jacket to be removed, which equates to 1,875 tonnes. These quantities exclude piles and well materials and are limited to everything above the seabed cutline. Jacket piling 3m below the mudline (comprising of 441 tonnes of steel) will be left in place.

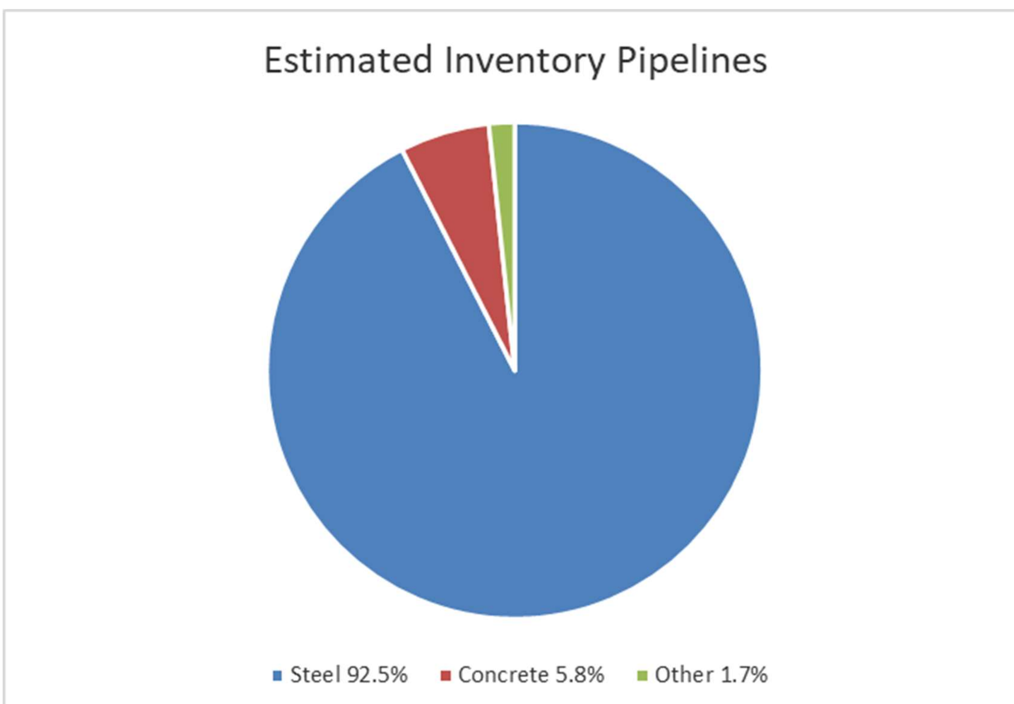
Figure 3.3. Pie Chart of Estimated Waste Inventories (Topside and Jacket Installation) [1]



[1] Total Topside & Jacket weight 1,875 tonnes

Figure 3.4 summarises the estimated breakdown of materials relating to the Kilmar subsea infrastructure, which equates to 3,063.8 tonnes. It is proposed that approximately 184 tonnes of this material will be removed, with the remainder of material left in situ (2,879.8 tonnes, ~94% of the total weight).

Figure 3.4. Pie Chart of Estimated Inventories (Pipelines) [1]



[1] Total pipelines weight 3,063.8 tonnes. This includes the pipelines, tie-in spools, mattresses and grout bags but excludes rock cover.

No naturally occurring radioactive material (NORM) has been encountered on Kilmar to date, but as a worst-case, it is anticipated that equipment contaminated with NORM scale or sludge may be encountered during the decommissioning project. EUL will ensure tests for NORM are undertaken offshore by a Radiation Protection Supervisor. If NORM is encountered, WPRL will ensure appropriate Radioactive Substance Regulation (RSR) permits are in place and conditions that dictate the management and control of radioactive waste are met.

3.6 Post Decommissioning

Post decommissioning, a site survey will be carried out around the Kilmar platform 500m radius and a (minimum) 100m corridor (50m either side) along the route of the Kilmar pipelines where decommissioning activities have taken place to identify any oil and gas debris and confirm the seabed has no trawling obstructions. Any seabed debris related to offshore oil and gas activities will be recovered for onshore disposal or recycling in line with existing disposal methods.

EUL will provide a verification of seabed clearance to OPRED following completion of the Kilmar decommissioning activities. This will be included in the Close Out Report and will also be sent to the Seabed Data Centre (Offshore Installations) at the Hydrographic Office.

A post-decommissioning monitoring programme covering the pipelines and associated stabilisation features remaining in situ will then be agreed with OPRED.

4 Environmental Baseline

This section describes the environmental and societal receptors, which could be affected by the proposed Kilmar decommissioning activities. The description is largely based on data provided in the OPRED Offshore Energy Strategic Environmental Assessment (SEA) Reports (2003-2022), as well as other published data sources. The Kilmar facilities are located within 'Regional Sea 2' as defined within the Offshore Energy SEA4 (BEIS, 2022).

In addition, site specific data gathered during the pre-decommissioning environmental baseline survey (EBS) and habitat assessment carried out by Fugro on behalf of WPRL, the previous Field Operator in April 2023 has been referenced, where relevant (Fugro, 2023a). The surveys consisted of geophysical, habitat investigation and environmental work scopes.

During the pre-decommissioning EBS survey and habitat assessment seven environmental sampling stations were sampled, arranged in a cruciform centred on the Kilmar NUI and aligned with the predominant current (Figure 4.1). At each environmental sampling station, video and stills photography were to be acquired prior to the collection of one chemical (CA), one particle size distribution (PSD) and two macrofaunal (FA/FB) grab samples. This was also achieved for an eighth sampling station on the SEAL (Shearwater Elgin Area Line) pipeline crossing 150 m east of SEAL pipeline crossing and 50 m north from the pipeline east-west route. Video and stills photographic data were successfully acquired along all eight proposed stations (Table 4.1). Grab samples were successfully acquired at all eight proposed stations and a complete suite of samples (two macrofauna, one PSD and one CA sample) were retained at all stations (Table 4.2). Seabed samples were acquired using a 0.1 m^2 Hamon grab for the macrofaunal and PSD samples and a 0.1 m^2 Day grab for CA samples. Sediment samples were analysed for their PSD using a combination of two techniques; sieve analysis for all material retained by a 1.0 mm sieve followed by laser diffraction analysis of the finer material.

Prior to the development of the Kilmar field, a site survey was carried out by Gardline Geosurvey Ltd (Gardline) in October 2004 (Gardline, 2004c). The scope of this survey was to establish site suitability for the installation of the Kilmar NUI and included the collection of bathymetry and side scan sonar (SSS) data. No site-specific environmental work was completed, but a review of the data for possible environmental sensitivities in the vicinity of the proposed well location (PWL) was carried out. Results of this survey indicated sandy sediments. The seafloor in the vicinity of the PWL was flat, the water depths in the surrounding 1 km x 1 km survey area varied from 47 m Lowest Astronomical Tide (LAT) in the south-west to 56 m LAT in the north-east. Very low relief sand waves with superimposed megaripples were present that were orientated from north-east to south-west. Sand waves featured wave heights of generally < 1 m and a wavelength of approximately 50 m to 100 m (Gardline, 2004). In addition, a pre-decommissioning survey was also conducted by Fugro at the nearby Garrow field in 2022 (Fugro, 2023b; 2023c). The Garrow field is located in UKCS Blocks 42/25a and 43/21a and consists of a NUI with 2 wells, tied back 22.4 km to the Kilmar platform by an 8" gas export line and 3" service pipeline. Seven stations were sampled, in similar water depths to the Kilmar field. The methodologies for PSD, sediment hydrocarbon content and metals analysis were similar to the methodologies used in this study and consequently the data have been included for comparison to the wider area.

The data collected during the Kilmar pre-decommissioning survey has also been compared to OEUK mean background levels of organic and inorganic substances (OEUK, 2001) to provide more general information on the typical range of environmental conditions that may be encountered in the SNS. Comparisons have also been made with the mean concentrations estimated from Area 1 (Sandbanks), as reported in the second Strategic Environmental Assessment (SEA2) conducted in 2001, as these provide more up to date and spatially comparable background concentrations (BCs) (ERT, 2003a; 2003b). In addition, comparison has also made to Oslo and Paris Commission (OSPAR) background values that were derived from data collected from pristine marine sediments in the wider north-east Atlantic (OSPAR, 2014). The OSPAR BCs reflect contaminant concentrations at "pristine" or "remote" sites, while background assessment concentrations (BACs) are statistically derived from background data and are defined as "values for testing whether the concentrations at a location are at or close to background" (OSPAR, 2005; 2009a).

Table 4.1. Completed Transects

Station		Easting	Northing	Depth (m BSL)	Length (m)	Data
Kilmar NUI						
ST01	SOL	391 502.0	6 017 713.5	51.8	29.8	8 min 46 sec 11 stills
	EOL	391 481.1	6 017 734.7	51.7		
ST02	SOL	391 671.2	6 017 348.8	50.8	30.2	8 min 39 sec 0 stills
	EOL	391 651.7	6 017 371.9	50.8		
ST03	SOL	391 802.8	6 017 303.4	51.6	29.9	9 min 31 sec 10 stills
	EOL	391 781.8	6 017 324.7	51.4		
ST04	SOL	391 622.8	6 017 225.5	50.3	30.9	8 min 26 sec 16 stills
	EOL	391 602.2	6 017 248.5	50.6		
ST05	SOL	391 803.4	6 017 171.8	52.2	29.8	8 min 55 sec 14 stills
	EOL	391 781.8	6 017 192.2	51.9		
ST06	SOL	391 926.8	6 016 806.6	50.5	30.8	6 min 42 sec 3 stills
	EOL	391 904.8	6 016 828.1	50.3		
ST07	SOL	392 136.7	6 016 352.6	46.3	30.2	8 min 51 sec 8 stills
	EOL	392 117.0	6 016 375.5	46.9		
Kilmar/SEAL Pipeline Crossing						
ST08	SOL	396 759.0	6 017 565.9	45.2	28.4	9 min 47 sec 16 stills
	EOL	396 737.3	6 017 588.2	45.3		

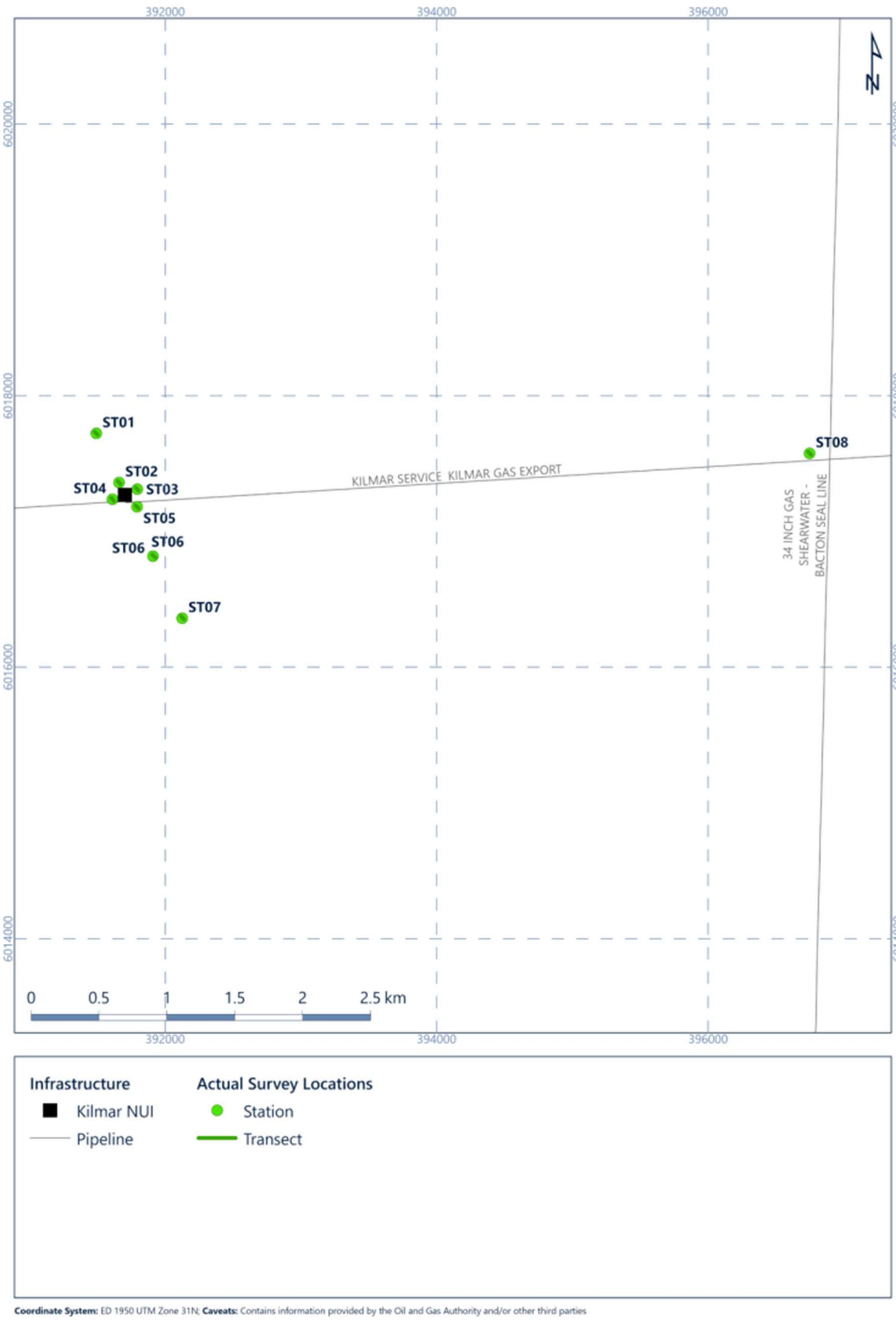
Notes
BSL = Below sea level
SOL = Start of line
EOL = End of line
NUI = Normally Unmanned Installation
SEAL = Shearwater Elgin Area Line
Geodetic Parameters: WGS 84, UTM Zone 31N, CM 3°E [m]

Table 4.2. Completed Sediment Sampling Stations

Station	Easting	Northing	Depth (BSL)	Sample Acquisition
Kilmar NUI				
ST01	391 492.5	6 017 723.3	53.1	PC, FA, FB, FC
ST02	391 660.5	6 017 361.1	50.8	PC, FA, FB, FC
ST03	391 794.9	6 017 312.5	48.2	PC, FA, FB, FC
ST04	391 612.0	6 017 238.0	51.3	PC, FA, FB, FC
ST05	391 793.2	6 017 182.6	53.6	PC, FA, FB, FC
ST06	391 910.0	6 016 816.3	50.4	PC, FA, FB, FC
ST07	392 125.1	6 016 359.3	47.9	PC, FA, FB, FC
Kilmar/SEAL Pipeline Crossing				
ST08	396 747.6	6 017 576.1	46.1	PC, FA, FB, FC

Notes
Coordinates presented for PC grab sample
BSL = Below sea level
FA/FB/FC = Faunal sample A, B or C
PC = Physico-chemical sample

Figure 4.1. Environmental Stations Sampled at the Kilmar NUI



4.1 Physical Environment

4.1.1 Geography

The Kilmar NUI is located in UKCS Block 43/22, approximately 94 km east northeast from Flamborough Head on the Yorkshire coast and 95 km west southwest of the UK / Netherlands median line (Figure 1.1, Section 1.1). The Kilmar pipelines also cross UKCS Block 43/23 and 43/24 (to the Trent Compression Platform). The Trent Platform is located in UKCS Block 43/24, approximately 116 km east of Flamborough Head, and 72 km west southwest of the UK / Netherlands meridian line. UKCS Block 43/22, 43/23 and 43/24 are hereafter referred to as the 'Blocks of Interest'.

4.1.2 Bathymetry

The Kilmar infrastructure lies in an area of sandbanks, which form a series of ridges parallel to the coast, with channels between them. Water depth along the proposed pipeline route varies between 40.9 metres and 56.7 metres and is approximately 48.1 metres at the Trent Compression Platform location and 54.8 metres at the Kilmar NUI location (Table 4.3).

Table 4.3. Water Depth at Locations of Proposed Kilmar Decommissioning Work

Infrastructure	Water Depth at Location (m)
Kilmar platform	54.8
Trent platform	48.1
Kilmar to Trent Gas Export Pipeline [1]	40.9 – 56.7

4.1.3 Seabed Sediments

Seabed sediments within the SNS generally comprise coarse sands with gravels in some areas. Sediments are highly mobile largely due to the increased near seabed currents (BEIS, 2022).

The British Geological Survey (BGS) seabed sediment maps show that the area over the Blocks of Interest are mainly comprised of fine to medium sandy sediments (DECC, 2001). Borehole logs from the Kilmar platform location identified the presence of a dense, silty sand cover, overlying stiff clay formations (Fugro, 2004).

The seafloor along the pipeline route generally comprises featureless sands and areas of megarippled sands. Three sand waves exist along the route. Seabed surveys carried out in the vicinity indicate sediments are mainly comprised of very loose to loose fine sands, becoming dense to very dense as they reach a depth of 2 to 10 meters below seabed. The area appears to be supported by the Bolders Bank Formation, overlying very stiff to hard clay.

A summary of sediment characteristics and sediment hydrocarbons analysis from the 2023 pre-decommissioning survey is provided in Table 4.4.

It can be seen that seven stations conformed to the Folk classification of 'Sand' apart from ST05 (100m SE of the Kilmar platform) which was classified as 'Muddy Sand'. Sand was the dominant fraction at all stations, with values ranging from 89.19 % at station ST05 to 94.10 % at station ST03, with a mean of 91.40 % and low variability (relative standard deviation (RSD) 2 %). The gravel content ranged from 0.00 % at station ST08 to 1.10 % at station ST01, with a mean of 0.25 % and very high variability (RSD 152 %), due to the low values present. The fines content ranged from 5.87 % at station ST03 to 10.67 % at station ST05, with a mean of 8.34 % and low variability (RSD 20 %). All stations had a fines content higher than the SNS mean background value (3.07 %; OEUK, 2001), however, no station exceeded the SNS 95th percentile (12.59 %; OEUK, 2001). The mean fines content was higher than the mean from the Garrow site (3.33%; Fugro, 2022a)

The median particle size (µm) ranged from 176 µm at station ST05 to 232 µm at station ST03, with a mean value of 201 µm and low variability (RSD 8 %). The Wentworth description, assigned from mean particle size, categorised all stations as 'Fine Sand' (Fugro, 2023a).

The Total Organic Carbon (TOC) values across the Kilmar survey area were low and typical of this region of the SNS. TOC content ranged from 0.09 % at station ST03 to 0.18 % at station ST05, with a mean of 0.14 % and low variability (RSD 25 %) (Fugro, 2023a).

The Total Hydrocarbon Content (THC) across the survey area was low and no trend was observed between THC and distance from the Kilmar NUI, suggesting that the THC values present were not influenced by drilling activity. THC values ranged from 1.5 µg/g at station ST08 to 5.3 µg/g at stations GST02 and GST05, with a mean of 3.1 µg/g and moderate variability (RSD 47 %). The mean value was higher than the mean from the SEA2 Area 1 survey (1.6 µg/g; ERT, 2003a), but lower than the mean from Garrow (4.1 µg/g; Fugro 2023b). Two stations had THC values slightly above the SNS mean background concentration (4.34 µg/g; OEUK, 2001). However, all stations were broadly comparable to, or lower than the mean background value for the SNS (OEUK, 2001) and broadly comparable to other surveys within the region (OEUK, 2021; ERT, 2003a), therefore could be ascribed as background. All THC values were below the OSPAR 50 ppm ecological effects threshold (Fugro, 2023a).

The gas chromatographic profiles obtained from the Kilmar sediments shared a common hydrocarbon distribution of low-range n-alkanes and biogenic inputs commonly found in SNS sediments. However, one station (ST05) displayed evidence of a low toxicity oil-based mud.

Total n-alkane (nC12 to nC36) concentrations ranged from 0.12 µg/g at station ST08 to 0.34 µg/g at station ST02, with a mean of 0.21 µg/g and moderate variability (RSD 34 %). The mean value was comparable to the mean from the SEA2 Area 1 survey (0.16 µg/g; ERT, 2003a). The concentration at station ST02 was slightly higher than the SNS mean background concentration (0.33 µg/g; OEUK, 2001) (Fugro, 2023a).

Total 2 to 6 ring PAH concentrations ranged from 0.0666 µg/g at station ST07 to 0.152 µg/g at station ST02, with a mean of 0.0988 µg/g and low variability (RSD 27 %). The mean value was higher than the mean from the SEA2 Area 1 survey (0.058 µg/g; ERT, 2003a). Concentrations at all stations were below the SNS mean background concentration (0.208 µg/g; OEUK, 2001) (Fugro, 2023a).

The pristane/phytane (Pr/Ph) ratio values ranged from 7.04 at station ST02 to 14.3 at station ST01, with a mean of 9.34 and low variability (RSD 26 %). The mean value was higher than the mean from the SEA2 Area 1 survey (2.51; ERT, 2003a) (Fugro, 2023a).

Results for heavy and trace metal analysis are provided in Table 4.5. The concentrations of metals were lower, or broadly comparable to their respective SNS mean background concentrations (OEUK, 2001) and the regional SEA2 Area 1 survey, and therefore were characteristic of background conditions for the region. Station ST05 had slightly higher concentrations of all metals when compared to the wider survey area, suggesting a very minor influence from drilling operations. The concentration of both zinc and mercury (frequently present as impurities in barite based weighting agents) both exceeded their respective ERL (effects range low) values at station ST05, although there was no evidence of this effecting the macrofaunal communities present. However, concentration of all remaining metals were below their respective ERL values (OSPAR, 2014) at all stations (Fugro, 2023a).

Table 4.4. Summary of Sediment Characteristics and Sediment Hydrocarbons

Station	Distance (m)*	Bearing (°)*	TOC (%)	Fractional Composition					Folk Desc. (BGS mod.)	Mean Particle Size			THC[3]	n-alkanes[3]						Pr/Ph Ratio
				Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)		(µm)[1]	(phi)[1]	Wentworth (1922) Description[2]		nC12-20	nC21-36	nC12-36	nC12-20	nC21-36	nC12-36	
ST01	500	335	0.14	1.10	89.42	9.47	7.72	1.75	Sand	201	2.32	Fine Sand	2.6	0.04	0.18	0.21	1.27	3.41	2.78	14.3
ST02	100	335	0.17	0.55	90.03	9.41	7.69	1.72	Sand	201	2.32	Fine Sand	5.3	0.09	0.25	0.34	1.11	2.97	2.24	7.04
ST03	100	65	0.09	0.03	94.10	5.87	5.31	0.56	Sand	232	2.11	Fine Sand	2.9	0.03	0.12	0.15	1.00	3.92	2.78	7.74
ST04	100	245	0.16	0.10	90.94	8.96	7.25	1.72	Sand	203	2.30	Fine Sand	3	0.05	0.17	0.22	1.11	3.48	2.51	7.46
ST05	100	155	0.18	0.14	89.19	10.67	8.38	2.29	Muddy Sand	176	2.51	Fine Sand	5.3	0.07	0.18	0.25	1.21	2.71	2.09	8.79
ST06	500	155	0.15	0.08	91.67	8.25	6.68	1.57	Sand	192	2.38	Fine Sand	2.5	0.04	0.17	0.21	1.27	3.29	2.69	10.3
ST07	1000	155	0.11	0.03	92.21	7.76	6.28	1.48	Sand	194	2.37	Fine Sand	1.7	0.02	0.12	0.14	1.26	3.66	2.94	11.0
ST08	158	290	0.10	0.00	93.66	6.34	5.40	0.94	Sand	212	2.24	Fine Sand	1.5	0.02	0.10	0.12	1.03	3.36	2.69	8.10
Minimum			0.09	0.00	89.19	5.87	5.31	0.56		176	2.11		1.5	0.02	0.10	0.12	1.00	2.71	2.09	7.04
Maximum			0.18	1.10	94.10	10.67	8.38	2.29		232	2.51		5.3	0.09	0.25	0.34	1.27	3.92	2.94	14.3
Mean			0.14	0.25	91.40	8.34	6.84	1.50	-	201	2.32	-	3.1	0.05	0.16	0.21	1.16	3.35	2.59	9.34
Standard Deviation			0.034	0.385	1.85	1.63	1.12	0.532		16.2	0.115		1.46	0.024	0.048	0.071	0.110	0.378	0.291	2.43
RSD (%)			25	152	2	20	16	35		8	-		47	54	30	34	9	11	11	26
Garrow (Fugro, 2023b) ‡																				
Mean			0.12	1.05	95.62	3.33	2.87	0.45	-	304	1.72	-	4.1	0.13	0.20	0.32	0.85	1.57	1.23	4.88
RSD (%)			25	82	2	50	50	56		8	-		48	47	42	43	12	12	9	51
Southern North Sea (OEUK, 2001)^																				
Mean			–	–	–	3.07	–	–	-	-	2.04	-	4.34	-	-	0.33	-	-	1.44	-
RSD (%)			–	–	–	12.59	–	–		-	3.28		11.39	-	-	0.78	-	-	2.12	-
SEA2 Area 1 (2003a) #																				
Mean			-	-	-	-	-	-	-	-	-	-	1.6	0.06	0.09	0.16	1.13	1.34	1.25	2.51
RSD (%)			-	-	-	-	-	-	-	-	-		106	200	156	163	12	16	13	31
EET Value (OSPAR, 2006)																				
EET			-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-

Notes:
THC = Total hydrocarbon content, UCM = Unresolved complex mixture, CPI = Carbon preference index, Pr/Ph = Ratio of pristane to phytane, RSD = Relative standard deviation, SNS = Southern North Sea, NUI = Normally Unmanned Installation, EET = Ecological effect threshold
* = Distance and bearing taken from Kilmar NUI or Kilmar/SEAL pipeline crossing
‡ = Mean and relative standard deviation values from an environmental survey in the Garrow field (Fugro, 2023b)
# = Mean and relative standard deviation value from the regional SEA2 Area 1 (Sandbanks) survey (ERT, 2003a)
^ = Mean and 95th percentile from data reported at stations greater than 5 km from nearest platform in the southern North Sea from 1975 to 1995 (UKOOA, 2001)
1 Folk and Ward method (Gradistat statistics), 2 Wentworth description (Wentworth, 1922), 3 Concentrations expressed as µg/g of dry sediment

Table 4.5. Sediment Metals Analysis

Station	Distance (m)*	Bearing (°)*	Al	As	Ba	TBa†	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Sn	V	Zn
ST01	500	335	3920	4.6	17.4	197	0.02	11.5	1.4	6320	< 0.03	4.5	5.8	< 0.1	16.3	14.7
ST02	100	335	3870	5.4	39.3	215	0.02	15.7	1.2	7630	< 0.03	3.9	6.2	< 0.1	16.6	13
ST03	100	65	2480	5.8	13.5	178	0.01	9.17	0.9	5540	< 0.03	3	5.3	< 0.1	13.1	12.7
ST04	100	245	3860	3.7	28.2	246	0.02	11.3	1	5930	< 0.03	3.6	5	< 0.1	16	12.1
ST05	100	155	3540	5.9	112	334	0.03	14.9	6.8	5570	0.421	4.3	17.3	< 0.1	15.2	323
ST06	500	155	3560	3.8	16.2	203	0.02	11.3	1.3	4820	< 0.03	3.5	5.8	< 0.1	13.5	19.8
ST07	1000	155	2860	4.1	13.9	199	0.01	8.27	0.7	4410	< 0.03	4	4.6	< 0.1	12.4	9.3
ST08	158	290	2810	4.5	10.8	187	< 0.01	9.65	0.8	5630	< 0.03	2.9	4.4	< 0.1	13.9	11.7
Minimum			2480	3.7	10.8	178	< 0.01	8.27	0.7	4410	< 0.03	2.9	4.4	< 0.1	12.4	9.3
Maximum			3920	5.9	112	334	0.03	15.7	6.8	7630	0.421	4.5	17.3	< 0.1	16.6	323
Mean			3360	4.7	31.4	220	0.02	11.5	1.8	5730	-	3.71	6.8	-	14.6	52
Standard Deviation			564	0.87	33.9	50.4	0.007	2.63	2.05	974	-	0.57	4.29	-	1.6	110
RSD [%]			17	19	108	23	37	23	116	17	-	15	63	-	11	210
Garrow (Fugro, 2023b) ‡																
Mean			1940	8.92	14.5	177	-	7.12	0.7	6690	-	3.2	5.1	-	17.6	10.5
RSD [%]			15	26	92	20	-	15	15	14	-	14	12	-	11	12
SEA2 Area 1 (ERT, 2003b)‡																
Mean			-	10.9	-	-	-	4	-	8246	-	-	-	-	17	10
RSD [%]			-	75	-	-	-	38	-	51	-	-	-	-	43	52
Southern North Sea (OEUK, 2001)#																
Mean			-	-	70.14	-	0.16	10.7	3.83	7595.33	0.02	5.47	8.39	-	18.5	15.88
95th Percentile			-	-	272.4	-	0.72	44.77	13.9	18555	0.05	21.5	21	-	35.8	35.8
CEMP Assessment Criteria (OSPAR, 2014)																
ERL			-	-	-	-	1.2	81	34	-	0.15	-	47	-	-	150

Notes:
Concentrations expressed in ìg/g dry sediment
Al = Aluminium As = Arsenic Ba = Barium TBa = Total barium Cd = Cadmium Cr = Chromium Cu = Copper Fe = Iron Hg = Mercury Ni = Nickel Pb = Lead Sn = Tin V = Vanadium Zn = Zinc
RSD = Relative standard deviation ERL = Effects Range Low OSPAR = Oslo and Paris Commission CEMP = Coordinated Environmental Monitoring Programme
* = Distance and bearing from Kilmar NUI, † = Determined by alkali fusion, ‡ = Mean and relative standard deviation values from the regional SEA2 Area 1 (Sandbanks) survey (ERT, 2003b), # = Mean and 95th percentile from data reported at stations farther than 5 km from nearest platform in the SNS from 1975 to 1995 (OEUK, 2001)
† = Mean and relative standard deviation values from an environmental survey in the Garrow field (Fugro, 2023b)

Key: Grey Cell = Below SNS Background Mean Light Yellow cell = Above SNS background mean Orange cell = Above SNS background 95th percentile Red cell = Above ERL

4.1.4 Oceanography

Tides in the SNS are predominantly semi-diurnal and tidal waters offshore in this area of the SNS flood southwards and ebb northwards (BEIS, 2022). Surface tidal streams flow in a south easterly direction and switch to a northerly direction at high water (Hydrographer of the Navy, 2011). Surface tidal streams in the vicinity of the Blocks of Interest are a maximum of 0.25 and 0.19 m/s respectively for spring and neap tides (Hydrographer of the Navy, 2011).

As the tidal front keeps the water column permanently vertically mixed, preventing the development of thermoclines (OSPAR, 2010), there is little variation between sea surface and bottom temperatures, as well as in the annual mean near temperatures, which are approximately between 9°C and 10°C (Marine Scotland, 2021a), and annual mean surface temperatures between 10°C and 11°C (Marine Scotland, 2021a).

The annual mean significant wave height in the vicinity of the Kilmar infrastructure ranges from 1.51 m to 1.80 m (Marine Scotland, 2021a).

4.1.5 Meteorology

Winds in this region of the SNS are generally from between south and north-west. The prevailing winds in the region vary with the seasons. North-easterly winds and south-westerly winds are both common in winter and early summer. From July to September south-westerly winds dominate. Wind strengths are generally between Beaufort scale 1- 6 (1 – 11 m/s) in the summer months, with a greater proportion of strong to gale force winds of Beaufort scale 7 – 12 (14 – 32 m/s) in winter (BEIS, 2022).

4.2 Biological Environment

4.2.1 Plankton

The collective term plankton describes the plants (phytoplankton) and animals (zooplankton) that live freely in the water column and drift passively with the water currents. Plankton form the base of the food chain, therefore changes in the abundance and composition of the planktonic community can have impacts on higher consumers. Typically, in the SNS a phytoplankton bloom occurs every spring, generally followed by a smaller peak in the autumn (BEIS, 2022a).

The SNS is characterised by shallow, well-mixed waters, which undergo large seasonal temperature variations (JNCC, 2004). The region is largely enclosed by land and as a result the marine environment is highly dynamic with considerable tidal mixing and nutrient-rich run-off from the land (eutrophication). Under these conditions, nutrient availability is fairly consistent throughout the year, therefore organisms with high nutrient uptake that thrive in dynamic waters, such as diatoms, are particularly successful (Leterme *et al.*, 2006). The phytoplankton community in the Regional Sea 2 area is dominated by the dinoflagellate genus *Tripos (T. fusus, T. furca, T. lineatus)* along with higher numbers of the diatom, *Chaetoceros* (subgenera *Hyalpchaete* and *Phaeoceros*) than are typically found in the northern North Sea. From November to May when mixing is at its greatest, diatoms comprise a greater proportion of the phytoplankton community than dinoflagellates (BEIS, 2022a).

The zooplankton community is dominated by copepods including *Calanus helgolandicus* and *C. finmarchicus* as well as *Paracalanus* spp., *Pseudocalanus* spp., *Acartia* spp., *Temora* spp. and cladorcerans such as *Evadne* spp. There has been a marked decrease in copepod abundance in the SNS, which has been linked to changes in global weather phenomena (BEIS, 2022a). However, the planktonic assemblage in the vicinity of the Kilmar infrastructure is not considered unusual.

4.2.2 Seabed Communities

4.2.2.1 Habitat Classification

Based on the EMODnet (2022) seafloor habitats map, the the Kilmar infrastructure is located in an area identified as the EUNIS habitat 'Atlantic offshore circalittoral sand' (MD52). There are small areas of 'Atlantic circalittoral sand' (MC52) to the north, 'Atlantic offshore circalittoral coarse sediment' (MD32) to the east and 'Atlantic offshore circalittoral mud' (MD62) to the south, all approximately 10 km from the infrastructure.

Numerous surveys have previously been undertaken in the Dogger Bank SAC, an extensive sandbank feature located approximately 20 km north-east of the Kilmar NUI. These have identified that seabed fauna on the sandbank is dominated by robust short-lived organisms including the heart urchin *Echinocardium cordatum*, the bivalve *F. fabula* and a number of polychaetes including *L. conchilega* and *O. fusiformis* (BEIS, 2022a). These species are widely found in clean sandy sediments in the North Sea (BEIS, 2022a). Mobile fauna identified across the Dogger Bank includes the masked crab (*Corystes cassivelaunus*) and the hermit crab (*Pagurus bernhardus*) and well as a number of flatfish species (BEIS, 2022a).

The seabed observed at Kilmar during 2023 pre-decommissioning survey was largely homogeneous. The main sediment type observed from photographic data was sandy with sparse areas of muddy sand, with varying proportions of shell fragments and small ripples. This sediment type has been classified as the EUNIS habitat classification 'Atlantic offshore circalittoral sand' (MD52) with biotope complex 'Faunal communities in Atlantic offshore circalittoral sand' (MD521) (Fugro, 2023a).

The habitat classification 'Atlantic offshore circalittoral sand' (MD52) is described by habitats mostly comprising of fine sands or non-cohesive muddy sands. This habitat is thought to be stable and characterised by echinoderms, amphipods, bivalves and polychaetes (EEA, 2022). The habitat classification was assigned along all drop-down camera stations. Characterising taxa from the photographic data (see Figure 4.2) showed the presence of sparse epifauna. Taxa observed included starfish (*Asteroidea inc. Luidia sarsii, Asterias rubens and Astropecten irregularis*), urchins (*Echinocardium cordatu*m), anemone (*Metridium sp*.), crab (*Decapoda*), scallop (*Pectinidae*), hydroid/bryozoan turf species (*Hydrozoa/Bryozoa inc. Sertularia sp*.), faunal tubes (*Polychaeta*), fish (*Gnathostomata inc. Callionymus sp. and Gadidae*), and flatfish (*Pleuronectiformes inc. Limanda limanda*).

The habitat classification 'Faunal communities of Atlantic offshore circalittoral sand' (MD521) is included within the UK Biodiversity Action Plan (BAP) priority habitat and habitat Features of Conservation Interest (FOCI) 'subtidal sands and gravels'.

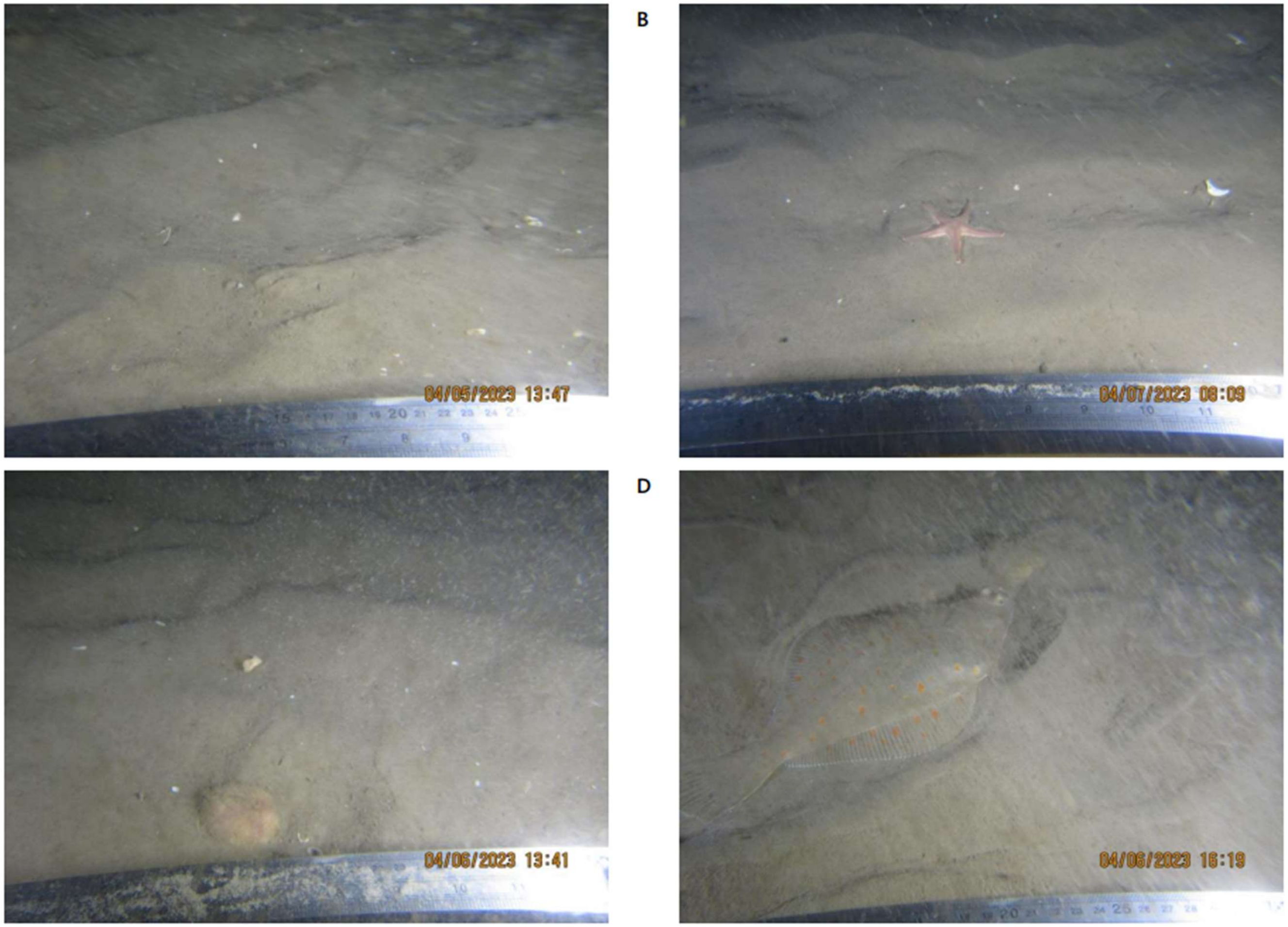
There was no evidence of biogenic or rocky reefs within the survey area. Reef forming taxa were not observed in the macrofaunal data.

Individuals belonging to the families Gadidae and Edwardsiidae were observed along transect ST04 and transects ST01 to ST06, respectively; these could not be identified to species level from the photographic data available. The Atlantic cod (*Gadus morhua*) and the timid burrowing anemone *Edwardsia timida* are UK BAP species. *Gadus morhua* is also listed on the OSPAR list of threatened and/or declining habitats and species.

No other Annex I habitats or Annex II species, OSPAR threatened and/or declining species and habitats, UK BAP priority habitats and species or FOCI (OSPAR, 2008; Biodiversity Reporting and Information Group [BRIG], 2011; JNCC, 2014; JNCC, 2018; JNCC, 2019) were observed within the Kilmar pre-decommissioning survey area.

Figure 4.2. Seabed photographs of 'Atlantic offshore circalittoral sand (MD521) at the Kilmar Field

A B C D



A: Photograph ST04_8

Sand with shell fragments and small-scale ripples

No visible fauna

B: Photograph ST06_1

Sand with shell fragments and small-scale ripples

Starfish (*Astropecten irregularis*)

C: Photograph ST01_5

Sand with shell fragments and small-scale ripples

Urchin (*Echinocardium cordatum*)

D: Photograph ST08_4

Sand with shell fragments and small-scale ripples

Flatfish (*Pleuronectes platessa*)

4.2.2.2 Macrofaunal Analysis

Seabed sediments provide support, protection, and the food source for many macrofaunal species. The sediment macrofauna, most of which are infaunal (living within the sediment), are therefore particularly vulnerable to external influences that alter the sediments' physical, chemical or biological nature. Such infaunal animals are largely sedentary and are thus unable to avoid unfavourable conditions. The sediment macrofauna is defined as those animals living in or on the seafloor that are retained on a sieve mesh of 1.0 mm (Fugro, 2023a).

Analysis of sediment macrofauna from the 2023 Kilmar pre-decommissioning survey found that the macrofaunal community was relatively homogenous across the survey area. A total of 84 taxa and 1,220 individuals were identified within grab samples from the survey area. Of these taxa, 15 were recorded as juveniles or pelagic (Fugro, 2023a).

The rationalised data comprised 69 benthic taxa, of which 20 (29.0 %) were molluscs, 18 (26.1 %) were annelids, 16 (23.2 %) were arthropods, 9 (13.0 %) were echinoderms and 6 (8.7 %) were classed as 'Other phyla' (specifically cnidarians, platyhelminthes and nemerteans). A total of 1 014 individuals were identified in the rationalised dataset; of these, 411 (40.5 %) were echinoderms, 287 (28.3 %) were molluscs, 232 (22.9 %) were annelids, 52 (5.1 %) were arthropods and 32 (3.2 %) were classed as 'Other phyla' (Fugro, 2023a).

The top ten most abundant taxa were similar across all the survey stations, with the echinoderm *Amphiura filiformis* being the most abundant taxon at all stations, except station ST07 where it was the second most abundant. The mollusc *Cylichna cylindracea* was recorded amongst the top four most abundant taxa at all stations and it was the most abundant taxon at station ST07.

Across the survey area, there was some fidelity between the top ten most abundant and dominant taxa with the top four most abundant being the top three most dominant, (specifically the echinoderm *Amphiura filiformis*, the annelid *Pholoe baltica* and the molluscs *Cylichna cylindracea* and *Kurtiella bidentata*) present at all stations. However, some differences did occur, with the echinoderm *Acrocnida brachiata* being the fifth most abundant taxa, but ranked eighth most dominant, occurring at 62.5 % of stations. The results suggest that the taxa and abundance were evenly distributed across the survey area with some small-scale variation (Fugro, 2023a).

Differences observed in the macrofaunal community at Kilmar were largely due to small scale variability in the abundance of the most dominant taxa across all clusters. The taxa encountered in the current survey were considered representative of a background SNS community.

4.2.3 Fish

4.2.3.1 Spawning and Nursery Grounds

Fish are separated into pelagic and demersal species, as follows:

- Pelagic species occur in shoals swimming in mid-levels of the water, typically making extensive seasonal movements or migrations between sea areas. Pelagic species include herring (*Clupea harengus*), mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*) and sprat (*Sprattus sprattus*);
- Demersal species live on or near the seabed and include haddock (*Melanogrammus aeglefinus*), cod (*Gadus morhua*), plaice (*Pleuronectes platessa*), sandeel (*Ammodytidae* spp.), sole (*Microstomus kitt*) and whiting (*Merlangius merlangus*).

The international Council for the Exploration of the Seas (ICES) standardise the division of sea areas for the statistical analysis. The Kilmar infrastructure is located in ICES Rectangle 37F1.

Species that spawn within ICES Rectangle 37F1 include cod, herring, lemon sole, mackerel, *Nephrops*, plaice (high intensity spawning ground), sandeel (high intensity spawning ground), sole (*Solea solea*), sprat and whiting (Table 4.6; Coull *et al*., 1998; Ellis *et al.,* 2012).

Species that use the waters within Rectangle 37F1 as nursery grounds include anglerfish (white monkfish) (*Lophius piscatorius*), blue whiting, cod, European hake (*Merluccius merluccius*), herring, lemon sole, ling (*Molva molva*), mackerel, *Nephrops*, sandeels, sprat, spurdog (*Squalus acanthias*) and whiting (high intensity nursery) (Table 4.6; Coull *et al.*, 1998; Ellis *et al.,* 2012).

Table 4.6. Fish Spawning and Nursery Species within ICES Rectangles 37F1 (Coull et al., 1998; Ellis et al., 2012; Aires et al., 2014)

Species	J	F	M	A	M	J	J	A	S	O	N	D
Anglerfish[1]	N	N	N	N	N	N	N	N	N	N	N	N
Blue whiting	N	N	N	N	N	N	N	N	N	N	N	N
Cod	N	N	N	N	N	N	N	N	N	N	N	N
European hake	N	N	N	N	N	N	N	N	N	N	N	N
Herring	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Lemon sole	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
Nephrops	N	N	N	N	N	N	N	N	N	N	N	N
Plaice												
Sandeels	N	N	N	N	N	N	N	N	N	N	N	N
Sole												
Sprat	N	N	N	N	N	N	N	N	N	N	N	N
Spurdog[2]	N	N	N	N	N	N	N	N	N	N	N	N
Whiting	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Horse mackerel	J	J	J	J	J	J	J	J	J	J	J	J
Haddock	J	J	J	J	J	J	J	J	J	J	J	J

Notes
[1] Insufficient data available on spawning grounds
[2] Viviparous species (gravid females can be found all year) (*Ellis et al., 2012*)

Key

N = High intensity nursery as per Ellis *et al.*, 2012

Species = High intensity spawning as per Coull *et al.*, 1998

J = Juveniles of a moderate probability or higher as per Aires et al., 2014

	Spawning		Peak Spawning	N	Nursery

Regarding cod, a very popular fish species important to the UK socioeconomic fisheries and of biological importance, ICES Rectangle 37F1 is described to be dominantly 'occasional grounds' for spawning cod (Gonzlaez-Irusta & Wright, 2016).

In addition, data outputs from Aires *et al.* (2014) provide a guide to the most likely locations for aggregations of fish during their first year. Age 0 group fish are defined as fish in the first year of their lives and can also be classified as juvenile. The Kilmar infrastructure is located in an area of moderate probability of 0 group fish for whiting, horse mackerel (*Trachurus trachurus*), herring and haddock (Table 4.6), and a low probability of 0 group fish for sole, plaice, Norway pout (*Trisopterus esmarkii*), mackerel, hake, cod, blue whiting and anglerfish and sprat (Aires *et al.*, 2014).

All the species mentioned above are listed as UK BAP priority marine species, with the exception of haddock, lemon sole, *Nephrops* and sprat (JNCC, 2007). Cod is also on the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2014). In addition, cod, haddock and spurdog (spiny dogfish) and are listed as 'Vulnerable' globally on the International Union for the

Conservation of Nature (IUCN) Red List of Threatened Species, with spurdog (spiny dogfish) also listed as 'Endangered' in Europe. All other species are listed as 'Least Concern', aside from sole which is listed as 'Data Deficient' (IUCN, 2023).

4.2.3.2 Elasmobranchs

Elasmobranchs encompass species of sharks, skates and rays. These species differ from other fish by having a skeletal structure made out of cartilage as opposed to bone. They typically have a slow growth rate and low fecundity, leaving their populations vulnerable to over-fishing, habitat degradation and pollution events however, their distribution is wide throughout the world's oceans (Baxter *et al.*, 2011).

A survey of the distribution of elasmobranch species was recorded throughout the North Sea and surrounding waters. Species which have been recorded in the SNS at various times throughout the year, and may therefore be present in the vicinity of the Kilmar infrastructure, are listed in Table 4.7 (Ellis *et al.*, 2004; IUCN, 2023).

Table 4.7. Elasmobranch Species Likely to be found in the Vicinity of the Proposed Decommissioning Work in ICES Rectangle 37F1 (Ellis et al., 2004; IUCN, 2023)

Common name	Latin name	Depth range (in metres)	Global IUCN Status [1]	European IUCN Status [1]
Thorny skate / Starry ray	*Amblyraja radiata*	18 – 1400	Vulnerable	Least Concern
Smallspotted catshark	*Scyliorhinus canicula*	< 400	Least Concern	Least Concern
Spiny dogfish	*Squalus acanthias*	15 – 528	Vulnerable	Endangered
Spotted skate	*Raja montagui*	< 530	Least Concern	Least Concern
Thornback skate	*Raja clavata*	10 – 300	Near Threatened	Near Threatened

[1] Status as of December 2023

Of these species listed in the table above thorny skate, spiny dogfish and thornback skate are of most concern due to their unfavourable conservation status (IUCN, 2021). In addition, spotted skate, thornback skate, and spiny dogfish are listed on the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2014). Smallspotted catshark and Spiny dogfish populations are described to be increasing in Europe (IUCN, 2023). Thorny skate / Starry ray, Spiny dogfish and Thornback Skate populations are described to be decreasing Globally (IUCN, 2023).

4.2.4 Seabirds

4.2.4.1 At-Sea Distribution

The offshore waters of the SNS are visited by seabirds, mainly for feeding purposes in and around the shallow sandbanks, although the number of seabirds in this region are generally lower compared to further north (DECC, 2016).

The abundance, distribution and assemblage of seabird species varies seasonally. Between December and March, large numbers of auks; guillemot (*Uria aalge*) and razorbill (*Alca torda*), are present in the offshore waters of the SNS and around Flamborough Head, located approximately 94 km to the west of the Kilmar platform. Large numbers of terns are present in the area during April and May and in coastal waters in August. The breeding season for most seabird species begins in April and continues through to June. During this and during the annual moult in July, most species are found in coastal waters and forage closer to their colonies (BEIS, 2022a).

The coastline in this region of the SNS encompasses a number of areas suitable for cliff nesting seabirds as well as important habitats for wintering and passage waterbirds (BEIS, 2022a). Based on the mean maximum foraging ranges taken from Woodward *et al*., 2019, species which are likely to be present from coastal SPAs including the Flamborough and Filey Coast SPA (located approximately 94 km to the west of Kilmar) include kittiwake (*Rissa tridactyla*) (156.1±144.5 km), guillemot (73.2±80.5 km), gannet (*Morus bassanus*) (315.2±194.2 km) and razorbill (88.7±75.9 km) (Woodward *et al.,* 2019).

The European Seabirds at Sea (ESAS) database indicates that the Kilmar infrastructure is not within a hotspot area, defined as an important area of high seabird density at sea. The predicted at-sea seabird density in the blocks of interest are shown in Table 4.8, with the data indicating a density of less than 43 seabirds per km^2 during the breeding season (March – September) and less than 16 seabirds per km^2 in winter (November – March). The most abundant species present is guillemot in the breeding season, kittiwake over winter, and guillemot during the post breeding dispersal period (JNCC, 2019; Kober *et al.*, 2010).

Table 4.8. Predicted At-Sea Seabird Density (number of individuals per km^2) (JNCC, 2019; Kober et al., 2010)

<table>
<tr><th rowspan="2">Species</th><th rowspan="2">Season</th><th colspan="12">Predicted Density in the Blocks of Interest [1]</th><th rowspan="2">Predicted Density Range Across UK Waters [1]</th></tr>
<tr><th>J</th><th>F</th><th>M</th><th>A</th><th>M</th><th>J</th><th>J</th><th>A</th><th>S</th><th>O</th><th>N</th><th>D</th></tr>
<tr><td rowspan="2">Fulmar</td><td>Breeding</td><td></td><td></td><td colspan="5">8.49</td><td></td><td></td><td></td><td></td><td></td><td>0 – 582.6</td></tr>
<tr><td>Winter</td><td colspan="2">4.92</td><td></td><td></td><td></td><td></td><td></td><td colspan="5">4.92</td><td>0 – 239.2</td></tr>
<tr><td>Sooty shearwater</td><td>Winter</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="5">< 0.01</td><td></td><td>0 - 16.3</td></tr>
<tr><td>Manx shearwater</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="5">< 0.01</td><td></td><td></td><td></td><td>0 - 190.2</td></tr>
<tr><td rowspan="2">Gannet</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="5">0.29</td><td></td><td></td><td></td><td>0 - 110.5</td></tr>
<tr><td>Winter</td><td colspan="4">2.77</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2.77</td><td>0 - 24.9</td></tr>
<tr><td>Arctic skua</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="4">< 0.01</td><td></td><td></td><td></td><td></td><td>0 - 2.4</td></tr>
<tr><td rowspan="2">Great skua</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="4">0.02</td><td></td><td></td><td></td><td></td><td>0 - 1.6</td></tr>
<tr><td>Winter</td><td colspan="4">0.13</td><td></td><td></td><td></td><td></td><td colspan="4">0.13</td><td>0 - 4.3</td></tr>
<tr><td rowspan="2">Kittiwake</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="5">11.2</td><td></td><td></td><td></td><td>0 - 185.0</td></tr>
<tr><td>Winter</td><td colspan="4">15.5</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">15.5</td><td>0 - 306.8</td></tr>
<tr><td>Black-headed gull</td><td>Breeding</td><td></td><td></td><td></td><td colspan="5">0.32</td><td></td><td></td><td></td><td></td><td>0 - 12.0</td></tr>
<tr><td>Little gull</td><td>Other</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="4">< 0.01</td><td></td><td>0 - 5.2</td></tr>
<tr><td rowspan="2">Great black-backed gull</td><td>Breeding</td><td></td><td></td><td></td><td colspan="5">0.02</td><td></td><td></td><td></td><td></td><td>0 - 4.8</td></tr>
<tr><td>Winter</td><td colspan="3">2.1</td><td></td><td></td><td></td><td></td><td></td><td colspan="4">2.1</td><td>0 - 19.5</td></tr>
<tr><td rowspan="2">Common gull</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="4">0.17</td><td></td><td></td><td></td><td></td><td>0 - 2.6</td></tr>
<tr><td>Winter</td><td colspan="4">0.02</td><td></td><td></td><td></td><td></td><td colspan="4">0.02</td><td>0 - 39.9</td></tr>
<tr><td rowspan="2">Lesser black-backed gull</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="4">0.27</td><td></td><td></td><td></td><td></td><td>0 - 351.7</td></tr>
<tr><td>Winter</td><td colspan="4">0.11</td><td></td><td></td><td></td><td></td><td colspan="4">0.11</td><td>0 - 368.8</td></tr>
<tr><td>Herring gull</td><td>Winter</td><td colspan="3">2.45</td><td></td><td></td><td></td><td></td><td></td><td colspan="4">2.45</td><td>0 - 101.9</td></tr>
<tr><td>Arctic tern</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="4">0.04</td><td></td><td></td><td></td><td></td><td>0 - 31.2</td></tr>
<tr><td rowspan="3">Guillemot</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="2">42.8</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0 - 713.4</td></tr>
<tr><td>Winter</td><td colspan="4">5.65</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">5.65</td><td>0 - 62.7</td></tr>
<tr><td>Other</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">19.7</td><td></td><td></td><td></td><td>0 - 254.8</td></tr>
<tr><td rowspan="3">Razorbill</td><td>Breeding</td><td></td><td></td><td></td><td></td><td colspan="2">0.32</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0 - 22.0</td></tr>
<tr><td>Winter</td><td colspan="4">0.30</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">0.30</td><td>0 - 15.8</td></tr>
<tr><td>Other</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">0.43</td><td></td><td></td><td></td><td>0 - 64.6</td></tr>
<tr><td>Little auk</td><td>Winter</td><td colspan="3">0.26</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">0.26</td><td>0 - 13.4</td></tr>
<tr><td rowspan="2">Atlantic Puffin</td><td>Breeding</td><td></td><td></td><td></td><td colspan="4">1.39</td><td></td><td></td><td></td><td></td><td></td><td>0 - 162.4</td></tr>
<tr><td>Winter</td><td colspan="3">0.54</td><td></td><td></td><td></td><td></td><td colspan="5">0.54</td><td>0 - 0.14</td></tr>
<tr><td colspan="15">Key (Number of individuals per km^2)</td></tr>
<tr><td colspan="15">10.0 - ≤ 25.0 | 1.0 - < 10.0 | 0.01 - < 1.0 | < 0.01 | No Occurrence</td></tr>
</table>

[1] The predicted at-sea seabird density for each seabird species/season was calculated from ESAS transect data using the spatial interpolation technique Poisson kriging (Kober *et al.,* 2010).

Of the species listed in Table 4.8, the global and European populations of kittiwake are listed as Vulnerable on the IUCN Red List, and the global and European populations of razorbill and sooty shearwater (*Ardenna grisea*) are listed as Near Threatened. Atlantic puffin is listed as Vulnerable globally and fulmar is listed as Least Concern globally, although both species are listed as Endangered in Europe. Globally, herring gull (*Larus argentatus*), and guillemot are of Least Concern, however their European populations are Near Threatened. The global and European populations of Manx shearwater, gannet, arctic skua (*Stercorarius parasiticus*), great skua (*Stercorarus skua*), great black-backed gull (*Larus marinus*), common gull (*Larus canus*), lesser black-backed gull, common tern (*Sterna hirundo*) and little auk (*Alle alle*) are of Least Concern (IUCN, 2023).

JNCC prepares the latest analysed trends in abundance, productivity, demographic parameters, and diet of breeding seabirds, from the Seabird Monitoring Programme (JNCC, 2023). This data provides at-a-glance UK population trends as a percentage of change in breeding numbers from complete censuses. From the year 2015 to 2021, 25 species were monitored, and there is confidence in the trends of 21 of these species, with 11 of these 21 having declined in population since the 1998- 2002 census. Species with declining population trends include Arctic skua (-66%), common gull (-49%), black- legged kittiwake (-42%), northern fulmar (-35%), and great, black-backed gull (-40%). Breeding seabird numbers of some species have shown a long-term decline, probably as a result of a shortage of key prey species such as sandeel associated with changes in oceanographic conditions (BEIS, 2022). This is further exacerbated by fish stock depletion by commercial fisheries, meaning there's not enough food to go around during the important breeding season. In contrast, seabird species with increasing population trends include great skua (+14%), razorbill (+18%) and northern gannet (+38%). Species that remained stable (change within +/- 10%) include common guillemot, common tern, and sandwich tern (JNCC, 2023).

4.2.4.2 Nesting Seabirds on the Kilmar Platform

Part 3 of the Conservation of Offshore Marine Habitats & Species Regulations 2017, and in particular regulation 40, gives protection to wild birds, their eggs and nests in UK offshore waters. The presence of wild birds on the Kilmar platform may therefore affect the timing of the proposed decommissioning activities.

To date, evidence suggests that black-legged kittiwakes are the predominant bird species exploiting nesting opportunities on offshore installations in the SNS (typically those in lighthouse mode prior to dismantlement). Although most kittiwake colonies are located on sheer cliffs, the species is known to nest on man-made structures such as offshore oil and gas installations (JNCC, 2021). Colony size can vary from less than ten pairs to tens of thousands, with individuals returning to the same colony over multiple years. The nearest major colony to the Kilmar platform is the Flamborough and Filey Coast SPA, which supported 45,504 apparently occupied nests in 2017 (JNCC, 2017), located approximately 94 km to the west of the Kilmar platform.

The global and European populations of kittiwake are listed as Vulnerable on the IUCN Red List. Kittiwake is also on the OSPAR List of Threatened and/or Declining Species and Habitats and Red listed in Birds of Conservation Concern 4.

The phenology of nesting kittiwakes has been summarised in Table 4.9, although timings can vary from year to year due to factors such as lack of food. During the breeding season, kittiwakes feed mainly on small pelagic shoaling fish, particularly sandeels, but also scavenge for offal and discards around fishing boats (JNCC, 2021b). The first breeding does not usually occur until the age of 4 to 5 years, with birds laying 1 to 3 eggs per season (Del Hoyo *et al*., 1996; Cramp and Simmons, 1983).

Table 4.9. Phenology of Kittiwakes (Coulson et al., 2011; Hatch et al., 2020; JNCC, 2021b; Keogan et al., 2018)

Behaviour	Approx. Date Range	Observations
First Arrival	February to April	-
Nest Building	End of April – Mid May	Nests are normally built 1-3 weeks before appearance of first eggs.
Egg Laying	May	At Flamborough & Filey Coast SPA egg laying normally occurs in early to mid May. Incubation is normally around one month.
Hatching	Mid to late June	-
Fledging	Late July – September	Peak in mid-August, with chicks leaving colony ca. 10 days after first flight.

In September 2022, a third party on behalf of WPRL, investigated if seabirds were present on the Kilmar platform. An ornithological survey was carried out to using methodologies in line with current JNCC and OPRED guidelines (JNCC, 2021b; Walsh *et al.,* 1995). The platform was accessed via helicopter. All areas/levels of the platform were observed; birds were found to be roosting on the helideck and the vent, it was also reported that roosting on lower leg cross members occurred. No history of past nesting was observed. 40 birds in total were observed, the species identified at the time was herring gull only (Figure 4.3).

The presence of seabirds on the Kilmar platform has also been recorded by WPRL during maintenance visits to the platform as follows: 6 x herring gulls observed in March 2023; 3 x herring gulls observed in February 2023; 200 x gulls, 100 x kittiwakes, 2 x sparrowhawks (*Accipiter nisus*) and 1 x kestrel (*Falco tinnunculus*) observed in August 2022; 20 x herring gulls and 5 x kittiwakes observed in June 2022 and 5 x herring gulls observed in March 2022. Of note, no nests have been observed on the Kilmar platform during any of these visits.

Figure 4.3. Seabirds Present on and in the Vicinity of the Kilmar NUI on 23 September 2022

4.2.4.3 Seabird Sensitivity to Oiling

Seabird sensitivity to oiling varies considerably throughout the year and is dependent on a variety of factors, including time spent on the water, total biogeographical population, reliance on the marine environment and potential rate of population recovery (BEIS, 2022a). The Seabird Oil Sensitivity Index (SOSI) (Webb *et al*., 2016) combines seabird data collected between 1995 and 2015 and individual seabird species index values to create a single measure of seabird sensitivity to oil pollution. The SOSI score for each UKCS Block can be ranked into sensitivity categories, from 1 (extremely high sensitivity) to 5 (low sensitivity).

An assessment of the median SOSI scores in the vicinity of the Blocks of Interest varies from low to extremely high throughout the year (see Table 4.10).

Table 4.10. Assessment of Seabird Oil Sensitivity Index (SOSI) Scores for UKCS Blocks 43/22, 43/23, 43/24 and the Surrounding Area (Webb *et al*., 2016)

Block	J	F	M	A	M	J	J	A	S	O	N	D
43/16	N	N	N	5	5	1	2	4	4	N	N	N
43/17	N	5	5	5	2	2	2	3	3	3	N	1
43/18	1	5	5	5	2	2	2	2	3	3	1	1
43/19	2	5	5	5	3	3	1	2	3	3	2	2
43/20	2	5	5	5	4	4	1	3	4	4	2	2
43/21	1	2	2	5	5	1	2	4	1	1	1	1
43/22	**1**	**5**	**5**	**5**	**2**	**2**	**2**	**4**	**2**	**2**	**1**	**1**

Block	J	F	M	A	M	J	J	A	S	O	N	D
43/23	**1**	**5**	**5**	**5**	**2**	**2**	**2**	**3**	**2**	**2**	**1**	**1**
43/24	**2**	**5**	**5**	**5**	**3**	**3**	**1**	**2**	**2**	**2**	**2**	**2**
43/25	2	5	5	5	4	4	1	2	3	3	2	2
43/26	1	2	1	1	5	1	2	3	1	1	1	1
43/27	1	3	5	1	1	2	1	3	1	1	1	1
43/28	1	5	5	5	3	3	1	4	1	1	1	1
43/29	2	5	5	5	3	3	1	4	2	2	2	2
43/30	2	5	5	5	2	2	1	4	3	3	2	2

Key: 1 = Extremely High; 2 = Very High; 3 = High; 4 = Medium; 5 = Low; 'N' = No Data.
SOSI sensitivity category in red and underlined indicates an indirect assessment of SOSI scores, in light of coverage gaps.
Rows in bold indicate the UKCS blocks within which the Kilmar infrastructure is located.

4.2.5 Marine Mammals

4.2.5.1 Cetaceans

Cetacean abundance in the SNS is relatively low compared to the northern and central North Sea, with the exception of harbour porpoise (*Phocoena phocoena*). Ten species of cetacean have been sighted in the SNS, however only the harbour porpoise and the white-beaked dolphin (*Lagenorhynchus albirostris*) are considered to be regularly occurring. Minke whale (*Balaenoptera acutorostrata*) is a frequent seasonal visitor, whilst bottlenose dolphin (*Tursiops truncatus*) and white-sided dolphin (*Lagenorhynchus acutus*) are considered uncommon visitors (BEIS, 2022a).

Harbour porpoise are found in persistently high densities year round at the inner Silver Pit, in summer at the north-western edge of Dogger Bank, and in winter in offshore areas east of Norfolk and east of the outer Thames estuary. The SNS SAC has been designated to protect these areas and the Kilmar infrastructure lies within this SAC (refer to Section 4.2.6 for further details).

The relative abundance of the most common species of cetaceans in this area of the SNS can be derived from data obtained during the Small Cetacean Abundance of the North Sea (SCANS-III) aerial and ship-based surveys. This project identified the abundance of cetacean species within predefined sectors of the North Sea and North-East Atlantic. The Kilmar infrastructure is located within SCANS-III Block O (Table 4.11) in which harbour porpoise, minke whale and white-beaked dolphin have been recorded (Hammond *et al.,* 2021). It should be noted that although density estimates are shown in Table 4.11, they are only an example of what densities could be encountered in the area due to the wide-scale nature of the SCANS-III survey and the fact the data was only collected in July 2016.

Table 4.11. Cetacean Abundance and Density Recorded in SCANS-III Aerial Survey Area Block O (Hammond et al., 2021)

Species	SCANS-III Block 'O'		Total (Aerial Survey Blocks)	
	Abundance	Density [1]	Abundance	Density [1]
Harbour porpoise	53,485	0.888	424,245	0.351
White-beaked dolphin	143	0.002	36,287	0.030
Minke whale	603	0.010	13,101	0.011

[1] Density is the number of individuals per km^2.

The UK Statutory Nature Conservation Bodies (SNCBs) have defined Management Units (MUs) for seven cetacean species (harbour porpoise, Risso's dolphin (*Grampus griseus*), common dolphin, bottlenose dolphin, white-beaked dolphin, white-sided dolphin, and minke whale) in UK waters in order to provide an understanding of the geographical range and abundance of marine mammal populations, and subpopulations, to aid conservation and management purposes. The MUs within which the Kilmar infrastructure is located, along with the corresponding abundance of animals within these units, are listed in Table 4.12 below (IAMMWG, 2022).

Table 4.12. Estimates of Cetacean Abundance in the Relevant MMMUs (IAMMWG, 2022)

Species	Management Unit (MU)	Abundance in MU	Abundance in UK part of MU	Density[1]
Harbour porpoise	North Sea (678,206 km^2)	346,601	159,632	0.5
Bottlenose dolphin	Greater North Sea (639,886 km^2)	2,022	1,885	0.003
Risso's dolphin	Celtic and Greater North Seas (1,560,875 km^2)	12,262	8,687	0.007
Common dolphin		102,656	57,417	0.06
Minke whale		20,118	10,288	0.01
White-beaked dolphin		43,951	34,025	0.02
White-sided dolphin		18,128	12,293	0.01

[1] Density (individuals per km^2) was calculated using the total area of the MU and the abundance of animals within that MU.

It is evident that harbour porpoise is the most abundant species in the North Sea compared to other species identified in Table 4.12, despite its MU being smaller in area.

To provide a more localised indication of the seasonal distribution of cetaceans in the area of the Kilmar infrastructure, data from the JNCC Atlas of Cetacean Distribution in north-west European Waters is shown in Table 4.13. This indicates that harbour porpoise, bottlenose dolphin, minke whale, pilot whale and white-beaked dolphin have been observed within ICES Rectangle 37F1 (Reid *et al.*, 2003).

Table 4.13 Cetacean Sightings in the Vicinity of the Kilmar Infrastructure (Reid et al., 2003)

Species	J	F	M	A	M	J	J	A	S	O	N	D
Harbour porpoise				V. Low	V. Low		V. Low	V. Low	V. Low	V. Low	Low	
Bottlenose Dolphin											V. Low	
Minke whale							V. Low	V. Low				
Pilot whale								V. Low				
White-beaked dolphin			V. Low		V. Low		V. Low			V. Low		

Key (Number of individuals per hour of sightings effort)

High (>100)	Medium (10 – 100)	Low (1 – 10)	V. Low (0.01 – 1)	No sightings

It is important to note that the lack of recorded sightings does not necessarily preclude the presence of other species. In addition, the highly mobile nature of cetaceans means that species that are found within the area in general, such as harbour porpoise and white-beaked dolphin, may be present at other times of the year.

All cetaceans (whales, dolphins and porpoises) are protected under Annex IV of the Council Directive 92/43/EEC (also known as the Habitats Directive). In addition, harbour propose is also listed on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2014) and harbour porpoise and bottlenose dolphin are listed under Annex II of the EC Habitats Directive. All of the species that may occur in the vicinity of the Blocks of Interest are listed as UK BAP priority species (JNCC, 2007), but are of least concern on the IUCN Red List (IUCN, 2023).

4.2.5.2 Pinnipeds

Two species of seals; grey seal (*Halichoerus grypus*) and the harbour (or common) seal (*Phoca vitulina*) are found along the English coast. Important numbers of grey and harbour seals are present off the east coast of England, particularly around The Wash where harbour seals forage over a wide area.

Grey and harbour seals are both listed under Annex II of the Habitats Directive, requiring the designation of SACs in order to protect these species. In addition, harbour and grey seals are listed as UK BAP priority marine species (JNCC, 2007). The Kilmar site lies within seal management unit (SMU) 9; southeast England (SCOS, 2021).

Grey Seal

Grey seals are rare globally, and the UK hosts around 34% of the world population and 82% of the EU population. Several colonies exist on the east coast of England, including Donna Nook, Blakeney Point, Horsey, Flamborough Head and The Wash (SCOS, 2022). A total of 8,677 grey seals were counted between Donna Nook and Dover in August 2019 (BEIS, 2022a; SCOS, 2020). In the southeast England SMU, the 2021 August grey seal count was 7,694, a decrease from the previous count in the 2016-2019 period (SCOS, 2022). The total UK grey seal population of at the start of the 2022 breeding season (before pups are born) is estimated at 162,000 (approximate 95% CI 146,700-178,500) (SCOS, 2022).

Grey seals forage in the open sea and return regularly to haul out on land where they rest, moult and breed. Grey seal foraging movements are on two geographical scales: long and distant trips from one haul-out site to another; and local repeated trips to discrete foraging areas (McConnell *et al.* 1999). Foraging areas can be up to 100 km offshore and connected to haul-out sites by prominent high-usage corridors (Jones *et al.*, 2016).

The at-sea distribution (relative density) of grey seals in the vicinity of the Kilmar infrastructure is moderate to high (between 0.00501-0.05% of the population per 25 km^2) (Figure 4.4; Carter et al., 2022). Densities at sea are lower during pupping and breeding season, which in south-east Britain occurs between August and September, and during the moulting season (February to March) (SCOS, 2022).

Harbour Seal

Around 32% of EU harbour seals are found in the UK. Their distribution on the east coast of the UK is restricted, concentrating in major estuaries including the Thames, The Wash and the Moray Firth. The south-east coast of England hosts several harbour seal colonies and haul-out sites, and total count for the southeast England SMU between 2016-2019 was 3,752 (SCOS, 2021). The most recent August 2021 harbour seal count was 3,505, a slight decrease since the previous survey (SCOS, 2022). The current best estimate of the UK harbour seal population in 2021 was 42,900 (approximate 95% CI: 35,100-57,100) (SCOS, 2022). Over the last 10 years reports showed significant growth in both SMUs on the east coast of England up to 2018. However, the 2019 count was approximately 25% lower than the mean of the previous 5 years. Counts for 2020, 2021 and 2022 confirm that this decline has continued (SCOS, 2022)

In general, the harbour seal tends to forage within 40 – 50 km of its haul out sites (SCOS, 2022). Tagging studies, however, have demonstrated that individuals from haul-out sites in The Wash forage for much greater distances than individuals from elsewhere in the UK (Sharples *et al.*, 2012).

The at-sea distribution (relative density) of harbour seals in the vicinity of the Kilmar infrastructure is low (< 0.001 % of the population per 25 km^2) (Figure 4.4; Carter et al., 2022). Harbour seals spend more time ashore at haul-out sites from June to July during breeding and in August during moulting season, and thus densities at sea are lower during this time (SCOS, 2022).

Management Units

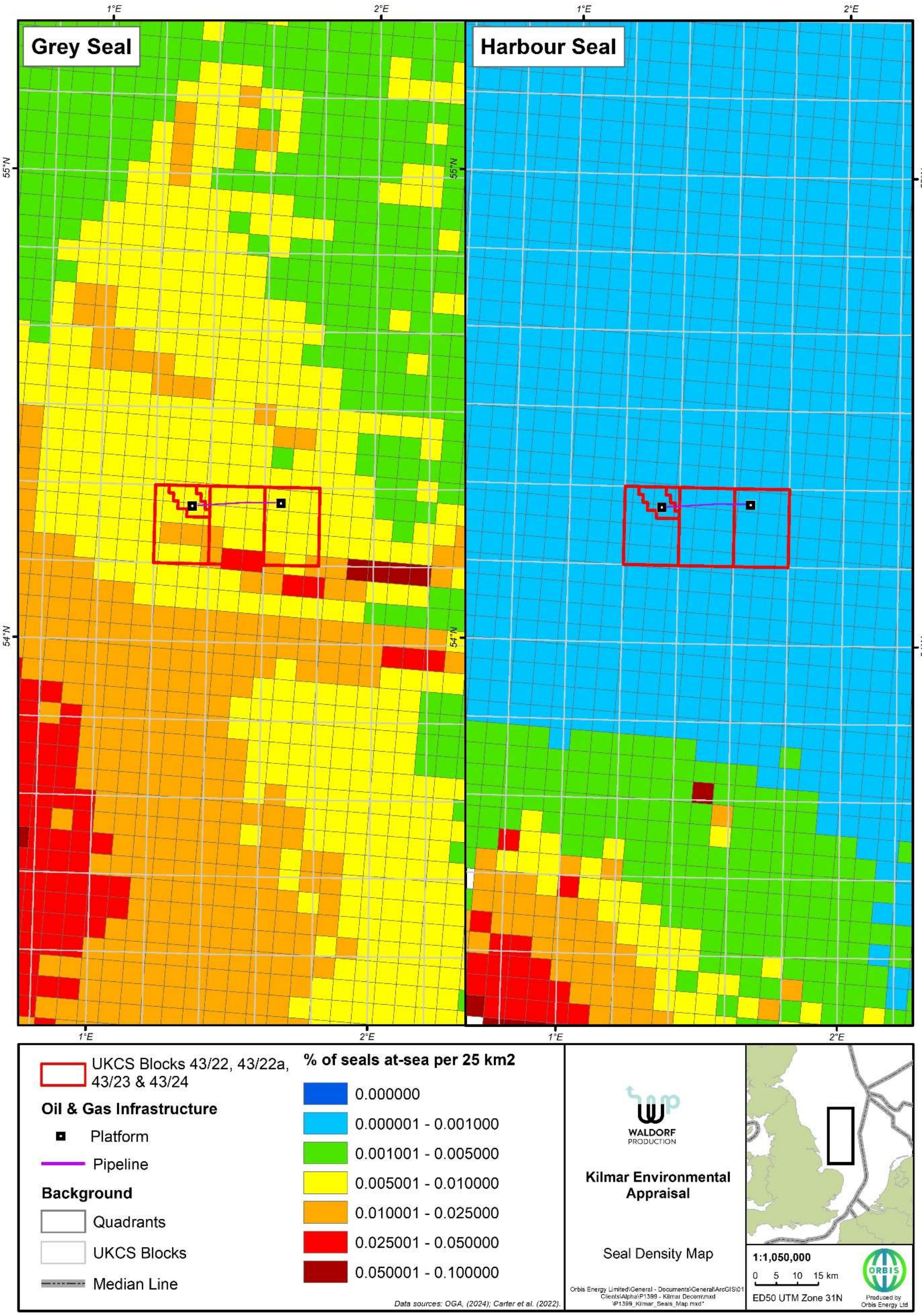
The UK SNCBs have defined MUs for grey and harbour seals in inshore UK waters in order to provide an understanding of their geographical range, and abundance of their populations and subpopulations, to aid conservation and management purposes. The proposed decommissioning work is not located within a MU for seals as these are specific to inshore waters (IAMMWG, 2022). However, it is noted that the seaward extent of these MUs is illustrative and not definitive, as seals will cross MU boundaries on a regular basis. Table 4.14 lists the seal count for the South East England MU, along with the corresponding abundance of animals within this unit.

Table 4.14. Marine Mammal Management Units for Pinnipeds in UK Waters (IAMMWG, 2013)

Species	Management Unit	Seal Count	Estimated Population Size [1]	Survey Year
Harbour seal	South East England	3,567	-	2011
Grey seal		3,103	10,350	2010, 2011

[1] An independent population estimate for grey seals was calculated using counts obtained during the 2007 and 2008 summer surveys (Lonergan *et al.*, 2010). This estimate was not available for harbour seals.

Figure 4.4: Percentage of the at-sea distribution (relative density) of the Grey and Harbour Seals population estimated to be present per 25 km² at any one time (Carter et al., 2022)



4.2.6 Marine Protected Areas

The Kilmar infrastructure lies within the boundary of one marine protected area (MPA), the SNS SAC. There is one other MPAs located within 40 km of the Kilmar infrastructure, the Dogger Bank SAC.

In addition, the Greater Wash SPA, which lies along the adjacent coastline approximately 92 km from the Kilmar platform at the closest point, has also been scoped into the assessment as vessels transiting through this site on the way to the Kilmar location have the potential to disturb overwintering birds (red-throated diver and common scoter).

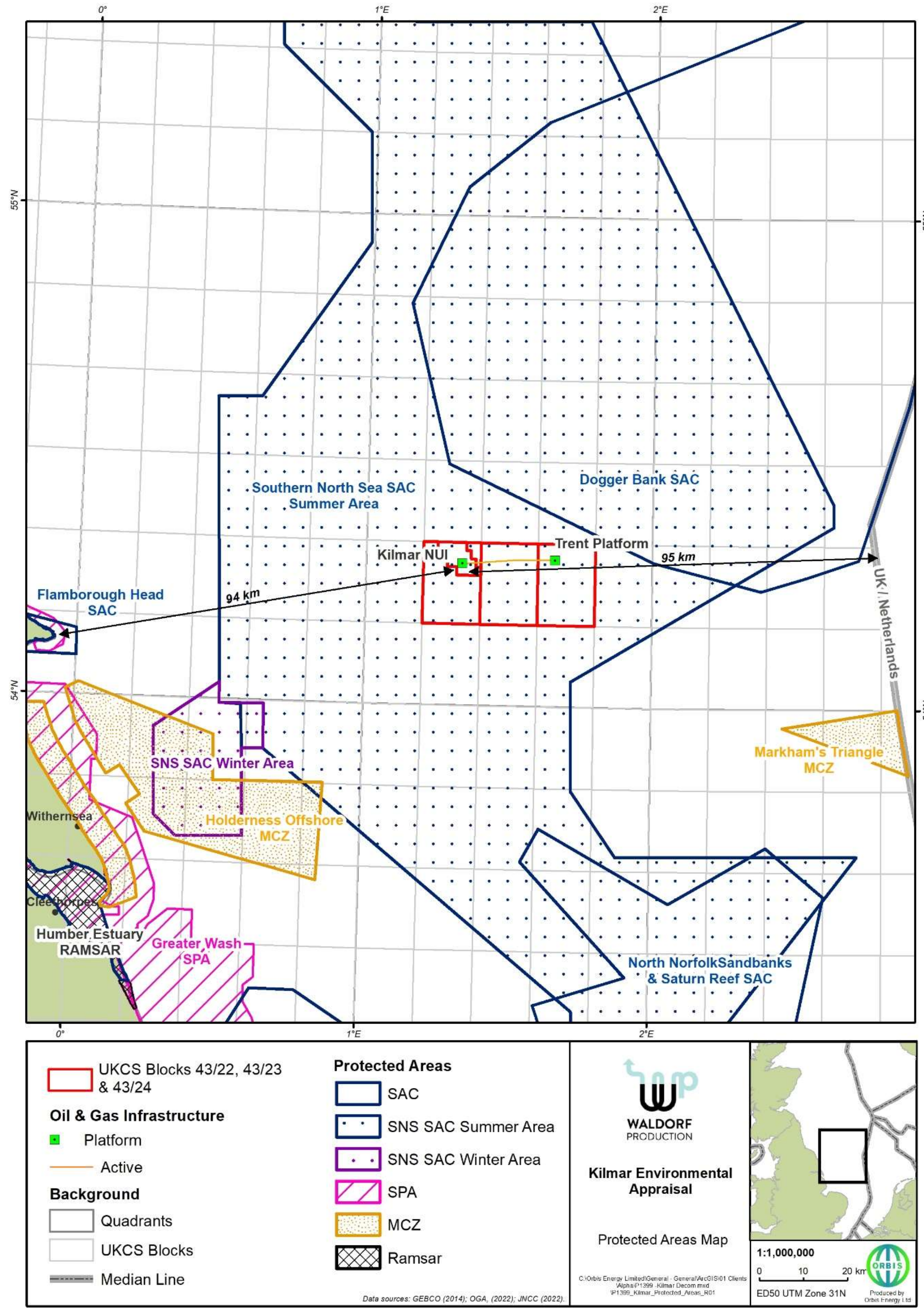
Figure 4.5 shows the location of these MPAs in relation to the location of the Kilmar infrastructure and the qualifying features and site description are detailed in Table 4.15.

Table 4.15. Marine Protected Areas within 40 km of the Proposed Kilmar Decommissioning Work

Site Name	Distance & Direction	Qualifying Features and Site Description
Southern North Sea SAC	All Kilmar infrastructure is located within the boundary of the SAC	**Features:** Annex II species; Harbour porpoise (*Phocoena phocoena*) (1351). **Description:** The site has been identified as an area of importance for harbour porpoise, and supports 17.5% of the UK North Sea MU population. This site covers an area of 36,951 km^2. The majority of this site lies offshore, though it does extend into coastal areas of Norfolk and Suffolk. The northern two thirds of the site (within which the Kilmar infrastructure is located) are recognised as important for porpoises during the summer season (April – September), whilst the southern part supports persistently higher densities during the winter (October – March). **Conservation Objectives:** To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: • Harbour porpoise is a viable component of the site; • There is no significant disturbance of the species; The condition of supporting habitats and processes, availability of prey is maintained.

Site Name	Distance & Direction	Qualifying Features and Site Description
Dogger Bank SAC	19 km NE from Kilmar platform and 9 km NE from the Trent Platform	**Features:** Annex I habitat; Sandbanks which are slightly covered by seawater all the time (1110). **Description:** The Dogger Bank is the largest single continuous expanse of shallow sandbank in UK waters, the southern area of the bank is covered by water seldom deeper than 20 m and extends within the SAC in UK waters down to 35–40 m deep. The site covers an area of 12,331 km^2. The site is an important location for the North Sea harbour porpoise population and as such, they are included as a non-qualifying feature. Grey and common seals are known to visit the bank and are also included as non-qualifying features at the site. Sediments range from fine sands containing many shell fragments on top of the bank to muddy sands at greater depths supporting invertebrate communities, characterised by polychaete worms, amphipods and small clams within the sediment, and hermit crabs, flatfish, starfish and brittlestars on the seabed. Sandeels are an important prey source at the bank, supporting fish, seabirds and cetaceans. **Conservation Objectives:** For the feature to be in favourable condition thus ensuring site integrity in the long term and contribution to FCS of Annex I Sandbanks which are slightly covered by seawater all the time. This contribution would be achieved by maintaining or restoring, subject to natural change: • The extent and distribution of the qualifying habitat in the site; • The structure and function of the qualifying habitat in the site; • The supporting processes on which the qualifying habitat relies.
Greater Wash SPA	92 km SWW from Kilmar platform	**Features:** Annex I bird species: Red throated diver (*Gavia stellata*), little gull (*Hydrocoloeus minutus*), little tern (*Sternula albifrons*), sandwich tern (*Sterna sandvicencis*), common tern (*Sternula albifrons*); and Migratory species: common scoter (*Melanitta nigra*). **Description:** The site is located predominantly in the coastal waters of the mid-SNS between the counties of Yorkshire and Suffolk, covering an area of 3,536km^2. This area supports the largest breeding populations of little terns within the UK SPA network by protecting important foraging areas, and supports the second largest aggregations of non-breeding red-throated diver and little gull. The SPA includes a range of marine habitats, including intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef, including *Sabellaria* reefs and mussel beds. **Conservation Objectives:** The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified (see above). The objectives are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and • The distribution of the qualifying features within the site.

Figure 4.5. Marine Protected Areas in the Vicinity of the Kilmar Infrastructure



4.3 Human Environment

4.3.1 Commercial Fishing

The North Sea is one of the world's most important fishing grounds, and major UK and international fishing fleets operate in the SNS, including vessels from England, Scotland, Belgium, Holland, Denmark and France (DECC, 2009). Fishing effort and landings are recorded by ICES Rectangle on a monthly and annual basis. As previously noted the Kilmar infrastructure is located within ICES Rectangles 37F1.

Fishing effort within ICES Rectangle 37F1 is low, with an average of 63 days fished per year between 2018 and 2022 (Table 4.15). Fishing effort is highest in May and August, but a deceasing trend has been seen between 2018 and 2022 (Table 4.15). It should be noted that the majority of fishing effort data for ICES Rectangle 37F1 was 'disclosive', meaning that rectangles in which fewer than five over 10 metre vessels undertook fishing activity are identified but as the data are disclosive they are not shown; indicating very low effort (Marine Scotland, 2022).

Fishing landings data is provided by the Marine Management Organisation (MMO) for the weight and value of fish. In ICES Rectangle 37F1, the mean annual fish landings (by weight) between 2018 and 2022 was 310 tonnes, with a mean value of £579,152. The annual value (£) of fisheries in ICES Rectangle 37F1 has decreased substantially between 2018 and 2022. Landings data demonstrate that catches within the time frame (by weight) are largely composed of shellfish (69%), followed by demersal species (31%). The most frequently caught species are crabs (702 tonnes), sandeels (235 tonnes) and whelks (178 tonnes) (MMO, 2022). Table 4.16 provides a summary of UK Fleet landings over a five-year period (2018-2022). There has been a general declining trend from 2018 to 2022 in ICES rectangle 37F1 (MMO, 2022). In ICES rectangle 37F1 the most frequently used type across the period 2018-2022 to was shared dominantly between traps (33%) and trawls (33%), followed by dredges (20%) and seine nets (13%) (Marine Scotland, 2023).

Table 4.15. Total Fishing Effort (Days Fished) between 2017 and 2021 within ICES Rectangle 37F1 (Marine Scotland, 2022)

ICES Rectangle 37F1													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total [1]**
2022	D	D	D	D	D	D	D	D	D	15	8	D	22
2021	D	D	D	20	27	16	D	10	D	D	D	D	72
2020	D	D	D	D	13	11	D	D	D	17	D	D	41
2019	D	D	D	D	25	D	17	18	18	D	D	D	78
2018	D	D	D	D	D	14	16	39	20	14	D	D	103

Note: Monthly fishing effort by UK vessels landing into Scotland: Blank = no data, D = Disclosive data (indicating very low effort),
[1] Includes any days that cannot be disclosed in the monthly figures,
green = 0 – 100 days fished, yellow = 101 – 200, orange =201-300, red = ≥301

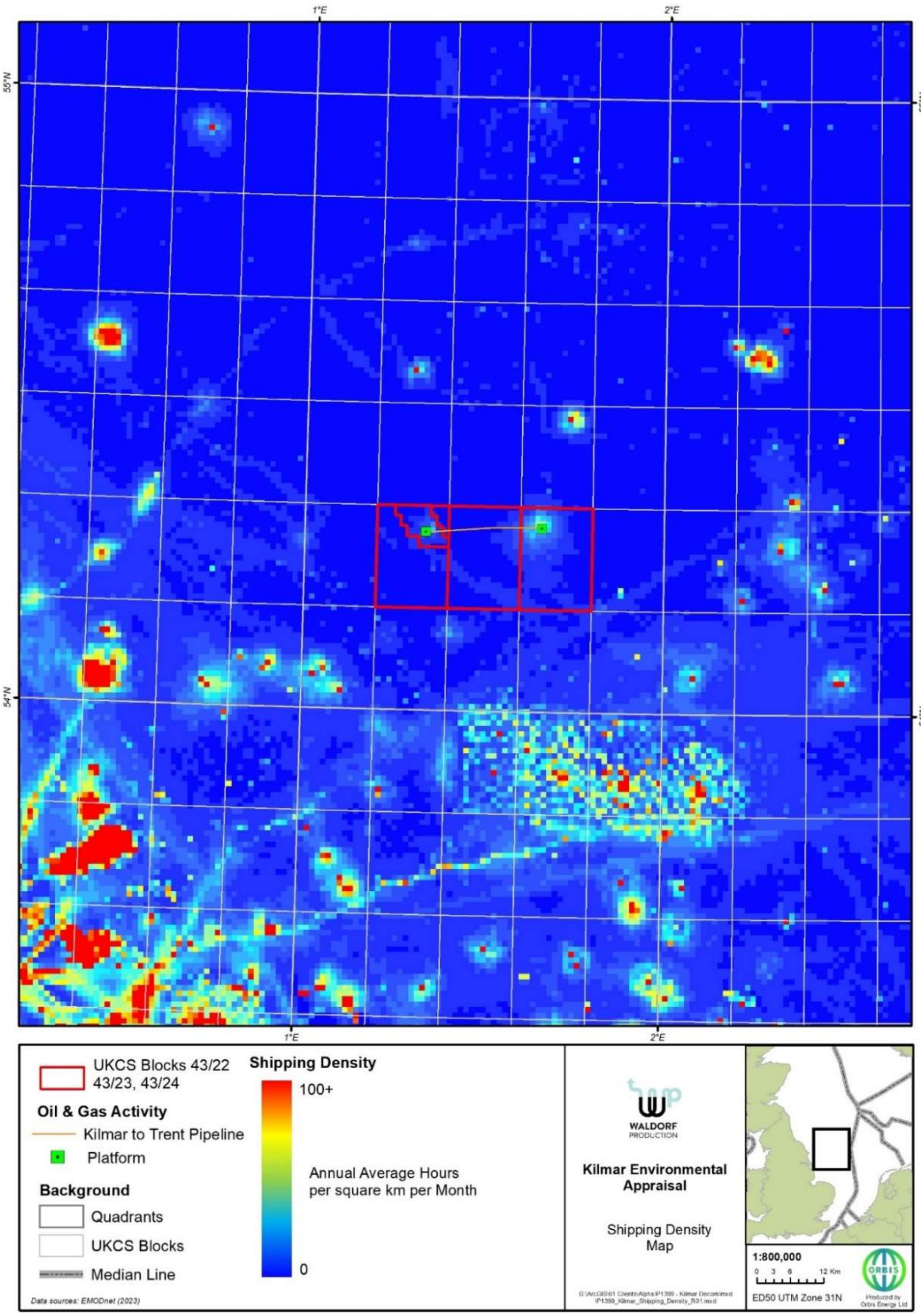
Table 4.16: Live Weight and Value of Fish and Shellfish from ICES Rectangle 37F1 from 2018 to 2022 (MMO, 2023)

Species type	2022		2021		2020		2019		2018	
	Value (£)	Landed weight (tonnes)	Value (£)	Landed weight (tonnes)	Value (£)	Landed weight (tonnes)	Value (£)	Landed weight (tonnes)	Value (£)	Live weight (tonnes)
Demersal	54,345.22	17.03	21,067.30	19.96	39,372.11	26.33	129,649.25	281.47	276,773.02	129.21
Pelagic	16.35	0.02	1,815.75	1.65	70.50	0.07	1,618.74	0.72	77.82	0.07
Shellfish	233,383.72	76.52	515,616.87	285.58	386,455.85	203.34	605,009.16	269.04	630,487.30	237.12
Total	**287,745.29**	**93.56**	**538,499.92**	**307.18**	**425,898.46**	**229.74**	**736,277.15**	**551.23**	**907,338.14**	**366.41**

4.3.2 Shipping

The density of shipping traffic in the SNS is relatively high due to the presence of fishing vessels, oil and gas activity, some ferries between the UK and the rest of Europe, and cargo and offshore support vessels (DECC, 2022). Shipping activity is considered to be relatively low within the Blocks of Interest, as seen in Figure 4.6 below (EMODnet, 2023). Removal of the Kilmar platform will see the associated vessel movements cease reducing the shipping intensity in the area.

Figure 4.6. Shipping density in the vicinity of the Kilmar Infrastructure (EMODnet, 2023)



4.3.3 Oil and Gas Activities

There is a high level of existing oil and gas activity in this region of the SNS, as illustrated in Figure 4.7. Facilities adjacent to the Kilmar platform are listed in Table 4.17.

Table 4.17. Oil and Gas Infrastructure Adjacent to the Kilmar Platform (OGA, 2023)

Name	Distance/ Direction[1]	Operator	Status
Garrow Platform	22 km West	Energean UK LTD	Non-operational and shut-in
Trent Platforms	21 km East	Perenco UK Limited	Non-operational and shut-in
Johnston Subsea Wells	29 km South Southwest	Premier Oil E&P UK EU Limited	Operational
Ravenspurn North Platforms	23km – 36 km South Southwest	Perenco UK Limited	Operational
Ravenspurn South Platforms	37 km – 40 km South Southwest	Perenco UK Limited	Operational
Babbage Platform	37km South	NEO Energy Petroleum Limited	Operational
Whittle Subsea Wells	55 km Southwest	Perenco UK Limited	Operational
Wollaston Subsea Well	62 km Southwest	Perenco UK Limited	Operational
Tolmount Platform	63 km Southwest	ODE Asset Management Limited	Operational
Breagh Platofrm	68 km Northwest	INEOS E&P (UK) Limited	Operational
Bacton SEAL (PL1570)	Between Shearwater / Elgin-Franklin and Bacton	TotalEnergies Offshore UK Limited	Active
Garrow Pipelines (PL2160 / PL2161)	Between Garrow and Kilmar	Energean UK LTD	Non-operational
Kilmar Pipelines (PL2162 / PL2163)	Between Kilmar and Trent	Energean UK LTD	Non-operational

[1] Measured from the Kilmar NUI platform

4.3.4 Telecommunication Subsea Cables

The disused 'UK-GERMANY 6 telecom cable (Operator: TAMPNET) is located 46 km north northwest of the Kilmar NUI (Figure 4.8) (KIS-ORCA, 2023).

4.3.5 Offshore Renewable and CCS Activities

The closest windfarm to the Kilmar platform is the Hornsea Project Four (Operator: Ørsted) which is in the consented stage, located approximately 12 km to the south west of the Kilmar NUI. The operational Hornsea Project Two wind farm turbine area (Operator: Ørsted Hornsea) is located approximately 32 km south of the Kilmar platform and 31 km to the south of the Kilmar pipelines. Additionally, the operational windfarm is the Hornsea Project One (Operator: Ørsted) is located approximately 43 km southeast from the Kilmar platform and 39km from the Kilmar pipelines at its nearest point (see Figure 4.8). The Dogger Bank Southwest and Southeast sites (Operator: RWE Renewables) located 30 km north and 34 km northeast respectively of the Kilmar platform are in the pre-planning application phase. The consented Dogger Bank export cable is located 45 km northwest to the north of the Kilmar NUI at its closest point (Crown Estates, 2023).

UKCS Blocks 43/22, and 43/24 lie within the Endurance Carbon Capture and Storage (CCS) licence which is owned by BP Exploration Operating Company Limited (Crown Estate, 2023). The Kilmar and Trent infrastructure additionally lies within a carbon storage licence area offered for application (SNS Area 1) (NSTA, 2023; Figure 4.8). The Trent platform and Kilmar pipelines lie within CS006, a current UKCS License Block.

4.3.6 Offshore Aggregate and Dredging Areas

There are no aggregate or dredging areas within 40 km of the Kilmar infrastructure (Crown Estates, 2023).

4.3.7 Military Activities

UKCS Blocks 43/22, 43/23 and 43/24 lie within a Ministry of Defence (MoD) Royal Airforce Practice and Exercise Area ‘other Danger Areas’ (PEXA) (DECC, 2016).

4.3.8 Wrecks

No protected wrecks or non-designated wrecks are located in the 40 km vicinity of the Kilmar infrastructure (NMPi, 2023). It should be noted that two wrecks classified as dangerous lie within the 40 km vicinity of Kilmar; one is 24 km southwest of the Kilmar NUI at a depth of 33 m, the other is 30 km north of the Kilmar NUI at a depth of 31 m (UKHO, 2023).

Figure 4.7. Oil and Gas Infrastructure in the Vicinity of the Kilmar Infrastructure

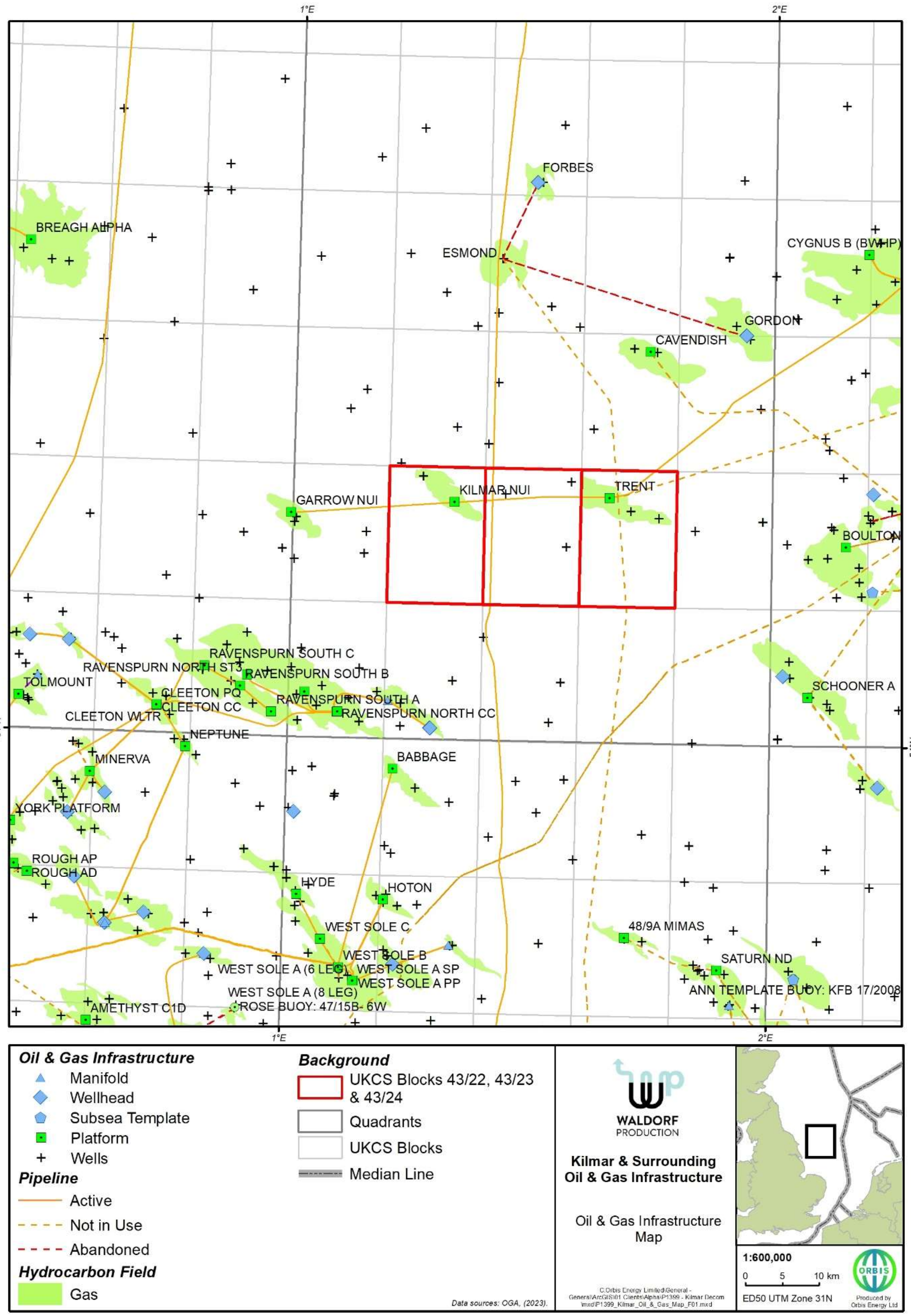
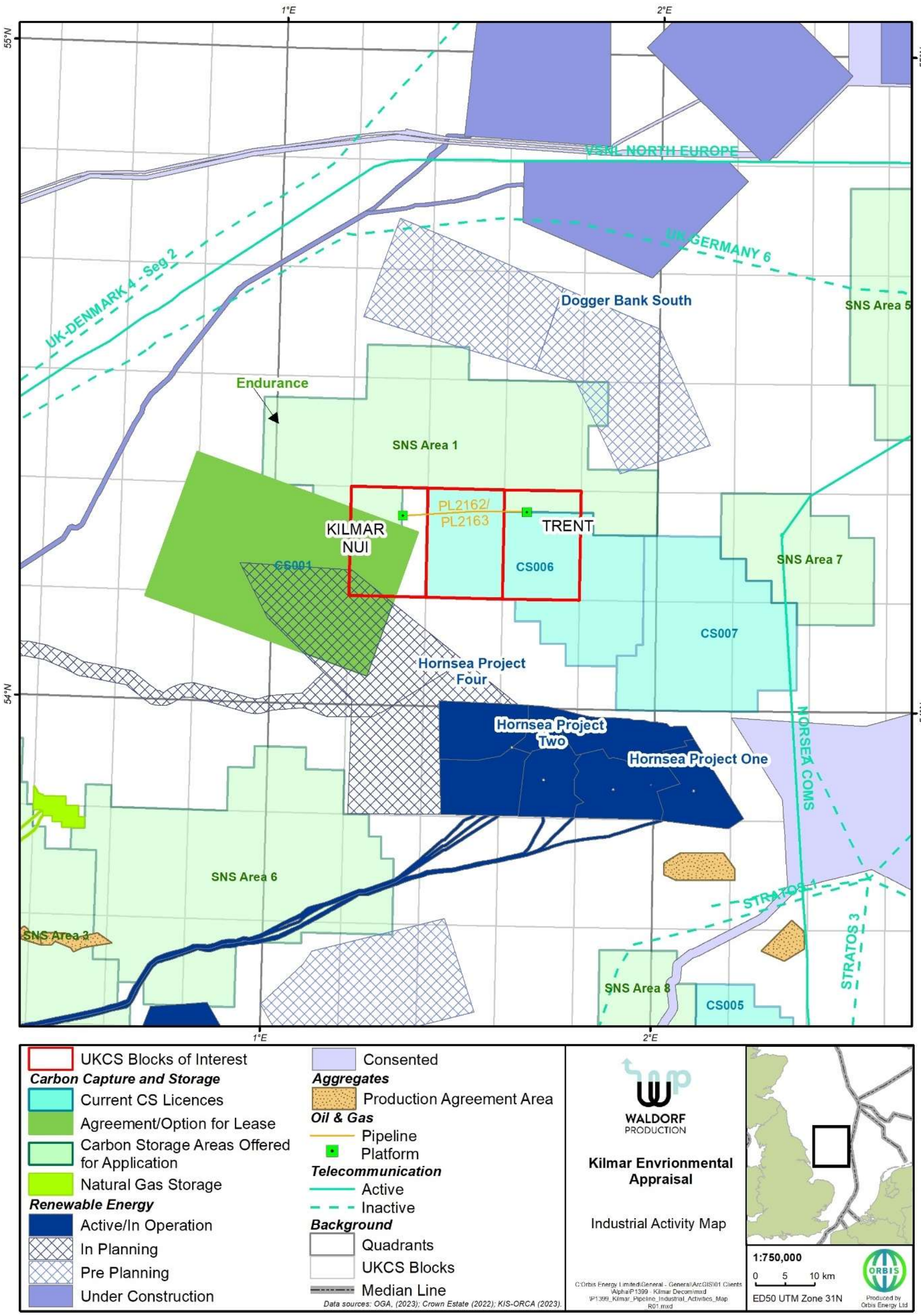


Figure 4.8. Offshore Renewable Energy and Industrial Activities in the Vicinity of the Kilmar Infrastructure



5 Environmental Assessment Methodology

This section describes the process followed by WPRL as previous Field Operator to identify and screen the relative significance of the potential environmental impacts associated with the proposed Kilmar decommissioning activities.

5.1 Stakeholder Engagement

Table 5.1 provides a summary of the key issues raised during the informal consultations which have been held to date and identifies where these issues have been considered in the EA report. Further details are provided in Section 5 of the combined Kilmar DP.

Table 5.1. Summary of Stakeholder Comments

Stakeholder	Summary of Comments	Addressed in EA Report
Joint Nature Conservation Committee (JNCC)	Stated that they see the Kilmar decommissioning project as a potential net benefit project in terms of benthic impacts.	Section 6.2
	Would like to see the survey data being used to avoid an overtrawl survey later on, whereas the fishing industry may argue for it.	See NFFO comments below
	JNCC would be interested to see if any signs of natural material influx (sand, marine growth, etc) is occurring over the rock berms.	
	JNCC / WPRL agreed noise levels generated in this type of decom operations are generally of low level so do not see any real cumulative effect with other operations or developments that may have activities in the near area and timeframe.	Section 6.3
	The technology for rock dump removal is not yet mature enough for it to be a realistic viable decom option. High environmental impacts would be associated if current equipment/techniques were used to remove all rock.	
National Federation of Fishermen's Organisations (NFFO)	NFFO's view on non-intrusive post decom surveys is that they prefer full overtrawl trials with bottom gear only (no nets involved so no risk of damage to nets). This is not in agreement with JNCC's view and ongoing discussions with JNCC/ OPRED are continuing. Some incidents of post decom snagging after non-intrusive surveys have been noted. Static gear is mainly used in the area, but some French trawlers have also been seen.	Section 3.6
	The windfarm activity (in particular Hornsea) has pushed fishing activity further north into the ICES rectangle 37F1 (near Kilmar) over the last few years so the same static gear is now used in a smaller area.	Section 4.3.1
	NFFO were in agreement that based on burial depths for the pipelines and stable nature of the seabed that a leave in situ solution will provide least impact solution to fishing industry.	
Scottish Fishermen's Federation (SFF)	SFF have been consulted and are content given the geographical location of Kilmar to let NFFO consult with regards to any fishing interaction with the decommissioning activities.	N/A
Northern Irish Fish Producer's Organisation (NiFPO)	NiFPO have been consulted and are content given the geographical location of Kilmar to let NFFO consult with regards to any fishing interaction with the decommissioning activities.	N/A
Global Marine Group	GMG have confirmed there are no cables within 50 km of the proposed decommissioning works.	N/A

5.2 Environmental Impact Identification

In order to identify the potential environmental issues and impacts on the marine environment, which may arise from the proposed Kilmar decommissioning activities (both from planned (routine) activities and unplanned (accidental) events).The previous Field Operator, WPRL's decommissioning team has undertaken a preliminary scoping exercise.

The activities (or aspects) identified during this exercise are summarised in the receptor-based activity and events matrix in Table 5.2. An initial high-level assessment of the aspects identified has been undertaken against the significance criteria defined in Section 5.3 to determine whether there is the potential for any of the impacts to result in significant effects on the environment. Impacts are defined as changes to the environment as a direct result of an activity or event and can be either positive or adverse. Effects are defined as the consequences of those impacts upon receptors.

A final decision on the removal methods associated with the combined Kilmar DP will be made following an engineering feasibility and commercial tendering process (refer to Section 2), the worse-case scenario in terms of the potential environmental impact has been considered in all instances.

The scoping exercise identified that the following sources of impact could potentially result in significant effects:

- Physical presence;
- Seabed disturbance;
- Underwater noise.

A comprehensive assessment has therefore been undertaken for these aspects, using the significance criteria defined in Section 5.3, the results of which are documented in Section 6. The potential for significant cumulative, in-combination and transboundary impacts has also been assessed in Section 6.

For the following sources of impact, it was considered that none of the resulting effects are likely to be significant:

- Energy use and atmospheric emissions;
- Waste management;
- Marine discharges;
- Accidental events.

These aspects have therefore been scoped out from detailed assessment, as justified in Section 5.4.

In addition, as the Kilmar infrastructure is located within the SNS SAC (refer to Section 4.2.6), an assessment has been undertaken to determine whether there will be any likely significant effects on the conservation objectives of this MPA as a result of the proposed Kilmar decommissioning activities, either alone or in-combination with other plans or projects. This assessment is documented separately within Section 7. The Greater Wash SPA, which lies along the adjacent coastline approximately 92 km from the Kilmar platform at the closest point, has also been scoped into the assessment as vessels transiting through this site on the way to the Kilmar location have the potential to disturb the qualifying features of this site, namely overwintering birds (red-throated diver and common scoter).

Table 5.2. Impact Identification Matrix

Assessment Topic	Project Activity / Unplanned Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments & Features	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	Marine Protected Areas	Shipping	Commercial Fisheries	Oil & Gas Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
Physical Presence	- Presence of vessels on location and transiting to / from site								A			A	A									
	- Removal of Kilmar platform (topside and jacket) and associated 500m safety zone								A		P	P	P									
	- Legacy of infrastructure decommissioned in situ										A		A									
	- Contingency rock dump to mitigate scour										A		A									
Seabed Disturbance	- Anchoring of LV	A	A				A	A			A											
	- Footprint of jack-up vessel	A	A				A	A			A											
	- Internal dredging and cutting of piles and removal of jacket	A	A				A	A			A											
	- Cutting of pipeline ends and removal of surface laid pipeline sections / tie-in spools	A	A				A	A			A											
	- Removal / redeployment of mattresses and grout bags	A	A				A	A			A											
	- Leaving in situ of rock dump along the pipelines	A					A	A			A											
Underwater Noise Emissions	- Use of propellers / DP thrusters on vessels							A		A	A		A									
	- Use of underwater cutting tools and ROVs							A		A	A		A									

Assessment Topic	Project Activity / Unplanned Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments & Features	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	Marine Protected Areas	Shipping	Commercial Fisheries	Oil & Gas Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
	- Use of geophysical equipment (MBES & SSS) during post decommissioning survey							A		A	A		A									
Energy Use & Atmospheric Emissions	- Power generation on vessels			A	A																	
	- Recycling of materials returned to shore and loss of materials left in situ for future use			A	A																	
Marine Discharges	- Routine vessel discharges to sea		A			A		A	A		A											
	- Potential for introduction of alien species (from ballast water)		A			A		A	A		A											
	- Discharge of residual amounts of chemicals/condensate during pipeline cutting operations		A				A	A			A											
	- Release overtime of contaminants contained within the pipeline material		A				A	A			A											
Waste Management	- Onshore disposal of waste transferred to shore																			A		A
	- Marine growth removal (offshore)	A	A				A	A														
Accidental Events	- Vessel collision (loss of diesel inventory)	A	A			A	A	A	A	A	A	A	A									
	- Dropped objects	A	A				A				A		A									
	- Leak of hydraulic fluid from cutting equipment	A	A			A	A	A	A	A	A		A									

Key:

(dark blue)	Potentially significant effects (aspects scoped in for further assessment)	(light blue)	No potential for significant effects (aspects scoped out from assessment, see Section 5.4)	A	Adverse effect	P	Positive effect		No interaction

5.3 Evaluation of Significance Criteria

5.3.1 Planned Activities

For planned activities, the significance of environmental effects has been evaluated by considering the sensitivity of the receptor affected in combination with the magnitude of impact that is likely to arise.

Sensitivity is a function of the value of the receptor (a measure of its importance, rarity and worth), its capacity to accommodate change when a pressure is applied (resistance or tolerance), and its subsequent recoverability (resilience). The criteria presented in Table 5.3 has been used as a guide to determine the sensitivity of receptors.

Table 5.3: Determining Sensitivity

		Resistance and Resilience			
		Very High	*High*	*Medium*	*Low*
Value	*Low*	Low	Low	Medium	Medium
	Medium	Low	Medium	Medium	High
	High	Low	Medium	High	Very High
	Very High	Medium	High	Very High	Very High

Definitions:

Resistance and Resilience	
Very High:	Highly adaptive and resilient to pressure. High recoverability in the short-term.
High:	Some tolerance / capacity to accommodate pressure. High recoverability in the medium-term.
Medium:	Limited tolerance / capacity to accommodate pressure. Recoverability is slow and/or costly.
Low:	Very limited or no tolerance / capacity to accommodate pressure. Recovery is unlikely or not possible.
Value	
Very High:	Very high value and/or of international importance.
High:	High value and/or of national importance.
Medium:	Moderate value and/or of regional importance.
Low:	Low value and/or of local importance.

The **magnitude of impact** considers the characteristics of the change that is likely to arise (e.g. a function of the spatial extent, duration, reversibility and likelihood of occurrence of the impact) and can be adverse or positive. The criteria presented in Table 5.4 has been used as a guide to define the magnitude of impact.

Table 5.4: Determining Magnitude of Impact

Magnitude	Definition
Substantial	Permanent or long-term (>5 years) change in baseline environmental conditions, which is certain to occur. Impact may be one-off, intermittent or continuous and/or experienced over a very wide area (i.e., transboundary in scale). Impact is likely to result in environmental quality standards or threshold criteria being routinely exceeded.
Major	Medium to long-term (1 – 5 years), reversible change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent, or continuous and/or experienced over a wide area (i.e., national in scale). Impact could result in one-off exceedance of environmental quality standards or threshold criteria.
Moderate	Short to medium-term (< 1 year), temporary change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent, or continuous and/or regional in scale (i.e., beyond the area surrounding the Project site to the wider region). Impact is unlikely to result in exceedance of environmental quality standards or threshold criteria.
Minor	Short-term (a few days to weeks), temporary change in baseline environmental conditions, which could possibly occur. Impact may be one-off, intermittent and/or localised in scale, limited to the area surrounding the proposed Project site. Impact would not result in exceedance of environmental quality standards or threshold criteria.
Negligible	Immeasurable or undetectable changes (i.e., within the range of normal natural variation).

The overall **significance** of an effect has been determined by cross referencing the sensitivity of the receptor with the magnitude of impact, using the matrix shown in Table 5.5.

Table 5.5: Significance Evaluation Matrix (Planned Activities)

		Magnitude of Impact				
		Negligible	**Minor**	**Moderate**	**Major**	**Substantial**
Receptor Sensitivity	**Low**	Negligible	Minor	Minor	Minor	Minor / Moderate Note 1
	Medium	Negligible	Minor	Minor	Moderate	Moderate / Major Note 1
	High	Negligible	Minor	Moderate	Major	Major
	Very High	Negligible	Minor / Moderate Note 1	Moderate / Major Note 1	Major	Major

Note 1: The choice of significance level is based upon professional judgement and has been justified in the assessment text in Section 5.

In the context of this assessment, effects classed as **Major** or **Moderate** are considered to be significant and therefore mitigation measures are required to be identified in order to prevent, reduce or offset adverse significant effects or enhance positive effects. The overall significance of the effect is then re-evaluated, taking the mitigation measures into consideration, to determine the residual effect utilising the methodology outlined above.

Effects classed as **Minor** are not considered to be significant and are usually controlled through good industry practice.

Effects classed as **Negligible** are also not considered to be significant.

5.3.2 Unplanned Events

For unplanned events, such as accidental hydrocarbon releases, significance has been determined using a risk assessment approach, where the likelihood (probability) of the unplanned event occurring is considered against the consequence (significance of effect) if the event was to occur.

The **consequence (significance of effect)** has been determined using the methodology for planned events as described in Section 5.3.1 above. The likelihood of an unplanned event occurring has been determined using the criteria presented in Table 5.6 as a guide.

Table 5.6: Determining Likelihood of Occurrence

Likelihood	Definition
Extremely Rare	Event is extremely unlikely to occur during the Project, given good industry practice. Frequency of event: 1×10^{-4}.
Rare	Event is very unlikely to occur during the Project, given good industry practice. Frequency of event: 1×10^{-3}.
Unlikely	Event is unlikely to occur during the Project, given good industry practice. Frequency of event: 1×10^{-2}.
Possible	Event could occur during the Project, based on industry data. Frequency of event: 1×10^{-1}.
Likely	Event is likely to occur at least once during the Project. Frequency of event: > 1

A risk category (low, medium or high) has then been assigned to the unplanned event using the matrix shown in Table 5.7.

Table 5.7: Risk Evaluation Matrix (Unplanned Events)

		Consequence (Significance of Effect) Note 1			
		Negligible	**Minor**	**Moderate**	**Major**
Likelihood of Event	**Extremely Rare**	LOW	LOW	MEDIUM	MEDIUM
	Rare	LOW	LOW	MEDIUM	MEDIUM
	Unlikely	LOW	LOW	MEDIUM	HIGH
	Possible	LOW	MEDIUM	MEDIUM	HIGH
	Likely	LOW	MEDIUM	HIGH	HIGH

In the context of this assessment, **High** risk events are considered to be significant and are unacceptable.

Medium risk events are also considered to be significant, unless it can be demonstrated that the risk has been reduced to as low as reasonably practicable (ALARP) through mitigation measures and good industry practice.

Low risk events are not considered to be significant but should still be controlled through good industry practice.

5.4 Aspects Scoped Out From Detailed Assessment

5.4.1 Energy Use and Atmospheric Emissions

Atmospheric emissions will be produced during the proposed Kilmar decommissioning activities as a result of the fuel consumed by offshore vessels, diesel-powered equipment and generators.

The main environmental effects of the emission of gases to the atmosphere are:

- Direct or indirect contribution to global warming (CO, CO_2, CH_4 and N_2O); and
- Contribution to photochemical pollutant formation and local air pollution (particulates, NOx, SO_2, VOCs).

Estimated emissions from the proposed decommissioning activities are summarised in Table 5.8.

Table 5.8. Estimated Atmospheric Emissions from Kilmar Decommissioning Activities

Activity [1]	Emissions (tonnes) [2]							
	CO_2	CO	NO_X	N_2O	SO_2	CH_4	VOC	CO_2e
Topside Removal & P&A Operations	6,195.20	30.40	115.00	0.43	7.74	0.35	3.87	6,331.88
Jacket Removal	2,240.00	10.99	41.58	0.15	2.80	0.13	1.40	2,289.42
Decommissioning of Pipelines and Stabilisation Material	908.80	4.46	16.87	0.06	1.14	0.05	0.57	928.85
Total:	**9,344.00**	**45.84**	**173.45**	**0.64**	**11.68**	**0.53**	**5.84**	**9,550.15**

[1] See assumptions relating to vessel types, timings and fuel consumption detailed in Section 3.4.
[2] Emissions factors from DECC (2008); Global Warming Potential calculated using AR5 (IPCC, 2014)

It is predicted that the atmospheric emissions generated will result in localised and short-term impacts on air quality, with prevailing metocean conditions expected to lead to the rapid dispersion and dilution of the emissions.

The contribution to UKCS and global atmospheric emissions will be negligible. To place this in context, the estimated CO_2e emissions predicted to be generated by the proposed Kilmar decommissioning operations equate to approximately 0.06% of the total UK offshore CO_2e 2021 (15.03 Mt CO_2e; OEUK, 2022) and 0.002% of the UK net total CO_2e emissions in 2021 (426.5 Mt CO_2e; BEIS, 2023).

To minimise the emissions generated, EULwill look to reduce vessel time in the field as far as practicable and will make use of vessel synergies where possible. In addition, WPRL's contractor selection process will aim to ensure that the engines, generators and other combustion plant on the vessels to be used during the proposed decommissioning activities are maintained and correctly operated to ensure that they work as efficiently as possible.

WPRL has therefore concluded that impacts arising from energy use and atmospheric emissions do not warrant further assessment.

5.4.2 Marine Discharges

Routine discharges to sea from the vessels used during the proposed decommissioning activities (e.g. the discharge of food waste, bilge water and grey water) has the potential to cause short-term, localised organic enrichment of the water column and an increase in biological oxygen demand. This could contribute to a minor increase in plankton and attract fish to the area. However, food waste will be macerated to increase the rate of dispersion and biodegradation at sea and waste water will be treated appropriately before being discharged to sea, in accordance with the requirements of the MARPOL convention.

Ballast water discharges will be in accordance with the International Maritime Organisation Ballast Water Management Convention, including a ballast water plan and log book.

During pipeline cutting operations there may be a small release of any residual chemicals / condensate remaining within the pipelines. However, as stated in Section 3.4.1, as part of the preparatory work the export pipeline and service pipeline will be flushed and depressurised. It is anticipated that agreed cleanliness criteria will be aligned with accepted industry thresholds for discharge of oil in produced water, under The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended), which is 30 mg/l or less. As such, any release of chemicals / condensate will be minimal and is anticipated to dissipate before it reaches the surface with no long-term persistence expected.

In addition, as the pipelines will be decommissioned in situ they will degrade overtime and contaminants contained within the pipeline material (e.g. coating) may be released. Any releases are expected to occur in very small quantities and over a long period of time. Additionally, since the pipelines are fully trenched and buried, the pathway for contaminant releases will be limited. Given the small quantities of contaminants expected to be released and the long-term degradation of the pipeline left in situ, no significant effects on the marine environment are predicted.

Given the above, WPRL as previous Field Operator has therefore concluded that impacts arising from marine discharges do not warrant further assessment.

5.4.3 Waste Management

The impacts of waste management are largely onshore and therefore outside the scope of this EA report; however, EUL will ensure the principles of the Waste Management Hierarchy are followed during the proposed decommissioning activities, focusing on the reuse and recycling of wastes where possible, that licensed waste contractors are used and a project Waste Management Plan is in place to ensure compliance with relevant waste regulations. In addition, good housekeeping standards will be maintained on board all vessels.

Any waste disposed of outside of the UK will be in accordance with the Transfrontier Shipment of Waste Regulations 2007.

The presence of NORM is not expected, but if encountered WPRL will ensure appropriate RSR permits are in place and conditions that dictate the management and control of radioactive waste are met.

Marine growth will be removed by high pressure cleaning offshore, only where necessary and practicable. The detached marine growth will fall to the seabed or be dispersed by currents and will degrade naturally. There may be a temporary increase in turbidity, nutrient enhancement and an increase in biological oxygen demand in the vicinity of the release, but any effects will be localised, and transient given the dispersive environment that exists offshore (OEUK, 2013; OGUK, 2019). The majority of marine growth will be removed onshore at a dismantling yard, with appropriate odour control implemented through an odour management plan.

On this basis, WPRL as previous Field Operator has concluded that no further assessment of waste management is necessary.

5.4.4 Accidental Events

5.4.4.1 Accidental Release of Hydrocarbons

Prior to the proposed decommissioning activities commencing, the Kilmar facilities will be made HCF. As such, the source of a worst-case accidental release of hydrocarbons to sea will be from the loss of diesel inventory from a vessel in the unlikely event of a collision. Of the types of vessels which may be utilised during the proposed decommissioning activities, the LV typically has the largest fuel inventory. This could be in the region of 500 to 800 m^3 of diesel, although the LV's fuel inventory is likely to be split between a number of separate fuel tanks, significantly reducing the potential of an instantaneous release of the full inventory.

The Kilmar wells are currently included in the scope of the Exceed Torridon Limited Tors, Wenlock, and Helvellyn Wells Oil Pollution Emergency Plan (OPEP) (CAP Ref: 230024/0) and the Kilmar platform is included in the scope of the ODE Asset Management Tors Offshore OPEP (CAP Ref: 210023/0).

The Tors Offshore OPEP contains diesel modelling for the nearby Garrow field, which is closer to the coast than Kilmar and therefore is considered to represent a worst case scenario for the purposes of this assessment. Modelling of an instantaneous release of 800 m^3 of diesel from a vessel at the Garrow platform (located 22 km to the west of Kilmar) and indicates that the probability of a diesel release beaching on the UK coastline is highest in Spring (up to 20 %), with the shortest arrival time after 2.7 days on the Yorkshire and The Humber coastline. The maximum mass accumulated onshore across all beaching locations in any one season is 192 m^3 after 15 days. However, diesel is a light oil, containing a large percentage of light and volatile compounds. Once spilt diesel is likely to remain on the sea surface and be subject to high rates of evaporation. It also has a low asphaltene content which prevents emulsification. A release of diesel is therefore not expected to persist in the marine environment for a prolonged period of time. The modelling predicts that a release of diesel at the Garrow location will not cross into international waters.

An approved OPEP will be in place for the proposed Kilmar decommissioning activities, as required by the Merchant Shipping (Oil Pollution Preparedness, Response and Co-Operation Convention) Regulations 1998 (as amended). In addition, the risk of collision is low as the majority of vessels required for the proposed decommissioning activities will be present on location within the existing 500m safety exclusion zone surrounding the Kilmar platform minimising the risk of a collision. This zone is clearly marked on navigation charts and has been in place for a number of years. Notifications will also be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins. Any spills from vessels in transit and working outside of existing 500m zones are covered by separate SOPEPs.

Considering the above, WPRL as previous Field Operator has concluded that the potential impacts from an accidental release of hydrocarbons during the proposed decommissioning activities do not require further assessment.

5.4.4.2 Dropped Objects

The potential for dropped objects to occur is most likely to arise from lifting operations. However, dropped object procedures are industry-standard and will be employed throughout the proposed operations. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Post-decommissioning debris clearance surveys will aid in the identification of any dropped objects should they occur. As such, WPRL as previous ield Operator has concluded that impacts from unplanned loss of materials to the sea do not require further assessment. Any known dropped objects that cannot be found/recovered will result in a PON 2 being submitted to OPRED.

5.4.4.3 Leak of Hydraulic Fluid from Cutting Equipment

The proposed Kilmar decommissioning activities require the use of subsea hydraulic cutting tools and ROVs that could fail and result in a release of a small number of litres of hydraulic fluid into the marine environment. However, in the event this did occur, it is anticipated that the hydraulic fluid would be rapidly dispersed in the marine environment given the highly dynamic nature of the area.

To minimise the risk of a release, appropriate maintenance, and pre-use checks on hydraulic equipment and ROVs will be undertaken. In addition, where possible equipment with automatic hydraulic shut-off will be used to minimise the volume of fluid released in the event of a hydraulic line failure. WPRL has therefore concluded that impacts from a leak of hydraulic fluid do not require further assessment.

6 Environmental Assessment

This section documents the detailed assessment undertaken for those impacts that were identified in the scoping exercise as potentially resulting in significant effects.

6.1 Physical Presence

6.1.1 Potential Impacts to Other Sea Users

The vessels required for the removal of the platform will be present on location within the existing 500 m safety exclusion zone surrounding the Kilmar platform. An existing 500 m safety exclusion zone also surrounds the Trent platform. These zones are clearly marked on navigation charts and have been in place for a number of years. If an anchored LV is used to remove the platform, the anchor lines are likely to extend outside the exclusion zone, although this should not present a significant hazard to shipping or fishing vessels as they are unlikely to transit immediately adjacent to an existing exclusion zone. In addition, once the Kilmar platform has been removed, the 500 m safety exclusion zone surrounding the platform will be withdrawn. This will result in a positive impact as an area of circa 0.79 km^2 will be made available to other sea users.

The potential for significant impacts to other sea users is therefore limited to the risk of fishing gear snagging on infrastructure that is being decommissioned in situ, particularly in the event free spans were to develop along the route of the pipelines. The sensitivity of commercial fishing to snagging is considered to be **Medium** in the vicinity of the Kilmar infrastructure, despite the two dangerous wrecks within 40 km of the site. The receptor has a low value as fishing effort in ICES Rectangle 37F1 is very low compared to the wider region and, due to the potential significance of the threat associated with snagging, resistance and resilience is medium. The magnitude of the impact is considered to be **Moderate** as snagging can result in damage to fishing gear, loss of fishing time/access, and risks to crew health and safety.

To minimise the risk of snagging, WPRL is proposing to remove any exposed subsea infrastructure (surface laid spools and pipeline sections and their associated mattress protection). One mattress may be redeployed and deposited over each cut end of the pipelines to prevent a possible snagging point, if the cut ends cannot easily be covered using the existing rock dump. If used, these mattresses will be flush with the seabed and overtrawlable. The majority of the pipelines are currently buried to a depth well in excess of 0.6 m and no pipeline exposures have been seen in any of the operational surveys undertaken since the lines were installed. In a flooded condition (as would be the decommissioned left in situ state) both pipelines are significantly negatively buoyant and so no upward movement of the pipelines would be expected. The likelihood of free spans developing or the stabilisation material decommissioned in situ becoming a snagging hazard is therefore considered to be **Extremely Rare**.

Given the above, the risk to commercial fishing from the legacy of the Kilmar infrastructure decommissioned in situ is therefore predicted to be **Low**.

6.1.2 Mitigation Measures

EUL will adopt the following measures to ensure the impacts to other sea users from the physical presence of the decommissioning vessels and legacy of infrastructure decommissioned in situ are minimised:

- Where required, Consent to Locate permits will be in place, existing collision risk management plans will be reviewed and notifications of the proposed decommissioning activities will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins;
- If the jacket is removed in a separate campaign to the topside, a solar navaid / foghorn will be installed to warn other sea users of its presence;

- Details of any infrastructure decommissioned in situ will be publicised through Notices to Mariners and marked on navigation and fisheries charts;
- A post-decommissioning survey will be undertaken around the Kilmar platform 500m radius and a (minimum) 100m corridor (50m either side) along the route of the Kilmar pipelines where decommissioning activities have taken place to identify and recover any oil and gas seabed debris and confirm the seabed has no trawling obstructions;
- A post-decommissioning monitoring programme covering the pipelines and associated stabilisation features remaining in situ will be agreed with OPRED.

6.1.3 Residual Effects

Residual effects on other sea users (commercial fishing and shipping) resulting from the physical presence of vessels on location at Kilmar and transiting to / from site are **Negligible** and not significant, particularly given the short duration of the proposed decommissioning activities and the operational control measures which will be in place. In addition, removal of the Kilmar platform and associated 500 m safety exclusion zone will result in positive effects as the area will become available to other sea users again.

The risk to commercial fishing from the legacy of the Kilmar pipelines and stabilisation material decommissioned in situ is predicted to be **Low**, but ALARP as the generation of snagging risks such as free spans is very unlikely, considering historic data, the burial depth of the pipelines and the mitigation measures that will be in place.

6.1.4 Potential Impacts to Seabirds

The physical presence of vessels associated with the decommissioning activities may potentially cause displacement and/or other behavioural responses in seabirds foraging in the vicinity of the Kilmar infrastructure. However, given the temporary and short-term presence of the decommissioning vessels and in the context of other vessel activity in the area, significant disturbance, or displacement of foraging seabirds from the area is unlikely. Considering the availability of alternative habitat in the surrounding area, no significant impacts on foraging seabirds are therefore predicted.

EUL is aware, however, that the physical presence of the Kilmar platform, particularly if it enters a Lighthouse Mode phase, has the potential to provide nesting habitat to breeding seabirds, which forage in the SNS. There is no history of nesting seabirds on the platform (refer to Section 4.2.4.2); however, the presence of nesting seabirds during the breeding season in future years cannot be ruled out.

The removal of the Kilmar topside therefore has the potential to result in significant impacts to possible seabirds nesting on the platform, if present in future years, through disturbance by operational movement and noise. Once the chicks start hatching, they are particularly vulnerable to human disturbance that may spook them from the nest, resulting in them falling or being pushed to sea.

All wild birds are protected under the Wild Birds Directive, which is transposed for the UK offshore area by The Conservation of Offshore Marine Habitats and Species Regulations (OMR) 2017. Under Part 3 (40) of the 2017 Regulations it is an offence to deliberately:

- Capture, injure, or kill any wild bird;
- Take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- Take or destroy an egg of any wild bird.

The sensitivity of nesting birds on the Kilmar platform is considered to be **Very High**. Nesting birds have a very high value and their tolerance to accommodate pressure is limited with a medium resistance and resilience. The magnitude of any disturbance is considered to be **Moderate** with nesting potentially abandoned for the year/season or chicks being spooked from the nest. Effects on nesting birds from the removal of the Kilmar platform, if their presence is recorded during the breeding bird season, are therefore predicted to be **Moderate** and significant before mitigation measures are applied.

6.1.5 Mitigation Measures

The following measures will be put in place during the Kilmar decommissioning activities to ensure any adverse effects on nesting seabirds are mitigated:

- If any nesting birds are identified in years ahead of the decommissioning activities, installation of nesting bird deterrents will be considered when the preparatory work is being undertaken to discourage birds from nesting on the platform, if it enters the Lighthouse Mode phase;
- EUL will continue to check for the presence of nesting birds on scheduled routine visits to the Kilmar platform, noting there is not a history of nesting birds on the platform. If the topside is to be removed during the breeding season, data will be reviewed to confirm the absence of nesting birds and, if considered necessary, the platform will be checked by a qualified ornithologist prior to removal. If nesting birds are observed, OPRED will be consulted to ascertain if it is possible for a Wild Birds Licence to be granted to allow the works to go ahead;
- If any other decommissioning activity (e.g. preparatory works) is to be undertaken on the topside during the breeding season, the platform will be checked for nesting birds prior to commencing work. OPRED will be informed of the results and, if necessary, a Wild Birds Licence applied for. In the event nesting birds are observed, WPRL currently propose to erect signage in the area advising offshore personnel of the nests and personnel will be briefed on instructions to minimise possible disturbance to the juveniles and attending adults. The nests will also be monitored on a regular basis to record bird presence and activity.

6.1.6 Residual Effects

Given the proposed mitigation measures, coupled with the fact that nesting birds have previously not been recorded on the Kilmar platform, residual effects on nesting birds from the removal of the Kilmar platform are predicted to be **Negligible** and not significant.

6.2 Seabed Disturbance

6.2.1 Quantification of Seabed Disturbance

The following Kilmar decommissioning activities have been identified as sources of potential seabed disturbance:

- LV anchoring and anchor line scour for removal of the topside and jacket;
- Contingency rock dump to mitigate scour either prior to or during the rig/JUWB decommissioning works;
- Footprint of jack-up vessel used to P&A the platform wells;
- Removal of the jacket following internal dredging and cutting of piles;
- Cutting of pipeline ends, removal of surface laid pipeline sections / tie-in spools, including mattresses and grout bags at the approaches to the Kilmar and Trent platforms and possible redeployment of mattresses to protect the cut ends of the pipelines, if exposed at the seabed and not easily covered by the existing rock dump.

Table 6.1 provides an estimate of the total area of seabed likely to be disturbed by the above listed decommissioning activities, which equates to ca. 78,961 m^2 (ca. 0.076 km^2).

Of this total 62,961 m^2 (0.06 km^2) will result in a temporary disturbance and 16,000 m^2 (0.016 km^2) will result in a permanent disturbance, namely as a result of the rock dump to mitigate scour. In addition, there will be a legacy impact from the existing rock dump along the pipelines which will be decommissioned in situ, as well as any mattresses redeployed to cover the cut pipeline ends, if required. The area of seabed currently covered by rock dump is ca. 2,790 m^2 (ca. 0.003 km^2), which is comprised of 1,350 m^2 at the SEAL pipeline crossing and 720 m^2 each at the approaches of the Kilmar and Trent platform. The redeployment of stabilisation material, if required, is likely to impact an area of ca. 48 m^2 (< 0.00005 km^2), on the assumption one (6 m x 4m) mattress is left at the Kilmar end and one (6 m x 4 m) mattress is left at the Trent end.

Of note is that there are no accumulations of historic drill cuttings on the seabed associated with the Kilmar wells as these have been dispersed by the energetic currents of the area.

Table 6.1. Estimated Area of Seabed Disturbed from Kilmar Decommissioning Activities

Activity	Description of Impact	Estimated Area Impacted	
		(m^2)	(km^2)
Use of an anchor moored LV to remove topside and jacket	Although selection of a LV is still to be made, it is assumed that the LV will have eight anchors (ca. 4 m by 4 m in dimension) and associated anchor chain/cable (each extending up to 1,200 m from the LV). Each anchor chain/cable will have a 600 m length section in contact with the seabed, which will be subject to lateral movement of ca. 5 m. This equates to an impact area of 16 m^2 per anchor and 3,000 m^2 per anchor chain/cable. As a worst case, it is assumed the topside and jacket will be removed separately and therefore the estimated area of impact accounts for disturbance from two anchored LVs.	48,256	0.0483
Contingency rock dump to mitigate scour either prior to or during the rig/JUWB decommissioning works	As a worst case contingency scenario against scour either prior to or during the rig/JUWB decommissioning works a total of up to 85,000 tonnes of rock could be required to be placed over an area of 16,000 m^2 adjacent to the existing jacket legs to prevent sinkage of the rig/JUWB legs into the seabed.	16,000	0.016
Use of jack-up vessel to P&A the platform wells[1]	Although selection of a jack-up vessel is still to be made, it is assumed that the vessel will have four spud cans, each of which has a radius of 7 m, impacting an area of 154 m^2, equating to 616 m^2 for all four. It is assumed that the vessel will be jacked down on the seabed at the Kilmar platform. In addition, the vessel may also need to deploy anchors to assist in final positioning. As a worst case, it is assumed that four anchors (ca. 4m by 4m in dimension) and associated chain/cable (each extending 600m from the vessel, with the entire length laid on the seabed and subject to a lateral movement of ca. 5 m) will disturb the seabed. This equates to an impact area of 16 m^2 per anchor and 3,000 m^2 per anchor chain/cable. Once the vessel is in position, the anchors (including the wires and chains) will be recovered for the duration of the P&A operations. It is not considered that there will be a need to deposit stabilisation material around the spud cans, due to the underlying clay layer and the fact it has not previously been required at the Kilmar location.	12,680	0.0126
Removal of the jacket following internal dredging and cutting of piles	The piles will be dredged to remove the soil inside the jacket skirts to a depth of ca. 4 m below the seabed to provide access for the abrasive cutting tool. As no dredging is planned around the exterior of the jacket, disturbance to the seabed will primarily occur when the jacket is lifted from the seabed and will be within close proximity to the existing physical footprint of the jacket (23 m by 23 m). To facilitate the release of the jacket from the seabed, it is estimated that an area of ca. 729 m^2 will be disturbed during removal operations, based on a contingency buffer of 2 m around the jacket footprint. All the abrasive material will be deposited in the hole and not the surrounding area. Once the jacket has been removed, the piles cut at least 3 m below the seabed will result in depressions, but these are expected to be temporary and will refill with natural backfill given the highly dynamic nature of the area.	729	0.0007

Activity	Description of Impact	Estimated Area Impacted (m²)	Estimated Area Impacted (km²)
Cutting of pipeline ends, removal of surface laid pipeline sections / tie-in spools, including mattresses and grout bags at the approaches to the Kilmar and Trent platforms and redeployment of mattresses to protect the cut ends of the pipelines (if required)	The Kilmar and Trent riser to pipeline spool sections will be cut (using either shear cutting or diamond wire cutting tools) to allow recovery of the Kilmar jacket and isolate the pipeline from the Trent platform. Mattresses and grout bags will be removed to allow access to cut the surface laid pipeline/spool sections. These sections will then be removed using a vessel crane. In total it is assumed that the total length of pipeline / tie-in spool pieces to be removed is ca. 80 m at Kilmar and ca. 75 m at Trent. Based on the mattress size (6 m x 4 m) and a contingency buffer of 2 m around each mattress to account for potential disturbance during their removal ($48m^2$), with a total of 27 mattresses (14 at Kilmar, 13 at Trent), it is estimated that an area of ca. 1,296 m^2 will be disturbed. The removal of the pipeline / tie-in spool pieces underneath the mattresses and the redeployment of mattresses to protect the cut ends of the pipelines, if required, will not result in additional seabed disturbance.	1,296	0.0013
	Total Area of Seabed Impacted:	**78,961**	**0.076**

[1] Although the P&A operations will be consented via appropriate environmental permits and consents under the OPRED PETS UK Energy Portal, for completeness the area of seabed disturbed by the jack-up vessel has been accounted for in the above table.

6.2.2 Potential Impacts to Seabed Communities

Seabed disturbance will result in direct physical effects on benthic fauna, which may include mortality as a result of physical trauma and smothering by resuspension and settlement of natural seabed sediments.

Physical disturbance of the seabed resulting from the removal of infrastructure from the seabed, temporarily placing materials and equipment on the seabed and anchoring of the LV is likely to cause displacement or mortality of benthic species, such as sessile organisms, that are unable to move out of the impacted area. However, species in highly dynamic, tidally-influenced areas such as those found in the shallow waters of the SNS, are generally tolerant of physical disturbance (DOER, 2000). With the exception of the legacy impact from the stabilisation material decommissioned in situ and the permanent impact arising as a result of the contingent rock dump to mitigate scour, the proposed Kilmar decommissioning activities are transient and, as such, it is expected that recovery of affected areas of seabed will be relatively rapid once the activities have been completed. Recolonisation of the affected areas is anticipated to take place in a number of ways; including mobile species moving in from the edges of the area, juvenile recruitment from plankton or from burrowing species digging back to the surface. The majority of seabed species recorded from the area are known, or believed to have, short lifespans (a few years or less) and relatively high reproductive rates, indicating the potential for rapid population recovery, such that any effects will be temporary. Species with opportunistic life strategies, are likely to recolonize the disturbed areas first (Tillin, 2016).

The proposed decommissioning activities will also lead to an increase in turbidity through sediment resuspension resulting in smothering of sensitive benthic species. As previously noted, the Kilmar platform is located within a highly dynamic area with strong near-seabed currents and highly mobile sediments (BEIS, 2022a). The fauna found here are therefore robust infauna that are adapted to frequent disturbances and natural fluctuations in sediment loading and resuspension. Where sedimentation does impact negatively on benthic species, consequences are likely to be short-lived as most of the smaller sedentary species (such as polychaete worms) have short lifecycles and recruitment of new individuals from outside of the disturbed area will be rapid (Tillin and Tyler-Walters, 2014).

Retrieval of mattresses and grout bags at the approaches to the Kilmar and Trent platforms will result in hard / coarse substratum habitats being replaced by sediment habitats, more typical of this area of the SNS. As a result, there will be localised changes in benthic communities from epifaunal species that can colonise hard substrata to those that favour of soft sandy sediments.

Given the above, the sensitivity of seabed communities to seabed disturbance in the vicinity of the Kilmar location is considered to be **Medium**, with a very high value due to some species being of international importance and very high resistance and resilience. The majority of seabed species recorded from the area are known to have short lifespans (a few years or less) and relatively high reproductive rates, indicating the potential for rapid population recovery. The magnitude of impact is considered to be **Minor**, due to the localised and temporary nature of the predicted impacts and the relatively small area of seabed disturbed (ca. 0.06 km^2). Therefore, physical effects on seabed communities due to seabed disturbance are predicted to be **Minor** and not significant.

In addition to the temporary impacts assessed above, there will be a legacy impact from the stabilisation material which will be decommissioned in situ, including the redeployment of any material required to protect the cut ends of the pipelines, if required. There will also be a permanent impact in the event rock dump is required to be deposited on the seabed to mitigate scour. The sensitivity of seabed communities in the vicinity of the Kilmar location to the legacy / permanent impact is considered to be **Very High**, with a very high value given the presence of the habitat FOCI 'subtidal sands and gravels' and low resistance and resilience, given that the changes will be permanent. It is estimated that this will permanently disturb an area of ca 0.019 km^2. Although the hard substrate will permanently change the habitat type and associated fauna present, the scale of the impact is **Negligible** considering the very large extent of sandy seabed available in the SNS. Effects on seabed communities are therefore predicted to be **Negligible**.

In all cases, the scale of changes to the seabed and its fauna are such that effects on higher trophic levels (e.g. fish and marine mammals), and any related effect on species of commercial interest are **Negligible**.

6.2.3 Mitigation Measures

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

- Jacket legs will be cut internally, to avoid seabed disturbance from external excavation;
- Where vessels are required to hold position for only short duration, dynamic positioning (DP) vessels will be used in favour of moored vessels;
- No new mattresses, grout bags or rock dump will be placed on the seabed.

6.2.4 Residual Effects

Based on the nature of the seabed habitats and species present in the vicinity of the Kilmar infrastructure, the comparatively small area of seabed that will be impacted by the proposed decommissioning activities (ca. 0.06 km^2 will be temporary disturbed and ca. 0.019 km^2 will be subject to a permanent loss of habitat from the stabilisation material decommissioned in situ and the contingent rock dump), residual effects on seabed communities are predicted to be **Minor** to **Negligible** and not significant. Of note, removal of the surface laid pipeline sections / tie-in spools, mattresses and grout bags will ultimately result in a positive impact as areas of the seabed are being returned back to their natural state.

6.3 Underwater Noise Emissions

The potential effects of underwater noise emissions on marine organisms depends on the characteristics of the sound (e.g. type, intensity, spectra, duration), the physical characteristics of the environment in which sound propagates, the acoustic sensitivity of the receiver, and their interaction in space and time.

Marine fauna use sound for navigation, communication and prey detection (NMFS, 2016; Southall *et al*., 2007; Richardson *et al.,* 1995). Therefore, the introduction of anthropogenic underwater sound has the potential to impact on marine animals if it interferes with the animal's ability to use and receive sound. Potential effects range from masking biological communication and causing small behavioural reactions, to chronic disturbance, injury and mortality (OSPAR, 2009c).

The most sensitive marine fauna to underwater noise are fish and marine mammals. A range of fish species use the Kilmar area for nursery and/or spawning grounds at different times of the year including anglerfish, blue whiting, cod, hake, herring, horse mackerel, lemon sole, ling, mackerel, *Nephrops*, plaice, sandeel, sole, sprat, spurdog, and whiting (Coull *et al.*, 1998 and Ellis *et al.,* 2012). Harbour porpoise, minke whale, pilot whale, white-beaked dolphin and white-sided dolphin are marine mammals that have been observed or identified as most likely to be present in the Garrow area (see Section 4.5.5).

6.3.1 Sources of Underwater Noise Emissions

The potential sources of underwater noise from the Kilmar decommissioning activities have been identified as:

- Vessel operations (e.g. use of propellers / DP thrusters);
- Use of underwater cutting tools and ROVs;
- Use of geophysical equipment during post decommissioning survey.

6.3.1.1 Vessel Operations

The Kilmar decommissioning activities will mobilise a variety of vessels, including the LV, jack-up rig, DSV / MSV, AHV, barge and tugs. Large vessels (greater than 100 m length, such as the LV) have sound pressure levels within the range of 180-190 dB re 1 µPa, whilst most support vessels, assuming a medium-size ship (50 – 100 m in length), have sound pressure levels within the range of 165-180 dB re 1 µPa (OSPAR, 2009c). The highest sound levels are expected from short-term energy-demanding activities, for example when using DP thrusters to position vessels on location (Genesis, 2011). The majority of the acoustic energy from vessels is below 1 kHz, typically within the 50-300 Hz range, although cavitation from propellers produces sounds at frequencies of between 1 kHz and 125 kHz (Genesis 2011; Hermannsen *et al.* 2014).

6.3.1.2 Underwater Cutting Tools and ROVs

It is proposed that mechanical (shear or diamond wire) cutters will be used to server the Kilmar pipelines, an abrasive cutting tool system will be used to internally cut the jacket piles. However, underwater noise emissions from cutting tools are unlikely to result in sufficient levels of noise to cause significant disturbance to marine fauna (BEIS, 2022a). As the tool use episodes will be intermittent and of short duration, it is predicted that the noise generated will not be greater than that arising from vessel operations and therefore no additional impacts beyond that estimated from the noise arising from vessel operations are predicted to occur. The ROVs will also not generate noise above that of the mother vessels supporting them. This aspect has therefore been scoped out of assessment.

6.3.1.3 Geophysical Survey Equipment

The post decommissioning survey is likely to utilise a combination of multi-beam echo sounder (MBES) and side scan sonar (SSS), as well as an Ultra Short Baseline (USBL) beacon system to confirm positioning of the underwater survey equipment. On the whole, these are highly directional sources with expected low levels of horizontal sound propagation. The use of this equipment in shallow waters is unlikely to cause injury or significant disturbance to marine fauna as the equipment tends to operate within frequency ranges that are outside the hearing range of most sensitive species (Turnpenny and Nedwell, 1994; JNCC, 2010). As such, no potentially significant impacts on sensitive marine fauna are predicted from the underwater noise emissions generated during the post decommissioning survey and therefore this aspect has been scoped out of assessment.

6.3.2 Potential Impacts to Fish and Marine Mammals

The potential effects of underwater noise emissions on marine organisms depends on the characteristics of the sound (e.g. type, intensity, spectra, duration), the physical characteristics of the environment in which sound propagates, the acoustic sensitivity of the receiver, and their interaction in space and time.

Marine fauna use sound for navigation, communication and prey detection. Therefore, the introduction of anthropogenic underwater sound has the potential to impact on marine animals if it interferes with the animal's ability to use and receive sound. Potential effects range from masking biological communication and causing small behavioural reactions, to chronic disturbance, injury and mortality (OSPAR, 2009c).

The most sensitive marine fauna to underwater noise are fish and marine mammals. A range of fish species use the Kilmar area for nursery and/or spawning grounds at different times of the year including anglerfish, blue whiting, cod, hake, herring, lemon sole, ling, mackerel, *Nephrops*, plaice, sandeel, sole, sprat, spurdog, and whiting (see Section 4.2.3). Harbour porpoise, bottlenose dolphin, minke whale, pilot whale and white-beaked dolphin are marine mammals that have been observed or identified as most likely to be present in the Kilmar area (see Section 4.2.5).

However, there is no direct evidence of mortality or potential mortal injury to fish from vessel noise or other continuous sound sources, such as that generated from the proposed decommissioning activities (Popper *et al.,* 2014). There is the possibility that underwater noise emissions from the vessels used during the proposed decommissioning operations may cause some behavioural disturbance to fish, but given that fish in this region of the SNS are accustomed to the presence of vessels in the area any impacts are assessed as Negligible. In addition, there is a range of evidence from underwater video inspections of North Sea drilling and production platform jackets (including Kilmar operational life inspections) that show fish species, especially gadoids such as cod and saithe, swimming calmly in the immediate vicinity of the installations (Fujii, 2015).

Marine mammals will also not be injured by the noise generated from the proposed decommissioning activities, but reported responses of behavioural disturbance include avoidance, changes in swimming speed, direction and surfacing patterns, alteration of the intensity and frequency of calls (Erbe *et al.,* 2019). Harbour porpoise and minke whale have been shown to respond to vessels by moving away from them, while some other species, such as common dolphin, have shown attraction (Palka & Hammond, 2001). In addition, observations at installations in the North Sea have shown harbour porpoises regularly frequenting and actively foraging around platforms (Todd *et al.,* 2009).

In conclusion, the sensitivity of fish and marine mammals to underwater noise emissions from the proposed decommissioning activities is considered to be **Medium** with a very high value and very high resistance and resilience as fish and marine mammals have capacity to accommodate the pressure, with high recoverability in the short term. The magnitude of impact is predicted to be **Negligible** as there is no potential for injury and any displacement from the area will be localised and temporary. Effects on fish and marine mammals from underwater noise emissions are therefore predicted to be **Negligible** and not significant, particularly relative to the underwater noise generated by existing levels of vessel traffic in the wider SNS area.

It is also acknowledged that during the proposed decommissioning activities there is the potential for indirect effects on marine mammals due to changes in prey (fish) species distribution and/or abundance. However, as discussed above, impacts to fish from underwater noise emissions will be temporary and in a localised area, in close proximity to the source. As such, any impacts to marine mammals due to changes in prey resources are not predicted to be significant.

All species of cetaceans are classified as European Protected Species (EPS), listed on Annex IV of the EU Habitats Directive, which is transposed into UK law in UK offshore waters through The OMR (2017). It is an offence under the OMR to deliberately disturb, injure or kill a species designated as an EPS. The likelihood of an offence being committed is highly dependent on the temporal characteristics of the activity (JNCC, 2010). A disturbance offence is more likely where an activity causes persistent (sustained and chronic) noise in an area for long periods of time. For most cetacean populations in the UK, disturbance in terms of OMR is unlikely to result from single, short-term operations (JNCC, 2010). Considering the noise sources associated with the proposed Kilmar decommissioning activities and the fact that any behavioural disturbance to individuals will be localised and temporary, with no cetaceans predicted to be injured, it is not considered that the proposed decommissioning activities would constitute an offence under OMR.

6.3.3 Mitigation Measures

The following measures will be implemented for the Kilmar decommissioning activities to ensure that any adverse effects on noise-sensitive receptors are mitigated:

- Operations will be planned to reduce vessel movements and minimise the overall duration of the project.
- Where vessels are required to hold position for extended durations (months rather than days), jack-up or moored vessel will be used in favour of DP vessels.
- Internal cutting techniques will be utilised where possible, which do not produce any significant noise emissions.
- Where internal cuts are not possible, external cuts will be via mechanical methods as they produce significantly less noise than those made using abrasive methods.

6.3.4 Residual Effects

In summary, there is no evidence to suggest that the underwater noise emissions generated during the proposed Kilmar decommissioning activities would result in injury or significant disturbance to marine fauna. Residual effects are therefore predicted to be **Negligible** and not significant.

6.4 Cumulative and In-combination Impacts

Cumulative impacts may arise from incremental changes caused by other past, present or reasonably foreseeable projects/ proposals together with the proposed Kilmar decommissioning activities.

There are no aggregate areas within the vicinity of the Kilmar platform, however, there are a large number of existing oil and gas developments adjacent to the Kilmar platform. The nearest operational surface infrastructure to the Kilmar platform are the Ravenspurn North platforms, operated by Perenco UK Limited, located approximately 23 km to the south south southwest (see Section 4.3.3). EUL's Garrow platform, which is also due to be decommissioned, is located approximately 22 km to the west of the Kilmar platform.

In addition, there are a number of offshore wind farm developments in the vicinity of the Kilmar platform (see Section 4.3.5), the closest operational wind farm is the Hornsea Project Two wind farm turbine area (Operator: Ørsted Hornsea), located 31 km to the south east of the Kilmar pipelines. The Hornsea Project One (operated by Ørsted) is located approximately 39 km southeast of the Kilmar pipelines. Ørsted is also planning to develop Hornsea Project Four; the proposed wind farm turbine area for which is located approximately 12 km southwest of the Kilmar platform. Furthermore, an application for a Development Consent Order (DCO) for this wind farm was accepted by the Planning Inspectorate in October 2021. In addition, the Dogger Bank Southwest and Southeast sites (Operator: RWE Renewables) located 30 km north and 34 km northeast respectively of the Kilmar are in the pre-planning application phase. The consented Dogger Bank export cable is located 45 km northwest to the north of the Kilmar NUI at its closest point. A DCO application for the Dogger Bank Project was made and achieved in November 2021 by Forewind, the then consortium between SSE, Statoil (now Equinor), Statkraft and Innogy.

However, given the limited area of seabed disturbed by the proposed Kilmar decommissioning activities, coupled with the distance between the Kilmar infrastructure and the developments listed above, no significant cumulative effects on seabed habitats and species are predicted.

The emissions and discharges from the developments listed above in conjunction with the proposed Kilmar decommissioning activities are also not expected to result in any significant cumulative effects on marine receptors. Atmospheric emissions are predicted to rapidly disperse. In addition, the underwater noise emissions generated by the proposed Kilmar decommissioning activities is predicted to be insignificant against the noise produced by the existing vessel traffic in this area of the SNS. As such, any emissions and discharges from the proposed Kilmar decommissioning activities are unlikely to significantly overlap with emissions and discharges from other activities in the area and therefore no significant cumulative effects on marine receptors are predicted.

In addition to cumulative impacts, in-combination impacts may arise from different activities within the Kilmar decommissioning project resulting in several impacts on the same receptor or where different receptors are adversely affected due to the detriment of the entire ecosystem. An example of this in the marine environment would be marine fauna, such as fish, experiencing habitat loss from both seabed disturbance and underwater noise emissions. Water quality may also be adversely impacted by an increase in turbidity through sediment resuspension during seabed disturbance activities, as well as routine marine discharges from vessels. However, given the localised nature of any impacts and the fact the majority will be temporary nature, no significant environmental effects are predicted as a result of in-combination impacts.

6.5 Transboundary Impacts

The Kilmar platform is located approximately 95 km west southwest of the UK / Netherlands median line and the Trent platform is located approximately 72 km west southwest of the UK / Netherlands median line. However, any impacts arising from emissions, discharges and seabed disturbance generated as a result of the proposed Kilmar decommissioning activities are predicted to be highly localised and are therefore not expected to result in any significant transboundary impacts.

As discussed in Section 5.4.4.1, it is unlikely that a worst-case release of diesel from the Kilmar location will cross into international waters. Once spilt diesel is likely to remain on the sea surface and be subject to high rates of evaporation. It also has a low asphaltene content which prevents emulsification. A release of diesel is therefore not expected to persist in the marine environment for a prolonged period of time. In the unlikely event an unplanned release of hydrocarbons does enter Dutch waters during the proposed Kilmar decommissioning activities, it may be necessary to implement the Bonn Agreement. This Agreement is the main counter-pollution multi-state agreement for dealing with marine pollution that may affect states that border the North Sea and English Channel (Belgium, Denmark, France, Germany, Ireland, Netherlands, Norway, Sweden and the UK). It requires member states to provide early notification if hydrocarbons may affect the interests of another party and mutual assistance in the event of a spill. EUL will therefore ensure the Maritime and Coastguard Agency (and OPRED) is immediately informed once they have any indication that an accidental release of hydrocarbons from the proposed Kilmar decommissioning activities will encroach into Dutch waters.

In the event any waste from the Kilmar decommissioning activities is disposed of outside of the UK, EUL will ensure regulations governing transfrontier shipment of waste are complied with.

7 Potential Impacts to Marine Protected Areas

WPRL as previous Field Operator has identified that the SNS SAC, is potentially at risk of being adversely impacted by the proposed Kilmar decommissioning activities. In addition, the Greater Wash SPA, which lies along the adjacent coastline approximately 92 km from the Kilmar platform, has been scoped into the assessment as vessels could be transiting through this site on the way to the Kilmar location. This section therefore assesses whether the potential impacts from the proposed decommissioning activities, either alone or in-combination with other plans or projects, may cause likely significant effects to the qualifying features of the SAC and SPA, thereby affecting the integrity of the site. It should be noted that the Dogger Bank SAC, designated for the protection of the Annex I sandbanks which are slightly covered by seawater all the time, has been screened out of this assessment given that it is located approximately 19 km to the north east of the Kilmar platform.

7.1 Southern North Sea SAC

7.1.1 Qualifying Features and Conservation Objectives

The SNS SAC is designated for the protection of Annex II species harbour porpoise. The site covers an area of 36,951 km^2 and supports an estimated 17.5 % of the UK North Sea MU population of harbour porpoises. The northern two thirds of the site, covering an area of 27,000 km^2, is recognised as important for harbour porpoises during the summer season (April – September), whilst the southern part, covering an area of 12,687 km^2 as there is some overlap with the northern part, supports persistently higher densities during the winter (October – March) (JNCC & NE, 2019). The Kilmar infrastructure is located within the northern part of the SAC.

The conservation objectives of the SNS SAC are to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining a FCS for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:

- Harbour porpoise is a viable component of the site;
- There is no significant disturbance of the species; and
- The condition of supporting habitats and processes, and the availability of prey is maintained.

7.1.2 Potential Impacts

As noted in Section 6.3, the underwater noise emissions generated during the proposed Kilmar decommissioning activities are not predicted to result in injury or significant disturbance to harbour porpoise. There is considered to be sufficient foraging habitat in the wider vicinity to accommodate any temporary displacement of harbour porpoise from the area whilst the decommissioning activities are ongoing.

In addition to impacts on harbour porpoise from noise, there is the potential for impacts to supporting habitats and processes relevant to harbour porpoises and their prey within the SAC. Harbour porpoises are strongly reliant on the availability of prey species due to their high energy demands and are highly dependent on being able to access prey species year-round. However, it is assumed that any potential effects on harbour porpoise prey species from the underwater noise generated during the proposed decommissioning activities would be the same or less than those for harbour porpoise, i.e. if prey are disturbed from an area as a result of underwater noise, harbour porpoise will be disturbed from the same or greater area, therefore any changes to prey availability would not affect harbour porpoise as they would already be disturbed from the same area.

In terms of the supporting habitats relevant to the prey of the harbour porpoise, fish species such as sandeels, herring, mackerel, cod and whiting that form part of the harbour porpoise diet and are present in the vicinity of the proposed decommissioning work. However, fish spawning and nursey grounds are not predicted to be significantly impacted by seabed disturbance activities resulting from the proposed decommissioning activities. The majority of disturbance to the seabed habitat that could affect the prey of the harbour porpoise or their prey within the SAC will be localised and temporary. It is estimated that the proposed decommissioning activities will temporary disturb an area of seabed totalling ca. 0.06 km^2 within the SAC, which equates to only ca. 0.00016% of the SNS SAC total area and ca. 0.00022% of the 'summer' area.

It is acknowledged that will be a permanent loss of ca. 0.019 km^2 of habitat within the SAC due to the decommissioning in situ of the protection material (rock) along the pipeline route and in the event rock dump is required to be deposited on the seabed to mitigate scour. However, the area impacted is extremely small compared to the extent of habitat in the wider SNS SAC, approximately 0.00005% of the total area of the SAC. The loss of a relatively very small area of habitat that occurs widely within the SAC is not predicted to impact on harbour porpoise or their prey.

Given the above, it is therefore considered that the proposed Kilmar decommissioning activities will not have a likely significant effect on harbour porpoise or supporting habitats and processes relevant to harbour porpoises and their prey.

7.1.3 In-Combination Effects

Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs states that noise disturbance within an SAC from a plan/project, individually or in combination, is considered to be significant if it excludes harbour porpoises from more than (JNCC, 2020):

- 20% of the relevant area of the site in any given day, or
- An average of 10% of the relevant area of the site over a season.

However, as the underwater noise emissions generated during the proposed Kilmar decommissioning activities are not predicted to result in injury or significant disturbance to harbour porpoise (refer to Section 6.3), it is considered that this in-combination with other plans / projects is unlikely to prevent the site from contributing in the best possible way to species FCS. In addition, this area of the SNS is subject to a relatively high volume of vessel traffic (refer to Section 4.3.2) and therefore it is anticipated that the additional underwater noise generated by the proposed Kilmar decommissioning activities is likely to be insignificant compared to the ambient noise level.

It is acknowledged that in the event rock is required to be deposited to prevent scour, either prior to or during the rig/JUWB decommissioning works, a total of up to 85,000 tonnes of rock could be required to be placed over an area of 0.016 km2 within the SAC. In addition, there will be a legacy impact, totalling < 0.00305 km2, from the existing rock dump along the Kilmar pipelines which will be decommissioned in situ, as well as any mattresses redeployed to cover the cut pipeline ends, if required (refer to Section 6.2.1). Although this is unlikely to adversely affect site integrity in isolation, based on the scale of the predicted impacts, it could adversely affect site integrity in relation to supporting habitats and processes of harbour porpoise and their prey when considered in-combination with the other large-scale plans / projects which will be occurring within the SNS SAC in the forthcoming years, for example decommissioning of other oil and gas fields and installation of offshore wind farms, including cables with rock protection.

EUL is aware of the following projects that have already been undertaken or potentially will be ongoing within the SNS SAC in future years, which will contribute to permanent seabed impacts:

1. Oil & Gas Decommissioning Projects
    - Garrow Decommissioning (operated by Energean) - located approximately 22 km west of the Kilmar platform (SNS SAC summer area);
    - Leman F & G NUIs Decommissioning (operated by Shell) - located approximately 138 km southwest of the Kilmar platform (SNS SAC summer area);
    - Johnston Decommissioning (operated by Premier Oil E&P UK EU Limited) - located approximately 28 km south of the Kilmar platform (SNS SAC summer area);

- Sean Field Decommissioning (operated by One-Dyas UK Limited) - located approximately 148 km southeast of the Kilmar platform (SNS SAC summer area);
- LOGGS LDP2- LDP5 Area Decommissioning (operated by Chrysaor Production (U.K.) Limited) - located approximately 114 km southeast of the Kilmar platform (SNS SAC summer area);
- Victoria Field Decommissioning (operated by NEO Energy (SNS) Limited) - approximately 111 km southeast of the Kilmar platform (SNS SAC summer area);
- Wenlock Decommissioning (operated by Energean) - located approximately 97 km southeast of the Kilmar platform (SNS SAC summer area);
- Ensign Decommissioning (operated by Sprit Energy North Sea Limited) - located approximately 77 km south of the Kilmar platform (SNS SAC summer area);
- Hunter and Rita Fields Decommissioning (operated by Premier Oil E&P UK EU Limited) - located approximately 56 km east of the Kilmar platform (SNS SAC summer area);
- Hewett Decommissioning (operated by ENI UK Limited) - located approximately 145 km south of the Kilmar platform (SNS SAC winter area);
- ‘A Fields’ (Ann, Alison, Annabel and Audrey) Decommissioning (operated by Sprit Energy North Sea Limited) - located approximately 80 km southeast of the Kilmar platform (SNS SAC summer area);
- Anglia Decommissioning (operated by Ithaca Energy UK Limited) - located approximately 97 km south of the Kilmar platform (SNS SAC summer area);
- VDP2 and VDP3 Decommissioning (operated by ConocoPhillip (U.K.) Limited) - located approximately 122 km southeast of the Kilmar platform (SNS SAC summer area);
- Caister-Murdoch Decommissioning (operated by Chrysaor Production (U.K.) Limited) - located 64 km southeast of the Kilmar platform (SNS SAC summer area);

2. Oil & Gas Field Development Projects

- Southwark Pipeline Installation (operated by IOG plc) - located approximately 133 km southeast of the Kilmar platform (SNS SAC summer area);
- Pegasus West Development (operated by Spirit Energy) - located approximately 71 km northeast of the Kilmar platform (SNS SAC summer area).

3. Offshore Wind Farm Projects

- Hornsea One offshore wind farm is currently operational (SNS SAC summer area) located approximately 51 km southeast of the Kilmar platform;
- Hornsea Two offshore wind farm is currently operational (SNS SAC summer area) located approximately 32 km southeast of the Kilmar platform;
- Hornsea Three offshore wind farm including cable corridor (status: consented) (SNS SAC winter/summer area): construction could be ongoing during 2024-2030, located 13 km south of the Kilmar platform;
- Hornsea Four offshore wind farm including cable corridor (status: consented) (SNS SAC summer area): construction could be ongoing during 2024-2030, located 13 km south of the Kilmar platform;
- Dogger Bank South (East and West) Offshore Wind Farms (status: pre-planning application) (SNS SAC summer area): construction could be ongoing starting in 2026, located 33 km northeast of the Kilmar platform;
- Dogger Bank Creyke Beck A and B Offshore Wind Farms (status: under construction) (SNS SAC summer area) construction is currently ongoing and is likely to continue until summer 2024, located 54 km and 66 km northeast of the Kilmar platform respectively;
- Dogger Bank C Offshore Wind Farm (status: under construction (SNS SAC summer area) construction is currently ongoing and is likely to continue until 2026, located 54 km and 66 km northeast of the Kilmar platform respectively;
- Sofia Offshore Wind Farm (status: under construction) (SNS SAC summer area) construction is currently ongoing and is likely to continue until 2026, located 86 km northeast of the Kilmar platform;

- Outer Dowsing Wind Farm (status: pre-planning application) (SNS SAC summer area): construction could be ongoing starting in 2026, located 69 km south of the of the Kilmar platform;
- Norfolk Vanguard offshore wind farms (status: consented) (SNS SAC summer area): construction could be ongoing during 2024-late 2020s, located 161 km south east of the Kilmar platform;
- Norfolk Boreas offshore wind farm (status: consented) (SNS SAC summer area): construction could be ongoing during 2024-late 2020s, located 161 km southeast of the Kilmar platform;
- East Anglia Three offshore wind farm (status: consented) (SNS SAC summer/winter area): offshore construction could be ongoing starting in 2024 and is likely to continue until 2026, located 195 km south east of the Kilmar platform;
- East Anglia One North and Two offshore wind farms (status: consented) (SNS SAC winter/summer area): construction could be ongoing during 2024-2030, located 216 km south east of the Kilmar platform.

4. Carbon Capture and Storage Projects

- Endurance Carbon Capture and Storage Site (Status: in planning) (SNS SAC summer area): construction could be ongoing from Q3 2025 until Q4 2026, located 8 km southwest of Kilmar platform.

The overall area of seabed estimated to be permanently impacted by the above listed projects, based on publicly available information (noting that data was not available for all projects), in-combination with the proposed Kilmar decommissioning activities, is summarised in Table 7.2.

Table 7.2. Total Estimated In-combination Permanent Seabed Impacts within SNS SAC

Project	Area of Seabed Permanently Impacted within the SNS SAC (km2)
Kilmar Decommissioning	0.01905
Garrow Decommissioning 1	0.017328
Leman F & G NUIs Decommissioning 2	0.0016
Johnston Decommissioning 3	0.00012
Sean Field Decommissioning 4	0.0067
LOGGS LDP2- LDP5 Area Decommissioning 5	0.01512
Victoria Field Decommissioning 6	0.0006
Wenlock Decommissioning 7	0.006
Ensign Decommissioning 8	0.0242
Hunter and Rita Fields Decommissioning 9	0.00044
Hewett Platforms Decommissioning 10	0.02
Ann and Alison Decommissioning 11	0.0252
Annabel and Audrey Decommissioning 12	0.0810
Anglia Decommissioning 13	0.002

Project	Area of Seabed Permanently Impacted within the SNS SAC (km2)
Viking Platforms, Vixen and associated Pipelines (VDP2) and Victor (VDP3) Decommissioning 14	1.47
Caister- Murdoch Decommissioning 15	0.102
Southwark Pipeline Installation 16	0.007
Pegasus West Installation 17	0.04948
Hornsea Project Three Offshore Wind Farm18	1.348 29
Endurance Carbon Capture and Storage19	3.5818
North Vanguard Offshore Wind Farm20	11.76
North Boreas Offshore Wind Farm21	6.371
Dogger Bank A and B Offshore Wind Farms22	14.748
Outer Dowsing Offshore Wind Farm 23	4.4
Hornsea Project Four Offshore Wind Farm24	3.730671
East Anglia One Offshore Wind Farm25	12.031517
East Anglia Two Offshore Wind Farm26	12.6781865
East Anglia Three Offshore Wind Farm27	3.48
Hornsea Project One Offshore Wind Farm 28	4.225
Total:	78.85401
% of SNS SAC Impacted: 30	0.213

1 Reference: Garrow Decommissioning Environmental Appraisal Report (2023)

2 Reference: Leman F & G NUIs Decommissioning Environmental Appraisal Report (2023)

3 Reference: Johnston Decommissioning Environmental Appraisal Report (2021)

4 Reference: Sean Field Decommissioning Environmental Appraisal Report (2022)

5 Reference: LOGGS LDP2- LDP5 Area Decommissioning Environmental Appraisal Report (2022)

6 Reference: Victoria Field Decommissioning Environmental Appraisal Report (2022)

7 Reference: Wenlock Decommissioning Environmental Appraisal Report (2022)

8 Reference: Ensign Decommissioning Environmental Appraisal Report (2021)

9 Reference: Hunter and Rita Fields Decommissioning Environmental Appraisal Report (2020)

10 Reference: Hewett Decommissioning Environmental Appraisal Report (2021)

11 Reference: Ann and Alison Decommissioning Environmental Appraisal Report (2017)

12 Reference: Annabel and Audrey Decommissioning Environmental Appraisal Report (2017)

13 Reference: Anglia Decommissioning Environmental Appraisal Report (2020)

14 Reference: VDP2 and VDP3 Decommissioning ES (2018)

15 Reference: Caister Murdoch System Decommissioning Environmental Appraisal Report (2022)

16 Reference: Southwark Pipeline Installation Project (2021). ES Addendum. Reference: D/4257/2020.

17 Reference: Pegasus West Development Environmental Statement (2021)

18 Reference: Hornsea Project Three (2017). July 2017. Preliminary Environmental Information Report: Chapter 2 - Benthic Subtidal and Intertidal Ecology.

19 Reference: BP. Offshore Environmental Statement for the Northern Endurance Partnership. (2023)

20 Reference: North Vanguard Offshore Wind Farm (2018). June 2018. Environmental Statement. Chapter 10 - Benthic and Intertidal Ecology.

21 Reference: North Boreas Offshore Wind Farm (2019). June 2019. Environmental Statement. Chapter 10 -Benthic and Intertidal Ecology.

22 Reference: Dogger Bank Teeside A and B (2014). March 2014. Environmental Statement. Chapter 12 -Marine and Intertidal Ecology.

23 Reference: Outer Dowsing Offshore Wind (2024). March 2024. Environmental Statement. Chapter 9 -Benthic and Intertidal Ecology.

24 Reference: Hornsea Project Four (2022). August 2022. Volume A2. Chapter 2 - Benthic and Intertidal Ecology.

25 Reference: East Anglia One North Offshore Windfarm (2019). January 2019. Preliminary Environmental Information Report. Chapter 9 - Benthic Ecology.

26 Reference: East Anglia Two North Offshore Windfarm (2019). October 2019. Environmental Statement. Chapter 9 - Benthic Ecology.

27 Reference: East Anglia Three North Offshore Windfarm (2014). May 2014. Preliminary Environmental Information Report. Chapter 10 - Benthic Ecology.

28 Reference: SMart Wind Hornsea Project One Offshore Wind Farm (2013). July 2013. Reports – Habitats Regulations Assessment Report.

29 This accounts for the worst- case permanent impact scenario as a part of the permanent impact area is outside of the SNS SAC.

30 Southern North Sea SAC total area: 36,951 km2.

The long-term habitat loss resulting from the above listed projects represents a relatively small percentage of the SAC at ca. 0.2% and any impacts relating to the rock substrate (either rock which is introduced to the site or rock decommissioned in situ) are predicted to be highly localised. Of note, for Kilmar although a small amount of new hard substrate may be introduced into the SNS SAC if scour mitigation is required prior to or during the rig/JUWB decommissioning works, other hard substrate material, including mattresses and grout bags, as well as the pipeline / tie-in spool pieces underneath the mattresses, will be removed (refer to Section 3.4.4). Based on the fact that a total of 27 mattresses (14 at Kilmar, 13 at Trent) will be removed within the SNS SAC and given the dimensions of the mattresses (6 m x 4 m), an area of at least 648 m2 will returned to a sediment habitat, more typical of this area of the SNS (i.e. soft sandy sediments).

In contrast, any temporary disturbance to the seabed within the SNS SAC from the above listed projects is expected to recover relatively rapidly given the relatively shallow and dynamic nature of the site, thereby ensuring that the site conservation objectives are not undermined and there is no adverse effect on site integrity.

Given the above, it is therefore considered that in-combination impacts will not have a likely significant effect on the qualifying features of the SNS SAC.

7.1.4 Conclusion

In summary, based on the predicted scale of impacts and proposed mitigation measures, along with evidence from existing studies of the likely potential effects on the qualifying features, it is concluded that the proposed Kilmar decommissioning activities either alone or in-combination with other plans or projects will not have an adverse effect on the integrity of the SNS SAC.

7.2 Greater Wash SPA

7.2.1 Qualifying Features and Conservation Objectives

The Greater Wash SPA covers an area of 3,536 km^2 and lies along the east coast of England in the mid-SNS and extends between the counties of Yorkshire (to the north) and Suffolk (to the south). The site is classified for the protection of red-throated diver, common scoter and little gull during the non-breeding season, and for breeding Sandwich tern, common tern and little tern. This area supports the largest breeding populations of little terns within the UK SPA network by protecting important foraging areas, and supports the second largest aggregations of non-breeding red-throated diver and little gull.

The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified. The objectives are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and
- The distribution of the qualifying features within the site.

7.2.1 Potential Impacts

As contracts are not yet in place for the proposed decommissioning work vessel mobilisation and demobilisation locations are unknown. Hull, Great Yarmouth and Lowestoft are all possible ports that could be utilised by the project, which would result in vessels transiting through the Greater Wash SPA to the Kilmar location.

Of the bird species present within the SPA, common scoter and red-throated diver are vulnerable to disturbance by boats (Schwemmer *et al*., 2011), with common scoter flushing at distances of around 1,600 ± 777 m from approaching vessels and red-throated diver flushing at distances of about 750 ± 437 m (Fliessbach *et al.,* 2019). Large aggregations of these species are present within the SPA between November and March. In contrast, little gull are less sensitive to disturbance from shipping traffic (Leopold & Dijkman, 2010) and tern species are generally tolerant of vessel activity (Cook & Burton, 2010).

In the event that vessels do transit through the SPA during the overwintering period, based on evidence of vessel displacement, it is assumed that all red-throated diver within 2 km of a vessel could be displaced (Burt et *al*., 2017; Burger *et al.,* 2019) and all common scoter within 2.5 km of a vessel could be displaced (Fliessbach *et al.,* 2019). The total number of birds that could be displaced at any one point by a vessel transiting through the SPA is summarised in Table 7.1.

Table 7.1. Estimated Numbers of Red-Throated Diver and Common Scoter Potentially Disturbed at Any One Point Within the Greater Wash SPA during the Overwintering Period

Mob / Demob Port	Distance Through SPA[1]	Displacement Area at Any One Point[2]	Density of Birds Within SPA[3]	No. of Birds Disturbed at any One Point	% Population of SPA Disturbed at any One Point[4]
Red-throated Diver					
Hull	14 km	13 km^2	1.35 – 3.38 per km^2	18 - 44	1.3 – 3

Mob / Demob Port	Distance Through SPA[1]	Displacement Area at Any One Point[2]	Density of Birds Within SPA[3]	No. of Birds Disturbed at any One Point	% Population of SPA Disturbed at any One Point[4]
Great Yarmouth	30 km	13 km^2	1.35 – 3.38 per km^2	18 – 44	1.3 – 3
Lowestoft	30 km	13 km^2	1.35 – 3.38 per km^2	18 - 44	1.3 – 3
Common Scoter					
Hull	14 km	20 km^2	0 – 0.7 per km^2	0 – 14	0 – 0.4
Great Yarmouth	30 km	20 km^2	0 – 0.7 per km^2	0 – 14	0 – 0.4
Lowestoft	30 km	20 km^2	0 – 0.7 per km^2	0 – 14	0 – 0.4

[1] Assumes a direct transit route through the SPA to the Kilmar platform.
[2] Based on displacement distance of 2km for red-throated diver and 2.5km for common scoter along the entire route within the SPA.
[3] Based on maximum predicted density of red-throated diver within the SPA. Highest densities of common scoter are present offshore The Wash therefore density range reflects the likely distribution along the transit routes (Lawson *et al.,* 2016)
[4] Based on the following count data: 1,407 red-throated diver and 3,449 common scoter (NE, 2018)

It can be seen from Table 7.1 that red-throated diver are most at risk of disturbance if vessels were transiting to / from Hull, Great Yarmouth or Lowestoft. Therefore, to minimise disturbance, WPRL proposes to implement the following mitigation measures:

- Restricting, to the extent possible, vessel movements within the Greater Wash SPA to existing navigation routes when transiting to / from the Kilmar location;
- Maintaining direct transit routes;
- Avoiding over-revving of engines;
- Briefing vessel crew on the purpose and implications of vessel management practices within the Greater Wash SPA.

Given the above, it is therefore considered that the proposed Kilmar decommissioning activities will not have a likely significant effect on the distribution and population of red-throated diver within the SPA.

7.2.3 In-Combination Effects

It is recognised that this region of the SNS is already subject to high densities of vessel traffic, which could result in adverse impacts to red-throated diver within the SPA in-combination with the vessel traffic generated during the proposed Kilmar decommissioning project. However, given the temporary nature of the project and the relatively short duration of the proposed operations, coupled with mitigation measures EUL propose to implement, significant in-combination effects are not predicted.

7.2.4 Conclusion

In summary, the proposed decommissioning activities will not significantly alter the extent, distribution, structure and function of the habitats of the qualifying bird species, the supporting processes on which these habitats rely, nor the population or distribution of the qualifying bird species. Therefore, in view of the conservation objectives of the SPA, no likely significant effects on the Greater Wash SPA are predicted, as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

8 Conclusions

The combined Kilmar Field Installation and Pipelines DP involves the removal of the Kilmar platform (topside and jacket) and surface laid tie-in spools and pipeline sections, mattresses and grout bags, with recovery to shore. The remaining buried pipelines will be left cleaned and decommissioned in situ, along with the associated rock stabilisation features. This EA report confirms that the combined Kilmar DP can be executed with no significant adverse effects on the marine environment.

An initial screening of the potential impacts to environmental and societal receptors from the proposed Kilmar decommissioning activities concluded that the only aspects considered to be potentially significant and therefore requiring further assessment were physical presence, seabed disturbance and underwater noise. However, following further assessment and upon implementation of the identified mitigation measures, it is has been concluded that no significant residual effects are predicted to occur, with the majority of impacts being localised and temporary in nature.

Of note is that the Kilmar infrastructure lies within the boundary of the SNS SAC, designated for the protection of harbour porpoises. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of the SAC as a result of the proposed Kilmar decommissioning activities, either alone or in-combination with other plans or projects.

The mitigation measures identified to reduce any adverse environmental effects arising from the proposed decommissioning activities are summarised in Table 8.1. WPRL operates under an integrated SEMS, certified to ISO 14001:2015, and has established contractor selection and management procedures. As a number of contractors will be involved in the detailed planning and execution of the proposed Kilmar decommissioning activities, WPRL will produce a SEMS interface document for the project to help ensure the measures listed in Table 8.1 are successfully implemented.

Table 8.1. Kilmar Decommissioning Mitigation Measures

Physical Presence
• Where required, Consent to Locate permits will be in place, existing collision risk management plans will be reviewed and notifications of the proposed decommissioning activities will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins; • If the jacket is removed in a separate campaign to the topside, a solar navaid / foghorn will be installed to warn other sea users of its presence; • Details of any infrastructure decommissioned in situ will be publicised through Notices to Mariners and marked on navigation and fisheries charts; • A post-decommissioning monitoring programme covering the pipelines and associated stabilisation features remaining in situ will be agreed with OPRED, if necessary; • If any nesting birds are identified in years ahead of the decommissioning activities, installation of nesting bird deterrents will be considered when the preparatory work is being undertaken to discourage birds from nesting on the platform, if it enters the Lighthouse Mode phase; • EUL will continue to check for the presence of nesting birds on scheduled routine visits to the Kilmar platform, noting there is not a history of nesting birds on the platform. If the topside is to be removed during the breeding season, data will be reviewed to confirm the absence of nesting birds and, if considered necessary, the platform will be checked by a qualified ornithologist prior to removal. If nesting birds are observed, OPRED will be consulted to ascertain if it is possible for a Wild Birds Licence to be granted to allow the works to go ahead; • If any other decommissioning activity (e.g. preparatory works) is to be undertaken on the topside during the breeding season, the platform will be checked for nesting birds prior to commencing work. OPRED will be informed of the results and, if necessary, a Wild Birds Licence applied for. In the event nesting birds are observed, EUL currently propose to erect signage in the area advising offshore personnel of the nests and personnel will be briefed on instructions to minimise possible disturbance to the juveniles and attending adults. The nests will also be monitored on a regular basis to record bird presence and activity.

- Restricting, to the extent possible, vessel movements within the Greater Wash SPA to existing navigation routes when transiting to / from the Kilmar location, maintaining direct transit routes, avoiding over-revving of engines and briefing vessel crew on the purpose and implications of vessel management practices within the Greater Wash SPA.

Seabed Disturbance

- Jacket legs will be cut internally, to avoid seabed disturbance from external excavation;
- Where vessels are required to hold position for only short duration, DP vessels will be used in favour of moored vessels;
- No new mattresses, grout bags or rock dump will be placed on the seabed.

Underwater Noise Emissions

- Operations will be planned to reduce vessel movements and minimise the overall duration of the project.
- Where vessels are required to hold position for extended durations, jack-up or moored vessel will be used in favour of DP vessels.
- Internal cutting techniques will be utilised where possible, which do not produce any significant noise emissions.
- Where internal cuts are not possible, external cuts will be via mechanical methods as they produce significantly less noise than those made using abrasive methods.

Energy Use and Atmospheric Emissions

- EUL will look to reduce vessel time in the field as far as practicable and will make use of vessel synergies where possible;
- EUL's contractor selection process will aim to ensure that the engines, generators and other combustion plant on the vessels to be used during the proposed decommissioning activities are maintained and correctly operated to ensure that they work as efficiently as possible.

Marine Discharges

- Food waste will be macerated and waste water will be treated appropriately before being discharged to sea, in accordance with the requirements of the MARPOL convention;
- Ballast water discharges will be in accordance with the International Maritime Organisation Ballast Water Management Convention, including a ballast water plan and log book.

Waste Management

- EUL will ensure the principles of the Waste Management Hierarchy are followed during the proposed decommissioning activities, that licensed waste contractors are used and a project Waste Management Plan is in place to ensure compliance with relevant waste regulations;
- Any waste disposed of outside of the UK will be in accordance with the Transfrontier Shipment of Waste Regulations 2007;
- If NORM is encountered, EUL will ensure appropriate RSR permits are in place and conditions that dictate the management and control of radioactive waste are met.

Accidental Events

- An approved Oil Pollution Emergency Plan (OPEP) will be in place for the proposed Kilmar decommissioning activities, as required by the Merchant Shipping (Oil Pollution Preparedness, Response and Co-Operation Convention) Regulations 1998 (as amended);
- All unplanned losses (dropped objects) in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out;
- Where possible equipment with automatic hydraulic shut-off will be used to minimise the volume of fluid released in the event of a hydraulic line failure.

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Appendix A: Marine Planning Objectives and Policies

Table A.1. Marine Planning Objectives and Policies Relevant to the Proposed Kilmar Decommissioning Operations

Relevant Objectives	Associated Policies	Project Compliance
Economic Productivity - To promote the sustainable development of economically productive activities, taking account of spatial requirements of other activities of importance to the East marine plan areas.	EC1 - Proposals that provide economic productivity benefits which are additional to Gross Value Added currently generated by existing activities should be supported.	Since first gas in 2006, production from Kilmar has been gradually declining and ceased in June 2020 when PUK closed the Kilmar export route at Trent. The remaining reserves in Kilmar are not thought sufficient to support an investment to return the facilities to production and cover the costs of an alternative export solution. WPRL as previous Field Operator has explored alternative uses for the Kilmar facilities (see Section 3.2); however, none were found viable. WPRL has therefore submitted a CoP notification to the NSTA.
Employment and Skill Levels - To support activities that create employment at all skill levels, taking account of the spatial and other requirements of activities in the East marine plan areas.	EC2 - Proposals that provide additional employment benefits should be supported, particularly where these benefits have the potential to meet employment needs in localities close to the marine plan areas.	Where possible the proposed decommissioning work will utilise local contractors.
Heritage Assets - To conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area.	SOC2 - Proposals that may affect heritage assets should demonstrate, in order of preference: a) that they will not compromise or harm elements which contribute to the significance of the heritage asset; b) how, if there is compromise or harm to a heritage asset, this will be minimised; c) how, where compromise or harm to a heritage asset cannot be minimised it will be mitigated against, or; d) the public benefits for proceeding with the proposal if it is not possible to minimise or mitigate compromise or harm to the heritage asset. SOC3 - Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference: a) that they will not adversely impact the terrestrial and marine character of an area;	The proposed decommissioning operations are not anticipated to have an impact on any heritage assets. There will be a beneficial impact to the seascape of the local area once the Kilmar platform has been removed.

Relevant Objectives	Associated Policies	Project Compliance
	b) how, if there are adverse impacts on the terrestrial and marine character of an area, they will minimise them; c) how, where these adverse impacts on the terrestrial and marine character of an area cannot be minimised they will be mitigated against; d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	
Healthy Ecosystem - To have a healthy, resilient and adaptable marine ecosystem in the East marine plan areas.	ECO1 - Cumulative impacts affecting the ecosystem of the East marine plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation.	No significant cumulative impacts are predicted to occur. Refer to Section 6.4
	ECO2 - The risk of release of hazardous substances as a secondary effect due to any increased collision risk should be taken account of in proposals that require an authorisation.	In the unlikely event of an accidental release of hydrocarbons or chemicals the impact to the marine environment is not anticipated to be significant. Refer to Section 5.4.4.1.
Biodiversity - To protect, conserve and, where appropriate, recover biodiversity that is in or dependent upon the East marine plan areas.	BIO1 - Appropriate weight should be attached to biodiversity, reflecting the need to protect biodiversity as a whole, taking account of the best available evidence including on habitats and species that are protected or of conservation concern in the East marine plans and adjacent areas (marine, terrestrial).	The proposed decommissioning operations will not significantly impact biodiversity. Refer to Section 6.
Marine Protected Areas (MPAs) - To support the objectives of MPAs (and other designated sites around the coast that overlap, or are adjacent to the East marine plan areas), individually and as part of an ecologically coherent network.	MPA1 - Any impacts on the overall MPA network must be taken account of in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network	The proposed decommissioning operations will not pose a risk of adversely affecting (either directly or indirectly) the integrity of any MPA, either alone or in combination with other plans or projects. Refer to Section 7.
Governance - To ensure integration with other plans, and in the regulation and management of key activities and issues, in the East marine plans, and adjacent areas.	GOV2 - Opportunities for co-existence should be maximised wherever possible.	Residual effects on other sea users resulting from the physical presence of vessels on location at Kilmar during the proposed decommissioning operations are predicted to be Negligible and not significant. In addition, removal of the Kilmar platform and associated 500 m safety exclusion zone will result in positive effects as the area will become available to other sea users again. Refer to Section 6.1
	GOV3 - Proposals should demonstrate in order of preference: a) that they will avoid displacement of other existing or authorised (but yet to be implemented) activities; b) how, if there are adverse impacts resulting in displacement by the proposal, they will minimise them; c) how, if the adverse impacts resulting in displacement by the proposal, cannot be minimised, they will be mitigated against or;	

Relevant Objectives	Associated Policies	Project Compliance
	d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts of displacement.	