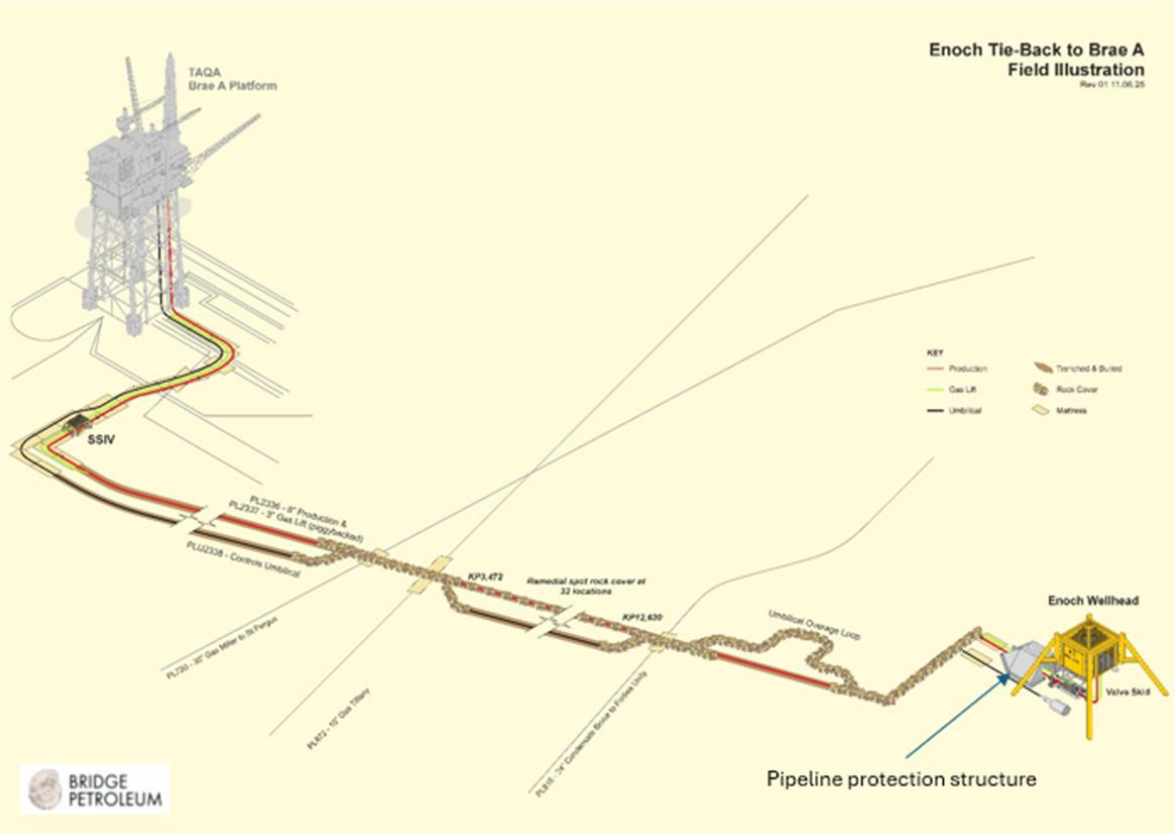
BRIDGE PETROLEUM



ENOCH DECOMMISSIONING PROJECT
ENVIRONMENTAL APPRAISAL

Document Number: ENO-P001-GEN-EN-RE-0003

Consultation Draft

July 2026

Approvals

Revision No	Date	Comment	Issued by	Checker	Approver
A	13/03/26	Issued for client review	Genesis	R. Farquhar L. Laszlo	
0	13/05/26	Issued for use	Genesis	R. Farquhar L. Laszlo	Dr Fazrie Wahid
1	03/07/26	Issued for Consultation	Genesis	R. Farquhar L. Laszlo	Dr Fazrie Wahid
2	30/07/26	Issued for Consultation	Genesis	R. Farquhar L. Laszlo	Dr Fazrie Wahid

For Genesis Tracking. Genesis document number 218919C-001-Y-RT-24002 (Job No J-UK-00351).

Revision No	Date	Comment	Issued by	Checker	Approver
A	13/03/26	Issued for client review	P. Mahbub	K. Hughes	L. Dallas Grindall
0	13/05/26	Issued for use	P. Mahbub	M. O' Sullivan L. Dallas Grindall	Stuart Odell
1	03/07/26	Issued for Consultation	P. Mahbub	M. O' Sullivan	Stuart Odell
2	30/07/26	Issued for Consultation	P. Mahbub	M. O' Sullivan	Stuart Odell

TABLE OF CONTENTS

ABBREVIATIONS

Abbreviation	Description
”	Inch
>	More Than
<	Less Than
%	Percentage
°C	Degrees Celsius
µg/g	Micrograms per Gram
µm	Micrometres
‰	Per thousand
£	Great British Pounds
µm	Micrometre
BAT	Best Available Technique
BEIS	Department for Business, Energy, and Industrial Strategy
BEP	Best Environmental Practices
c.	Circa / Approximately
cm	Centimetre
CA	Comparative Assessment
CCC	Climate Change Committee
CH_4	Methane
CMID	Common Marine Inspection Documents
CNS	Central North Sea
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COLREGS	International Regulations for the Prevention of Collisions at Sea
CRA	Corrosion Resistant Alloy
CSV	Construction Support Vessel
DESNZ	Department for Energy Security and Net Zero
DoB	Depth of Burial
DP	Decommissioning Programme
EA	Environmental Appraisal
EC	European Commission
EEMS	The Environmental and Emissions Monitoring System
EHC	Electro-Hydraulic and Chemical
EIA	Environmental Impact Assessment
EMODnet	European Marine Observation and Data Network
EMS	Environmental Management System
ENVID	Environmental and socio-economic Impact Identification
EPS	European Protected Species

Abbreviation	Description
ERL	Effects Range Low
ESAS	European Seabirds at Sea
ESG	Environmental Social Governance
ESIA	Environmental / socio-economic impact significance
ESRA	Environmental and Socio-Economic Risk Assessment
EU	European Union
EUNIS	European Nature Information System
FPS	Forties Pipeline System
FOCI	Features of Conservation Importance
GEN	NMP General principles
GES	Good Environmental Status
GESAMP	The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GHG	Greenhouse Gas
GWP	Global Warming Potential
HSSE	Health, Safety, Security and Environment policy
IAMMWG	Inter-Agency Marine Mammal Working Group
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
INTOG	Innovation and Targeted Oil and Gas
IoP	Institute of Petroleum
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
kg	Kilogram
km^2	Square Kilometre
km	Kilometre
KP	Kilometre Point
LAT	Lowest Astronomical Tide
LTOBM	Low Toxicity Oil Based Mud
m	Metre
m^2	Square Metre
m^3	Cubic Metre
m/s	Metre Per Second
$mg.kg^{-1}$	Milligrams Per Kilogram
mm	Millimeters
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multibeam Echo Sounder
MCA	Marine and Coastguard Agency
MDAC	Methane derived authigenic carbonate structure

Abbreviation	Description
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MU	Management Unit
N/A	Not Applicable
N_2O	Nitrous Oxide
NCP	National Contingency Plan
nm	Nautical mile
NMP	National Marine Plan
NNS	Northern North Sea
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NOCS	Norwegian Continental Shelf
NSTD	The North Sea Transition Deal
OBM	Oil-based Mud
OEUK	Offshore Energies UK (*prev. OGUK)*
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OPEP	Oil Pollution Emergency Plan
OSPAR	Oslo and Paris Conventions (*prev. PARCOM*)
PAH	Polycyclic Aromatic Hydrocarbons
PMF	Priority Marine Feature
RAG	Red-Amber-Green
ROV	Remotely Operated Vehicle
ROVSV	Remotely Operated Vehicle Support Vessel
SAC	Special Areas of Conservation
SACFOR	Superabundant, Abundant, Common, Frequent, Occasional and Rare
SCANS	Small Cetacean Abundance in the North Sea
SFF	Scottish Fishermen's Federation
SGMD	Scottish Government Marine Directorate
SIMOPS	Simultaneous Operations
SNS	Southern North Sea
SO_2	Sulphur Dioxide
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Areas
SSIV	Subsea Safety Isolation Valves
SSS	Side Scan Sonar
te	Tonnes
THC	Total Hydrocarbon Content
UK	United Kingdom
UKCS	UK Continental Shelf

Abbreviation	Description
UKHO	UK Hydrographic Office
UKOOA	The UK Offshore Operators Association
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UV	Ultraviolet
VOCs	Volatile Organic Compounds
WMP	Waste Management Plan

NON-TECHNICAL SUMMARY

Purpose

Bridge Petroleum 3 Limited (hereafter referred to as Bridge Petroleum) are preparing to decommission the Enoch Field. The proposed decommissioning of the subsea infrastructure will be covered over a single Decommissioning Programme. The Decommissioning Programme submission captures the decommissioning of the following subsea infrastructure;

- Recovery of the wellhead protection structure and a valve skid at the Enoch well;
- Recovery of a Subsea Isolation Valve located within the Brae Alpha 500 m zone;
- Decommissioning of the buried piggybacked flowlines *in situ*[1] with remediation of the exposed sections;
- Recovery of the Electro-Hydraulic and Chemical umbilical (apart from sections covered with rock which will decommissioned *in situ*);
- Recovery of the subsea flexible risers, and surface laid tie-in spools;
- Recovery of a pipe tunnel, exposed mattresses and exposed grout bags; and
- Decommissioning of concrete plinths, rock cover and rock covered mattresses *in situ*.

As operator, Bridge Petroleum has prepared this Environmental Appraisal under the Petroleum Act 1998, in support of the draft Decommissioning Programme submitted to the Offshore Petroleum Regulator for Environment and Decommissioning, to seek approval for the proposed decommissioning activities.

Background Information

The Enoch Field was first discovered in 1985 and developed as a single-well subsea tieback to the Brae Alpha platform. The Enoch Field is located within United Kingdom Continental Shelf licence block 16/13a and partially extends onto Norwegian block 15/5. The associated subsea infrastructure lies within the same UK Continental Shelf licence block with the addition of blocks 16/8 and 16/7 (Figure 1).

The Enoch Field comprises of a single subsea production well, tied back via an 8” rigid production line (PL2336), 3” rigid gas lift line (PL2337) and a combined control and chemical umbilical (PLU2338). The infield lines are tied back to Brae Alpha (operated by TAQA) via flexible risers and oil production is exported from Brae via the Forties Pipeline System.

[1] *"In situ" refers to the decommissioning practice of abandoning oil, gas, or umbilical pipelines in their original location on or under the seabed (or ground) rather than removing them completely.*

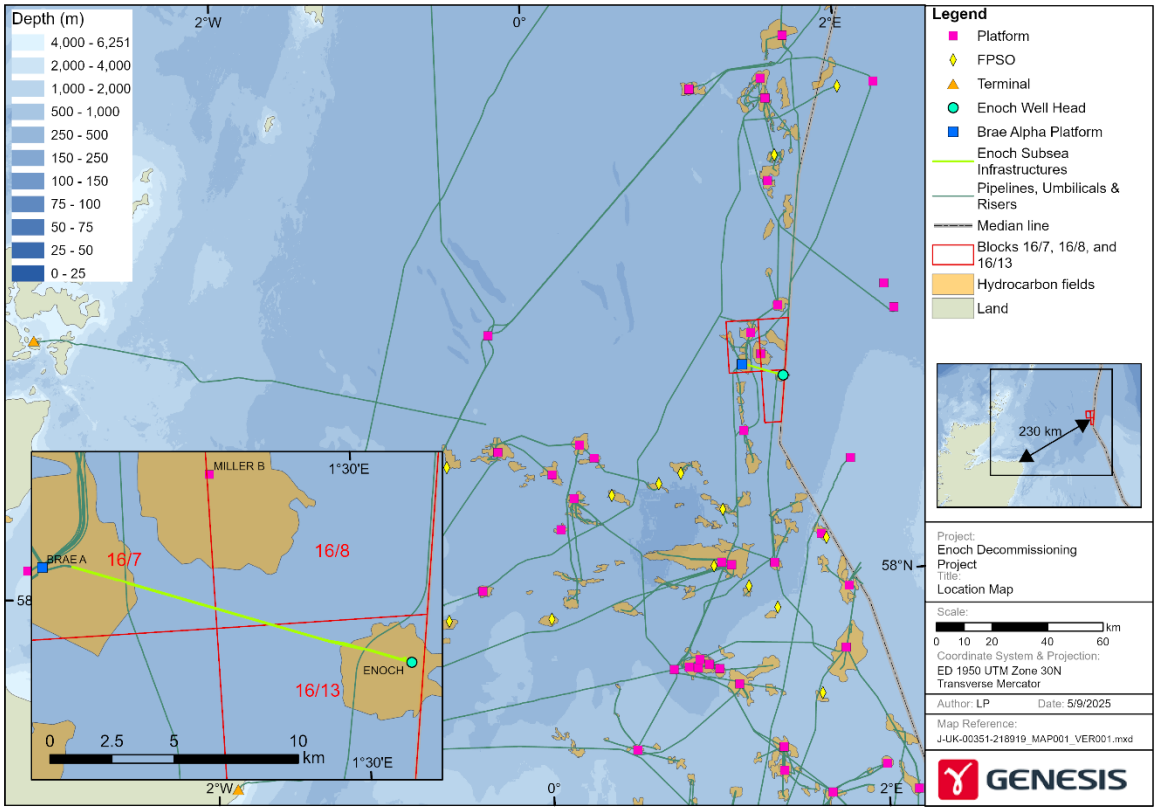


Figure 1: Location of the Enoch Field.

Stakeholder Engagement

The formal statutory and public consultation process will be triggered by the submission of Decommissioning Programme and supporting documents (including this Environmental Appraisal report) to Offshore Petroleum Regulator for Environment and Decommissioning. As the Project progresses, further consultation will be undertaken as deemed necessary by the Project.

Planned Decommissioning Activities

Bridge Petroleum are preparing to decommission the Enoch Field as described in the Decommissioning Programme submission. This comprises the decommissioning of the subsea infrastructure associated with the Enoch Field (Bridge Petroleum, 2026a).

The proposed decommissioning activities include;

- Recovery of the wellhead protection structure and associated valve skid;
- Recovery of the Enoch Subsea Isolation Valve located within the Brae Alpha 500 m zone;
- Remediate *in situ* with exposed sections cut and removed for the buried piggybacked flowlines and the Electro-Hydraulic and Chemical (EHC) umbilical;
- Recovery of the risers and surface laid tie-in spools;
- Recovery of a pipe tunnel, exposed mattresses and exposed grout bags; and
- Decommissioning of the existing concrete plinths (associated with third party crossings), rock cover and rock covered mattresses *in situ*.

A Comparative Assessment of the feasible decommissioning options for the buried subsea infrastructure was carried out, to determine the preferred approach to decommissioning the following;

- Group A: Rigid piggybacked flowlines PL2336 & PL2337 (trenched and buried with partial rock cover) with average Depth of Burial 0.99 m; and
- Group B: Umbilical PLU2338 (trenched for *c*. 14.125 km, the remaining *c*. 1.25 km is rock covered) with average Depth of Burial 0.3 m.

A screening process was initially carried out to identify which decommissioning options would be suitable. In the Comparative Assessment, the selected options were then assessed against several criteria (safety, environment, technical feasibility, societal impacts, and economics) to determine the preferred approach. For Comparative Assessment Group A, in addition to identifying a preferred decommissioning option, two acceptable options were also identified. If the Contracts and Procurement tendering phase that will be completed in advance of execution, result in the preferred option not being selected, Bridge Petroleum will inform the Department for Energy Security and Net Zero before a decision is taken on the overall strategy. An alternative option was not required for Group B umbilical line (further detail is presented in Section 4). For both Group A and B lines remediate *in situ* with exposed sections cut and removed was the preferred option.

All existing rock protection will remain *in situ*, including existing protection at the flowline crossing. Any mattresses which are rock covered will also remain in place. Any additional rock protection required for decommissioning activities will also remain *in situ*.

A post-decommissioning site survey will be carried out on final completion of all decommissioning works. Surveys will be undertaken where the surface laid subsea structures have been removed. Any oil and gas related debris will be recovered for onshore recycling or disposal. Independent verification of the seabed state will be obtained for the flowline and umbilical areas and structure locations, and evidence of clearance will be provided to all relevant governmental and non-governmental organisations. Preference will be given to an approach not impacting on the seabed, for example, using Side Scan Sonar or Multibeam Echo Sounder data to show a clear seabed. An over-trawl trial may be carried out if deemed necessary following an initial “as left” survey; this Environmental Appraisal assumes the worst case of an over trawl trial being carried out.

For a safe seabed, a post-decommissioning environmental seabed survey (centred on the sites of the subsea structures and those sections of flowlines and umbilical where remedial activities may be required) will be carried out. The objective of the survey will be to identify any chemical or physical disturbances to the seabed following decommissioning to provide a baseline from which future surveys can be compared. The survey reports will be submitted to Offshore Petroleum Regulator for Environment and Decommissioning, and a post-monitoring survey regime will be agreed.

Environmental and Socio-Economic Baseline

A high-level summary of the environment at the Project location is provided in Table 1.

Table 1: Summary Description of the Baseline Environment.

Sediment and Seabed Features
A survey was carried out in 2023 which covered the Enoch Field, the pipelines route and the cuttings deposit around the Enoch wellhead, the findings are summarised here. The dominant seabed habitat across the Enoch Field, as defined by the European Nature Information System, is MD521'Offshore Circalittoral Sand'. There are also small areas of MD42 'Offshore Circalittoral Mixed Sediment' (Benthic Solutions, 2023a). The results of the particle size analysis indicated that the survey area is primarily composed of sand, with moderate or equal proportions of fines and minimal gravels across all stations sampled along the Enoch to Brae Alpha pipeline route. The samples collected in the survey area represented four Wentworth classifications with the most frequent category being assigned as 'Coarse Silt' (52% of total stations). Mixed sediment was noted in proximity to the Enoch wellhead comprising concrete and shell fragment overlying cuttings material. The increase in shell density identified, was likely due to the baffled water currents increasing the natural accumulation of shell material (Benthic Solutions, 2024). The Total Hydrocarbon Concentrations ranged from 2.52 $mg.kg^{-1}$ to 16.50 $mg.kg^{-1}$. Total Hydrocarbon Concentrations concentrations were below the UK Offshore Operators Association (2001) 95th percentile and also the Oslo Paris convention for the Protection of the Marine environment of the North-East Atlantic Total Hydrocarbon Concentrations threshold (OSPAR, 2006). All THC concentrations recorded in the survey were below these published thresholds values and the faunal community was not expected to be influenced by the Total Hydrocarbon Concentrations. The Total Organic Matter levels were fairly consistent across the Enoch Field, 17 of 23 stations had Total Organic Matter values that exceeded the UK Offshore Operators Association 95th percentile threshold of 2.04% (Benthic Solutions, 2024). The Polycyclic Aromatic Hydrocarbons levels were consistent across the Enoch survey area, below the UK Offshore Operators Association 95th percentile (0.80 $mg.kg^{-1}$). Moisture content and was similar across the Enoch site with no clear spatial pattern due to the general sand dominance across the survey area.
Benthic Communities
The pipeline route sampling stations recorded a mean Shannon-Wiener diversity index of 4.23, while the cuttings deposits sampling stations had a mean diversity index of 4.57 (Benthic Solutions, 2024). A wide variety of polychaetes, with 144 species recognised and a diverse assemblage of arthropods, with 94 species, were identified. The polychaete *Paramphinome jeffreysii* was the most abundant species across the survey area. Sessile faunal assemblages were also noted across stations including seapens such as *Pennatula phosphorea* and *Virgularia mirabilis*. A number of species considered as component species of the Scottish Priority Marine Feature 'Seapen and Burrowing Megafauna Communities' and Ocean quahog (*Arctica islandica)* were identified across the surveys. *Arctica islandica* shells were present across the survey area, adult specimens of *Arctica islandica* (shell diameter > 5 cm) were retained within nine grab samples within 100m of the Enoch wellhead. The video footage and still photographs were used to assess the presence of burrowing megafauna using the Superabundant, Abundant, Common, Frequent, Occasional and Rare abundance scale. The results revealed all pipeline route stations had a burrow density of at least 'Frequent'. As such, the Enoch site shows conformance to the OSPAR 'Seapen and Burrowing Megafauna Communities' habitat type (Benthic Solutions, 2023a). Shallow seabed depressions were noted on the geophysical data across the Enoch survey area, revealing depressions featuring centralised hard contacts; however, whilst potential pockmarks were identified, no Methane-Derived Authigenic Carbonate, indicator species, active gas seepages or bacterial mats were observed across the survey area. The results from the survey showed a significant homogeneity in terms of diversity. If differences in seasonality, sampling methodology and analytical technique are considered, the survey area analysed, on a gross basis, could be considered as a single complex community which exhibits minor changes when moving northwest to southeast.

Fish and Shellfish
Several fish species are known to use the Enoch area as a nursery and spawning ground. These include cod, mackerel, *Nephrops* and spotted ray. Additionally, the area is considered a high intensity spawning ground for Norway pout. A number of fish species in the area have been identified as Scottish Priority Marine Features including those listed here (Tyler-Walters *et al.*, 2016).
Marine Mammals
The Atlas of Cetacean Distribution in Northwest European Waters (Reid *et al.*, 2003) has indicated that the following cetaceans are likely to be present in the Enoch area: harbour porpoise, bottlenose dolphin, white-beaked dolphin, Atlantic white-sided dolphin, killer whale and minke whale. Grey seals have the potential to be present in the vicinity of the Enoch area in low numbers while harbour seals are not likely to be present (Carter *et al.*, 2022).
Seabirds
European Seabirds at Sea data (Kober *et al.*, 2010) indicates the presence of a number of bird species in the area of the Enoch Field. This includes, but is not limited to, northern fulmar, manx shearwater, Atlantic puffin, northern gannet and razorbill. The vulnerability of seabirds to surface oil pollution was assessed using the Seabird Oil Sensitivity Index. The sensitivity of seabirds to surface pollution within the Enoch area varies throughout the year. For the majority of Blocks, sensitivity is low throughout the year. Sensitivity is extremely high in May for Block 16/8. No data is available for November and December.
Fisheries
Fishing effort statistical data, of UK vessels over 10 m in length, between 2020 and 2024 for International Council for the Exploration of the Sea rectangle 46F1 was reviewed. When compared to all International Council for the Exploration of the Sea rectangles in the UK Continental Shelf, fishing effort within 46F1 accounted for an average of 0.4 % of the overall fishing effort between 2020 and 2024. Fishing effort within these rectangles is therefore considered relatively low. The data show that demersal fish species contributed the highest landings in terms of weight and shellfish contributed to highest landings in terms of value between 2021 and 2024, except for in 2020 where demersal fish species contributed to higher landings in terms of both value and weight (Scottish Government, 2025).
Other Sea Users
Blocks 16/7, 16/8 and 16/13 lie within a well-developed oil and gas area of the CNS with many fields, supporting infrastructure and pipelines present in the area. The 2023 vessel density in Block 15/20 ranges from 0 to > 100 hours per km^2 per month (EMODnet, 2023b). The closest wind farm site is located *c.* 125 km southwest of the Enoch Field. There are no known military activities, power cables, offshore aggregate extraction sites or aquaculture sites in the vicinity of the Enoch Field.

Environmental Impact Assessment

In order to determine the significance of the impact of the proposed decommissioning activities an ENVironmental Impacts IDentification (ENVID) assessment was undertaken according to good industry practice. Receptors considered included: air quality, climate, water quality, sediment quality, plankton, benthic species, fish, marine mammals, seabirds, fisheries, shipping, landfill resources, local communities, and resource use. The impacts associated with emissions to air, discharges to sea, seabed disturbance, underwater noise, waste production, the physical presence of the vessels during operations, and the legacy impacts of the infrastructure to be decommissioned *in situ* were considered on each of the receptors.

Through the application of industry standard mitigation measures, the impact significance of each of the planned activities was considered to be Low, however Seabed Disturbance, Legacy Impact and Emissions to Air, are assessed further in the Environmental Appraisal to understand the impacts on these aspects from the proposed decommissioning activities.

Environmental Management

The Decommissioning Programme is aligned to Bridge Petroleum's goal to 'minimise the impact to the environment' in line with the companies Environmental, Net Zero and Corporate Social responsibilities policies.

Atmospheric emissions will be managed by selection, assurance and record keeping of the vessels contracted to carry out the work and by planning vessel schedules to ensure efficient operations.

The inventory of decommissioned items will distinguish equipment that can be reused, materials that can be recycled and waste for appropriate disposal. Waste management activities will be conducted in full compliance with all relevant legislation and regulatory controls through application of Bridge's Waste Management Policy. Disposal to landfill will be the waste management option of last resort.

Following the decommissioning activities, independent verification of the seabed state will be obtained, and evidence of clearance will be provided to all relevant governmental and non-governmental organisations. An ongoing monitoring survey strategy will be agreed with Offshore Petroleum Regulator for Environment and Decommissioning, the aim of which will be to verify recovery of the seabed and that the pipelines decommissioned *in situ* remain buried, and do not present a risk of snagging to other users of the sea.

Stringent control measures and operational procedures will be implemented to prevent accidental events involving the release of hydrocarbons or chemicals. Bridge Petroleum will have measures and procedures in place to respond to any hydrocarbon releases should they occur.

Table 2 lists procedural and technical controls and mitigation measures identified in the ENVID and during the preparation of this Environmental Appraisal to reduce impacts to a level that is 'as low as reasonably practicable'.

Table 2: Enoch Decommissioning Project Specific Commitments.

Aspect	Commitment
Physical Presence	• Consultation with Scottish Fishermen's Federation. • Notice to mariners will be circulated. • Vessel use will be optimised. • A Collision Risk Management Plan will be produced if required; the 500 m zone around Brae Alpha platform will be managed by TAQA. • All vessels engaged in the Project operations will have markings and lightings as per the International Regulations for the Prevention of Collisions at Sea (International Maritime Organisation, 1972). • A safe seabed will be achieved as part of the decommissioning activities. • Existing 500 m exclusion zone is currently in place. At the end of decommissioning activities, the 500 m zone surrounding Enoch facilities will be surrendered, such that the fishing industry will gain access to this area.
Emissions to Air	• As part of the tendering process, proposed vessels will go through an assurance process which will follow standard industry good practice. Emissions compliance will be as per International Maritime Organization guidance. • Decommissioning vessel schedules will be planned to optimise vessel use.

Aspect	Commitment
	• Prior to the contract award, Bridge Petroleum will carry out due diligence of the decommissioning yards to ensure suitable permits and licenses are in place • Activities will be carried out in line with Bridge Petroleum's environmental policy which includes minimising emissions.
Discharges to Sea	• Bridge Petroleum will carry out a detailed assurance process on all vessels prior to contract award in collaboration with TAQA. • Vessels will be International Convention for the Prevention of Pollution from Ships (MARPOL) compliant. • All contracted vessels will be signed up to the International Maritime Organisation and will adhere to their guidelines. • Review of procedures will ensure that ballasting procedures for the contracted vessels are in line with the International Maritime Organisation Convention aimed at preventing associated harmful effects. All discharges of ballast water will be monitored, and records maintained. • Flushing of pipelines and umbilical cores will be carried out in line with Best Available Techniques and Best Environmental Practices and lines left open to sea prior to decommissioning activities. • Any associated discharges will be managed to minimise the impact.
Seabed Disturbance	• Cutting / dredging / jetting work plans in place, and excavation will be minimised where possible. • Lifting procedures in place. • Additional rock cover required will be minimised. Recovery of exposed Group B umbilical line is planned to be carried out without additional excavation as lines can be pulled through the sediment, thereby expected to reduce area of impact.
Legacy Impacts	• Exposed infrastructure (including stabilisation/protection material) where technically feasible will be recovered to shore. • Prior to commencing the decommissioning activities, flowlines and umbilical cores will be flushed in line with BAT and BEP, in order to reduce hydrocarbons and chemicals for lines decommissioned *in situ*. • Additional rock cover will be minimised and, where required, will be laid in profiles aligned with industry standards. • Independent Verification of a safe seabed will be obtained. • Adherence to a post-decommissioning survey strategy agreed with OPRED. • Seabed clearance surveys. • Over trawl trials to be carried out if considered necessary.
Underwater Noise	• No explosives use planned for severance. • Suitable technology for cutting will be selected to ensure the effectiveness of the cutting, minimising the duration, disturbance and risk of requiring the activity to be repeated.

Aspect	Commitment
Waste Generation and Resource Use	• The Enoch subsea Decommissioning Programme will have in place a Waste Management Plan developed to describe and quantify waste arising from decommissioning activities and to identify appropriate an available disposal options for those wastes. Company waste management strategy will be adhered to in collaboration with TAQA. • Waste will be managed in line with the waste hierarchy. • Use of licensed waste contractors/sites, waste transfer notes. Contractor to maintain a waste audit trail through to recycling or disposal facility. Audit of yard/contractor waste management systems. • Compliance with International Convention for the Prevention of Pollution from Ships requirements. • The Project will look to vessel owners to minimise all wastes during the project (monthly reporting of waste sent to shore; Waste Management Plan and Waste Record Book; Waste Management Duty of Care audit).
Onshore Activities	• As part of Bridge Petroleum Duty of Care, contract award will be to an established yard with appropriate experience, capability, licences, consents, and community engagement in place.
Unplanned Events	• Work procedures in place. • Vessel assurance inspections. • Pre-hire vessel audits. • Emergency response plans in place. • Collision risk assessment. • Maintenance procedures. • Simultaneous Operations. • Lifting procedures in place. • Recovery baskets and grappling hooks. • No live pipelines in the vicinity during decommissioning activities.

Conclusion

This Environmental Appraisal has assessed the environmental and socio-economic impacts associated with the proposed Enoch subsea decommissioning activities in the context of the environment within which the infrastructure is situated. With implementation of the proposed mitigation measures, the environmental impact of the decommissioning activities is likely to be minimal, and the proposed decommissioning activities will leave the area in a condition suitable for re-colonisation by local species and a seabed which is safe for fishermen.

In addition, the Environmental Appraisal has considered the objectives and marine planning policies of the Scottish National Marine Plan, across the range of policy topics including biodiversity, natural heritage, cumulative impacts and oil and gas. Bridge Petroleum considers that the proposed decommissioning activities are in broad alignment with such objectives and policies. Similarly, Bridge Petroleum considers that the proposed activities are aligned with the oil and gas specific marine planning policies.

1.0 INTRODUCTION

Bridge Petroleum 3 Limited (hereafter referred to as Bridge Petroleum) are preparing to decommission the Enoch Field. The field is located in the Central North Sea (CNS), along the United Kingdom (UK)/Norway median line and partially extends into the Norwegian Continental Shelf (NOCS). The earliest anticipated Cessation of Production (CoP) date is Q3 2026.

The Enoch Field spans UKCS licence block 16/13a and Norwegian block 15/5. The associated subsea infrastructure is fully located within UKCS blocks 16/13, 16/8 and 16/7 (Figure 1-1) *c.* 230 km northeast of Aberdeen and *c.* 0.4 km from the UK/Norway median line. The water depth at the field ranges from 118.5 m to 121 m Lowest Astronomical Tide (LAT).

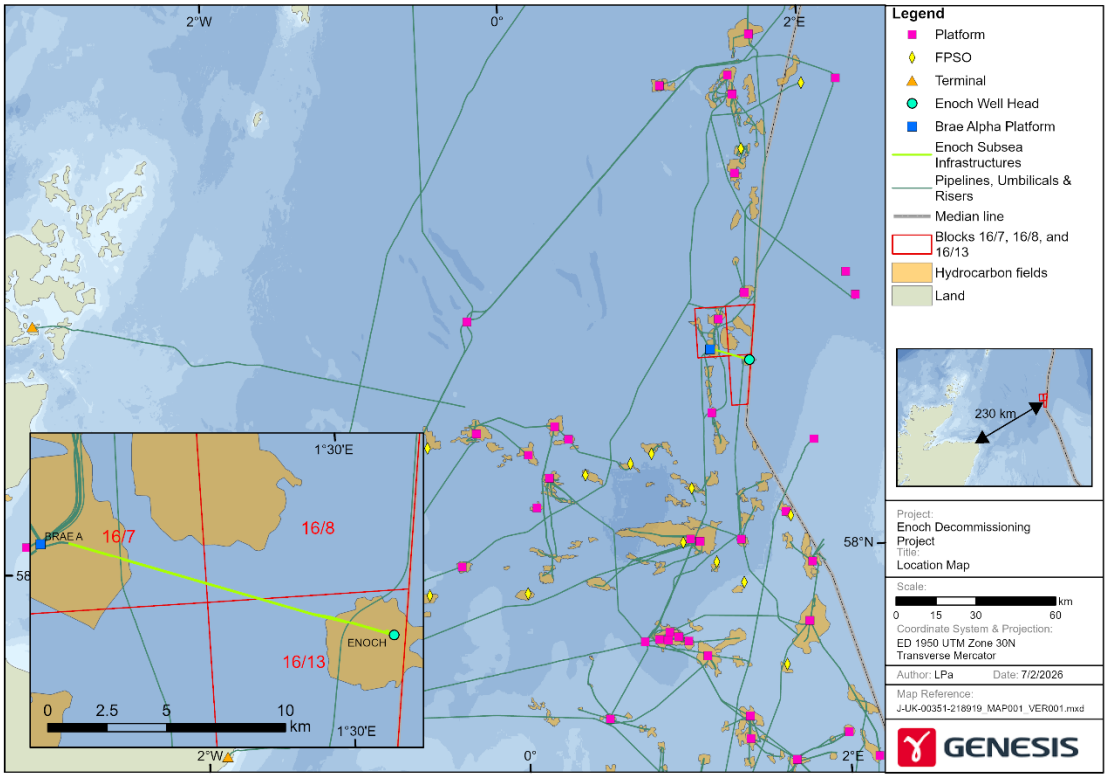


Figure 1-1: Location of the Enoch Field.

The Enoch Field was discovered in 1985 and was developed as a single-well subsea tie-back to the Brae Alpha platform. First production was in 2007. Details of the infrastructure associated with the field are provided in Section 3.

It has been agreed with the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), that the proposed decommissioning activities at the Enoch Field covering the Section 29 Notices associated with the Enoch subsea installations (S29/178/07) and pipelines (S29/202/07) are covered in two Decommissioning Programmes (DP) captured in a single DP submission.

In support of the DP submission, Bridge Petroleum has prepared this Environmental Appraisal (EA) under the Petroleum Act 1998 as required. The EA and a subsea Comparative Assessment (CA) Report (Genesis, 2026) are submitted to OPRED in support of the DP submission. The DP submission, CA report, and EA report are being submitted to OPRED to seek approval for the decommissioning activities captured in the DP.

1.1 Purpose of the Document

The purpose of this EA is to assess and describe, in a proportionate manner, the potential environmental and social impacts associated with the proposed decommissioning activities presented in the DP submission, and to identify mitigation measures to reduce the level of these impacts to as low as reasonably practicable.

1.2 Regulatory Context

The UK's international obligations on decommissioning are governed principally by the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention). The OSPAR Decision 98/3, requires that all installations should be completely removed and recovered to shore for re-use, recycling, or final disposal unless a derogation is granted. Pipelines and cables are not included within the Decision; however, OPRED's decommissioning guidance notes (BEIS, 2018) require operators to aim to achieve a clear seabed and robustly assess decommissioning options (based on available evidence and data) using the CA process.

The decommissioning of offshore oil and gas infrastructure (including pipelines) in the UKCS is principally governed by the Petroleum Act 1998 (as amended by the Energy Act 2008). This Act sets out the requirements for a formal DP, which must be approved by OPRED before the owners of an offshore installation or pipeline may proceed with decommissioning.

There is no statutory requirement to undertake an Environmental Impact Assessment (EIA), but OPRED's decommissioning guidance notes (BEIS, 2018) advise that any DP is supported by an assessment of the environmental impacts of the proposed decommissioning activities. The Enoch Decommissioning EA has been prepared to meet this requirement.

1.3 Document Layout

Table 1-1 details the structure of the EA Report.

Table 1-1: Structure of EA Report.

Section No.	Title	Contents
	Non-Technical Summary	A summary of the EA Report.
1	Introduction	Introduction to the Project, and scope of the EA. This section also includes a summary of applicable legislation.
2	Stakeholder Engagement	Details of the consultation process to date.
3	Project Description	A description of the infrastructure to be decommissioned, the proposed decommissioning activities, and an indicative schedule of activities.
4	Comparative Assessment	Summary of the CA results.
5	Environmental and Socio-Economic Baseline	A description of the environmental and socio-economic receptors in the area.
6	Scoping of Potential Environmental and Socio-economic Impacts	Overview of the methodology used to determine the environmental and socio-economic impact significance of the proposed decommissioning activities. Results of the ENVID (ENVironmental issues IDentification), and justification for selecting those aspects not requiring further assessment in the EA. Justification is also provided for those aspects that are assessed further.
7 to 9	Assessment of Aspects	Seabed Disturbance: Assessment of seabed disturbance during operations (Section 7). Legacy Impacts: Assessment of physical presence with respect to legacy impacts on other sea users and on the environment (Section 8). Atmospheric Emissions: Assessment of atmospheric disturbance during operations (Section 9).
10	Environmental Management	A description of Bridge Petroleum's Environmental Management Procedures and how they apply to the Decommissioning Project.
12	Conclusions	A summary of key findings and conclusions.
13	References	Data sources used to support the EA.
Appendix A		Impact Assessment Methodology.
Appendix B		Assessment against Scotland's National Marine Plan.

2.0 STAKEHOLDER ENGAGEMENT

Consulting with stakeholders is an important part of the decommissioning impact assessment process as it allows any concerns or issues which stakeholders may have to be communicated and addressed.

As part of the informal stakeholder engagement process, Bridge Petroleum issued a Scoping Letter in February 2026 to a number of stakeholders (Bridge Petroleum, 2026b). The Scoping Letter provided an overview of the Enoch Field, summarising the impacts to be considered in the EA. Recipients of the Scoping Letter were invited to comment on it with respect to any concerns they may have. Table 2-1 summarises the stakeholder comments received on the Letter.

The formal statutory and public consultation process will be triggered by the submission of the DP and supporting documents (including this EA report) to OPRED.

As the project progresses, further consultation will be undertaken as deemed necessary by the Project.

Table 2-1: Summary of Stakeholder Engagement.

Organisation	Comments / Issues / Concerns Raised / Bridge Petroleum's response
Informal Stakeholder Consultations	
Response from OPRED Received 25th February 2026	OPRED requested clarity on whether or not the cuttings pile around wellhead consists of OBM cuttings and if so, have an impact assessment of any disturbance. **Response:** The well was drilled in 2006 which was after the OSPAR Convention Decision 92/2 prohibiting the discharge of oil-based mud (OBM) contaminated cuttings came into place (see Section 3.2.4.3).
	OPRED requested information on the Depth of Burial (DoB) for the whole pipeline lengths and queried if there are any areas that may present a hazard to other users of the sea. In addition, OPRED asked if the pipelines would remain stable. **Response:** The pipelines are buried to an average DoB of 0.99 m. There is a section between KP0.252 – 2.882 that has an average DoB of 0.55 m. This shallower covered section is rock covered. Based on these burial depths, the lines are not expected to present a hazard to other sea users and are expected to remain buried given the location within the CNS.
	In relation to *Arctica islandica* OPRED advised that juveniles form part of the community and are regarded just as important as adults. **Response**: Disturbance to juvenile *A. islandica* species is discussed in the EA. Section 5 provides a description of *A. islandica* in the area whilst Section 7 discusses the impact on the species. The EA recognises the importance of juvenile *A. islandica.*
	OPRED note that shallow seabed depressions with centralised, hard contacts are referenced in the Scoping Report. It is stated that no Methane-Derived Authigenic Carbonate (MDAC), indicator species, active gas seepages or bacterial mats were observed across the survey area. Bridge Petroleum should clarify what the centralised, hard contacts were and provide visual evidence to support the findings. **Response**: Section 5.2.5 details the results of the survey which concluded there was no MDAC present Visual inspections (Figure 5-6) revealed only shell fragments and central boulders, with no indicator species (such as *Lucinoma borealis*) or signs of active gas seepage (e.g. bubbles, anoxic sediments, bacterial mats). Based on these

Organisation	Comments / Issues / Concerns Raised / Bridge Petroleum's response
	observations, the presence of MDAC within the Enoch survey area is considered unlikely.
The Scoping Letter was also sent to Joint Nature Conservation Committee (JNCC), Scottish Fishermen's Federation, Marine Directorate, OPRED Environmental Management Team, OPRED Offshore Decommissioning Unit, North Sea Transition Authority decommissioning team, National Federation of Fishermen's Organisations and Northern Ireland Fish Producers' Organisation however responses were not received.	

3.0 PROJECT DESCRIPTION

This section describes the Enoch subsea infrastructure to be decommissioned as part of the DP and outlines the proposed decommissioning activities.

The Enoch Field comprises a single subsea production well, *c.* 15 km from the Brae Alpha platform. A 15.8004 km x 8" rigid production pipeline (PL2336) connects the Enoch well to the Brae Alpha platform. Lift gas is provided to the Enoch well from Brae Alpha via a 15.7979 km x 3” rigid gas lift pipeline (PL2337). These two pipelines are piggy backed and trench and buried or trenched and rock covered to an average depth of 0.99 m.

A 15.375 km x 7” Electro-Hydraulic and Chemical (EHC) umbilical (PLU2338) runs between the Brae Alpha platform and Enoch well. This is laid in a separate trench and is buried or rock covered to an average depth of 0.3 m. The Enoch lines have three third party pipeline crossings out with the Brae Alpha platform 500 m safety zone.

In summary the DP submission captures:

- Recovery of the wellhead protection structure and the valve skid;
- Recovery of the Enoch Subsea Isolation Valve (SSIV) which is located within the Brae Alpha 500 m zone;
- Remediate *in situ* with exposed sections cut and removed for the buried piggybacked flowlines and the EHC umbilical;
- Recovery of the subsea flexible risers and surface laid tie-in spools;
- Recovery of a pipe tunnel, and exposed mattresses; and
- Decommissioning of the concrete plinths, rock cover and rock covered mattresses *in situ*.

3.1 Subsea Infrastructure Overview

Figure 3-1 shows an overview of the Enoch Field and how it is tied back to the Brae Alpha platform. The Enoch Field comprises the following subsea infrastructure:

- One subsea well and associated Xmas tree, conductor and wellhead protective structure;
- A valve skid located underneath the integrated well protection structure;
- A 15.8004 km 8" rigid production pipeline (PL2336) and associated spools;
- A 15.7979 km 3" rigid gas lift pipeline (PL2337) and associated spools
- A 15.375 km 7” EHC umbilical (PLU2338) and associated umbilical jumpers;
- The Enoch SSIV at the Brae Alpha end of the production flowline;
- A number of protection and stabilisation structures associated with the flowlines including, mattresses, concrete plinths, rock cover and a pipe tunnel (with concrete ballast).

Further details of the project infrastructure are provided in the DP submission (Bridge Petroleum, 2026a).

Out with the Brae Alpha 500 m zone there are three pipeline crossings where the Enoch piggybacked flowlines and EHC umbilical cross over the third party lines:

- Bruce (24” condensate line) at Kilometre Point (KP) 3.111;
- Tiffany (10” gas line) at KP 3.356; and
- Miller (30” gas line) at KP 13.354.

These crossings comprise rock cover and in line with the results of the CA are expected to remain *in situ* (see Table 1-5 of the DP for further detail).

Within the Brae Alpha 500 m exclusion zone there are an additional seven crossings where the Enoch lines cross over the third-party lines. These crossing comprise mattresses (no rock cover) and are expected to be fully removed in coordination with Brae Alpha platform decommissioning.

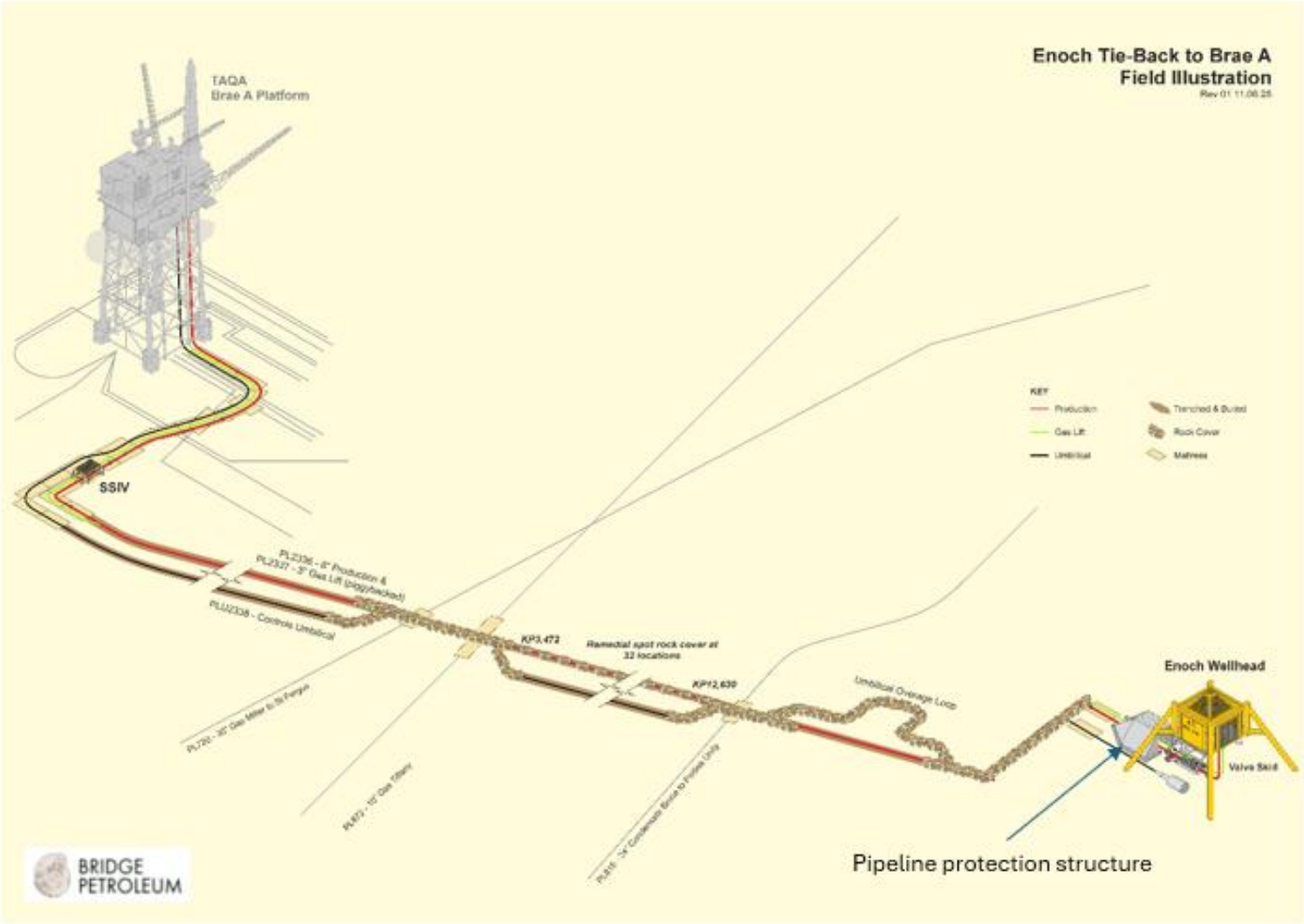


Figure 3-1: Enoch Field Layout.

3.1.1 Flowlines and Umbilicals

Table 3-1 summarises the flowlines and EHC umbilical to be decommissioned as part of the proposed decommissioning activities. The information presented in Table 3-1 is taken from Table 2-2 of the DP submission.

Table 3-1: Flowlines and Umbilicals Associated with the Enoch Field.

Description	Pipeline Number	Total length (km)	From – To End Points	Current Content	Burial Status
8" Production flowline including tie-in spools and risers [1 2]	PL2336	15.8004	Enoch Wellhead to Brae Alpha platform	Hydrocarbons	Piggybacked and trenched and buried with partial rock cover
3" Gas Lift flowline including tie-in spools and risers [1 2]	PL2337	15.7979	Brae Alpha platform to Enoch wellhead	Gas	Piggybacked and trenched and buried with partial rock cover
7" EHC umbilical [3]	PLU2338	15.375	Brae Alpha platform to Enoch wellhead	Methanol Wax Inhibitor Scale Inhibitor Hydraulic Fluid	Trenched and buried for *c.* 14.125 km, the remaining *c.* 1.25 km is surface laid and rock covered

1. PL2336 and PL2337 each have an exposed length of *c.* 30 m on approach to the Enoch SSIV (where the lines transition out of the trench. This surface laid length is protected with mattresses. At the well end the rock cover extends up to the well covering the pipeline end and the spools. The last 6 m of spool extends from the rock cover and is protected by a mattress.
2. The average DoB along the piggybacked trenched and buried lines is 0.99 m. Between KP0.252 – KP2.882 burial is at its shallowest with an average DoB of 0.55 m. This section is rock covered.
3. The average DoB of the trenched and buried length of the umbilical is 0.3 m. Therefore, out with the rock covered sections the umbilical was considered to be 'exposed' in the CA.

3.1.2 Subsea Structures

Table 3-2 summarises the subsea structures to be decommissioned as part of the proposed decommissioning activities. This information is taken from Table 2-1 of the DP.

Table 3-2: Summary of Subsea Structures.

Subsea Structures[1]		Dimensions (L x W x H) / weight	Comments
Enoch SSIV (within Brae Alpha 500 m zone)		6.0 m x 2.4 m x 2.2 m 21 te	Gravity based structure to be recovered as part of the DP.
Pipe tunnel (with concrete ballast)		4.0 m x 4.5 m x 1.7 m 21.6 te	Gravity based structure protecting the spools at the Enoch well (see Figure 3-1). Structure to be recovered as part of the DP.
Enoch Tree Valve Skid		3.5 x 1.5 m x 1.7m 6.5 te	Gravity based structure to be recovered as part of the DP.
Production well	Xmas tree	4.057 m x 4.192 m x 2.99 m 53.4 te	The Xmas tree is attached to the wellhead, and the protection structure is integrated with the Xmas tree. Xmas tree and protection structure to be recovered and wellhead conductor/ casings to be cut down to 3 m below seabed. Note recovery of the Xmas tree and casings is not covered in this EA as they are out with the scope pf the DPs.
	Wellhead	0.476 m x 0.476 m x 3 m 20 te	
	Wellhead protection structure	7.831 m x 9.277 m x 5.616 m 15 te	

[1] The production well is not subject to a Section 29 notice, therefore not included within the scope of the DPs. However, the information is included here for EA completeness.

3.1.3 Stabilisation Features

Table 3-3 summarises the subsea stabilisation features to be decommissioned as part of the proposed decommissioning activities. The information presented was compiled using information presented in Table 3-4 of the DP.

As described in Section 3.1, there are three third party pipeline crossings along the path of the buried flowlines (PL2336 & PL2337) and umbilical (PLU2338) length, these crossings are however all rock covered and mattress protected. The associated rock cover from the crossings and the *c.* 1.25 km of rock covered umbilical length will be decommissioned *in situ*.

Table 3-3: Existing Stabilisation Features to be Decommissioned.

Stabilisation Feature	Total Number	Weight (te)	Location	Decommissioning Route
Concrete mattresses; total number of mattresses is 120, of which 99 mattresses would be recovered and 21 mattresses decommissioned *in situ*. 6 m x 3 m x 0.3 m: 8.334 te each	99	825.1	Located within the Brae Alpha platform 500 m zone	Exposed and to be recovered for management in line with the waste hierarchy.
	9	75	At wellhead protection structure	Rock covered and to be decommissioned *in situ*.
	12	175	Mattresses associated with third-party crossings: Miller crossing – 4 mattresses Tiffany crossing – 5 mattresses Bruce crossing - 3 mattresses	Rock covered and to be decommissioned *in situ*.
Concrete Plinths All with same length and width: 6 m (L) x 2 m (W) Heights vary between 0.37 m to 1.42 m Weights vary between 8.53 te and 17.68 te	21	282.4	Concrete plinths associated with third-party crossings Miller crossing – 8 plinths Tiffany crossing – 2 plinths Bruce crossing - 11 plinths	Rock covered and to be decommissioned *in situ*
Rock Cover	-	75,232	On approach to the Enoch well and at the third party crossings	To be decommissioned *in situ*

3.2 Proposed Activities

3.2.1 Schedule

Bridge Petroleum propose to progress decommissioning activities in line with the indicative schedule shown in Table 3-4.

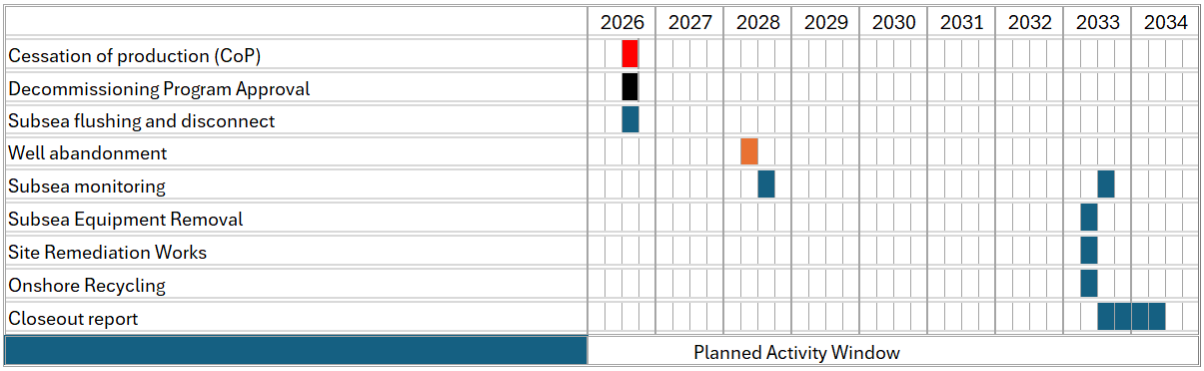


Table 3-4: Indicative Project Schedule.

3.2.2 Plug and Abandonment

The Enoch Field well (16/13a-7) is currently producing however, the well will be decommissioned in compliance with the requirements of the Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996 and in accordance with the latest version of the Offshore Energies UK (OEUK) Guidelines (OEUK, 2018).

3.2.3 Preparatory Works

Prior to commencing the decommissioning activities, flowlines and umbilical cores will be flushed in line with Best Available Techniques (BAT) and Best Environmental Practices (BEP), and lines will be left open to sea.

There is a blocked scale inhibitor core in umbilical PLU2338 which is filled with methanol. Prior to disconnection / recovery activities chemical permit applications will be submitted to OPRED for any discharges which have not already been fully permitted during the preparatory scopes.

3.2.4 Decommissioning Activities

3.2.4.1 Flowlines and Umbilicals

As detailed in Section 3.1.1, all three lines are trenched and buried with partial rock cover. As per OPRED's Guidance Notes on the decommissioning of offshore installations and pipelines (OPRED, 2018) these lines were subject to a CA to determine suitable decommissioning approaches. To support the CA, the lines were grouped as follows:

- Group A: Rigid piggybacked flowlines PL2336 & PL2337 (trenched and buried with partial rock cover) with average DoB 0.99 m; and
- Group B: Umbilical PLU2338 (trenched and buried for *c.* 14.125 km, the remaining *c.* 1.25 km is rock covered) with average DoB 0.3 m.

The CA approach and the results are detailed in the CA report submitted in support of DP (Bridge Petroleum, 2026a) and are summarised in Section 4 of this EA. Table 3-5 summarises the approach to decommissioning the flowlines and umbilical.

Table 3-5: Proposed Decommissioning Approach for the Flowlines and Umbilical.

Infrastructure	Description and Proposed Decommissioning Methods
CA Group A *Rigid piggybacked flowlines PL2336 & PL2337 (Trenched and buried with partial rock cover). Average DoB is 0.99 m*	Total length of the Group A piggybacked lines is 15.8004 km. 15.764 km of the piggybacked pipelines is trenched and buried with an average DoB of 0.99 m while *c*. 36 m of each of these pipelines is exposed* as they transition out of the trench: *c*. 30 m at Brae end and *c*. 6 m at well end. The CA identified a preferred option and an acceptable option as summarised in Section 4 and detailed in the CA Report (Genesis, 2026). **Preferred Option:** Decommission *in situ* with exposed ends cut and removed. A total of *c*. 20 te of additional rock cover would be required to mitigate snagging of the cut ends. This is based on 10 te of rock cover being placed over each of the two cut ends of the two piggybacked pipelines. **Acceptable Options:** - Decommission *in situ* with addition of rock cover to exposed ends; A total of 462 te of additional rock cover would be required to cover the exposed ends. - Decommission *in situ* with exposed ends trenched and buried; It is assumed jet trenching using remotely operated vehicles (ROV) would be used to bury the exposed ends.
CA Group B *Umbilical PLU2338 (trenched and buried with partial rock cover). Average DoB is 0.3 m*	Total length of umbilical PLU2338 in Group B is 15.375 km of which; 14.125 km is trenched and buried to an average DoB of 0.3 m, while the remaining 1.25 km is rock covered; therefore, the 14.125 km umbilical line length is treated as exposed. **Preferred Option:** Remediate *in situ* with exposed sections (*c*. 92 % of the umbilical length) cut and removed and rock covered sections decommissioned *in situ.* For this option, it is expected that the exposed umbilical length (i.e. the lengths buried to < 0.6 m) will be pulled through the seabed without requiring excavation. A total of *c*. 40 te additional rock cover would be required. This is based on *c*. 10 te of rock cover at each of the four required cuts on the umbilical.
*Reference to exposed ends of the piggybacked pipelines specifically refers to the lengths that transition out of the trench and are protected with mattresses. The term 'exposed' is used as the mattresses will be recovered and these sections are therefore considered exposed.	

3.2.4.2 Subsea Structures

Table 3-2 summarises the subsea structures associated with the DP submission. All of the structures listed will be recovered and returned to shore for management in line with the waste hierarchy.

Removal operations will likely be undertaken using a Construction Support Vessel (CSV), or Remotely Operated Vehicle Support Vessel (ROVSV), dependent upon the outcome of the technical and commercial tendering process.

3.2.4.3 Wells

Enoch Field is a single well development (well 16/13a-7), tied back to the Brae Alpha platform. Table 3-6 summarises the well to be decommissioned as part of the Enoch subsea infrastructure DP. An exploration well was drilled in 1986, prior to acceptance of development of the Enoch Field, which was later subsequently plug and abandoned. The Enoch well (16/13a-7) was drilled in 2006 and began production in 2007. As the drilling of the well took place after the OSPAR Convention Decision 92/2 ban on the use of oil-based muds (OBM), it is unlikely for drill cuttings to contain OBM.

The well is to be permanently decommissioned with due consideration to be given to the latest OEUK Well Decommissioning Guidelines and demonstrable compliance with relevant UKCS regulations.

Table 3-6: Well associated with Enoch Field.

Well Number	Description
16/13a-7	Production well

3.2.4.4 Stabilisation Features

Existing stabilisation features associated with the Enoch Field are summarised in Table 3-3.

It is proposed to recover all exposed mattresses. These will be returned to shore and managed in line with the waste hierarchy. Based on information presented in Table 3-3, as a worst-case, this would mean recovery of 99 mattresses in total. Exposed mattresses will be removed by CSV or ROVSV, dependent upon the outcome of the technical and commercial tendering process. Recovered stabilisation features will be transported to shore, and waste material will be managed in line with the waste hierarchy.

In line with OPRED decommissioning guidance all existing rock protection will remain *in situ*, including existing protection at the flowline crossings. The mattresses associated with the crossings will also be decommissioned *in situ*.

Based on information presented in Table 3-3, 282.4 te concrete plinths, 75,232 te rock cover and 21 mattresses will be decommissioned *in situ*.

3.2.5 Vessel Use

A range of specialist and support vessels will be required at various times and for various durations to support the decommissioning activities. At the time of writing, specific vessels have not yet been identified, however, the type of vessels required are known and

performance characteristics for typical vessels have been assumed for the purposes of estimating energy consumption and emissions to air.

Estimates of fuel consumption (te) can be made by calculating the likely duration of the work programme for each vessel and estimating fuel use (based on vessel type (Institute of Petroleum (IoP) Guidelines, 2000) and general industry experience) (Table 3-7).

Table 3-7: Anticipated Vessel Requirements and Fuel Usage for Proposed Decommissioning Activities[1].

Vessel type	Activity	Duration (days)[i]	Fuel consumption rate (te/day)[ii]	Fuel usage (te)
Decommissioning activities				
Reverse Reel Vessel	Mob/demob	5	4	20
	Transit	1	40	40
	Working	2	20	40
CSV/ROVSV: recovery of structures, mattresses, exposed ends.	Mob/demob	7	4	28
	Transit	3	20	60
	Working	10	17	170
Rock cover vessel[iii]	Mob/demob	0.5	2	1
	Transit	0.5	2	1
	Working	0.5	2	1
Seabed clearance and over-trawlability surveys				
Trawl sweeps/trawl trials[iv]	Mob/demob	0.5	1	0.5
	Transit	1	4	4
	Working	5	4	20
Survey vessel	Mob/demob	2	1	2
	Transit	1	10	10
	Working	4	1.5	6
Post decommissioning survey				
Survey vessel	Mob/demob	2	1	2
	Transit	2	10	20
	Working	4	1.5	6
Maximum anticipated fuel use across all operations				431.50

[i] Vessel day estimates include 15% allowance for waiting on weather.
[ii] IoP guidelines do not always have exact equivalent vessel and therefore a representative vessel has been used.
[iii] Assumes that a rock cover vessel will not be mobilised for the project; it will be a fly by vessel transiting from another field.
[iv] A trawl sweep may be carried out along the length of the umbilical that will be recovered.

3.3 Survey and Monitoring Programme

A post-decommissioning site survey will be carried out upon final completion of all decommissioning works. Surveys will be undertaken where the surface laid subsea structures have been removed. Any significant debris will be recovered for onshore recycling or disposal. Independent Verification of the seabed state will be obtained for the flowline areas and

[1] As the wellhead severance and recovery is expected to be carried out as part of the well Plug & Abandonment campaign, the associated vessel days will be captured on the relevant permits.

installation locations, and evidence of clearance will be provided to all relevant governmental and non-governmental organisations. Preference will be given to an approach not impacting on the seabed, for example, using Side Scan Sonar (SSS) or Multibeam Echo Sounder (MBES) data to show a clear seabed. However, if deemed necessary following an initial “as left” survey, an over-trawl trial may be carried out. This EA assumes the worst case of an over trawl trial being carried out.

A post decommissioning environmental seabed survey (centred on the sites of the subsea structures and those sections of flowlines and umbilicals where remedial activities may be required) will be carried out. The objective of the survey will be to identify any chemical or physical disturbances to the seabed following decommissioning to provide a baseline from which future surveys can be compared. The survey reports will be submitted to OPRED, and a post monitoring survey regime will be agreed.

4.0 COMPARATIVE ASSESSMENT SUMMARY

OPRED's Guidance Notes on the decommissioning of offshore installations and pipelines (OPRED, 2018) call for a case-by-case consideration of pipeline decommissioning alternatives through application of a CA. The CA process is aligned with and based on the principles detailed within the OSPAR Decision 98/3.

To determine the optimal approach for decommissioning of the pipelines and umbilicals, a CA was carried out for Enoch, applying the methodology detailed in the OEUK Guidelines for CA (OGUK, 2015). The CA Report, submitted in support of the consultation draft DP submission (Genesis, 2025), provides full details of the assessment carried out for all decommissioning options considered (refer to Table 4-2).

This Section summarises the CA process followed, and the results obtained.

4.1 Pre-Screening of Decommissioning Options

To facilitate the CA workshop, and as per standard CA methodology, the Enoch flowlines and umbilical, were considered in two separate pipeline groups (Group A and Group B), as detailed in Table 4-1.

Table 4-1: Summary of Flowline Groupings.

Group ID	Component type / as-laid condition	Description	Boundary	length (km)	Exposed Length (km)
A	Flexible & rigid piggybacked flowlines (Trenched and buried with partial rock cover)	PL2336, 8" Oil Production Flowline – flexible and rigid section	Enoch Wellhead to Brae Alpha platform	15.8004	Circa 36 m[1]
		PL2337, 3" Gas Lift Flowline – flexible and rigid section	Enoch Wellhead to Brae Alpha platform	15.7979	Circa 36 m[1]
B	Umbilical (trenched and buried with partial rock cover)	PLU2338, 7" EHC umbilical	Enoch Wellhead to Brae Alpha platform	15.375	14.125 km trenched to average 0.3 m depth – the remaining 1.25 km including crossings is rock covered[2]

[1] At the SSIV the line transitions to full trench depth with 30 m exposed length, protected with mattresses. At the well end the rock cover extends up to the well covering the pipeline end and the spools with the last 6 m of spool extends exposed from the rock cover and is protected by a mattress.

[2] The umbilical is rock covered at crossings and at the well end – for a total of 1.25 km.

In the pre-screening, each of the groupings were assessed against a range of possible decommissioning options. A qualitative assessment considering safety, environment, technical feasibility, societal and economic impacts was carried out using a Red-Amber-Green (RAG) evaluation method. The pre-screening is detailed in the CA Report. The results of the pre-screening of the decommissioning options are shown in Table 4-2.

Table 4-2: Summary of Option Screening Assessment for Groups A and B.

GROUP ID	Component type / as-laid condition	1. Total Removal				2. Remediate *in situ* With Exposed Sections			3. Leave *in situ*
		A) By Reverse Reeling	B) By Lift And Cut	C) By Reverse S-Lay	D) By Cut And Lift	A) Rock Covered	B) Trenched And Buried	C) Cut And Removed	
A	Rigid piggyback lines which are trenched and buried with varying lengths/sections of rock cover. Average DoB is 0.99 m.	✓	× (Screened Out)	× (Screened Out)	× (Screened Out)	✓	✓	✓	× (Screened Out)
B	Umbilical which is trenched and buried with some rock cover. Average DoB is 0.3 m. Assessment considers that out with the rock covered sections and crossings the umbilical is exposed due to being only covered to 0.3 m DoB.	✓	✓	× (N/A)	× (Screened Out)	✓	✓	✓	× (Screened Out)

X (N/A)
Not Applicable, not carried forward to the CA.

X (Screened Out)
Screened Out option based on qualitative assessment; not carry forward to CA.

✓ **Carried forward option to CA.**

4.2 Comparative Assessment Approach and Results

For all options selected for each of the Groups, scoring in the CA was carried out against safety, environment, technical feasibility, societal impacts, and economics. Within each of these criteria a number of sub-criteria were considered. Whilst the 'Preferred Options' are carried forward to the DP; there remains optionality on the chosen methods (i.e. no 'showstoppers' were identified against the options which were ranked 'Acceptable' in the CA). A detailed decommissioning method, based on those identified as preferred, will be decided as part of the overall contracting strategy, with input from the decommissioning contractor at the point of award. In the instance that the tender process proposes an acceptable option being selected that is not however, the ´most-preferred´ option, Bridge Petroleum will inform OPRED before a decision is taken on the overall strategy.

The results of the CA are provided in Table 4-3. Justification for the results is provided in the CA Report (Genesis, 2025).

Table 4-3: Preferred and Acceptable Decommissioning Options Identified by CA.

Infrastructure	Description and Proposed Decommissioning Methods
CA Group A *Rigid piggybacked flowlines PL2336 & PL2337 (Trenched and buried with partial rock cover). Average DoB is 0.99 m*	**Preferred Option:** Decommission with remediation *in situ* with exposed sections cut and removed. A total of *c*. 20 te of additional rock cover would be required. **Acceptable Options** Decommission *in situ* with addition of rock cover to exposed ends; and Decommission *in situ* with exposed ends trenched and buried.
CA Group B *Umbilical PLU2338 (Trenched and buried with partial rock cover). Average DoB is 0.3 m*	**Preferred Option:** Decommission with remediate *in situ* with exposed sections (*c*. 92 % of the umbilical length) cut and removed and rock covered sections decommissioned *in situ.* As four cuts are made at four spot rock covered locations (including pipeline crossings) to leave *in situ*, a total of *c*. 40 te of additional rock would be required.

5.0 ENVIRONMENTAL & SOCIO-ECONOMIC BASELINE

An understanding of the environmental and socio-economic baseline is required to identify the potential environmental and socio-economic impacts of the proposed Project. This section outlines the main environmental and socio-economic sensitivities within the Enoch Field area that could be impacted by the proposed activities.

5.1 Environmental Baseline Surveys

A pre-decommissioning environmental baseline survey was carried out across the Enoch Field and pipeline routes in June 2023 and, where relevant, has been used to inform this section. The associated reports to the survey carried out, are listed in Table 5-1. The sampling locations from the survey carried out in Enoch area is shown in Figure 5-1.

Table 5-1: Environmental reports across the Enoch area.

Survey Report	Reference
Enoch Environmental Survey. Enoch Habitat Assessment Report. Survey work completed in June 2023.	Benthic Solutions (2023a)
Enoch Environmental Survey. Enoch Survey Report Survey work completed in June 2023.	Benthic Solutions (2023b)
Enoch Environmental Survey. Environmental Baseline and Cuttings Pile Report – Enoch Survey Survey work completed in June 2023.	Benthic Solutions (2024)

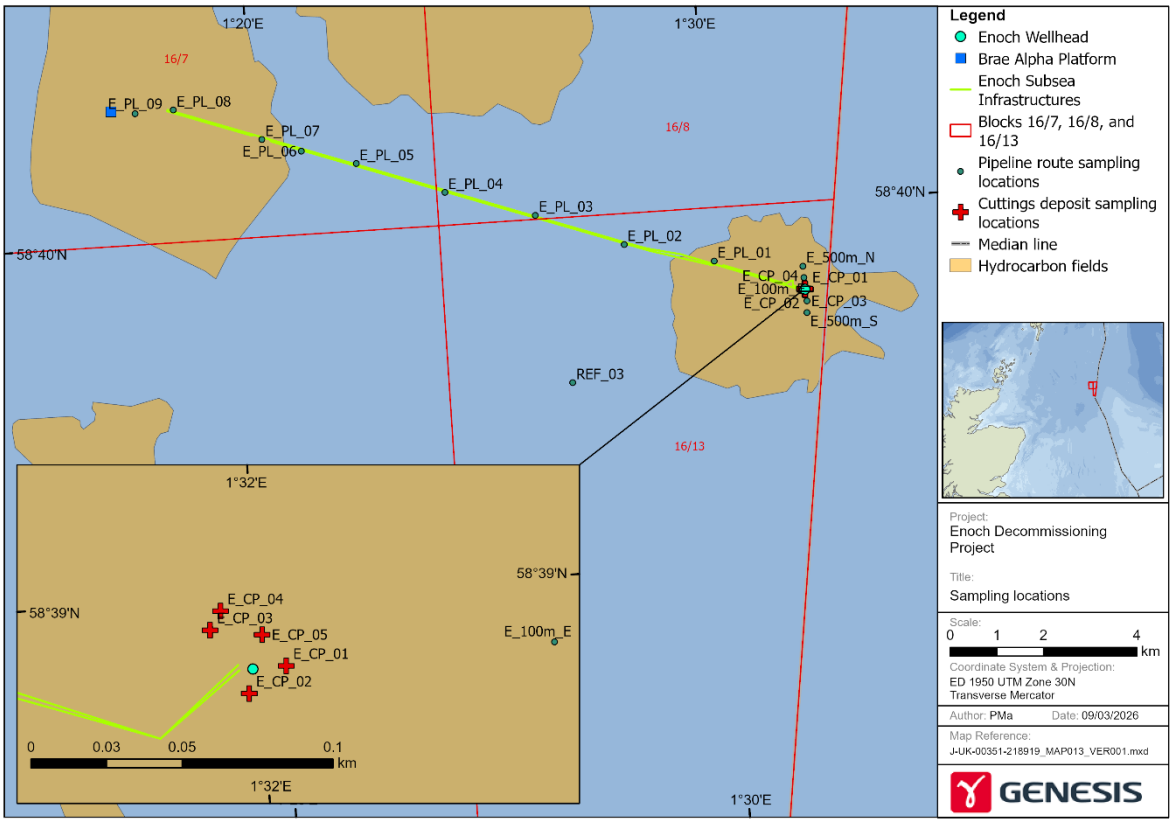


Figure 5-1: Surveys carried out in Enoch area (Benthic Solutions, 2023b and 2024).

5.2 Physical Environment

The type and distribution of marine life is influenced by the physical conditions of the surrounding environment, biological interactions, and anthropogenic activities. These physical factors, which include currents, tides, waves, temperature, salinity, and wind also influence the fate and behaviour of emissions and offshore discharges (planned and unplanned) from vessels and installations, and the risks associated with them.

5.2.1 Bathymetry

Bathymetry plays a significant role in modifying coastal tidal and residual currents, especially in the North Sea (DESNZ, 2022). Knowledge of the bathymetry of the area helps to provide an understanding of the movement of sediments and possible contaminants associated with the sediment. The Enoch Wellhead and associated pipelines are located in an area of gently undulating seabed at a water depth of *c.* 120 m. The associated subsea infrastructure passes over a section of seabed varying between *c.* 105 m and *c.* 120 m (LAT; Figure 5-2).

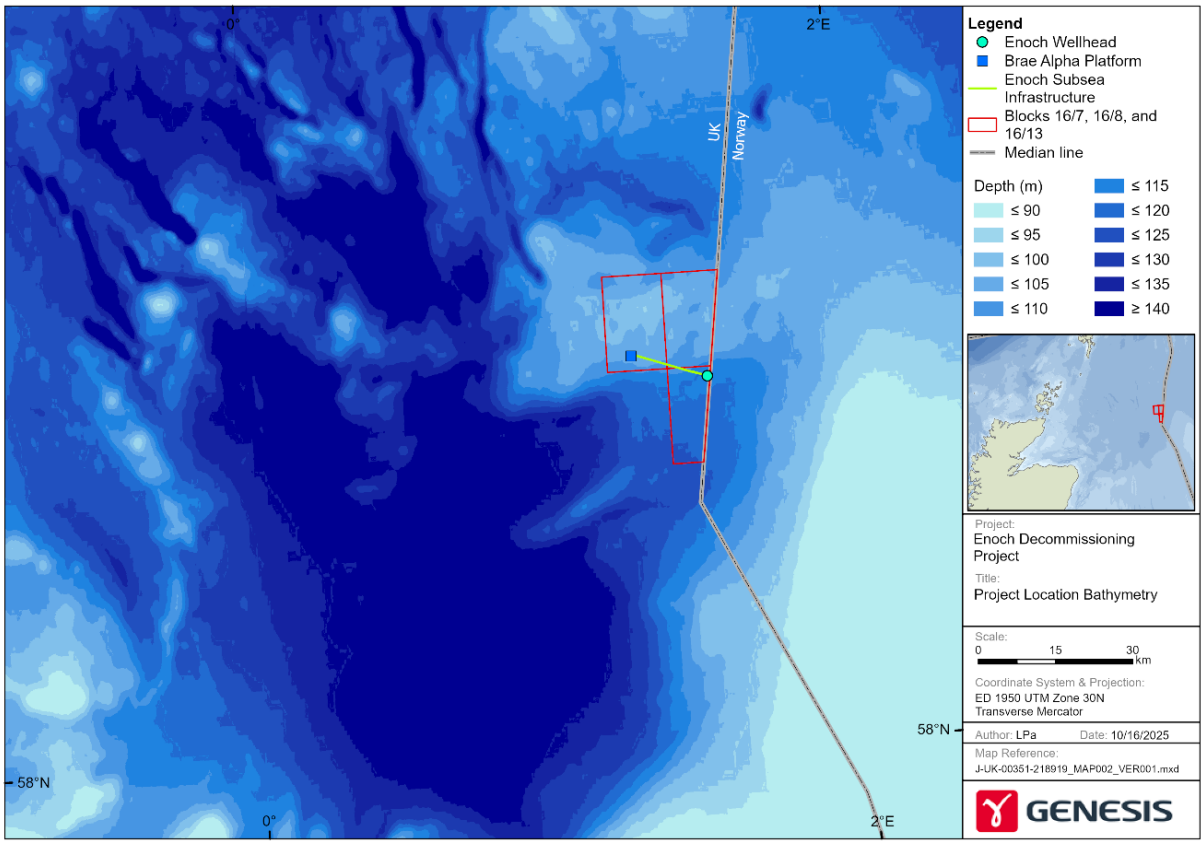


Figure 5-2: Bathymetry in the vicinity of the Enoch Field.

5.2.2 Water Masses, Currents and Tides

Water masses, local current speeds and direction all influence the transport, dispersion, and fate of marine discharges. The major water masses in the North Sea can be classified as Atlantic water, Scottish coastal water, Northern North Sea (NNS) water, Norwegian water, CNS water, Southern North Sea (SNS) water, Jutland water and Channel water (Turrell, 1999).

The Enoch Field is located in the area influenced by the Atlantic water (West) and the NNS current. The predominant regional current in the CNS originates from the vertically well-mixed

coastal water and Atlantic water inflow of the Fair Isle/ Dooley current, which flows around the north of the Orkney Islands and into the North Sea (Figure 5-3).

Typical current speeds in the NNS are 0.20 – 0.25 m/s and the maximum current speed during mean spring tide is between 0.4 and 0.5 m/s. The mean spring tidal range is between 0.1 - 1.0 m (DESNZ, 2022).

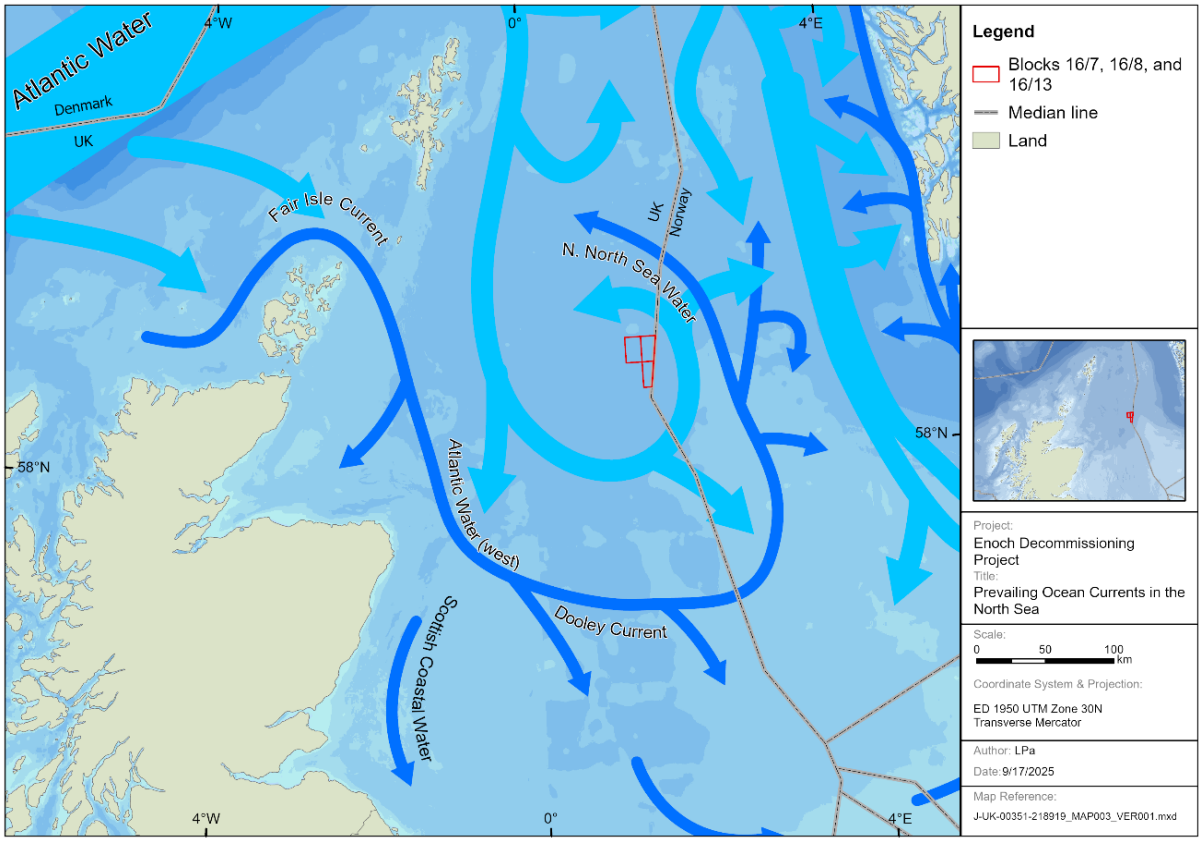


Figure 5-3: Ocean circulation in the North Sea (Turrell, 1999).

5.2.3 Wind and Waves

Wind direction and speed directly influence the transport and dispersion of atmospheric emissions from an installation. These factors are also important for the dispersion of marine discharges, including oil spills, influencing the movement, direction and break up of substances on the sea surface.

The highest proportion of wind at the Enoch Field originates from the southwest, west and south each direction accounting for over 15% of the wind experienced. The mean annual wind speed is 8.8 m/s. The majority of waves originate from a northerly direction, accounting for over 30%. The annual mean significant wave height at the project location is 2.4 m (Figure 5-4; Saha *et al*. 2010; ABPmer, 2013).

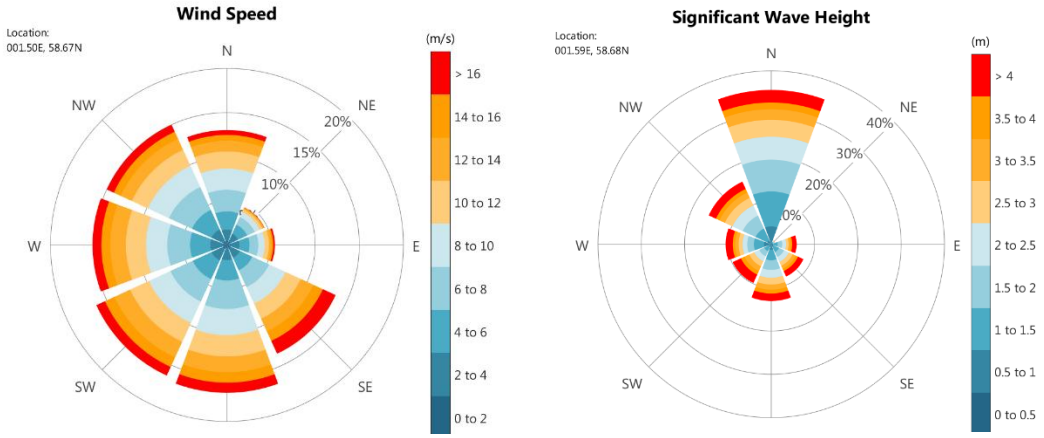


Figure 5-4: Wind rose (a) (Saha *et al.*, 2010) and Wave rose (b) (ABPmer, 2013) at the Enoch Field.

5.2.4 Temperature and Salinity

The water column in the CNS is vertically stratified during the summer months with a thermocline in August/ September, typically forming at around 50 m water depth. The strong stratification of the water mass in the CNS effectively isolates the bottom water and seabed fauna from the large-scale temperature changes that occur in the upper water column. Water temperatures remain reasonably constant throughout the winter months, with only a marginal seasonal variation in salinity that is typical of the open and western waters of the North Sea (Berx & Hughes, 2009). The temperature of the sea affects both the properties of the sea water and the fates of discharges and spills to the environment. Seawater temperatures vary with season, depth, and proximity to land.

Annual mean near-seabed water temperatures are *c.* 7.0°C at the Enoch Field. The average annual surface water temperature in the Enoch area is *c.* 9.5°C (Berx & Hughes, 2009). Salinity in the Enoch area shows little variation through the water column, averaging *c.* 35.15 ‰ near-bed and *c.* 35.00 ‰ at the sea surface (Berx & Hughes, 2009).

5.2.5 Seabed Sediments

The characteristics of local sediments within a project area is an important factor in determining the potential effects of developments or decommissioning projects on the local seabed environment. as defined by the European Nature Information System (EUNIS).

In 2023, Benthic Solutions was commissioned to carry out a survey at the Enoch Field (Benthic Solutions, 2023a). The area is considered to be primarily comprised of MD521 Offshore Circalittoral Sand' with small areas of MD42 'Offshore Circalittoral Mixed Sediment' (Benthic Solutions, 2023a). The survey area is primarily composed of sand, with moderate or equal proportions of fines and minimal gravels across all stations sampled along the Enoch to Brae Alpha pipeline route.

In Figure 5-5, it can be seen the seabed around Enoch wellhead is characterized as 'Offshore Circalittoral Mud' while Brae Alpha Platform is characterized as 'Offshore Circalittoral Sand'. Figure 5-6 shows the seabed habitat images within Enoch area.

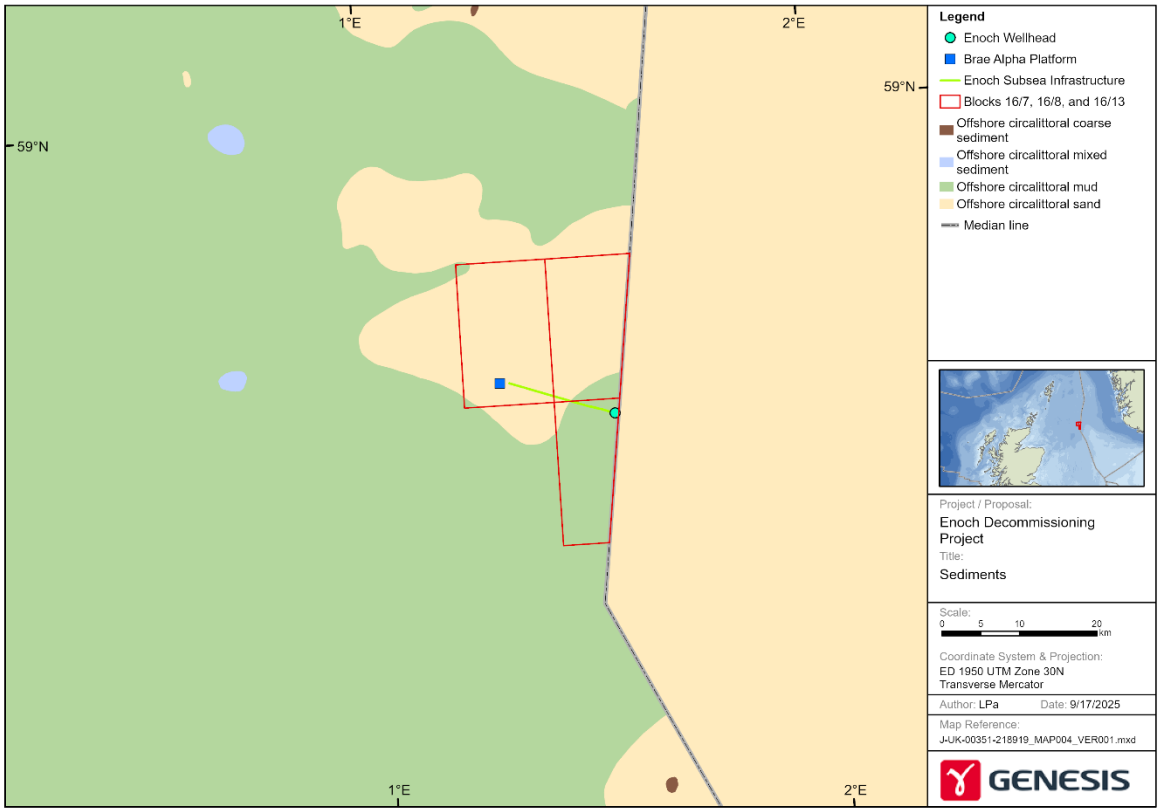


Figure 5-5:Modelled distribution of seabed sediments in the vicinity of the Enoch Field (EMODnet, 2023a).

Shallow seabed depressions were noted on the geophysical data across the Enoch survey area, revealing depressions featuring centralised hard contacts; however, whilst potential pockmarks were identified, no MDAC, indicator species, active gas seepages or bacterial mats were observed across the survey area. As shown in Figure 5-6 the presence of shell fragments and with central boulders, and no indicator species such as the chemotrophic bivalve *Lucinoma borealis* often associated with active pockmarks which might indicate active seepage of shallow gas, i.e. no gas bubbles, anoxic sediments, were present (Benthic Solutions, 2023a).

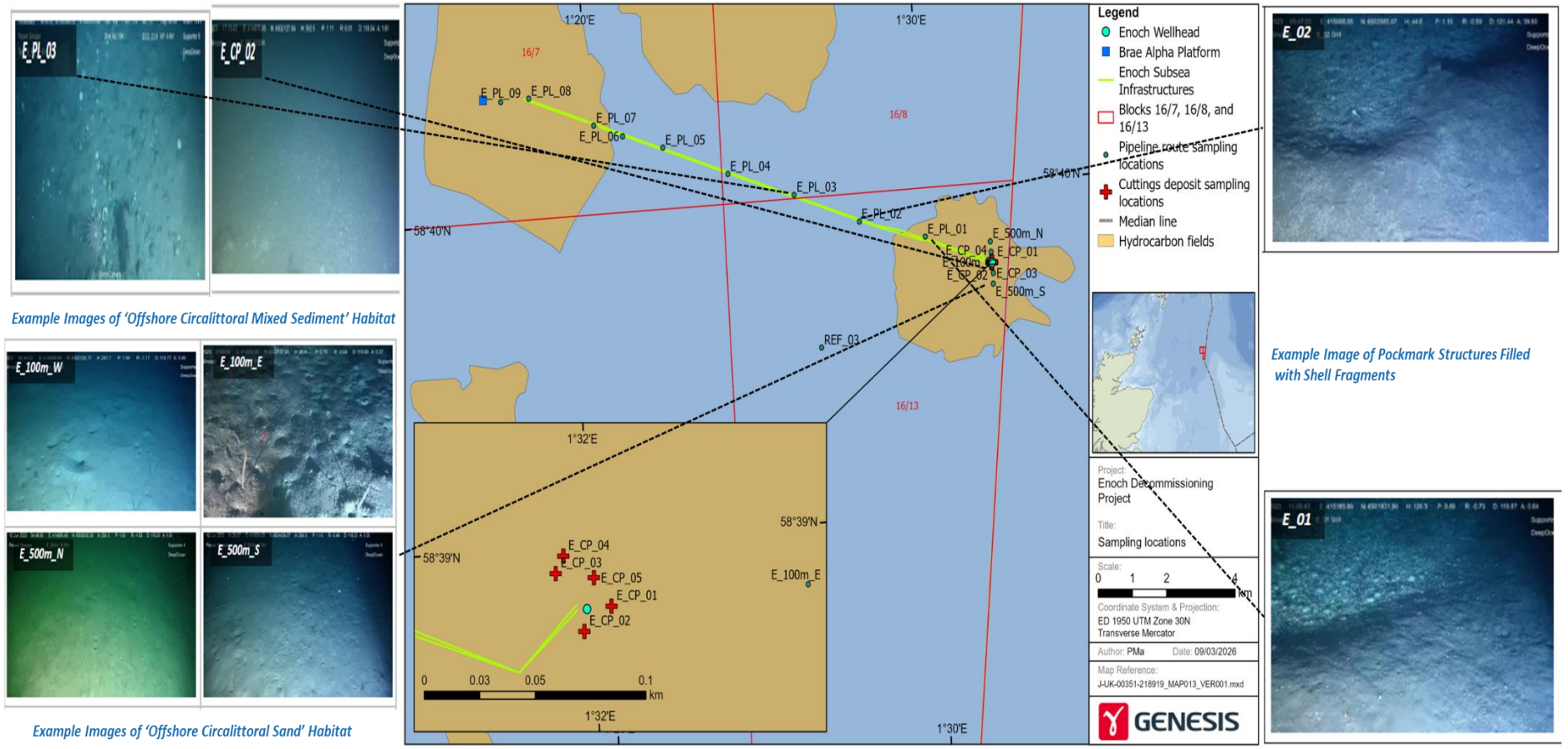


Figure 5-6: Example seabed images within Enoch survey area (Benthic Solutions, 2023a).

5.2.5.1 Particle Size Distribution

Sediments across the Benthic Solutions (2024) Enoch survey area had a mean particle size ranging from 2.52 µm at station E_CP_01 (100 m east of the Enoch wellhead) to 5.88 µm at station E_CP_05 (100 m north of the Enoch wellhead) (Figure 5-7).

Sediment particle size analysis from surveys in the Enoch area are shown in Figure 5-7, whilst Figure 5-8 shows the percentage of fine material (<72.6 µm).

The samples collected in the Enoch survey area represented four Wentworth classifications with the most frequent category being assigned as 'Coarse Silt' (52% of total stations), this classification is to be expected due to similar abundance of fines and sand, both outside and within the CP boundary. However, the Folk classification scale identified four differing sediment classifications, this includes 'Muddy Sand', 'Sandy Mud', Slightly Gravelly Muddy Sand' and 'Slightly Gravelly Sandy Mud'. During the survey (Benthic Solutions, 2024) the greatest difference in particle size was noted across the physical cuttings deposit boundary, ranging from 0.02mm at station E_CP_05_S to 0.17mm at station E_CP_01_S. The variable mean particle size was related to the variable abundance of concrete fragments across the cuttings deposit around the wellhead.

The majority of stations (43% of total stations) was considered to reflect ambient sediment across the Enoch survey area, with relatively even proportions of sand (45.1% to 56.4%) and fines (43.6% to 54.9%), with minimal proportions of gravels (0% to 0.02%).

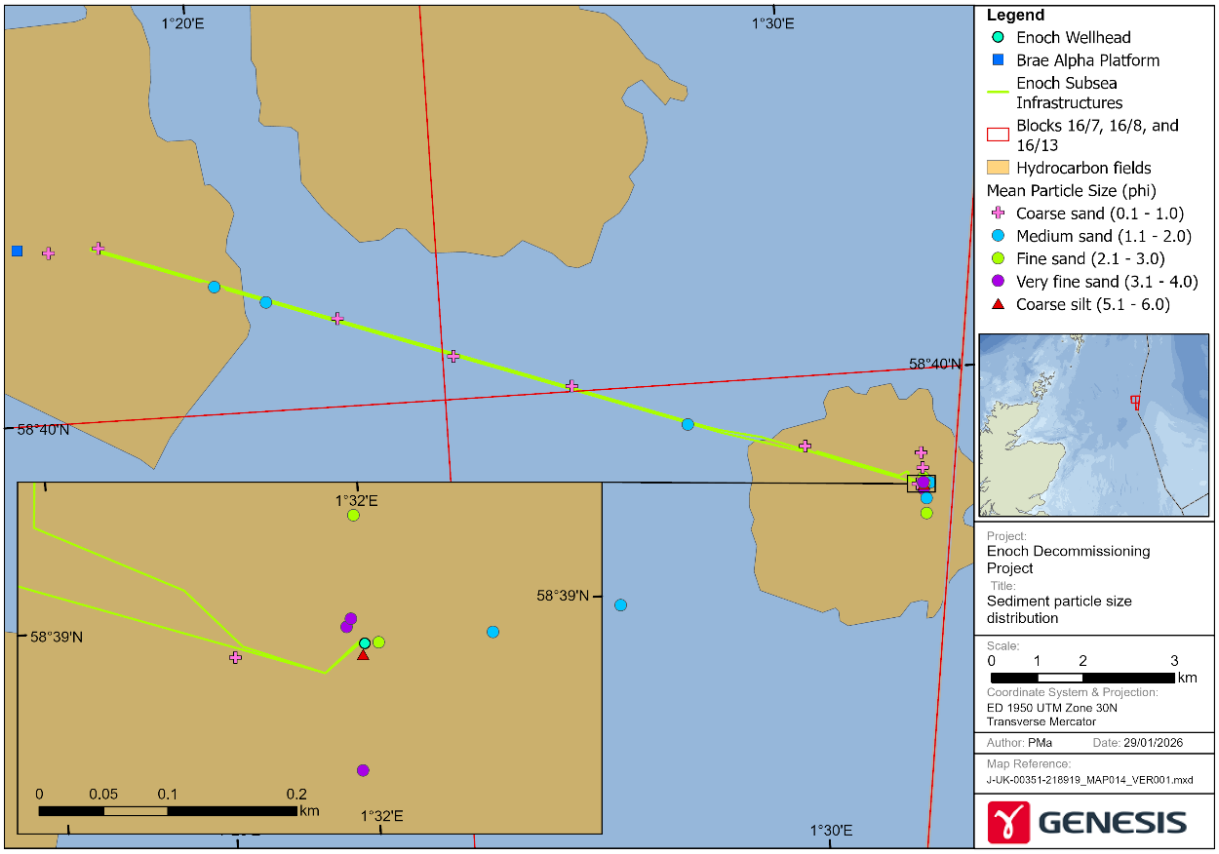


Figure 5-7: Sediment particle size in the vicinity of the Enoch infrastructure (Wentworth, 1922).

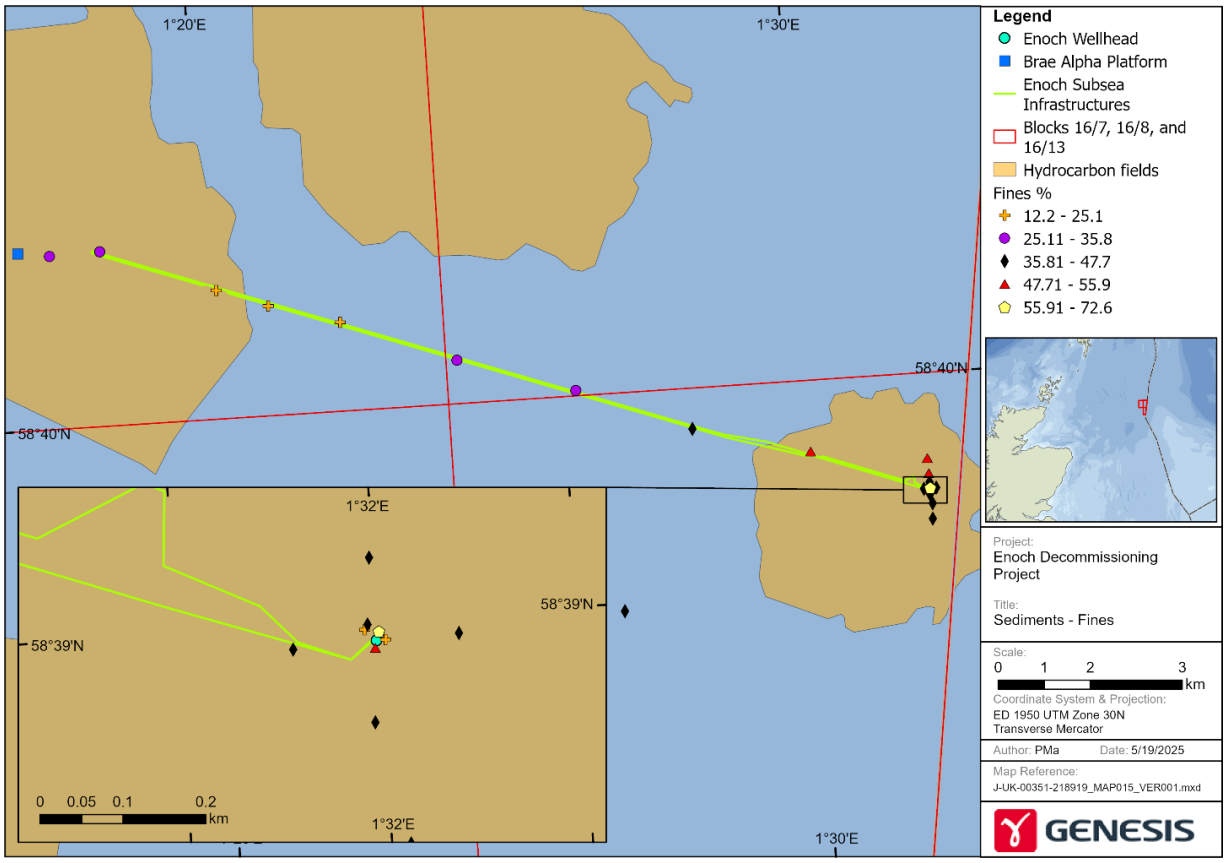


Figure 5-8: Percentage fines in the sediment in the vicinity of the Enoch Field.

5.2.5.2 Sediment Hydrocarbons

Existing Cuttings Deposit

In June 2023, DeepOcean aboard the ROVSV Stil Server carried out a survey at the Enoch Field and the pipeline to Brae Alpha platform which included a visual inspection of the cuttings deposit around Enoch wellhead, and collection of data using MBES and a sub-bottom profiler. The Volume Calculation Utility in NaviModel reported the overall area of 823 m^2 and the calculated cuttings deposit volume of 46.9 m^3 (Benthic Solutions, 2024). The Enoch Field cuttings deposit is considered to be a "small cuttings pile" (<5,000 m^3) according to the Norwegian Oil and Gas Association Guidance (Norsk Olje & Gass, 2016), however, due to the small, localised cuttings deposit and only one well drilled the cuttings are not classified as a "cuttings pile" under OSPAR Recommendation 2006/5.

The survey data showed traces of the presence of highly weathered low toxicity oil-based mud (LTOBM) contamination within 250 m of the Enoch well, this is likely due to the weathering of exploration well cuttings, located *c.* 400 m south, that was drilled in 1986 prior to the ban of using OBM.

Total Hydrocarbon Content (THC)

The spatial variation of THC was similar across the Enoch Field, with peak THC concentration at stations E_CP_02_S (101.13 $mg.kg^{-1}$) and E_CP_05_S (65.79 $mg.kg^{-1}$), both within the CP boundary. The THC concentrations reported were higher than the CNS mean background concentration (9.51 µg/g; UKOOA, 2001) however, lower than the UK Offshore Operators Association (UKOOA) 95th percentile of NNS (20.32 $mg.kg^{-1}$) and OSPAR THC Threshold (50.079 $mg.kg^{-1}$) in all stations except in stations E_CP_02_S and E_CP_05_S.

The increased THC values at these stations (E_CP_02_S and E_CP_05_S) can be attributed to the visible presence of hydrated drilling muds within the cores which are intermixed with concrete fragments. Three stations along the pipeline survey route had notably lower THC values due to the higher proportion of sands and lower presence of fines, reducing the adsorption of diffuse hydrocarbons. THC content was higher at E_CP_02_S due to the presence of a weathered diesel signature along with LTOBM, attributed to the presence of drilling fluids laying close to the surface of this CP station. Despite the presence of weathered LTOBM across the wider survey area, only two of the 22 stations, situated within the physical cuttings boundary, exceeded the OSPAR 50 $mg.kg^{-1}$ THC threshold.

The lowest THC value was recorded at station E_CP_01_S (4.74 $mg.kg^{-1}$) which was related to a high proportion of sand and low fines content due to the subsampling of cuttings material intermixed with ambient sediment, concrete fragments and shell debris.

Polycyclic Aromatic Hydrocarbons (PAHs)

The total 2 to 6 ring polycyclic aromatic hydrocarbons (PAHs) concentrations were fairly consistent across the Enoch survey area due to the general sand dominance of the surface sediments. The total PAHs concentrations ranged from 0.04 mg.kg-1at station E_PL_05 to 0.51 $mg.kg^{-1}$ at station E_CP_05_S. Peak PAH occurred at station E_CP_05_S (0.51 $mg.kg^{-1}$), which was above the National Oceanic and Atmospheric Administration (NOAA) Effects Range Low (ERL) of 0.5 $mg.kg^{-1}$, but was still below the UKOOA 95th percentile for the NNS (0.80 $mg.kg^{-1}$).

The mean concentrations reported within the Enoch survey area were broadly comparable and generally less than the mean background concentrations for the region (UKOOA, 2001; FRS, 2002; ERTSL, 2003), although above the ERL threshold concentrations (OSPAR, 2014), it is unlikely that the PAHs present in the sediments would have a detrimental effect on the sediment macrofaunal community.

5.3 Biological Environment

5.3.1 Plankton

Plankton are drifting organisms that inhabit the pelagic zone of a body of water and include single celled organisms such as bacteria as well as plants (phytoplankton) and animals (zooplankton). Phytoplankton are the primary producers of organic matter in the marine environment and form the basis of marine ecosystem food chains. They are grazed on by zooplankton and fish, which in turn are eaten by larger species such as other fish, birds and cetaceans. Therefore, the distribution of plankton directly influences the movement and distribution of other marine species. Zooplankton include all life stages of planktonic organisms (holoplankton) and includes the eggs, larvae and spores of non-planktonic species such as fish, benthic invertebrates and algae (meroplankton).

The composition and abundance of plankton communities varies throughout the year; influenced by several factors including depth, tidal mixing, temperature stratification, nutrient availability and the location of oceanographic fronts. Species distribution is directly influenced by temperature, salinity, water inflow and the presence of local benthic communities (Colebrook, 1982). The meroplankton population may have a very different seasonal cycle depending on the life cycle strategy of the fish species and benthic organisms which inhabit the area.

The Enoch Field lies within Regional Sea 1 as discussed in UK Offshore Energy Strategic Environmental Assessment 4 (OESEA4). The Regional Sea 1 was, until recently, a cold-boreal province. However, after the late 1980s regime shift, it is now considered a temperate province. Plankton in the Regional Sea 1 generally comprise Atlantic and offshore species as

these waters are stratified during summer months. The inflowing warm, nutrient rich waters from the north Atlantic are thought to be a factor promoting earlier stratification (Drinkwater *et al*., 2003), conditions suited for successful competitors such as dinoflagellates (Leterme *et al*., 2006). Dinoflagellates typically comprise a greater proportion of the phytoplankton community than diatoms from June to October, when waters will be most stratified (McQuatters-Gollop *et al*., 2007). The zooplankton community is dominated by calanoid copepods, although other groups such as *Paracalanus* and *Pseudocalanus* are also abundant. There is also a high biomass of Calanus larval stages present in the region. *Euphausiids*, *Acartia*, and decapod larvae are all important components of the zooplankton assemblage. Jellyfish are typically less abundant in northern and eastern coasts of the UK, although species commonly sighted include *Aurelia aurita*, *Cyanea capillata* and *Cyanea lamarckii* (Pikesley *et al*., 2014).

Macrofaunal analysis across the Enoch site revealed a total of 3,183 individuals, of which Annelida had the highest percentage contribution to the total number of individuals at 44.4%. The averaged macrofaunal community had minimal variability across the Enoch site, with lower species richness generally recorded at the cutting deposit stations when compared to stations sampled further afield. Multivariate statistical analysis identified seven significantly different macrofaunal groupings within the survey area at a 50-75% Bray-Curtis similarity level (Benthic Solutions, 2024).

5.3.2 Benthos

Bacteria, plants and animals living on or within the seabed sediments are collectively referred to as benthos. Species living on top of the sea floor may be sessile (e.g., seaweeds) or freely moving (e.g., starfish) and collectively are referred to as epibenthic or epifaunal organisms. Animals living within the sediment (e.g., clams, tubeworms and burrowing crabs) are termed infaunal species. Semi-infaunal animals, including sea pens and some bivalves, lie partially buried in the seabed. The majority of marine benthic invertebrates exhibit a life cycle that includes a planktonic larval phase, from which the bottom dwelling juvenile and adult phases recruit.

Benthic animals display a variety of feeding methods. Suspension and filter feeders capture particles which are suspended in the water column (e.g., sea pens) or transported by the current (e.g., mussels). Deposit feeders (e.g., sea cucumbers) ingest sediment and digest the organic material contained within it. Benthic species can be herbivorous (e.g., sea urchins), carnivorous (e.g., crabs) or omnivorous (e.g., nematodes). Benthic communities show a strong correlation with habitat type, with depth mainly influencing epifauna, and sediment characteristics typically influencing the infauna (Basford *et al*., 1990). Benthic communities in deeper soft sediment habitats tend to be spatially distributed over large scales, with distinctive species assemblages associated with particular substrate types. However, depending on the intensity and spatial extent of sampling, localised community types or subtler variations may be distinguished, often associated with topographic features (DESNZ, 2022).

Benthic community data are best summarised using an index to distill the species data from a potentially very large matrix of stations to something that can be compared within and between locations. The Shannon Weiner diversity index is a quantitative measure that can be used to capture how many different species there are in a dataset and simultaneously takes into account how evenly the individuals are distributed among those species. The value increases both when the number of species increases and when evenness increases. For a given number of species, the value of a diversity index is maximized when all species are equally abundant. Figure 5-9 shows the Shannon Weiner index of diversity from the benthic data in the Enoch survey area.

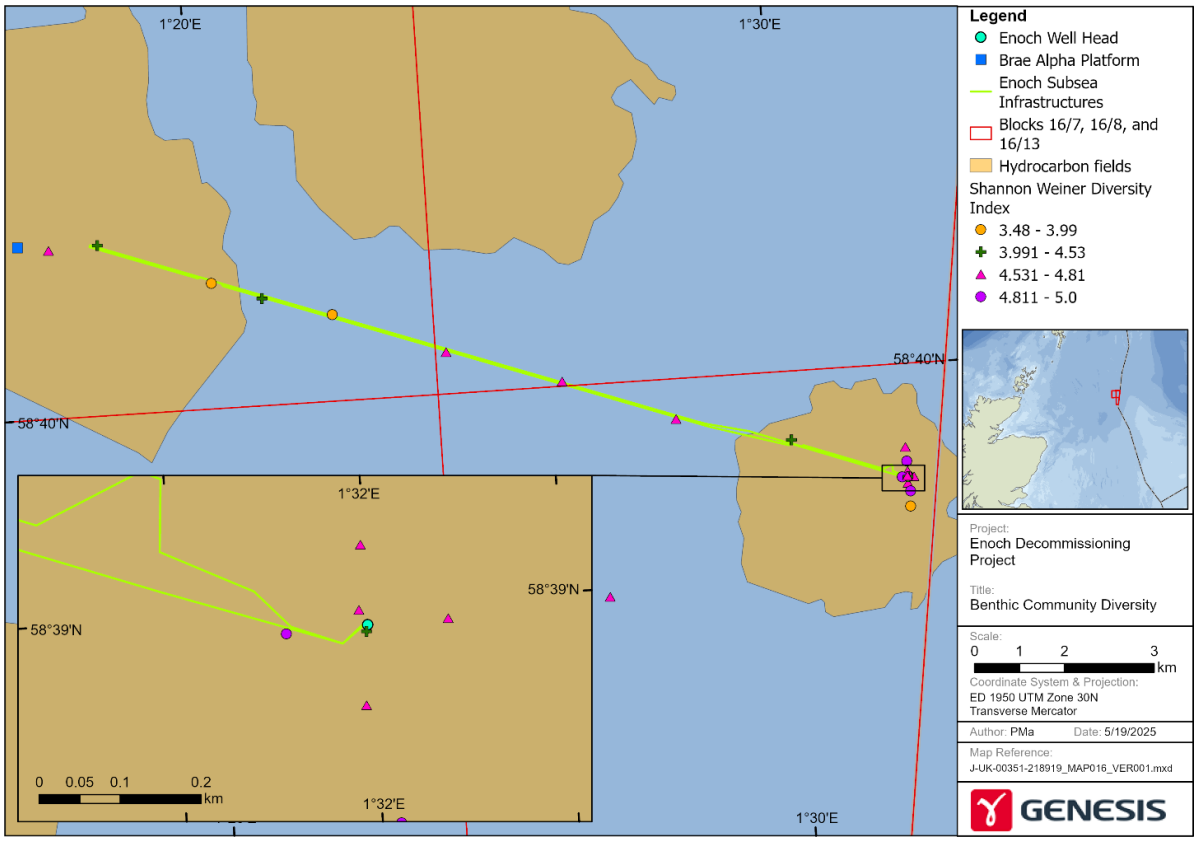


Figure 5-9: Shannon Weiner Diversity Index over the surveyed area.

The Enoch samples taken in 2023 (Benthic Solutions, 2024) showed elevated Shannon Weiner values. The Shannon-Wiener's Diversity Index revealed little variable diversity ranging from 'good' through to 'high' diversity at a station level. The Shannon-Weiner diversity ranged from 3.48 (E_500m_S) and 5.0 (E_250m_N). Values >4.00 indicate 'high' diversity; values between 3.00 and 4.00 indicate 'good' diversity, values between 2.00 and 3.00 indicate 'moderate' diversity and values between 1.00 and 2.00 indicate 'bad' diversity, whilst values <1.00 indicate 'poor' diversity.

Overall, the following results show a fairly invariable and consistently distributed community across all stations for a primarily sand dominated habitat, with slight variations in spatial patterns relating to natural variation.

5.3.3 Habitats and Species

A number of habitats and species are known to occur in the vicinity of the Enoch Field including:

- Sea pen and Burrowing Megafauna Communities (Habitat Features of Conservation Importance (FOCI), Scottish Priority Marine Feature (PMF), OSPAR threatened and/or declining Habitat); and
- Ocean quahog (*Arctica islandica*) (Species FOCI, OSPAR threatened and/or Declining Species).

Sea pen and Burrowing Megafauna Communities

For a habitat to be classified as 'Sea pen and burrowing megafauna communities' the presence of burrowing macrofauna is an essential element, while sea pens (e.g. *Virgularia mirabilis*, *Pennatula phosphorea* and *Funiculina quadrangularis*) may, and by extension may

not, be present (JNCC, 2014). The density of the burrows was quantified using the video footage and still images to provide further information on the potential abundance of burrowing fauna and the Superabundant, Abundant, Common, Frequent, Occasional, Rare (SACFOR) scale. The results of the burrows assessment indicate that Burrows were absent from the cuttings deposits, likely due to the presence of coarser sediment/concrete fragments (Figure 5-10). Small burrows were categorised as 'Occasional' to 'Frequent' on the SACFOR scale, whereas large burrows varied between 'Frequent' to 'Common' within the survey area. The presence of 'Frequent' or above burrow densities indicates that the Enoch site up to 100 m from the well and along the pipeline showed some level of conformity to the OSPAR 'Sea pen and Burrowing Megafauna Communities' and/or the 'Burrowed Mud' Scottish PMF (Table 5-2).

Table 5-2: SACFOR densities of burrows at the Enoch Field (Benthic Solutions, 2023a).

Transect	Sediment variation	Number of small burrows present (1 to 3cm)	Number of large burrows present (3 to 15cm)
E_100m_N	Offshore Circalittoral Sand	1.95 per m²	2.95 per m²
E_100m_E	Offshore Circalittoral Sand	0.70 per m²	1.70 per m²
E_100m_S	Offshore Circalittoral Sand	4.73 per m²	3.46 per m²
E_100m_W	Offshore Circalittoral Sand	2.81 per m²	0.30 per m²
E_250m_N	Offshore Circalittoral Sand	3.16 per m²	0.92 per m²
E_250m_S	Offshore Circalittoral Sand	2.47 per m²	1.97 per m²
E_500m_N	Offshore Circalittoral Sand	1.05 per m²	0.55 per m²
E_500m_S	Offshore Circalittoral Sand	3.86 per m²	2.37 per m²
E_PL_01	Offshore Circalittoral Sand	1.35 per m²	0.50 per m²
E_PL_02	Offshore Circalittoral Sand	3.59 per m²	1.84 per m²
E_PL_03	Offshore Circalittoral Sand	1.67 per m²	0.17 per m²
E_PL_04	Offshore Circalittoral Sand	1.46 per m²	1.00 per m²
E_PL_05	Offshore Circalittoral Sand	0.59 per m²	0.43 per m²
E_PL_06	Offshore Circalittoral Sand	0.65 per m²	1.19 per m²
E_PL_07	Offshore Circalittoral Sand	0.37 per m²	1.02 per m²
E_PL_08	Offshore Circalittoral Sand	1.47 per m²	0.26 per m²
E_PL_09	Offshore Circalittoral Sand	1.64 per m²	0.13 per m²
REF_03	Offshore Circalittoral Sand	0.13 per m²	1.11 per m²

Colour code for SACFOR abundance classification					
Superabundant	Abundant	Common	Frequent	Occasional	Rare

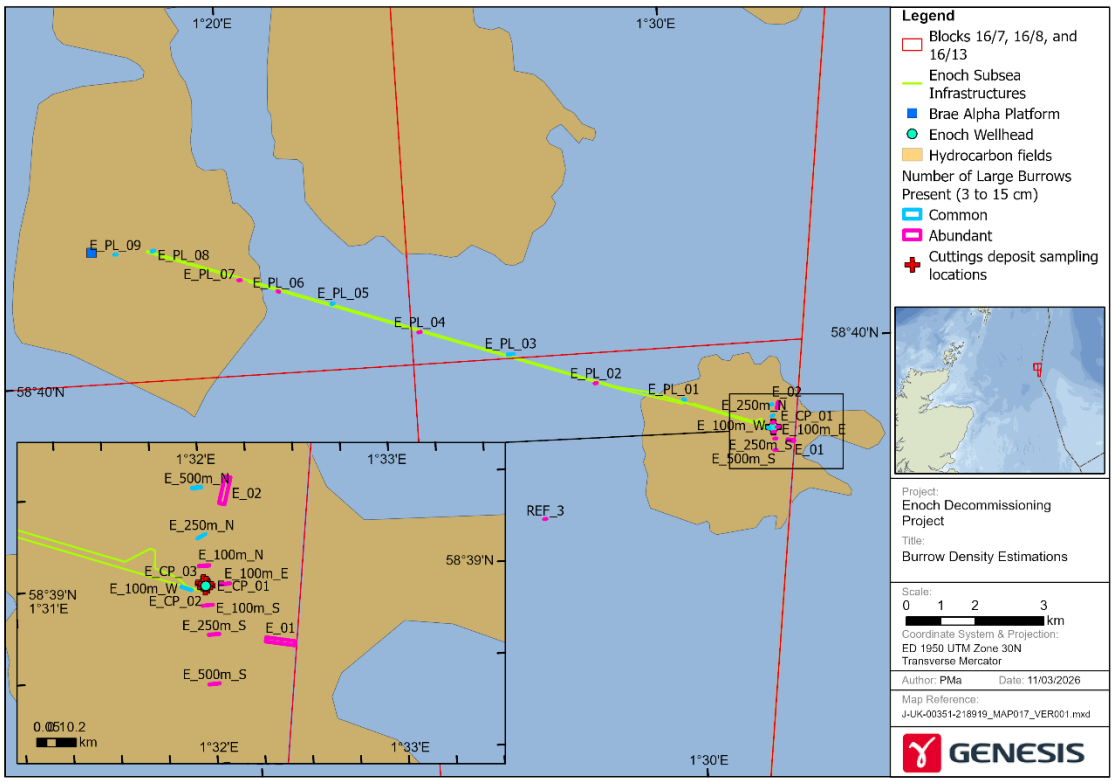


Figure 5-10: SACFOR densities of burrows in the vicinity of Enoch Field (Benthic Solutions, 2023a).

Ocean quahog (*Arctica islandica*)

The *A. islandica* bivalve species are afforded status under the OSPAR Commission due to its inclusion on the OSPAR List of Threatened and/or Declining Species in the Greater North Sea area as a priority (OSPAR, 2009). The siphons of *A. islandica* were observed across most of the Enoch survey area (excluding E_01 and all PL stations except 01). The siphon analysis revealed average siphon densities ranging between 'Occasional' across transect E_500m_N to 'Frequent' across transect REF_03. However, unaveraged densities of up to a maximum of 10 per m^2 (E_100m_S) were recorded within the survey area, which would classify as 'Abundant', and indicates the patchy distribution of *A. islandica* across the survey area (Table 5-3 and Figure 5-11).

A total of 11 juvenile individuals (< 5cm) from 120 0.25m^2 DVV grab samples were reported; with a maximum reported density of two individuals per 0.25m^2 of survey area.

Table 5-3: *A. islandica* density estimations (Benthic Solutions, 2023b).

Transect	Sediment variation	Total number of siphons across transect	Maximum number of siphons per still (m^2)	Average siphon density (m^2)	Number of individuals retained in co-located grabs ($0.3m^2$)
E_01	Offshore Circalittoral Sand/ Offshore Circalittoral Mixed Sediment	0	0	0	N/A*
E_02	Offshore Circalittoral Sand/ Offshore Circalittoral Mixed Sediment	10	6	0.25	N/A*
E_100m_N	Offshore Circalittoral Sand	8	3	0.15	11
E_100m_E	Offshore Circalittoral Sand	1	1	0.02	5
E_100m_S	Offshore Circalittoral Sand	31	10	0.62	3
E_100m_W	Offshore Circalittoral Sand	10	2	0.08	4
E_250m_N	Offshore Circalittoral Sand	16	4	0.26	3
E_250m_S	Offshore Circalittoral Sand	5	3	0.07	1
E_500m_N	Offshore Circalittoral Sand	1	1	0.01	6
E_500m_S	Offshore Circalittoral Sand	6	2	0.09	3
E_PL_01	Offshore Circalittoral Sand	2	0	0.02	5
E_PL_02	Offshore Circalittoral Sand	0	0	0	1
E_PL_03	Offshore Circalittoral Sand	0	0	0	0
E_PL_04	Offshore Circalittoral Sand	0	0	0	0
E_PL_05	Offshore Circalittoral Sand	0	0	0	0
E_PL_06	Offshore Circalittoral Sand	0	0	0	0
E_PL_07	Offshore Circalittoral Sand	0	0	0	0
E_PL_08	Offshore Circalittoral Sand	0	0	0	0
E_PL_09	Offshore Circalittoral Sand	0	0	0	0
REF_03	Offshore Circalittoral Sand	25	6	0.76	8

Colour code for SACROR abundance classification

Superabundant	Abundant	Common	Frequent	Occasional	Rare

N/A – No grab sample acquired at this location due to potential sensitive habitat presence.

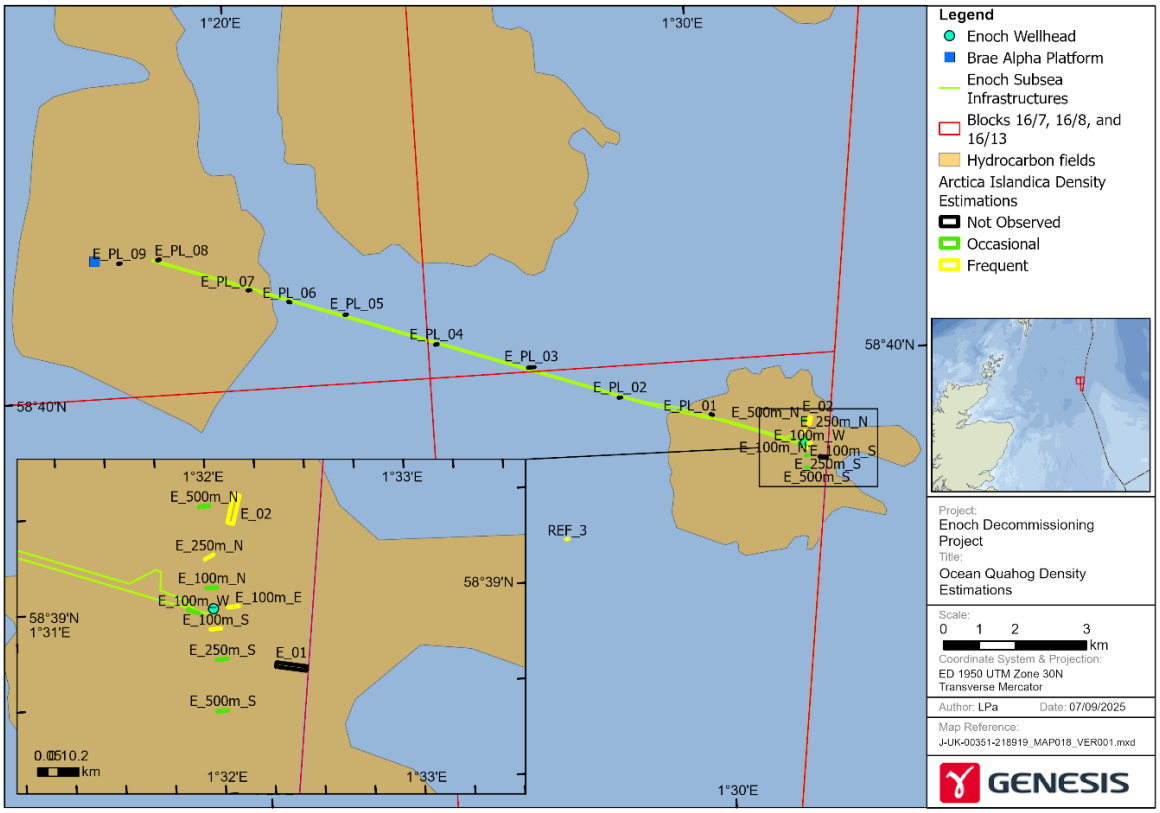


Figure 5-11: *A. islandica* densities in the vicinity of Enoch Field (Benthic Solutions, 2023b).

The densities of *A. islandica* across the Enoch survey area were comparable to the *A. islandica* densities recorded within the nearby Norwegian Boundary Sediment Plain Marine Protected Area (MPA), which was designated to protect the species.

In addition to the presence of listed habitats, novel anthropogenic habitats were observed in the vicinity of the Enoch well head. Benthic Solutions (2024) noted that areas of concrete mattresses, rock placement, sandbags and fishing debris were being colonised by epifaunal species such as bryozoan and hydrozoan turf, squid eggs (*Decapodiformes*), *Cnidaria*, *Actinaria* and *Porifera* species. Similarly to the naturally occurring hard substrate (i.e., shell fragments, cobbles and boulders), areas of anthropogenic habitat had an observable increase in the abundance and density of mobile fauna, as sheltered structures are often used by mobile species as nursery areas and function as refuges from predators (Lewis *et al.,* 2000, Hiscock *et al.,* 2010).

5.3.4 Fish and Shellfish

More than 330 fish species are thought to inhabit the shelf seas of the UKCS (Pinnegar *et al*., 2010). Pelagic species (e.g., herring, mackerel, blueing, and sprat are found in mid-water and typically make extensive seasonal movements or migrations. Demersal species (e.g., cod, haddock, sandeel, sole and whiting live on or near the seabed and similar to pelagic species, many are known to passively move (e.g., drifting eggs and larvae) and / or actively migrate (e.g., juveniles and adults) between areas during their lifecycle.

Fish occupying areas in close proximity to offshore oil and gas installations will be exposed to aqueous discharges and may accumulate hydrocarbons and other contaminating chemicals in their body tissues (Torgeir *et al*., 2013). The most vulnerable stages of the fish life cycle, to general disturbances such as disruption to sediments and oil pollution, are the egg and larval stages. Hence, recognition of spawning and nursery times and areas within a development

area is important when considering potential disturbance caused by installation activities and when responding to accidental releases during operations.

Of the fish species identified in the area, a number have been assessed by NatureScot and Joint Nature Conservation Committee (JNCC) as PMFs in Scotland (NatureScot, 2016); see Section 5.5 for a list of all PMFs in the area. Table 5-4 shows the approximate spawning and nursey times of some of the fish species known to occur within the Enoch Field area. International Council for the Exploration of the Sea (ICES) rectangle 46F1 is noted as a high intensity spawning ground for Norway pout. No high intensity nursery grounds are thought to be present in the Enoch Field area (Table 5-4 and Coull *et al*., 1998; Ellis *et al*., 2012).

Table 5-4: Summary of spawning and nursery activity for some commercial fish species in ICES rectangle 46F1 (Coull *et al*., 1998; Ellis *et al*., 2012).

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anglerfish	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	SN	S*N	S*N	SN	N	N	N	N	N	N	N	N
European hake	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN
Haddock	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN
Herring	N	N	N	N	N	N	N	N	N	N	N	N
Ling	N	N	N	N	N	N	N	N	N	N	N	N
Mackerel	N	N	N	N	S*N	S*N	S*N	SN	N	N	N	N
Nephrops	SN	SN	SN	S*N	S*N	S*N	SN	SN	SN	SN	SN	SN
Norway pout	N	N	SN	SN	SN	N	N	N	N	N	N	N
Saithe	S*	S*	S	S								
Sandeel	N	N	N	N	N	N	N	N	N	N	N	N
Spotted ray	N	N	N	N	S*N	S*N	S*N	N	N	N	N	N
Spurdog	N	N	N	N	N	N	N	N	N	N	N	N
Whiting	N	N	N	N	N	N	N	N	N	N	N	N

Key: S = Spawning; S* = Peak Spawning; N = Nursery; J = Juveniles (i.e., 0 group fish)
Species with high intensity spawning grounds is highlighted in Orange.
Source : Coull *et al* (1998); Ellis *et al* (2012); Aires *et al* (2014).

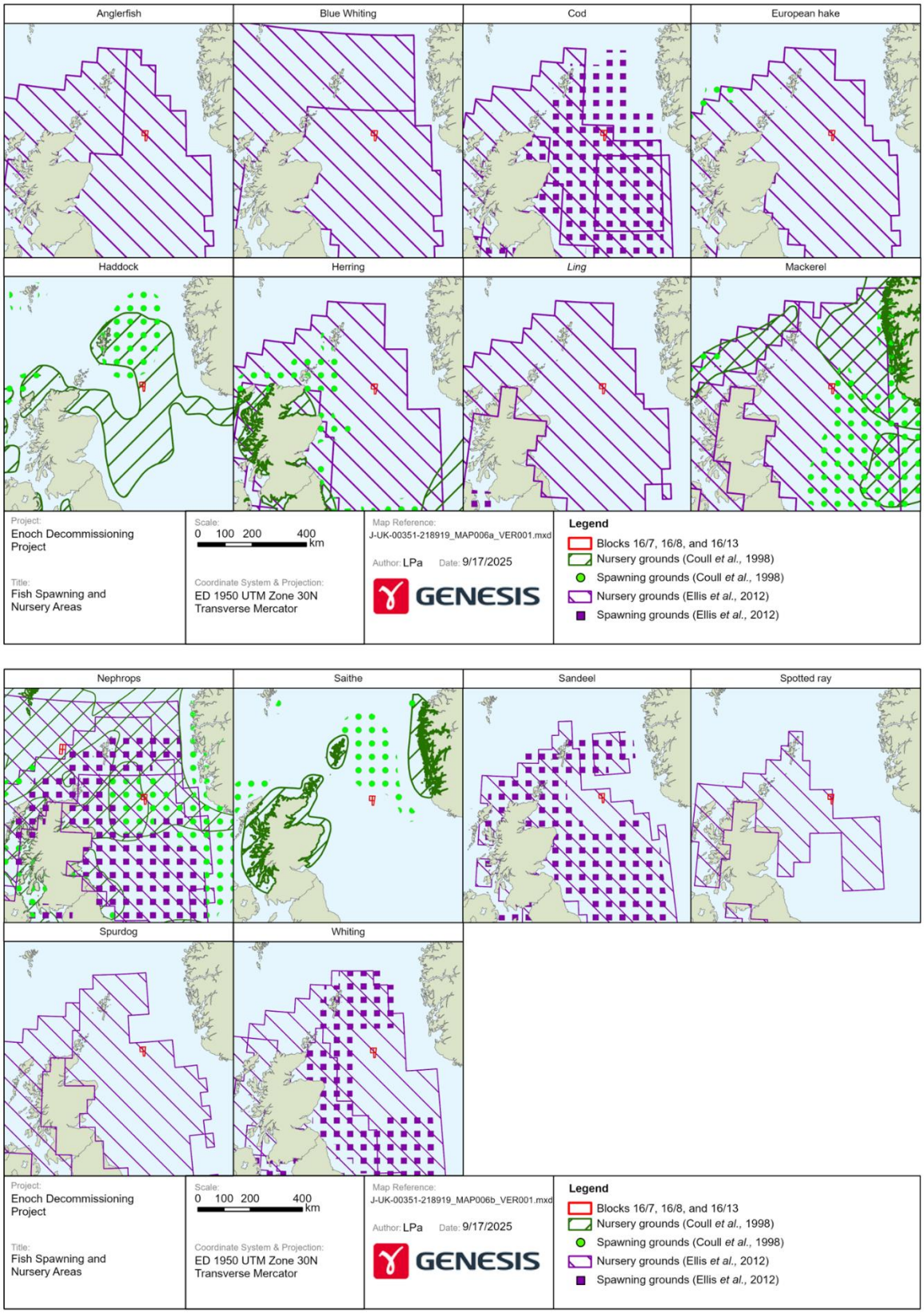


Figure 5-12: Nursery and spawning grounds of fish species in the vicinity of Blocks 16/7, 16/8, and 16/13 (Coull *et al.*, 1998; Ellis *et al.*, 2012)[1].

[1] Spotted ray shapefile for spawning grounds could not be sourced.

5.3.5 Seabirds

The UK and its surrounding seas are very important for seabirds. The extensive network of cliffs, sheltered bays, coastal wetlands, and estuarine areas provide breeding and wintering grounds for nationally and internationally important bird species and assemblages. Approximately 26 species of seabird regularly breed in the UK and Ireland, as do a number of other water bird and wader species (DESNZ, 2022).

Predicted maximum monthly abundance of seabirds in the Enoch area has been based on an analysis of the European Seabirds at Sea (ESAS) data collected over 30 years (Kober *et al*., 2010). Kober *et al* (2010) generated continuous seabird density surface maps using the spatial interpolation technique 'Poisson kriging' and fifty-seven seabird density surface maps were created to show particular species distribution in specific areas.

The data indicates that a number of seabird species are likely to occur in the area over the summer breeding season and winter months. For all species combined, a maximum of 14 seabirds are predicted to occur per km^2 during the breeding season (March to September), maximum of 12 seabirds predicted to occur per km^2 during summer months (July to August), whilst during the winter months (November to March) a maximum of 12 seabirds are predicted to occur per km^2 (Table 5-5).

Of the species expected to occur in the area; European storm petrel (*Hydrobates pelagicus*) is afforded protection by the European Commission (EC) Birds Directive (Annex I).

Table 5-5: Predicted monthly seabird surface density at the proposed Project area (maximum number of individuals/km^2; Kober *et al.*, 2010).

Species	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arctic Skua	Breeding												
Arctic Tern	Breeding												
Atlantic Puffin	Breeding												
	Winter												
Common Gull	Winter												
Northern Fulmar	Breeding												
	Winter												
Northern Gannet	Breeding												
	Winter												
Great Black Backed Gull	Winter												
Great Skua	Breeding												
	Winter												
Common Guillemot	Breeding												
	Winter												
	Additional Season												
Herring Gull	Breeding												
	Winter												
Black-legged Kittiwake	Breeding												
	Winter												
Lesser Black Backed Gull	Breeding												
Little Auk	Winter												
Razorbill	Breeding												
	Winter												
Key	≤1.0	1.0 – 5.0				5.0 – 10.0			10.0 - 20.0			20.0 ->30.0	

Seabirds are generally not at risk from routine offshore oil and gas production operations. However, they may be vulnerable to pollution from less regular offshore activities such as accidental hydrocarbon discharges. Oily surface pollution can cause direct toxicity to birds through ingestion and/or hypothermia as a result of the birds' inability to waterproof their feathers. Seabirds are likely to be most vulnerable to the impacts of an oil spill during the post-breeding season (July to September) when breeding birds disperse away from their breeding colonies into the North Sea. Some species, (e.g., guillemots and razorbills), rapidly moult their wing feathers and become flightless for approximately six weeks and consequently spend

large amounts of time on the water surface. This significantly increases their vulnerability to the impacts of oil between July and September.

Fulmars (*Fulmarus glacialis*) and auks (*Alcidae* spp.) may be particularly vulnerable to surface pollutants as they spend the majority of their time on the surface of the water. Gulls and terns are less vulnerable as they spend a larger proportion of their time flying and therefore less time on the sea surface.

Using survey data from 1995 – 2015, a Seabird Oil Sensitivity Index (SOSI) has been published (JNCC, 2017). The purpose of the index is to identify areas where seabirds are likely to be most sensitive to oil pollution by considering factors that make a species more or less sensitive to oil-related impacts. Data were collected from a wide survey area extending beyond the UK Continental Shelf using boat-based, visual aerial, and digital video aerial survey techniques.

This seabird data were combined with individual seabird species sensitivity index values. These index values are based on a number of factors which are considered to contribute towards the sensitivity of seabirds to oil pollution. Factors such as:

- Habitat flexibility (a species ability to locate to alternative feeding sites);
- Adult survival rate;
- Potential annual productivity; and
- The proportion of the biogeographical population in the UK (classified following the methods developed by Certain *et al* (2015).

The combined seabird data and species sensitivity index values are subsequently summed at each location to create a single measure of seabird sensitivity to oil pollution. This is presented as a series of fine scale density maps for each month that show the median, minimum, and maximum seabird sensitivity to oil pollution, and an indication of data confidence. The index is independent of where oil pollution is most likely to occur; rather, it indicates where the highest seabird sensitivities might lie if there were to be a pollution incident.

The mean sensitivity SOSI data for the Enoch Area is shown in Table 5-6. For blocks with ‘No Data’, an indirect assessment has been made based upon guidance from JNCC (JNCC, 2017) where possible.

As can be seen from the data available and the indirect assessment, the sensitivity of seabirds to surface pollution within the Enoch Area varies throughout the year. For the majority of Blocks, sensitivity is low to medium throughout the year.

Sensitivity is extremely high in May for block 16/08. Blocks 16/07 and 16/13 are also expected to be extremely high in May via indirect assessment against block 16/08 for this period. Whilst sensitivity in adjacent blocks is expected to be low for the majority of the period assessed sensitivity is high in May for Block 16/18, very high in February for block 16/03 and extremely high in May for block 16/03.

Table 5-6: SOSI Indirect Assessment for the Enoch area Blocks (JNCC, 2017).

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
16/01	5*	5	5	4*	4	4*	5	5	5	5*	N	N
16/02	5*	5	5	5*	5	5	5	5	5	5*	N	N
16/03	2*	2	5	1*	1	5	5	5	5	5*	N	N
16/06	5*	5	5	5*	4**	5*	5	5	5	5*	N	N
16/07	5*	5	5	5*	1**	5*	5	5	5	5*	N	N
16/08	5*	5	5	1*	1	1*	5	5	5	5*	N	N
16/11	5*	5	5*	5*	5	5*	5	5	5	5*	N	N
16/12	5*	5	5*	5*	5	5*	5	5	5	5*	N	N
16/13	5*	5	5*	N	1**	5*	5	5	5	5*	N	N
16/16	5*	5	5*	5*	5	5	5	5	5	5*	N	N
16/17	5*	5	5	4*	4	5	5	5	5	5*	N	N
16/18	N	5*	5	3*	3	5	5	5	5	5*	N	N

Key:	1 Extremely High	2 Very High	3 High	4 Medium	5 Low	N No Data

Yellow shading – Indirect Assessment
* Data gap filled using data from the same block in adjacent months
** Data gap filled using worst case data from the adjacent blocks within the same month

5.3.6 Marine Mammals

Marine mammals in the UK includes; pinnipeds (seals) and cetaceans (whales, dolphins, and porpoises). Marine mammals are vulnerable to the direct effects of oil and gas activities such as noise, contaminants, and oil spills. They may also be affected indirectly by activities that affect prey availability.

5.3.6.1 Pinnipeds

Two seal species are resident in British waters; the grey seal (*Halichoerus grypus*) and the harbour seal (*Phoca vitulina*). Under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, grey and harbour seals are considered species whose conservation requires the designation of Special Areas of Conservation (SACs)[2]. These seal species are not considered European Protected Species (EPS) under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[3]. However, in UK waters they are protected under the Conservation of Seals Act 1970 such that it is illegal to intentionally or recklessly kill, injure, or take seals. In Scottish waters, both species are considered Scottish PMFs. Both grey seals and harbour (also called common) seals tend to frequent inshore waters but have been seen offshore from a number of platforms in the North Sea (Cosgrove, 1996).

During a study by Carter *et al* (2022) grey (n = 114: 45 male, 69 female) and harbour seals (n = 239: 107 male, 132 female) were tagged at 26 sites in the UK and Ireland between (2005 – 2019).

Haul-out counts were scaled to a total population size for the UK and Ireland using the mean estimated proportion of the population hauled-out during the survey window (and thus available to count). Total population size was then scaled to an ´at-sea´ population size using

[2] *In UK waters, species previously referred to as Annex II under the EU Habitats Directive are now referred to as species of community interest requiring Special Areas of Conservation (SACs).*
[3] *In UK waters species previously referred to as Annex IV under the EU Habitats Directive are now referred to as European Protected Species (EPS). EPS are under strict protection regardless of where they occur within the EU member states. This means it is prohibited to kill, disturb, capture, or trade these species.*

the mean estimated proportion of time seals spend at-sea based off the telemetry data gathered during the study period.

Telemetry data were analysed at a 5 km^2 cell resolution, enabling the percentage of the at-sea population for the UK and Ireland (i.e. excluding hauled-out animals) present in each cell at any one time to be estimated. The resulting distribution maps indicate harbour seals are not likely to be present in the Enoch Area whilst grey seals possibly occur in low numbers with > 0 to 0.001% of the UK and Ireland at-sea grey seal population potentially present in the vicinity of Enoch Field (Carter *et al*., 2022; Figure 5-13).

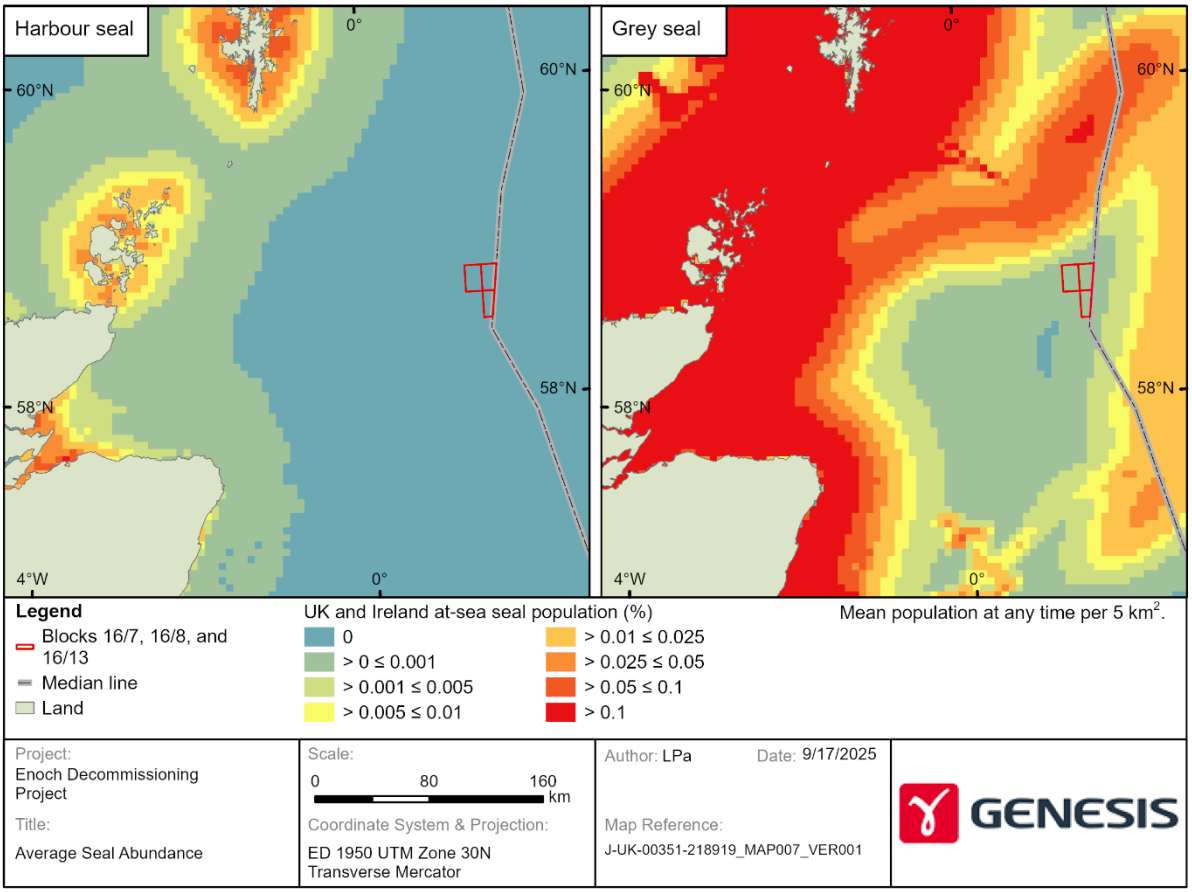


Figure 5-13: Mean UK and Ireland at-sea seal population distribution in the vicinity of the Enoch area (Carter *et al*., 2022).

5.3.6.2 Cetaceans

Cetacean species likely to occur within the area include Atlantic white-sided dolphin (*Lagenorhynchus acutus*), white-beaked dolphin (*Lagenorhynchus albirostris*), minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), harbour porpoise (*Phocoena phocoena*), Risso's dolphin (*Grampus griseus*) and beaked whale (*Mesoplodon* spp.) (Reid *et al*., 2003). When present, monthly densities range from high to low as shown in Table 5-7.

Under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, harbour porpoise are considered to be a species whose conservation requires the designation of SACs. In addition, under these regulations, all cetaceans are considered EPS such that it is considered an offence to deliberately disturb, capture, injure or kill any of these species. In addition, these cetacean species are also considered Scottish PMFs.

Table 5-7: Seasonal cetacean abundance in the vicinity of the Enoch Field (Reid *et al*., 2003).

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harbour Porpoise							3	3				
Bottlenose Dolphin							1	1				
White-beaked Dolphin						1					1	
Atlantic White-sided Dolphin							1					
Minke Whale						3	3					

Key: 1: High Density, 2: Moderate Density, 3: Low Density, Blank: Not present, ND: No Data
*Note: Beaked whale presence was identified in the area, Reid *et al* (2003), however monthly density data is not available for this species.

A series of Small Cetacean Abundance in the North Sea (SCANS) surveys were conducted to obtain an estimate of cetacean abundance in the North Sea and adjacent waters, the most recent of which is SCANS-IV (Gilles *et al*., 2023).

The Enoch Field is located within SCANS-IV Block 'NS-F'. Aerial survey estimates of animal abundance and densities (animals per km^2) within this area are provided in Table 5-8. These data show that minke whale may occur at fairly low densities while harbour porpoise and white-beaked dolphin may occur more frequently at higher densities.

The JNCC has also published the 'regional' population estimates for the seven most common species of cetacean occurring in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2022). Divided into Management Units (MU), these provide an indication of the spatial scale and the relevant populations at which potential impacts should be assessed. The relevant MU population estimates are also presented in Table 5-8.

Table 5-8: Cetacean abundance in SCANS-IV survey Block 'NS-F'.

Species	Animal Abundance[1]	Density (animals/km^2)[1]	MU Population[2]
Harbour porpoise	26,383	0.4393	346,601
White-beaked dolphin	18,350	0.3056	43,951
Minke whale	1,630	0.0271	20,118
Sources: [1] Gilles *et al* (2023) [2] IAMMWG (2022).			

5.4 Marine Protected Areas

A network of MPAs are in place to aid the protection of vulnerable and endangered species and habitats through structured legislation and policies. These sites include SACs and Special Protection Areas (SPAs), which were designated in the UK under the European Union (EU) Nature Directives (prior to January 2021) and are now maintained and designated under the Habitats Regulations for England and Wales, Scotland and Northern Ireland.

Amendments to the Habitats Regulations mean that the requirements of the EU Nature Directives continue to apply to how European sites (SACs and SPAs) are designated and protected. The Habitats Regulations also provide a legal framework for species requiring strict

protection, e.g. EPS. MPAs are designated under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.

The protected sites in closest proximity to the Enoch Field are shown in Figure 5-14. Table 5-9 describes the closest protected areas and their qualifying features.

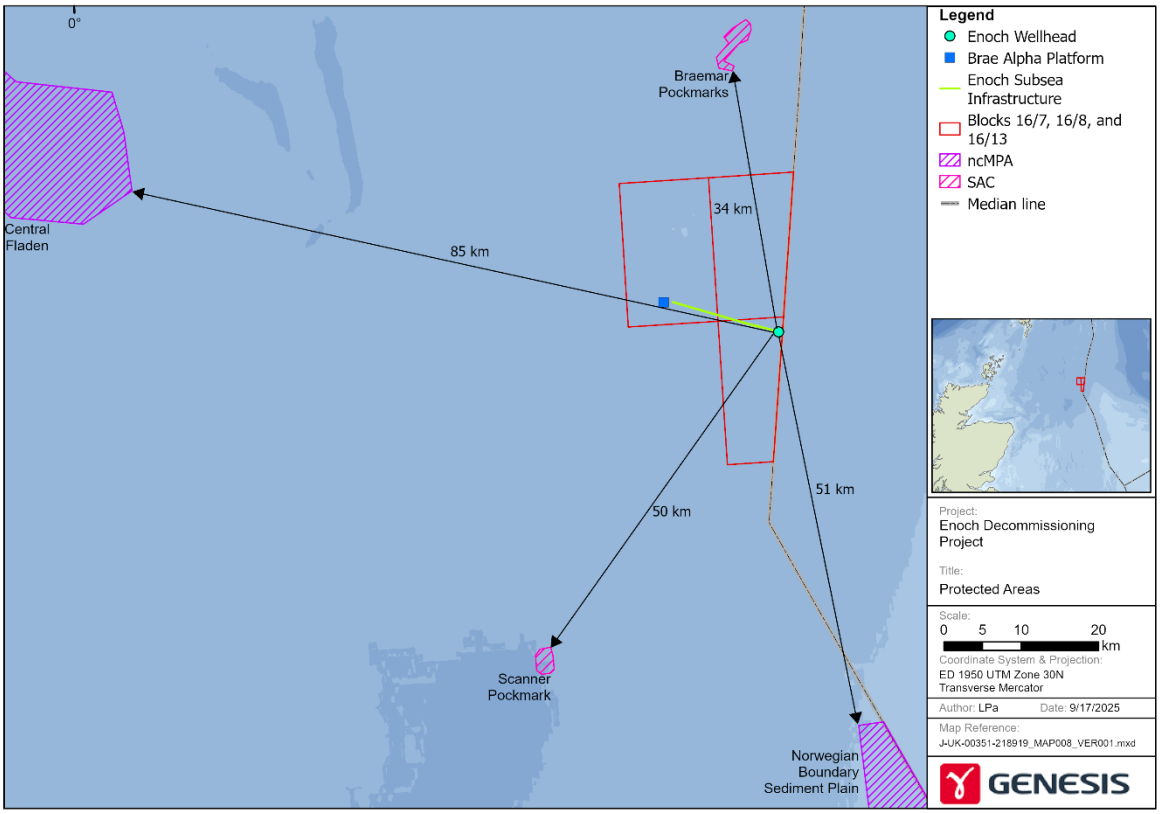


Figure 5-14: Location of the Enoch Field in relation to protected areas.

Table 5-9: Protected areas in closest proximity to the Enoch Field (JNCC, 2017).

Area	Qualifying Features	Approximate distance from Enoch wellhead (km)
Braemar Pockmarks SAC	**Habitats of community interest that require designation as SACs:** Submarine structures made by leaking gases	34
Scanner Pockmarks SAC	**Habitats of community interest that require designation as SACs:** Submarine structures made by leaking gases	50
Norwegian Boundary Sediment Plain NCMPA	**Species of community interest requiring SPAs:** Ocean Quahog (*A. islandica).* **Habitats of community interest that require designation as SACs:** sands and gravels supporting ocean quahog assemblages.	51
Central Fladen NCMPA	**Habitats of community interest that require designation as SACs:** sea-pens and burrowing megafauna and tall sea-pen components, Sub-glacial tunnel valley representative of the Fladen Deeps Key Geodiversity Area	85

5.5 Sensitive Habitats and Species

Environmental surveys in the area highlighted a number of priority habitats and species with potential to occur in the vicinity of the Enoch Field as described in Section 5.3.3. A number of cetacean species occur in the vicinity of Enoch Field. All cetaceans in UK waters are EPS under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, and it is an offence to deliberately disturb, capture, injure or kill an EPS at any time. Harbour porpoise, bottlenose dolphin and grey seals are further recognised as species of community interest requiring SACs under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

In 2016, NatureScot and JNCC provided an assessment of marine life in Scottish waters, identifying key sensitive species and habitats as PMFs in (NatureScot, 2016). The following are the PMFs within this report that are located in the vicinity of the Enoch Field. (Tyler-Walters *et al*., 2016).

Fish

Mackerel (*Scomber scombrus*)
Ling (*Molva molva*)
Whiting (*Merlangius merlangus*)
Cod (*Gadus morhua*)
Norway pout (*T. esmarkii*)
Atlantic herring (*Clupea harengus*)
Sandeel (*Ammodytes marinus*)
Blue whiting (*Micromesistius poutassou*)
Spurdog (*Squalus acanthias*)
Anglerfish (*Lophius piscatorius*)
Atlantic white-sided dolphin *(Lagenorhyncus acutus)*

Marine mammals

Harbour porpoise (*Phocoena phocoena*)
Minke whale (*Balaenoptera acutorostrata*)
White-beaked dolphin (*Lagenorhyncus albirostris*)
Killer whale (*Orcinus orca*)
Grey seal (*Halichoerus grypus*)
Harbour seal (*Phoca vitulina*)

Habitat

Sea pens and burrowing megafauna communities (component feature of the PMF 'Burrowed mud')

Ocean quahog *(A. islandica)*

5.6 Socio-Economic Environment

This section describes the socio-economic activities in the vicinity of the Enoch Field, which primarily include fishing, shipping and oil and gas operations.

5.6.1 Commercial Fisheries

The ICES collates fisheries information for area units termed ICES rectangles measuring 30 nautical miles (nm) by 30 nm. The importance of an area to the fishing industry is assessed by measuring the fishing effort (within each ICES rectangle) which is defined as the number of days (time) multiplied by the fleet capacity (tonnage and engine power). Due to the requirement by UK fishermen to report catch information such as total landings (includes species type and tonnage of each), and location of hauls and catch method (type of gear / duration of fishing), it is possible to get an indication of the value of an area (ICES rectangle)

to the UK fishing industry. It should be noted, however, that fishing activity may not be uniformly distributed over the whole area of the ICES rectangle.

5.6.1.1 Fishing Effort

The Enoch Field is located within ICES rectangle 46F1. Fishing effort statistical data, of UK vessels over 10 m in length, between 2020 and 2024 for ICES rectangle 46F1 are provided in Table 5-10. When compared against effort across all ICES rectangles in the UKCS fishing effort within 46F1 accounted for an average of 0.4% between 2020 and 2024 (Scottish Government Marine Directorate (SGMD), 2025). Fishing effort within these rectangles is therefore considered Low.

Table 5-10: Monthly fishing effort for ICES rectangle 46F1 from 2019-2023 (SGMD, 2025).

Year	Month[1 3]												46F1 total (days)[2]	UK total (days)[2]	46F1 as % of UK Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
2020	14	8	32	12	7	23	49	65	14	34	90	11	358	104,678	0.3
2021	7	20	37	9	6	3	50	194	20	60	25	7	437	105,977	0.4
2022	5	9	13	20	6	165	91	65	75	41	D	D	491	95,516	0.5
2023	3	5	94	17	7	7	15	74	116	0	D	5	343	96,131	0.4
2024	4	7	19	197	D	D	6	39	13	6	8	10	312	92,322	0.3
Mean	6	10	39	51	7	49	42	87	48	28	41	8	388	98,925	0.4

Notes:
[1] Monthly effort data are shown where five or more UK vessels over 10 m undertook fishing activity in a given year. Where less than five such vessels undertook fishing activity in a given month, the data are “disclosive” (D) and not shown.
[2] Includes disclosive days.
[3] A measure of the fishing activity of vessels including the time spent travelling to fishing grounds as well as the time spent fishing.

5.6.1.2 Fish Landings

The annual weight (te) and value (£) of landings from UK vessels into the UK and abroad, and foreign vessels into the UK for demersal, pelagic and shellfish species across 2020-2024 from ICES rectangle 46F1 are shown in Table 5-11.

The data shows that demersal and shellfish and demersal species were the most significant contributors in terms of value and weight. Demersal species had the highest contribution in terms of weight and value in 2020. Shellfish species contributed more in terms of value between 2021 – 2024, while demersal catches contributed more in terms of weight between 2021 – 2024. The difference between landing value and weight between shellfish and demersal catches in these ICES rectangles is likely due to the difference in the price per kg of each catch species. Data shows that pelagic catches did not contribute significantly to landings in 46F1 between 2020 and 2024.

Table 5-11: Annual landings in weight and value for ICES Rectangle 46F1 between 2020-2024 (SGMD, 2025).

Year	Species	Variable	46F1 total	UK total	% of UK total
2020	Demersal	Value (GBP)	1,345,203	177,603,350	0.8
		Weight (te)	874	116,517	0.8
	Pelagic	Value (GBP)	60	291,139,518	0.0
		Weight (te)	0	339,441	0.0
	Shellfish	Value (GBP)	459,090	179,360,854	0.3
		Weight (te)	191	73,727	0.3
2021	Demersal	Value (GBP)	876,235	173,292,073	0.5
		Weight (te)	505	99,316	0.5
	Pelagic	Value (GBP)	-	284,429,673	0.0
		Weight (te)	-	367,339	0.0
	Shellfish	Value (GBP)	1,187,633	214,218,804	0.6
		Weight (te)	365	74,802	0.5
2022	Demersal	Value (GBP)	718,529	167,087,023	0.4
		Weight (te)	468	95,049	0.5
	Pelagic	Value (GBP)	75	291,902,065	0.0
		Weight (te)	0	321,096	0.0
	Shellfish	Value (GBP)	1,981,549	228,733,494	0.9
		Weight (te)	387	68,440	0.6
2023	Demersal	Value (GBP)	625,010	180,002,198	0.3
		Weight (te)	411	101,919	0.4
	Pelagic	Value (GBP)	28	365,580,597	0.0
		Weight (te)	0	372,452	0.0
	Shellfish	Value (GBP)	759,287	256,538,149	0.3
		Weight (te)	178	71,886	0.2
2024	Demersal	Value (GBP)	650,467	188,523,050	0.3
		Weight (te)	327	99,563	0.3
	Pelagic	Value (GBP)	181	480,014,498	0.0
		Weight (te)	0	427,083	0.0
	Shellfish	Value (GBP)	674,621	213,716,112	0.3
		Weight (te)	174	67,836	0.3

Scottish Government (2025) data also revealed that between 2020-2024 trawls were the most dominant gear type used in ICES rectangle 46F1 amounting to a collective total of 1,930 days of fishing effort compared to seine nets where data were disclosive for each year through this time period except in 2022 where there were 3 days of fishing effort.

5.6.2 Vessel Density

Figure 5-15 shows vessel activity in 2023 in the area of the proposed project (European Marine Observation and Data Network (EMODnet), 2023b). The data is presented as hours per km^2 per month. The data accounts for all vessel types, including fishing vessels, service vessels, vessels associated with dredging or underwater operations, tugs and towing vessels, passenger, cargo, tanker, military and law enforcement, sailing, pleasure craft, high speed craft, and all other vessel types.

The vessel density in Blocks 16/7, 16/8, and 16/13 ranges from *c.* 0 to 100 hours per km^2 per month, with higher vessel density (50 – 100 hours per km^2) along Brae Alpha platform (Figure 5-15). The areas of higher vessel activity in the vicinity of the proposed Project area are associated with oil and gas activities, with provision of support to existing fixed installations.

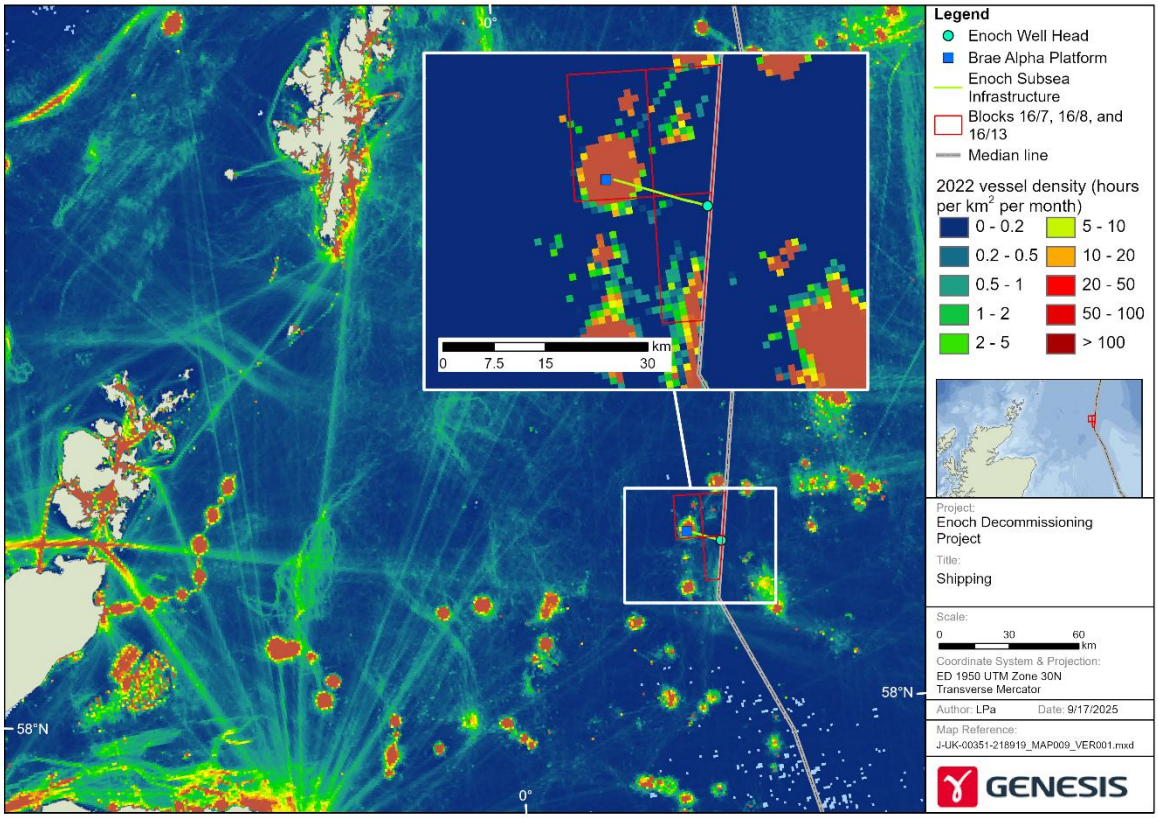


Figure 5-15: Vessel density in the vicinity of Blocks 16/7, 16/8, and 16/13 (EMODnet, 2023b).

5.6.3 Oil and Gas Exploration

The Enoch Field is situated within a well-developed area of the North Sea, featuring mature oil and gas infrastructure and activity. There are several oil and gas installations within 40 km of the Enoch wellhead, the closest of which are Brae Bravo platform (located *c.* 19 km northwest of Enoch wellhead) and the Tiffany platform (located *c.* 25 km to the southwest of the Enoch wellhead).

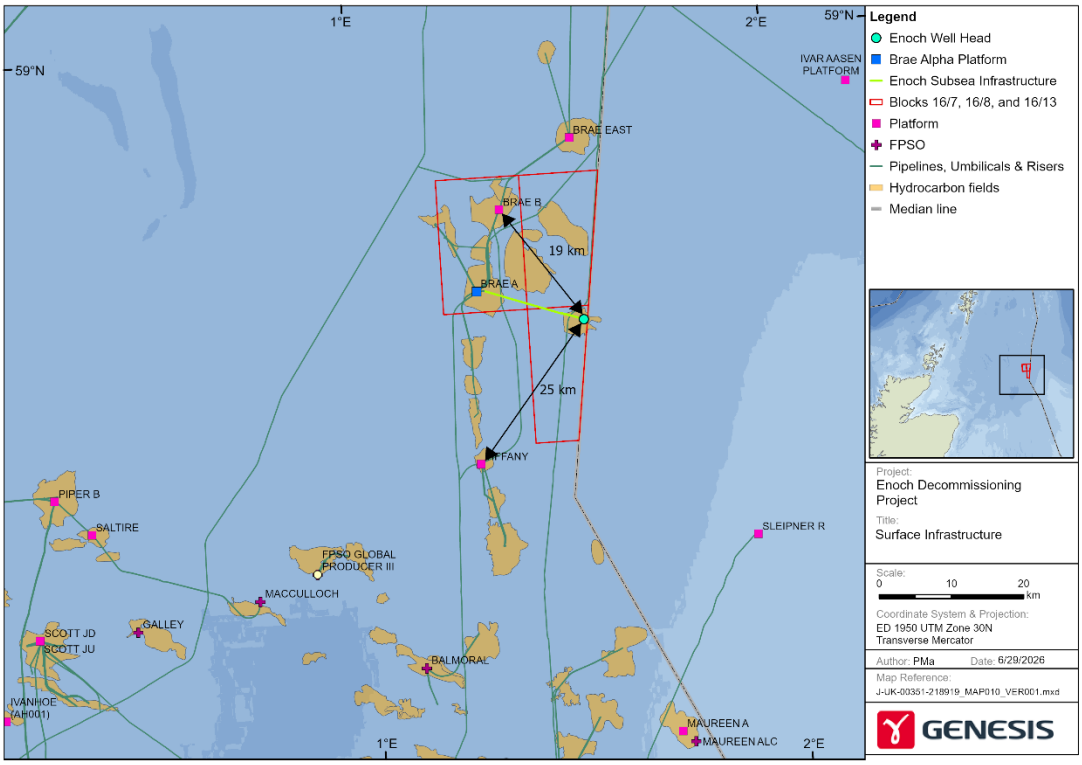


Figure 5-16: Existing oil and gas installations within the vicinity of the Enoch Field.

5.6.4 Cultural Heritage

A large number of ship and aircraft wrecks are known to be situated in UK waters, including more than 5,200 records in Scottish waters. There is also potential for substantial unidentified aircraft remains (primarily World War II) to be found on the seabed, since there are extensive documentary sources relating to aviation loss at sea, but these do not provide accurate positions (DESNZ, 2022).

There are no protected wrecks or sites in the vicinity of the Enoch Field. The closest is the foul ground located *c.* 0.4 km to the south of the Enoch wellhead and the closest wreck classified as a non-dangerous wreck is located 4.0 km (Figure 5-17; Admiralty, 2023). It should be noted that no wrecks of significance were identified during the 2023 (Benthic Solutions, 2024) survey.

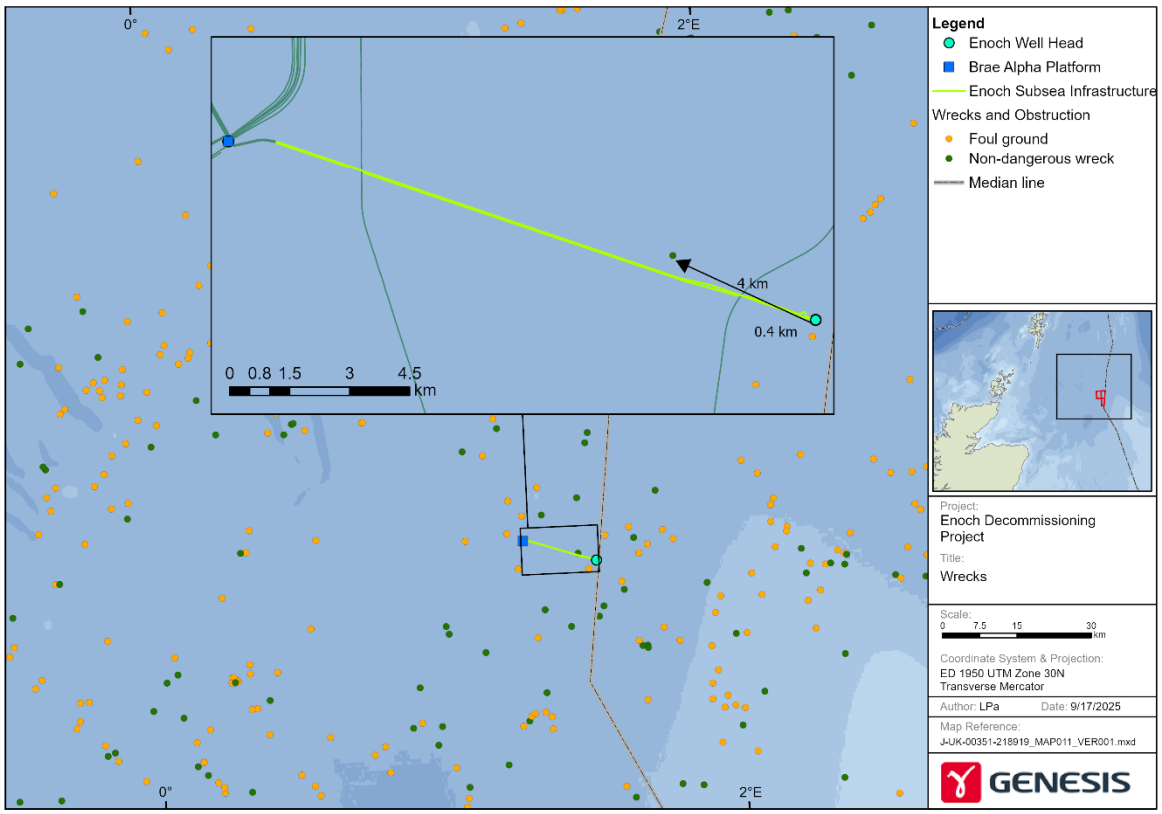


Figure 5-17: Wrecks and obstructions in the vicinity of the Enoch Field (Admiralty, 2023).

5.6.5 Offshore Renewable Energy

The closest offshore wind farm site is NE7, located *c.* 125 km to the southwest and successful Innovation and Targeted Oil and Gas (INTOG) site is site 9, located *c.* 68 km to the south, (Figure 5-18).

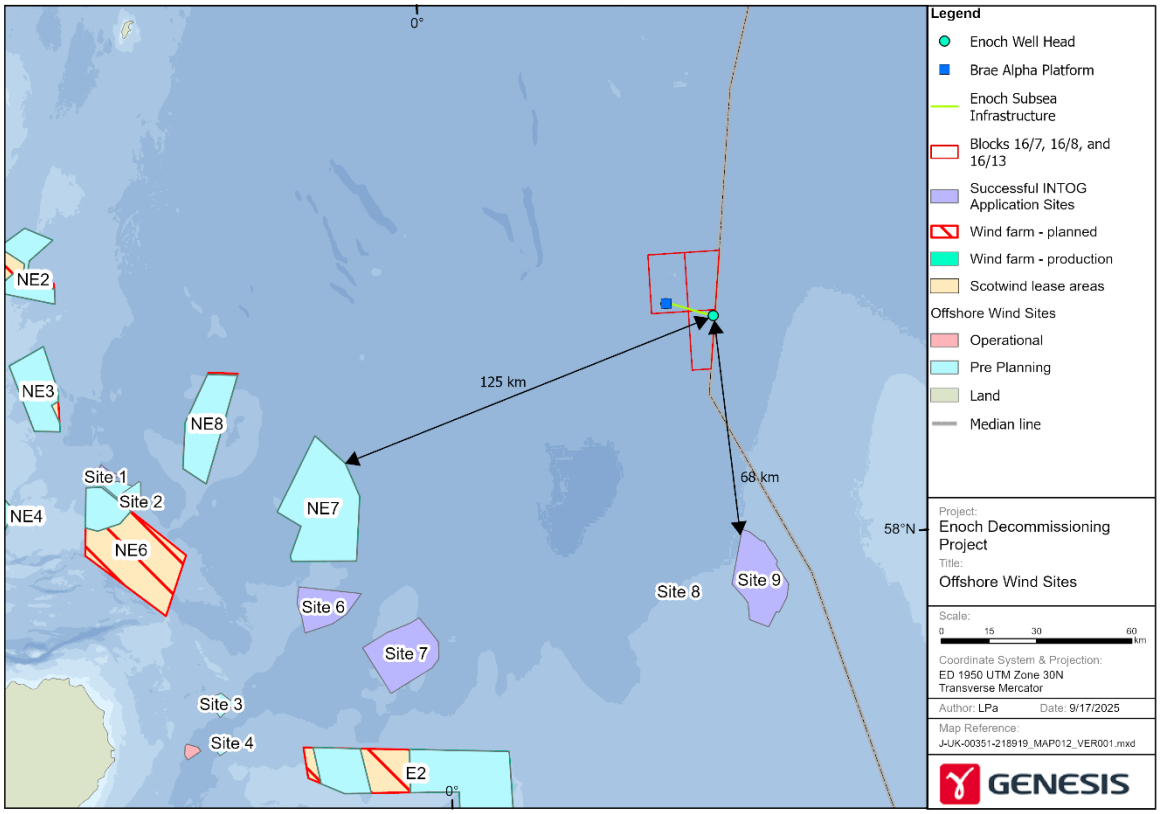


Figure 5-18: Offshore wind farm sites and Scotwind lease areas in the vicinity of the Enoch Field.

5.6.6 Other

There are no known military activities, power cables, offshore aggregate extraction sites or aquaculture sites in the vicinity of the Enoch Field.

6.0 SCOPING OF POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

6.1 Methodology

To determine the significance of the potential impacts associated with the proposed decommissioning activities, an ENVID was undertaken following a structured methodology as summarised here.

The ENVID nodes considered were as follows:

- Node 1 - Vessel Use;
- Node 2 - Decommissioning of subsea infrastructure including protection/stabilisation materials (e.g. rock cover and mattresses); and
- Node 3 - Post decommissioning surveys.

The ENVID identified the key environmental and societal sensitivities, discussed all the anticipated sources of potential impact, and ultimately highlighted those impacts which required further assessment within the EA. The decision on which impacts required further assessment was reinforced by a review of industry experience of decommissioning impact assessment and on an assessment of wider stakeholder interest (informed in part by the stakeholder engagement described in Section 2).

Where relevant, the aspects considered in the ENVID for the proposed activities included:

1. Physical Presence/ interactions with other sea users;
2. Emissions to Air;
3. Discharges to Sea;
4. Seabed Disturbance;
5. Underwater Noise;
6. Waste Generation;
7. Resource Use;
8. Dismantling Yard Activities; and
9. Legacy Impacts.

Where relevant, the following environmental receptors were considered in the ENVID for each activity:

- Air quality;
- Climate;
- Water quality;
- Plankton;
- Sediment quality;
- Benthic communities;
- Fish;
- Marine mammals;
- Seabirds;
- Designated areas;
- Cultural heritage (e.g. wrecks).
- Shipping;
- Fisheries;
- Resource availability (e.g. landfill and fuel); and
- Local communities (e.g. yard activities);

During the ENVID, the significance of the environmental/social impact of planned activities on each of the susceptible receptors was derived by considering the ‘Receptor Sensitivity’ in relation to the ‘Magnitude of Effect’ of the aspect. This was carried out by applying the

Environmental and Socio-Economic Impact Assessment (ESIA) methodology described in Appendix B.

Worst case accidental events were also identified and assessed in the ENVID. To determine the environmental and social risk of an unplanned event, firstly the significance of the environmental impact of the event was determined. The likelihood of the unplanned event was then considered. Finally, a level of environmental risk (low, medium or high) was assigned by combining the impact significance and the likelihood of the event occurring using the Environmental and Socio-Economic Risk Assessment (ESRA) matrix presented in Appendix B.

6.2 Scoping

Applying the accepted industry good practice standard mitigation measures, the significance of impact for the majority of the planned activities was considered in the ENVID to be Negligible, such that any environmental and social impacts are considered to be Low. The ENVID concluded that the majority of the aspects could be screened out and would not require further assessment within the EA. Table 6-1 presents the findings of the ENVID and provides justification for the aspects not being assessed further.

The following aspects were not screened out and will be assessed further in the EA:

- Seabed Disturbance (which is assessed in Section 7);
- Legacy Impacts (which is assessed Section 8); and
- Emissions to Air (which is assessed in Section 9).

The potential impact of unplanned accidental events was also assessed in the ENVID, including the loss of diesel inventory from the vessels, potential pipeline discharges, and potential dropped objects. The results from this assessment are presented in Table 6-1.

Table 6-1: ENVID Results and Justification for Deselecting Different Impacts for Further Assessment in the EA.

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
Node 1: Vessel Use								
Physical presence	Physical presence of vessels in relation to other sea users, birds and marine mammals.	Receptor: Other sea users. Navigation hazard, and restriction of fishing operations.	- Campaign, logistics, optimising vessels to minimise use. - UK Hydrographic Office (UKHO) standard communication channels including: Kingfisher, Notice to Mariners, and radio navigation warnings. - Collision risk assessment. - Stakeholder consultation. - Logistics plan. - Enoch Field has existing 500 m exclusion zone.	B	1	Low	Fishing activity in the area is considered low. In addition, the development is located within a well-developed oil and gas area such that vessels in transit are the norm, therefore Sensitivity of other sea users to the proposed activities is considered Medium (B). Given the proposed scope of activities the Magnitude of Effect of the presence of vessels on other sea users is considered Negligible (1). The Impact Significance is therefore considered Low and is not considered further in the EA.	No
		Receptors: Birds Possible behavioural change e.g. The vessels and their lights also have the potential to cause displacement of seabirds from foraging habitat and may cause migrating birds to detour from their flight routes.	- Optimise vessel use.	B	1	Low	The Enoch Field lies within an area where seabird densities are estimated to range between 1-5 individuals/km^2 over both the breeding and winter season. Therefore, the Sensitivity of birds as a receptor is considered Medium (B). Although evidence suggests the presence of the vessels could cause some bird species to be displaced from foraging areas, the impact from project vessels is not considered to be significant as birds are mobile species and the project vessels will occur in a very small proportion of their overall available habitat. Given the existing oil and gas vessel activity in the area, it is expected that the impact of the vessels on bird migration routes (e.g. birds being attracted to the vessel lights at night) is not significant. The Magnitude of Effect on birds is therefore considered Negligible (1) such that the Impact Significance is considered Low and is not considered further in the EA.	
		Receptors: Marine mammals. Possible behavioural	- Optimise vessel use.	C	1	Low	The sensitivity of marine mammals as a receptor is High (C), given that all species present in the area are Scottish PMFs, and all cetacean species present are European Protected Species (EPS).	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
		changes in marine mammals e.g. could be attracted to the vessel or may move away from the area.					The CNS is a busy shipping area and has well developed fishing and oil and gas industries. The evidence for lethal injury from boat collisions with marine mammals suggests that collisions with vessels are very rare (Cetacean Stranding Investigation Programme, 2022). It is expected that marine mammals in the region are habituated to the presence of vessels. The Magnitude of Effect on marine mammals is therefore considered Negligible (1) such that the Impact Significance is considered Low and is not considered further in the EA.	
Emissions to air	Atmospheric emissions associated with vessel use	Receptor: Climate change. Emissions to atmosphere resulting in a contribution to global warming.	- Low sulphur diesel. - Contractor selection - maintenance programme. - International Convention for the Prevention of Pollution from Ships (MARPOL) compliance. - Campaign, logistics, optimising vessels to minimise use. - Review vessel Common Marine Inspection Documents (CMID) as part of vessel assurance (evidence of maintenance).	D	1	Low	Sensitivity of climate change as a receptor is considered Very High (D) in recognition of the global impact of cumulative effects. Given the relatively short offshore campaigns and the use of MARPOL compliant vessels, the Magnitude of Effect of vessel emissions on climate change is considered Negligible (1). As a result of the high Sensitivity ranking, the Impact Significance is therefore considered Low. Due to the cumulative impacts of emissions on climate change, the impact of atmospheric emissions from the vessels on climate change is considered further in the EA.	Yes
		Receptor: Air quality. Possible reduction in local air quality.		A	1	Low	Given the offshore location the Sensitivity of air quality as a receptor is considered Low (A). Additionally, due to the relative short vessel campaigns, the Magnitude of Effect is considered Negligible (1) such that the Impact Significance is considered Low. As the impacts on local air quality are not considered significant, this aspect is not considered further in the EA.	No
Discharges to sea	Routine vessel discharges (e.g. greywater, ballast discharges, biofouling)	Receptor: Water quality. Water quality in immediate vicinity of discharge may be reduced (deoxygenation), but effects are usually	- Minimise use of vessels, through efficient journey planning. - Review vessel CMID as part of vessel assurance. - Vessels will be MARPOL compliant. - All contracted vessels will originate from countries adhering to the International Maritime Organisation (IMO) Convention. - Audit procedures will ensure that the	A	1	Low	Due to the open nature of the North Sea, the sensitivity of water as a receptor is considered Low (A) Vessel discharges will be in line with MARPOL requirements such that the Magnitude of Effect is considered Negligible (1) and the Impact Significance Low. The impact of routine vessel discharges on water quality is therefore not considered further in the EA.	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
		minimised by rapid dilution in receiving body of water and non-continuous discharge.	contracted vessel ballasting procedures are in line with IMO Convention. These guidelines are aimed at preventing the associated harmful effects of ballast exchange activities. - All discharges of ballast water will be monitored, and records maintained. - As part of the Company's auditing process, only vessels adhering to the IMO 2011 - Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Species will be used. All member states of IMO are signed up to these guidelines.					
Seabed Disturbance	All vessels will use dynamic positioning; therefore no seabed disturbance associated with vessel use.							
Underwater noise	Underwater noise from vessels	Receptors: Marine mammals and fish. Noise from vessels has the potential to cause disturbance to marine mammals and fish in the form of temporary displacement from the area.	- Optimising vessels to minimise use.	C	1	Low	Sensitivity of marine mammals as a receptor is High (C) given that all species present in the area are Scottish PMFs, and all cetacean species present are EPS. The Sensitivity of fish is Medium (B) as there are spawning and nursery grounds within the area and a number of fish species identified to be PMFs. The CNS is a busy shipping area and has well developed fishing and oil and gas industries, such that marine mammals and fish in the region are habituated to the presence of vessels. Any impacts from vessel noise on these receptors is expected to be behavioural rather than physical, such that they may cause marine mammals or fish to vacate the area, however they would be expected to return once the vessels have left the location. The Magnitude of Effect of underwater noise from vessels on marine mammals and fish is therefore considered Negligible (1) due to potential behaviour change. Therefore, the Impact Significance is considered Low. The impact of underwater noise from vessels on marine mammals and fish is therefore not considered further in the EA.	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
Waste generation	General operational waste from vessels	Receptor: Resource availability (landfill take). Waste to landfill.	- Compliance with MARPOL requirements. - The Project will look to vessel owners to minimise all wastes during the project (monthly reporting of waste sent to shore; WMP and Waste Record Book; Waste Management Duty of Care audit). Waste minimisation and supply chain management. - Waste will be managed in line with the waste hierarchy.	B	1	Low	MARPOL Annex V applies to all ships/vessels and generally prohibits the discharge of all waste into the sea (there are some exceptions which relate for example to food waste and cleaning agents). As vessels will be compliant with MARPOL, there will be no significant impact offshore. Sensitivity of landfill as a receptor is considered Medium (B) as landfill sites are a finite resource. However, as the vessels will have WMPs in place that will adhere to the waste hierarchy principle of reduce, reuse recycle and so the Magnitude of Effect is considered Negligible (1), and the Impact Significance is considered Low. Furthermore, Section 12.8 of the OPRED Guidance Notes (OPRED, 2018) advises that an assessment of wastes returned to shore is not required in the EA (as it is not relevant to the impacts in the marine environment). Therefore, the onshore impacts associated with vessel waste is not discussed further in the EA.	No
Resource use	Energy consumption (fuel use by vessels and equipment)	Receptor: Resource availability. Energy use.	- Compliance with MARPOL. - Vessel and equipment maintenance. - Monitor fuel use. - Scheduling/design to optimise opportunities to use resources more efficiently (i.e. minimise transits, ensure vehicles are fully loaded).	B	1	Low	Sensitivity of fuel availability as a receptor is considered Low (A). Hydrocarbon-based fuel is recognised as a finite resource, however as alternative fuel/power sources are being developed for vessels receptor Sensitivity is considered Medium (B). Given the duration of the proposed vessel activities and the use of MARPOL compliant vessels the Magnitude of Effect for fuel use is considered Negligible (1), such that the Impact Significance is considered Low. The impact of energy consumption on resource availability is therefore not considered further in the EA.	No
Unplanned event and related discharges to sea	Accidental loss of vessel (collision) and associated fuel inventory (worst case).	Receptor: Water quality and flora and fauna in the water column. Water quality deterioration, impact on marine flora and fauna. Immediate oxygen demand on receiving water with	- Ship Oil Pollution Emergency Plan (SOPEP) (inc. spill kits etc). - Collision risk assessment. - Maintenance procedures. - Simultaneous Operations (SIMOPs). - Vessels will be selected which comply with IMO/ Marine and Coastguard Agency (MCA) codes for prevention of oil pollution. - Maintenance procedures. - Pre-mobilisation audits will be carried out	B	2	Low	Sensitivity of water quality and flora and fauna receptors in the water column are considered Medium (B). However, it is expected most diesel would evaporate quickly, such that the Magnitude of Effect is considered Minor (2), and the Impact Significance is considered Low. The likelihood of a vessel collision is considered Remote such that the Environment Risk is considered Low. In line with Subsection 12.4 of the OPRED Decommissioning Guidance (OPRED, 2018), the impacts of accidental events are not considered further	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
		consequential impacts on marine fauna.	including a comprehensive review of spill prevention procedures.				in the EA.	
Node 2: Decommissioning of subsea infrastructure including protection/stabilisation materials (e.g. rock cover and mattresses).								
Emissions to air	Emissions associated with vessel use are considered in Node 1 above.							
Discharges to Sea	Discharges to sea during decommissioning activities	Receptor: Water quality. Water quality in immediate vicinity of discharge may be impacted. Blocked core in umbilical PLU2338 (filled with methanol).	- Flushing of pipelines and umbilical cores in line with Best Available Techniques and Best Environmental Practices (BAT/BEP) and lines left open to sea as part of decommissioning activities.	B	1	Low	Sensitivity of water quality as a receptor is considered Medium (B). As pipelines and umbilical will be flushed prior to decommissioning activities, the impact of any discharges due to releases are considered Negligible (1) resulting in an Impact Significance of Low. This is therefore not considered further in the EA.	No
Seabed Disturbance	<u>Preferred Options:</u> Decommissioning of pipelines and umbilicals (Groups A (piggy backed flowlines) and B (umbilical)) using preferred options identified in the CA.	Receptors: Sediment quality and benthic communities. Preferred options include: • Group A - Remediate piggybacked flowlines *in situ* (with exposed ends cut and recovered) • Group B – Remediate *in situ;* cut and removal of exposed sections (14.125 km) with rock covered section decommissioned *in situ*.	- Remediate *in situ* the Group A piggybacked lines (PL2336 and PL2337) with recovery of *c.* 36 m of exposed ends of each of the pipelines would minimise volumes of spot rock protection required (note small volumes of rock would be laid at each cut end; < 10 te per cut location). - Recovery of exposed Group B umbilical length to be carried out without initial excavation as lines can be pulled through the sediment, thereby reducing the area of impact. The rock covered sections (*c.* 1.25 km) will be decommissioned *in situ*. - Cutting / dredging / jetting work plans in place, and dredging / jetting will be minimised. - Lifting procedures in place.	C	1	Low	Sensitivity of the habitat is considered High (C) due to presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity of the lines. **Group A:** preferred option is to remediate *in situ* by cut and recover exposed ends; *c.* 36 m of each of the lines would require mitigating. Spot rock laid at cut ends, estimated total of *c.* 20 te of rock would be laid to mitigate the cut ends. The Magnitude of Effect associated is considered Negligible (1). **Group B:** As the average DoB is 0.3 m,–recovery of exposed umbilical length *c.* 14.125 km. The Magnitude of Effect associated with pulling of lines through sediment is considered Negligible (1). Overall, the impact Significance is considered Low for all Group A and Group B preferred options. Significance and the impact of seabed disturbance resulting from these activities is discussed further in the EA.	Yes

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
	Acceptable options: Decommissioning of pipelines in Group A (piggy backed pipelines) using alternative acceptable options identified in the CA.	Receptors: Sediment quality and benthic communities. • Group A Acceptable Option - remediate *in situ* (with exposed ends rock covered)	- Minimise use of rock cover (e.g. short length of line to be rock covered, assessment assumes rock laid on *c.* 36 m of line exposures on each pipeline to be remediated). - Lifting procedures in place.	C	1	Low	Sensitivity of the habitat is considered High (C) due to presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity of the lines. **Group A:** alternative acceptable option is to remediate *in situ* and rock cover exposed ends. Estimated *c.* 462 te rock would be required to cover all exposed ends (*c.* 36 m on each line). Due to small quantity of rock relative to existing *c.* 75,232 te rock cover along the length of the piggybacked lines, the Magnitude of Effect is considered Negligible (1) such that the Impact Significance is considered Low. The impact of seabed disturbance resulting from these activities is discussed further in the EA to allow a cumulative assessment of all sources of seabed disturbance.	Yes
		Receptors: Sediment quality and benthic communities. • Group A (piggy backed pipelines) Acceptable Option - remediate *in situ* (with exposed ends trenched and buried)	- Jet trenching procedures in place.	C	1	Low	Sensitivity of the habitat is considered High (C) due to the presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity of the lines. **Group A:** alternative acceptable option is to remediate *in situ* and trench and bury exposed ends. It is assumed jet trenching using ROV will be carried out for *c.* 36 m of exposed ends. Due to a short length of exposed ends, minimal footprint is expected, the Magnitude of Effect is considered Negligible (1) such that the Impact Significance is considered Low. The impact of seabed disturbance resulting from these activities is discussed further in the EA to allow a cumulative assessment of all sources of seabed disturbance.	Yes
	Disturbance to seabed during recovery of subsea structures (includes pipe tunnel, mattresses, SSIV, well tie-in spools, wellhead	Receptors: Sediment quality and benthic communities.	- Lifting procedures in place. - Concrete ballast will be cut using ROV prior to removal. - Well conductors cut internally at a target depth of 3 m such that no excavation required for wellhead recovery.	C	1	Low	Sensitivity of the habitat is considered High (C) due to presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity. For pipe tunnel, ROV will be used to cut into manageable pieces before lifting, therefore there will be minimised seabed disturbance. The Magnitude of Effect is ranked as Negligible (1) due to the relatively small areas of impact associated with	Yes

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
	protection structure and valve skid).						recovery of surface laid structures and protection/stabilisation material. The Impact Significance is therefore considered Low. The impact of seabed disturbance resulting from these activities is discussed further in the EA to allow a cumulative assessment of all sources of seabed disturbance.	
Legacy Impacts	Legacy environmental impacts associated with decommissioning *in situ* of the buried lines, existing rock cover, and any additional rock that may be laid during decommissioning operations.	Receptors: Sediment quality and benthic communities. Decommissioning relevant infrastructure *in situ*.	- All surface laid infrastructure will be recovered. - All exposed mattresses will be recovered. - Additional rock cover will be minimised.	C	1	Low	Sensitivity of the habitat is considered High (C) due to presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity. The Magnitude of Effect is considered Negligible (1) such that the Impact Significance is Low. This is due to the existing rock volume (*c*. 75,232 te) relative to additional rock from the acceptable decommissioning option of pipelines (*c*. 462 te) is insignificant. Legacy environmental impacts associated with remaining infrastructure will be assessed further in the EA, in order to understand the cumulative effect of legacy impacts. Note: The pipelines are trenched and buried, and everything surface laid (apart from the rock) will be recovered. Therefore, no legacy impacts expected.	Yes

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
	Legacy socio-economic impacts associated with pipelines and existing stabilisation features left *in situ* (e.g. rock cover).	Receptor: other sea users. Potential for access to seabed area being impeded due infrastructure / stabilisation features decommissioned *in situ*.	- All surface laid infrastructure will be recovered. - Seabed clearance surveys. - Additional rock cover will be minimised and if used it will be laid in profiles aligned with industry standards. - Independent verification of a safe seabed will be obtained. - Post decommissioning survey strategy.	B	1	Low	Sensitivity of other sea users to the proposed activities is considered Medium (B). Pipeline status reports have found the seabed to be stable over the trenched and buried pipelines; there have been no upheaval buckling or snagging incidents during the life of the field, such that the potential for additional exposures to occur along these lines is considered low. Demersal trawl gear is used in the area, however, given the stability of the seabed in the area and with the application of the mitigation measures identified, the Magnitude of Effect is considered Negligible (1). Therefore, the Impact Significance with respect to impact on other sea users is considered Low. Given stakeholder interests with respect to a clear seabed, the decommissioning of the buried pipelines, rock cover (existing rock cover and any potential additional rock added to remediate exposed sections) will be considered further in the EA to understand the cumulative effect of legacy impacts.	Yes
	Legacy socio-economic impacts associated with surrendering of 500 m exclusion zone.	Receptor: other sea users. Fishing vessels will gain access to the exclusion areas at Enoch Field.	- At the end of decommissioning activities, the 500 m zone around the Enoch drill centre will be surrendered such that fishers will have access to the area. - Any rock to be laid will be laid in over trawlable profile. - Safe seabed survey will be carried out.	B	0	Positive / No effect	Sensitivity of other sea users to the proposed activities is considered Medium (B). As fishing vessels will gain access to an area that are currently prohibited from, the Magnitude of Effect is considered Positive (0) such that the Impact Significance is Positive / No effect. Legacy socio-economic impacts associated with surrendering the 500 m exclusion zone will be assessed further in the EA, in order to understand the cumulative effect of legacy impacts.	Yes

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
	Legacy environmental impacts associated with discharges from pipelines decommissioned *in situ* following degradation.	Receptors: sediment quality and benthic communities. Over time the trenched and buried pipelines decommissioned *in situ* may degrade. Following degradation, there is the potential that any hydrocarbons / chemicals that may have remained in the pipelines following the flushing activities may become exposed to the surrounding sediment.	- Flushing of pipelines in line with BAT/BEP. - The pipelines will be buried under sediment/rock such that following eventual degradation, it is expected that the disintegrated line components and contents will be restricted to their current location and will not make it into the water column.	C	1	Low	Sensitivity of the habitat is considered High (C) due to presence of the OSPAR threatened/declining species *A. islandica* and components of "Sea pen and burrowing megafauna communities" habitat in the vicinity. Prior to decommissioning activities, the pipelines will be flushed and left open to sea. All infrastructure to be decommissioned *in situ* is trenched to 0.6 m. Exposed sections will be remediated. Therefore, the impacts of degradation will be contained within a limited area around the pipelines. Should the lines corrode, the contents may 'seep' into surrounding sediments, however the impact on biota is considered to be localised. The Magnitude of Effect is considered Negligible (1), such that the impact significance of pipeline degradation over time is considered Low. Given stakeholder interests the legacy impact of decommissioning the buried pipelines *in situ* is considered further in the EA to understand the cumulative effect of legacy impacts.	Yes
Underwater Noise	Underwater noise from cutting activities and rock dump noise	Receptors: Marine mammals and fish. Noise from cutting of the concrete ballast has the potential to cause disturbance to marine mammals and fish in the form of temporary displacement from the area.	- Suitable technology for cutting will be selected to ensure the effectiveness of the cutting, minimising the duration, disturbance and risk of requiring the activity to be repeated. - No explosives use planned.	B	1	Low	Given the presence of marine mammals and fish, receptor Sensitivity is considered Medium (B). Pangerc *et al.*, (2016) reported that the noise from underwater diamond wire cutting, during the severance of a 0.76 m diameter conductor at a platform in the North Sea, was barely discernible above background noise levels including the noise of associated vessel presence. There is no published information on the behavioural response of marine mammals or fish to sound generated by underwater cutting. As reported source levels are relatively low compared with those generated by vessels, the main impact, if any, is therefore expected to be disturbance rather than injury. Similarly, the noise generated from activities such as depositing rock is expected to be less than vessel noise. The Magnitude of Effect is expected to be Negligible (1). The Impact Significance is assessed as Low and is not considered further in the EA.	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
Waste Generation	Waste processing	Receptor: Use of landfill. In addition, there is the potential for impact on communities located in proximity to the landfill site (e.g. from traffic, noise, and odour). Following application of the waste hierarchy, minimal quantities of materials will go to landfill.	- Waste management strategy will be adhered to. - Project waste management plan, use of licensed waste contractors/sites, waste transfer notes. - Develop WMP prioritising reuse and recycling. - Contractor to maintain a waste audit trail through to recycling or disposal facility. - Contractor to report waste inventories. - Audit of yard/contractor waste management systems.	B	1	Low	Sensitivity of landfill as a receptor is considered Medium (B) as landfill sites are a finite resource. Onshore yard location currently unknown, but assumed an existing yard will be used, with experience in handling decommissioning waste and suitable treatment/ disposal/recycling/reuse routes will be identified. Given adherence to waste hierarchy, quantities of material to landfill will be minimised such that the Magnitude of Effect is considered Negligible (1) and therefore the Impact Significance Low. Furthermore, Section 12.8 of OPRED's Guidance Notes (OPRED, 2018) advises that an assessment of wastes or waste management returned to shore for treatment or disposal is not required in the EA as it is not relevant to the impacts in the marine environment. For this reason, the processing of waste returned to shore and any onshore impacts associated with the returned material is not discussed further in the EA.	No
Unplanned Events	Discharges from pipelines	Receptor: Water quality. Water quality deterioration.	- Inspections to identify and mitigate potential blockages. - Flushing of pipelines and umbilical cores in line with BAT/BEP prior to decommissioning activities and pipelines will be left open to sea	B	1	Low	Receptors include water quality, plankton, fish, marine mammals etc. Due to the presence of marine mammals (EPS), receptor Sensitivity is considered to be Medium (B). However, prior to decommissioning activities lines will be flushed to As Low As Reasonably Practicable. Therefore, the magnitude of Effect of any accidental releases is considered Negligible (1). As a result the Impact Significance is Low. The likelihood of an unplanned spill occurring is considered Remote such that the Environment Risk is considered Low. In line with Subsection 12.4 of the OPRED Decommissioning Guidance (OPRED, 2018), the impacts of accidental events are not considered further in the EA.	No
	Seabed disturbance from a dropped object	Receptor: sediment quality and benthic communities. Potential for object to be dropped during recovery operations.	- Lifting procedures in place.	C	1	Low	There are sensitive habitats and species in the area and so the Sensitivity is considered High (C). However, the area of potential impact from a dropped object would be limited to relatively small area, and so the Magnitude of Effect is considered Negligible (1), and the Impact Significance is Low. Furthermore, the likelihood of a dropped object incident	No

Aspect		Receptors and Potential Impacts	Mitigation	Sensitivity	Magnitude	Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA.	Assessed further in the EA
							occurring is considered Remote, therefore the Environment Risk is considered Low. In line with Subsection 12.4 of the OPRED Decommissioning Guidance (OPRED, 2018), the impacts of accidental events are not considered further in the EA.	
Node 3: Post decommissioning surveys								
Disturbance to seabed	Clear seabed surveys and over trawl trials	Receptor: benthic communities. Potential for trawl sweeps (chain mats) to be carried out to demonstrate a safe seabed. Trawl sweeps and/or over trawl trials will result in some disturbance to the seabed habitats in the area.	- Preference will be given to the use of side scan sonar surveys (SSS, or similar) to determine a safe seabed. - Possible that SSS surveys would also negate the requirement for an over trawl trial.	C	1	Low	There are sensitive habitats and species in the area therefore the Sensitivity is considered High (C). As a worst-case scenario, a trawl sweep using a chain mat will be required to demonstrate a safe seabed. As fishing in the area is considered low, the impact of a trawl sweep or over trawl trial is not expected to be significant and impact the demersal trawl gear associated with the wider area. The Magnitude of Effect is considered Negligible (1), therefore the Impact Significance is considered Low. This impact will be considered further in the EA to allow an assessment of the cumulative seabed disturbance across all activities.	Yes

7.0 SEABED DISTURBANCE

When assessing the impact of the proposed activities during the ENVID (refer to Section 6), the Impact Significance of the decommissioning of flowlines and umbilical, and the use of over trawl trials (if required), was considered to be Low. It was acknowledged, however, that the activities were considered in isolation and therefore all project activities resulting in seabed disturbance are considered further here, to allow for a cumulative assessment to be completed.

7.1 Activities (Cause of Impact)

Activities that will result in an impact to the seabed include:

- Remediation of the exposed ends of the piggybacked pipelines (30 m length at the brae Alpha end and 6 m length at the Enoch well end);
- Recovery of the umbilical length (*c*. 92 % of the umbilical length) that is buried to *c*. 0.3 m (rock covered section to be decommissioned *in situ*);
- Recovery of the subsea structures across the Enoch Field (SSIV, valve skid and wellhead protection structure);
- Recovery of stabilisation materials including pipe tunnel and exposed mattresses; and
- Deposition of rock cover.

The decommissioning of the Enoch Field was subject to a CA to determine the most preferred option and any other acceptable options (refer to Section 4).

Given the depth of burial (*c*. 0.99 m) and the lack of midline exposures the CA determined that the trenched and buried piggybacked pipelines will be left *in situ* with remediation of the exposed ends. The preferred approach for remediation of the cut ends is to cut and recover them. However, the option to rock cover or trench and burial the exposed ends were also considered acceptable.

The preferred decommissioning option for the umbilical (average DoB of 0.3 m) is to remediate *in situ* by recovering the exposed length (*c*. 14.125 km) of the line, and decommissioning the section covered with rock *in situ*. No additional acceptable options were identified for Group B.

Following completion of the decommissioning campaign, to ensure that the seabed is safe and free of obstructions, a post decommissioning over trawl survey may be carried out. This activity is particularly important to ensure the safety of commercial fishing (i.e. bottom trawling) activities. Bridge Petroleum will explore opportunities to use SSS or MBES survey methods which are non-intrusive therefore minimising the area of temporary seabed disturbance. Although it is not yet confirmed if over trawl trials will be undertaken, the potential seabed disturbance has also been quantified and is presented in Table 7-4).

7.1.1 Quantification of Seabed Disturbance

Quantification for potential seabed disturbance is presented below as follows:

- **Preferred Option 1**: Table 7-1 presents the total anticipated area of seabed disturbance associated with proposed decommissioning activities, where the exposed ends of the piggybacked pipelines are cut and recovered.
- **Acceptable Option 2**: Table 7-2 presents the area of impact from proposed decommissioning activities, where the exposed ends of the piggybacked pipelines are rock covered.

- **Acceptable Option 3**: Table 7-3 presents the area of impact from proposed decommissioning activities, where the exposed ends of the piggybacked pipelines are trenched and buried.
- **Post Decommissioning Survey:** Table 7-4 presents the anticipated area of temporary disturbance associated with the over trawl trials (if required).

Table 7-1: Anticipated Area of Seabed Disturbance (Cut and Recovery of Exposed Pipeline Ends).

Activity	Assumptions	Temporary Area of Disturbance (km^2)	Permanent Area of Disturbance (km^2)
Cut and removal of exposed ends of piggybacked pipelines (PL2336 & PL2337)	Removal of exposed ends of the piggybacked pipelines. Exposed length of each line is 36 m (30 m at Brae Alpha end and 6 m on approach to the Enoch well). Therefore, total exposed pipeline lengths are 72 m. However, as the lines are piggybacked a single corridor width of impact is assumed. As a worst-case, the seabed disturbance calculation assumes a 2 m corridor of temporary disturbance along the surface laid sections of the piggybacked lines.	0.00007	-
Spot rock at cut ends of piggybacked pipelines	Following cut and removal of exposed lengths of the piggybacked pipelines, rock cover will be applied to cut locations to mitigate any potential snagging risk. Anticipated a maximum of 20 te of rock would be deposited; 10 te at each end of the piggybacked lines. It is assumed that 1 te of spot rock will impact upon 1 m^2 of seabed.	-	0.00002
Recovery of exposed length of umbilical. (Rock covered sections decommissioned *in situ*)	Give the shallow depth of burial (average of 0.3 m), it is proposed to pull the umbilical through the sediment without the need for excavation. A total length of 14.125 km will be recovered. As a worst-case, the seabed disturbance calculation assumes a 10 m corridor along the length of the umbilical line to be pull through the seabed. This 10 m corridor allows for suspended sediment to resettle at a depth > 6.5 mm. A thickness of 6.5 mm is considered the threshold at which 5 % of the most sensitive benthic species would be affected by burial.	0.14	-
Spot rock at cut locations on the umbilical	Following removal of exposed lengths of the umbilical, rock cover will be applied at four cut locations, adjacent to the existing rock covered sections to mitigate snagging risk. A total of 40 te of rock cover will be deposited (*c.* 10 te at each location). It is assumed that 1 te of spot rock will impact upon 1 m^2 of seabed.	-	0.00004
Recovery of Subsea Structures	Enoch SSIV will be recovered. Dimensions: 6 m (L) x 2.4 m (W). As a worst case, the calculation of the seabed disturbance assumes temporary disturbance out to 1 m on each side of the structure (extended	0.00004	-

Activity	Assumptions	Temporary Area of Disturbance (km^2)	Permanent Area of Disturbance (km^2)
	length/width) (i.e. the temporary area of disturbance would therefore be 8 m x 4.4 m).		
	Pipe tunnel with concrete ballast will be fully recovered. Dimensions: 4 m (L) x 4.5 m (W) As a worst-case, the calculation of the seabed disturbance assumes temporary disturbance out to 1 m on each side of the structure (extended length/width) (i.e. the temporary area of disturbance would therefore be 6 m x 6.5 m).	0.00004	-
	The Enoch tree valve skid will be fully recovered. Dimensions: 3.5 m (L) x 1.5 m (W) As a worst-case, the calculation of the seabed disturbance assumes temporary disturbance out to 1 m on each side of the structure (i.e. the temporary area of disturbance would therefore be 5.5 m x 3.5 m).	0.00002	-
	The Enoch wellhead protection structure will be fully recovered. Dimensions: 7.831 m (L) x 9.277 m (W) As a worst-case, the calculation of the seabed disturbance assumes temporary disturbance out to 1 m on each side of the structure (i.e. the temporary area of disturbance would therefore be 9.831 m x 11.277 m).	0.0001	-
Recovery of Exposed Concrete Mattresses	Exposed concrete mattresses will be recovered. As detailed in Table 3-3, a total of 99 concrete mattresses (6 m x 3 m) will be recovered. As a worst case, the calculation of the seabed disturbance assumes temporary disturbance out to 1 m on each side of each concrete mattresses (extended length/width) (i.e. the temporary area of disturbance would therefore be 8 m x 5 m).	0.004	-
Total		**0.145**	**0.00006**
Note the disturbance associated with recovery of the spools is not included as it is within the footprint of the area disturbed by the mattress recovery activities.			

Table 7-2: Anticipated Area of Seabed Disturbance (Rock Cover of Exposed Pipeline Ends).

Activity	Assumptions	Temporary Area of Disturbance (km^2)	Permanent Area of Disturbance (km^2)
Rock cover of exposed ends of piggybacked pipelines (PL2336 & PL2337)	A rock berm width of 8 m would be laid on the exposed ends of the piggybacked pipelines. Therefore, at Brae Alpha end rock cover footprint would be a 30 m x 8 m berm and at the Enoch well end it would be 6 m x 8 m.	-	0.0003
Decommissioning of Group B: Recovery of exposed length	See Table 7-1.	0.14	-
Spot rock at cut locations on the umbilical	See Table 7-1.	-	0.00004
Recovery of subsea structures	See Table 7-1.	0.0002	-
Recovery of exposed concrete mattresses	See Table 7-1.	0.004	-
	Total	**0.145**	**0.00034**

Table 7-3: Anticipated Area of Seabed Disturbance (Jet Trench of Exposed Pipeline Ends)

Activity	Assumptions	Temporary Area of Disturbance (km^2)	Permanent Area of Disturbance (km^2)
Trench and bury of exposed ends of piggybacked pipelines (PL2336 & PL2337)	In this scenario it is assumed that jet trenching would be used to bury the exposed ends of the piggybacked pipelines. As a worst case, the calculation of the seabed disturbance assumes a corridor of temporary disturbance of 10 m along length of the ends to be jet trenched Therefore, at Brea Alpha end disturbance footprint would be a 30 m x 10 m and at the Enoch well end it would be 6 m x 10 m.	0.0004	-
Decommissioning of Group B: Recovery of exposed length	See Table 7-1.	0.14	-
Spot rock at cut rock covered sections left *in situ* of Group B	See Table 7-1.	-	0.00004
Recovery of subsea structures	See Table 7-1.	0.0002	-
Recovery of exposed concrete mattresses	See Table 7-1.	0.004	-
	Total	**0.146**	**0.00004**

Table 7-4: Post Decommissioning Survey - Estimated Area Temporarily Impacted by Over-Trawl Trials.

Activity	Assumptions	Temporary Area of Disturbance (km^2)
Over trawl trials of 500 m zone at Enoch well location.	Following decommissioning activities, the 500 m zone may be subject to over trawl trials to ensure a safe seabed. To allow for the vessel turn radius, the diameter of the safety zone has been extended by 200 m (i.e. resulting in a diameter of 1,200m). Thus, area of disturbance = 1 x (π x 600^2)	1.13
Over trawl trials of line routes.	It is assumed that an over trawl trial will be conducted along the length of the pipelines decommissioned *in situ* lines to ensure a safe seabed. Given the close proximity of the pipelines and umbilicals it is assumed the survey will cover a 100 m corridor of disturbance. As the lines enter one of the 500 m zones; to avoid double counting of disturbance, 1000 m has been removed from the total over trawled area captured in this row. Over trawled area captured in this row item is assumed to be (15,800.4 m – 1,000m) x 100 m	1.5
	Total	**2.61**

7.2 Impacts on Receptors

Should the over trawl trials described be required the maximum area of temporary disturbance is estimated to be 2.61 km^2 (note all other areas of temporary disturbance described would fall within the footprint of the area impacted by the over trawl trial). The area of permanent disturbance is estimated to be between 0.00004 km^2 and 0.00034 km^2 depending on the approach selected for remediation the exposed pipeline ends.

Should SSS/MBES surveys be used to obtain evidence of a safe seabed rather than over trawl trials temporary seabed disturbance would be significantly less (0.145 km^2).

This section will discuss the impacts which may arise from the proposed decommissioning activities. The section will focus on impacts resulting from the preferred decommissioning activities, i.e. the first scenario, however, where appropriate, reference will be made to the second scenario.

7.2.1 Temporary Impact

Temporary impacts from the recovery of seabed structures, exposed protective materials and pipelines and umbilical, will directly disturb the benthic communities and their habitat within the area of impact footprint.

It is expected that during recovery, sediment will be resuspended and will resettle out to 6.5 mm and greater within the extended footprints (Table 7-1). During recovery, suspended solids within the water column may increase. This increase in turbidity may result in short-term smothering and difficulties for filter feeding organisms. Increased suspended solids in the water column can also cause environmental stress if individuals ingest the suspended particles rather than food. It is possible that these disturbed sediment particles may be transported via tidal currents for re-settlement over adjacent seabed areas. Sessile epifaunal

species may be particularly affected by increases in suspended sediment concentrations as a result of potential clogging or abrasion of sensitive feeding and respiratory apparatus (Nicholls *et al*., 2003). In the case of filter feeders, an increased suspended sediment concentration could impact the ability to feed. Larger, more mobile animals, such as crabs and fish, are expected to be able to avoid areas of deposition and elevated suspended solid concentrations.

As described in Section 5.3, surveys identified specimens of the OSPAR threatened/declining, PMF species, FOCI *A. islandica*. The siphons of *A. islandica* were observed across most of the Enoch survey area (excluding E_01 and all PL stations except 01). The siphon analysis revealed average siphon densities ranging between 'Occasional' and 'Abundant' which indicated a patchy distribution across the survey area (Benthic Solutions, 2023b). The live specimen of juvenile ocean quahog was also observed within the survey area.

A. islandica are described as having a high sensitivity to sub-surface abrasion and siltation changes, although damage is related to body size with larger specimens are more vulnerable (Scottish Government, 2025). Although *A. islandica* burrow into the sediment, they use a short inhalant siphon which sits above the sediment surface for feeding and respiration (Taylor, 1976). Studies have shown that surface abrasion and siltation may therefore damage/clog the inhalant siphon, however it should be noted that following smothering/burial (30 - 40 cm), they are able to burrow to the surface (Powilleit *et al*., 2009). Therefore, *A. islandica* is not considered to be sensitive to a smothering event within a range of approximately 30 - 40 cm of material (Tyler-Walters & Sabatini, 2017).

Component habitat features representing that of the OSPAR listed ´threatened and/or declining habitat – 'sea pens and burrowing megafauna communities' were identified across the survey areas. Given the presence of these features, a sea pens and burrowing megafauna communities habitat assessment was carried out. The assessment determined that small burrows were categorised as 'Occasional' to 'Frequent' on the SACFOR scale, whereas large burrows varied between 'Frequent' to 'Common' within the survey area. The densities indicated that the Enoch site, up to 100m from the well and along the pipeline, showed some level of conformity to both this OSPAR habitat and the Scottish PMF categorised habitat 'Burrowed Mud' (Benthic Solutions, 2023a). Experimental studies have shown that the two species of sea pen (*Funiculina quadrangularis* and *Pennatula phosphorea*), can re-anchor themselves in the sediment if dislodged (by fishing gear) (Eno *et al*., 2001). In long-term experimental trawling, Tuck *et al*. (1998) found no effect on *V. mirabilis* populations and Kinnear *et a*l. (1996) found that sea pens were quite resilient to being dragged or uprooted (by creels). *V. mirabilis* is able to withdraw into the sediment which may provide it with some protection from dislodgement (Hughes, 1988). *P. phosphorea* recovered within 72 – 96 hours after experimental smothering for 24 hours by pot or creel and after 96 – 144 hours of smothering for 48 hours (Kinnear *et al*., 1996; Eno *et al*., 2001). Sea pens have been shown to be relatively resilient to smothering and re-suspension, and the limited deposition of sediment attributed to the proposed operations is unlikely to have a significant impact on them. Proposed decommissioning activities are likely to result in resuspension of sediments. Should these sediments resettle over burrowed areas of the seabed, the characteristic burrowing megafauna (mud-shrimp and *Nephrops*) if present, are unlikely to be adversely affected by sediment resettlement as they are active burrowers (Hill and Tyler-Walters, 2018).

Any impacts from sediment disturbance and sediment re-suspension are expected to be short term, since most of the smaller sedentary species associated with the area have short lifecycles and recruitment of new individuals from outside of the disturbed area will occur. Recolonisation of the impacted areas can take place in a number of ways, including mobile species moving in from the edges of the area (immigration), juvenile recruitment from the plankton and burrowing species digging back to the surface. Recovery times for soft sediment faunal communities are difficult to predict, although some recent studies have attempted to quantify timescales. Collie *et al*. (2000) examined impacts on benthic communities from bottom towed fishing gear and concluded that, in general, muddy sediment communities (as

seen in the vicinity of Enoch infrastructure (see Section 5.2.5)) recovered slowly and were regarded as sensitive to disturbance. Although recovery speed was dependent upon the spatial scale of the impact. It was estimated that recovery from a small-scale impact, such as a fishing trawl, is likely to occur within about 400 - 500 days (1.1 – 1.4 years) assuming that recolonisation was through immigration into the disturbed area rather than from settlement or reproduction within the area. Recovery irrespective of method would be expected to take longer for the more extensively disturbed areas, and larval recruitment or local reproduction by surviving individuals may be an important determining factor (Collie *et al.*, 2000). Therefore, given the relatively small area of impact and the evidence for recovery from small scale impacts, the impact significance of the proposed activities on benthic communities is considered Moderate.

Evidence suggests that the sensitivity of fish to suspended sediments varies greatly between species and their life history stages and depends on sediment composition (particle size and angularity), concentration and the duration of exposure (Newcombe and Jensen, 1996). Being the major organ for respiration and osmoregulation, gills are directly exposed to, and affected by, suspended solids in the water. If sediment particles are caught in or on the gills, gas exchange with the water may be reduced leading to oxygen deprivation (Essink 1999; Clarke and Wilber, 2000). This effect is greatest for juvenile fish as they have small easily clogged gills and higher oxygen demand (FeBEC, 2010). As described in Section 5.3.4., a number of fish species recognised as PMFs occur in the area, and it is possible that suspended sediments in the water column resulting from the recovery, and/or trench and bury activities, could impact on individual fish including PMFs. However, given the short duration of the activities and any impacts on fish in the area will be at an individual level such that the impact significance is considered Low.

7.2.2 Permanent Impact

The area of permanent seabed disturbance expected with Preferred Option 1 of the proposed decommissioning activities is 0.00006 km^2, which is associated with the placement of rock cover to remediate cut ends in Group A (20 te in total) and remediated cut rock covered sections in Group B (40 te in total). However, it should be noted that if Acceptable Option 2 is undertaken, permanent seabed disturbance slightly increases. Permanent disturbance increases to 0.00034 km^2 and is associated with the placement of rock cover to remediate exposed ends of Group A (462 te in total). The permanent impact is expected from Acceptable Option 3 (0.00004 km^2) is very minimal. Impacts on the seabed are considered permanent (rather than temporary) because, following completion of activities, the seabed will remain in an altered state.

The loss of habitat and smothering of the benthos associated with the potential placement of rock cover creates habitats for benthic organisms that live on hard substrates, leading to a change in the local seabed community. There is approximately 75,232 te of existing rock cover spread across the Enoch Field. The additional rock volume resulting from Options 1 and 2 would add 0.08% and 0.7% of existing rock to the area respectively. This is not considered to significantly alter the natural character of the seabed in the area, given the existing rock across the area and the small rock volume to be deposited.

Given the relatively low footprint of disturbance, the severity of the environmental impact from permanent disturbance is therefore considered to be Low.

7.2.3 Disturbance to the Drill Cuttings

The drill cuttings deposit in Enoch Field is located along the Enoch wellhead. As described in Section 5.2.5.2., the survey carried out in 2023 reported the drill cuttings pile area of 823 m^2 and volume of 46.9 m^3 (Benthic Solutions, 2024). The Enoch Field cuttings pile is considered

to be a “small cuttings pile” (<5,000 m^3) according to the Norwegian Oil and Gas Association Guidance (Norsk Olje & Gass, 2016). The cuttings deposit is localised at the wellhead, as the Enoch wellhead protection structure and valve skid are being recovered, a small level of disturbance may occur. However, any suspended sediments would be expected to settle back in the same area. It should be noted, as explained in Section 3.2.4.3 no OBM is expected.

7.3 Transboundary and Cumulative Impact

The Enoch Field partially extends into NOCS, however the infrastructure to be decommissioned ends before the UK/Norway median line. Despite the close proximity to the nearest transboundary line, there are no transboundary seabed impacts anticipated.

As discussed, there is 75,232 te of existing rock cover across the Enoch Field. Total additional rock volumes anticipated range from *c.* 60 te to 502 te depending on the option selected for remediation of the pipeline ends. Any additional rock has the potential to have a cumulative impact however given the small increase of rock any cumulative impact is not considered significant. The significance of cumulative impact of the additional rock is therefore considered Low.

All other impacts on the seabed are considered temporary and to not contribute to a cumulative impact over time.

7.4 Mitigation Measures

The following measures are proposed to minimise the environmental impacts related to the planned seabed disturbance associated with the proposed decommissioning activities:

- Cutting / dredging / jetting work plans in place, and excavation will be minimised where possible;
- Lifting procedures in place; and
- Additional spot rock cover will be minimised. Recovery of exposed Group B umbilical line is planned to be carried out without additional excavation as lines can be pulled through the sediment, thereby expected to reduce area of impact.

7.5 Conclusion

The decommissioning activities associated with the Enoch Decommissioning Project will result in localised temporary and permanent disturbance to the seabed. The volume of seabed disturbance is influenced by selected options, should preferred decommissioning options be undertaken rather than acceptable options, the overall disturbance is decreased.

Temporary disturbance will result from decommissioning of lines (cut and lift, full recovery), the recovery of subsea structures, and stabilisation materials. Over trawl trials may be required to confirm a safe seabed and, if required, will result in the largest area of temporary impact. Bridge Petroleum will investigate opportunities for the use of SSS/MBES with OPRED to determine a safe seabed and therefore may potentially remove the worst-case impact associated with this activity.

Permanent disturbance will result from the placement of new rock cover. The area of permanent disturbance is estimated to be between 0.00004 km^2 and 0.00034 km^2. The additional volume of rock (ranging from 60 te to 502 te depending on selected pipeline end remediation approach) is therefore not considered significant.

In conclusion, both the preferred and acceptable options, trench and burying of exposed ends for Group A, result in an overall low impact to seabed receptors, with recovery expected to occur shortly after the completion of decommissioning activities.

8.0 LEGACY IMPACTS

When assessing the impact of the proposed activities during the ENVID (Section 6), several of the activities were considered to result in potential legacy environmental or social impacts. These legacy impacts are considered further in this Section. Legacy impacts refer to those impacts which persist after the decommissioning activities have taken place, and may affect the biological/physical environment and/ or other users of the sea.

8.1 Activities (Causes of Impact)

Proposed activities which could result in a legacy impact include:

- *In situ* decommissioning of Group A line lengths that are trenched and buried to an average depth of 0.99 m.
- *In situ* decommissioning of Group B line lengths that are rock covered (*c*. 1.25 km).
- *In situ* decommissioning of existing stabilisation materials (i.e. concrete plinths, rock cover, and rock covered mattresses).
- Additional rock protection added during decommissioning activities to mitigate snagging risks.

8.2 Environmental Impact of Infrastructure to be Decommissioned In Situ

Over time, the Group A and Group B infrastructure decommissioned *in situ* will break down. Water depth in the Project area ranges from *c*. 105 m to 120 m. At these depths, if infrastructure decommissioned *in situ* was exposed on the seabed there would likely be abrasion, accumulation of marine organisms, and salt-water corrosion over time (Angulo *et a*l., 2017).

A dataset compiled by Solan *et al*. (2019), based on a literature review of papers published since 1864, found that the mixed sediment depth (bioturbation depth) in the North Sea is up to 25 cm. This means that any material remaining in the seabed sediments at a depth greater than this is unlikely to have any interaction with benthic organisms, provided that it remains buried to this depth.

The flowlines and umbilicals will be flushed, in line with OSPAR BAT/BEP principles, and left open to sea. Over time, the trenched and buried, and rock covered flowlines and umbilicals decommissioned *in situ* will degrade. Following degradation, there is the potential that any hydrocarbons / chemicals that may have remained in the pipelines following the flushing activities may become exposed to the surrounding sediment. Given the lines will be flushed and left open to sea, the Impact Significance of any potential discharges is considered Low.

In line with OPRED decommissioning guidance, all existing rock protection will remain *in situ*, including existing protection at the Miller flowline crossing, Tiffany flowline crossing and Bruce flowline crossing. The mattresses, associated with this crossing will also be decommissioned *in situ*.

Although only *c*. 1.25 km of Group B rock covered length will be decommissioned *in situ*, in the worst-case the following quantities of materials that make up Group A and B lines are accounted for to be left on the seabed by sources: steel (*c.* 1,184 te), aluminium alloy (*c*. 1,484 te), Corrosion Resistant Alloy (CRA) (trace), plastic (*c*. 291 te), and rock cover (75,232 te). The impact of the degradation of component materials of infrastructure remaining *in situ* is considered in Sections 8.2.1 and 8.2.2, whilst protection materials are considered in Section 8.2.3.

The environmental and socio-economic legacy impacts of decommissioning are discussed in the following sections.

8.2.1 Metals

The steel (*c.* 1,184 te), and aluminium alloy (*c.* 1,484 te), associated with the flowlines to be decommissioned *in situ,* will over time, become exposed to the surrounding sediment as the pipelines degrade. OEUK suggests that steel structures below the seabed will corrode at rates in the region of 0.01 to 0.02 mm/year (OGUK, 2013). During this long-term process, the degraded components could potentially become bioavailable to benthic fauna in the immediate vicinity.

During the gradual breakdown there will be a release of metal into the environment. As degradation will take place over decadal or centurial timescales it is not expected that metal concentrations in the sediment will accumulate significantly. As the corrosion occurs, the contents will 'seep' into surrounding sediments. Some metals have the potential to exert toxic effects in biota and can bioaccumulate through the food web (Neff, 2002). Within benthic animals, accumulated metals may act as enzyme inhibitors, adversely affect cell membranes, damage reproductive and nervous systems, cause changes in metabolic and respiratory efficiency, affect growth and behaviour or act as carcinogens (Kennish, 1997; Ansari *et al*., 2004). However, as all steel remaining *in situ* will be buried, any potential impact on biota is considered to be localised.

The long-term environmental Impact Significance of leaving metals *in situ* is considered Low, given:

- The buried nature of the lines following decommissioning activities, (all lines left on the seabed will be trenched and buried to an average depth of 0.99 m); and
- The slow anticipated rate of metal degradation.

8.2.2 Plastic

A total of 291 te of plastic is associated with the flowlines and umbilical. As the flowlines will be remediated *in situ* following the completion of decommissioning activities, plastics will eventually breakdown and be released into the environment. It is thought the deterioration of plastics within the pipelines will take significantly longer than the time expected for it to degrade (Dames *et al*., 1999).

There are four mechanisms by which plastics degrade in the environment (Andrady, 2011):

- Photodegradation – action of light (usually sunlight);
- Thermooxidative degradation – slow oxidative breakdown at moderate temperatures;
- Hydrolytic degradation – reaction with water; and
- Biodegradation – action by living organisms, usually microbes.

The natural degradation of plastic generally begins with photodegradation, which leads to thermooxidative degradation. Fragmentation and biodegradation proceeds through a combination of photodegradation, thermooxidative degradation and microbial activity. In the marine environment, ultraviolet (UV) radiation is the dominant weathering process (photodegradation). It causes embrittlement, cracking and fragmentation, leading to the production of microplastics (Andrady, 2011). Thus, fragmentation is greatest when debris are directly exposed to UV radiation on shorelines. The effect of photodegradation is significantly decreased in seawater due to lower temperatures, oxygen availability, and that the rate of hydrolysis of most polymers is very low in the ocean (Andrady, 2011). Additionally, as all lines

remaining *in situ* are trenched and buried at water depths between *c.* 105 m to 120 m, the potential for photodegradation is decreased further.

The release of plastics into the water column may occur through mechanisms such as scouring. Plastics in the marine environment pose a chemical hazard, as toxic chemicals from ingested plastics can be released into the guts of marine species, or they may otherwise leach to the environment as the plastic weathers (Gallo *et al*., 2018; Thushari and Senevirathna, 2020).

As many organic pollutants are lipophilic; in the same way as fats, plastic particles can also adsorb and concentrate contaminants such as persistent organic pollutants from the water column and act as pathways for transfer into the food chain (Bai *et al*., 2021). Because of the persistence of such compounds, humans and other animals continue to be exposed long after a chemical has been withdrawn from production (United Nations Environment Programme (UNEP), 2016).

Evidence of microplastic ingestion is summarised by Anderson (Anderson *et al*., 2016) and is presented here. Microplastics can be ingested by aquatic organisms that feed from the water column including, ciliates, zooplankton, rotifers, polychaete worms, coral, sea cucumbers, barnacles, amphipods, molluscs, crustaceans, and fish. Once ingested, these particles can be transferred to higher trophic levels. Some species are capable of rapid excretion or egestion, while others retain, accumulate, and/ or mobilise microplastics into their circulatory systems. Particles can be ingested by filter feeders directly from the water column and filter feeders might have greater exposure to microplastics than organisms employing other feeding strategies.

Uncertainties remain regarding the extent of harm caused to marine species by ingestion of microplastics, and over the contribution they make to overall exposures to hazardous chemicals. Some studies report little or no physical or chemical harm to marine biota (Koelmans, *et al*., 2014), while others, suggest that chemicals in plastics might be released to organisms after ingestion (Teuten, *et al*., 2009; Tanaka, *et al*., 2013; Browne, *et al*., 2013; and Bakir, *et al*., 2014). Ingestion by copepods was found to affect swimming behaviour, growth and reproduction, depending on the size and type of plastics ingested and can lead to malnutrition and starvation (Bai *et al*., 2021). Chronic exposure to the presence of microplastics has also been linked to effects on populations, including the negative influence of microplastics and nanoplastics on survival and mortality of different species of zooplankton who ingest plastic (Desforges, 2015).

Bivalve molluscs are thought to be particularly vulnerable to microplastics due to their filter feeding behaviour and direct exposure to suspended microplastics (Khanjani *et al*., 2023). Juveniles of the PMF species *A. islandica* were identified within the project area (see Section 5.3.3). Studies pertaining to the impacts of micro plastics on *A. islandica* are not available, however the impact on bivalve molluscs has been studied widely. The impacts of micro plastics on bivalve molluscs are broad and vary by species. The small size and irregular shape of microplastics enable them to penetrate and accumulate in the tissues of bivalves, leading to the obstruction of vital physiological processes such as respiration, digestion, and excretion (Khanjani *et al.*, 2023). Cole *et al.*, 2011 found that ingestion of microplastics caused physical damage to the digestive tract of Blue Mussels (*Mytilus edulis*) resulting in reduced feeding rates. Another study showed that increased ingestion of microplastics led to physical blockages developing within the gut of the Mediterranean mussel (*Mytilus galloprovincialis*) (Abidli *et al*., 2021). Furthermore, the presence of microplastics in the gut of bivalves can interfere with the absorption of nutrients, leading to malnutrition and potentially reducing their overall fitness (Guzzetti *et al.,* 2018; Sana *et al.,* 2020; Scherer *et al.,* 2018). Bringer *et al.* (2021) examined the impact of microplastics on filtration and respiration rates on pacific oysters (*Crassostrea gigas*), results showed a decrease in filtration rates and respiration rates. The effect was also observed in two other species, Pearl Oyster (*Pinctada margaritifera*) and

the Mediterranean mussel. Ingestion of microplastics by the Pearl Oyster resulted in a reduction in filtration rate (Gardon *et al.,* 2018) and resulted in a significant reduction in filtration rate and filtration efficiency by the Mediterranean mussel (Abidli *et al.,* 2021). Impacts on filtration rate and respiration from microplastics are exacerbating by the damage they cause to the gills of bivalves and thus interfering with gas exchange (Khanjani *et al.*, 2023). Studies have shown ingestion of microplastics shown to impact upon the physiological processes of bivalves and increase oxidative stress and result in DNA damage in blue mussels (Mattsson *et al*., 2017), interfere with the formation of byssal thread formation in blue mussels (Green *et al*., 2019) and Asian muscles (*Perna viridis*) (Rist *et al.,* 2016). Furthermore, microplastics have been shown to disrupt molecular pathways (Sun *et al.,* 2021) and suppress immune responses (Shi *et al.,* 2020) in bivalves.

Available evidence would suggest that as a bivalve mollusc, *A. islandica* is likely to be vulnerable to microplastic pollution and may experience physical and/or physiological impact. However, given the rate of degradation, the contribution of the buried lines to mobile and bioavailable microplastics, is likely to be minor and occur over a long timeline. At a population scale, it is therefore unlikely *A. islandica* will suffer acute impacts.

Once plastics become buried in sediment, then the rate of fragmentation decreases rapidly. Microorganisms, animals, salt, sunlight, and fluctuations of water all play a part in the degradation process (Krasowska *et al*., 2015). Degradation can therefore be impeded by cold temperatures and a lack of UV light. As the pipelines will be buried after decommissioning it can be expected that most of these degradation sources, such as UV light and high temperatures will not be relevant. In addition, the impacts of mechanical forces acting on these pipelines are predicted to be low, and it is expected that much of the eventual plastic contaminants produced will be contained within the sediment and prevented from reaching the water column.

Physical forces, such as heating/cooling or seabed movements, can cause mechanical damage such as the cracking of polymeric materials. The growth of microorganisms within the sediment can also cause small-scale swelling and bursting (Krasowska *et al*., 2015), leading to fragmentation and the eventual breakdown into microplastics (1 µm to 5 mm) or nanoplastics (1 nm to 1 µm). The potential ecological and human health risks of microplastics/ nanoplastics are relatively new areas of research, and there is currently a large degree of uncertainty surrounding this issue (Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), 2015). Adverse effects of plastics on marine organisms have been observed through the physical obstruction or damage of feeding appendages/digestive tracts/breathing tubes has been frequently observed (GESAMP, 2015).

In summary, the long-term environmental Impact Significance of leaving plastic *in situ* is considered Low, given:

- The buried nature of the lines following decommissioning activities; and
- The slow anticipated rate of plastic degradation.

8.2.3 Stabilisation Features

Concrete from the pipe tunnel, associated with the pipelines that will be trenched and buried following decommissioning activities, is expected to degrade over centuries. The degradation products will be the aggregates (sand and gravel) used in the concrete and the reacted cement compounds, predominantly calcium carbonate. These degradation products are relatively chemically inert and are likely to result only in a slight increase in the coarse sediment in the area. Impacts of concrete on benthic fauna and the water column are therefore expected to be Negligible.

Legacy rock deposits will create hard substrate in an area of naturally softer seabed, which will create habitat for benthic organisms which live on hard substrate. The habitat in the vicinity is considered to be sensitive due to the presence of juvenile *A. islandica,* which are listed as threatened/declining by OSPAR, and further due to the presence of habitat components representing the OSPAR described "Sea pen and burrowing megafauna communities" habitat. Any potential additional quantities of rock cover required will be minimised (*c.* 10 te), and it is expected the exposed ends of lines in CA Group A will be recovered. Therefore, it is unlikely that the decommissioning of rock cover *in situ* will have a significant impact on the benthic populations in the wider area.

The long-term environmental Impact Significance of leaving the stabilisation features *in situ* is considered Low, given that:

- The slow anticipated rate of concrete degradation;
- The relatively chemically inert nature of concrete degradation products; and
- Any potential additional quantities of rock cover will be minimised.

8.3 Socio-Economic Impact of Infrastructure to be Decommissioned *In Situ*

The primary fishing gear type used within the Project area is trawls (Section 5.6.1). Trawl gear has the potential to interact with any infrastructure or rock cover remaining on the seabed.

Based on a range of penetration depths of main fishing gear components (demersal trawls, seines and dredges) across different sediment types as estimated from a literature review by Eigaard (Eigaard, *et al*., 2016), the depths of penetration from different fishing gear for a seabed dominated by mud and sand ranges from 0 cm to 35 cm. Any material remaining in the seabed sediments at a depth greater than 35 cm is therefore unlikely to have any interaction with fishing gear, providing that it remains buried to this depth. The infrastructure to be decommissioned *in situ* is in an area where the seabed is stable, and no significant changes are expected.

For existing rock cover, rock size and rock profiles are in accordance with industry best practice and SFF recommended practice, such that demersal trawl gear would be expected to be able to access the area. Any potential additional rock cover required for decommissioning activities to be placed on the seabed will be of appropriate grade (1-5 grade), and will be in accordance with industry best practice and SFF recommended practice. Bridge Petroleum will work with OPRED to agree the best methodology to establish an acceptable clear seabed and confirmation that no snagging hazard remain.

Following execution of the decommissioning activities, independent verification of the seabed state will be obtained and evidence of a safe seabed will be provided to all relevant governmental and non-governmental organisations.

Therefore, considering:

- The current condition of the lines;
- The stability of the seabed;
- The use of industry preferred rock size and profiles;
- Demonstration of a clear seabed; and
- A post decommissioning survey strategy.

The socio-economic Impact Significance of these lines, stabilisation features and rock being decommissioned *in situ* is considered to be Low.

8.4 Transboundary and Cumulative Impacts

The Enoch Field partially extends into NOCS, however the infrastructure to be decommissioned ends before the UK/Norway median line. Despite the close proximity to the nearest transboundary line, there are no transboundary impacts anticipated from the activities captured in this Section.

Additional spot rock cover may be required for the remediation of the cut ends of pipelines. Rock volumes will be minimised and represent a small volume (60 te minimum to 502 te maximum), therefore the cumulative impact of these proposed decommissioning activities is not considered significant.

8.5 Mitigation Measures

The following mitigation measures are proposed to minimise the environmental and socio-economic impacts associated with the infrastructure to be decommissioned *in situ*:

- Exposed infrastructure (including stabilisation/protection material) where technically feasible will be recovered to shore;
- Prior to commencing the decommissioning activities, flowlines and umbilical cores will be flushed in line with BAT and BEP, in order to reduce hydrocarbons and chemicals for lines decommissioned *in situ*;
- Additional rock cover will be minimised and, where required, will be laid in profiles aligned with industry standards;
- Independent Verification of a safe seabed will be obtained;
- Adherence to a post-decommissioning survey strategy agreed with OPRED;
- Seabed clearance surveys; and
- Over trawl trials to be carried out if considered necessary.

Bridge Petroleum's commitment to adhering to the mitigation measures identified means that the environmental and socio-economic Impact Significance of decommissioning the infrastructure described in Section 8.1 *in situ* is considered Low.

The activities assessed in this section will not contradict the Scottish NMP objectives (Appendix A) and as the project progresses Bridge Petroleum will aim to comply with the NMP policies. In addition, the Project will aim to comply with the oil and gas marine planning policies.

9.0 ATMOSPHERIC EMISSIONS

As shown in Table 6-1, due to the high sensitivity of the global climate, the cumulative impact of atmospheric emissions from the Enoch decommissioning vessels are considered further here.

9.1 Activities (Causes of Impact)

In 2020, the UK's independent Committee on Climate Change (CCC) released their publication 'Net Zero: The UK's contribution to stopping global warming' (CCC, 2020). In the report, the CCC concluded that it is achievable for the UK to implement a new target of net-zero greenhouse gas (GHG) emissions by 2050 in England and Wales, and by 2045 in Scotland. The report acknowledges that a diverse energy mix is needed in the transition to a net-zero future to maintain security of supply, which includes the continued extraction and use of oil and gas.

To achieve the net zero goal, the CCC report calls for concerted efforts and actions by all to reduce emissions, and for any remaining emissions in 2050 to be offset. As part of this, the offshore oil and gas industry is focused on the continued management and reduction of its operational emissions (OEUK, 2021). The North Sea Transition Deal (NSTD) (DESNZ, 2021) further commits the sector to early targets for the reduction of GHG emissions from production, against a 2018 baseline.

GHGs differ in their abilities to trap heat in the atmosphere, and this is represented by a relative measure known as the Global Warming Potential (GWP). This is usually expressed as the CO_2 equivalent (CO_2e). For example, methane (CH_4) is estimated to have a GWP of up to 27 times greater than CO_2 over 100 years (Intergovernmental Panel on Climate Change (IPCC), 2024), although it has a shorter life span in the atmosphere. Overall, CO_2e emissions from UK upstream oil and gas operations in 2018 contributed three percent (14.63 million te) of total domestic CO_2e emissions (OEUK, 2021).

The predominant source of emissions associated with the proposed offshore activities is emissions from the vessels used during the operations.

The main combustion products associated with power generation on the vessels is CO_2 with small quantities of CH_4, volatile organic compounds (VOCs), oxides of nitrogen (NO_x), carbon monoxide (CO), very small quantities of nitrous oxide (N_2O), and sulphur dioxide (SO_2).

9.2 Impact of Receptors

Table 9-1 shows the expected vessel emissions based on predicted vessel requirements identified in Table 3-7. Emissions factors used were taken from the Environmental Emissions Monitoring System (EEMS) Atmospheric Emission Calculations guidance (EEMS, 2008).

Table 9-1: Predicted atmospheric emissions associated with the proposed vessel use.

Source		Atmospheric emissions (te)							
		CO_2	NO_X	N_2O	SO_2	CO	CH_4	VOC	CO_2e
EEMS Emissions Factor[1]		3.2	0.0594	0.00022	0.002	0.0157	0.00018	0.002	-
GWP[2]		1	-	273	-	-	27	-	-
Total fuel use (see Table 3-6) and emissions	431.5	1,381	26	0.09	0.86	7	0.08	0.86	1,409
Total upstream UKCS CO2e emissions in 2018[3]									18,100,000
Total project CO_2e emissions as a % of UKCS CO_2e emissions in 2018									0.008
Total CO_2e emissions from upstream oil and gas activities in the UK in 2024[4]									11,800,000
Total project CO_2e emissions as a % of upstream oil and gas activities in 2024									0.012

Notes:

[1] Emissions calculated using EEMS emission factors (EEMS, 2008).

[2] CO_2e figure is calculated by multiplying CO_2, N_2O and CH_4 by their relevant GWP value. GWP values are as defined on a 100-year horizon according to the IPCC Fifth Assessment Report (IPCC, 2024), as required by the United Nations Framework Convention on Climate Change (UNFCCC) and in line with the United Kingdom's National Inventory Report (DESNZ, 2022).

[3] Total CO_2e emissions from UKCS 2018 (NSTA, 2025).

[4] Total CO_2e emissions from UKCS 2024 (NSTA, 2025)

The emissions from the anticipated vessel use will amount to approximately 0.008% of the total upstream UKCS emissions in 2018 and approximately 0.012% of the total upstream UKCS emissions in 2024 (Table 9-1) and therefore represents a relatively small contribution to total UKCS emissions.

The emissions associated with these operations may result in short-term deterioration of local air quality within the vicinity, however, in the exposed conditions that prevail offshore, these emissions are expected to disperse rapidly such that they are not expected to have a significant impact on air quality. These emissions will also have a cumulative effect on climate change as described in Section 9.3.

9.3 Transboundary and Cumulative Impacts

The potential cumulative effects associated with the atmospheric emissions produced by vessel use during decommissioning operations include global warming (greenhouse gases), acidification (acid rain) and local air pollution as well as elevated levels of atmospheric emissions in the immediate area. Given the worst-case estimates of emissions presented, the cumulative effects on climate change is not considered to be significant.

9.4 Mitigation Measures

The following mitigation measures are proposed to minimise the impacts of vessel emissions:

- As part of the procurement process, proposed vessels will go through a detailed assurance process which will include a review of generator and engine maintenance which leads to better efficiency in line with manufacturer's specifications.
- Decommissioning vessel schedules will be planned to optimise vessel use.

- Prior to the contract award, Bridge Petroleum will carry out due diligence of the decommissioning yards to ensure suitable permits and licences are in place.
- Activities will be carried out in line with Bridge Petroleum's environmental policy (Section 10) which includes minimising emissions.

Bridge Petroleum's commitment to adhering to the mitigation measures identified means that the significance of the environmental impacts associated with the proposed activities is considered Low.

Impacts from GHG emissions are difficult to assess in isolation because they are derived from cumulative emissions generated across a range of fossil fuel and industry activities, rather than from any single activity. As such the sensitivity of climate change as a receptor is considered Very High (D). Nevertheless, GHG emissions from the proposed decommissioning activities are relatively low (1,409 te CO_2e) when compared to 2024 UKCS emissions (0.012%) and in the context of projected targets for future emissions.

Emissions generated during the proposed activities are expected to disperse quickly and with the mitigation measures in place the Magnitude of Effect is considered Negligible (1) such that the Impact Significance is considered Low.

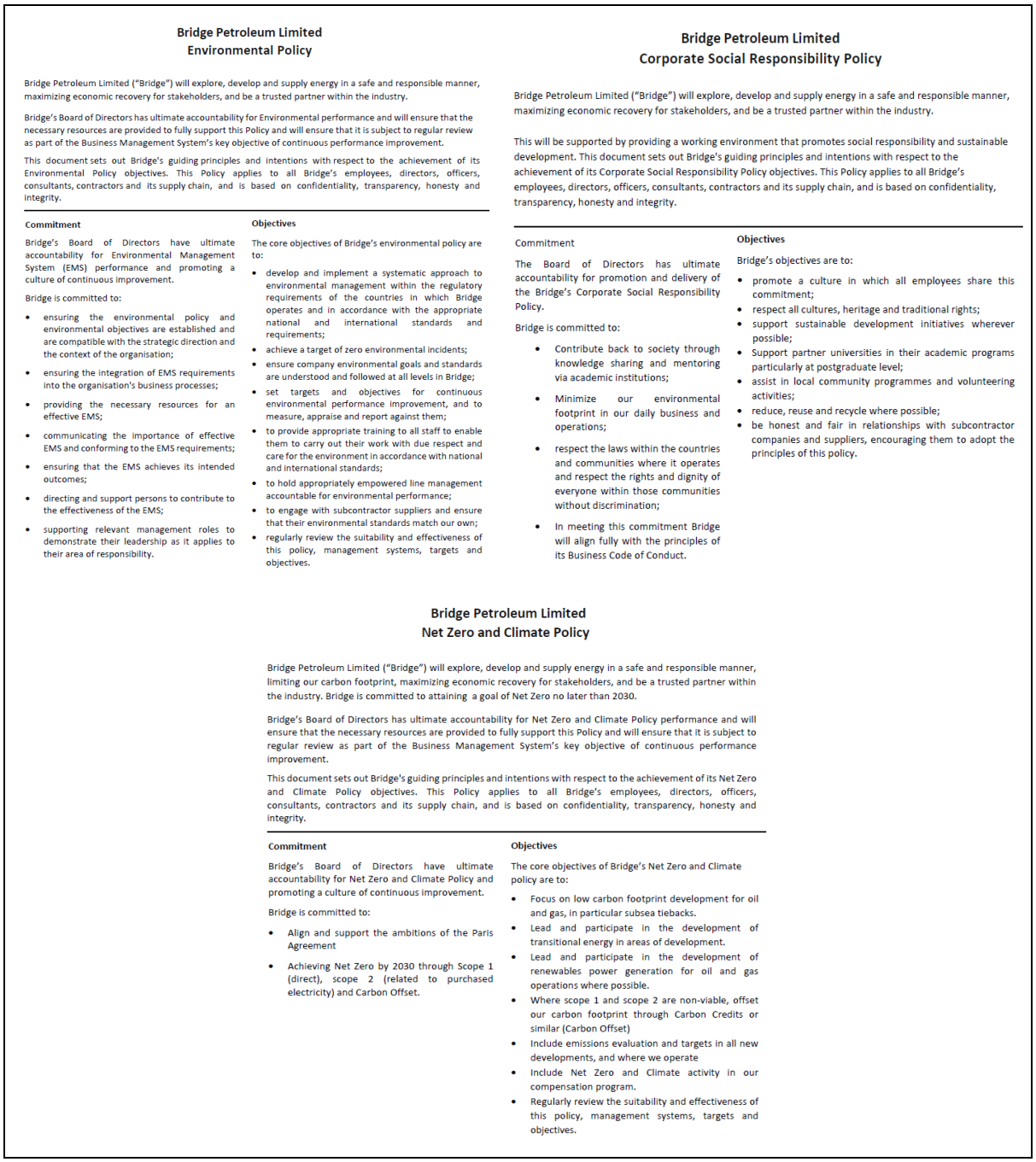
The activities assessed in this section will not contradict the NMP objectives (Appendix A) and as the project progresses, Bridge Petroleum will aim to comply with the NMP policies. In addition, the Project will aim to comply with the Oil and Gas Marine Planning Policies (Appendix A).

10.0 ENVIRONMENTAL MANAGEMENT

Bridge Petroleum are committed to conducting activities in compliance with all applicable legislation and in a manner that will minimise and/or remove potential impacts on the environment. Environmental and social impacts identified through the impact identification process will be input to the Project's risk register. A summary of key environmental and social impacts and risks shall be included within the project's decision documentation throughout all phases of the Project.

Bridge Petroleum has established a clear framework for the effective management of Health, Safety, Security and Environmental (HSSE) aspects associated with their activities in the UK. The Company regards environmental management as being an integral part of its overall management responsibility. The fundamental aim of the HSSE Management Framework is to support environmental protection, prevent pollution, and comply with legislation and regulations. The principles of the International Standard for Environmental Management Systems (EMS) (ISO14001:2015) are incorporated within the Company's EMS, which is an integral part of the company's overall management system. Bridge Petroleum is certified against ISO14001:2015 and is currently preparing to be certified against ISO14001:2026.

The proposed decommissioning activities will be delivered in compliance with Bridge Petroleum's EMS. Bridge Petroleum Environmental, Social, and Governance (ESG) Policy is provided in Figure 10-1. This is a public declaration of the Company's commitment to explore, develop and supply energy in a safe and responsible manner, limiting our carbon footprint, maximising economic recovery for stakeholders, and to be a trusted partner within the industry. Bridge is committed to attaining a goal of Net Zero no later than 2030.



Bridge Petroleum Limited
Environmental Policy

Bridge Petroleum Limited ("Bridge") will explore, develop and supply energy in a safe and responsible manner, maximizing economic recovery for stakeholders, and be a trusted partner within the industry.

Bridge's Board of Directors has ultimate accountability for Environmental performance and will ensure that the necessary resources are provided to fully support this Policy and will ensure that it is subject to regular review as part of the Business Management System's key objective of continuous performance improvement.

This document sets out Bridge's guiding principles and intentions with respect to the achievement of its Environmental Policy objectives. This Policy applies to all Bridge's employees, directors, officers, consultants, contractors and its supply chain, and is based on confidentiality, transparency, honesty and integrity.

Commitment

Bridge's Board of Directors have ultimate accountability for Environmental Management System (EMS) performance and promoting a culture of continuous improvement.

Bridge is committed to:

- ensuring the environmental policy and environmental objectives are established and are compatible with the strategic direction and the context of the organisation;
- ensuring the integration of EMS requirements into the organisation's business processes;
- providing the necessary resources for an effective EMS;
- communicating the importance of effective EMS and conforming to the EMS requirements;
- ensuring that the EMS achieves its intended outcomes;
- directing and support persons to contribute to the effectiveness of the EMS;
- supporting relevant management roles to demonstrate their leadership as it applies to their area of responsibility.

Objectives

The core objectives of Bridge's environmental policy are to:

- develop and implement a systematic approach to environmental management within the regulatory requirements of the countries in which Bridge operates and in accordance with the appropriate national and international standards and requirements;
- achieve a target of zero environmental incidents;
- ensure company environmental goals and standards are understood and followed at all levels in Bridge;
- set targets and objectives for continuous environmental performance improvement, and to measure, appraise and report against them;
- to provide appropriate training to all staff to enable them to carry out their work with due respect and care for the environment in accordance with national and international standards;
- to hold appropriately empowered line management accountable for environmental performance;
- to engage with subcontractor suppliers and ensure that their environmental standards match our own;
- regularly review the suitability and effectiveness of this policy, management systems, targets and objectives.

Bridge Petroleum Limited
Corporate Social Responsibility Policy

Bridge Petroleum Limited ("Bridge") will explore, develop and supply energy in a safe and responsible manner, maximizing economic recovery for stakeholders, and be a trusted partner within the industry.

This will be supported by providing a working environment that promotes social responsibility and sustainable development. This document sets out Bridge's guiding principles and intentions with respect to the achievement of its Corporate Social Responsibility Policy objectives. This Policy applies to all Bridge's employees, directors, officers, consultants, contractors and its supply chain, and is based on confidentiality, transparency, honesty and integrity.

Commitment

The Board of Directors has ultimate accountability for promotion and delivery of the Bridge's Corporate Social Responsibility Policy.

Bridge is committed to:

- Contribute back to society through knowledge sharing and mentoring via academic institutions;
- Minimize our environmental footprint in our daily business and operations;
- respect the laws within the countries and communities where it operates and respect the rights and dignity of everyone within those communities without discrimination;
- In meeting this commitment Bridge will align fully with the principles of its Business Code of Conduct.

Objectives

Bridge's objectives are to:

- promote a culture in which all employees share this commitment;
- respect all cultures, heritage and traditional rights;
- support sustainable development initiatives wherever possible;
- Support partner universities in their academic programs particularly at postgraduate level;
- assist in local community programmes and volunteering activities;
- reduce, reuse and recycle where possible;
- be honest and fair in relationships with subcontractor companies and suppliers, encouraging them to adopt the principles of this policy.

Bridge Petroleum Limited
Net Zero and Climate Policy

Bridge Petroleum Limited ("Bridge") will explore, develop and supply energy in a safe and responsible manner, limiting our carbon footprint, maximizing economic recovery for stakeholders, and be a trusted partner within the industry. Bridge is committed to attaining a goal of Net Zero no later than 2030.

Bridge's Board of Directors has ultimate accountability for Net Zero and Climate Policy performance and will ensure that the necessary resources are provided to fully support this Policy and will ensure that it is subject to regular review as part of the Business Management System's key objective of continuous performance improvement.

This document sets out Bridge's guiding principles and intentions with respect to the achievement of its Net Zero and Climate Policy objectives. This Policy applies to all Bridge's employees, directors, officers, consultants, contractors and its supply chain, and is based on confidentiality, transparency, honesty and integrity.

Commitment

Bridge's Board of Directors have ultimate accountability for Net Zero and Climate Policy and promoting a culture of continuous improvement.

Bridge is committed to:

- Align and support the ambitions of the Paris Agreement
- Achieving Net Zero by 2030 through Scope 1 (direct), scope 2 (related to purchased electricity) and Carbon Offset.

Objectives

The core objectives of Bridge's Net Zero and Climate policy are to:

- Focus on low carbon footprint development for oil and gas, in particular subsea tiebacks.
- Lead and participate in the development of transitional energy in areas of development.
- Lead and participate in the development of renewables power generation for oil and gas operations where possible.
- Where scope 1 and scope 2 are non-viable, offset our carbon footprint through Carbon Credits or similar (Carbon Offset)
- Include emissions evaluation and targets in all new developments, and where we operate
- Include Net Zero and Climate activity in our compensation program.
- Regularly review the suitability and effectiveness of this policy, management systems, targets and objectives.

Figure 10-1: Bridge Petroleum's ESG Policy.

11.0 CONCLUSIONS

Bridge Petroleum are preparing to decommission the Enoch Field as detailed in the pipelines and installation DPs (Bridge Petroleum, 2026a). Included in the decommissioning activities is the recovery of the subsea structures and exposed mattresses, whilst existing rock cover will be decommissioned *in situ*.

A CA was carried out to determine the optimal approach to decommissioning the buried pipelines and umbilical. The preferred and acceptable decommissioning options are summarised below for each CA Group;

- CA Group A: Rigid piggybacked flowlines, trenched and buried with DoB of 0.99 m;
  - Preferred Option: Remediate *in situ* with exposed ends cut and removed.
  - Acceptable Option: Remediate *in situ* with addition of rock cover to exposed ends.
  - Acceptable Option: Remediate *in situ* with exposed ends trenched and buried.
- CA Group B: Umbilical, trenched and buried with average DoB 0.3 m;
  - Preferred Option: Remediate *in situ* with exposed sections (*c*. 92 % of the umbilical length) cut and removed and rock covered sections decommissioned *in situ*.

Spot rock will be added to all cut ends to mitigate the potential for snagging.

In line with OPRED decommissioning guidance, all existing rock protection will remain *in situ*, including existing protection at the Bruce, Tiffany and Miller crossings along the Enoch flowlines and umbilical. Up to 502 te additional rock cover may also be required for the decommissioning activities.

All waste material will be managed in line with the waste hierarchy (reduce, reuse and recycle).

A detailed review has been conducted of the proposed Project activities, the environmental sensitivities of the project area, industry experience with decommissioning activities and of stakeholder concerns. Following this, it was determined that a more rigorous assessment of the following issues was required as part of this EA, to properly define and manage the potential impact of the proposed decommissioning activities;

- Seabed Disturbance:
  - During recovery of infrastructure, potential rock cover associated with remediate in situ activities including cutting, dredging and jet trenching, and potential over trawl sweeps / trials.
- Legacy Impacts:
  - The release of metals, plastic, and concrete as material decommissioned *in situ* degrades.
- The physical presence of infrastructure decommissioned *in situ* on other sea users, both in terms of physical exclusion and risk of snagging.
- The surrender of the existing exclusion zone for infrastructure removed.
- Emissions to Air:
  - Impact of atmospheric emissions on climate change.

A review of each of these potentially significant environmental interactions has been completed and, considering the mitigation measures that will be built into the decommissioning project activities, no significant impact is expected. As part of this review, cumulative and transboundary impacts were also assessed and determined not to be significant.

Consideration was also given to potential impacts to protected sites. The Enoch Field is over 30 km from the closest protected sites, and following the assessment it was concluded that there would be no significant impacts on any of the designating features for these sites.

The EA has considered the objectives and marine planning policies of the Scottish NMP across a range of policy topics including biodiversity, natural heritage, cumulative impacts, and oil and gas. Bridge Petroleum considers that the proposed decommissioning activities are in broad alignment with such objectives and policies of the Scottish NMP. Similarly, Bridge Petroleum considers that the proposed activities are aligned with the oil and gas specific marine planning policies for the Scottish NMP.

Based on the findings of this EA and the application of the mitigation measures identified f it is concluded that the proposed decommissioning activities will result in no significant environmental or societal impacts.

12.0 REFERENCES

Abidli, S., Pinheiro, M., Lahbib, Y., Neuparth, T., Santos, M.M., Trigui El Menif, N. (2021). Effects of environmentally relevant levels of polyethylene microplastic on Mytilus galloprovincialis (Mollusca: Bivalvia): filtration rate and oxidative stress. Environ. Sci. Pollut. Res. 28, 26643–26652.

ABPmer (2013). SEASTATES Wave Hindcast Model: Calibration and Validation Report. ABP Marine Environmental Research Ltd, Report No. R.2145. August 2013.

Admiralty (2023). Wrecks and Obstructions Shapefile. Available at: https://datahub.admiralty.co.uk/portal/apps/sites/?_gl=1*mmgmzy*_ga*NDAzODA2MjgxLjE2NTU0NzMxNjk.*_ga_8PTW8GJL1R*MTcwMTA5ODIwMC4yLjAuMTcwMTA5ODIwNy4wLjAuMA..#/marine-data-portal/items/3a234f90e54349f1b77c4b3e303f8dd4

Aires, C., Gonz lez-Irusta, J. and Watret, R. (2014). Updating Fisheries Sensitivity Maps in British Waters, Scottish Marine and Freshwater Science Report. Vol 5 No 10: Marine Scotland ISSN: 2043-7722.

Anderson, J. C., Park, B. J. & Palace, V. P., 2016. Microplastics in aquatic environments: Implications for Canadian ecosystems. Environmental Pollution, Volume 218, pp. 269-280.

Andrady, A., (2011). Microplastics in the marine environment. Marine Pollution Bulletin, 62(8), pp. 1596-1605.

Angulo, Á., Edwards, G., Soua, S. and Gan, T., (2017). Mooring Integrity Management: Novel Approaches Towards In Situ Monitoring. Structural Health Monitoring - Measurement Methods and Practical Applications.

Ansari, T.M., Marr, I.L. and Tariq, N. (2004). Heavy Metals in Marine Pollution Perspective – A Mini Review. Journal of Ap-plied Sciences, 4: 1-20.

Bai, Z. Wang, N. and Wang, M. (2021). Effects of microplastics on marine copepods. Ecotoxicology and Environmental Safety 217 (2021) 112243.

Bakir, A., Rowland, S. J. & Thompson, R. C., (2014). Enhanced desorption of persistent organic pollutants from microplastics under simulated physiological conditions. Environmental Pollution, Volume 185, pp. 16-23.

Basford, D., Elefherious, A. and Raffaelli, D. (1990). The infauna and epifauna of the northern North Sea. Netherlands Journal of Sea Research. 25: 15-173.

BEIS (2018). Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf

Benthic Solutions (2023a). Clyde Area & Enoch Environmental Survey, Enoch Habitat Assessment Report, October 2023. Report No. PRJ000836-SUB-REP-004

Benthic Solutions (2023b). Clyde Area & Enoch Environmental Survey. Enoch Survey Report. Report No. PRJ000836-SUB-REP-002

Benthic Solutions (2024). Clyde Area & Enoch Environmental Survey, Environmental Baseline and Cuttings Pile Report, February 2024. Report No. PRJ000836-SUB-REP-006

Berx, B. and Hughes, S. (2009). Climatology of Surface and Near-bed Temperature and Salinity on the North-West European Continental Shelf for 1971–2000 dataset. DOI: 10.7489/1900-1

Bridge Petroleum (2026a). Draft Enoch Subsea Decommissioning Programme. ENO-P001-GEN-DE-RE-0003.

Bridge Petroleum (2026b). Enoch Decommissioning Project – Environmental Appraisal Scoping Letter. ENO-P001-GEN-EN-RE-0004

Bringer, A., Cachot, J., Dubillot, E., Lalot, B., Thomas, H. (2021). Evidence of deleterious effects of microplastics from aquaculture materials on pediveliger larva settlement and oyster spat growth of Pacific oyster, Crassostrea gigas. Sci. Total Environ. 794, 148708.

Browne, M.A., Niven, S.J., Galloway, T.S., Rowland, S.J. and Thompson, R.C. (2013). Microplastic moves pollutants and additives to worms, reducing functions linked to health and biodiversity., s.l.: Current Biology. 23: 2388-92.

Cao, Y., Zhao, M., Ma, X., Song, Y., Zuo, S., Li, H., Deng, W.(2021). A critical review on the interactions of microplastics with heavy metals: mechanism and their combined effect on organisms and humans. Sci. Total Environ. 788, 147620.

Carter, M.I., Boehme, L., Cronin, M.A., Duck, C.D., Grecian, W.J., Hastie, G.D., Jessopp, M., Matthiopoulos, J., McConnell, B.J., Miller, D.L. and Morris, C.D. (2022). Sympatric seals, satellite tracking and protected areas: habitat-based distribution estimates for conservation and management. Frontiers in Marine Science, 9, p.875869.

CCC (2020). Committee on Climate Change's 2020 Progress Report. Available online at: https://www.gov.uk/government/publications/committee-on-climate-changes-2020-progress-report-government-response

Cetacean Stranding Investigation Programme (2022). Annual Report for the period 1st January – 31st December 2022. Available at: https://randd.defra.gov.uk/ProjectDetails?ProjectId=20759

Certain, G., Jørgensen, L.L., Christel, I., Planque, B. and Bretagnolle, V. (2015). Mapping the vulnerability of animal community to pressure in marine systems: disentangling pressure types and integrating their impact from the individual to the community level. ICES Journal of Marine Science 75: 1470-1482.

Clark, R. (1996). Oil Pollution. In Marine Pollution Third Edition, pp. 28-51.

Clarke, D.G. and Wilber, D.H. (2000). Assessment of potential impacts of dredging operations due to sediment resuspension. DOER Technical Notes Collection (ERDC TN-DOERE9), US Army Engineer Research and Development Centre, Vicksburg, MS. 2000. Available at: http://www.dtic.mil/get-tr-doc/pdf?AD=ADA377325.

Cole, M., Lindeque, P., Halsband, C., Galloway, T.S. (2011). Microplastics as contaminants in the marine environment: a review. Mar. Pollut. Bull. 62, 2588–2597.

Colebrook, J.M. (1982). Continuous plankton records: seasonal variations in the distribution and abundance of plankton in the North Atlantic Ocean and the North Sea. Journal of Plankton Research, 4(3), pp.435-462.

Collie, J.S., Hall, S.J., Kaiser, M.J. and Poiner, I.R. (2000). A quantitative analysis of fishing impacts on shelf-sea benthos. Journal of Animal Ecology. 69: 785–798.

Cosgrove, P. (1996). North Sea Bird Club 14th Annual Report. Aberdeen University.

Coull, K., Johnstone, R. and Rogers, S. I. (1998). Fisheries Sensitivity Maps in British Waters, Available from https://www.cefas.co.uk/media/52612/sensi_maps.pdf : UKOOA Ltd.

Dames & Moore Norge, JP Kenny, og Corresist AS, Long term disintegration of pipelines. (1999). Website: http://www.regjeringen.no/oed/html/rapporter/03/index.html

Desforges J.P.W., G. M. R. P. (2015). Ingestion of microplastics by zooplankton in the Northeast Pacific Ocean. Archives of Environmental Contamination and Toxicology, 69(3), pp. 320-330.

DESNZ (2021). Energy Transition Outlook 2021. Available online at https://oilandgasuk.cld.bz/Energy-Transition-Outlook-2021/3/

DESNZ (Department for Energy Security and Net Zero) (2022). Guidance notes for preparing oil pollution emergency plans. For offshore oil and gas installations and relevant oil handling facilities.

Drinkwater, K.F., Belgrano, A., Borja, A., Conversi, A., Edwards, M., Greene, C.H., Ottersen, G., Pershing, A.J. & Walker, H. (2003). The response of marine ecosystems to climate variability associated with the North Atlantic Oscillation. In: JW Hurrell, Y Kushnir, G Ottersen & M Visbeck (Eds.). The North Atlantic Oscillation: climate significance and environmental impact. Geophysical Monograph Series 134: 211-234.

EEMS (2008). Atmospheric Emissions Calculations (Issue 1.810a). 11th November 2008. Updated for private and public area of EEMS replica of Root-5 version 1.10.

Eigaard, O.R., Bastardie, F., Breen, M., Dinesen, G.E., Hintzen, N.T., Laffargue, P., Mortensen, L.O., Nielsen, J.R., Nilsson, H.C., O'Neill, F.G., Polet, H., Reid, D.G., Sala, A., Sköld, M., Smith, C., Sørensen, T.K., Tully, O., Zengin, M. and Rijnsdorp, A.D. (2016). Estimating seabed pressure from demersal trawls, seines and dredges based on gear design and dimensions. ICES Journal of Marine Science, 73(1), pp. i27 - i43.

Ellis, J.R., Milligan, S., Readdy, L., South, A., Taylor, N. and Brown, M. (2012). Spawning and nursery grounds of select fish species in UK Waters, Sci. Ser. tech. Rep. Cefas Lowestoft, 147:56 pp, Available from: https://www.cefas.co.uk/publications/techrep/TechRep147.pdf.

Eno, N.C., MacDonald, D.S., Kinnear, J.A.M., Amos, C.S., Chapman, C.J., Clark, R.A., Bunker, F.S.P.D. & Munro, C., (2001). Effects of crustacean traps on benthic fauna ICES Journal of Marine Science, 58, 11-20.

EMODnet (European Marine Observation and Data Network) (2023a). Broad-scale seabed habitat map including confidence & EUNIS & MSFD classifications (updated 6th October 2023). Available at: https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/0a1cb988-22de-48b2-8cda-d90947ef77d1

EMODnet (2023b). EMODnet Human Activities, Vessel Density Map. Available at: https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/0f2f3ff1-30ef-49e1-96e7-8ca78d58a07c

Essink, K. (1999). Ecological effects of dumping of dredged sediments; options for management. Journal of Coastal Conservation. 1999. 5: 69-80.

FeBEC (2010). Sediment Dose Response Study. Technical Report. Prepared for Femern A/S. Doc. No. E4-TR-036. 147 pp.

Gallo, F., Fossi, C., Weber, R., Santillo, D., Sousa, J., Ingram, I., Nadal, A., & Romano, D. (2018). Marine litter plastics and microplastics and their toxic chemicals components: the need for urgent preventive measures. Environmental Sciences Europe, 30(1), 13. https://doi.org/10.1186/s12302-018-0139-z.

Gardon, T., Reisser, C.L., Soyez, C., Quillien, V., Le Moullac, G.(2018). Microplastics affect energy balance and game to genesis in the pearl oyster Pinctada margaritifera. Environ. Sci. Technol. 52, 5277–5286.

Genesis (2026). Enoch Subsea Comparative Assessment Report. ENO-P001-GEN-DE-RE-0002

GESAMP (2015). "Sources, fate and effects of microplastics in the marine environment: a global assessment" (Kershaw, P. J., ed.). (IMO/FAO/UNESCO-

IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 90, 96 p.

Gilles, A, Authier, M, Ramirez-Martinez, NC, Araújo, H, Blanchard, A, Carlström, J, Eira, C, Dorémus, G, Fernández Maldonado, C, Geelhoed, SCV, Kyhn, L, Laran, S, Nachtsheim, D, Panigada, S, Pigeault, R, Sequeira, M, Sveegaard, S, Taylor, NL, Owen, K, Saavedra, C, Vázquez-Bonales, JA, Unger, B, Hammond, PS (2023). Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. https://tinyurl.com/3ynt6swa

Green, D.S., Colgan, T.J., Thompson, R.C., Carolan, J.C. (2019). Exposure to microplastics reduces attachment strength and alters the haemolymph proteome of blue mussels (Mytilus edulis). Environ. Pollut. 246, 423–434.

Guzzetti, E., Sureda, A., Tejada, S., Faggio, C. (2018). Microplastic in marine organism:environmental and toxicological effects. Environ. Toxicol. Pharmacol. 64, 164–171.

Hill, J.M., Tyler-Walters, H. and Garrard, S.L. (2018). Seapens and burrowing megafauna in circalittoral fine mud. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 28-05-2020]. Available from: https://www.marlin.ac.uk/habitat/detail/131

Hiscock, K. (1996). Marine nature conservation review: rationale and methods (coasts and seas of the United Kingdom – MNCR series). Joint Nature Conservation Committee. pp. 167.

Hiscock, K., Sharrock, S., Highfield, J., and Snelling, D. 2010. Colonization of an artificial reef in southwest England—ex-HMS 'Scylla'. Journal of the Marine Biological Association of the United Kingdom, 90: 69-94.

Hughes, D.J. (1998). Sea Pens and Burrowing Megafauna. An overview of dynamics and sensitivity characteristics for conservation management of marine SACs. Natura 2000 report prepared for Scottish Association of Marine Science (SAMS) for the UK Marine SACs Project., Scottish Association for Marine Science. (UK Marine SACs Project, Vol. 3).

Inter-Agency Marine Mammal Working Group (IAMMWG) (2022). Updated abundance estimates for cetacean Management Units in UK waters (Revised 2022). JNCC Report No. 680, JNCC Peterborough, ISSN 0963-8091.

IMO (1972). Convention on the International Regulations for Preventing Collisions at Sea (COLREGs), 1972. Available at: https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx

IPCC (2024). AR6 Synthesis Report: Climate Change. Available online at: https://ghgprotocol.org/sites/default/files/2024-08/Global-Warming-Potential-Values%20%28August%202024%29.pdf

JNCC, 2014, JNCC clarifications on the habitat definitions of two habitat Features of Conservation Importance: Mud habitats in deep water, and; Sea-pen and burrowing megafauna, Available at: http://data.jncc.gov.uk/data/91e7f80a-5693-4b8c-8901-11f16e663a12/3-

JNCC (2017). Using the Seabird Oil Sensitivity Index to inform contingency planning. Available online at https://jncc.gov.uk/our-work/seabird-oil-sensitivity-index-sosi/

JNCC and Natural England, 2016. Identifying possible Marine Conservation Zones for highly mobile species: Principles for third-party proposals. May 2016. [Online] Available at: https://data.jncc.gov.uk/data/3e7e6267-8219-4555-b83f-58d5eb1e2fdc/MCZs-highly-mobilemarine- species-2016-JNCC-NE-Web.pdf

Kennish, M. J. (1997). Pollution Impacts on Marine Biotic Communities. CRC Press LLC, USA, ISBN 0-8493-8428-1.

Khanjani M. H., Sharifinia M., Mohammadi, A. R. (2023). The impact of microplastics on bivalve mollusks: A bibliometric and scientific review. Marine Pollution Bulletin. Issue 194. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0025326X23007051

Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S, Wilson, L.J, and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs, JNCC Report 431, ISSN 0963-8091. Available at: http://jncc.defra.gov.uk/page-5622

Koelmans, A. A., Besseling, E. & Foekema, E. M., (2014). Leaching of plastic additives to marine organisms. Environmental Pollution, Volume 187, pp. 49-54.

Krasowska, K., A. Keimowska and M. Rutkowska (2015). Environmental Degradability of Polyerethanes. Found at: https://www.intechopen.com/books/thermoplastic-elastomers-synthesis-and-applications/environmental-degradability-of-polyurethanes

Leewis, R., van Moorsel, G., and Waardenburg, H. 2000. Shipwrecks on the Dutch continental shelf as artificial reefs. In A.C. Jensen, K.J. Collins and A.P.M. Lockwood (eds) Artificial reefs in European Seas. Dordrecht, The Netherlands: Kluwer Academic Publishers, pp. 419–434.

Leterme, S.C., Seuront, L. & Edwards, M. (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. Marine Ecology Progress Series 312: 57- 65.

Mattsson, K., Johnson, E.V., Malmendal, A., Linse, S., Hansson, L.-A., Cedervall, T.(2017). Brain damage and behavioural disorders in fish induced by plastic nanoparticles delivered through the food chain. Sci. Rep. 7, 11452.

McQuatters-Gollop, A., Raitsos, D.E., Edwards, M. & Attrill, M.J. (2007). Spatial patterns of diatom and dinoflagellate seasonal cycles in the NE Atlantic Ocean. Marine Ecology Progress Series 339: 301-306.

NatureScot (2016). Description of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406

Neff, J. (2002). Bioaccumulation in Marine Organisms. Effect of Contaminants from Oil Well Produced Water.

Newcombe, C.P. and Jensen, J.O.T. (1996). Channel suspended sediment and fisheries: A synthesis for quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management. (1996). Vol. 16, 4, pp. 693-727.

Nicholls, P., Hewitt, J. and Haliday, J. (2003). Effects of Suspended Sediment Concentrations on Suspension and Deposit Feeding Marine Macrofauna. NIWA Client Report ARC03267.Oil and Gas UK (OGUK) (2017). UKbenthos – database of offshore environmental surveys in the North Sea. V 5.06.

NSTA (2025). Emissions Monitoring Repore 2025. Available at: https://storymaps.arcgis.com/stories/0d057da0fdd84f8ea7f7889a918b1903

OEUK (2021). Energy Transition Outlook 2021. Available from: https://oilandgasuk.cld.bz/Energy-Transition-Outlook-2021/3/

Offshore Energies UK. Well Decommissioning Guidelines. Issue 7, November 2022.

OGUK (2013). Long term degradation of offshore structures and pipeline decommissioned and left in situ. Report no. O02=1201-RPT-001.

OGUK (2015). Oil and Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes. Published October 2015.

O'Connor, 2016. 1515S Cruise Report: Monitoring Survey of East of Gannet and Montrose Fields and Norwegian Boundary Sediment Plain Scottish Nature Conservation Marine Protected Areas. JNCC Report No. 580, JNCC, Peterborough, ISSN 0963-8091.

OPRED (2018) 'Decommissioning of Offshore Oil and Gas Installations and Pipelines– Guidance Notes. Available at: chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://assets.publishing.service.gov.uk/media/5c00f3f3e5274a0fdaaaa0f7/Decom_Guidance_Notes_November_2018.pdf

OSPAR, 2009. Background Document for ocean quahog Arctica islandica. Biodiversity Series. Publication Number: 407/2009. OSPAR Commission, London.

Pangerc, T., Robinson, S., Theobald, P. and Galley, L. (2016). Underwater sound measurement data during diamond wire cutting: First description of radiated noise. In Proceedings of Meetings on Acoustics 4ENAL (Vol. 27, No. 1, p. 040012). ASA.

Pikesley, S.K., Godley, B.J., Ranger, S., Richardson, P.B. & Witt, M.J. (2014). Cnidaria in UK coastal waters: description of spatio-temporal patterns and inter-annual variability. Journal of the Marine Biological Association of the United Kingdon 94: 1401-1408.

Pinnegar, J., Blasdale, T., Campbell, N., Coates, S., Colclough, S., Fraser, H., Greathead, C., Greenstreet, S., Neat, F., Sharp, R., Simms, D., Stevens, H. and Waugh, A. (2010). Charting Progress 2 Healthy and Biologically Diverse Seas Feeder Report: Section 3.4: Fish. Published by Department for Environment, Food and Rural Affairs on behalf of UKMMAS. P 378-505. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder report (eds. Frost, M. and Hawkridge, J.).

Powilleit, M., Graf, G., Kleine, J., Riethmuller, R., Stockmann, K., Wetzel, M.A. & Koop, J.H.E. (2009). Experiments on the survival of six brackish macro-invertebrates from the Baltic Sea after dredged spoil coverage and its implications for the field. Journal of Marine Systems, 75 (3-4), 441-451.

Reid, J., Evans, P. and Northridge, S. (2003). Atlas of Cetacean distribution in north-west European waters., Available from http://jncc.defra.gov.uk/page-2713

Rist, S.E., Assidqi, K., Zamani, N.P., Appel, D., Perschke, M., Huhn, M., Lenz, M. (2016). Suspended micro-sized PVC particles impair the performance and decrease survival in the Asian green mussel Perna viridis. Mar. Pollut. Bull. 111, 213–220.

Saha, S., *et al*. (2010), The NCEP Climate Forecast System Reanalysis, Bull. Am. Meteorol. Soc., 91(8), 1015–1057, doi:10.1175/2010BAMS3001.1.

Sana, S.S., Dogiparthi, L.K., Gangadhar, L., Chakravorty, A., Abhishek, N. (2020). Effects of microplastics and nanoplastics on marine environment and human health. Environ. Sci. Pollut. Res. 27, 44743–44756.

Scherer, C., Weber, A., Lambert, S., Wagner, M. (2018). Interactions of Microplastics with Freshwater Biota. Springer International Publishing.

Scottish Government. (2025). Feature Activity Sensitivity Tool (FeAST). Available at: https://feature-activity-sensitivity-tool.scot/

Scottish Government Marine Directorate [SGMD] (2025). Fishing Effort and Quantity and Value of Landings by ICES Rectangle. Available from: https://www.gov.scot/publications/scottish-sea-fisheries-statistics-2024/

Sharifinia, M., Bahmanbeigloo, Z.A., Keshavarzifard, M., Khanjani, M.H., Lyons, B.P.(2020). Microplastic pollution as a grand challenge in marine research: a closer look at their adverse impacts on the immune and reproductive systems. Ecotoxicol. Environ. Saf. 204, 111109.

Shi, W., Han, Y., Sun, S., Tang, Y., Zhou, W., Du, X., Liu, G. (2020). Immunotoxicities of microplastics and sertraline, alone and in combination, to a bivalve species: size dependent interaction and potential toxication mechanism. J. Hazard. Mater. 396, 122603.

Solan, M., Ward, E.R., White, E.L., Hibberd, E.E., Cassidy, C., Schuster, J.M., Hale, R., Godbold, J.A. (2019). Worldwide measurements of bioturbation intensity, ventilation rate, and the mixing depth of marine sediments. Scientific Data 6, 58. Dataset available online at https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/GBELFW

Sun, S., Shi, W., Tang, Y., Han, Y., Du, X., Zhou, W., Zhang, W., Sun, C., Liu, G.(2021). The toxic impacts of microplastics (MPs) and polycyclic aromatic hydrocarbons (PAHs) on haematic parameters in a marine bivalve species and their potential mechanisms of action. Sci. Total Environ. 783, 147003.

Tanaka, K., Takada, H., Yamashita, R., Mizukawa, K., Fukuwaka, M. and Watanuki, Y. (2013). Accumulation of plastic-derived chemicals in tissues of seabirds ingesting marine plastics. Marine Pollution Bulletin, 69(1-2), pp. 219-222.

Taylor, A.C. (1976). Burrowing behaviour and anaerobiosis in the bivalve Arctica islandica (l.). Journal of the Marine Biological Association, 56:95-109.

Teuten, E.L., Saquing, J.M., Knappe, D.R.U, Barlaz, M.A., Jonsson, S., Bjorn, A., Rowland, S.J., Thompson, R.C., Galloway, T.S., Yamashita, R., Ochi, D., Watanuki., Y., Moore, C., Viet, P.H., Tana, T.S., Prudente, M., Boonyatumanond, R., Zakaria, M.P., Akkhavong, K., Ogata, Y., Hirai, H., Iwasa, S., Mizukawa, K., Hagino, Y., Imamura, A., Saha, M. and Takada, H. , (2009). Transport and release of chemicals from plastics to the environment and to wildlife. Philosophical Transactions of the Royal Society B, Volume 364, pp. 2027-2045.

Thushari, G.G.N. and Senevirathna, J.D.M. (2020). Plastic pollution in the marine environment.

Torgeir B., Jarle K., Steinar S. (2013). Environmental impacts of produced water and drilling waste discharges from the Norwegian offshore petroleum industry, Marine Environmental Research, Volume 92, Pages 154-169. https://doi.org/10.1016/j.marenvres.2013.09.012.

Tyler-Walters, H., James, B., Carruthers, M. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. and Crawford-Avis, O.T. (2016). Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406.

Turrell, W.R., Hansen, B., Osterhus, S., Hughes, S., Ewart, K. and J. Hamilton (1999). Direct observations of inflow to the Nordic Seas through the Faroe-Shetland Channel 91994-1997), ICES CM 1999/L:o1. International Council for the Exploration of the Sea, Copenhagen.

UNEP (United Nations Environmental Programme), 2016. Marine Plastic Debris & Microplastics - Global lessons and research to inspire action and guide policy change, Nairobi: s.n.

Vieira, K.S., Baptista Neto, J.A., Crapez, M.A.C., Gaylarde, C., Pierri, B.D.S., Salda˜na-Serrano, M., Bainy, A.C.D., Nogueira, D.J., Fonseca, E.M. (2021). Occurrence of microplastics and heavy metals accumulation in native oysters Crassostrea Gasar in the Paranagu´a estuarine system, Brazil. Mar. Pollut. Bull. 166, 112225.

A. ASSESSMENT AGAINST RELEVANT POLICIES

The Project Area is regulated by the Scottish NMP (Marine Scotland, 2015). The proposed decommissioning activities detailed within this EA have been assessed against the objectives and relevant policies of the Scottish NMP (Table A-1 and Table A-2), as well as the Marine Strategy Framework Directive (MSFD) Objectives (Table A-3).

A.1 Scotland's National Marine Plan (NMP)

The Scottish NMP (Marine Scotland, 2015) covers the management of both Scottish inshore waters (out to 12 nm) and offshore waters (12 to 200 nm). The aim of the NMP is to help ensure the sustainable development of the marine area through informing and guiding regulation, management, use and protection of the NMP areas. The proposed decommissioning activities have been assessed against the NMP General (GEN) principles (Table A-1) and against the oil and gas policies (Table A-2).

Table A-1: Assessment Against Scotland NMP General Planning Principals (Marine Scotland, 2015).

Scotland's NMP Principle Number	Assessment Against Principle
GEN 1 General planning principle	
There is a presumption in favour of sustainable development and use of the marine environment when consistent with the policies and objectives of this Plan.	The proposed project is the decommissioning of an existing field. The EA assesses the impacts to the environment and to other sea users.
GEN 3 Social benefit	
Sustainable development and use which provides social benefits is encouraged when consistent with the objectives and policies of this Plan.	The EA considers impacts to other sea users in decision making e.g. fisheries. The lifecycle of the project is assessed for environmental and economic implications.
GEN 4 Co-existence	
Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision-making processes, when consistent with policies and objectives of this Plan.	Bridge Petroleum will ensure that any potential impacts on other sea users associated with the decommissioning operations will be kept to a minimum, and that liaison with other marine users will be undertaken prior to and during decommissioning activities.
GEN 5 Climate change	
Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change.	Vessel movements and therefore associated fuel use will be minimised.
GEN 9 Natural heritage	
Development and use of the marine environment must: a) Comply with legal requirements for protected areas and protected species. b) Not result in significant impact on the national status of PMF. c) Protect and, where appropriate, enhance the health of the marine area.	Decommissioning activities will take account of existing environmental surveys in the area to minimise the impact to any PMFs, priority habitats and species, and protected areas.

Scotland's NMP Principle Number	Assessment Against Principle
GEN 10 Invasive non-native species	
Opportunities to reduce the introduction of invasive non-native species to a minimum or proactively improve the practice of existing activity should be taken when decisions are being made.	All vessels will follow IMO regulations including the International Convention for the Control and Management of Ships' Ballast Water and Sediments, and will be subject to audit prior to contract award.
GEN 11 Marine litter	
Developers, users and those accessing the marine environment must take measures to address marine litter where appropriate. Reduction of litter must be taken into account by decision makers.	Contractor management plans will be in place. All vessels will follow IMO requirements.
GEN 12 Water quality and resource	
Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, MSFD or other related Directives apply.	All vessels will be IMO and MARPOL compliant such that impact severity for vessel discharges to sea is considered Minor and is not discussed further in the EA. Pipelines will be flushed in line with BAT and BEP to reduce hydrocarbon content to as low as reasonably practicable and left filled with untreated seawater. Therefore, any discharges from the pipelines are not expected to have a significant impact on the environment.
GEN 13 Noise	
Development in and use of the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects.	There will be no piling or explosive use associated with the proposed activities. Vessel noise is not expected to significantly impact on the receptors in the area.
GEN 14 Air quality	
Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits.	Given the offshore location, impacts of vessel emissions are not considered significant and will be minimised through project planning.
GEN 21 Cumulative Impacts	
Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation.	Cumulative impacts are considered in the EA and are considered proportionate to the size of the project. Cumulative impacts will be limited to impacts on climate change and those associated with the potential deposit of rock. For CA Group A, the minumum – maximum quantity of rock to be placed on the seabed will be between 10 te – 462 te. Project planning will minimise the use of vessels.

Table A-2: Assessment Against Scotland's NMP Oil and Gas Planning Policies (Marine Scotland, 2015).

Oil and Gas Marine Planning Policies	Assessment Against Policy
Oil & Gas 1	
The Scottish Government will work with DESNZ, NSTA, and the industry to maximise and prolong oil and gas exploration and production whilst ensuring that the level of environmental risks associated with these activities are regulated. Activity should be carried out using the principles of BAT and BEP. Consideration will be given to key environmental risks including the impacts of noise, oil and chemical contamination, and habitat change.	BAT will be used as a key tool for the proposed DP. Environmental risks are assessed and addressed in the EA, where necessary.
Oil & Gas 2	
Where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. Re-use or removal of decommissioned assets from the seabed will be fully supported where practicable and adhering to relevant regulatory process.	Infrastructure will be decommissioned in line with legislation in force at the time. The DP will be developed in consultation with the relevant statutory authorities and will ensure that potential effects on the environment resulting from the decommissioning activities are considered and minimised.
Oil & Gas 3	
Supporting marine and coastal infrastructure for oil and gas developments, including for storage, should utilise the minimum space needed for activity and should take into account environmental and socio-economic constraints.	The proposed decommissioning project is located over 230 km from the nearest coastline such that this principle is not relevant.
Oil & Gas 5	
Consenting and licensing authorities should have regard to the potential risks, both now and under future climates, to oil and gas operations in Scottish waters, and be satisfied that installations are appropriately sited and designed to take account of current and future conditions.	The infrastructure will be decommissioned in a way that there will not be a significant impact on the physical, biological, or socio-economic environment. The DP will be developed in consultation with the relevant statutory authorities and will ensure that potential effects on the environment resulting from the decommissioning activities are considered and minimised.
Oil & Gas 6	
Consenting and licensing authorities should be satisfied that adequate risk reduction measures are in place, and that operators should have sufficient emergency response and contingency strategies in place that are compatible with the National Contingency Plan (NCP) and the Offshore Safety Directive.	The proposed decommissioning Project has been subject to this EA process, and potential environmental impacts have been assessed and appropriate mitigation measures developed. The work will be undertaken under an approved OPEP and safety case.

A.2 Marine Strategy Framework Directive (MSFD)

The aim of the European Union's MSFD is to protect more effectively the marine environment across Europe. The MSFD outlines a transparent, legislative framework for an ecosystem-

based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' (GES) by 2020 across Europe's marine environment. Note that following the UK's exit from the EU, the UK has made amendments to the Marine Strategy Regulations 2010, which transpose the requirements of the EU's Marine Strategy Framework Directive into domestic law, so that they continue to be effective now that the UK is no longer part of the EU.

The MSFD does not state a specific programme of measures that Member States should adopt to achieve GES, except for the establishment of MPAs. The MSFD does, however, outline 11 high level descriptors of GES in Annex I of the Directive. The proposed decommissioning activities have been assessed against each of the GES descriptors, details of which can be found in Table A-3.

Table A-3: Assessment Against MSFD Objectives.

MSFD: GES Objectives	Assessment Against Objective[1]
GES 1	
Biological diversity is maintained and recovered where appropriate. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	Linked to GEN 9. Environmental surveys have been undertaken in the project area.
GES 2	
Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.	All vessels will follow IMO regulations including the International Convention for the Control and Management of Ships' Ballast Water and Sediments, and will be subject to audit prior to contract award.
GES 3	
Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.	Linked to GEN 9. Environmental surveys have been undertaken in the project area.
GES 4	
All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.	Linked to GEN 9. Environmental surveys have been undertaken in the project area.
GES 5	
Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.	Linked to GEN 9. Environmental surveys have been undertaken in the project area.
GES 6	
Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are	Linked to GEN 9. Environmental surveys have been undertaken in the project area.

MSFD: GES Objectives	Assessment Against Objective[1]
not adversely affected.	
GES 7	
Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.	Linked to GEN 12. Seabed disturbance and potential impact on marine ecosystems have been assessed in this EA.
GES 8	
Concentrations of contaminants are at a level not giving rise to pollution effects.	Linked to GEN 12. The proposed activities will not result in the noticeable deterioration of water quality in the project vicinity.
GES 9	
Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.	Linked to GEN 12. The proposed activities will not result in the noticeable deterioration of water quality in the project vicinity.
GES 10	
Properties and quantities of marine litter do not cause harm to the coastal and marine environment.	Linked to GEN 11. Contractor management plans will be in place. All vessels will follow IMO requirements.
GES 11	
Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	Linked to GEN 13. The proposed activities will not result in a noticeable prolonged period of increased underwater noise in the project vicinity.
[1] The MSFD GES Objectives has been assessed as part of the scoping ENVID, then carried forward to be assessed in the EA if deemed necessary.	

B. IMPACT ASSESSMENT METHODOLOGY

In order to determine the impacts that the Enoch Subsea Decommissioning Project may have on the environment an ENVironmental and socio-economic impact IDentification (ENVID) Workshop was undertaken. The purpose of the ENVID was to identify the significance of the environmental and social impacts associated with the planned activities and the significance of the environmental and social risks associated with unplanned events. Appropriate mitigation measures, controls and safeguards to minimise these impacts/risks were also identified during the workshop.

This Appendix presents the Environmental and Socio-Economic Impact Assessment (ESIA) and the Environmental and Socio-Economic Risk Assessment (ESRA) matrices used to determine the impact of the planned and potential unplanned activities (respectively) associated with the decommissioning of the Enoch subsea installations and associated infrastructure.

B.1 Receptors and Aspects

Prior to carrying out the ESIA / ESRA the potential receptors likely to be impacted were identified (Section 6), and the ways in which the activities may interact with the environment, i.e. the "aspects" (Section 3) were ascertained.

B.1.1 Environmental and Socio-Economic Receptors

Where relevant, the following environmental receptors were considered in the ENVID for each activity:

- Air quality;
- Climate;
- Water quality;
- Plankton;
- Sediment quality;
- Benthic communities;
- Fish;
- Marine mammals;
- Birds;
- Designated areas;
- Cultural heritage (e.g. wrecks).
- Shipping;
- Fisheries;
- Resource availability (e.g. landfill and fuel); and
- Local communities (e.g. yard activities);

B.1.2 Identification of Aspects

Where relevant, the aspects considered in the ENVID for the different activities included:

- Physical Presence/ interactions with other sea users;
- Emissions to Air;
- Discharges to Sea;
- Seabed Disturbance;
- Underwater Noise;
- Waste Generation;
- Resource Use;
- Dismantling Yard Activities;
- Legacy Impacts; and
- Unplanned Events.

The aspects associated with each activity were assessed in terms of their impact on the receptors in the area. For example, the use of vessels will result in atmospheric emissions, discharges to sea, underwater noise, physical presence/interaction with other sea users and,

if anchored, seabed and habitat disturbance. Receptors potentially impacted by these aspects include air quality, climate, marine mammals, birds, other users of the sea, and benthic communities (if anchored).

B.2 ESIA for Planned Activities

The significance of the environmental/social impact of planned activities on each of the susceptible receptors is derived by considering the 'Receptor Sensitivity' in relation to the 'Magnitude of Effect' of the aspect.

B.2.1 Receptor Sensitivity

Four categories of Receptor Sensitivity are applied ranging from 'Low' to 'Very High' as shown in Table B-1.

Table B-1: Receptor Sensitivity.

CATEGORY	ENVIRONMENTAL DEFINITION
(a) Low	**Flora/Fauna/Habitats - within the impacted area** • Population sizes are considered to be of little to no geographical importance. • Species do not have designated conservation status and are of International Union for Conservation of Nature (IUCN) 'Least Concern'. • No designated habitat/sites. • Impacted species are widespread in the North East Atlantic region. **Air quality:** Emissions may impact on other nearby installations. **Water quality**: Open offshore water body. **Cultural heritage sites**: Site integrity is already compromised. **Resource availability:** (e.g. landfill sites, diesel use) Renewable and/or abundant. **Third party users:** have capacity to absorb change without impact.
(b) Medium	**Flora/Fauna/Habitats – within the impacted area** • Significant numbers of at least one receptor of national importance (e.g. Priority Marine Features (PMFs – Scotish waters) and Features of Conservation Importance (FOCI- English waters). • Significant numbers of a species which is listed as IUCN 'Near Threatened'. • Nationally designated habitat/sites. • Species may be of regional value. **Air quality**: Populated areas nearby. **Water quality**: Semi-enclosed water body with good flushing. **Cultural heritage sites:** Site is of local heritage importance. **Resource availability**: (e.g. landfill sites, diesel use) Renewable and/or available. **Third party users:** have capacity to absorb change without significant impact.
(c) High	**Flora/Fauna/Habitats – within the impacted area** • Significant numbers of at least one receptor of regional (European) importance (e.g. Annex II / IV species and Oslo and Paris Convention for the Protection of the Marine environment of the North-East Atlantic (OSPAR) designations). • Significant numbers of a species which are listed as IUCN 'Vulnerable'. • Designated habitats/sites (e.g. OSPAR designations and Annex I habitats, Marine Protected Areas (MPA) Networks; Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites etc.). • Locally distinct sub-populations of some species may occur.

CATEGORY	ENVIRONMENTAL DEFINITION
	Air quality: Densely populated areas nearby. **Water quality:** Semi-enclosed water body with limited flushing. **Cultural heritage sites:** Site is of regional heritage importance. **Resource availability:** (e.g. landfill sites, diesel use) Not renewable and/or limited availability. **Third party users:** have low capacity to absorb change and significant impact is likely to occur.
(d) Very High	**Flora/Fauna/Habitat – within the impacted area** • Significant numbers of at least one receptor of international importance. • Significant numbers of a species which are listed as IUCN 'Endangered' or 'Critically Endangered'. • Designated habitats/sites (e.g. OSPAR designations and Annex I habitats, Marine Protected Areas (MPA) Networks; Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites etc.) (as for High (c)). • At least one receptor is endemic (unique) to the area. **Air quality:** Very densely populated area with sensitive receptors such as schools and hospitals. **Water quality:** Enclosed water body with no flushing. **Cultural heritage sites:** Site is of international heritage importance. **Resource availability:** (e.g. landfill sites, diesel use) Not renewable and/or scarce availability. **Third party users:** have no capacity to absorb change e.g. unemployment due to long term closure of fisheries.

B.2.2 Climate Change

With respect to GHG emissions, climate is considered a global receptor rather than a local receptor. This is because the sensitivity status of climate is considered to be 'Very High' in line with the 2024 Climate Change Report produced by the Intergovernmental Panel on Climate Change (IPCC,2024).

B.2.3 Magnitude of Effect

Definitions for the Magnitude of Effect on the receptors are presented in Table B-2. Prior to determining the Magnitude of Effect, industry recognised 'base case' mitigation measures are assumed to be applied e.g. on mobilisation of vessels to carry out the work, Bridge Petroleum will notify other sea users.

Table B-2: Magnitude of Effect.

MAGNITUDE LEVEL		DESCRIPTION	
		ENVIRONMENTAL IMPACT	SOCIAL IMPACT
0	**Positive/No effect** *Regulatory compliance or Company goals are not a concern.*	**No environmental concerns** • Positive environmental impact e.g. retaining a 500 m zone resulting in a 'protected area'. • No significantly negative environmental effects.	**No public concerns** • Possible enhancement in the availability of a resource benefitting the persons utilising the area e.g. removal of 500 m zones results in return of access to fishing grounds. • No impacts on sites or features of cultural heritage. • No impact on resource or landfill availability.
1	**Negligible** *Regulatory compliance or Company goals are not breached.*	**Negligible environmental effects** • Any effects are unlikely to be discernible or measurable and will reverse naturally. • No beaching or transboundary impacts.	**Limited local public awareness and no concerns** • An intermittent short-term decrease in the availability of a resource which is unlikely to be noticed e.g. vessels working out-with existing 500 m exclusion zones could temporarily impact on a shipping route or fishing area. • Undiscernible changes to a site or feature of cultural heritage that do not affect key characteristics and are not above background changes. • Undiscernible use of a resource (e.g. diesel, rockcover or landfill).
2	**Minor** *Possible minor breach of regulatory compliance.*	**Minor, localised, short term, reversible effect** • Any change to the receptor is considered low, would be barely detectable and at same scale as existing variability. • Recover naturally with no Company intervention required. • No beaching or transboundary impacts	**Some local public awareness and concern** • A temporary (<1 year) decrease in the availability or quality of a resource e.g. access to fishing grounds may temporarily be inhibited due to presence of vessels. • Minor changes to a site or feature of cultural heritage that do not affect key characteristics. • Minor use of a resource (e.g. diesel, rockcover or landfill).
3	**Serious** *Possible moderate breach of regulatory compliance.*	**Detectable environmental effect within the project area** • Medium localised changes to the receptor are possible. • Localised Company response may be required. • No beaching or transboundary impacts.	**Regional / local concerns at the community or stakeholder level which could lead to complaints** • Medium decrease in the short-term (1-2 years) availability or quality of a resource affecting usage e.g. bring a rig on site for 1-2 years. • Nuisance impacts e.g. marine growth odour coming from yards. • Partial loss of a site or feature of

MAGNITUDE LEVEL		DESCRIPTION	
		ENVIRONMENTAL IMPACT	SOCIAL IMPACT
			cultural heritage. • Moderate use of a resource (e.g. diesel, rockcover or landfill).
4	**Major effect** *Possible major breach of regulatory compliance.*	**Severe environmental damage extending beyond the project area** • High, widespread mid-term (2-5 years) degradation of the receptor. • Company response (with Corporate support) required to restore the environment. • Possible beaching and / or transboundary impacts.	**National stakeholder concerns leading to campaigns affecting the Company's reputation** • High mid-term (2-5 year) decrease in the availability or quality of a resource affecting usage e.g. closure of fishing grounds. • Substantial loss or damage to a site or feature of cultural heritage. • High use of a resource (e.g. diesel, rockcover or landfill).
5	**Critical effect** *Major breach of regulatory compliance resulting in project delays and prosecution.*	**Persistent severe environmental damage** • Very high, widespread long-term (>5 years) degradation to the receptor that cannot be readily rectified. • Major impact on the conservation objectives of internationally/nationally protected sites. • Full Corporate response required. • Major beaching and/or transboundary impacts.	**International public concern and media interest affecting the Company's reputation** • Very high decrease in availability of a resource and potentially livelihood of users for > 5 years e.g. *hydrocarbons on beaches affecting tourism or tainting of fish resulting in the long-term closure of fishing grounds.* • Total loss of a site or feature of cultural heritage. • Significant use of a resource (e.g. diesel, rock cover or landfill).

B.2.4 Environmental / Socio-Economic Impact Significance

The 'Receptor Sensitivity' and the 'Magnitude of Effect' are combined using the matrix presented in Table B-3 to determine the level of impact for planned activities.

Table B-3: Impact Significance Matrix for Planned Activities.

		Receptor Sensitivity			
		(a) Low	(b) Medium	(c) High	(d) Very high
Magnitude of Effect	(0) Positive/No effect				
	(1) Negligible				
	(2) Minor				
	(3) Serious				
	(4) Major				
	(5) Critical				

(i) Positive / No effect significance	• Positive or no environmental or social impact. • No public interest or positive public support.
(ii) Low significance	• No/negligible environmental and social impact. • No concerns from consultees.
(iii)Moderate significance	• Discernible environmental and social impacts. • Requirement to identify project specific mitigation measures. • Concerns by consultees which can be adequately addressed by the Company.
(iv)High significance	• Substantial environmental and social impacts. • Serious concerns by consultees requiring Corporate support. • Alternative approaches should be identified.

B.3 ESIA For Unplanned Events

To determine the environmental and social risk of an unplanned event, the following approach considers firstly, the significance of the environmental impact of an event should it occur and secondly, the likelihood of the event occurring.

B.3.1 Environmental and Social Significance of an Unplanned Event

The ESIA approach described above for determining the environmental and social impacts of planned activities is also used to determine the significance of impacts that may result from unplanned events.

B.3.2 Likelihood of an Unplanned Event

Five categories of 'likelihood' have been identified as presented in Table B-4.

Table B-4: Likelihood of an Unplanned Event.

LIKELIHOOD CATEGORY	DEFINITION
Extremely Remote	Has never occurred within industry or similar industry but theoretically possible.
Remote	Similar event has occurred elsewhere but unlikely to occur with current practices
Unlikely	Event has occurred in the industry during similar activities.
Possible	Event could occur during project activities.
Likely	Event is likely to occur more than once during the project.

B.3.3 Environmental Risk of an Unplanned Event

Combining the significance of the environmental/social impact with the 'likelihood of the unplanned event occurring' allows the level of environmental risk to be determined using the matrix presented in Table B-5. Note the potential for a beneficial impact significance has been removed as it is not expected that an unplanned event would lead to a beneficial environmental or social impact.

Table B-5: ESRA Matrix for Unplanned Activities.

		Environmental significance of unplanned event*		
		(ii) Low	**(iii) Moderate**	**(iv) High**
Likelihood of event	**Extremely remote**	Low	Low	Low
	Remote	Low	Low	Medium
	Unlikely	Low	Medium	Medium
	Possible	Low	Medium	High
	Likely	Low	High	High

*Note the numbers associated with each significance level range from (ii) to (iv) in keeping with assignment in Table B-3.

Low risk	• Negligible environmental and social risks. • Mitigation measures are industry standard and no project specific mitigation required. • No consultee concerns.
Medium risk	• Discernible environmental and social risks. • Consultee concerns can be adequately resolved. • Local public interest.
High risk	• Significant environmental and social risks. • Serious consultee concerns. • Media interest and reputational impacts.