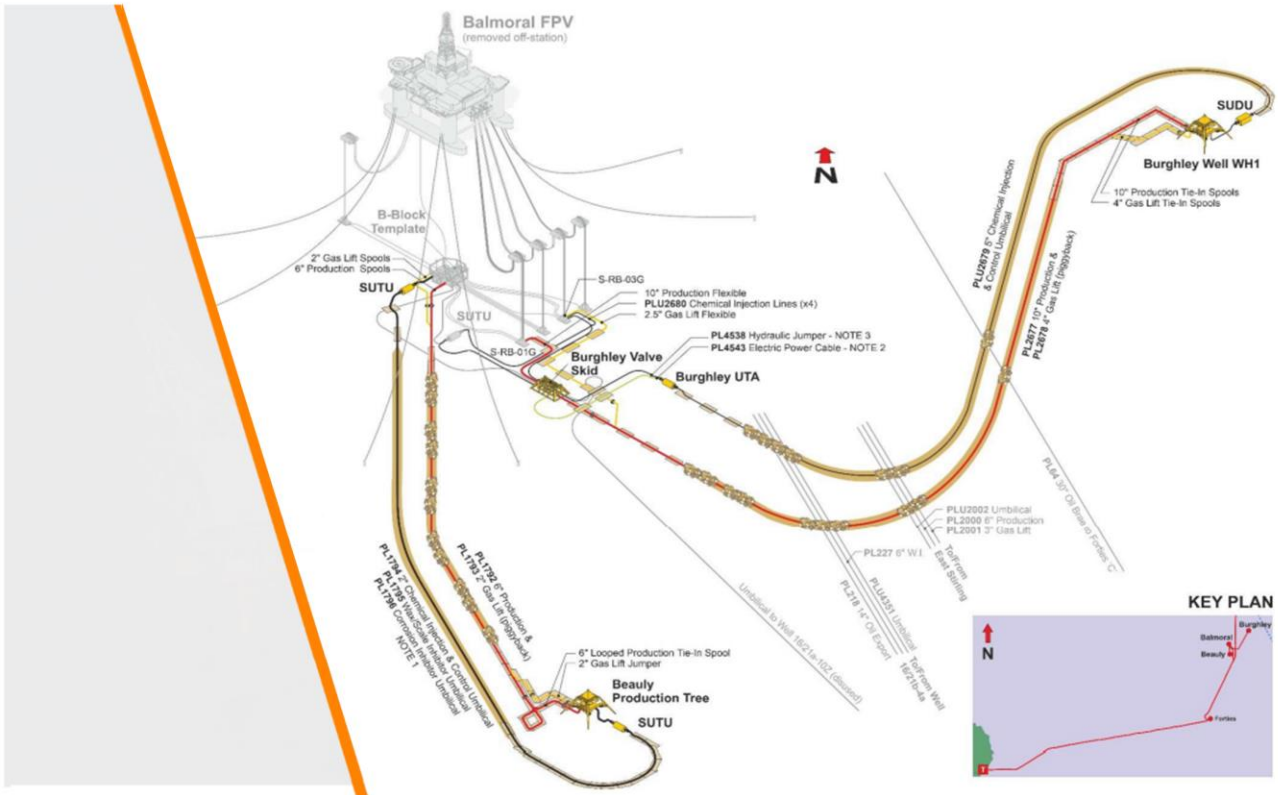

BEAULY & BURGHLEY DECOMMISSIONING PROGRAMMES

Environmental Appraisal

Consultation Draft

October 2022

Repsol Sinopec Resources UK
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SUMMARY INFORMATION SHEET

<table>
<tr><td>Project Name</td><td>Beauly and Burghley Fields Decommissioning Environmental Appraisal</td></tr>
<tr><td>Block No</td><td>Block Numbers 16/21c and 15/22</td></tr>
<tr><td>Type of Project</td><td>Decommissioning</td></tr>
<tr><td>Undertaker</td><td>Repsol Sinopec Resources UK Limited.,
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<tr><th>Field</th><th>Company</th><th>% Equity</th></tr>
<tr><td rowspan="4">Beauly</td><td>Repsol Sinopec North Sea Limited</td><td>60%</td></tr>
<tr><td>Rockrose UKCS4 Limited</td><td>40%</td></tr>
<tr><td>Idemitsu Kosan Co., Ltd.*</td><td>0%</td></tr>
<tr><td>Repsol Sinopec Resources UK Limited*</td><td>0%</td></tr>
<tr><td rowspan="4">Burghley</td><td>Repsol Sinopec North Sea Limited</td><td>29.895%</td></tr>
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<tr><td>Rockrose UKCS4 Limited</td><td>41.1006%</td></tr>
<tr><td colspan="3">*These Section 29 holders are included here as they are documented in Part A of the current Section 29 Notice (dated 13/12/16), however they have no equity interest and are subsequently not owners.</td></tr>
</table>
</td></tr>
<tr><td>Short Description</td><td>This document considers the environmental and socio-economic impact of the activities associated with the decommissioning of the Beauly and Burghley fields in the central North Sea. Each field comprises a single well which was tied back to the Premier Oil operated Balmoral Floating Production Vessel (FPV). From the FPV the hydrocarbons were exported via the Forties Pipeline System.

Both fields are now in the decommissioning phase. Production from the fields ceased in November 2020. The Balmoral FPV has already been removed from the field.

Infrastructure at the Beauly and Burghley fields comprises trenched and buried pipelines and umbilicals, surface laid subsea structures, well head protection structures (WHPS), surface laid spools and jumpers and stabilisation features (mattresses, grout bags and rock cover). All surface laid structures, spools and jumpers will be fully removed. In line with the results of a Comparative Assessment the trenched and buried pipelines will be decommissioned in situ with the exposed end sections remediated. The trenched and buried umbilicals will either be fully removed or will be decommissioned in situ with the exposed ends remediated. All exposed mattresses and grout bags will be recovered as long as it is safe to do so. Existing rockdump will be decommissioned in situ.

The impact assessment presented in this Environmental Appraisal determined that there are no significant environmental or socio-economic impacts associated with the proposed decommissioning activities.</td></tr>
<tr><td>Company Document Reference No.</td><td>RP-DTABAB001-HS-0018</td></tr>
<tr><td>EA Prepared by</td><td>Repsol Sinopec Resources UK Limited and Genesis Energies.</td></tr>
</table>

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EXECUTIVE SUMMARY

The Beauly and Burghley fields lie in the central North Sea (CNS) *c*. 220 km from Aberdeen and *c*. 19 km from the Norwegian/UK median line. As operator, Repsol Sinopec Resources UK Limited has prepared this Environmental Appraisal (EA) under the Petroleum Act 1998, in support of two draft Decommissioning Programmes (DPs) that are being submitted to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to seek approval for the following decommissioning works:

- DP 1 covers the Beauly subsea installation, flowlines and umbilical; and
- DP 2 covers the Burghley subsea installations, flowlines and umbilical.

Given that the fields are in the same geographical area, the two draft DPs are supported by a single Comparative Assessment (CA) Report and a single EA Report.

Background Information

The Beauly field was discovered in 1998 and first oil was achieved in 2001. The field is located in Block 16/21c of the CNS. The Beauly field development comprises a single subsea production well, tied back to the Balmoral template, *c*. 5 km to the north-west, via a single 6" production pipeline, a piggybacked 2" gas lift pipeline and an umbilical. The Beauly pipelines are trenched and buried with rock placement along the pipeline length. The umbilical is trenched and buried.

The Burghley field, located in Block 16/22, was discovered in 2005 and commenced production in 2010. It also comprises a single production well tied back to the Balmoral template via a 10" production pipeline, a piggybacked 4" gas lift pipeline and an umbilical. The pipelines and umbilical are trenched and buried. The pipeline has rock placement at crossings and where required to prevent upheaval buckling. The Burghley field is c. 9 km north-east of the Balmoral template.

Both fields were tied back to the Balmoral template in Block 16/21a and were produced via the Premier Oil operated Balmoral Floating Production Vessel (FPV) as shown in Figure 1. From the FPV, the hydrocarbons were exported to shore via the Forties Pipeline System. The FPV has already been removed from the field. At the time of writing the Balmoral template and the associated risers and riser bases remain on the seabed. These are covered under Premier Oil's Balmoral Decommissioning Programmes (Premier Oil, 2021).

The Beauly and Burghley wells are currently suspended. The subsea infrastructure and pipelines have been cleaned to reduce the hydrocarbons to a low as reasonably practicable and are currently filled with filtered seawater. The production and gas lift pipelines and the control umbilicals have been disconnected at the Xmas trees and at the Balmoral template.

Both fields are now in the decommissioning phase. Production from the fields ceased in November 2020.

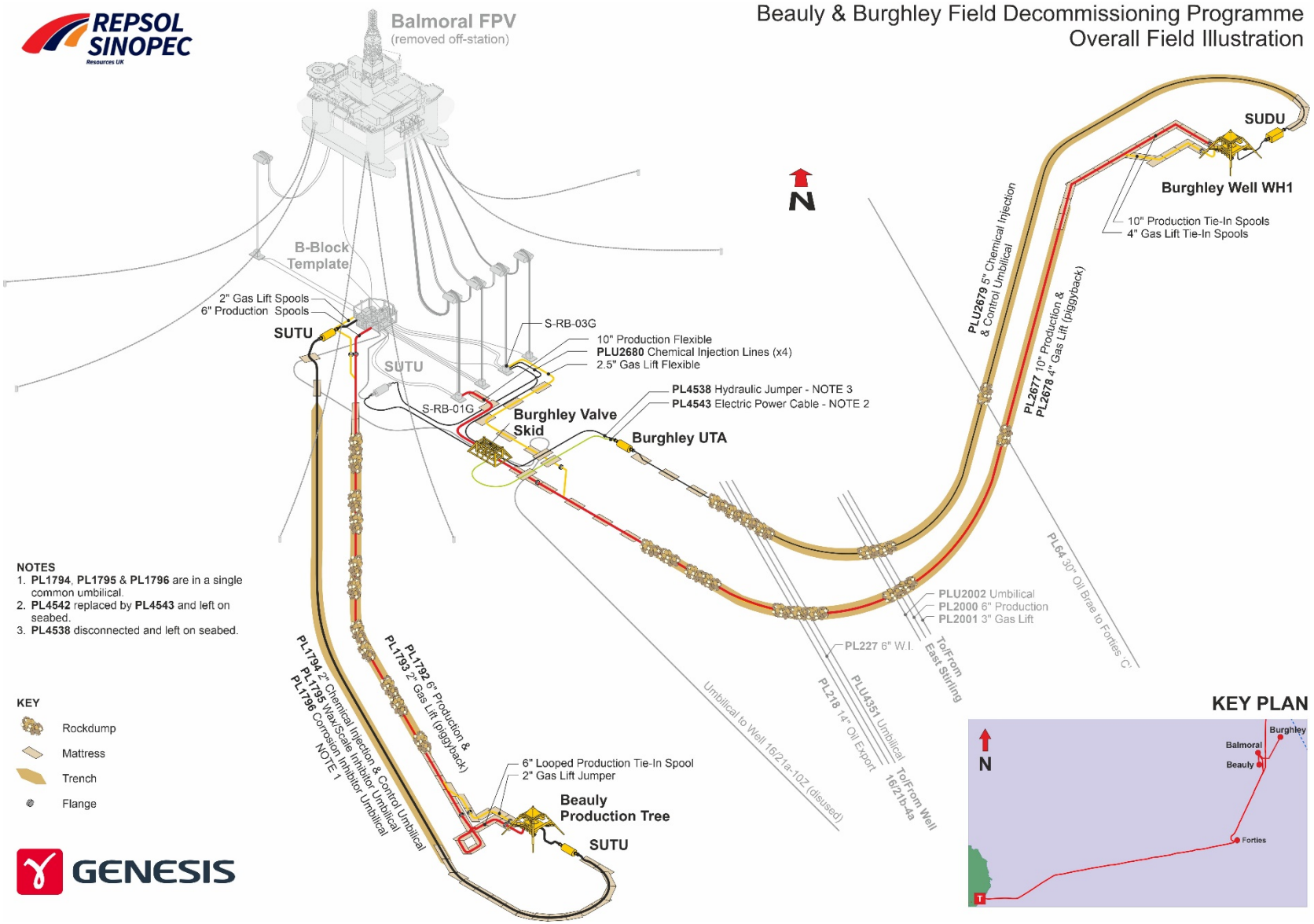


Figure 1: Representative schematic of the Beauly and Burghley fields.

Stakeholder Engagement

In June 2022, as part of the informal stakeholder engagement process Repsol Sinopec Resources UK Limited issued a Scoping Report (Repsol Sinopec Resources UK Limited, 2022d) to a number of stakeholders. The Scoping Report provided an overview of the Beauly and Burghley fields, the proposed decommissioning activities and an overview of the impacts to be assessed in this EA. Stakeholders were invited to comment on the Scoping Report with respect to any concerns they may have, and comments received have been addressed in this report.

Decommissioning Activities

All subsea structures, spools and jumpers, and any exposed mattresses and exposed 25 kg grout bags will be fully recovered. A CA workshop was carried out to determine the best method of decommissioning the pipelines and umbilicals associated with the Beauly and Burghley fields. The trenched and buried pipelines will be decommissioned *in situ* with the exposed ends remediated to prevent potential snagging by fishing gear. The trenched and buried umbilicals will be either fully removed or decommissioned *in situ* with the exposed ends remediated. Preference will be given to either 'trench and bury' or 'cut and recover' the exposed ends, however the CA did also identify the use of rock cover as a suitable remediation option. Existing rock cover will be decommissioned *in situ*.

If following the Contracts & Procurement process, the option to rock cover is selected, *c*. 6,255 te of rock will be required to remediate these pipeline and umbilical ends. Repsol Sinopec Resources UK Limited will consult with OPRED and seek relevant approvals prior to any rock being laid.

Following recovery and remediation activities, Repsol Sinopec Resources UK Limited will get independent verification of a safe seabed. This will be achieved by either non-intrusive survey techniques or over trawl trials. The decision will be made in consultation with OPRED.

Environmental and Socio-Economic Baseline

Repsol Sinopec Resources UK Limited commissioned a pre-decommissioning environmental survey at the Beauly and Burghley fields in 2017.

Water depths vary from *c*. 135 m at the Burghley wellhead to *c*. 146 m at the Beauly wellhead. The sediments across the area comprise mud and sandy mud and represent the habitat type 'offshore circalittoral mud'.

At some locations there is potential presence of the sensitive habitat 'sea pens and burrowing megafauna communities'. Juveniles of the Scottish Priority Marine Feature (PMF) *Arctica islandica* occurred at about half of the sample stations but no adult specimens were observed either in samples or on the seabed. No other sensitive habitats were identified.

There is some evidence of contamination from drilling fluids at the wellhead locations and a cuttings pile exists at the Balmoral template.

Plankton, benthic and fish species in the area are typical of the CNS. Of the fish species known to occur in the area, anglerfish, herring, mackerel, ling, blue whiting, cod, saithe, sandeels and whiting are Scottish PMFs.

Minke whale, harbour porpoise, Atlantic white-sided dolphin, white-beaked dolphin and killer whale are among the cetacean species recorded in the area. All cetaceans in UK waters are European Protected Species such that it is an offence to deliberately disturb, capture, injure or kill any of these species. Harbour porpoise is also protected under Annex II of the Habitats Directive.

A number of seabird species are known to occur in the area including (but not limited to) black-legged kittiwake, northern fulmar, Atlantic puffin and northern gannet.

Fishing gear types associated with the area include both demersal and pelagic gear. Available fishing effort and landings data suggests the area is relatively important to the UK fishing industry.

Relative to other areas within the UKCS, shipping activity is considered very low in Blocks 16/21 and 16/22. There are no offshore windfarm developments or military exercise areas in the vicinity of the two fields.

Impact Assessment

In order to determine the significance of the impact of the proposed decommissioning activities an ENVironmental Issues IDentification (ENVID) was undertaken. Receptors considered included: air quality, water quality, sediment quality, plankton, benthic species, fish, marine mammals, seabirds, fisheries, shipping, landfill resources 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 items (buried pipelines and umbilicals and surface laid rock cover) to be decommissioned *in situ* were considered on each of the receptors.

Applying industry standard mitigation measures (see Table 1), the impact significance of each of the planned activities was considered to be Low. Following scoping of the ENVID results, a further assessment was carried out on

1) the impacts of the potential seabed disturbance associated with the proposed activities, and

2) the legacy impacts associated with decommissioning the buried pipelines and umbilical, and the surface laid rock cover *in situ*.

In both cases the results of this further assessment aligned with the initial results of the ENVID Workshop and concluded that, with the application of industry standard mitigation measures, the impact significance is Low with respect to seabed disturbance and legacy impacts (both environmental and socio-economic).

Environmental Management

The Beauly and Burghley Decommissioning Project will be aligned to Repsol Sinopec Resources UK Limited's goal to 'minimise the impact to the environment'.

Atmospheric emissions will be managed by inspection 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. 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 a safe seabed will be provided to all relevant governmental and non-governmental organisations. A post-decommissioning environmental survey will be carried out following decommissioning activities to establish the condition in which the seabed is left. An ongoing monitoring survey strategy will be agreed with OPRED, the aim of which will be to verify recovery of the seabed and that the pipelines and umbilical 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.

Table 1 lists procedural and technical controls and mitigation measures identified by the Project to reduce impacts to a level that is 'as low as reasonably practicable'.

Table 1: Decommissioning of Beauly and Burghley: project specific commitments.

Aspect	Commitment
Physical presence	• Ongoing consultation with Scottish Fishermen's Federation (SFF). • Notice to mariners will be circulated. • Vessel use will be optimised. • A Collision Risk Management Plan will be produced if required. • All vessels engaged in the project operations will have markings and lightings as per the International Regulations for the Prevention of Collisions at Sea (COLREGS) (International Maritime Organisation, 1972). • A clean seabed will be achieved as part of the decommissioning activities. • If used, rock cover will be optimised and carefully managed. A fall pipe will be used to ensure accuracy of the rock placement. Size of rock cover will be in accordance with industry practice and SFF preference. • Location of remaining material will be mark on FishSAFE.
Atmospheric emissions and energy use	• As part of the tendering 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 minimise vessel use. • Prior to the contract award, Repsol Sinopec Resources UK Limited will audit the decommissioning yards to ensure suitable permits are in place and that atmospheric emissions are being managed. • Activities will be carried out in line with Repsol Sinopec Resources UK Limited's environmental policy which includes minimising emissions.
Discharges to sea	• Repsol Sinopec Resources UK Limited will carry out a detailed assurance process on all vessels prior to contract award. • Work procedures will be in place to minimise offshore campaigns. • Only MARPOL compliant vessels will be used. • Flushing and cleaning of pipelines and umbilicals has been completed in line with Best Available Technique (BAT)/Best Environmental Practice (BEP) requirements. • All contracted vessels will be signed up to the International Maritime Organisation (IMO) and will adhere to their guidelines. • Any associated discharges will be managed to minimise impact.
Physical disturbance of the seabed and marine species	• Cutting/jetting/dredging and lifting procedures will be in place. • With respect to remediation on the exposed ends of the buried pipelines and umbilical, trench and bury or cut and recover will be prioritised over rock cover. • If rock cover is used, volumes will be minimised, and a fallpipe will be used to lay it on the seabed. • With respect to determining a safe seabed status after decommissioning activities are completed, independent verification will be required. This will be achieved by either non-intrusive survey techniques or over trawl trials. The decision will be made in consultation with OPRED.
Onshore activities	• Contract award will be to an established yard with appropriate experience, capability, licences, consents and community engagement in place.
Waste generation and resource use	• The Beauly and Burghley Decommissioning Project will have in place a Waste Management Plan (WMP) developed to describe and quantify waste arising from decommissioning activities and identify available disposal options for those wastes. • Waste management options will take account of the waste hierarchy.

Aspect	Commitment
	• As part of Repsol Sinopec Resources UK Limited's Duty of Care, contract award will be to an established yard with appropriate experience, capability, licences and consents in place.
Accidental events	• Any infrastructure decommissioned *in situ* will be marked on FishSafe and communicated accordingly. • Work procedures in place. • Vessel assurance inspections. • Pre-hire vessel audits. • Emergency response plans in place including the Balmoral OPEP (oil pollution emergency plan) and SOPEPs (shipboard oil pollution emergency plan).

Conclusion

This EA has assessed the environmental and socio-economic impacts associated with the proposed Beauly and Burghley decommissioning activities in the context of the environment within which the fields are 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 safe for fishermen.

In addition, the EA 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. Repsol Sinopec Resources UK Limited considers that the proposed decommissioning activities are in broad alignment with such objectives and policies.

ACRONYMS

%	Percent
‰	Parts per Thousand
<	Less than
>	More than
≥	More than or equal to
°C	Degrees Centigrade
µm	Micrometre
µg/g	Micrograms per Gram
AHV	Anchor Handling Vessel
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
BAC	Background Assessment Concentration
BAT	Best Available Technique
BC	Background Concentration
BEIS	(Department for) Business, Energy and Industrial Strategy
BEP	Best Environmental Practice
c.	Circa
CA	Comparative Assessment
cm	Centimetre
CMID	Common Marine Inspection Documents
CNS	Central North Sea
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COLREGS	International Regulations for the Prevention of Collisions at Sea
C&P	Contracts and Procurement
CoP	Cessation of Production
CRA	Collision Risk Assessment
DP	Decommissioning Programme
DSV	Dive Support Vessel
E	East
EA	Environmental Appraisal
EAC	Environmental Assessment Criteria
EEMS	Environmental Emissions and Monitoring System
EIA	Environmental Impact Assessment
ENVID	ENVironmental issues IDentification
EPS	European Protected Species
ERL	Effects Range Low
ESAS	European Seabirds at Sea
ESIA	Environmental and Socio-Economic Impact Assessment
ESRA	Environmental and Socio-Economic Risk Assessment
EU	European Union
EUNIS	European Nature Information System
FPSO	Floating Production Storage and Offloading unit
FPV	Floating Production Vessel
GEN	National Marine Plan General Policies
GHG	Greenhouse Gases
HLV	Heavy Lift Vessel
HPVC	Hard Polyvinyl Chloride
HSE	Health, Safety and Environmental
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 (leasing round)
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	Kilometre
km^2	Kilometre squared
kW/m	Kilowatts per Metre
L	Length
m	Metre

m^2	Metre squared
m^3	Metre cubed
MAS	Marine Assurance System
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCZ	Marine Conservation Zone
mg/kg	Milligrams per kilogram
mg/l	Milligrams per litre
mm	Millimetre
MPA	Marine Protected Area
m/s	Metres per Second
MSS	Marine Scotland Science
MU	Management Units
N	North
N/A	Not Applicable
NCMPA	Nature Conservation Marine Protected Area
ng.g-1	Nanograms per gram
nm	Nanometre
nm	Nautical mile
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NOAA	National Oceanic and Atmospheric Administration
NORM	Naturally Occurring Radioactive Material
NOx	Nitrogen oxides
NSTA	North Sea Transition Authority (previously OGA)
NTF	Not Technically Feasible
OEUK	Offshore Energies UK (previously OGUK)
OGA	Oil and Gas Authority (now NSTA)
OGUK	Oil and Gas UK (now OEUK)
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
P&A	Plug and Abandonment
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PMF	Priority Marine Feature
POP	Persistent Organic Pollutant
ppb	Parts per billion
PPC	Pollution Prevention and Control
ppm	Parts per million
PWA	Pipeline Works Authorisation
RAG	Red-Amber-Green
ROV	Remotely Operated Vehicle
ROVSV	Remotely Operated Vehicle Support Vessel
S	South
SAC	Special Area of Conservation
SCANS	Small Cetacean Abundance in the North Sea
SACFOR (scale)	Super abundant, abundant, common, frequent, occasional, rare and present
SEEMP	Ship Energy Efficiency Management Plan
SEMS	Safety and Environmental Management System
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SIMOPS	Simultaneous Operations
SMRU	Sea Mammal Research Unit
SNH	Scottish Natural Heritage (now NatureScot)
SO	Screened Out
SO_x	Sulphur Oxides
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Area
SSS	Side Scan Sonar
SUDU	Subsea Umbilical Distribution Unit
SUTU	Subsea Umbilical Termination Unit
Te / te	Tonnes
te/day	Tonnes per day

THC	Total Hydrocarbon Concentration
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UKCS	United Kingdom Continental Shelf
UKOOA	UK Offshore Operators Association (now OEUK)
UTA	Umbilical Termination Unit
UV	Ultraviolet
w	Width
W	West
WBM	Water Based Mud
WGS	World Geodetic System
WHPS	Wellhead Protection Structure
WMP	Waste Management Plan
yr	Year

1. INTRODUCTION

The Beauly and Burghley fields are located in Blocks 16/21c and 15/22 respectively in the central North Sea (CNS), *c*. 220 km from Aberdeen and *c*. 19 km from the Norwegian/UK median line (Figure 1-1). The fields are wholly owned and operated by Repsol Sinopec Resources UK Limited. Repsol Sinopec Resources UK Limited has prepared this Environmental Appraisal (EA) under the Petroleum Act 1998, in support of two draft Decommissioning Programmes (DPs) that are being submitted to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to seek approval for the following decommissioning works:

- DP 1 covers the Beauly subsea installation and pipelines (Repsol Sinopec Resources UK Limited, 2022a); and
- DP 2 covers the Burghley subsea installations and pipelines (Repsol Sinopec Resources UK Limited, 2022b).

Given that the fields are in the same geographical area, the two draft DPs are supported by a single Comparative Assessment (CA) Report (Repsol Sinopec Resources UK Limited, 2022c) and a single EA Report.

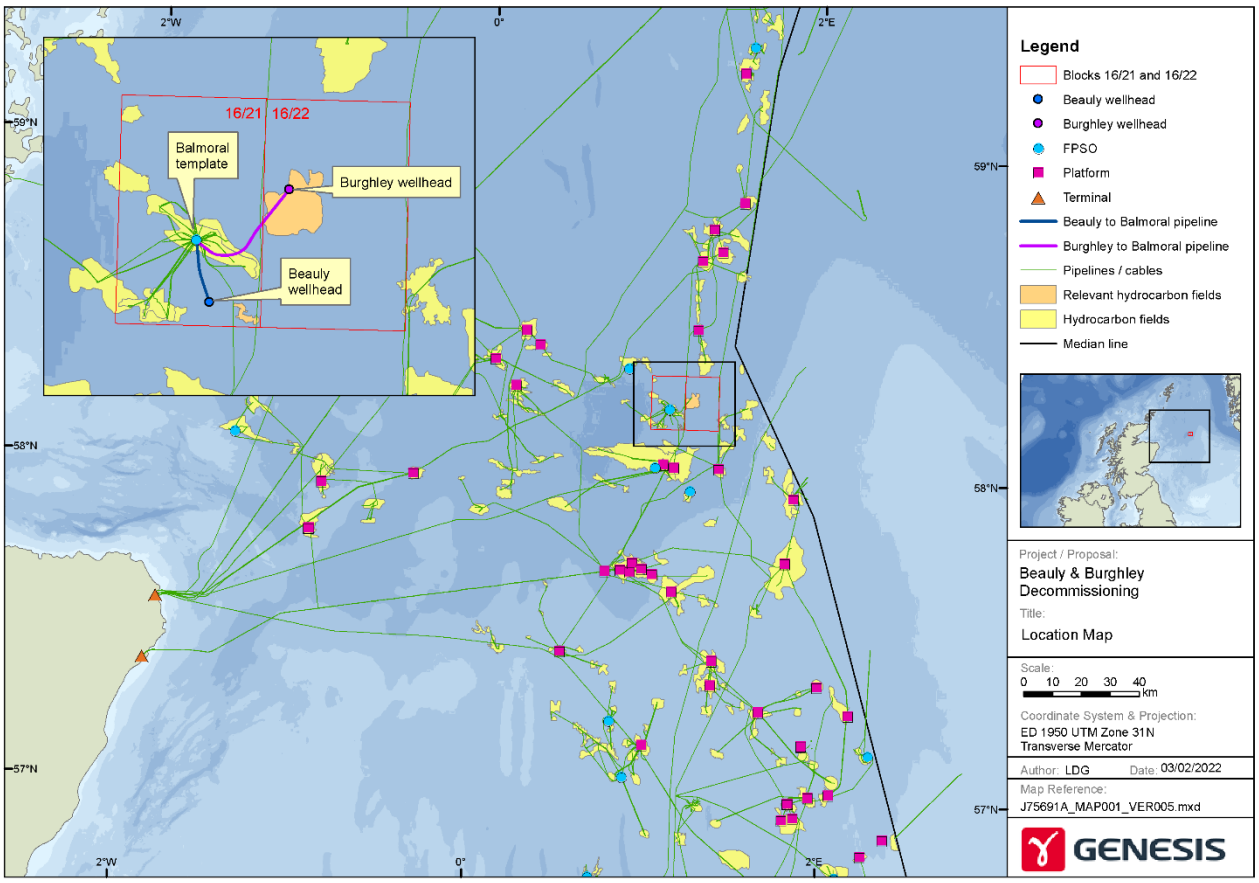


Figure 1-1: Location of the Beauly and Burghley fields.

1.1 Overview of the Beauly and Burghley Fields

The Beauly field, located in Block 16/21c of the CNS was discovered in 1998 and first oil was achieved in 2001. The Beauly field development comprises a single subsea horizontal production well, tied back to the Balmoral template, *c*. 5 km to the north-west, via a single 6” production pipeline, a piggybacked 2” gas lift pipeline and an umbilical. The Beauly pipelines are trenched and buried with rock placement along the pipeline length. The umbilical is trenched and buried.

The Burghley field, located in Block 16/22, was discovered in 2005 and commenced production in 2010. It also comprises a single production well tied back to the Balmoral template via a 10” production pipeline, a piggybacked

4" gas lift pipeline and an umbilical. The pipelines and umbilical are trenched and buried. The pipeline has rock placement at crossings and where required to prevent upheaval buckling. The Burghley field is *c*. 9 km north-east of the Balmoral template.

Both fields were tied back to the Balmoral template in Block 16/21a and were produced via the Premier Oil operated Balmoral Floating Production Vessel (FPV) as shown in Figure 1-2. From the FPV, the hydrocarbons were exported to shore via the Forties Pipeline System. The FPV has already been removed from the field, although the Balmoral template and the associated risers and riser bases remain on the seabed. These are covered under Premier Oil's Balmoral Decommissioning Programmes (Premier Oil, 2021) and are therefore out with the scope of this EA.

The Beauly and Burghley wells are currently suspended. The subsea infrastructure and pipelines have been flushed and cleaned to reduce oil in water content to as low as reasonably practicable and are currently filled with filtered seawater. The production and gas lift pipelines and the control umbilicals have been disconnected at the Xmas trees and at the Balmoral template.

Figure 1-2 illustrates the infrastructure associated with the two DP scopes (greyed-out infrastructure is out with the scope). Infrastructure captured in the draft DPs comprises:

- Beauly integrated well head protection structure (WHPS);
- Beauly pipelines, umbilical, subsea umbilical termination units (SUTU[1]) and surface laid spools/ jumpers;
- Burghley valve skid;
- Burghley integrated WHPS;
- Burghley pipelines, umbilical, subsea umbilical distribution unit (SUDU[2]), umbilical termination unit (UTA[3]) and surface laid spools/ jumpers; and
- Protection materials associated with both fields including rockdump, mattresses and grout bags.

1.2 Purpose of the Document

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

1.3 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). 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) requires that operators aim to achieve a safe seabed and robustly assess decommissioning options, based on evidence and data, using the CA process.

The decommissioning of offshore oil and gas infrastructure (including pipelines) in the United Kingdom Continental Shelf (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 undertaking the decommissioning activities described. This EA has been prepared to meet this requirement.

[1] The SUTU is a small inline termination which is not deemed a structure and will be decommissioned along with the umbilical.
[2] The SUDU is a small inline termination which is not deemed a structure and will be decommissioned along with the umbilical.
[3] The UTA is a small termination assembly which will be decommissioned along with the umbilical.

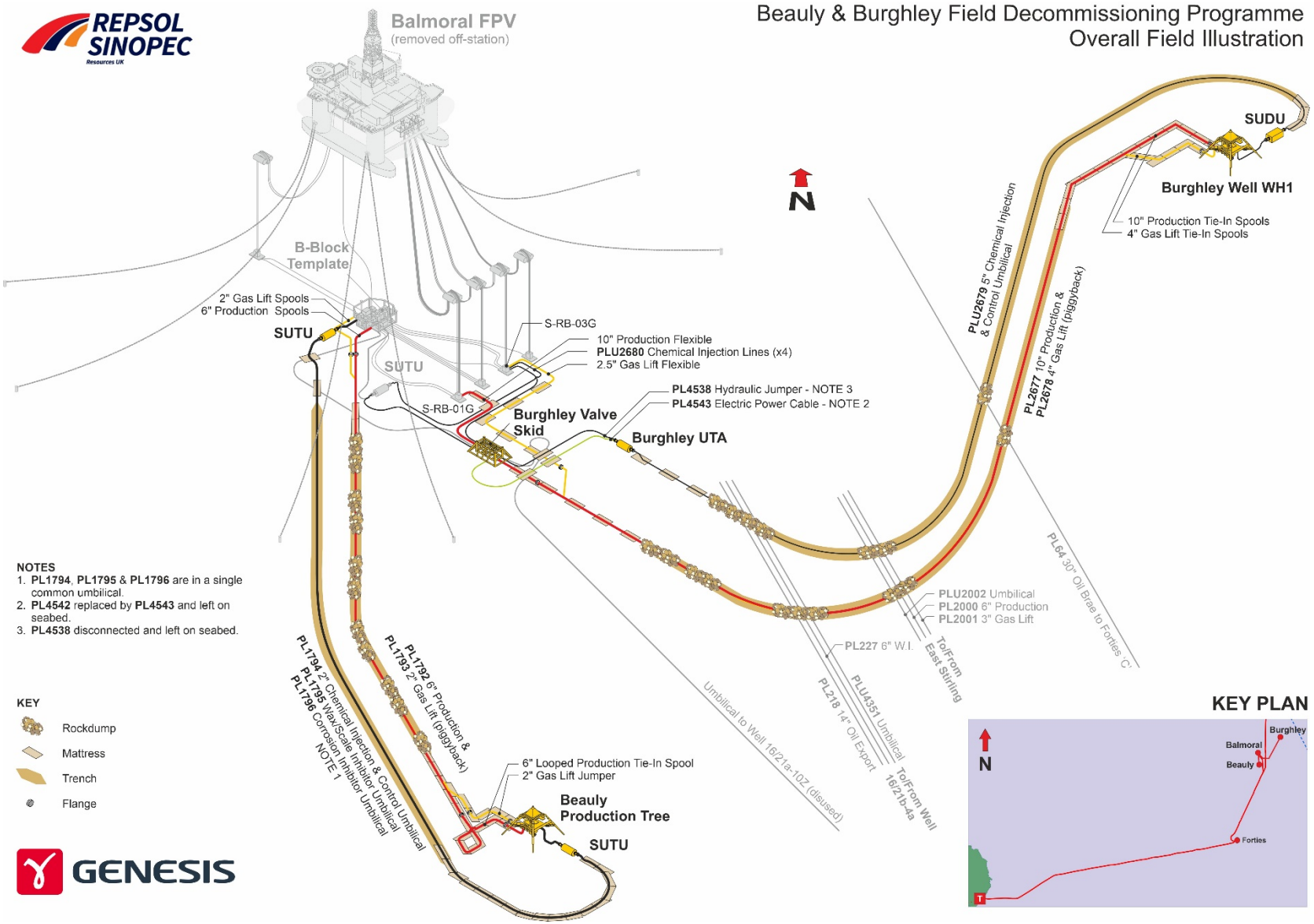


Figure 1-2 Representative schematic of the Beauly and Burghley fields.

1.4 Document Layout

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

Table 1-1: Structure of the EA Report.

Chapter No.	Title	Contents
	Non-Technical Summary	A summary of the EA Report.
1	Introduction	Introduction to the project and scope of the EA. This chapter 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 results of the CA carried out for the pipelines and umbilicals.
5 and 6	Environmental and Socio-Economic Baseline	A description of the environmental (Chapter 5) and socio-economic (Chapter 6) receptors in the area.
7	Scoping of Potential Environmental 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) Workshop and justification for selecting those aspects not requiring further assessment in the EA. Justification is also provided for those aspects that are assessed further.
8 to 9	Assessment of Aspects	Assessment of seabed disturbance during operations (Chapter 8); and physical presence with respect to legacy impacts on other sea users and on the environment (Chapter 9).
10	Environmental Management	A description of Repsol Sinopec Resources UK Limited's Environmental Management Procedures and how they apply to the Beauly and Burghley Decommissioning Project.
11	Conclusions	Key findings including a register of commitments.
12	References	Data sources used to support the EA.
Appendix A:		Impact Assessment Methodology.

2. 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. In June 2022, as part of the informal stakeholder engagement process, Repsol Sinopec Resources UK Limited issued a Scoping Report (Repsol Sinopec Resources UK Limited, 2022d) to stakeholders. The Scoping Report provided an overview of the Beauly and Burghley fields, the proposed decommissioning activities and an overview of the impacts to be assessed in this EA. Stakeholders were invited to comment on the Scoping Report with respect to any concerns they may have. Table 2-1 identifies the stakeholders and captures the comments received.

The formal statutory and public consultation process will be triggered by the submission of the consultation draft of the DPs and supporting documents (including this EA report) to OPRED. As the project progresses further consultation will be undertaken in line with the Beauly and Burghley Decommissioning Project's Stakeholder Engagement Plan.

Table 2-1: Comments received on Scoping Report.

Date of contact	Comments / Issues / Concerns
OPRED Environmental Management Team (EMT)	
29/06/2022	OPRED requested that the following are included in the EA: – Target oil in water content achieved during flushing and cleaning of lines; – Impacts associated with overtrawl trials. OPRED requested that the following are included in the environmental and socio-economic baselines: – Sensitivity of receptors – are they in decline, increasing, at risk etc; – Seabed – note habitat designated as PMF, OSPAR listed; – Metocean conditions – include current speed in particular; – Socio economic – proximity to other oil and gas decommissioning, live assets, other development e.g., cables, wrecks, MoD restrictions, shipping/ fishing intensity etc; – Benthic communities – potential for OSPAR listed habitat (SACFOR), any *A. islandica*? – Screening out of fish species which are unlikely given sediment type, note any IUCN listed species; – Marine mammals – are pinnipeds screened out due to distance from shore? OPRED requested that the following potential environmental impact and risks are included: – Cumulative impact; – Transboundary impact as appropriate; – Climate – any emissions reduction initiatives to achieve net zero including vessel net zero initiatives etc. – Include residual risks; – Long term impacts from in situ decommissioning. *Response: Repsol Sinopec Resources UK Limited confirm that these issues have been included in the EA as appropriate.*
Maritime and Coastguard Agency (MCA)	

Date of contact	Comments / Issues / Concerns
19/07/2022	The MCA advised that they expect interaction with other marine users/impact on shipping and navigation to be considered as part of the EA. MCA advised they have no significant concerns to raise on the understanding that a Risk Assessment (Shipping and Navigation) and Collision Risk Management Measures will be. *Response: Repsol Sinopec Resources UK Limited confirm that interaction with other users is assessed in the EA and that a navigation risk assessment and collision risk assessment will be undertaken and measures put in place as needed.* The MCA advised that the following requirements are also likely to be applied: Commencement of Works a) The UK Hydrographic Office (UKHO) and the Maritime Coastguard Agency (MCA) must be informed at least 48 hours in advance of the commencement of the Works. b) Kingfisher Information Services and local operators must be informed at least two weeks in advance of the date of commencement of the Works. If determination of the application is made within two weeks prior to of the commencement of the Works, Kingfisher Information Services and Local Operators must be notified immediately following issue of the consent. *Response: Repsol Sinopec Resources UK Limited confirm that the UKHO, MCA, Kingfisher Information Services and local operators will be advised of the commencement of works.* *Local Notifications will include the start date, duration, nature of activity including an image on a nautical chart, details of precautions, the potential impact on shipping and contact details. All local notifications will be sent to the UKHO and MCA as required.*
Other consultees that received the Scoping Report	
The following consultees acknowledged receipt of the Scoping Report but did not have any comments: • Joint Nature Conservation Committee • Marine Scotland • UKHO. At the time of writing, feedback on the Scoping Report had not been received from: • Health and Safety Executive • North Sea Transition Authority (Decommissioning) • Scottish Environmental Protection Agency • Scottish Fishermen's Federation.	

3. PROJECT DESCRIPTION

This section describes the Beauly and Burghley infrastructure to be decommissioned and outlines the proposed decommissioning activities.

3.1 Beauly and Burghley Field Overview

As described in Section 1.1 the Beauly field development comprises a single subsea horizontal production well tied back to the Balmoral template via a single 6" production pipeline, a piggybacked 2" gas lift pipeline and an umbilical. The Beauly pipelines are trenched and buried with rock placement along most of pipeline length. The umbilical is trenched and buried.

The Burghley field also comprises a single production well tied back to the Balmoral template via a 10" production pipeline, a piggybacked 4" gas lift pipeline and an umbilical. The pipelines and umbilical are trenched and buried. The pipeline has rock placement at crossings and where required to prevent upheaval buckling.

Both fields were produced via the Premier Oil Operated Balmoral FPV. From the FPV the hydrocarbons were transported to the Forties Charlie platform via a *c*. 14.5 km export line (PL218). The Balmoral FPV has already been moved off-station and the risers are laid on the seabed. The Beauly and Burghley wells are currently suspended. The subsea infrastructure, pipelines and umbilicals have been disconnected at the Xmas trees and at the Balmoral template. They have been flushed and cleaned to reduce oil in water content to as low as reasonably practicable and are filled with filtered seawater or, in the case of some of the umbilical cores, water based hydraulic fluid.

The template and associated risers and riser bases are covered by Premier Oil's Balmoral DPs and are out with the scope of this EA. The drill cuttings pile at the Balmoral template is also outwith the scope of the Beauly and Burghley DPs and this EA.

Decommissioning of the Beauly and Burghley fields will comprise removal of the subsea infrastructure and all surface laid jumpers and tie-in spools. Where technically feasible and safe to do so, all mattresses and grout bags will also be recovered. The infrastructure captured by the Beauly and Burghley DPs is illustrated in Figure 1-2. Sections 3.2.4 and 3.2.5 provide details of this infrastructure and describe the proposed decommissioning activities.

Cuttings were discharged during the drilling of each of the wells. Survey data (described further in Section 5) shows evidence of discharged cuttings at the Beauly and Burghley wellheads, however in line with OSPAR Recommendation 2006/5, these cuttings are not considered to have formed a pile due to the small volumes[1].

3.2 Proposed Activities

3.2.1 Schedule

Repsol Sinopec Resources UK Limited propose to progress well plug and abandonment and decommissioning activities in line with the indicative schedule shown in Figure 3-1.

[1] Note: OSPAR 2006/5 defines cuttings pile as 'an accumulation of cuttings on the seabed which has been derived from more than one well'.

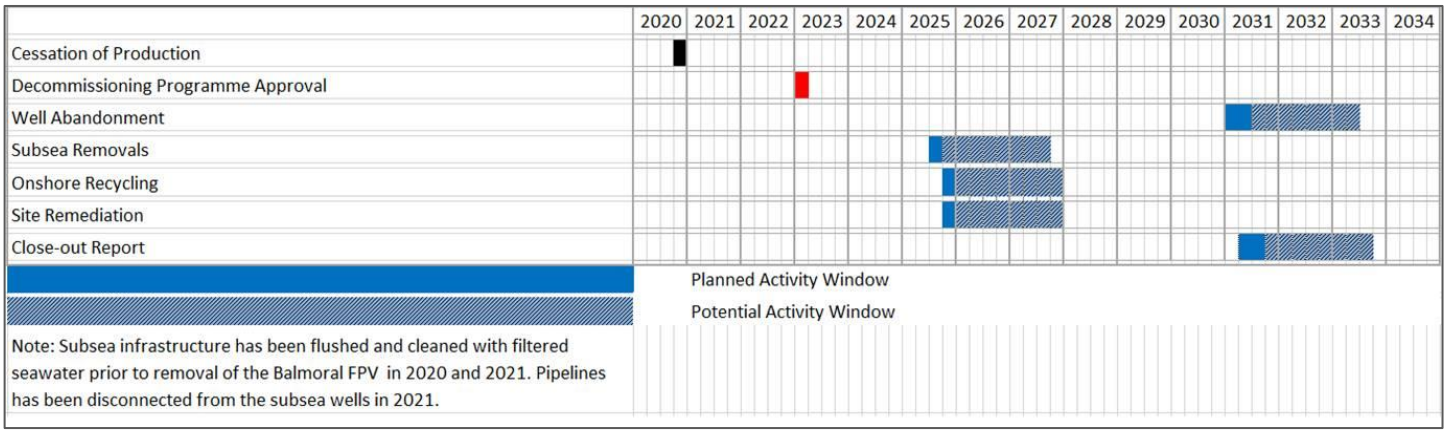


Figure 3-1: Indicative schedule for the Beauly and Burghley decommissioning project.

3.2.2 Preparatory Works

The Beauly and Burghley production pipelines have been flushed and cleaned. Sampling and testing was carried out to determine the oil in water content of the subsea pipelines and infrastructure. The final three samples from Beauly had oil in water content of 10.7 mg/l, 7.6 mg/l and 7.2 mg/l. The final three samples from the Burghley flushing had oil in water content of 7.9 mg/l, 15.4 mg/l and 14.7 mg/l. The pipelines (production and gas lift) were left filled with filtered seawater. The chemical cores within the umbilicals have either been flushed with filtered seawater or contain water based hydraulic fluid (Aqualink 300).

Prior to disconnection / recovery activities chemical permit applications will be submitted to OPRED seeking consent for the discharge of the umbilical contents.

3.2.3 Well Abandonment

The Beauly and Burghley wells will be abandoned in accordance with the Offshore Energies UK (OEUK) well decommissioning guidelines (OGUK, June 2018) and Repsol Sinopec Resources UK Limited standards.

3.2.4 Decommissioning of the Subsea Installations

The subsea structures covered by this EA are the Beauly integrated WHPS, the Burghley integrated WHPS and the Burghley valve skid. Although the integrated WHPSs are included in the DPs, they will be decommissioned as part of the well plug & abandonment programme.

3.2.4.1 Integrated WHPSs

The integrated WHPSs protect the Xmas trees and prevent damage to fishing gear. The Beauly integrated WHPS has a footprint of 5.6 m x 5.6 m and is 4.12 m high. It weighs approximately 32.9 te (in air). The Burghley integrated WHPS has a footprint of 9.2 x 9.2 m and is 5.2 m high. It weighs approximately 51.5 te (in air). The WHPSs are composed of carbon steel and will be removed as part of the wells plug and abandonment scope.

3.2.4.2 Burghley Valve Skid

The Burghley valve skid (Figure 3-2) houses subsea controls for the Burghley well. Mudmats prevent the structure from sinking into the seabed and a roof panel provides protection for the control modules within.

It has a footprint of 9.2 m x 7.7 m and is 4.1 m high. It weighs approximately 48.2 te (in air). The valve skid comprises mainly carbon steel with some aluminium alloy, sacrificial anodes and miscellaneous/ plastic coatings.

It is assumed that the valve skid will be recovered using a single lift.

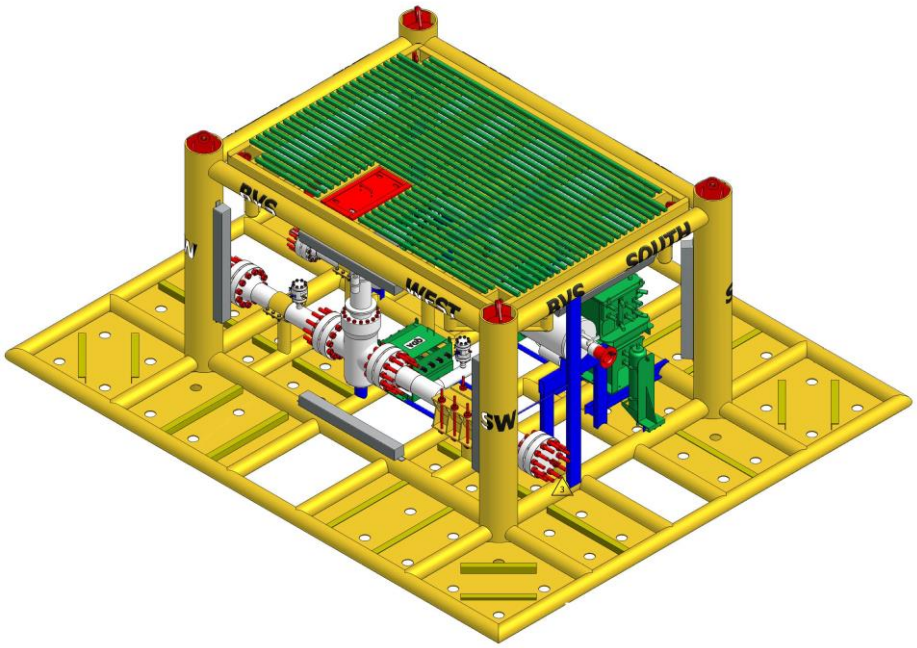


Figure 3-2: Burghley Valve Skid (isometric view looking north east).

3.2.5 Decommissioning of the Pipelines and Umbilicals

3.2.5.1 Pipelines and Umbilicals

Table 3-1 summarises the pipelines and umbilicals associated with the Beauly and Burghley fields (information is taken from Table 2.3 of the draft DPs). The table shows which pipelines/ umbilicals were surface laid and which were trenched and buried.

A CA was carried out to determine the optimal approach to decommissioning the pipelines and umbilicals. The CA approach and results are detailed in the CA report (Repsol Sinopec Resources UK Limited, 2022c) and summarised in Chapter 4 of this report.

In line with the results of the CA, Table 3-2 summarises the fate of the pipelines and umbilicals. Repsol Sinopec Resources UK Limited proposes to decommission the trenched and buried pipelines *in situ* with the exposed pipeline ends cut and recovered to shore. The trenched and buried umbilicals will be either decommissioned *in situ* with the exposed ends remediated or they will be fully removed and recovered to shore. All surface laid spools and jumpers will be recovered to shore.

Table 3-2 provides summary details of the exposed lengths associated with the trenched and buried pipelines which will be decommissioned *in situ* and the umbilicals which may be decommissioned *in situ*. The CA process identified that the best approach to remediating the exposed pipeline and umblical end sections is cut and recover, however the other remediation options were also deemed to be acceptable as discussed in Section 4 and Table 3-2.

Table 3-1: Pipelines and umbilicals associated with the Beauly and Burghley fields (Repsol Sinopec Resources UK Limited, 2022a & 2022b).

Description	Pipeline Number (as per PWA)	Length (km)[2]	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status[3]	Current Content
Beauly 6" main production pipeline	PL1792	5.264	Carbon steel, plastics, coating, alloy	Oil	Beauly wellhead to Balmoral template	Trenched and buried to > 0.6 m with rock dump on 4.3 km of length at 36 locations	Filtered seawater
Beauly 2" gas lift pipeline (piggy backed[4])	PL1793	5.275	Carbon steel, plastics, coating, alloy	Gas	Balmoral template to Beauly wellhead	Trenched and buried to > 0.6 m with rock dump on 4.3 km of length at 36 locations	Filtered seawater
Beauly umbilical	PL1794/ PL1795/ PL1796[5]	5.392	Carbon steel, plastics, coatings	n/a	Balmoral template to Beauly wellhead	Trenched and buried to average depth 0.64 m	Filtered seawater, Aqualink 300
Burghley 10" main production pipeline	PL2677	10.480	Carbon steel, stainless steel, plastics, coating, alloy	Oil	Burghley wellhead to riser base at Balmoral	Trenched and buried to > 0.6 m. Rockdump for crossings and upheaval buckling (UHB)	Filtered seawater
Burghley 4" gas lift pipeline (piggy backed[6])	PL2678	10.500	Carbon steel, stainless steel, plastics, coating, alloy	Gas	Riser base at Balmoral to Burghley wellhead	Trenched and buried to > 0.6 m. Rockdump for crossings and UHB	Filtered seawater

[2] Pipeline lengths include corresponding spools and jumpers where applicable.

[3] Burial status, when quoted 'trenched and buried' is for the main pipeline/ umbilicals (jumpers and spool pieces are surface laid).

[4] Beauly gas lift pipeline is piggy backed onto Beauly main production pipeline.

[5] Although the umbilical cores have been allocated separate pipeline numbers in the PWA, all cores are within a single common umbilical.

[6] Burghley gas lift pipeline is piggy backed onto Burghley main production pipeline.

Description	Pipeline Number (as per PWA)	Length (km)[2]	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status[3]	Current Content
Burghley control/chemical umbilical	PLU2679	10.470	Carbon steel, plastics, coatings, copper	n/a	Burghley SUTU at Balmoral to Burghley SUDU	Trenched and buried to average 0.57 m. Rock dump at crossings	Filtered seawater, Aqualink 300
Chemical jumper bundle	PLU2680	0.101	Carbon steel, plastics, coatings	n/a	SUTU at Balmoral to Balmoral riser base	Surface laid	Filtered seawater
Hydraulic jumper (redundant[7])	PL4538	0.055	Carbon steel, plastics, coatings	n/a	Burghley valve skid to Burghley UTA	Surface laid	Filtered seawater, Aqualink 300
Electric power cable (redundant[8])	PL4542	0.057	Carbon steel, plastics, coatings	n/a	Burghley valve skid to Burghley UTA	Surface laid	-
Electric power cable	PL4543	0.057	Carbon steel, plastics, coatings	n/a	Burghley valve skid to Burghley UTA	Surface laid	-
Miscellaneous jumper bundles[9] at Balmoral, associated with the Burghley field tie-back.	n/a	0.451	Carbon steel, plastics, coatings	n/a	Various between Burghley SUTU, Burghley UTA, Burghley valve skid and Balmoral riser base	Surface laid	-

[7] PL4538 replaced with PL4539 in 2018 (PL4538 remains disconnected on the seabed but PL4539 was returned to shore in 2021 such that liability for PL4539 has been removed)

[8] PL4542 replaced with PL4543 in 2017 (both remain on the seabed)

[9] Miscellaneous jumper bundles do not have pipeline numbers associated with them. They are all surface laid and will be removed.

Table 3-2: Proposed decommissioning methods for the Beauly and Burghley pipelines and umbilicals.

PIPELINE/UMBILICAL	PROPOSED DECOMMISSIONING METHOD
CA Group A PL1792 / PL1793 Beauly production and gas lift pipelines; and PL2677 / PL2678 Burghley production and gas lift pipelines.	To be decommissioned *in situ*. All pipelines in this group are rigid trenched and buried lines. The lines were installed with a minimum depth of cover of around 0.6 m. There is no evidence of spans and there is no evidence of snagging on the pipelines since they were first installed. Total length of pipelines is 15,744 m. At each end of each pipeline there is an exposed section where the pipelines exit the trench. Combined these exposed end sections have a length of 276.5 m. These sections will be remediated by cut and recover. Approximately 4,300 m of PL1792/PL1793 is rock covered. PL2677/PL2678 is rock covered at crossings and for UHB.
CA Group B PL1794/1795/1796 Beauly umbilical; and PLU2679 Burghley umbilical.	Umbilicals in this group are trenched and buried and will be either: - fully recovered to shore; or - decommissioned *in situ* with ends remediated. PLU1794/1795/1796 is 5.392 km long and is buried to an average depth of 0.64 m. There is no rock cover over this umbilical. PLU2679 is 10.470 km long and is buried to an average depth of 0.57 m with rock cover at crossings and for UHB. There is no evidence of spans and there is no evidence of snagging on the umbilicals since they were installed. At each end of each umbilical there is an exposed section where the umbilical exits the trench. Combined, these exposed end sections have a length of 685 m. If the umbilicals are to be decommissioned *in situ*, the most likely remediation option is cut and recover, however the CA found that trench and bury or rock placement are also acceptable.
Other PLU2680 Chemical jumper bundle (0.101 km) PL4538 Hydraulic jumber (redundant) (0.055 km) PL4542 Electric power cable (redundant) (0.057 km) PL4543 Electric power cable (0.057 km) Micellaneous jumper bundles (o.451 km).	This group comprises surface laid items which were not included in the comparative assessment as the base case is full removal. Total length of all items is 776 m.

3.2.5.2 Stabilisation Features

Stabilisation features associated with the Beauly and Burghley fields are summarised in Table 3-3. Where technically feasible, Repsol Sinopec Resources UK Limited plan to recover all exposed concrete mattresses and grout bags. Should it not be possible to remove any of the exposed mattresses or grout bags, Repsol Sinopec Resources UK Limited will consult with OPRED before any alternative option is executed. Mattresses and grout bags that are beneath rock cover or associated with crossings will be decommissioned *in situ*. All rock cover will be decommissioned *in situ*.

Table 3-3 : Summary of stabilisation features associated with the Beauly and Burghley fields.

Stabilisation Feature	No.	Weight (Te)	Location	Comments/Status
Flexible concrete mattresses	290	1,868	Beauly field (total 152). Located within the Balmoral 500 m zone & Beauly wellhead approaches. Burghley field (total 138) Located within the Balmoral 500 m zone, at the South East Stirling Crossing, at the Brae Forties Crossing and at the Burghley wellhead approaches.	There are 15 mattresses at Beauly and 81 mattresses at Burghley that are exposed or partially covered in sediment. Condition and dimensions vary. The remainder are buried beneath rock cover.
Grout bags (25 kg bags)	736	18	Beauly Field (486) Located within the Balmoral 500m zone and at the Beauly Wellhead Approaches. Burghley Field (total 250) Located within the Balmoral 500 m zone, at the South East Stirling Crossing, at the Brae Forties Crossing and at the Burghley Wellhead Approaches.	There are 150 grout bags at Burghley that are exposed or partially covered in sediment, and none at Beauly. Condition and dimensions vary. The remainder are buried beneath rock cover.
Rockdump	-	34,582	There is 9,767 te of rock cover over the Beauly pipelines. There is 24,815 te of rock cover associated with the Burghley pipelines (at various locations: crossings within the Balmoral 500 m zone, the South East Stirling Crossing, the Brae Forties Crossing and along pipeline route).	Exposed.

Table 3-4 gives a breakdown of the mattresses by size (footprint) and summarises the stabilisation materials that are planned to be removed versus those to be decommissioned *in situ*.

Table 3-4 : Mattresses and grout bags decommissioned in situ and removed to shore.

Stabilisation Feature	Dimensions (m)	No. decommissioned *in situ*	No. returned to shore
Flexible concrete mattresses	5 x 2	133	15
	6 x 3	61	3
	8 x 4	0	24
	8 x 3	0	54
Grout bags (25 kg bags)	-	586	150

Flexible Concrete Mattresses

All flexible concrete mattresses that are buried beneath rock cover will be decommissioned *in situ*.

The exposed flexible concrete mattresses will be recovered to a vessel either using a grab or will be lifted onto recovery frames or steel cargo nets or speed loaders while subsea, and then lifted to the surface via vessel crane. Should any individual flexible concrete mattresses be found to be severely degraded and at risk of disintegrating on removal, baskets may be deployed on the seabed for filling by remotely operated vehicles (ROVs) or divers. If during the offshore campaign it is found that any of the exposed flexible mattresses cannot be recovered, Repsol Sinopec Resources UK Limited will consult with OPRED before any alternative option is executed.

Grout Bags (25 kg)

All grout bags that are buried beneath rock cover will be decommissioned *in situ*.

Where technically feasible to do so, Repsol Sinopec Resources UK Limited plan to recover all of the exposed grout bags. It is likely these will be placed into baskets for removal to the surface. If during the offshore campaign it is found that any of the exposed 25 kg grout bags cannot be recovered, Repsol Sinopec Resources UK Limited will consult with OPRED before any alternative option is executed.

Rock cover

All existing rock cover will be decommissioned *in situ*. Surveys to monitor the burial status of the pipelines and umbilicals and associated protection materials are discussed in Section 3.3.

3.2.5.3 Third Party Crossings

There are a number of third party crossings associated with the Beauly and Burghley pipelines and umbilicals as summarised in Table 3-5. For all crossings, the third party pipeline goes beneath the Beauly/ Burghley lines and therefore decommissioning of these crossings will be captured in the DPs associated with the third party pipelines. PL64 is a live line and it is proposed to decommission this crossing *in situ*.

Table 3-5: Third party crossings.

Third party infrastructure	Location[10] (WGS 84)	Crossing details
PL64 30" oil export pipeline from Brae to Forties Charlie	1°11'38.804" 58°14'22.754"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross over PL64.
PL218 oil export pipeline from Balmoral to FPS	1°6'51.708" 58°13'29.675"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross over the disused Balmoral export pipeline.
PL227 water injection pipeline from Balmoral to well 16/21b-4a	1°6'56.062" 58°13'27.981"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross the disused water injection pipeline to well 16/21b-4a.
PLU4351 control umbilical from Balmoral to well 16/21b-4a	1°6'55.82" 58°13'28.074"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross the disused control umbilical to well 16/21b-4a.
PL2000 to East Stirling	1°9'2.367" 58°13'4.822"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross the disused East Stirling pipelines.
PL2001 to East Stirling	1°9'2.786" 58°13'4.846"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross the disused East Stirling pipelines.
PLU2002 to East Stirling	1°9'2.385" 58°13'4.778"	Burghley pipelines and umbilical (PL2677, PL2678 & PLU2679) cross the disused East Stirling umbilical.
Note: All third party crossings are associated with disused lines except for the crossing of PL64 Brae oil export pipeline.		

3.2.6 Vessel Use

A range of specialist and support vessels (Table 3-6) will be required to complete the decommissioning activities. At the time of writing, specific vessels have not yet been identified, however, the types of vessel required are well known and standard performance characteristics for typical vessels have been used for the purposes of estimating energy consumption and emissions to air. By estimating the fuel use based on generic vessel types (Institute of Petroleum (IoP) Guidelines, 2000 and industry experience) and the likely duration of the work programme for each vessel, estimates of fuel consumption can be made (Table 3-6). Although the detailed schedules for the different workscopes are still to be defined, the predicted maximum estimates of vessel use have been presented. The total number of vessel days associated with the decommissioning activities is *c*. 72.

[10] Location coordinates refer to the points where the Burghley pipelines cross the existing infrastructure. The Burghley umbilical runs parallel to the pipeline.

Table 3-6: Anticipated vessel requirements and fuel usage.

Vessel type	Duration (days)[1]			Fuel consumption rate (te/day) [2]			Fuel usage (te)
	Working	Mob/ demob	In transit	Working	Mob/ demob	In transit	
Subsea decommissioning							
Remotely operated vehicle support vessel (ROVSV)	31	6	2	21.5	1.5	27	730
Anchor handling vessel (AHV)	7	4	2	21	1	12	175
Seabed clearance and over trawlability surveys							
Trawler (trawl sweeps and trawl trials) (if used)	12	1	1	4	4	4	56
Post decommissioning survey							
Survey vessel (assumes seabed sampling and visual surveys full length of lines)	4	1	1	14	3	21	80
Maximum anticipated fuel use across all operations							**1,041**

1. Vessel day estimates include a contingency for e.g. waiting on weather (15 %).
2. IoP guidelines do not always have exact equivalent vessel: e.g. MSV used to represent ROVSV, cargo barge tug used to represent AHV and DSV used to represent survey vessel.
Note: vessel days provided are worst case estimates and include mobilisation, transit and working days. Prior to contract award it is difficult to determine accurately. Final vessel days will be captured in the environmental impact assessment supporting the Marine Licence to be submitted prior to commencement of offshore activities.

3.3 Survey and Monitoring Programme

A post decommissioning site survey will be carried out on final completion of all decommissioning works. Surveys will be undertaken along all pipeline routes and at all sites where 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 pipeline areas and installation locations and evidence of a safe seabed will be provided to all relevant governmental and non-governmental organisations. This will be achieved by either a non-intrusive survey technique or over trawl trials. The decision will be made in consultation with OPRED. In terms of seabed disturbance, the EA assumes a worst case of an over trawl trial being carried out.

Inspections of the pipelines and umbilicals decommissioned *in situ* will be carried out to confirm that no further exposures develop and that existing rock berms have maintained their position. The timeline for inspections will be agreed with OPRED.

A post decommissioning environmental seabed survey (centred on the sites of the subsea structures and those sections of pipelines and umbilicals where remedial activities are required) will be carried out. The objective of the survey is to identify any chemical or physical disturbances to the seabed following decommissioning and 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. COMPARATIVE ASSESSMENT

4.1 Introduction

OPRED's Guidance Notes on the decommissioning of offshore installations and pipelines (BEIS, 2018) provide for a case by case consideration of pipeline decommissioning alternatives on the basis of a CA.

A CA was carried out in line with the OEUK guidelines (OGUK, 2015). The CA Report (Repsol Sinopec Resources UK Limited, 2022c), submitted in support of the draft DPs provides full details of the assessment carried out for the decommissioning of the Beauly and Burghley pipelines and umbilicals. This chapter summarises the process followed and the results of the CA.

4.2 Pre-Screening of Decommissioning Options

In order to facilitate the CA workshop, and as per standard CA methodology, the Beauly and Burghley pipelines and umbilicals were split into groups dependent on their type (flexible or rigid).

The pipeline and umbilical groupings were as identified in Table 4-1.

Table 4-1: Pipeline and umbilical groupings used for the CA.

Group ID	Component type / as-laid condition	Pipeline/umbilical
A	- Rigid pipelines -Trenched and buried	- PL1792 & PL1793 Beauly production pipeline and piggy-backed gas lift pipeline. - PL2677 & PL2678 Burghley production pipeline and piggy-backed gas lift pipeline.
B	-Umbilicals -Trenched and buried	- PL1794/95/96 Bundled Beauly umbilical. - PLU2679 Burghley umbilical.

Prior to the CA a pre-screening of a wide range of the potential decommissioning options for the pipeline and umbilical groups was carried out. Options considered included:

Option 1A: Total removal by reverse reeling.

Option 1B: Total removal by reverse s-lay.

Option 1C: Total removal by cut and lift.

Option 2A: Remediate *in situ*: rock cover exposed sections.

Option 2B: Remediate *in situ*: trench and bury exposed sections.

Option 2C: Remediate *in situ*: cut and remove exposed sections.

The total removal options (1A to 1C) refer to total removal of the pipelines or umbilicals. The partial remediation options (2A to 2C) refer to leaving the buried pipelines and umbilical *in situ* and remediating the exposed sections.

In the pre-screening each of the groupings were assessed against the above options. A qualitative assessment taking into account safety, environment, technical, societal and economic impacts was carried out using a Red-Amber-Green (RAG) evaluation method. The pre-screening is detailed in the CA Report submitted with the DPs (Repsol Sinopec Resources UK Limited, 2022c). The results of the pre-screening of the decommissioning options are shown in Table 4-2.

Table 4-2: Results of the decommissioning options pre-screening assessment.

Pipeline / umbilical group	Full removal			Remediate *in situ*		
	1A	1B	1C	2A	2B	2C
Group A	✓	X (SO)	X (SO)	✓	✓	✓
Group B	✓	X (SO)	X (SO)	✓	✓	✓

✓ Selected for assessment in the CA

X (SO) Screened out

4.3 Comparative Assessment Approach and Results

For all options selected for each of the Groups, scoring at 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.

The conclusions of the CA are that Repsol Sinopec Resources UK Limited propose to remediate the trenched and buried rigid pipelines (Group A) *in situ* by cutting and recovering the exposed end sections. It is proposed that the umbilicals (Group B) will either be fully removed by reverse reeling or they will be decommissioned *in situ* with the exposed ends cut and recovered.

A sensitivity analysis of the CA outcome identified that all remediate *in situ* options are acceptable, such that all three will be carried through the contracts & procurement (C&P) tendering phase. The preferred remediation options will be to trench and bury or to cut and recover the exposed ends. Should the option to rock cover the exposed sections be considered more favourable during the C&P tendering phase, Repsol Sinopec Resources UK Limited will engage with OPRED before a decision is taken on the overall strategy.

5. ENVIRONMENTAL BASELINE

5.1 Introduction

This section describes the environment and the environmental receptors in the vicinity of the Beauly and Burghley fields and has been prepared with reference to available literature and the results from a pre-decommissioning environmental survey carried out across the fields during August 2017 (Fugro, 2018a; Fugro, 2018b; and Fugro, 2018c).

5.2 Pre-Decommissioning Environmental Survey

The environmental survey deployed a combination of side scan sonar (SSS), video/still photography and grab sampling. Twenty-five stations covering the two wellheads; the pipeline routes connecting each wellhead to the Balmoral subsea template; and two additional reference stations were selected. A full suite of samples (three macrofaunal and one physico-chemical) was successfully collected from each station along with video footage and still photographs (Fugro, 2018a).

The objectives of the survey included:

- confirming a clear seabed around the infrastructure to be decommissioned;
- assessing the sediment types and any contaminants;
- investigating the presence of any potentially sensitive habitats or species; and
- establishing the pre-decommissioning environmental baseline.

Figure 5-1 shows the locations of the sampling stations and camera transects. There are eight sampling stations in a cruciform pattern around each wellhead, two stations along the Beauly to Balmoral pipeline route, four stations along the Burghley to Balmoral pipeline route, an additional station at Beauly (BEU09) and two reference stations. Five camera transects were run including TR01 (a rerun of a historic transect from 2007), TR02 and TR03 along the Burghley pipeline route and TR04 and TR05 along the Beauly pipeline route.

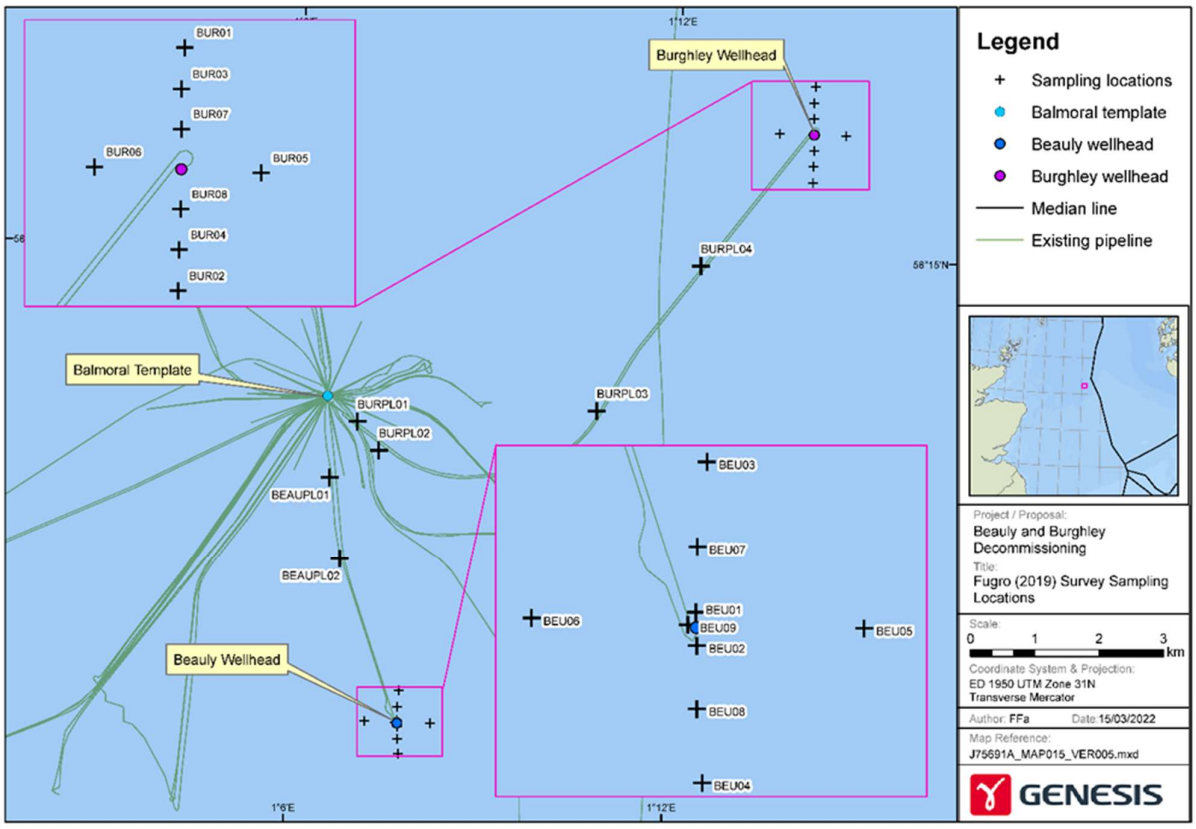


Figure 5-1: Location of survey sampling stations (Fugro,2018a).

5.3 Metocean Conditions

Metocean (meteorological and oceanographic) conditions including bathymetry, currents, tides and circulation patterns all influence the type and distribution of marine life and the behaviour of emissions and discharges from offshore facilities. For example, the speed and direction of water currents have a direct effect on the transport, dispersion and ultimate fate of any discharges from a vessel or installation.

5.3.1 Bathymetry

Water depth at the fields ranges from *c*. 135 m at the Burghley wellhead to *c*. 146 m at the Beauly wellhead (Fugro, 2018a).

5.3.2 Hydrology

Water masses, and 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 water, Norwegian water, CNS water, southern North Sea water, Jutland water and Channel water (Turrell *et al*., 1992). The Beauly and Burghley fields are located in the area influenced by the northern North Sea water mass (Figure 5-2) (Turrell *et al.,* 1992). 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. Weak residual currents of up to 0.05 m/s occur in the Beauly and Burghley area (Marine Scotland, 2020).

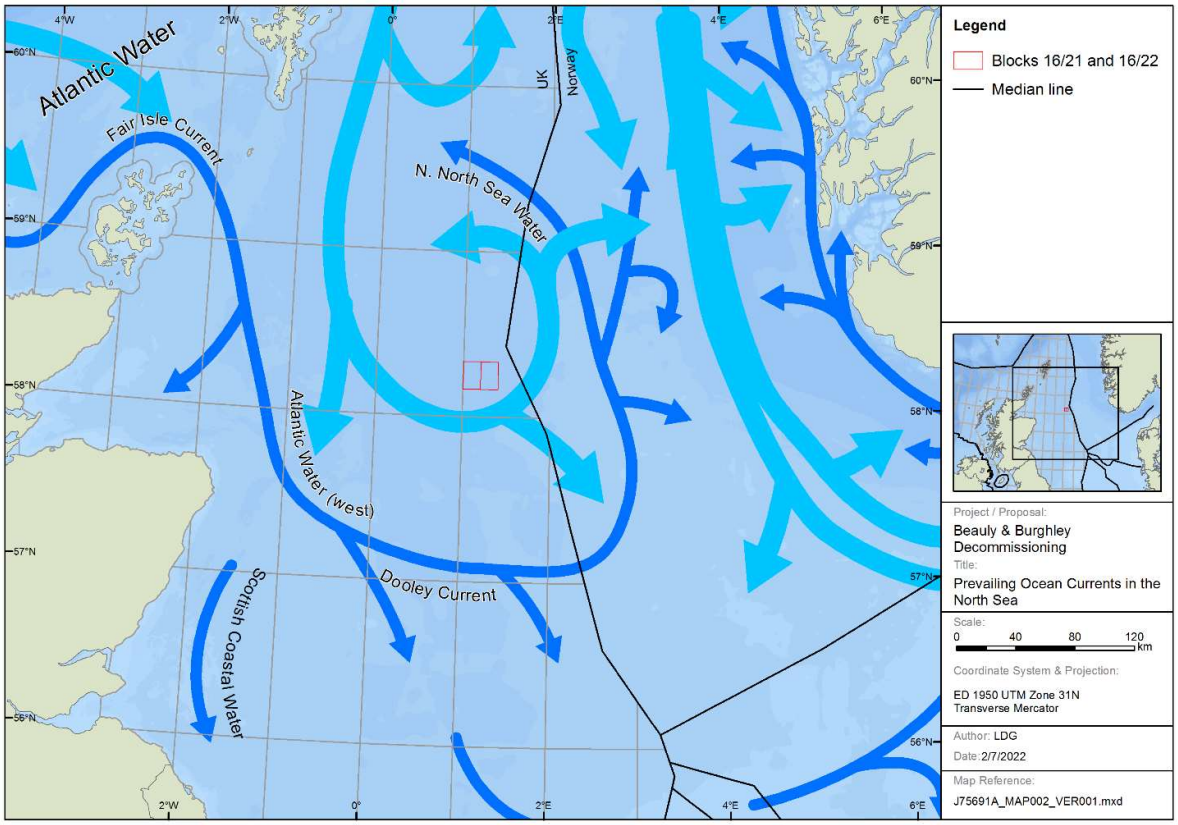


Figure 5-2: General circulation in the North Sea (Turrell et al., 1992)

Mean significant wave height in the area is 2.4 m and as can be seen from Figure 5-3a around 55 % of waves originate from a north/ northwest direction and around 25 % from a south/ southwest direction (Data Explorer, 2018).

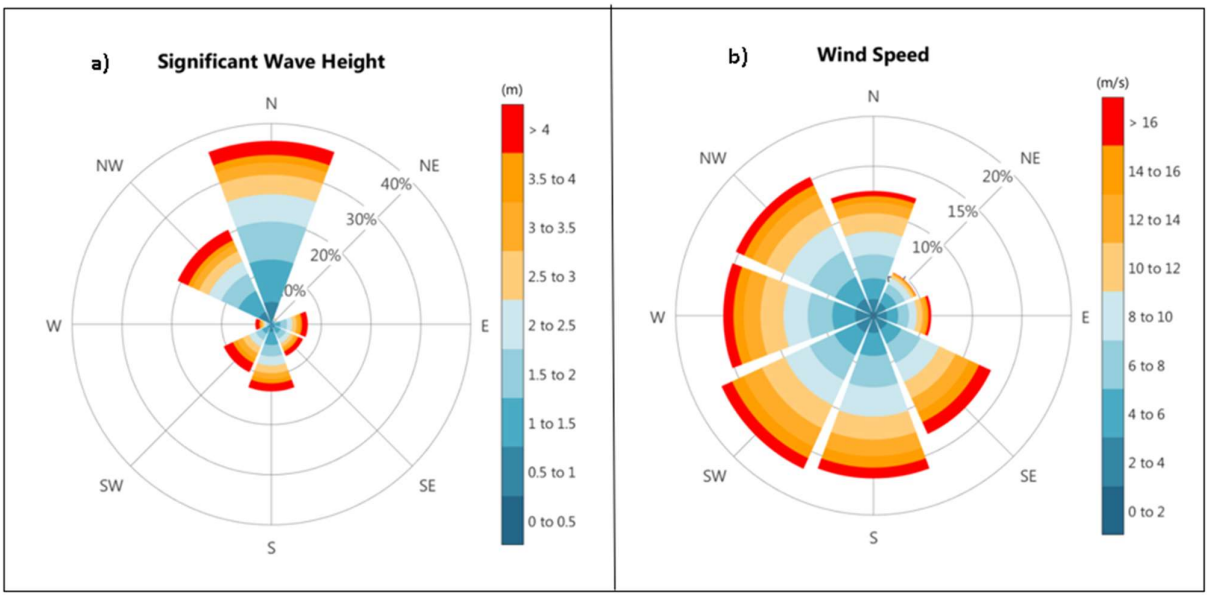


Figure 5-3: Wave rose (a) and wind rose (b) for the Beauly and Burghley area (Data Explorer, 2018).

The mean spring tidal range in the area is 1.1 – 2.0 m and the annual mean wave power is 27.25 kW/m (Scottish Government National Marine Plan Interactive (NMPi)).

5.3.3 Meteorology

Wind speed and direction directly influence the transport and dispersion of atmospheric emissions. These factors are also important for the dispersion of water borne emissions, including oil, by affecting the movement, direction and break up of substances on the sea surface. Mean wind speed in the area is 8.8 m/s and as can be seen from Figure 5-3b, winds in the area originate from all directions though primarily from the south/ southwest/ west and northwest.

5.3.4 Sea Temperature and Salinity

Sea surface temperature and salinity in the area are governed by the flow of oceanic Atlantic waters into the North Sea through the Fair Isle Channel (Turrell, *et al*. 1992). According to data collected between 1971 and 2000, the annual mean seawater surface temperature in the Beauly and Burghley area is *c*. 9 °C and the annual mean temperature at the seabed is *c*. 7 °C (Scottish Government NMPi).

Salinity in the area shows little seasonal variation through the water column with annual mean salinity near the seabed equalling 35.1 ‰ and 35.01 ‰ in surface waters (Scottish Government NMPI).

5.4 Seabed Characteristics

The seabed across the survey area was interpreted from SSS data as comprising mud and sandy mud. Drill cuttings were observed in grab samples at four stations in the Burghley wellhead area.

Figure 5-4 presents an overview of the sediment type in the vicinity of Beauly and Burghley fields using Marine Strategy framework Directive (MSFD) predominant habitat classification data (EMODnet, 2018). Seabed sediments within blocks 16/21 and 16/22 comprise offshore circalittoral mud.

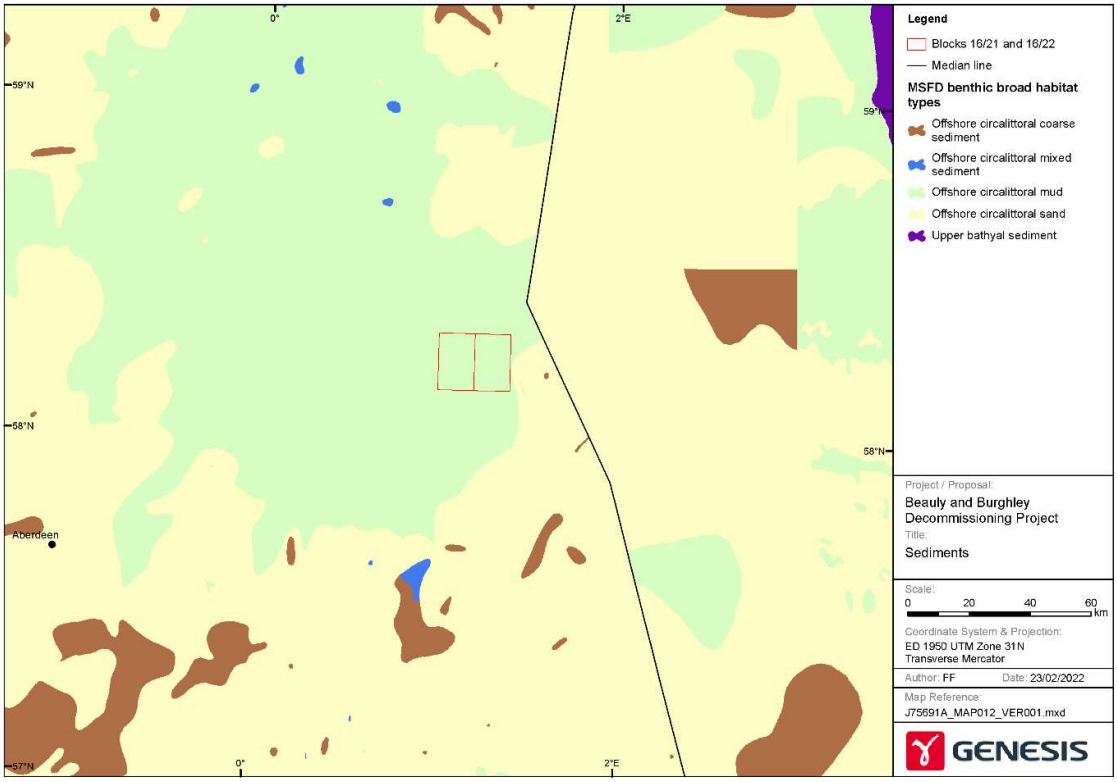


Figure 5-4: Sediment types in the vicinity of Beauly and Burghley (EMODnet, 2018).

5.4.1 Particle Size Distribution

The mean particle size recorded for sediments collected at the Beauly locations ranged from 21 μm (BEUPL01) to 62 μm (BEUPL02) (medium to coarse silt). The mean particle size variation along the pipeline route was high whereas at the wellhead stations it was low. Fines dominated all stations except for station BEUPL02 where sand was the dominant component. The variation in the percentage of fines at the pipeline stations was moderate and at the wellhead stations it was low. Similarly, the variation in the percentage of sand at the pipeline stations was moderate and at the wellhead stations it was low. The proportions of fines / sand ranged from:

- Fines: 30.5 % to 75.6 %
- Sand: 24.4 % to 69.5 % (Fugro, 2018b)

Particle size throughout the Burghley survey area shows low variation. The mean particle size ranged from 20 μm (BURPL02) to 36 μm (BUR05) (medium to coarse silt). Fines dominated the sediments at all Burghley stations with proportions ranging from:

- Fines: 53.4 % to 56.9 %
- Sand: 43.1 % to 46.6 % (Fugro, 2018c)

The sediments at both the Beauly and Burghley locations were comparable with other surveys undertaken in the area (Fugro, 2018b; Fugro, 2018c).

5.4.2 Sediment Hydrocarbons

5.4.2.1 Total Hydrocarbon Concentrations

Total hydrocarbon concentration (THC) in the sediments ranged from 5.1 μg/g to 7.5 μg/g at the Beauly wellhead stations (mean 6.4 μg/g and median 6.3 μg/g) and 3.6 μg/g to 6.5 μg/g at the pipeline stations (mean 5.1 μg/g). These values are comparable to the reference stations and are lower than other values reported for the wider CNS (Fugro, 2018b and references therein). Evidence of weathered 'Petrofree' ester based drilling fluid was found at several stations around the Beauly wellhead (BEU01, BEU02, BEU09).

THC concentrations in the Burghley wellhead area range from 3.8 μg/g to 9.0 μg/g and from 4.7 μg/g to 11.7 μg/g along the pipeline route. Whilst the THC value of 11.7 μg/g at BURPL02 exceeds the UKOOA mean (9.5 μg/g (UKOOA, 2001)), the mean THC concentrations across the Burghley area are broadly comparable with other values reported for the wider CNS (Fugro, 2018c and references therein).

5.4.2.2 Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbon (PAH) concentrations in the Beauly survey area showed a similar pattern to the THC concentrations, with the lowest values along the pipeline route (0.075 μg/g at BEUPL02) and higher values closer to the wellhead (0.228 μg/g at BEU04). These values are also comparable to the reference stations and to other values reported in the wider CNS (Fugro, 2018b and references therein).

PAH concentrations in the sediments of the Burghley field also show a strong correlation with THC values and range from 0.111 μg/g to 0.277 μg/g. All PAH concentrations were well below the OSPAR effects range low (ERL) values (where available) (Fugro, 2018b; Fugro, 2018c; OSPAR, 2009).

5.4.2.3 Polychlorinated Biphenyls

Concentrations of the ICES-7 polychlorinated biphenyl (PCB) congeners in the sediments were measured and normalised to allow direct comparison with established background concentrations and environmental assessment criteria thresholds.

The sum of the ICES-7 PCB concentrations exceeded the background assessment concentration (BAC) at six of the Beauly stations. The concentration of the individual congener CB#28 exceeded the BAC at all stations whereas the concentrations of the other congeners (except CB#52) exceeded the BAC at one or more stations. None of the

normalised PCB concentrations in the Beauly survey area exceeded the environmental assessment criteria threshold (Fugro, 2018b and references therein).

The sum of the ICES-7 PCB concentrations exceeded the BAC at two of the Burghley wellhead stations and two of the four Burghley pipeline stations. The concentrations of all individual congeners exceeded the BAC at one or more stations and the concentration of congener CB#118 exceeded the EAC at Burghley wellhead station BUR01 (Fugro, 2018c).

The concentration of the congener CB#101 and the total ICES-7 concentration exceeded the BAC at reference station REF02 (Fugro, 2018b; Fugro, 2018c).

5.4.3 Heavy Metals

Drilling activities tend to result in increased concentrations of heavy metals in the surrounding seabed. This section summarises the results of the analysis undertaken as part of the pre-decommissioning survey.

Levels of natural barium in both the Beauly and Burghley survey areas were below the UK Offshore Operators Association (UKOOA) mean values, however elevated levels of total barium, exceeding the UKOOA 95th percentile for the CNS (523 mg/kg), were recorded at six of the Beauly wellhead stations, one of the Beauly pipeline stations and three of the Burghley wellhead stations (Fugro, 2018b; Fugro, 2018c). The highest levels of total barium occurred at the stations closest to the wellheads.

Across most of the Beauly survey area, chromium, copper, nickel, lead and zinc exceeded the UKOOA mean. Iron, vanadium and zinc exceeded their respective UKOOA 95th percentile values for the CNS at the majority of Beauly stations (Fugro, 2018b).

There were fewer exceedances of the UKOOA values in the Burghley wellhead area, however the UKOOA mean for chromium, copper, iron, nickel, lead, vanadium and zinc were exceeded at most stations and the UKOOA 95th percentile for the CNS was exceeded for nickel at station BUR01. Elevated levels of heavy metals occur along the Burghley to Balmoral pipeline route with the UKOOA means for chromium, copper, iron, nickel, lead, vanadium and zinc being exceeded at all Burghley pipeline stations and the UKOOA 95th percentile being exceeded for chromium, iron, nickel, vanadium and zinc at some stations (Fugro, 2018c).

The sediment heavy metals were also normalised to allow comparison with OSPAR background concentration (BC) and BAC values. The heavy metal concentrations across most of the survey area were below the BC and BAC with the following exceptions (Fugro, 2018b; Fugro, 2018c):

- chromium exceeded the BC at
  - all Beauly wellhead stations and Beauly pipeline station BEUPL01
  - five out of eight Burghley wellhead stations and all Burghley pipeline stations
- mercury exceeded the BAC at wellhead stations BEU01 and BUR01
- nickel exceeded BC at BURPL02 and the BAC at BUR01.

5.4.4 Drill Cuttings Pile at Balmoral Template

The Beauly and Burghley wells were tied back to the Balmoral Template. A study of the drill cuttings at the Balmoral template was undertaken by Premier Oil to inform the Balmoral Decommissioning Programmes (Premier Oil, 2020 and references therein). Push core samples with a depth of 75 cm were collected and these were analysed for THC content in the bottom, middle and top sections of each core.

Thirteen samples were collected from within the footprint of the template and showed that the highest level of THC contamination towards the centre of the template was 34,000 µg/g. THC levels at the perimeter of the template were much lower, varying from 9.6 µg/g to 1,240 µg/g. In the area surrounding the template, THC levels varied from 8 µg/g to 4,360 µg/g. The lowest levels are interpreted as the cores penetrating natural seabed beneath the cuttings pile.

The THC ecological effects threshold of 50 mg/kg (UKOOA, 2005) was exceeded in the top-most sections of sediment at all stations on the template and the surrounding seabed and is reflected in the macrofaunal communities at these stations.

The cuttings pile occurs beneath and immediately adjacent to the template, however sediment contamination spreads beyond this area. Cuttings contamination was found to extend in a predominantly northeast direction away from the template, with no apparent changes in macrofaunal communities more than 300 m from the template (Premier Oil, 2020). The Beauly and Burghley pipelines and surface laid items therefore extend into this area of contamination in the vicinity of the Balmoral template.

5.5 Marine Flora and Fauna

5.5.1 Plankton

The phytoplankton community in the CNS is dominated by the dinoflagellate genus *Tripos* (*T. fusus, T. furca, T. lineatus*), with diatoms such as *Thalassiosira spp*. and *Chaetoceros spp*. also occurring in abundance (DECC, 2016). The zooplankton in the area is dominated by calanoid copepods, with *Paracalanus* and *Pseudocalanus* also abundant. *Calanus* larvae, eupausiids, *Acartia* and decapod larvae are also important components of the zooplankton assemblage. Although not abundant, jellyfish such as *Aurelia aurita*, *Cyanea capillata* and *Cyanea lamarckii* also occur in the region (DECC, 2016).

5.5.2 Habitat Type and Benthic Communities

5.5.2.1 Habitat Type

Habitat types in the survey area were classified as European Nature Information System (EUNIS) types 'circalittoral fine mud' (A5.36) and 'circalittoral sandy mud' (A5.35). Habitat type 'industrial waste' (J6.5) occurs at one station located 25 m from the Beauly wellhead (Fugro, 2018a; EUNIS, 2012). The habitat types identified are summarised in Table 5-1.

Table 5-1: Habitat classifications (EUNIS, 2012; Connor et al., 2004)

EUNIS Habitat	EUNIS Classification	JNCC Marine Habitat Classification
Circalittoral fine mud	A5.36	SS.SSa.CFiMu
Circalittoral sandy mud	A5.35	SS.SMu.CSaMu
Industrial waste	J6.5	n/a

Photographs showing the habitat types observed during the survey are shown in Figure 5-5.

Figure 5-5: Photos of habitats observed during pre-decommissioning survey (Fugro, 2018a).

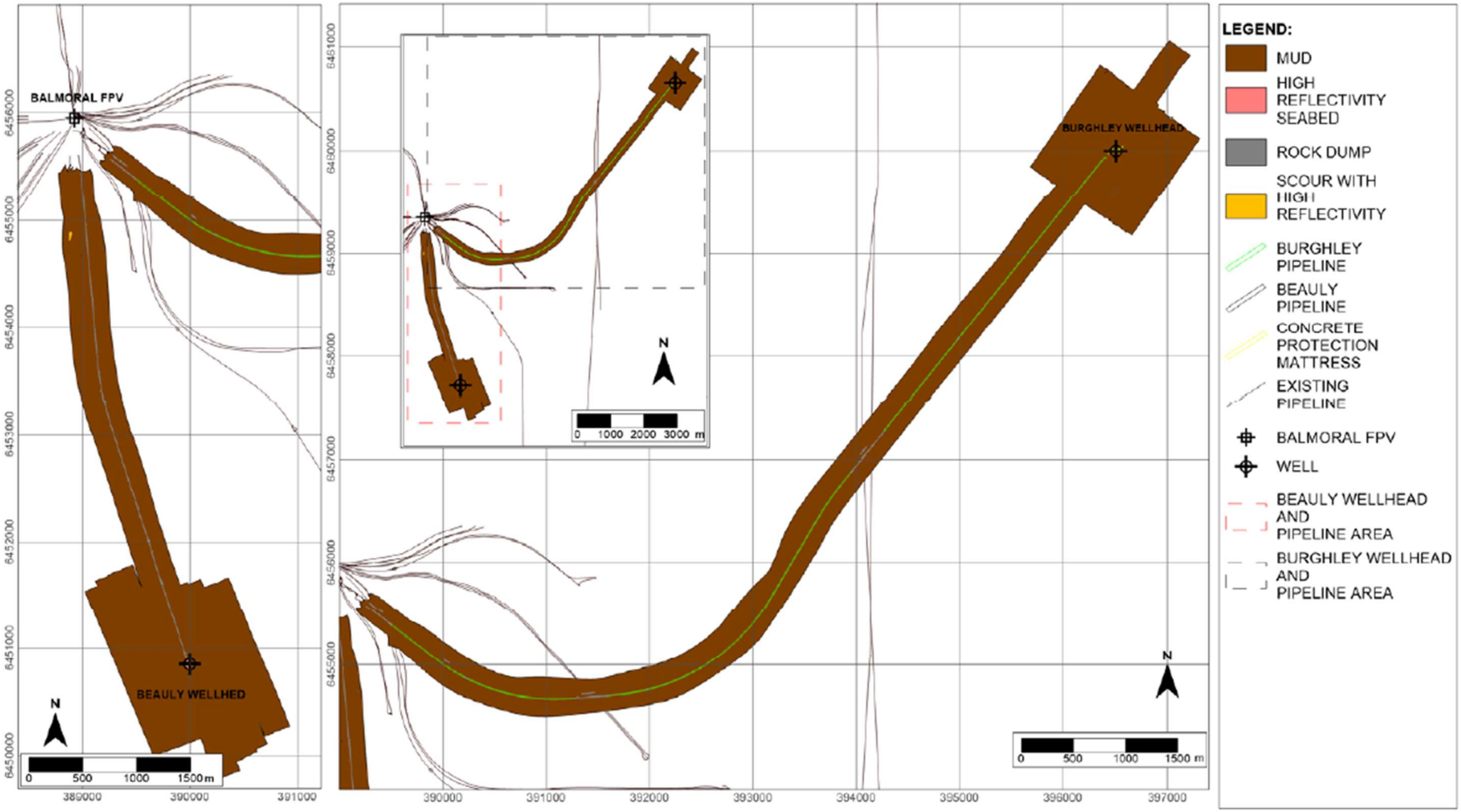


Figure 5-6: Seabed types and features in the Beauly and Burghley survey areas (Fugro, 2018a).

5.5.2.2 Benthic Communities

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 are termed infaunal species (e.g. tubeworms and burrowing crabs). Semi-infaunal animals, including sea pens and some bivalves, lie partially buried in the seabed.

The fauna observed across the survey area are described as sparse, with the most frequently occurring species being sea pens (*Virgularia mirabilis*, *Pennatula phosphorea*), sea urchins (*Gracilechinus acutus*), starfish (*Asterias rubens*), shrimp (Caridea), hermit crabs (Paguridae) and hagfish (*Myxine glutinosa*). Gadoid fish (including *Pollachius virens*, *Molva molva*, *Trisopterus esmarkii*), flatfish (Pleuronectiformes), polychaete worms (Serpulidae, *Ditrupa arietina*), starfish (*Astropecten irregularis*), Norway lobsters (*Nephrops norvegicus*), and euphasiids (Euphausiacea), were observed infrequently. Burrows were common across both survey areas, including mounds with conspicuous burrows forming a prominent feature of the sediments. The fauna responsible for creating the burrows were not identified, however the presence of sea pens and burrows means that the environmentally sensitive habitat 'sea pens and burrowing megafauna communities' may occur within the survey area (Fugro, 2018a).

At stations where drill cuttings and other anthropogenic debris were present, species observed included polychaete worms (Serpulidae, cf. *Ditrupa arietina*), hydroids (Hydrozoa), sea anemones (*Urticina sp.*), starfish (*Asterias rubens*), squat lobsters (Galatheidae) and sea squirts (Ascidiacea) (Fugro, 2018a).

Macrofaunal analysis of samples collected during the Beauly survey showed that the dominant taxa were annelids (46 %) arthropods (25 %) and molluscs (19 %). These taxa also dominate in terms of individual animals. The top ten most abundant taxa include the molluscs *Adontorhina similis* and *Parathyasira equalis*, and polychaete worms *Levinsenia gracilis*, *Abyssoninoe hibernica*, *Eclysippe vanelli*, *Galathowenia oculata* and *Paramphinome jeffreysii* (Fugro, 2018b).

The results of macrofaunal analysis of samples collected during the Burghley survey were similar to the Beauly area with the dominant taxa comprising 50 % annelids, 25 % arthropods, and 15 % molluscs and that these groups also dominate in terms of individual animals. The most abundant taxa were polychaete worms *P. jeffreysii*, *L. gracilis*, *G. oculata* and *Heteromastus filiformis* (Fugro, 2018c).

Low variation in species diversity and evenness was demonstrated throughout the Beauly and Burghley survey areas (Fugro, 2018b; Fugro, 2018c).

5.5.3 Fish and Shellfish

More than 330 fish species inhabit the shelf seas of the UKCS (Pinnegar *et al*., 2010). Figure 5-7 shows the spawning and nursery areas of some of the commercially important fish species known to occur in the vicinity of the Beauly and Burghley infrastructure. Table 5-2 shows the times of year that are important for spawning and nursery grounds of these species (Coull *et al*., 1998; Ellis *et al.,* 2012).

Figure 5-8 shows the probability of juvenile fish for some species occurring in the area (Aires *et al*., 2014). Table 5-2 and Figure 5-7 show the approximate spawning times and nursery grounds of some commercial fish species occurring in 45F1. It should be noted that spawning and nursery areas tend to be transient and therefore cannot be defined with absolute accuracy (Coull et al., 1998; Ellis et al., 2012).

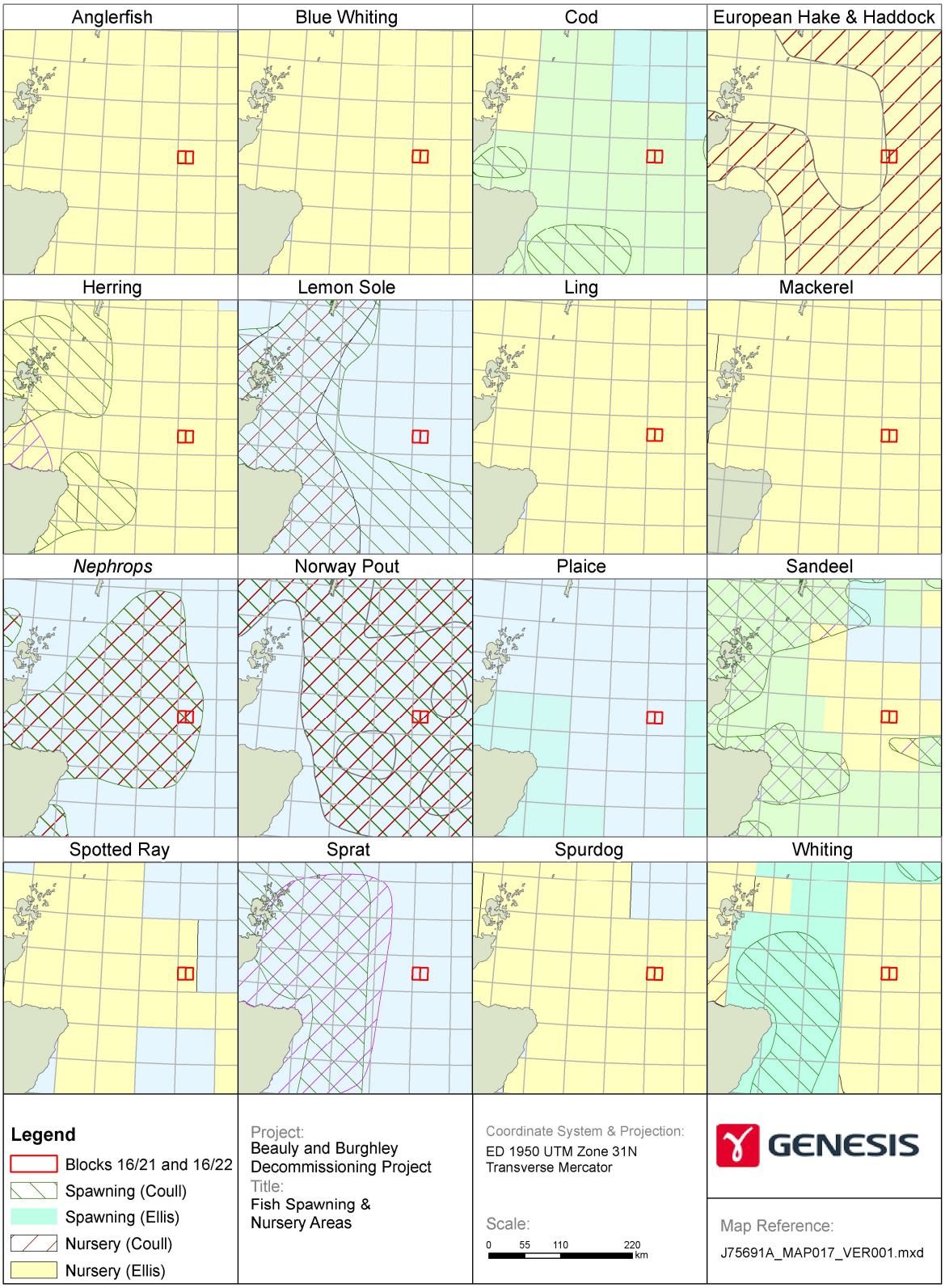


Figure 5-7: Fish spawning and nursery areas in the proximity of the Beauly and Burghley project area (Coull et al.,1998; Ellis et al., 2012).

Table 5-2 Summary of spawning and nursery activity for species known to occur in the vicinity.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anglerfish	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Blue whiting	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Cod	SN	S*N	S*N	SN	N	N	N	N	N	N	N	N
European hake	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Haddock	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ
Herring (Buchan/Shetland)	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 (North Sea)	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
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	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ	NJ

Key: S = Spawning; S* = Peak Spawning; N = Nursery; J = Juveniles (i.e. 0 group fish)
Source: Coull *et al.* (1998); Ellis *et al*. (2012); Aires *et al.* (2014).

Other fish species which may occur in the area include basking shark, porbeagle shark, round-nose grenadier and saithe (Tyler-Walters *et al*., 2016).

A number of the species identified are Scottish PMFs. These are: anglerfish, basking shark, blue whiting, cod, herring, ling, mackerel, Norway pout, porbeagle shark, round-nose grenadier, saithe, sandeels, spurdog and whiting (Tyler-Walters *et al*., 2016).

Of the species identified in the project area, cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) are listed as Vulnerable on the International Union for Conservation of Nature (IUCN) Red List. The population of spurdog (*Squalus acanthias*) is decreasing and this species is listed as Vulnerable on a global scale but is Endangered in Europe (IUCN, 2022). Basking shark are Endangered and Decreasing globally but stable in Europe. Porbeagle shark is critically endangered and decreasing in Europe. Round-nose grenadier is critically endangered.

Cod, spotted ray and spurdog are on OSPAR list of threatened and/or declining species.

Cod return to aggregate at specific spawning grounds, making them vulnerable to anthropogenic impacts. Cod spawning grounds are strongly influenced by sediment type, with coarse sand being a preferred spawning substrate compared with mud or sand. Depth is also important, with spawning abundance declining rapidly beyond 125 m depth (González-Irusta, J. M. and Wright, P. J., 2016a).

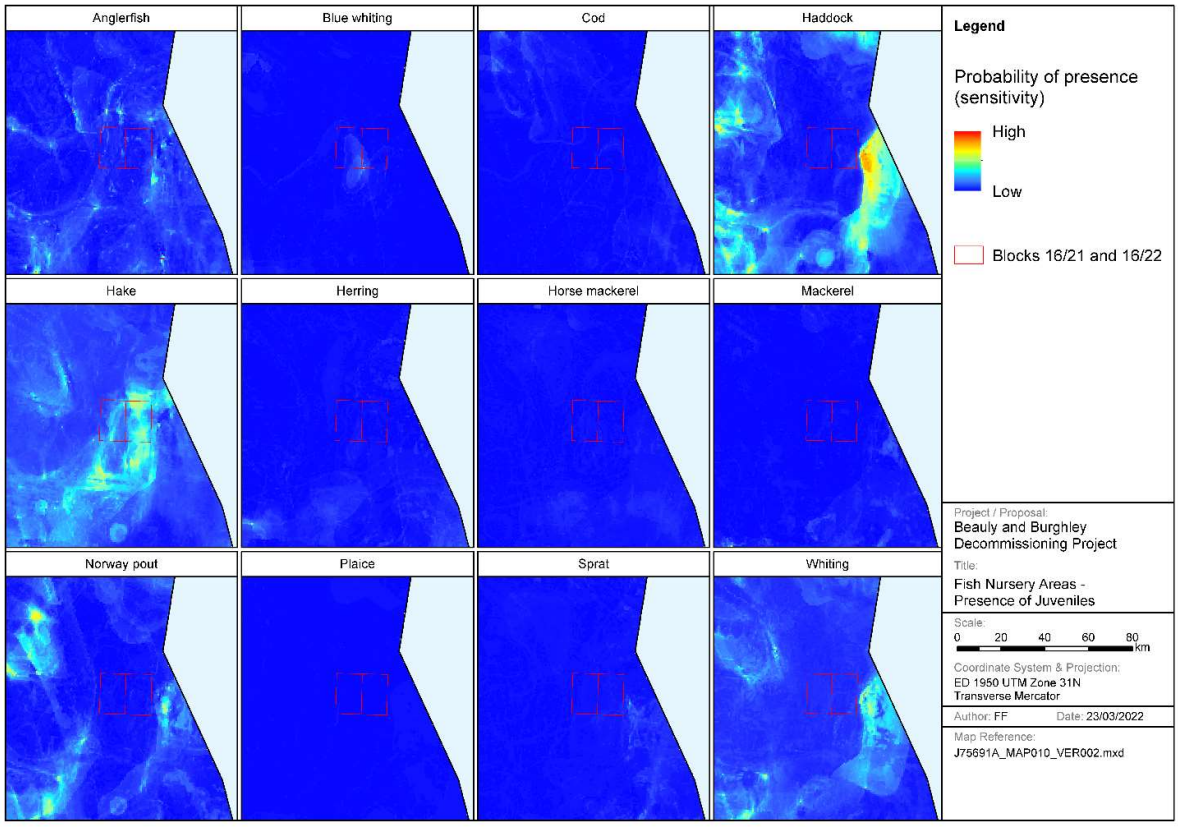


Figure 5-8: Probability of juvenile fish presence in the vicinity of Beauly and Burghley (Aries et al., 2014)

5.5.4 Marine Mammals

5.5.4.1 Pinnipeds

Two species of seal live and breed in UK waters: the grey seal (*Halichoerus grypus*) and the harbour (also called common) seal (*Phoca vitulina*). Both species are listed as Annex II species under the European Union (EU) Habitats Directive.

The foraging range of the harbour seal is typically within 40 – 50 km of their haul out site. Tracking of individual grey seals has shown that they can feed up to several hundred kilometres offshore, although most foraging tends to be within approximately 100 km (SCOS, 2013). Telemetry data (1991-2012) and count data (1988-2012) indicate that seals are very unlikely to be present in the vicinity of the Beauly and Burghley infrastructure (Russell *et al*., 2017).

5.5.4.2 Cetaceans

The Joint Nature Conservation Committee (JNCC) has compiled an Atlas of Cetacean Distribution in Northwest European Waters (Reid *et al.,* 2003) which gives an indication of the annual distribution and abundance of cetacean species in the North Sea. Table 5-4 presents the annual abundance of cetacean species likely to occur in the Beauly and Burghley area. The data suggests that moderate to low densities of minke whale, harbour porpoise, killer whale and Atlantic white-sided dolphin and high to low densities of white-beaked dolphin have been sighted in the immediate vicinity of the Beauly and Burghley infrastructure (Reid *et al*., 2003).

Table 5-3 Marine mammal sightings in the vicinity of the Blocks (Reid et al., 2003) (blue- species seen).

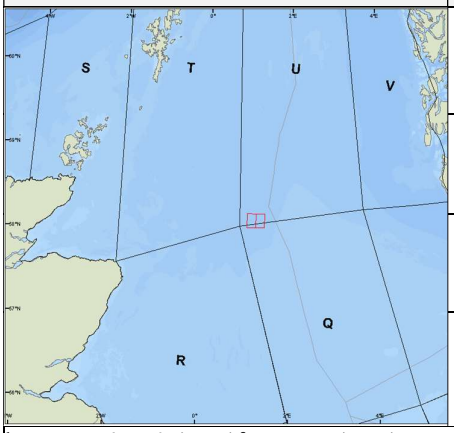
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minke whale												
Harbour porpoise												
Atlantic white-sided dolphin												
White-beaked dolphin												
Killer Whale												

A series of Small Cetacean Abundance in the North Sea (SCANS) surveys have been conducted to obtain an estimate of cetacean abundance in North Sea and adjacent waters, the most recent of which is SCANS-III (Hammond *et al.*, 2017).

The Beauly and Burghley fields are located within SCANS-III Block 'U' and 'Q'. Aerial survey estimates of animal abundance and densities (animals per km^2) within this area are provided in Table 5-4. The data confirm that some of those species identified by Reid *et al*. (2003), frequent Block U and Q (Hammond *et al*., 2017).

The JNCC have published the 'regional' population estimates for the seven most common species of cetacean occurring in UK waters (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 5-4.

Table 5-4 Cetacean Abundance in SCANS-III Survey Block U and Q (Hammond et al., 2017).

SCANS-III Block U and Q	Species	Animal Abundance[1] Block U	Density (animals/km^2) Block U	Animal Abundance[1] Block Q	Density (animals/km^2) Block Q	MU Population[2]
	Harbour Porpoise	19,269	0.321	16,569	0.333	346,601
	Minke whale	895	0.015	348	0.7	20,118
	White-sided dolphin	177	0.003	0	0	18,128
	Beaked Whale	75	0.001	0	0	N/A

[1] Hammond *et al*., (2017) [2] IAMMWG (2022)

Of the cetacean species identified in the area, harbour porpoise, minke whale, white beaked dolphin and white sided dolphin are Scottish PMFs (Tyler-Walters *et al*., 2016). Harbour porpoise are on OSPAR list of threatened and/or declining species and all cetaceans are EPS.

5.5.5 Seabirds

The North Sea is an internationally important area for breeding and feeding seabirds. Using seabird density maps from European Seabirds at Sea (ESAS) data collected over 30 years, Table 5-5 identifies a number of the bird species (and their predicted maximum monthly abundance) known to occur in the Beauly and Burghley area (Kober *et al*., 2010).

The data indicate 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 11 seabirds are predicted to occur per km^2 during the breeding season (April to September), whilst during the winter months (November to March) a maximum of 10 seabirds are predicted to occur per km^2. Some of the seabirds that occur in the area are qualifying features of SPAs with marine components along the Scottish coastline.

Table 5-5 Predicted monthly seabird surface density in the Beauly and Burghley area (Kober et al., 2010).

Species	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern gannet	Breeding												
	Winter												
Northern fulmar	Breeding												
	Winter												
Black-legged kittiwake	Breeding												
	Winter												
European storm-petrel	Breeding												
Lesser black-backed gull	Breeding												
Great black-backed gull	Breeding												
	Winter												
Razorbill	Breeding												
	Winter												
Pomarine skua	Breeding												
	Winter												
Little auk	Winter												
Herring gull	Winter												
Arctic skua	Breeding												
Common guillemot	Breeding												
	Additional												
	Winter												
Atlantic puffin	Breeding												
	Winter												
All species combined	Breeding												
	Summer												
	Winter												

KEY: maximum number of individuals per km^2	**Not recorded**	**≤ 1.0**	**1.0 – 5.0**	**5.0 – 10.0**	**10.0 - 15.0**	**15.0 - > 20.0**

Of the species likely to occur, northern fulmar are considered Vulnerable and are decreasing in Europe, black-legged kittiwake are Vulnerable and decreasing globally, Arctic skua are Endangered and decreasing in Europe, but stable

globally and Atlantic puffin are Vulnerable and decreasing (IUCN, 2022). Common guillemot and European storm-petrel are listed on Annex I of the Birds Directive and black-legged kittiwake are on the OSPAR list of threatened and/or declining species.

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 well testing and flaring, when hydrocarbon dropout to the sea surface can occasionally occur, or from unplanned events such as accidental hydrocarbon spills.

The vulnerability of seabirds to surface oil in the blocks and surrounding areas has been assessed according to the Seabird Oil Sensitivity Index (SOSI). The purpose of this 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.

The SOSI combines the seabird survey data with individual seabird species sensitivity index values. These values are based on a number of factors which are considered to contribute towards the sensitivity of seabirds to oil pollution, and include:

- habitat flexibility (the ability of a species to locate to alternative feeding grounds);
- 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 were then subsequently summed at each location to create a single measure of seabird sensitivity to oil pollution. The mean sensitivity SOSI data for the area is shown in Table 5-6. For blocks with 'no data', an indirect assessment has been made (where possible) using JNCC guidance (JNCC, 2017). The sensitivity of birds to surface oil pollution within the Beauly and Burghley Project area ranges from low to medium throughout the year.

Table 5-6: SOSI and indirect assessment for Blocks 16/21 and 16/22 (including adjacent Blocks; JNCC, 2017).

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15/20	5*	5	5*	5*	5	4	5	5	5	5*	N	N
15/25	5*	5	5*	5*	5	4	5	5	5	5*	N	N
15/30	5*	5	5*	5*	5	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
16/21	5*	5	5*	5*	5	5	5	5	5	5*	N	N
16/22	5*	5	5	5*	5	5	5	5	5	5*	N	N
16/26	5*	5	5*	5*	5	5	5	5	5	5*	N	N
16/27	5*	5	5	4*	4	5	5	5	5	5*	N	N
Key	1 Extremely High			2 Very High		3 High			4 Medium		5 Low	
	Indirect Assessment – data gaps have been populated following guidance provided by the JNCC (JNCC, 2017). ** Data gap filled using data from the same Block in adjacent months.* ** Where no data available cells have been left blank with "N".*											

5.6 Marine Protected Areas

A network of Marine Protected Areas (MPAs) are in place to aid the protection of vulnerable and endangered species and habitats, through structured legislation and policies. These sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA), which were designated in the UK under the EU Nature Directive (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 Habitat Regulations mean that the requirements of 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.

Nature Conservation Marine Protected Areas (NCMPAs) are designated under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.

The protected sites in closest proximity to the Beauly and Burghley fields are shown in Figure 5-8. The nearest protected sites are the Scanner Pockmark SAC *c.* 12km north-west and the Norwegian Boundary Sediment Plain NCMPA *c.* 23km to the south-east.

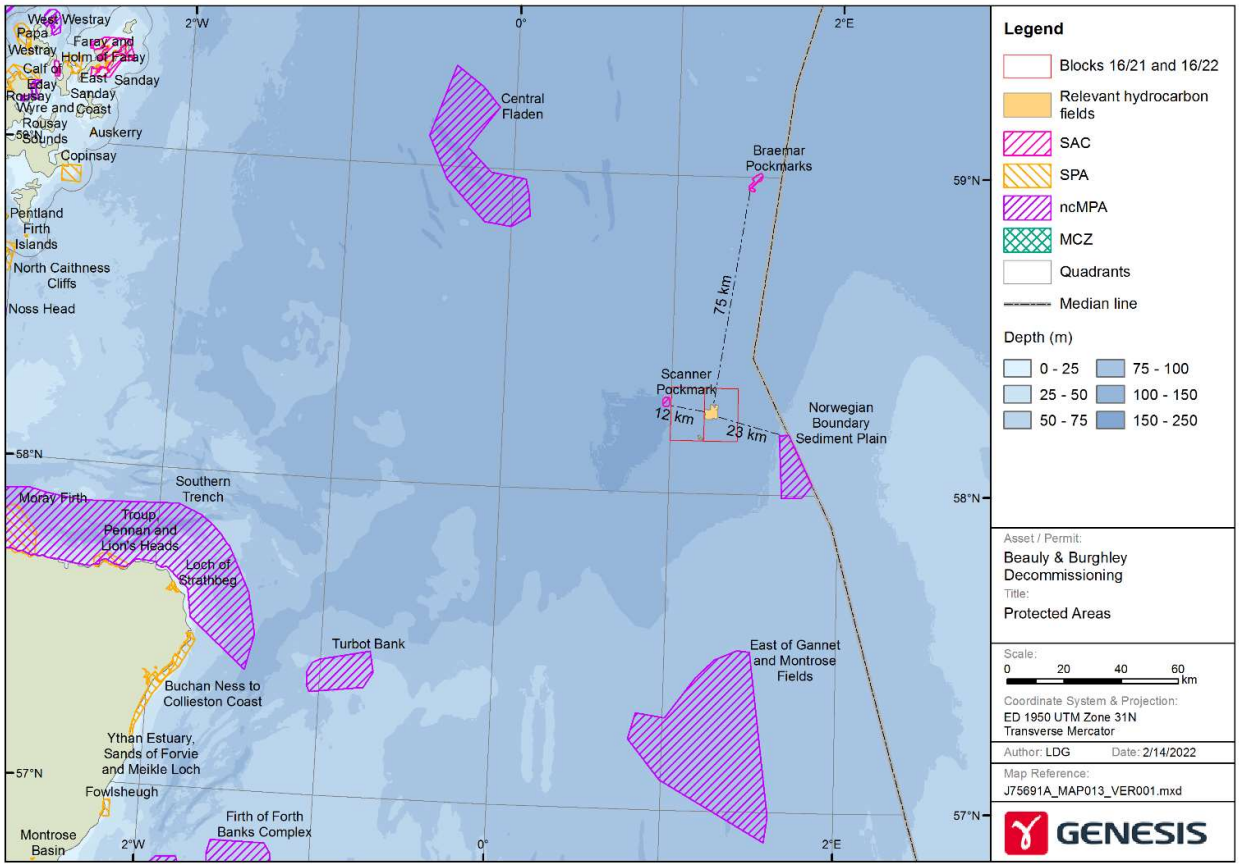


Figure 5-7 Location of the Beauly and Burghley fields in relation to protected areas

5.7 Sensitive Habitats and Species Summary

The OSPAR listed threatened and/or declining habitat 'sea pens and burrowing megafauna communities' may occur in the survey area (Fugro, 2018a). An assessment was carried out using the SACFOR (super-abundant, abundant, common, frequent, occasional, rare) scale (Hiscock, 1996). The SACFOR density assessment results were medium to high at all stations and concluded that there is potential for the presence of the OSPAR listed threatened and/or declining habitat 'sea pens and burrowing megafauna communities' (Fugro, 2018a).

Seabed samples and photographs were analysed for the presence of the Scottish priority marine feature (PMF) *Arctica islandica* (ocean quahog). No adult specimens of *A. islandica* were identified, and no siphons were observed on the seabed (Fugro, 2018a). Macrofaunal analysis revealed that juvenile *A. islandica* occurred at almost half the stations in the Beauly survey area, but only in low numbers (Fugro, 2018b).

No other evidence of Annex I habitats or PMF habitats was found in the survey area (Fugro, 2018a; Fugro, 2018b).

Sensitive species are defined by a number of legal instruments and other sources. These include:

- 'Annex II species' (listed in Annex II of the Habitats Directive)
- European Protected Species
  - under the Habitats Regulations, it is an offence to deliberately disturb any EPS, or to capture, injure or kill an EPS at any time
- 'Annex I bird species' listed in Annex I of the Birds Directive)
- Scottish PMFs
  - habitats and species which are considered to be of particular importance in Scotland
- OSPAR list of threatened and/or declining species
- IUCN 'red list'.

The sensitive species, according to each of these designations, are identified in the previous sections.

5.8 National Marine Plan (NMP)

The Beauly and Burghley fields fall within the Scottish NMP area, which comprises plans for Scotland's inshore (out to 12 nm) and offshore waters (12 to 200 nm) as set out under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. The plan represents a framework of Scottish Government policies for the sustainable development of marine resources and is underpinned by strategic objectives:

- Achieving a sustainable marine economy;
- Ensuring a strong, healthy and just society;
- Living within environmental limits;
- Promoting good governance;
- Using sound science responsibly.

These objectives are to be achieved through the application of 21 'General Planning Principles'. Table 5-7 identifies which of these 21 Principles are considered relevant to the proposed decommissioning activities.

Table 5-7 Scottish NMP's General Planning Principles.

Scotland's National Marine Plan Principles
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.
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.
GEN 5 Climate change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change.
GEN 9 Natural heritage: Development and use of the marine environment must: a) Comply with legal requirements for protected areas and protected species. b) Not result in significant impact on the national status of Priority Marine Features. c) Protect and, where appropriate, enhance the health of the marine area.
GEN 12 Water quality and resource: Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply.
GEN 13 Noise: Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects.
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.
GEN 21 Cumulative impacts: Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation.

5.9 Oil and Gas Sector Specific Policies

In addition to the above general policies, the Beauly and Burghley Decommissioning Project will align with the relevant specific oil and gas Marine Planning Policies.

Table 5-8: Oil and Gas Marine Planning Policies.

Oil and Gas Marine Planning Policies
Oil and Gas 1 – Environmental Risks & Impacts (noise, discharges and habitat change): The Scottish Government will work with BEIS, the Oil and Gas Authority 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 Best Available Technology (BAT) and Best Environmental Practice (BEP). Consideration will be given to key environmental risks including the impacts of noise, oil and chemical contamination and habitat change.
Oil and Gas 2 – Decommissioning (re-use or removal of decommissioned assets): 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.
Oil and Gas 3 – Other Users of the Sea (environmental and socio-economic constraints): 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.
Oil and Gas 5 – Potential Environmental Risks & Hazards: 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.
Oil and Gas 6 – Risk Reduction Measures: Consenting and licensing authorities should be satisfied that adequate risk reduction measures are in place, and that operators should have sufficient emergency response and contingency strategies in place that are compatible with the National Contingency Plan and the Offshore Safety Directive.

SOCIO-ECONOMIC BASELINE

6.1 Introduction

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

6.2 Fishing

The Beauly and Burghley fields occur within ICES rectangle 45F1. Data provided by the Scottish Government indicate that seine nets and trawl gear are both used in this rectangle (Marine Scotland, 2021). Species targeted in the area include herring, mackerel, haddock, whiting, anglerfish, cod, saithe and *Nephrops*.

Using data provided by the Scottish Government (Marine Scotland, 2021), fishing effort (vessel days), value and quantity data have been plotted for UK vessels ≥ 10 m in length (Table 6-1, Table 6-2 and Figure 6-1). The data suggest that this ICES rectangle encompasses an area that is relatively important to the UK fishing industry such that fishing activity in the area can be considered moderate.

Table 6-1 Fishing effort (days) in ICES rectangle 45F1 (2016-2020) (Marine Scotland, 2021).

Year	Monthly Fishing Effort [1]												Total in 45F1 [2]	UK Total	45F1 as % of UK
	J	F	M	A	M	J	J	A	S	O	N	D			
2016	15	196	8	22	D	10	D	11	17	21	194	60	559	131,590	0.4
2017	-	D	213	8	D	D	D	13	14	194	60	D	514	125,831	0.4
2018	D	12	D	3.9	70	D	8	13	105	120	73	D	417	124,844	0.3
2019	D	275	36	209	-	45	264	50	47	112	D	-	1,042	126,353	0.8
2020	D	D	208	50	D	10	17	19	9	111	9	D	446	103,918	0.4
Mean													**596**	**122,507**	**0.5**

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.

Key	2 – 49 days	50-99 days	100-159 days	160-249 days	250-300 days

Table 6-2: Landings (by species type) from ICES rectangle 45F1 (2020) (Marine Scotland, 2021).

Species Type	Weight (te)			Value (£)		
	UK Total	45F1	% of UK	UK Total	45F1	% of UK
Demersal	115,898	364	0.3	184,520,801	511,061	0.3
Pelagic	329,965	0.9	< 0.01	283,309,285	638	< 0.01
Shellfish	72,518	367	0.5	176,825,552	904,715	0.5
Total	**518,374**	**732**	**0.1**	**644,655,641**	**1,416,450**	**0.2**

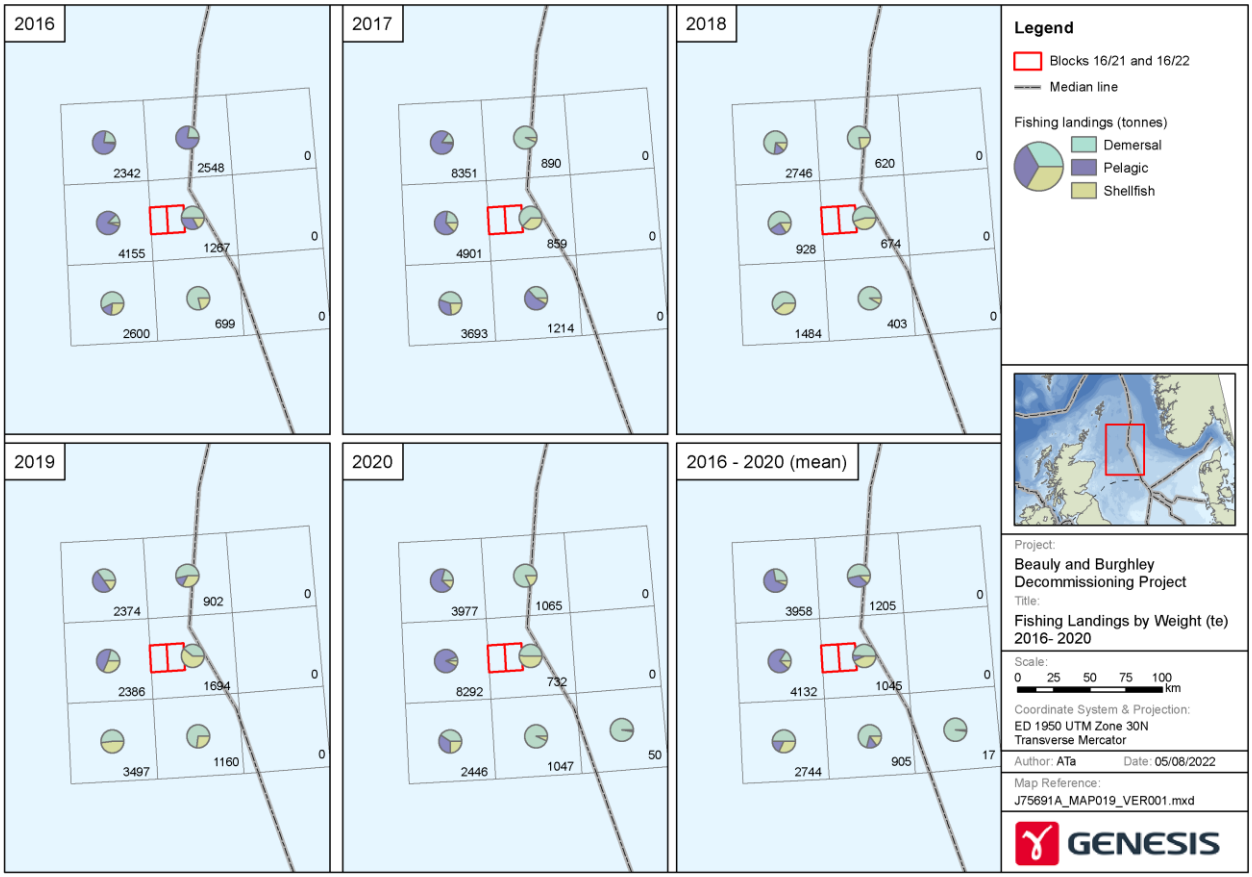


Figure 6-1: Landings (tonnes) of demersal, pelagic, and shellfish catches in the ICES rectangles surrounding Block 16/21 and 16/22 (Marine Scotland, 2021a).

6.3 Shipping Activity

Shipping densities in the North Sea are categorised by the OGA (now NSTA) to be either: negligible; very low; low; moderate; high; or very high. As can be seen in Figure 6-2 the shipping activity in blocks 16/21 and 16/22 is considered very low, whilst it is low in adjacent blocks to the south and moderate to the north.

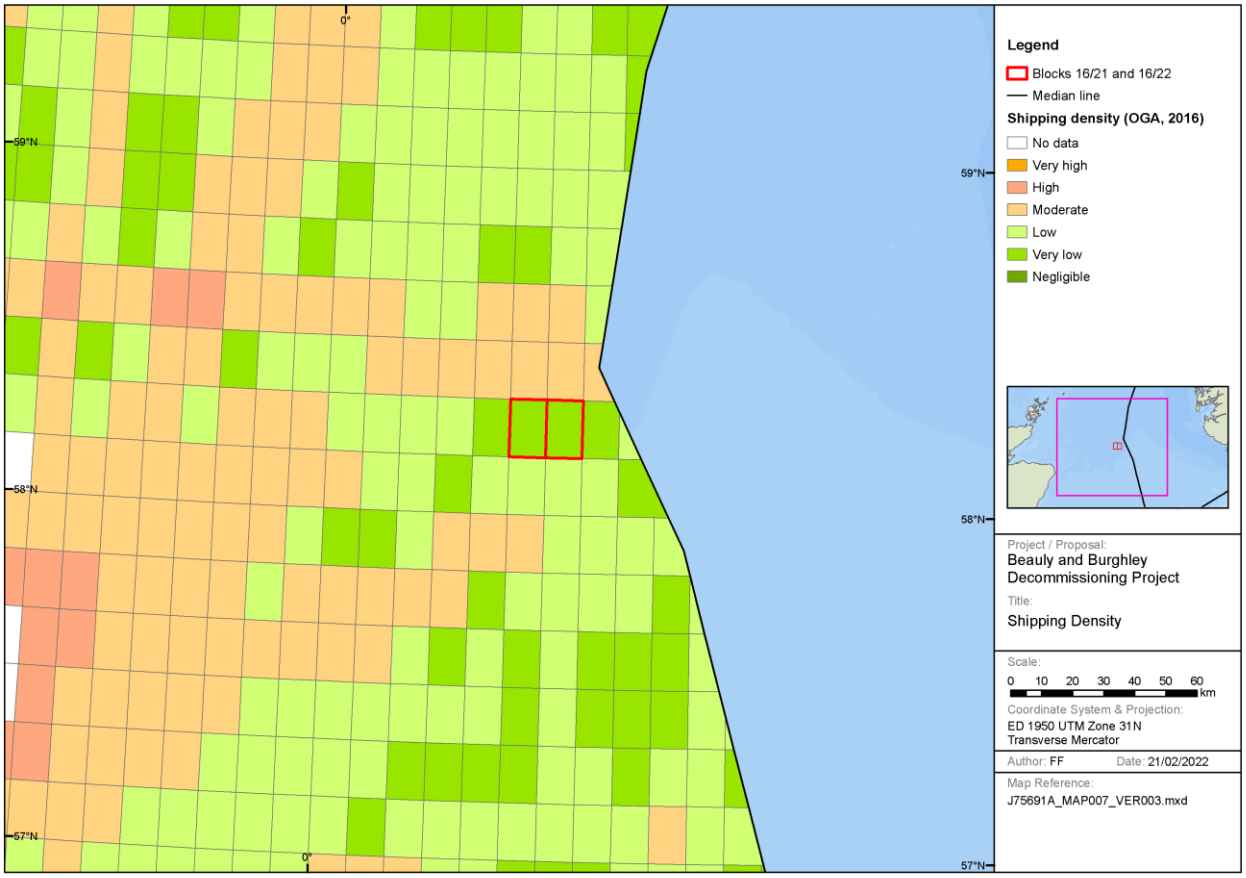


Figure 6-2 Shipping density in the vicinity of the Beauly and Burghley area as categorised by the OGA (OGA, 2016).

6.4 Wrecks

There are five wrecks within Block 16/21. The closest wreck to the Beauly wellhead is situated 2.2 km east while the closest wreck to the Burghley wellhead is 3.5 km to the northwest. There are no wrecks within Block 16/22 (Figure 6-3).

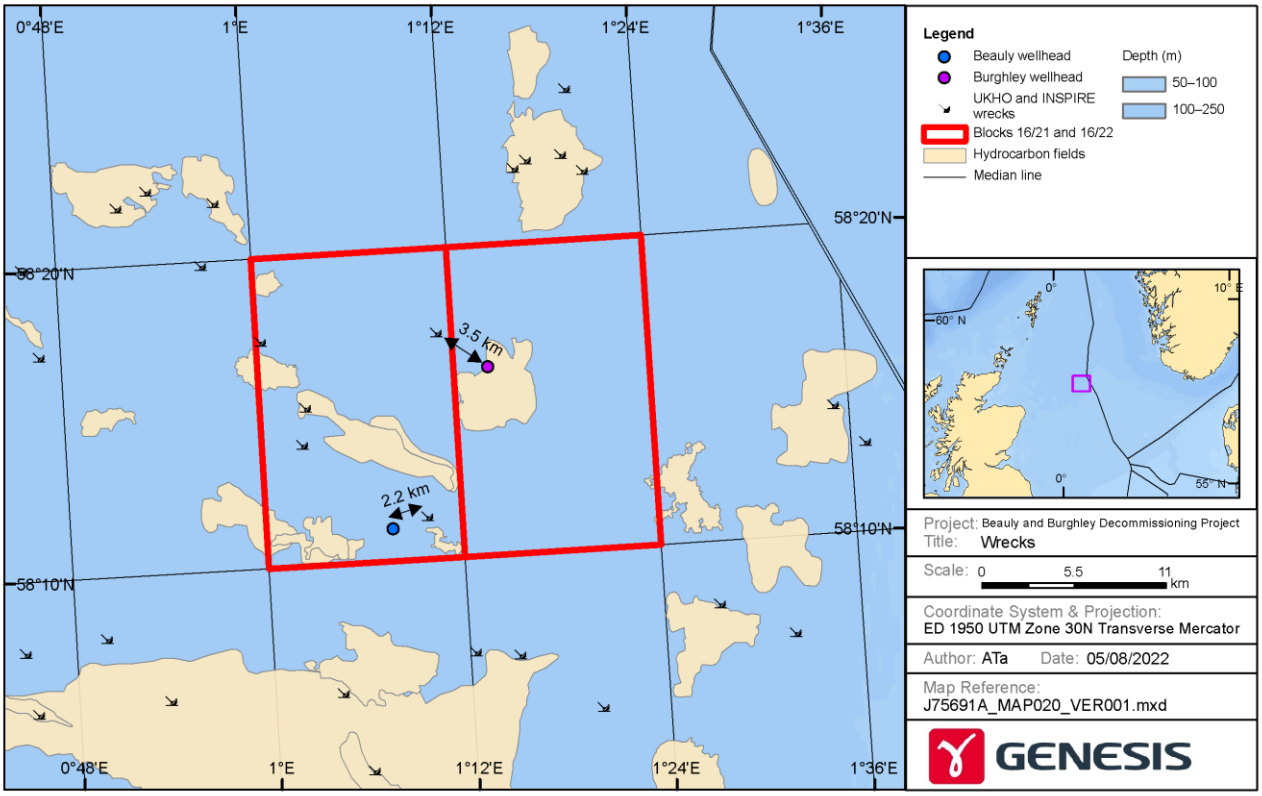


Figure 6-3: Wrecks in the vicinity of Beauly and Burghley wellheads.

6.5 Offshore Wind

The Hywind Scotland wind farm located off the coast of Peterhead is the closest operational wind farm to the Beauly and Burghley area, approximately 166 km to the southwest of the Beauly wellhead (Figure 6-4). The closest Scotwind lease area is NE7, which is located 90 km west of the Beauly wellhead. INTOG[1] E-a is also located 15 km southeast of the Burghley wellhead.

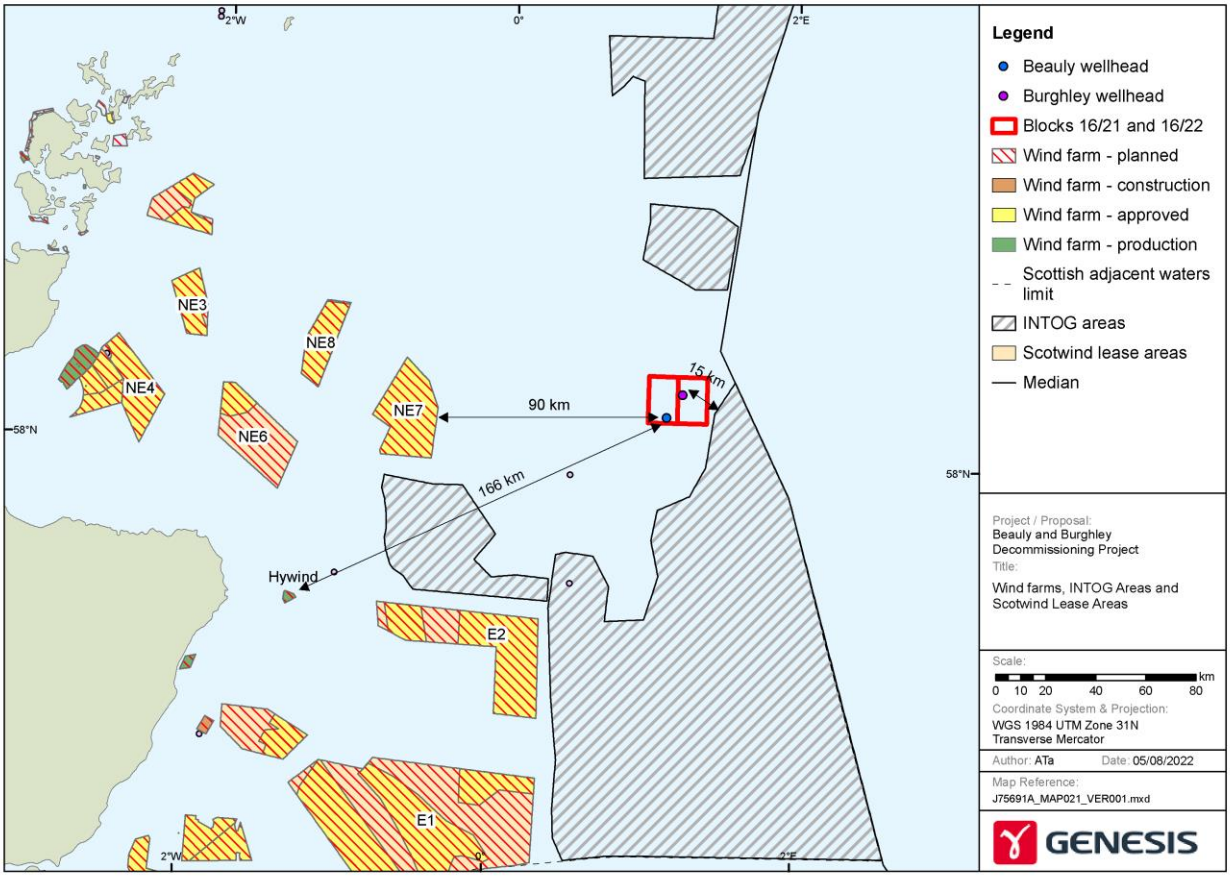


Figure 6-4: Offshore wind areas in the vicinity of the Beauly and Burghley area.

[1] Innovation and Targeted Oil & Gas (INTOG) is a leasing round for offshore wind projects that will directly reduce emissions from oil and gas production and boost further innovation.

6.6 Surrounding Infrastructure

The Beauly and Burghley fields are situated in a well-developed area of the North Sea. Figure 6-5 shows those installations in closest proximity to the Beauly and Burghley infrastructure and corresponding distances are provided in Table 6-3.

There are no offshore windfarm developments in the vicinity of the Beauly and Burghley fields (Crown Estate, 2021) The closest telecommunications line is located approximately 70 km to the northeast (NMPI, 2019). There are no military exercise areas in the vicinity of the Beauly and Burghley fields (NMPI, 2019).

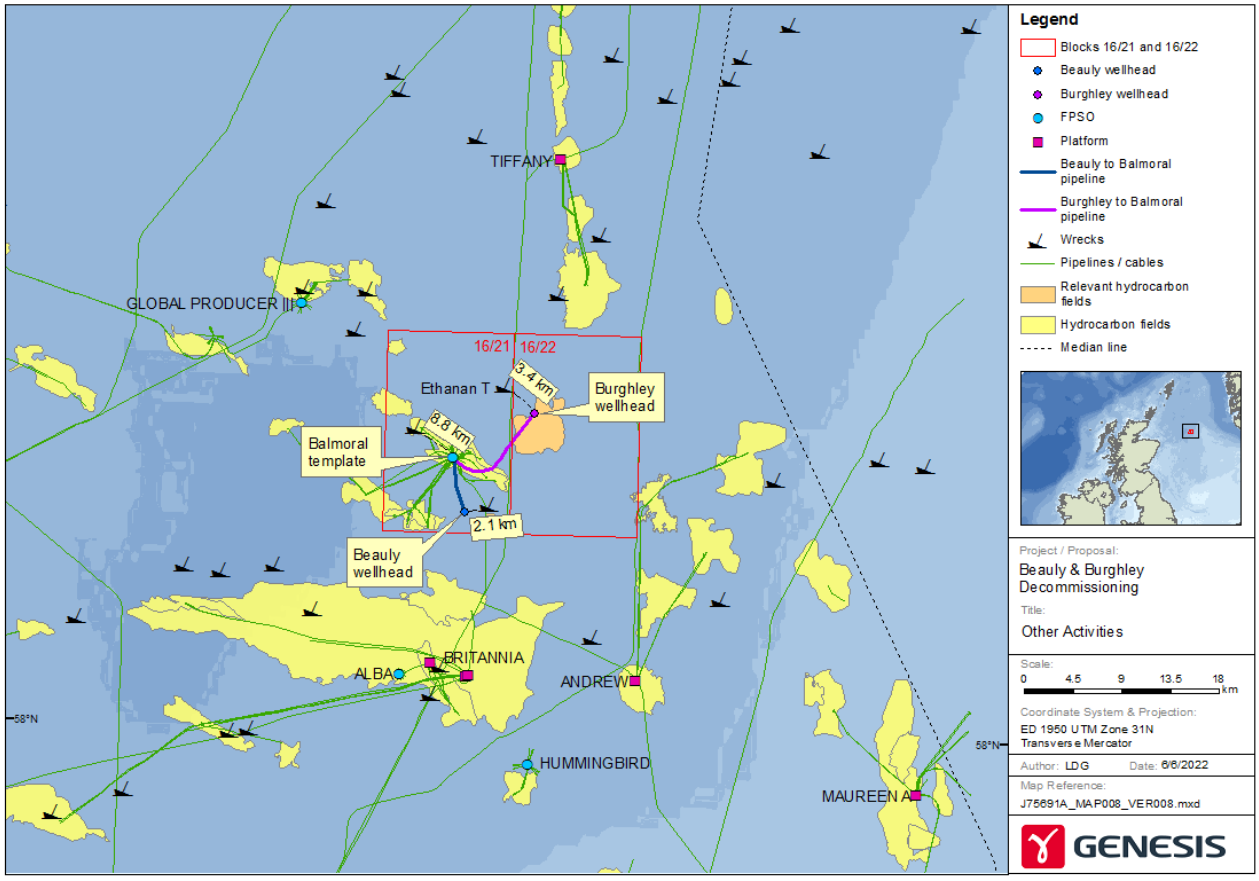


Figure 6-5: Surface infrastructure in the vicinity of the Beauly and Burghley fields (Marine Scotland, 2018; NMPI, 2019; Crown Estate, 2021)

Table 6-3: Oil and gas installations in the vicinity of the Beauly and Burghley fields.

Installation	Approximate distance from the Beauly and Burghley infrastructure (km)
Britannia platform	13 km south of Beauly wellhead
Global Producer FPSO	23 km northwest of Burghley wellhead
Alba platform	16 km south southwest of Beauly wellhead
Hummingbird FPSO	23 km south of Beauly wellhead
Andrew platform	22 km southeast of Beauly wellhead
Tiffany platform	22 km north of Burghley wellhead

7. SCOPING OF POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

7.1 Methodology

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

The ENVID identified the key environmental and societal sensitivities, considered all the 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 different activities (e.g., recovery of structures) included:

- Physical presence/ interaction with other sea users;
- Seabed and habitat disturbance;
- Under water noise impacts;
- Discharges to sea;
- Atmospheric emissions;
- Waste; and
- Accidental events.

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

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

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 A.

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 A.

7.2 Scoping

The results from the ENVID review are presented in Table 7-1. Applying the industry standard mitigation measures, the significance of impact of each of the planned activities was considered to be Low such that any environmental and social impacts are considered to be negligible. Table 7-1 provides a justification for not assessing further the majority of the aspects identified in the EA, with the exception of:

- Seabed disturbance (Section 8); and
- Legacy impacts on the environment and on other sea users (Section 9).

The potential impact of a loss of diesel inventory resulting for example from a vessel collision or fire was also considered in the ENVID. The significance of impact of a release of diesel inventory from one of the vessels was considered to be moderate, such that it could result in discernible environmental and social risks. The likelihood of such an event was considered to be remote, in that it was recognised that a similar event has occurred elsewhere but is unlikely to occur during this project with the application of current industry standard practices. Combining the significance of impact with the likelihood, results in an overall Low environmental risk. In line with Subsection 12.4 of the OPRED Decommissioning Guidance (BEIS, 2018), the impacts of accidental events are not assessed further in the EA.

Table 7-1 ENVID results and justification for selecting / deselecting the impact for further assessment in the EA.

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
Vessel use								
1	Emissions to air. Power generation.	Receptor: Air quality. Fuel combustion emissions (CO_2, CO, SO_x, NO_x, etc.) from vessels DSVs, ROVSV, reel lay vessels, rock dump and survey vessels. UK and EU Air Quality Standards not exceeded.	Minimise use of vessels through efficient journey planning and use of relevant vessels for each activity. Prior to contract award Repsol Sinopec Resource UK will review vessel Common Marine Inspection Documents (CMID) as part of vessel assurance (evidence of maintenance). All vessels will be in compliance with Repsol Sinopec Resources UK Limited's Marine Assurance Standards (MAS). Vessels will be MARPOL compliant. RSRUK includes energy efficiency and emissions during selection and management of contractors.	A	2	L	The estimated total fuel use by the vessels required to complete the proposed decommissioning activities is *c.* 1,041 te (Table 3.5) resulting in *c.* 3,402 te of CO_2 equivalent (CO_2e) emissions[1]. When compared against total CO_2e emissions from upstream oil and gas activities in the UK in 2020 (17,060,000 te) (OGUK, 2021), this equates to 0.020 %. Due to the offshore location of the project area, the sensitivity of air quality is considered low given the distance from any populated areas whilst the magnitude of effect is considered minor such that the overall impact significance on air quality is considered Low.	No
2	Emissions to air. Power generation.	Receptor: Climate change. Emission of greenhouse gases (GHG) from fuel combustion.		D	1	L	The sensitivity of climate change as a receptor is considered 'Very High' in line with various Intergovernmental Panel on Climate Change reports (e.g., IPCC, 2021). Repsol Sinopec Resources UK Limited, acknowledges that the atmospheric emissions associated with the use of vessels will contribute to climate change, however the relatively short duration of the vessel campaign, means that the magnitude of effect of the incremental increase in emissions to the atmosphere is considered Negligible such that the overall impact significance on climate change is considered Low. As the impacts on air quality and climate change are not considered significant this aspect is not considered further in the EA.	No

[1] CO_2e calculation based on GWPs defined on a 100-year horizon according to the Fourth Assessment Report (IPCC, 2007) as required by the United Nations Framework Convention on Climate Change (UNFCCC) and in line with the United Kingdom's National Inventory Report (NIR) (BEIS 2022).

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
3	Physical presence. Vessels.	Receptor: Other sea users. Presence of vessels will have the potential to impact on other sea users for example through collision with towed fishing gear.	Minimise use of vessels, through efficient journey planning. Notify other sea users - e.g., UK Hydrographic Office (UKHO), Maritime Coastguard Agency (MCA) Kingfisher and SFF. Ongoing collaboration with SFF. All vessels engaged in the project operations will have markings and lightings as per the International Regulations for the Prevention of Collisions at Sea (COLREGS) (International Maritime Organization, 1972). Navigational aids including radar, lighting and Automatic Identification Systems (AIS) will be used. A Navigation Risk Assessment (NRA) and Collision Risk Assessment (CRA) will be produced if required.	A	1	L	Vessels associated with the proposed decommissioning activities have the potential to displace fishing vessels and potentially cause ships to avoid an area normally traversed. Though fishing effort in the area is considered relatively important to the UK fishing industry (see Section 6.2), taking account of the mitigation measures identified, the relatively short duration of the activities and the fact that a number of the activities will take place within existing 500 m zones, the impact significance of the presence of vessels on fishing activity during the proposed activities is considered Low and is not considered further in the EA. Shipping activity is low to very low in the vicinity of the proposed operations. The impact significance of the presence of vessels on shipping activity during the proposed activities is considered Low and is not considered further in the EA.	No
4	Physical presence. Vessels.	Receptors: marine mammals and birds. Receptor sensitivity is considered Medium given the presence of marine mammals and potential presence of birds from coastal SPAs. Possible behavioural changes in marine mammals e.g., could be attracted to the vessel or may move away from the area. Migrating birds could be attracted to the lights on the vessels.	Minimise use of vessels, through efficient journey planning.	B	1	L	The North Sea has well developed fishing and energy industries and is a busy shipping area, such that marine mammals in the region are habituated to the presence of vessels. In addition, the evidence for lethal injury from boat collisions with marine mammals suggests that collisions with vessels are very rare (Cetacean Stranding Investigation Programme, 2011). Out of 478 post mortem examinations of harbour porpoise in the UK carried out between 2005 and 2010, only four (0.8 %) were attributed to boat collisions. The impact significance of the proposed vessel use on marine mammals is therefore considered to be Low and is not discussed further in the EA. The vessels have the potential to cause displacement of seabirds from foraging habitat and may cause flying birds to detour from their flight routes. For example, auk species (e.g., guillemot and little auk) are believed to avoid vessels by up to 200 to 300 m but gull species (e.g., kittiwake, herring gull and great black-backed gull) are attracted to the presence of them (Furness and Wade, 2012 and Weise *et al*. 2001).	No

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
							Though evidence suggests that the presence of the vessels could cause some bird species to be displaced from their foraging area, the very small proportion of their overall available habitat that will be occupied by the vessels means the impact is not considered to be noticeable. In addition, 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., they could be attracted to the vessel lights at night) is not expected to be significant. The impact significance on birds is therefore considered to be Low and is not discussed further in the EA.	
5	Discharges to sea. Vessel sewage, ballast water and biofouling.	Receptors: water quality flora/ fauna associated with the water column. Sensitivity is considered to be Medium (B) based on presence of marine mammals and those fish species considered to be PMFs (see Section 5.6.3) Discharge of sewage; grey and black water macerated to <6 mm prior to discharge and discharge of food waste to sea. Water quality in the immediate vicinity of discharges of vessel sewage or ballast water may be reduced, but effects are usually minimised by rapid dilution in the receiving body of water and non-continuous discharge. May result in organic enrichment and chemical contaminant effects in water column and seabed sediments. Ballast water could introduce invasive species depending on vessel routes. Bioinvasions as a result of biofouling (accumulation of organisms including plants, algae, or animals such as barnacles) on vessels could also occur.	Minimise use of vessels, through efficient journey planning. Repsol Sinopec Resources UK Limited will review vessel CMID as part of vessel assurance and all vessels will be compliant with the Company's Marine Assurance System (MAS). Vessels will be MARPOL compliant. All contracted vessels will originate from countries adhering to the International Maritime Organisation (IMO) Convention. The Company's audit procedures will ensure that the contracted vessels ballasting procedures are in line with IMO Convention aimed at preventing associated harmful effects. 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 Minimize the Transfer of Invasive Species will be used. All member states of IMO are signed up to these guidelines.	B	1	L	All vessels will be IMO and MARPOL compliant such that impact significance of any vessel sewage, ballast water or biofouling is considered Low and is not discussed further in the EA.	No

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
6	Underwater noise.	Receptors: marine mammals and fish. Vessels will use dynamic positioning and will have the potential to cause disturbance to marine mammals and fish in the form of temporary displacement from the area. Marine mammals and fish are expected to return once the vessel(s) has left the area.	Minimise use of vessels, through efficient journey planning.	B	2	L	The North Sea has well developed fishing and energy industries and is a busy shipping area, such that marine mammals and fish in the region are habituated to the underwater noise associated with vessels. Over the duration of the recovery and survey activities the total vessel days associated with the proposed activities is estimated to be *c.* 70 (see Section 3.2.6). Any impacts from vessel noise will 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 field. The impact significance of underwater noise on marine mammals and fish is therefore considered to be Low and is not discussed further in the EA.	No
7	Waste production. General waste from vessels.	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.	Repsol Sinopec Resources UK Limited are cognisant of their Duty of Care obligations under the Environmental Protection Act. Prior to contract award Repsol Sinopec Resources UK Limited will review the vessels' Waste Management Plans (WMP) which will adhere to the waste hierarchy principle. The Company will ensure vessels are compliant with MARPOL and, as such, meet Repsol Sinopec Resources UK Limited's MAS. As part of their auditing procedures, Repsol Sinopec Resources UK Limited will ensure the contractor adheres to the Waste Duty of Care Code of Practice. Only landfill sites with approved Pollution Prevention and Control (PPC) permits/ environmental permits will be used.	B	1	L	MARPOL Annex V applies to all ships/vessels and generally prohibits the discharge of all garbage 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. Repsol Sinopec Resources UK Limited recognise landfill sites as a finite resource, however as the vessels will have WMPs in place that will adhere to the waste hierarchy principle of reduce, reuse recycle, the impact significance on the availability of landfill sites is considered Low. Similarly, as only permitted sites will be used, the impact significance on local communities is also considered Low. As the impact significance of any waste from the vessels is considered Low and given that Section 12.8 of OPRED's Guidance Notes (BEIS, 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), the onshore impacts associated with vessel waste are not discussed further in the EA.	No

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
8	Resource use.	Receptor: fuel	Scheduling/design to optimise opportunities to use vessels more efficiently (i.e., minimise transits, ensure vehicles are fully loaded). Under MARPOL Annex VI, all vessels will adhere to the Ship Energy Efficiency Management Plan (SEEMP) such that the vessels will have best practices for fuel efficiency in place.	A	1	L	Repsol Sinopec Resources UK Limited recognise that hydrocarbon-based fuel is a finite resource, however given the relatively short duration of the proposed decommissioning activities and the use of MARPOL compliant vessels the impact significance of the use of fuel is considered Low and is not discussed further in the EA.	No
9	Unplanned event: diesel spill. Unforeseen event during operations for example a collision or fire resulting in a loss of fuel inventory.	Receptors: water quality, sediment quality, fisheries, marine mammals, birds, fish, plankton, benthic communities. Given the nature of diesel, a large volume of any diesel spill would be expected to evaporate. Modelling of a diesel spill (2,947.5 m^3) carried out to support the Balmoral field Oil Pollution Emergency Plan (OPEP) suggests the probability of a diesel spill reaching the Norwegian coastline is less than 70 % after 15 days and the probability of reaching the UK coastline is less than 30 % after 12 days (Premier Oil, 2020 and references therein).	Vessel assurance inspections. Pre-hire vessel audits. Emergency response plans in place including the OPEP (Oil Pollution Emergency Plan) SOPEPs (Shipboard Oil Pollution Emergency Plan). SIMOPS (simultaneous operations) will be managed through bridging documents and communications. All vessels engaged in the project operations will have markings and lightings as per the COLREGS whilst the navigational aids will include radar, lighting and AIS.	C	2	M	Given the results of the modelling previously carried out, the magnitude of effect of a loss of diesel inventory is considered minor. As marine mammals do occur in the area, receptor sensitivity to a spill is considered high such that the overall impact significance of such an event is considered Moderate. With the application of the mitigation measures the likelihood of a total loss of fuel inventory from a vessel is considered Remote such that the environmental risk is considered Low. In line with Subsection 12.4 of the OPRED Decommissioning Guidance (BEIS, 2018), the impacts of accidental events are not assessed in the EA.	No
Decommissioning of pipelines and umbilicals (including spools, mattresses and grout bags) and subsea structures								
10	Disturbance to the seabed. Recovery of spools, mattresses, grout bags, surface laid pipelines and umbilicals and subsea structures.	Receptors: sediment quality and benthic communities. All activities will take place out with any designated areas. In some areas the environmental survey identified the potential presence of 'sea pens and burrowing megafauna communities'.	Cutting/dredging/jetting work plans will be in place. Dredging/jetting will be minimised. Lifting procedures in place.	B	1	L	Due to the potential presence of 'sea pens and burrowing megafauna communities' is B (medium). The magnitude of effect is considered to be negligible given the very small area and that recovery of the seabed and associated communities is expected to occur naturally without Company intervention. The overall impact significance is therefore considered to be Low. To allow an assessment of the cumulative seabed disturbance across all activities, the impact of seabed disturbance resulting from these activities is discussed further in the EA.	Yes

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
11	Disturbance to the seabed. Remediation of exposed pipeline / umbilical ends using cut and recover techniques.			B	2	L	The magnitude of effect of cutting and recovering the exposed pipeline and umbilical ends is considered Minor given that recovery of the seabed and associated benthic communities is expected to occur naturally without Company intervention. The overall impact significance is therefore considered to be Low. However, this impact will be considered further in the EA, in order to allow an assessment of the cumulative seabed disturbance across all activities.	Yes
12	Discharges to sea. Discharges from surface laid spools, pipelines and umbilicals during recovery and discharges from cut ends of trenched and buried pipelines and umbilical.	Receptor: water quality which subsequently could impact on flora and fauna. Discharge of flushing fluids (filtered seawater) and hydraulic fluids (Aqualink 300) from the pipelines / umbilicals during cutting and/or recovery operations.	All pipelines used to transport oil have been flushed and cleaned in line with BAT/BEP procedures to minimise oil concentrations. Hydraulic fluids in the umbilicals are all water based.	B	1	L	Given that the lines have been flushed and cleaned to BAT/BEP such that hydrocarbon content has been reduced to ALARP and given the current contents of the pipelines and umbilicals, the impact significance of any discharges during cutting/recovery activities is considered Low and is not considered further in the EA.	No
13	Underwater noise from cutting activities.	Receptors: marine mammals and fish. Noise from cutting operations may cause mobile species to move away from the area for the duration of the cuttings.	Suitable technology for cutting will be selected to ensure the effectiveness of the cutting, minimise the duration and therefore minimise the disturbance caused.	B	1	L	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 response of marine mammals or fish to sound generated by underwater cutting. However, reported source levels are relatively low compared with those generated by vessels The main impact, if any, therefore is expected to be disturbance rather than injury and the magnitude of the effect is expected to be less than the vessels. The impact is assessed as Low and is not considered further in the EA.	No

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
14	Waste processing. Treatment of recovered materials including marine growth, hazardous waste and potential naturally occurring radioactive material (NORM).	Receptor: Potential for nuisance impact on communities located in proximity to waste processing facilities (e.g., from traffic, noise and odour). Significant quantities of marine growth are not expected.	Repsol Sinopec Resources UK Limited are cognisant of their Duty of Care obligations under the Environmental Protection Act. As part of Repsol Sinopec Resources UK Limited's Duty of Care, contract award will be to an established yard with appropriate experience, capability, licences and consents in place. As part of this the sites must demonstrate waste stream management throughout the deconstruction process. All waste will be handled and disposed of in line with regulations which will be detailed in the WMP, including NORM which will be handled in accordance with relevant permitting requirements.	B	2	L	The impact significance on local communities is considered to be Low. Section 12.8 of OPRED's Guidance Notes (BEIS, 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.	
15	Waste processing. Disposal to landfill including hazardous waste and potential NORM.	Receptor: use of landfill. Following application of the waste hierarchy, minimal quantities of materials will go to landfill.	Repsol Sinopec Resources UK Limited are cognisant of their Duty of Care obligations under the Environmental Protection Act. As part of Repsol Sinopec Resources UK Limited's Duty of Care, any waste disposal will be in an appropriately licenced landfill site. All waste will be handled and disposed of in line with regulations and the WMP, including NORM which will be handled in accordance with relevant permitting requirements.	B	2	L	Repsol Sinopec Resources UK Limited recognise landfill sites as a finite resource, however applying the mitigation measures identified and considering the relatively small volumes of material to be returned (see Section 3.8 of the draft DPs) the impact significance on the availability of landfill sites is considered Low. 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

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
Over trawl trials								
16	Seabed disturbance. Clear seabed surveys and over trawl trials.	Receptor: benthic communities. Potential for over trawl trials using standard nets may be carried out to demonstrate a safe seabed. This will result in 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 requirement for an over trawl trial.	B	2	L	As a worst case an over trawl trial using a standard net will be required to demonstrate a safe seabed. As fishing in the area is considered moderate, the impact of an over trawl trial is not expected to be more significant that the impact of the demersal trawl gear associated with the wider area such that the impact significance is considered Low. However, this impact will be considered further in the EA, in order to allow an assessment of the cumulative seabed disturbance across all activities.	Yes
Legacy Impacts								
17	Legacy socio-economic impacts associated with pipelines, umbilicals, stabilisation materials and rock cover left *in situ*.	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. Over trawl trials to be carried out if considered necessary. Post decommissioning survey strategy.	A	1	L	Pipeline status reports have found the seabed to be stable over the trenched and buried pipelines and umbilical such that the potential for additional exposures to occur along these lines is considered low. Repsol Sinopec Resources UK Limited recognise that demersal trawl gear is used in the area (see Section 6.2), however given the stability of the seabed in the area and with the application of the mitigation measures identified, the impact significance with respect to impact on fishing activities is considered Low. Though the impact significance is considered Low, given stakeholder interests with respect to a safe seabed, the decommissioning of the buried pipelines and umbilical, and existing rock cover will be considered further in the EA.	Yes
18	Legacy socio-economic impacts associated with surrendering of 500 m exclusion zones	Receptor: other sea users. Shipping and fishing vessels will get access to the Beauly and Burghley exclusion areas.		A	0	P	To assess total impact on other sea users with respect to materials (pipelines, umbilical and rock cover) decommissioned *in situ*, the impact on other users with respect to a safe seabed will also be considered further in the EA.	Yes

No.	Aspect/Activity	Observations	Existing Mitigation	Receptor Sensitivity	Magnitude of Effect	Impact Significance	Justification for selecting/deselecting the aspect/impact for further assessment in the EA	Further Assessment?
19	Legacy environmental impacts associated with discharges from pipelines and umbilicals decommissioned *in situ* following degradation.	Receptor: sediment quality and benthic communities. Over time the trenched and buried pipelines decommissioned *in situ* will degrade, releasing their contents including residual hydrocarbons and chemicals into the sediment. As the pipelines degrade, plastics and other debris will be released into the sediments.	All pipelines used to transport oil have been flushed and cleaned in line with BAT/BEP procedures to minimise oil concentrations remaining. The pipelines and umbilical will be trenched and buried under sediment *c*. 0.6 m deep.	B	2	L	All infrastructure decommissioned *in situ* will be trenched and buried such that impacts of degradation will be contained within a limited area around the pipelines and umbilical. As the lines corrode the contents will 'seep' into surrounding sediments, however the impact on biota is considered to be negligible as the lines contain only filtered seawater or water based hydraulic fluid. During the gradual breakdown there will be a release of metals and plastics into the sediment. As degradation will take place over decadal or centurial timescales it is not expected that metal concentrations in the sediment will accumulate significantly. Degradation of plastics is expected to take place over many decades or possibly centuries. As the lines are buried, it is expected that the broken-down products will remain contained within the area of the lines. Given the current contents of the pipelines and umbilical and the fact that all infrastructure decommissioned *in situ* is trenched and buried, the impact significance of pipeline and umbilical degradation over time is considered Low. However, given public concern with respect to the impact of plastics in the environment the legacy impact of decommissioning the buried pipelines and umbilical *in situ* is considered further in the EA.	Yes
20	Legacy environmental impact associated with presence of existing rock cover and any additional rock used to remediate exposed sections	Receptors: sediment quality and benthic communities. Addition of rock would result in a change in habitat type. Some mortality of benthic animals belonging to species which are generally considered widespread throughout the CNS.	Cut and recover and trench and bury options will be prioritised over the addition of rock cover. If option to rock cover is selected, quantity required will be optimised.	B	2	L	There is an estimated 34,582 te of rock associated with the Beauly (9,767 te) and Burghley (24,815 te) fields. If following the C&P tendering phase, the option to rock cover the exposed sections of lines to be decommissioned in situ it is estimated that an additional 6,255 te of rock would be added across the two fields. Given that the additional rock will be added to an area with existing rock berms the environmental impact significance is considered Low. However, the addition of rock will be assessed further in the EA, in order to understand the cumulative impact of disturbance to the seabed.	Yes

8 SEABED DISTURBANCE

When assessing the impact of the proposed activities during the desktop ENVID Review (Section 7), none of the seabed impacts were considered to result in a significant environmental impact. However, it is acknowledged that the activities were considered separately and therefore those activities resulting in seabed disturbance are considered further here to allow for a cumulative assessment to be completed.

8.1 Activities (Cause of Impact)

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

- Recovery of the subsea structures, surface laid pipelines and umbilicals, spools, umbilical jumpers, mattresses and grout bags;
- Remediation of pipeline and umbilical ends by either:
  - rock cover;
  - trench and bury; or
  - cut and recover.
- Total removal of umbilicals by reverse reeling; and
- Over trawl trials.

Note: not all of these activities will necessarily be undertaken (e.g. rock placement and over trawl trials), however, they have been fully assessed in this section to ensure the potential 'worst case' impact is assessed.

Table 8-1 presents the anticipated total area of temporary disturbance associated with all the potential decommissioning activities (estimated at 0.33 km^2), other than those associated with the over trawl trials.

With regards to the decommission *in situ* option for the pipelines and umbilicals, preference will be given to remediating the exposed end sections by cut and recover or trench and bury. Following the contracts and procurement phase, if rock cover is selected, up to 6,255 te of additional rock cover with a footprint of up to 0.006 km^2 will be required.

If over trawl trials are required to demonstrate a 'a safe seabed', the area covered will include the footprint of activities captured within Table 8-1. The area impacted by the over trawl trial is estimated to be *c*. 4.29 km^2 (Figure 8-1). Table 8-2 shows the worst-case assumptions used to calculate this footprint.

Repsol Sinopec Resources UK Limited will explore the use of a side scan sonar survey or similar to demonstrate a safe seabed, and therefore minimise the area of temporary seabed disturbance.

Table 8-1: Anticipated area of temporary seabed disturbance associated with the proposed activities.

Activity	Assumptions made	Temporary area of disturbance (km^2)
Recovery of subsea installations	Beauly WHPS: 5.6 m (L) x 5.6 m (W) Burghley WHPS: 9.2 m (L) x 9.2 m (W) Burgley Valve Skid: 9.2 m (L) x 7.7 m (W) As a worst case, calculation of the seabed disturbance around each structure assumes temporary disturbance out to 5 m on each side of the structure.	0.00032
Recovery of surface laid pipeline ends	Although the production and gas lift pipelines are piggy backed, they diverge to different tie-in points. The removed lengths are therefore treated separately to give a maximum worst case disturbance. Therefore the total exposed length of end sections across the four lines is 1,265 m (PL1792 – 242 m; PL1793 – 253 m; PL2677 – 473.5 m; and PL2678 – 296.5 m). A disturbance corridor of 5 m is assumed for these items.	0.0063
Total removal of umbilicals	Recovery of the umbilicals is expected to be achievable by pulling the umbilicals through the sediment. However, as a worst case the EA assumes mass flow excavation is required and a corridor width of 20 m will be impacted along the full length of each umbilical (PL1794/5/6 – 5, 392 m; and PLU2679 – 10,470 m).	0.317
Total removal of other surface laid spools and jumpers	As described in Table 3-2, 776 m of surface laid spools and jumpers that are not included within the pipelines or umbilicals above will be recovered. It is assumed that there will be a disturbance corridor of 2 m associated with recovery of each item.	0.0014
Recovery of mattresses	96 mattresses to be recovered. These include: • 15 mattresses associated with the Beauly field (5 m (L) x 2 m (W)) • 81 mattresses associated with the Burghley field comprising – 3 (6 m (L) x 3 m (W)) – 24 (8 m (L) x 4 m (W)) – 54 (8 m (L) x 3 m (W)) As a worst case, calculation of the seabed disturbance assumes temporary disturbance out to 2 m on each side of each mattress.	0.0079
Recovery of grout bags	There are no exposed grout bags associated with the Beauly field. 150 x 25 kg grout bags will be removed from the Burghley field. As a worst case, calculation of seabed disturbance assumes temporary disturbance of 1 m^2 for each grout bag.	0.00015
Total area of temporary disturbance		0.33
Note: area of disturbance calculated for each line item will overlap with other line items in a number of instances such that the area calculated is worst case estimate.		

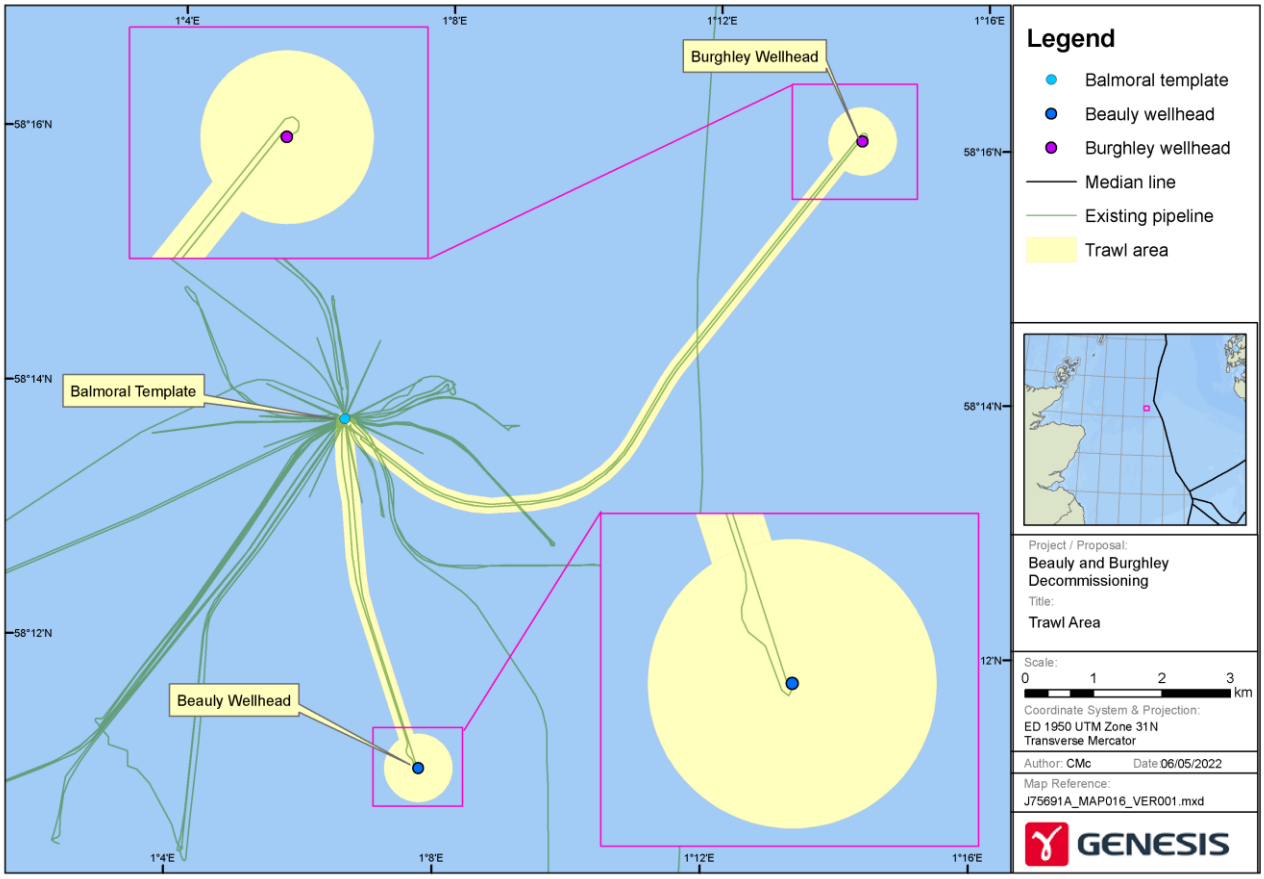


Figure 8-1: Maximum area expected to be covered by the potential over trawl trials.

Table 8-2: Estimate of area impacted by over trawl trials.

Row No.	Activity	Assumptions made	Area impacted by over trawl activities (km^2)
1	Existing 500 m exclusion zones	Assumes over trawling of 500 m exclusion zones at Beauly and Burghley.	1.57
2	Beauly pipelines and umbilical	Assumes over trawling of a 100 m corridor along the full pipeline lengths out with the 500 m zones at Beauly and at Balmoral.	0.87
3	Burghley pipelines and umbilical	Assumes over trawling of a 100 m corridor along the full pipeline lengths out with the 500 m zones at Burghley and at Balmoral.	1.85
Total			**4.29**
Note: area of disturbance calculated for each line item will overlap with other line items in a number of instances such that the area calculated is worst case estimate.			

8.2. Impact on Receptors

The maximum area of temporary seabed disturbance associated with the worst case proposed decommissioning activities is 4.29 km^2. However, this relates to an area impacted by the over trawl trials and would be significantly less if side scan sonar surveys are used to obtain evidence of a safe seabed. Impacts on this seabed area are considered temporary because, following completion of activities, the seabed will begin to recover.

The seabed area considered to be impacted permanently is limited to the areas where rock cover could be deposited. For this assessment, it includes the potential worst-case scenario of rock cover over a total length of *c*. 1 km of exposed pipeline and umbilical end sections with a maximum seabed footprint of 0.006 km^2.

If selected, trenching physically disturbs the benthic communities and their habitat within the area impacted and may cause some smothering in the wider region due to the re-deposition of excavated material. In addition, trenching can create a temporary plume of suspended solids. While some, mostly epifaunal, organisms may be killed by the passage of the trenching machinery, the majority will be displaced, and are likely to survive. Some of the exposed organisms may not be able to re-bury before being predated upon while others may be relocated by water movements.

Given the nature of the sediment in the area it is possible that 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, such as the juvenile *A. islandica*, 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 discussed in Section 5.7, the OSPAR listed threatened and/or declining habitat 'sea pens and burrowing megafauna communities' may occur in the area. No adult specimens of the Scottish PMF *A. islandica* were identified although juveniles occurred at about half of the stations sampled during the pre-decommissioning survey of the Beauly area.

FEAST (Marine Scotland, 2020) reports that burrowed mud habitats (and the species that it supports, such as sea pens) show a medium sensitivity to sub-surface abrasion/penetration and surface abrasion, which may be caused by the over trawl trials. Experimental studies have shown that all three species of sea pen 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 al.* (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).

The proposed decommissioning activities may therefore impact on the 'sea pens and burrowing megafauna communities' habitat, however this impact is not expected to be significant due to the very localised nature of the operations and the results of the studies cited.

Powilleit *et al*., (2009) exposed *A. islandica* to increased sediment depths of up to 40 cm and found that the animals were able to burrow to the surface. Based on this evidence, Tyler-Walters and Sabatini (2017) conclude that a deposit of 30 cm of fine material is unlikely to have a negative impact on *A. islandica*. Therefore, though the proposed activities will result is the settling of suspended sediments over an extended area, the area over which burial depths exceeds 30 cm is expected to be localised such that the impact of the proposed activities on *A. islandica* is not expected to be significant.

Any impacts from compression (caused for example by potential remedial rock cover) and sediment re-suspension are expected to be short lived since most of the smaller sedentary species associated with the area (such as polychaete worms) have short lifecycles and recruitment of new individuals from outside the disturbed area will be rapid. 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 (Dernie *et al*., 2003; Hiddink *et al*, 2017). Recovery times for soft sediment faunal communities are difficult to predict, although some recent studies have attempted to quantify timescales. Benthic communities are observed to recover at rates similar to physical restoration (Kraus and Carter, 2018). Collie *et al*. (2000) examined impacts on benthic communities from bottom towed fishing

gear and concluded that, in general, sandy sediment communities were able to recover rapidly, although this was dependent upon the spatial scale of the impact. It was estimated that recovery from a small-scale impact, such as a fishing trawl, could occur within about 100 days assuming that recolonisation was through immigration into the disturbed area rather than from settlement or reproduction within the area. Recovery through immigration would be expected to take longer for the more extensive trawled areas, and larval recruitment or local reproduction by surviving individuals may be more important determining factors.

The Minerals Management Service (MMS) (1999) quotes various sources and reports that recolonisation takes 1-3 years in areas of strong currents but up to 5-10 years in areas of low current velocity. A later study (Kraus and Carter, 2018) corroborates the finding that restoration is fastest in high energy environments with high sediment supply and slowest in lower energy environments further from terrestrial sediment inputs. It compiles 12 case studies of subsea power cables that were surveyed at varying intervals after installation. In shallow inner continental shelf waters up to 30 m (not including sensitive nearshore habitats such as seagrass beds) recovery could be seen within a year but in deeper outer continental shelf – continental slope environments (approximately 80 to >130 m water depth) characterised by mud or sandy mud, full recovery could take more than 15 years. Longer recovery times are also reported for sands and gravels where an initial recovery phase in the first 12 months is followed by a period of several years before pre-extraction population structure is attained (MMS, 1999). Communities on gravel may be more sensitive because they generally have a larger proportion of longer living species with lower reproduction rates that take longer to recover (Hiddink *et al*., 2017). Fine sediments such as the silts and sands, which occur in the Beauly and Burghley area, tend to recover much more quickly than the biologically controlled communities which characterise coarse deposits.

Recovery of the benthic communities also depends on the spatial and temporal scale of the disturbance. In their metaanalysis of the impacts of trawl gear on benthic communities, Hiddink *et al*., 2017 found that more frequently trawled areas take longer to recover and that proximity to less impacted areas, from which individuals can migrate, also speeds up the recovery process. Given the short duration and small areas of seabed impacted by decommissioning operations, recovery can be expected to occur more quickly than it does in the case of wider ranging and longer-term disturbance.

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 Low.

The loss of habitat and smothering of the benthos associated with the placement of rock cover creates habitats for benthic organisms that live on hard substrates leading to a change in the local seabed community and an increase in local habitat and community diversity. The environmental impact significance of any additional rock is therefore considered to be Low.

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 5.6.3, 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, any impacts on fish in the area will be at an individual level such that the impact significance is considered Low.

The Beauly and Burghley infrastructure lies in an area that is targeted by demersal fishing gear and the temporary impacts of the decommissioning activities are considered to be minor compared to the impacts associated with these gear types.

8.3. Transboundary and Cumulative Impacts

The fields are located approximately 19 km from the UK/ Norwegian median line. Given the relatively small scale and local nature of the proposed decommissioning activities, there are no transboundary seabed impacts anticipated.

The cumulative impacts associated with the temporary seabed disturbance is negligible when seabed disturbance associated with demersal fishing in the area is taken into account.

With respect to the potential for adding rockdump to the exposed pipeline and umbilical ends, the additional quantities of rock are expected to have a maximum seabed footprint of 0.006 km^2 and will be laid out with any designated areas. Compared to existing rock cover in the vicinity, the impact significance of any cumulative impacts is still considered Low.

8.4. Mitigation Measures

The following mitigation measures are proposed to minimise the environmental impacts related to the planned seabed disturbance associated with the Beauly and Burghley Decommissioning Project.

Proposed Mitigation Measures

- Cutting/jetting/dredging and lifting procedures will be in place.
- With respect to remediation on the exposed ends of the buried pipelines and umbilical, trench and bury or cut and recover will be prioritised over rockdump.
- If rockdump is used, volumes will be minimised, and a fallpipe will be used to lay it on the seabed.
- Rockdump profiles will align with industry standards with respect to size of rock.
- Preference will be given to the use of side scan sonar surveys (or similar) to determine a safe seabed.

8.5. Conclusions

The majority of decommissioning activities associated with the Beauly and Burghley Decommissioning Project will result in localised short-term disturbance to the seabed, including disturbance to contaminated sediments close to the Balmoral template and well locations. Permanent disturbance is limited to that associated with the potential use of the addition of rock to the exposed end sections of the lines.

Over trawl trials used to confirm a safe seabed will result in the largest area of impact, and Repsol Sinopec Resources UK Limited will investigate the use of side scan sonar to determine a safe seabed and therefore remove this impact.

Should rock cover be selected for the remediation of exposed pipeline and umbilicals ends, it is expected that this impact will not be significant given the small scale of the additional rock cover and the presence of existing rock substrates.

Considering the scope of activities and the receptors in the area, the impact significance of disturbing the seabed is considered Low. In addition, the activities assessed in this Chapter will not contradict the NMP objectives (see Sections 5.8) and as the project progresses Repsol Sinopec Resources UK Limited will aim to comply with the NMP policies. In addition, the Project will aim to comply with the oil and gas marine planning policies (see Section 5.9).

9. LEGACY IMPACTS

When assessing the impact of the proposed activities during the ENVID Review (Section 7), none of the legacy impacts were considered to result in a significant environmental impact. However, given that the legacy impacts could change over time, and are of particular interest to stakeholders, they are considered further here.

9.1 Activities (Cause of Impact)

Proposed activities that could result in a legacy impact are:

- Decommissioning of the buried pipelines *in situ*;
- Potential decommissioning of the buried umbilicals *in situ*;
- Decommissioning of the existing rock cover and rock covered concrete mattresses and 25 kg grout bags *in situ*; and
- Potential placement of additional rock cover.

In line with the results of the CA, Repsol Sinopec Resources UK Limited propose to decommission the trenched and buried pipelines *in situ* with the exposed pipeline ends cut and removed. The CA found that the preferred option for decommissioning the umbilicals is either: full removal or decommission *in situ* (ends cut and removed). The most likely option, as described in the DPs, is decommission *in situ* (ends cut and removed). There will be no legacy impacts associated with full removal, therefore this section assesses the impact of decommissioning the umbilicals *in situ* as a worst-case scenario.

The potential options for decommissioning *in situ* with the pipeline/ umbilical ends trenched and buried or with rock cover are also being carried forward and have therefore been assessed in this chapter.

9.2 Environmental Impact of Infrastructure to be Decommissioned *In Situ*

9.2.1 Buried Pipelines and Umbilicals

Over time the buried pipelines and umbilicals will break down. Analysis by Atkins indicates that the process of deterioration of rigid steel pipelines in saltwater environments may take from 220 to 600 years (Atkins, 2012) and OEUK suggest that steel structures below the seabed will corrode at rates in the region of 0.01 to 0.02 mm/year (OGUK, 2013). It is expected that the deterioration of plastics within the pipelines and umbilical will take significantly longer than the time for the steel pipelines to degrade (Dames *et al*., 1999).

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.

Pipeline and Umbilical Contents

The pipelines to be decommissioned *in situ* contain filtered seawater whilst the umbilical cores contain either filtered seawater or water based hydraulic fluids (Aqualink 300). As the lines corrode, their contents will be slowly released into the surrounding sediments. Given that:

- the release will be gradual; and
- the hydraulic fluids are water based

the impact significance of these discharges is considered to be Low.

Metals

The steel (*c*. 1,718 te), and aluminium alloy (*c*. 4 te), associated with the pipelines and umbilicals which could be decommissioned *in situ* will over time become exposed to the surrounding sediment as the pipelines and umbilicals degrade. 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; and Ansari *et al*., 2004).

Taking account of:

- the buried nature of the lines; and
- the slow anticipated rate of degradation.

the long term environmental impact significance of the metals associated with the lines decommissioned *in situ* is considered Low.

Plastics

The pipelines and umbilicals to be decommissioned *in situ* have a worst case *c*. 285 te of plastic associated with them. 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.

Generally speaking, natural degradation of plastic 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). This means that fragmentation is greatest when debris is directly exposed to UV radiation on shorelines. The effect of photodegradation is significantly decreased in seawater due to the lower temperature and oxygen availability and that the rate of hydrolysis of most polymers is very low in the ocean (Andrady, 2011).

During this long-term process, the degraded components of the pipelines and umbilicals and their contents will be released into the sediments, and mechanisms such as biodegradation and ingestion by benthic species could result in the introduction of heavy metals and plastics into the food chain.

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 (POP) 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 (UNEP, 2016).

Chronic exposure to the presence of microplastics has 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).

The Joint Research Centre of the EC (Werner, *et al*., 2016) concluded that there is experimental evidence of negative physical/ mechanical impacts from ingestion of plastic on the condition, reproductive capacity and survival of individual marine organisms. However, the evidence is restricted to laboratory experiments with organisms from lower trophic levels. These findings imply evidence of harm in natural populations, but quantifying the extent of this harm would be extremely challenging and the extent of harm caused by ingestion is likely to be underestimated, because insufficient autopsies have been carried out.

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 circulation. 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). In mussels, *Mytilus galloprovincialis*, exposed to polyethylene and polystyrene microplastics contaminated with poly aromatic hydrocarbons, marked bioaccumulation of these chemicals was recorded in both digestive glands and gills (Avio *et al*., 2015). 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).

Once plastics become buried in sediment, then the rate of fragmentation decreases rapidly. Microorganisms, animals, salt, sunlight, fluctuations of water, etc. 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 Beauly and Burghley pipelines and umbilical to be decommissioned *in situ* are buried it can be expected that the majority of degradation sources, such as UV light and high temperatures will not be relevant.

Physical forces such as heating/cooling or seabed movements can cause mechanical damage such as the cracking of polymeric materials, and these physical forces are more likely to occur, however again these are not expected to impact on the pipelines and umbilical. The growth of microorganisms within the sediment can 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).

Due to the buried nature of the Beauly and Burghley pipelines and umbilicals it is expected that the timescale of degradation will be considerably slower than it is for plastic in the water column or at the surface. The impacts of mechanical forces acting on the plastic 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. The long term environmental impact significance of the plastics associated with the pipelines and umbilical to be decommissioned *in situ* is therefore considered Low.

9.2.2 Existing Stabilisation Features and Additional Rock Cover

Approximately 34,582 te of rock cover has previously been deposited at various locations across the Beauly and Burghley fields. Some of this rock has been in place for over 25 years creating a habitat for benthic organisms that live on hard substrate. If the option to rock cover the exposed sections of the pipelines and umbilical (to be decommissioned *in situ*) is selected, up to 6,255 te of additional rock will be required.

As for the existing rock, this additional rock will create a habitat for benthic organisms that live on hard substrate. Whilst this will create further hard substrate in an area of naturally softer seabed, it will not be significantly different from the existing baseline, therefore, it is unlikely that the decommissioning *in situ* of existing rock or the introduction of any additional rock will have a significant impact on the benthic species that occur in the area. The environmental impact of decommissioning existing rock *in situ* or adding new rock to mitigate the exposed ends of the pipelines and umbilical is therefore considered Low.

As discussed in Section 3.2.5.3 the Beauly and Burghley lines cross over the third party lines at each of the crossings, such that the owners of the third party lines are responsible for decommissioning of these crossings. Should the line owners choose to decommission the crossing components *in situ*, the concrete mattresses and grout bags associated with these crossings are expected to degrade over centuries given that they are buried under rock. The degradation products will be the aggregates (sand and gravel) used in the concrete and grout 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 of the crossings. Impacts on benthic fauna are therefore expected to be negligible, whilst there are no anticipated impacts on the water column. Therefore, the potential impact significance of the degraded concrete mattresses and grout bags is considered low.

9.3 Socio-Economic Impacts of Infrastructure to be Decommissioned *In-Situ*

As described in Section 6.2, demersal trawl gear is used in the area of the Beauly and Burghley fields and therefore has the potential to interact with any infrastructure or rock remaining on the seabed. The buried pipelines and umbilical to be decommissioned *in situ* have a depth of lowering / cover in general of over 0.6 m and occur in an area where the seabed is stable. Trawl gear currently working in the area, have regularly traversed the buried sections of the pipelines and umbilical without any interaction.

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.

Assuming a worst case whereby rock is used to mitigate the exposed ends of the trenched and buried pipelines and umbilical, *c*. 6,255 te of rock will be required. In the event that any rock cover is laid, the rock size and profiles selected will be 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.

Following 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.

As part of the DP, Repsol Sinopec Resources UK Limited will commit to a post decommissioning survey strategy (agreed with OPRED) to monitor the burial status of the lines and stability of the rock profiles.

Therefore taking:

- the current buried condition of the lines into account;
- the stability of the seabed;
- the used of industry preferred rock size and profiles;
- demonstration of a safe seabed; and
- a post decommissioning survey strategy,

the socio-economic impact significance of these lines and rock being decommissioned *in situ* is considered Low.

9.4 Transboundary and Cumulative Impacts

Given the distance from the nearest transboundary line (*c*. 19 km), there are no transboundary impacts anticipated as a result of the decommissioning activities.

All surface laid infrastructure will be recovered. Cut and recover or trench and bury are the most likely options for remediation of exposed pipeline and umbilical ends, however if rock cover is selected then the additional quantity of rock will be up to 15 % of the existing rock cover. The cumulative impact of the proposed activities in relation to other activities in the area is not considered significant.

9.5 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*.

Proposed Mitigation Measures

- All surface laid infrastructure will be recovered.
- A clean seabed will be achieved as part of the decommissioning activities.
- Exposed pipeline ends will be remediated. Umbilicals will either be fully removed or, if decommissioned *in situ*, the exposed ends will be remediated.
- Lines decommissioned *in situ* have been flushed to reduce hydrocarbons and chemicals to as low as reasonably practicable.
- Locations of remaining materials will be marked on FishSafe.
- Adherence to a post decommissioning survey strategy agreed with OPRED.

Repsol Sinopec Resources UK Limited's commitment to adhering to the mitigation measures identified means that the environmental and socio-economic impact significance of decommissioning the buried pipelines, umbilical and existing rock cover *in situ* is considered Low.

The activities assessed in this chapter will not contradict the NMP objectives (see Section 5.8) and as the project progresses Repsol Sinopec Resources UK Limited will aim to comply with the NMP policies. In addition, the Project will aim to comply with the oil and gas marine planning policies (see Section 5.9).

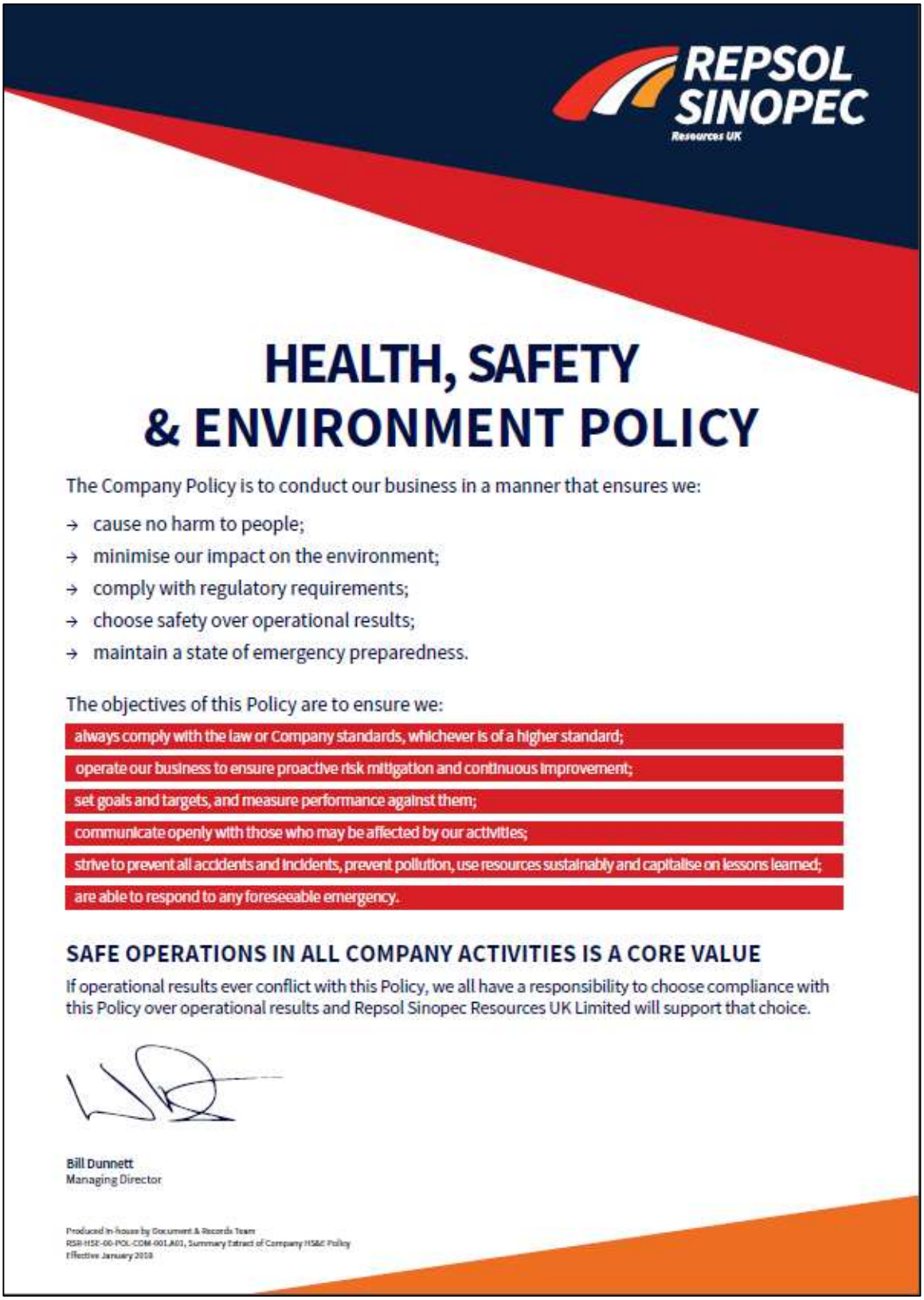
10. ENVIRONMENTAL MANAGEMENT

Repsol Sinopec Resources UK Limited are committed to conducting activities in compliance with all applicable legislation and in a manner that will minimise impacts on the environment. Environmental and social impacts identified through the impact identification processes will be input to the projects risk register. A summary of key environmental and social impacts and risks shall be included within the projects decision documentation throughout all phases of the project.

Repsol Sinopec Resources UK Limited has established a clear framework for the effective management of Health, Safety and Environmental (HSE) issues involving their oil and gas activities in the UK. The Company regards environmental management as being an integral part of its overall management responsibility, the fundamental aims being to support environmental protection, prevent pollution and comply with legislation and regulations. The principles of the International Standard for Environmental Management Systems (ISO14001) are incorporated within the Company's Safety and Environmental Management System (SEMS) which is an integral part of the company's overall management system.

Repsol Sinopec Resources UK Limited's structure, roles and responsibilities are outlined in the SEMS. In addition, the SEMS provides the framework for a 'Plan-Do-Check-Act' approach to HSE management, which actively promotes continual improvement in all aspects of the organisation's activities.

Repsol Sinopec Resources UK Limited's HSE Policy is a public declaration of the Company's commitment to create a working environment such that no harm is caused to people and where environmental impact is minimised. The Company's HSE Policy is shown in Figure 10-1.



REPSOL SINOPEC
Resources UK

HEALTH, SAFETY & ENVIRONMENT POLICY

The Company Policy is to conduct our business in a manner that ensures we:

- cause no harm to people;
- minimise our impact on the environment;
- comply with regulatory requirements;
- choose safety over operational results;
- maintain a state of emergency preparedness.

The objectives of this Policy are to ensure we:

- always comply with the law or Company standards, whichever is of a higher standard;
- operate our business to ensure proactive risk mitigation and continuous improvement;
- set goals and targets, and measure performance against them;
- communicate openly with those who may be affected by our activities;
- strive to prevent all accidents and incidents, prevent pollution, use resources sustainably and capitalise on lessons learned;
- are able to respond to any foreseeable emergency.

SAFE OPERATIONS IN ALL COMPANY ACTIVITIES IS A CORE VALUE

If operational results ever conflict with this Policy, we all have a responsibility to choose compliance with this Policy over operational results and Repsol Sinopec Resources UK Limited will support that choice.

Bill Dunnett
Managing Director

Produced in-house by Document & Records Team
RSR-HSE-00-POL-COM-001,A01, Summary Extract of Company HS&E Policy
Effective January 2018

Figure 10-1: Repsol Sinopec Resources UK Limited HSE Policy.

11. CONCLUSIONS

The Beauly and Burghley fields are to be decommissioned by Repsol Sinopec Resources UK Limited. Included in the decommissioning activities is the recovery of all subsea structures, spools, jumpers, exposed mattresses and exposed 25 kg grout bags. The trenched and buried pipelines will be decommissioned *in situ* with the exposed ends remediated. The trenched and buried umbilicals will be either fully removed or decommissioned *in situ* with the exposed ends remediated. Preference will be given to either 'trench and bury' or 'cut and recover' the exposed ends however the CA did also identify the use of rockdump as a suitable remediation option.

Following a detailed review of the project activities, the environmental sensitivities of the project area, industry experience with decommissioning activities and of stakeholder concerns, it was determined that further assessment of the following issues was required in order to properly define the potential impact of the proposed decommissioning activities for the Beauly and Burghley fields:

- Seabed disturbance impacts – during recovery of infrastructure, potential trench and bury activities, potential rock cover and over trawl sweeps/ trials.
- Legacy impacts:
    - The release of chemicals, metals, and plastic 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.

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, there is expected to be no significant impact on receptors. As part of this review, cumulative and transboundary impacts were assessed and determined to be not significant.

The potential impact on protected sites in the wider vicinity has been considered in the assessment. The protected sites in closest proximity to the Beauly and Burghley fields are the Scanner Pockmark SAC *c*. 12 km north-west and the Norwegian Boundary Sediment Plain NCMPA *c.* 23 km to the south-east. Having assessed the impact of the decommissioning activities, there is not expected to be a significant impact on any protected sites.

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

Based on the findings of this EA and the identification and subsequent application of the mitigation measures identified for each potentially significant environmental and societal impact, it is concluded that the proposed Beauly and Burghley fields decommissioning activities will result in no significant environmental or societal impacts.

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APPENDIX A – IMPACT AND RISK ASSESSMENT METHODOLOGIES

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 activities and unplanned events (respectively) associated with the project.

A.1. Receptors and Aspects

Prior to carrying out the ESIA / ESRA the potential receptors likely to be impacted were identified (Chapters 5 and 6), and the ways in which the activities may interact with the environment, i.e. the ''aspects'' (Chapter 3) were ascertained.

A.1.1 Environmental and Socio-Economic Receptors

Receptors to be considered in the ESIA and ESRA include:

Environmental receptors:

- Air quality;
- Climate;
- Water quality;
- Sediment quality;
- Plankton;
- Benthic communities (including flora and fauna);
- Fish;
- Marine mammals;
- Seabirds;
- Coastal marine communities;
- Designated areas.

Social receptors:

- Resource availability (e.g. diesel, landfill sites etc.);
- Fisheries;
- Shipping;
- Local communities (including other users e.g. tourism and persons living/working near the decommissioning yards, ports etc.);
- Cultural heritage (e.g. wrecks).

A.1.2 Identification of Aspects

Aspects to be considered include:

- Energy use and emissions to air;
- Physical presence of infrastructure decommissioned *in situ;*
- Disturbance to the seabed;
- Waste generation;
- Unplanned events;
- Physical presence of vessels;
- Discharges to sea;
- Underwater noise;
- Resource use;
- Yard activities e.g. noise, odour etc.

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 emissions to air, discharges to sea, underwater noise, physical use of space and, if anchored, disturbance to the seabed. Receptors potentially impacted by these aspects include air quality, climate, marine mammals, seabirds, other users of the sea, seascape and benthic communities (if anchored).

A.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.

A.2.1 Receptor Sensitivity

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

Table A-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 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. PMFs). • Significant numbers of a species which is listed as IUCN 'Near Threatened'. • Nationally designated habitat/sites (e.g. PMFs). • 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 OSPAR designations). • Significant numbers of a species which are listed as IUCN 'Vulnerable'. • Regionally designated habitats/sites (e.g. OSPAR designations and Annex I habitats: SACs and SPAs). • Locally distinct sub-populations of some species may occur. **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'. • Internationally designated habitats/sites (e.g. Ramsar sites). • 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.

A.2.1.1 Climate Change

With respect to the emission of greenhouse gases, climate is considered a global receptor rather than a local receptor. The categories identified in Table A-1 do not capture definitions for climate change. This is because the sensitivity status of climate is considered to be 'Very High' in line with various Intergovernmental Panel on Climate Change reports (e.g. IPCC, 2021).

A.2.2 Magnitude of Effect

Definitions for the Magnitude of Effect on the receptors are presented in Table A-2. Prior to determining the Magnitude of Effect, industry recognised 'base case' mitigation measures were assumed to be applied e.g. on mobilisation of vessels to carry out the work Repsol Sinopec Resources UK Limited will notify other sea users such as SFF. Additional Repsol Sinopec Resources UK Limited or Project specific measures would include having a fisheries liaison officer on board any reel lay vessels that may be mobilised. These additional mitigations are considered prior to identifying the residual impact.

Table A-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).

Magnitude Level		Description	
		Environmental Impact	**Social Impact**
2	**Minor** *Regulatory compliance is not breached.*	**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 minor 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 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).

A.2.3 Cumulative Impacts

The EA sets the activities and potential impacts in the context of all other activities taking place in the Beauly and Burghley Field area to determine the additional cumulative effects of the new activities. The potential cumulative effects are discussed in the impact assessment chapters e.g. cumulative impacts on climate change.

A.2.4 Environmental / Socio-Economic Impact Significance

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

Table A-3: ESIA 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.

A.2.5 Transboundary Impacts

Where relevant, transboundary impacts of each aspect on the receptors is discussed in the impact assessment chapters e.g. the impact of emissions on climate change.

A.3. ESRA 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.

A.3.1 Environmental and Social Significance of an Unplanned Event

The ESIA approach described in Section A.2 for determining the environmental and social impacts of planned activities was also used to determine the significance of impacts that may result from unplanned events.

A.3.2 Likelihood of an Unplanned Event

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

Table A-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.

A.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 A-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 A-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 A-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.

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