Durango Installation and Stabilisation Materials Decommissioning

Environmental Appraisal Report

For Perenco North Sea Limited

Final

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ABBREVIATIONS

Abbreviation	Description
Al	Aluminium
As	Arsenic
BAP	Biodiversity Action Plan
Ba	Barium
BDL	Below Detection Limit
BEIS	Business, Energy, and Industrial Strategy (Formerly Department of Energy and Climate Change)
BOEPD	Barrels Of Oil Equivalent Per Day
Ca	Cadmium
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
Cr	Chromium
Cu	Copper
DESNZ	Department for Energy Security and Net Zero
DTI	Department of Trade and Industry
DP	Decommissioning Programme
e.g.	For example
EA	Environmental Appraisal
EC	European Council
EEC	European Economic Council
EIA	Environmental Impact Assessment
ENVID	Environmental Impacts Identification
EPA	Environmental Protection Agency
EU	European Union
EUNIS	European Nature Information System
Fe	Iron
HCS	Hydrocarbon Safe
Hg	Mercury
HSE	Health, Safety and Environmental
HSSE	Health, Safety, Security and Environment
i.e.	That is
ICES	International Council for the Exploration of the Sea
INNS	Invasive Non-Native Species

Abbreviation	Description
ISO	International Organisation for Standardisation
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Council
JUB	Jack Up Barge
km	Kilometre
Km^2	Square kilometre
m	Metre
m^2	Square metre
mg kg-1	Milligrams per kilogram
MCZ	Marine Conservation Zones
MMMU	Marine Mammal Management Units
MPA	Marine Protected Area
N_2O	Nitrous oxide
Ni	Nickel
NOx	Nitrogen oxides
OEUK	Offshore Energies UK (Formerly Oil and Gas UK (OGUK))
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PEL	Probable Effect Level
PETS	Portal Environmental Tracking System
PL	Pipeline
PLU	Pipeline Umbilical
POMS	PUK Operating Management System
PUK	Perenco North Sea Limited
SAC	Special Area of Conservation
SCANS	Small Cetacean Abundance of the North Sea
SEMS	Safety and Environmental Management System
Sn	Tin
SNS	Southern North Sea
SO_2	Sulphur dioxide
te	Tonnes (UK)
TEL	Threshold Effect Level
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons

Abbreviation	Description
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
V	Vanadium
VOC	Volatile Organic Compound
WPS	Wellhead Protection System
Xtree	Christmas Tree Valve
Zn	Zinc
%	Percentage
>	Greater than
<	Less than
°C	Degree Celsius
kW/m	Kilowatt/metre

EXECUTIVE SUMMARY

In accordance with the Petroleum Act 1998, Perenco North Sea Limited (PUK) is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for the decommissioning of the Durango subsea installation.

The Durango field was formed in 2005, with the subsea installation installed by Bridge North Sea Limited, and the subsequent first gas produced in October 2008. PUK purchased and became the operator of Durango in 2011.

The Durango subsea template is tied back to the Waveney platform via Pipeline (PL) 2555, 8" gas/condensate and the umbilical (PLU 2556).

The Durango subsea installation will be removed to shore for disposal, including the subsea Xtree, wellhead and associated Well Head Protection Structure (WHPS) frame, the subsea wells will be abandoned and shut in and drilling cuttings left undisturbed on the seabed. If any practical difficulties are encountered Perenco will consult OPRED.

The Durango pipeline, umbilical and associated stabilisation features will be addressed in a separate Pipeline Decommissioning Programme (DP). Before decommissioning of the Durango installation, the pipeline will be made hydrocarbon safe (HCS). The Waveney platform will remain operational.

In line with legislation and regulatory guidance, this Environmental Appraisal (EA) report has been produced to support the Durango Installation DP by assessing the potentially significant impacts associated with the preferred decommissioning option.

This EA Report sets out to describe, in a proportionate manner, the potential environmental impacts of the proposed activities associated with the Durango subsea template decommissioning and demonstrate the extent to which these will be mitigated and controlled to an acceptable level.

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1 INTRODUCTION

1.1 Purpose of Document

This EA Report sets out to describe, in a proportionate manner, the potential environmental impacts of the proposed activities associated with the Durango subsea template decommissioning and demonstrate the extent to which these will be mitigated and controlled to an acceptable level. The key components and structure of this report are laid out in Table 1-1.

Table 1-1: EA Structure

Section	Description
	Executive summary
Section 1	Introduction to the decommissioning project for the Durango installation materials and a description of the EA report scope and structure.
Section 2	The regulatory context and guidance for undertaking a decommissioning EA.
Section 3	A summary of the stakeholder engagement process and activities carried out by PUK to date.
Section 4	An outline of the options considered for decommissioning, the decision-making process undergone by PUK to arrive at the selected decommissioning strategy and a description of the proposed decommissioning activities.
Section 5	A summary of the baseline sensitivities relevant to the activities taking place and the assessments that support this EA.
Section 6	A summary of the project Environmental Issues Identification process and findings.
Section 7	An outline of the EA method used a review of the potential impacts from the proposed decommissioning activities and justification for scoping potential impacts in or out of assessment in this EA Report
Section 8	Assessment conclusions
Section 9	Environmental management
Section 10	References
Section 11	Appendices

1.2 Field and Infrastructure Description

The Durango subsea template (Durango) falls entirely within United Kingdom Continental Shelf (UKCS) block 48/21a within the Southern North Sea (SNS) (Figure 1-2, Figure 1-3). Table 4-1 and Table 4-2 provides details of the Durango subsea template subject to the Durango installation DP and this EA.

The Durango field was formed in 2005, with the subsea installation installed by Bridge North Sea Limited, and the subsequent first gas produced in October 2008. Perenco purchased and became the operator of Durango in 2011.

Durango is located approximately 14.7km southwest of the Waveney Platform. Production flowed from the single Durango subsea development, well 48/21a-4z, which was side-tracked from well 48/21a-4 to the Waveney Platform via the 8-inch export line PL 2555. Control of the Durango subsea well was via a control umbilical pipeline PLU 2556 that tied back to the Waveney platform.

At Waveney, production from the Durango well entered the production header where the product was separated into gas, condensate, and water by means of the production separator to allow metering of the individual flow streams. Gas, condensate, and water were then recombined and flowed from Waveney under its own pressure into the Lancelot Area Pipeline System (LAPS) export pipeline and then onto the Bacton Gas Terminal.

Durango was shut-in during 2018 and is no longer producing.

The Durango field subsea infrastructure comprises the following. Only the first point (in bold) is included in the scope of this Durango installation DP. The remaining infrastructure will be subject to a separate Durango pipelines DP:

- **One subsea production well, Christmas Tree Valve (Xtree) and associated protection structure (**Figure 1-1**);**
- Two rigid tie-in spool pieces at the well location;
- One gas 8” export PL (PL 2555);
- One control umbilical (PLU 2556);
- Two rigid tie-in spool pieces at the Waveney platform which tie into a 6” riser;
- The existing 6” Waveney riser;
- 6” emergency shutdown valves on the Waveney platform.

Figure 1-1: Durango Subsea Production Well, Xtree and Associated Protection Structure

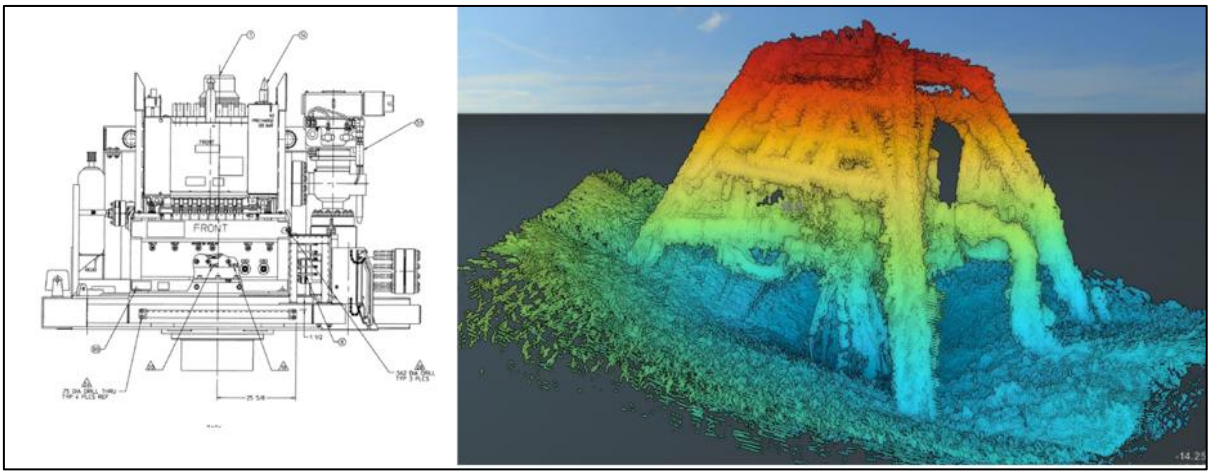


Figure 1-2: Durango and Surrounding Fields in SNS

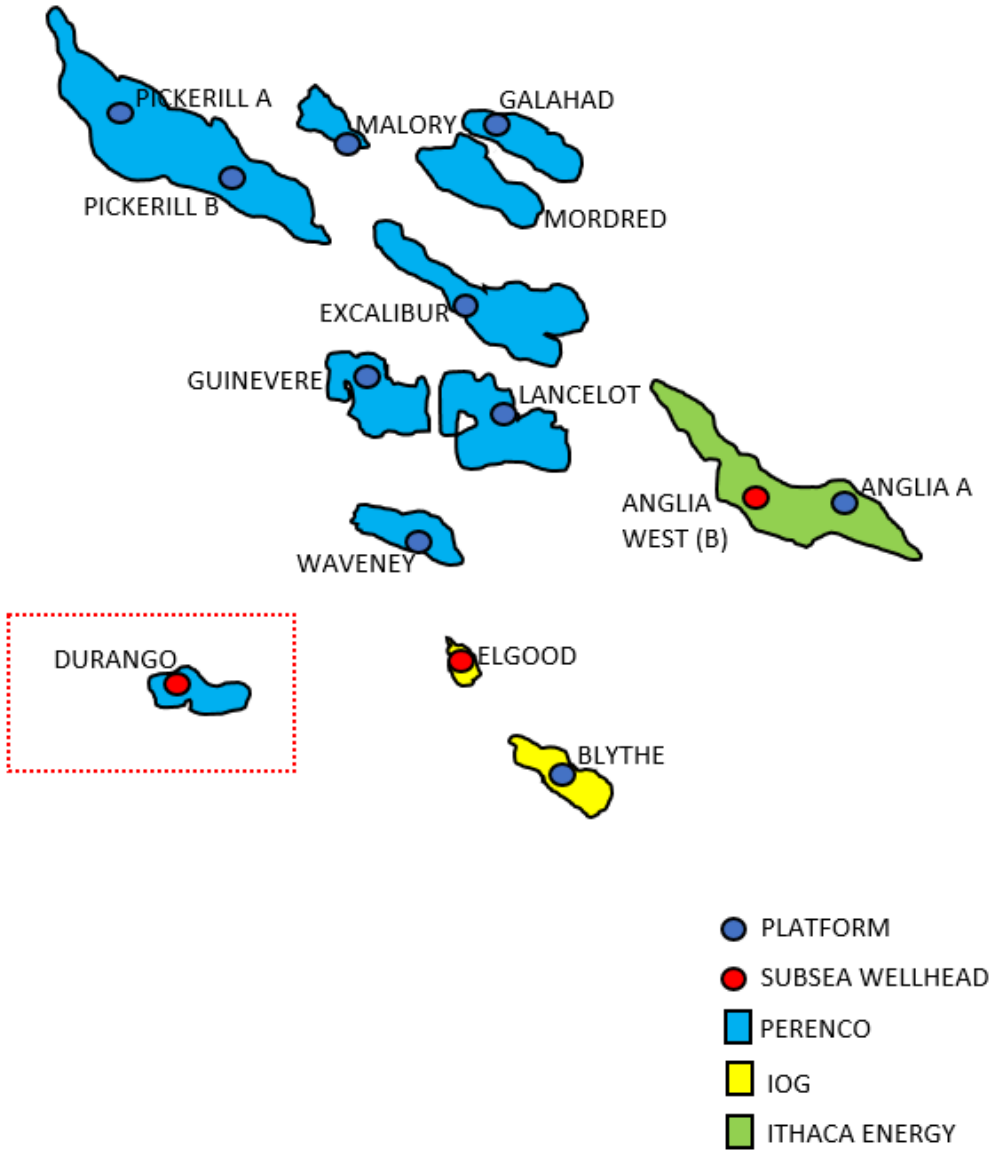
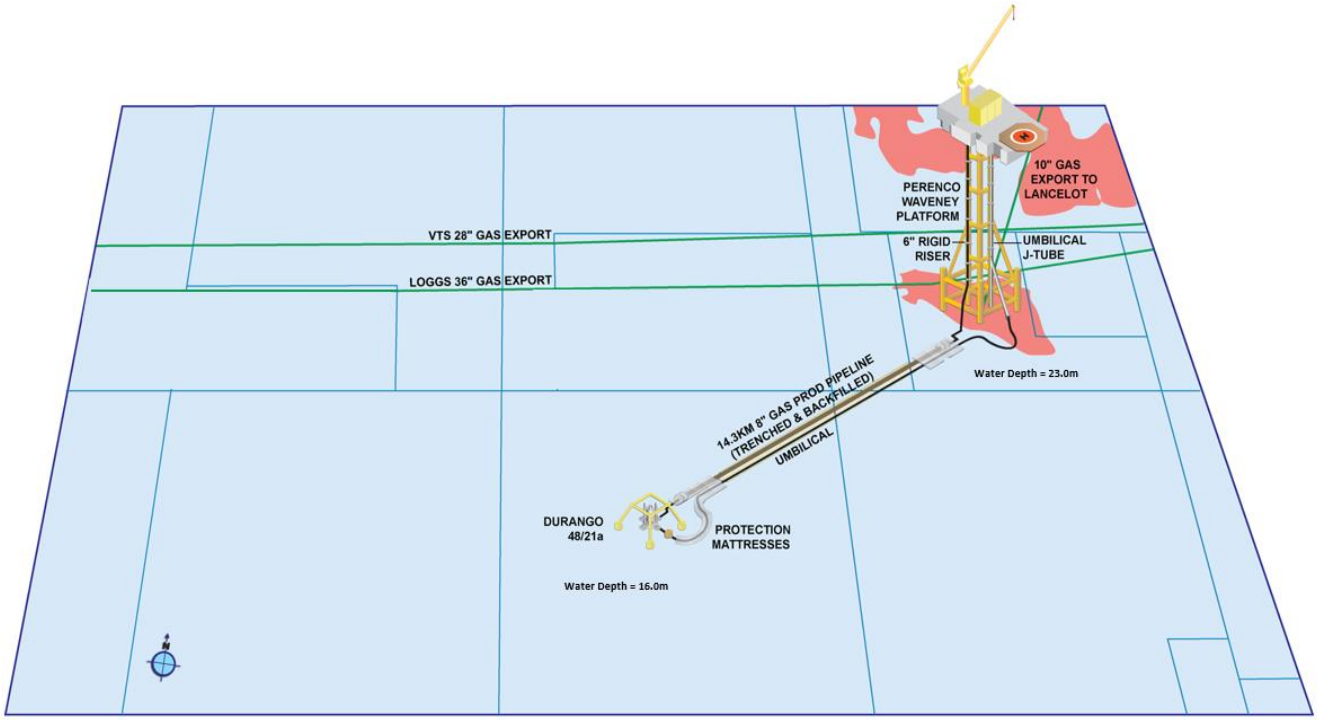


Figure 1-3: Durango Field Layout



1.3 PUK Limited

PUK is an independent oil and gas company with operations in 13 countries across the globe, ranging from Northern Europe to Africa and from South America to Southeast Asia.

PUK currently produces approximately 450,000 barrels of oil equivalent per day (BOEPD), of which 250,000 BOEPD is net to the company. The group is present in world-class exploration basins such as Brazil, Peru, northern Iraq, Australia, and the North Sea. While PUK's growth has been driven by acquisitions, the Group's strategy evolved rapidly towards increasing production and reserves, renewing licenses, and securing additional acreage for new exploration and development opportunities.

In the SNS Gas Basin, PUK operates 17 offshore fields, along with associated pipelines and onshore processing facilities including the Bacton and Dimlington Terminals. PUK's gas production in the North Sea is around 72,000 BOEPD.

PUK operates under a Safety and Environmental Management System (SEMS) which is certified to conform to the International Organisation for Standardisation (ISO) 14001 for environmental management systems. SEMS provides the framework for PUK to achieve safe and reliable operations and ensures compliance with PUK's Health, Safety, Security and Environment (HSSE) Policy. Further detail on PUK's SEMS is provided in Section 9.

2 Policy & Regulatory Context

The decommissioning of offshore oil and gas installations and pipelines on the UKCS is principally governed by the Petroleum Act 1998 and is amended by the Energy Act 2008.

The United Kingdom's (UK) international obligations in relation to decommissioning is principally governed by the 1992 Oslo Paris Convention (OSPAR) for the protection of the Marine Environment of the Northeast Atlantic. Agreement in relation to the offshore decommissioning regime was reached at a meeting of the OSPAR commission in 1998 (OSPAR Decision 98/3). As a result, The OPRED guidance in relation to offshore decommissioning is aligned.

The primary objection of OSPAR decision 98/3 remains to prevent the dumping of offshore installations at sea, with the default position of full removal.

In the context of marine planning and being located in the English offshore waters of the SNS, Durango falls within the area of the East Marine Plan [41]. These plans were developed to help ensure sustainable development of the UK marine area; The broad aims and policies outlined in the Marine Plan have therefore been considered in this EA Report.

The primary guidance for offshore decommissioning [4] details the need for an EA to be submitted in support of the DP. The guidance sets out a framework for the required environmental inputs and deliverables throughout the approval process. It now describes a proportionate EA process that culminates in a streamlined EA report rather than a lengthy Environmental Statement as would be required under the Environmental Impact Assessment (EIA) Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) [12,19].

3 Consultee responses

Table 3-1 provides details of stakeholder responses in response to this EA.

Table 3-1: Consultee Responses

Stakeholder	Comment	PUK Response
Global Marine Group	Having reviewed the information provided, the closest active telecoms cable is >85km away, therefore I have no further comments.	N/A
National Federation of Fishermans Organisations	I can confirm NFFO have no comments to make.	N/A
OPRED Environmental Management Team	No Comment	N/A
Centre for Environment, Fisheries and Aquaculture Science	No Comment	N/A
Joint Nature Conservation Council (JNCC)	No Comment	N/A

4 Decommissioning Activities & Parameters

This section details the infrastructure being decommissioned and provides details on the selected decommissioning method along with proposed timings.

4.1 Relevant Infrastructure

The Durango installation subject to this DP falls entirely within the UKCS block 48/21a. Table 4-1 provides details on the infrastructure relevant to the Durango installation DP and EA. The Durango pipeline (PL 2555), the umbilical (PLU 2556) and the associated stabilisation material are currently connected to the Durango installation template. However, these are beyond the scope of this DP and will be addressed in a separate pipeline DP.

Table 4-1: Details of Durango Installation Material Subject to the DP

<table>
<tr><th>Subsea Installations Including Stabilisation Features</th><th>Number</th><th>Size/Weight (te)</th><th colspan="2">Location</th><th>Comments/Status</th></tr>
<tr><td>Wellhead and Xtree</td><td>1</td><td rowspan="2">40</td><td rowspan="2">ED50</td><td>53° 17' 24.0967" North</td><td rowspan="2">The Well is abandonment phase 1 (AB1) status.
WHPS surrounds Xtree.</td></tr>
<tr><td>WHPS</td><td>1</td><td>01° 06' 38.201" East</td></tr>
</table>

Table 4-2: Durango Well Information

Wells	Designation	Status	Category of Well
48/21a-4	Gas Production	AB1	SS-3-0-3
48/21a-4z	Gas Production	Completed (Shut-in)	

4.2 Decommissioning activities and methodology

Perenco has assessed options for extending the producing life of the subsea installation, but none proved commercially viable. Considerations were made for the relocation of the subsea infrastructure, but no feasible use was identified. However, Perenco will continue to review, the subsea installation's equipment inventories to assess the potential for adding to their existing asset portfolio spare inventory or for resale to the open market.

4.2.1 Preparatory works

Decommissioning of the Durango subsea Well is anticipated to commence in summer 2024. Before this time Perenco will flush and clean PL 2555 and PLU 2556 making them HCS.

To clean and isolate the Durango pipeline and umbilical, the following steps will be taken:

- Flush the pipeline and chemical cores of the umbilical using filtered seawater from Waveney to Durango.
- Inject the fluids into the Durango subsea well.
- Close X-mas Tree valves once flushing is complete.
- Isolate umbilical and riser at Waveney topside.

Once complete, the well at Durango will be P&A to a permanent abandonment state.

4.2.2 Durango decommissioning

The subsea Xtree, wellhead and associated WHPS frame will be removed from its current location to obtain a clear seabed clearance certificate.

This will be achieved by cutting PL 2555 in two locations using a diamond wire saw, once to disconnect from the Xtree and additionally to remove potential snagging associated with the pipeline end. PLU 2556 will be cut to separate it from the subsea Xtree.

Once free from PL 2555 and PLU 2556, the subsea Xtree, wellhead and associated WHPS frame will be lifted from the seabed and recovered to the deck for transport onshore.

Recovered material will be landed ashore for recovery or disposal by a suitable contractor. It is not possible to forecast the wider reuse market with any accuracy or confidence at this point. The Perenco Section 29 Notice Holders will continue to track reuse market trends to seize reuse opportunities at the appropriate time.

Before removal, wells will be Plugged and Abandoned (P&A) in accordance with Offshore Energies UK (OEUK) guidelines for the suspension and abandonment of wells and the pipeline will be flushed and cleaned. These works will be supported by a Master Application Template (MAT) and supporting Subsidiary Application Templates (SATs) submitted within the Portal Environmental Tracking System (PETS).

4.2.3 Schedule

Table 4-3: Schedule of Durango Installation Decommissioning Activities

Year	2023				2024				2025				2026				2027				2028				2029				2030			
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pipeline Decommissioning Programe																																
Submission of DP																																
Consultation																																
Approval of DP																																
P&A and Removal Campaign																																
Durango P&A & WHPS Removal																																
Post Decommissioning Activities and Surveys																																
Post Decommissioning Surveys																																
Remediation (if required)																																
Obtain Clear Seabed Certification																																
Close Out report																																

LEGEND	
	Earliest date task could be completed
	Period in which the task expected to be completed
	Latest date task could be completed

5 Environmental and Societal Baseline

5.1 Introduction

As part of the EA process, the main physical, biological and societal sensitivities of the receiving environment must be well understood. As such, this section describes the main characteristics of the physical and biological environment, identifies the other users of the sea present in and around the Durango development, and highlights any key sensitivities.

This environmental baseline description draws upon a number of data sources including published papers on scientific research in the area, industry-wide surveys (for example (e.g.), the Offshore Energy Strategic Environmental Assessment programme) and site-specific investigations commissioned as part of the exploration and development processes and pre-decommissioning survey work at Durango.

5.2 Planned Surveys

5.2.1 Post Platform Decommissioning Surveys

A post-decommissioning site survey will be carried out around the 500m safety zone of the installation site. Oil and gas seabed debris will be recovered for onshore disposal or recycling in line with existing disposal methods. Independent verification of the seabed state will be obtained by trawling the platform area. This will be followed by a statement of clearance to all relevant governmental departments and non-governmental organisations.

5.3 Surveys Completed to Date

Data acquired from these surveys and supplemented by data from other published sources has been used in the preparation of this baseline study.

5.3.1 Pre-Installation Surveys [20]

Prior to installation, in 2008, Perenco commissioned an Environmental Baseline Survey (data no longer available), and a Habitat Assessment geophysical survey with shallow geotechnical sampling and testing before installation of the umbilical.

5.3.2 PL 2555 – PLU 2556 Durango Survey Report [25,49]

In November/December 2023, Hydroconsult carried out a geotechnical survey along the Durango Corridor and Durango Box installation. This report aimed to describe the activities and summarise the results during the survey operations at Durango BOX (1.2x1.2km^2) and corridor Durango to Waveney with a focus on PL 2555 and PLU 2556 exposure and mattresses/ protection materials.

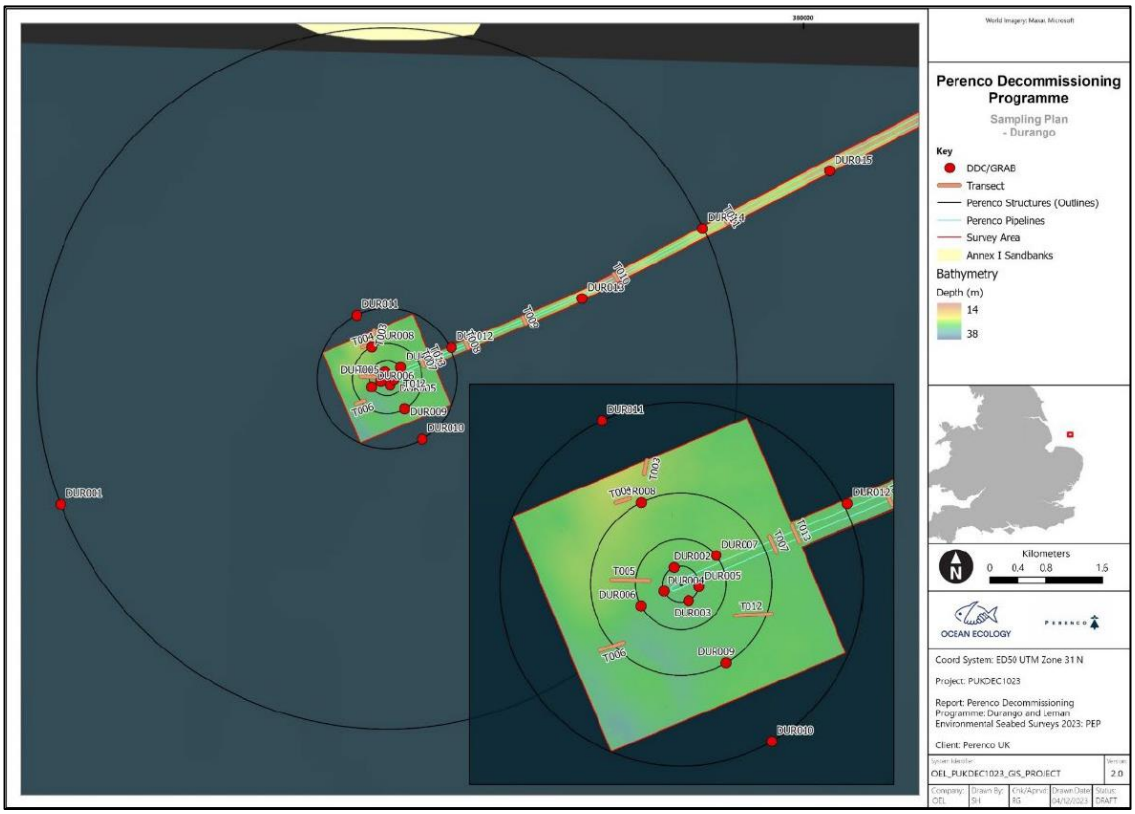
5.3.3 Durango Pre-Decommissioning Survey

A pre-decommissioning survey of the Durango and Leman fields was completed in 2023 including an assessment of chemical contaminants and benthic fauna [67, 68]. The objectives of the survey were to:

- Describe the benthic communities present within the project areas, including described biotopes, covering biodiversity, function, abundance, extent, species richness, representativeness, rarity, and sensitivity. This covered the range of water depths across the sites and included both infaunal and epifaunal communities.
- Identify and assess the status of species and habitats of conservation importance, including Annex I protected species and habitats (such as *Sabellaria spinulosa* biogenic reef or stony reef), and Annex V species of the Habitats Regulations, species listed under Schedule 5 of the Wildlife & Countryside Act, OSPAR species and habitats and designated features of the Marine Protected Area (MPA) network (e.g., Special Area of Conservation (SAC) and Marine Conservation Zone (MCZ) features); and
- Confirm the presence/absence of any invasive non-native species (INNS), species non-native to UK waters and species non-native to the local habitat types (e.g., hard-substrate specialists in a wider sedimentary habitat).

A total of 11 sampling stations were covered at the Durango location and a further 7 sampling stations were located along the Durango Pipeline.

Figure 5-1: Durango pre-decommissioning sample locations



5.3.4 Guinevere field survey

A post-decommissioning environmental baseline survey of the nearby Guinevere platform and pipelines area was completed in 2022 [22]. The survey involved the collection of benthic grab samples and camera transects of the former Guinevere platform location and along the PL 874/PL 875 route.

5.4 Physical Environment

5.4.1 Bathymetry

The SNS extends from the Flamborough front in the south to north of the Dover Strait in the south, with a transition from south sea water to Atlantic water. This region is shallow (generally 0-50m), with a predominantly sandy seabed [11]. Mapped information [40] indicates that the SNS generally comprises of sand and muddy sand with significant areas of coarse sediment, especially closer to shore.

The SNS has many extensive sandbanks features present at less than 25m depth; these include areas which have been designated under the European Union (EU) Habitats Directive (92/43/EEC) such as Dogger Bank SAC and the North Norfolk Sandbanks SAC [11].

Water depth at the Durango 48/21a wellhead is recorded at approximately 18m. The bathymetry indicates mega-ripples, broadly parallel to the corridor, throughout the route between the Durango wellhead to the Waveney platform.

A geophysical survey was conducted in quarter 1 of 2008, with shallow geotechnical sampling and testing before installation of the umbilical. The findings confirm the regional geological setting detailed by the British Geological Survey (BGS) - the superficial Holocene sand progressively thickens from KP 7.40 and is thickest beneath sand waves, where they are apparent [20]. The base of the sand is poorly defined on the data and, where present, cannot be reliably mapped across the route corridor. Beneath the Cromer Knoll sandbank, the sands are expected to be more than 13m thick. Beneath the Holocene sand, sediments comprise firm to very stiff clay with sand and gravel (Bolders Bank Formation), expected to be more than 10m thick [20].

Additional bathymetric data around Durango wellhead installation was collected in 2023 Side Scan & MAG survey data [25]. Figure 5-2 and Figure 5-3 represents the current conditions at the installation location.

Figure 5-2: MBES Navigation Track Line and Survey Area at Durango Box Area (2023)

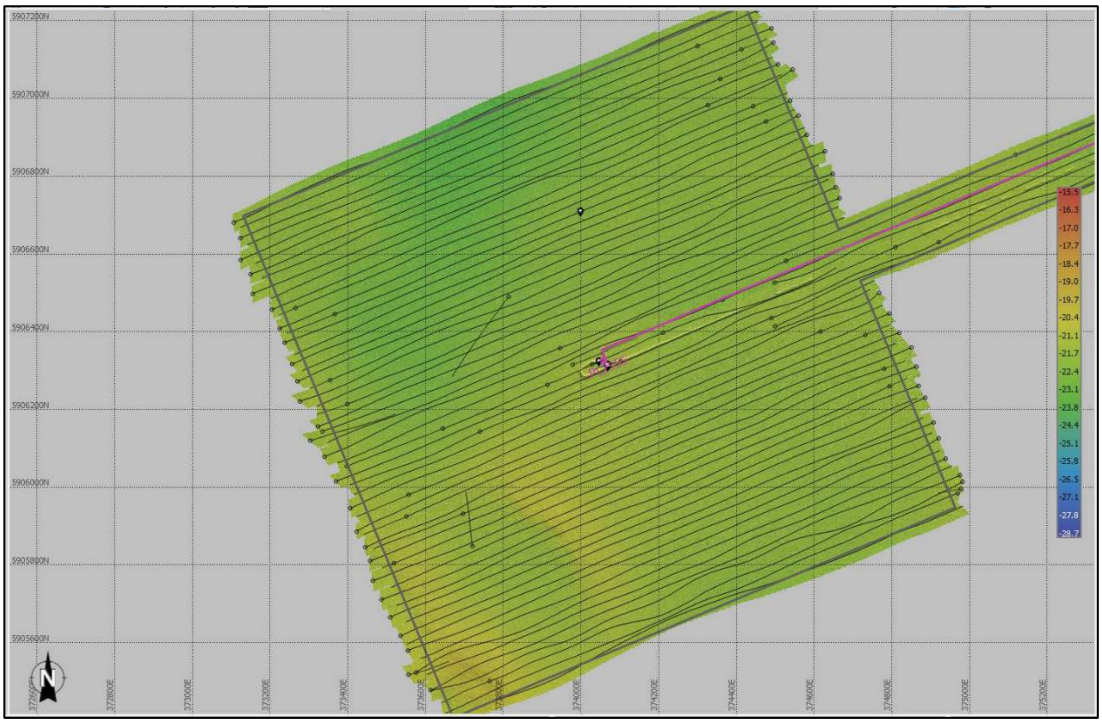
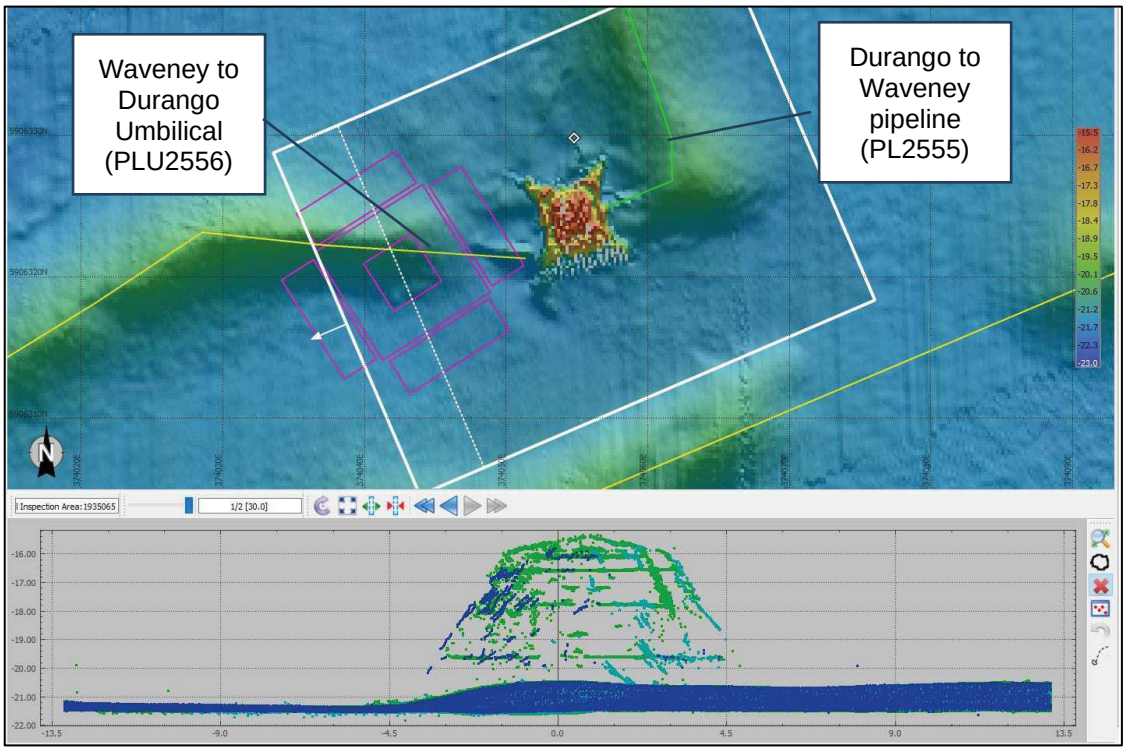


Figure 5-3: Durango Subsea Station Chart & Slice View (2023)



5.4.2 Seabed Sediments

The following European Nature Information System (EUNIS) seabed classifications have been identified in the vicinity of the Durango installation (Figure 5-4) [8, 11, 30]. The predominant broadscale habitat was encountered to be A5.14 Circalittoral coarse sediment.

A5.14 Circalittoral coarse sediment - Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g. *Neopentadactyla*) may also be prevalent in these areas along with the lancelet (*Branchiostoma lanceolatum)*.

European Council (EC) Habitats Directive Annex I habitats

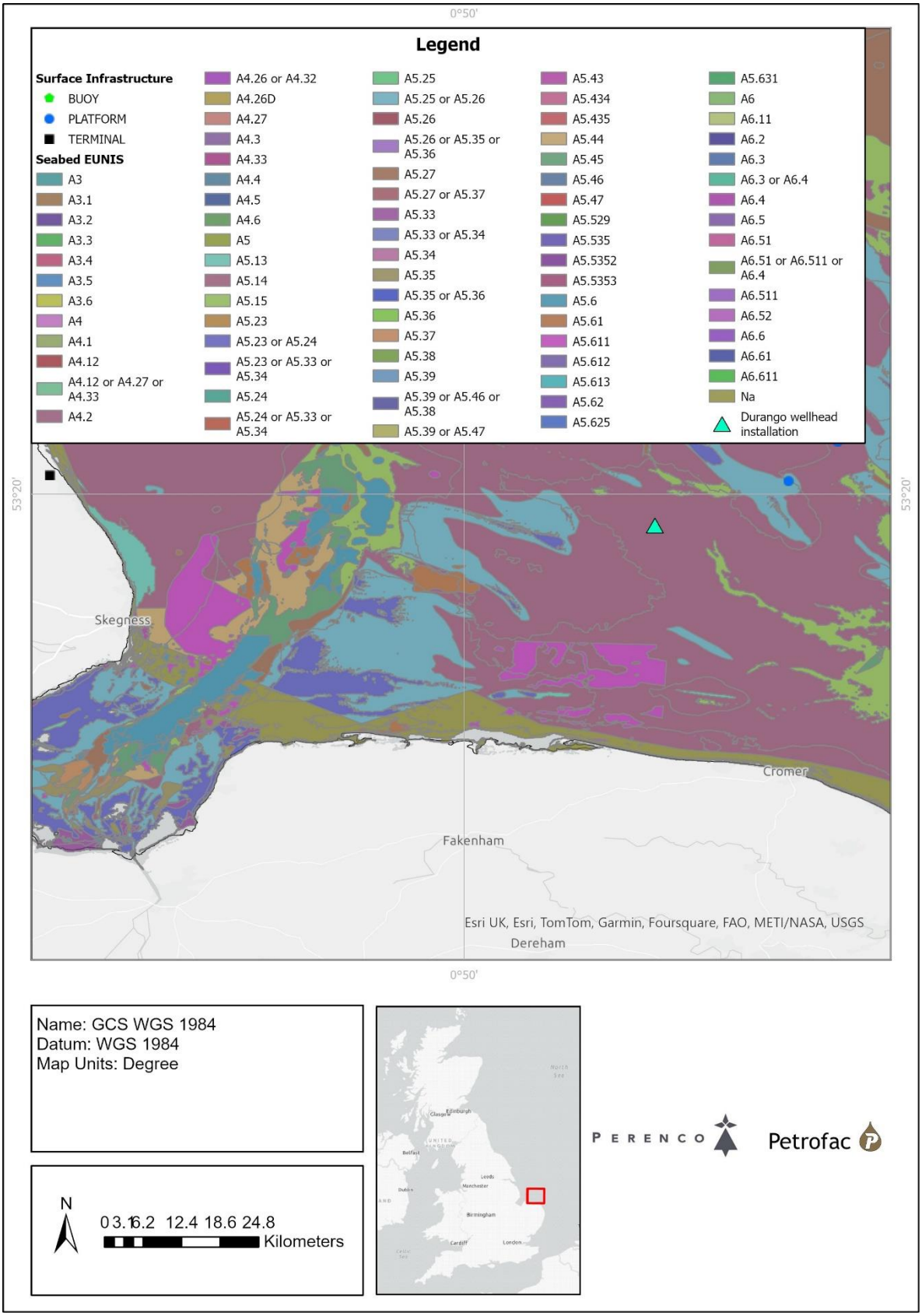
The Durango installation and its associated wells are all located outside designated areas in the SNS. However, the site is near an area of potential Annex I habitats, mainly due to the presence of sandbanks and areas of biogenic reefs within the North Norfolk Sandbanks and Saturn Reef SAC/ MPA. The most likely sensitive habitat (Annex I, UK Biodiversity Action Plan (BAP) and OSPAR), other than sandbanks, is the biogenic reefs formed by the ross worm *Sabellaria spinulosa*, which comprise of dense subtidal aggregations of this small, tube-building polychaete worm. The *S. spinulosa* reef habitats of greatest nature conservation significance occur on predominantly sediment or mixed sediment areas allowing the settlement and growth of other biotas on the reef surface.

There are no noted reefs or potential reefs within the Sandbanks, however, biogenic reefs have been known to form on exposed sections of pipelines, taking advantage of the presence of hard substrate.

A geotechnical, environmental baseline and habitat assessment survey was carried out along the pipeline route between the Durango field and the Waveney platform in 2008, to determine the presence of sensitive habitats (e.g., *S. spinulosa* reefs, herring spawning grounds, other Annex I habitats). Seabed photography and video footage revealed no evidence of any Annex I habitats in the surveyed area, including *S. spinulosa* reefs during the 2008 geotechnical survey. The overall faunal density was low and dominated by species known to inhabit coarser areas [20].

In 2023 a basic multibeam echosounder survey was completed. During this survey, the environmental contractor highlighted the potential of *S. spinulosa* along the pipeline and noted potential *S. spinulosa* within the 500m safety zone. The 500m safety zone area was further assessed, and it was concluded that no *S. spinulosa* were present [49].

Figure 5-4: Seabed EUNIS Broad-scale Seabed Classification



5.4.3 Waves

Waves are the result of energy being transferred between two fluids moving at different rates [1]. They are caused at sea by the differential motion of the air (wind) and the seawater. The height of a wave is the distance from the crest to the trough, but as the waves at any one time are not of equal size, the significant wave height is taken and corresponds approximately to the mean height of the highest third of the waves. The wave period is the (mean) time between two wave crests, called the zero up-crossing period and is given in seconds. The wave climate of the area provides information on the physical energy acting on structures and dictates the structural design requirements.

The annual mean wave height at the Durango installation location (UKCS block 48/21) is recorded as 1.28m, with an annual mean power of 6.37kW/m [1].

There is considerable seasonal variation between sea states, as represented in Table 5-1. Wave direction is variable throughout the year.

Table 5-1: Average Wave Heights in the Vicinity of the Block of Interest

Average wave height (m)			
Spring	Summer	Autumn	Winter
1.08 to 1.3	0.83 to 0.99	1.14 to 1.46	1.29 to 1.7

5.4.4 Water Circulation and Tides

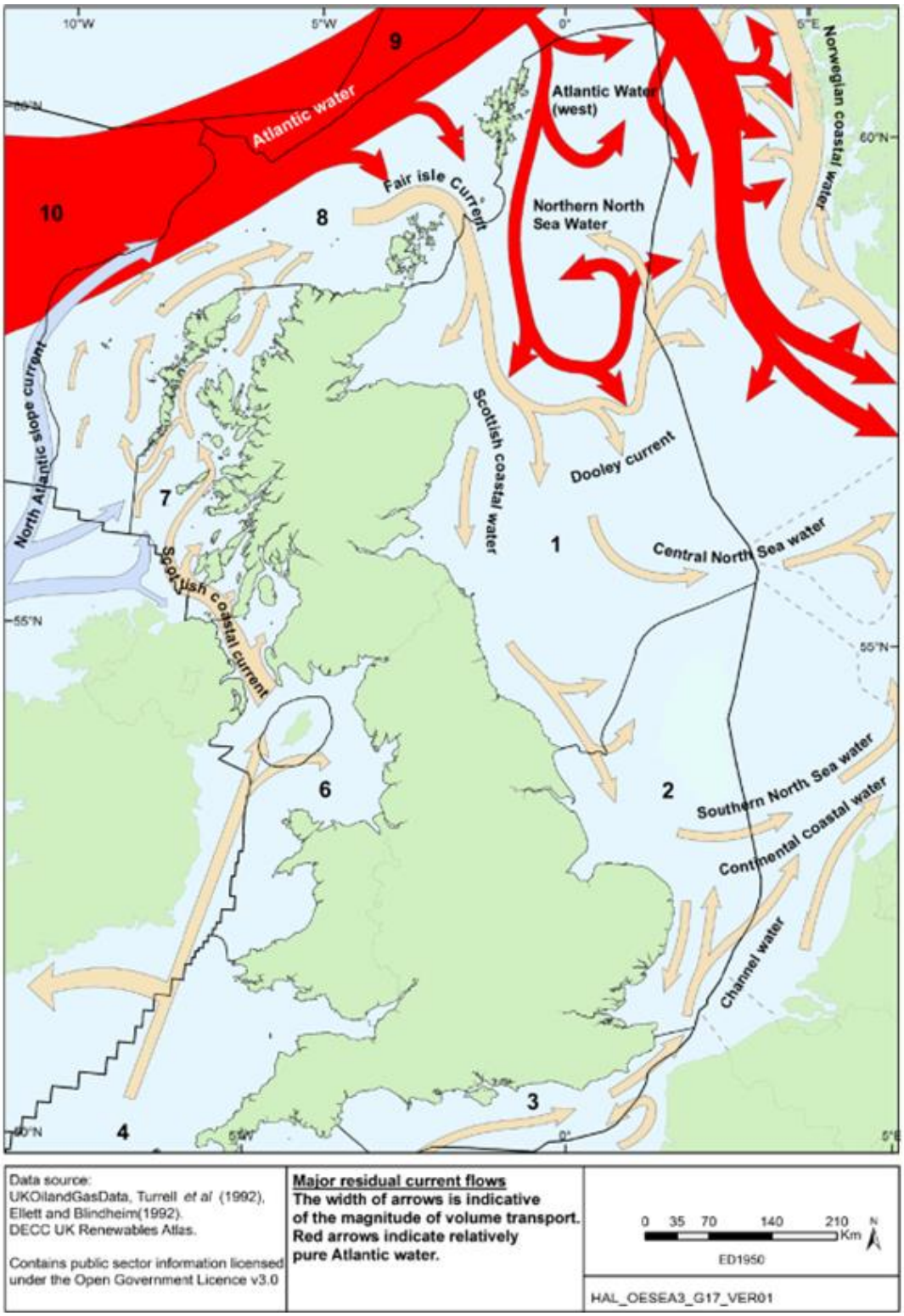
The general circulation of near-surface water masses in the North Sea is cyclonic, mostly driven by the ingression of Atlantic surface water in the western inlets of the northern North Sea. As a result, residual water currents near the sea surface tend to move in a south-easterly direction along the coast towards the English Channel [45, 11].

In addition, counter currents occur towards the English/ Dutch sector median line, flowing NE towards Denmark (Figure 5-5). The effect of this counter current in the vicinity of the blocks of interest pushes the near-surface water movement towards a more southerly and easterly direction.

Tides in this region of the SNS are predominately semi-diurnal and increase towards the Hunstanton coast. The mean spring tidal range in the region of the blocks of interest is 4.31m [2].

It is important to note that significant variations in local currents occur in the vicinity of the UKCS block 48/21a which can influence near-bottom flow and current amplification around these features [23, 7]. The shallow bathymetry and relatively fast water circulation in this area of the SNS lead to a relatively well-mixed water column throughout the year [11]. This leads to a consistent level of biological productivity throughout the year, with only minor peaks seen in spring and late summer, which are typical of deeper waters.

Figure 5-5: Major Current Flows Around the UK [11]



5.4.5 Temperature & Salinity

Winter water temperatures in the SNS are in the range of 4 – 8ºC, while summer water surface temperatures are in the range of 16 – 19ºC, with little variation, either down the water column or from near shore to offshore waters [16].

Sea surface temperatures at the installation location reach the minimum peak in February (5.23°C) and maximum peak in August (16.14°C), with an average mean annual temperature of 10.36°C. Near seabed temperatures follow the same monthly variation pattern, varying from 5.39°C to 15.90°C, with an annual mean of 10.24°C [38].

The salinity in the block of interest varies throughout the year. The mean annual salinity of the sea surface varies between 34.123 parts per thousand (ppt) to 34.507ppt, with an overall mean of 34.318ppt. The mean salinity of the near seabed varies between 34.097ppt to 34.503ppt, with an overall mean of 34.337ppt [38].

Salinities decrease both towards the south and towards the coastline, reflecting the influence of freshwater inputs from the adjacent landmasses.

5.4.6 Contaminants

The 2023 pre-decommissioning survey of the Durango area assessed contaminant levels to establish a pre-decommissioning baseline.

Total Organic Carbon (TOC) concentrations ranged from 0.20% at DUR017 located toward the end of the pipeline opposite the Durango well to 0.45% at DUR003 located 100 m southeast of the well. The average TOC content across the survey area (± SE) was 0.35 ± 0.02%.

Moisture content varied between 15.2% and 28.5% with an average value (± SE) of 20.9 ± 0.9%.

A total of 8 main heavy and trace metals were analysed from sediments taken at each of the sampling stations. These were: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), and Zinc (Zn). In addition, 5 secondary heavy and trace metals were analysed to provide a more in-depth picture of potential sediment contamination. These were: Barium (Ba), Tin (Sn), Vanadium (V), Aluminium (Al) and Iron (Fe).

Summary data for the 8 primary heavy and trace metals (dry-weight concentration, mg kg-1) are shown in Table 5-2, together with available reference levels. For the oil and gas industry, the OSPAR commission recommended the monitoring of metals to focus on Cd, Pb and Hg. Cd concentrations were below the detection limit at 11 of the 17 stations and ranged between 0.04 mg kg-1 and 0.08 mg kg-1 where measurable. Pb concentrations varied between 3.9 mg kg-1 and 9.6 mg kg-1, with the maximum concentration found at station DUR016. Hg concentrations were below the detection limit at 7 of the 17 stations and varied between 0.01 mg kg-1 and 0.04 mg kg-1 where measurable.

Additionally, Ba is known to be present in higher concentrations in sediments potentially affected by drilling fluids which can contain substantial amounts of barites (barium sulphates). Therefore, monitoring of Ba is of relevance for the oil and gas industry. Ba concentrations varied between 19.1 mg kg-1 at station DUR017 and 171 mg kg-1 at station DUR004 located 100 m to the west of the Durango well. No correlation between any of the metals and TOC content was found across the survey area potentially due to the very narrow range of TOC in the sediments.

Table 5-2: Summary data for the 8 main heavy and trace metals with industry reference levels pre-decommissioning survey

Station	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
DUR001	9.9	<0.04	6.3	2.5	6.7	0.02	6.3	20.7
DUR002	9	0.04	9	4.9	7.6	0.01	9.6	27.1
DUR003	11.6	0.06	10.8	3.4	7.1	0.04	11.1	23.6
DUR004	14	0.08	12.4	4.8	7.2	0.02	14.6	26.7
DUR005	11.3	0.08	9	3.9	9	0.03	11	27.5
DUR006	8.4	<0.04	18.8	6.1	7.6	0.01	17.9	27.7
DUR007	6.7	<0.04	6.3	2.8	7	0.01	6.2	22
DUR008	9.9	<0.04	8.5	3	7.2	0.02	8.6	20.9
DUR009	10.8	<0.04	7.2	3.9	7.1	<0.01	8.4	26.5
DUR010	11.2	<0.04	10.6	4.6	6.5	<0.01	10.6	31.9
DUR011	9.3	<0.04	5.4	2.4	6.9	<0.01	6.1	19.9
DUR013	8.1	0.05	6.5	2.9	6.4	0.01	6.6	21.7
DUR014	11.2	0.04	7.9	4	7.4	0.01	8.3	24
DUR015	4.9	<0.04	5.3	2.4	4.6	<0.01	5.1	16.6
DUR016	13.8	<0.04	5.8	2.3	9.6	<0.01	6.8	19.2
DUR017	13.1	<0.04	4.6	1.6	3.9	<0.01	3.4	12.8
DUR018	13	<0.04	5.7	1.7	3.9	<0.01	4.4	14.5
CEFAS AL1	**20**	**0.4**	**40**	**40**	**50**	**0.3**	**20**	**130**
CEFAS AL2	**100**	**5**	**400**	**400**	**500**	**3**	**200**	**800**
OSPAR BAC	**25**	**0.31**	**81**	**27**	**38**	**0.07**	**36**	**122**
OSPAR ERL	**8.2***	**1.2**	**81**	**34**	**47**	**0.15**	**21***	**150**
TEL	**7.24**	**0.7**	**52.3**	**18.7**	**30.2**	**0.13**		**124**
PEL	**41.6**	**4.2**	**160**	**108**	**112**	**0.7**		**271**

Note: *The ERLs for As and Ni are below the BACs therefore As and Ni concentrations are usually assessed only against the BAC.

Total Petroleum Hydrocarbons (TPH) in sediment samples ranged from 1,360 µg kg-1 at station DUR017 located toward the end of the pipeline opposite the Durango well to 47,600 µg kg-1 at station DUR003 located 100m to the southeast of the well, with an average value (± SE) for the survey area of 9,301 ± 2,507µg kg-1.

The highest concentration of total n-alkanes was also recorded at station DUR003 2,525 µg kg-1, while the lowest concentration of 106.00 µg kg-1 was found at station DUR017. The average concentration of n-alkanes (± SE) for the survey area was 632.00 ± 133.00 µg kg-1.

The full range of Polycyclic Aromatic Hydrocarbons (PAHs) as specified in the Department of Trade and Industry (DTI) regulations as well as by the Environmental Protection Agency (EPA) was tested.

PAH concentrations were compared to Cefas AL1 (no Cefas AL2 available for PAHs), OSPAR BAC levels and ERLs, Threshold Effects Level (TEL) and Probable Effect Level (PEL) where possible. None of the PAHs measured exceeded CEFAS AL1, however, Naphthalene and Phenanthrene exceeded the OSPAR BAC at three stations (DUR003, DUR004 and DUR014) and one station (DUR003), respectively, while Acenaphthene exceeded the ISQG TEL at station DUR003. It is noteworthy that while stations DUR003 and DUR004 were both located within 100m from the Durango well, station DUR014 acted as a reference station located 5,000m to the northeast of the well.

Naphthalene was Below the Detection Limit (BDL) at three stations (DUR16, DUR17 and DUR18) and ranged between 1.87 µg kg-1 at station DUR015 and 21.4 µg kg-1 at station DUR004 where measurable. Phenanthrene was BDL at two stations (DUR016 and DUR017) and varied between 3.5 µg kg-1 at station DUR001 and 42.7 µg kg-1 at station DUR003. Acenaphthene was BDL at all stations but three with a maximum of 13.4 µg kg-1 at each station.

To determine the origin source of PAH compounds in sediments, the ratio between NPD and HMW PAHs was calculated. Based on this ratio 12 of the 17 stations sampled were characterised by PAHs of pyrogenic origin (NPD/HMW < 1), while the remaining 5 stations had ratios higher than one indicating a petrogenic source origin of PAHs. Overall NPD concentrations were BDL at station DUR017 while they ranged from 14 µg kg-1 at station DUR016 and 948 µg kg-1 at station DUR003 where measurable.

It was not possible to calculate the Ph/Ant ratio at stations DUR016 and DUR017 while it resulted in PAHs of mostly pyrogenic origin at 7 stations (< 10), while the remaining 7 stations indicated PAHs of mostly petrogenic origin.

The Fl/Py ratio was BDL at station DUR17 while it was higher than one at all stations indicating a pyrogenic origin source of PAHs across the survey area.

Despite some contrasting results depending on what ratio was used to assess the source origin of PAHs, on average PAH concentrations across the survey area indicated a pyrogenic origin of PAHs.

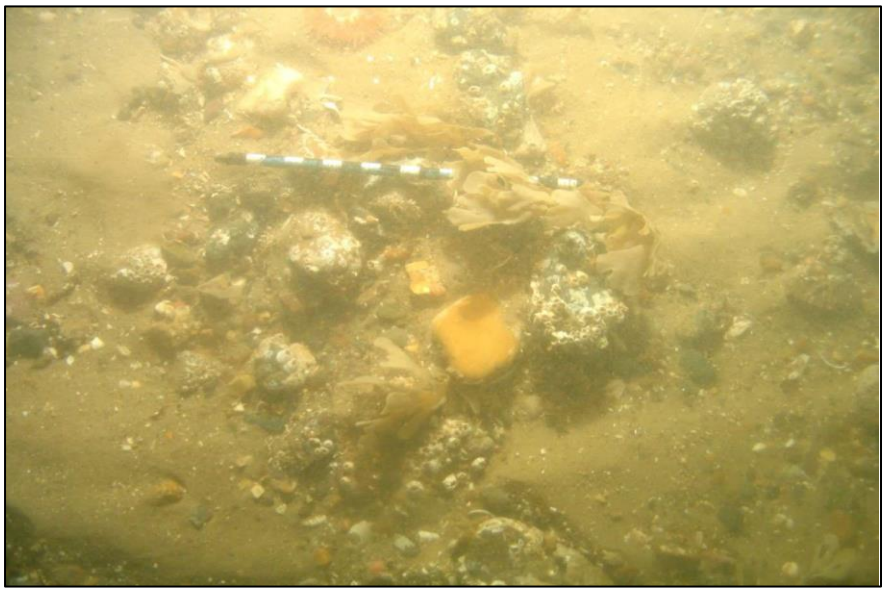
5.5 Biological Environment

5.5.1 Benthic Biodiversity

Seabed photography and video footage during the 2008 geotechnical survey revealed no evidence of any Annex I habitats in the surveyed area, including *S. spinulosa* reefs [20]. The overall faunal density was low and dominated by species known to inhabit coarser areas.

The habitat encountered in the vicinity of the Durango installation (A5.14) may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g. *Neopentadactyla*) may also be prevalent in these areas along with the lancelet (*Branchiostoma lanceolatum)*.

Figure 5-6: Example Seabed Imagery and Benthic Fauna Habitat Type Found in 2008 Survey



Assessment of macrofauna during the decommissioning surveys of the Guinevere field showed some small-scale variability in terms of abundance, richness and species composition associated with the sediment composition across the survey area. The most abundant phyla group identified within the samples are the crustaceans, representing 51.8% by 16 species, followed by annelids by 16 species (24.9%), molluscs by 14 species (18.2%), and echinoderms by three species (1.6%). Despite crustaceans being the dominant group, the infauna community was dominated by annelids in terms of species richness, followed by crustaceans and molluscs. The faunal assemblage was similar across all samples, with multivariate analyses finding no significant difference between groups, however, some intra-station samples showed up to 60% dissimilarity. The species richness and diversity were also similar across the survey area, with only small-scale variations recorded. *S. spinulosa* individuals were recorded at 5 stations, however, only 15 individuals were recorded across the survey area, and there was no evidence of a biogenic reef in either the grab or image data. Additionally, no evidence of a biogenic reef was recorded.

Two Invasive Non-Native Species (INNS) were found across the Guinevere field: the slipper limpet (*C. fornicata*) and the crustacean *Monocorophium sextonae*. *C. fornicata* is originally from the Eastern coast of North America and was accidentally introduced in the UK in 1872 as a contaminant on other animals (e.g., on commercial oysters) and via ship/boat hull fouling. Slipper limpets can form dense colonies and compete for space and smother native species potentially changing local habitats [17]. A total of 120 individuals were counted across the survey area, with 83 individuals occurring at station GU_09B, however, no evidence of *C. fornicata* colonies was observed in the seabed imagery collected at this location.

M. sextonae is originally from New Zealand and was first introduced to the UK in the 1930s. Effects on the environment due to the presence of this INNS seem negligible; however, *M. sextonae* has been observed competing with the native amphipod *Crassicorophium bonellii* [17]. Only four specimens were recorded across the Guinevere field all identified at station GU_09 (one individual in replicate A and three individuals in replicate B).

The Ross worm (*S. spinulosa*) is a protected species under the Habitats Directive and as a threatened and/or declining species in the OSPAR list. A total of 41 individuals were counted across the Guinevere field with 38 specimens recorded at station PL 874_03 (22 in replicate A and 16 in replicate B). Nevertheless, no evidence of reef-forming features was observed in the seabed imagery. Similar aggregations of *S. spinulosa* were recorded during the pre-decommissioning survey; however, these were also deemed to not meet the reef qualifying criteria [21].

The ocean quahog (*A. islandica*) is one of the longest-lived molluscs on record, with the potential to survive for more than four centuries. This species predominantly inhabits the sandy and muddy sediments found at depths ranging from 10 to 280m. Its primary habitat spans the maritime expanses surrounding the UK and Ireland. This species' slow growth rate and low juvenile survival rate, combined with the threat of mechanical damage and incidental catch by bottom fishing gear has meant that this vulnerable species is now experiencing a decline, prompting increased attention to its conservation.

Whilst there have been no recorded sightings within the survey area, there is one record of *A. islandica* present approximately 6km to the northwest of the Durango well [68].

The European smelt, *O. eperlanus* is a small elongate fish reaching lengths of up to 45 cm. They are an anadromous midwater species rarely found far from shore, often in estuarine environments and are common off the east coast of Britain as well as the western coast of Scotland. Whilst this species is regarded as widespread and described as a species of least concern on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, they are very sensitive to local threats such as pollution and barriers to migration. No records of this species exist within the survey area; however, several records exist approximately 10km to the northeast of the Durango pipeline and umbilical [68].

5.5.2 Plankton

The collective term plankton describes the plants (phytoplankton) and animals (zooplankton) that live freely in the water column and drift passively with the water currents. Typically, in the SNS a phytoplankton bloom occurs every spring, generally followed by a smaller peak in the autumn [11].

The SNS is characterised by shallow, well-mixed waters, which undergo large seasonal temperature variations. The region is largely enclosed by land and as a result, the marine environment is highly dynamic with considerable tidal mixing and nutrient-rich run-off from land (eutrophication). Under these conditions, nutrient availability is fairly consistent throughout the year therefore organisms with high nutrient uptake that thrive in dynamic waters, such as diatoms, are particularly successful [34]. The phytoplankton community in the Regional Sea 2 area is dominated by the dinoflagellate genus Tripos (*T. fusus, T. furca, T. lineatus*), along with higher numbers of the diatom, Chaetoceros (subgenera Hyalochaete and Phaeoceros) than are typically found in the northern North Sea. From November to May when mixing is at its greatest, diatoms comprise a greater proportion of the phytoplankton community than dinoflagellates [11].

The zooplankton community is dominated by copepods including *Calanus helgolandicus* and *C. finmarchicus* as well as *Paracalanus spp*., *Pseudocalanus spp*., *Acartia spp*., *Temora spp* and cladocerans such as *Evadne spp*. There has been a marked decrease in copepod abundance in the SNS, which has been linked to changes in global weather phenomena [11]. However, the planktonic assemblage in the vicinity of the proposed deposit operations is not considered unusual.

5.5.3 Fish & Shellfish

The North Sea supports a diverse fish community, many species of which are umbrella species, providing an essential food source for larger marine predators (such as marine mammals and seabirds), or areas of commercial importance. Several fish species of conservation importance also utilise the North Sea.

The migratory fish species that may be present in the North Sea include lampreys, shads, salmonids, European eel (*Anguilla Anguilla*), and smelt (*Osmerus eperlanus*) [18]. These species may utilise both freshwater river systems and saltwater sea areas for spawning before migrating to the sea. Commercially important fish species in the North Sea include Atlantic cod (*Gadus morhua*), European plaice (*Pleuronectes platessa*), Dover sole (*Solea solea*), lemon sole (*Microstomus kitt*), whiting (*Merlangius merlangus*), sprat (*Sprattus sprattus)*, thornback ray (*Raja clavate)*, blonde ray (*R. brachyura*), Atlantic mackerel (*Scomber scrombrus*), Atlantic herring (*Clupea harengus*), and sandeel species Ammodytidae. The latter 3 are of also high ecological importance, supporting wider populations of fish and other marine predators [18].

Generally, there is little interaction between fish and offshore developments, although some species congregate around platforms and along pipelines. However, spawning individuals and juveniles can be sensitive to seismic activities, seabed disturbance activities, discharges to sea and, in some cases, accidental spills.

Shellfish species of commercial importance that have been recorded in the area, including brown crab (*Cancer pagarus*), the common whelk (*Buccinum undatum*), European lobster (*Homarus gammarus*), Norway lobster (*Nephrops norvegicus*), brown shrimp (*Crangon crangon*), pink shrimp (*Pandalus montagui*) and velvet swimming crab (*Necora puber*).

Shellfish species of non-commercial importance include blue mussel (*Mytilus edulis*); cockle (*Cerastoderma edule*); razor clam (*Ensis directus*).

The North-East Atlantic and North Sea are split into statistical grids called International Council for the Exploration of the Sea (ICES) Rectangles to map statistical information about the area. UKCS Block 48/21, in which the Durango installation is situated, is located within ICES Rectangle 35F1.

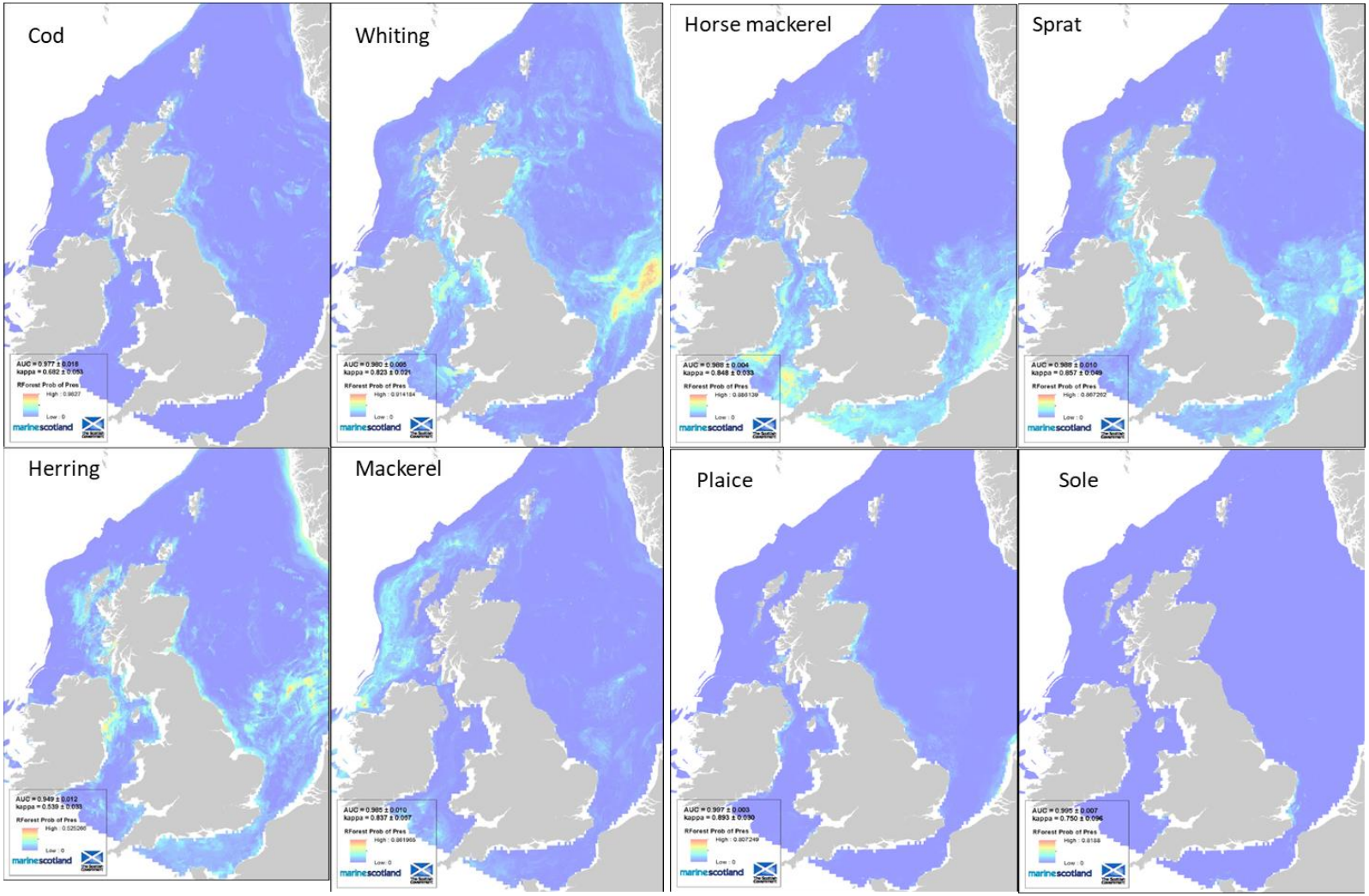
Species that spawn within ICES Rectangle 35F1 include herring (*Clupea harengus*), lemon sole (*Microstomus kitt*), mackerel (*Scomber scombrus*), sandeel (*Ammodytes* spp.), sole (*Solea solea*), and whiting (*Merlangius merlangus*). ICES Rectangle 35F1 is also a nursery ground for cod (*Gadhus morhua*), herring, horse mackerel (*Trachurus trachurus*), lemon sole, mackerel, plaice (*Pleuronectes platessa*), sandeels and whiting (Table 5-3) [5, 14].

Table 5-3: Fish Spawning and Nursery Species Within the Vicinity of the Durango Location (ICES 35F1)

Species	January	February	March	April	May	June	July	August	September	October	November	December
Cod	N	N	N	N	N	N	N	N	N	N	N	N
Herring	N	N	N	N	N	N	N	N	N	N	N	N
Horse mackerel	N	N	N	N	N	N	N	N	N	N	N	N
Lemon Sole	N	N	N	N	N	N	N	N	N	N	N	N
Mackerel	N	N	N	N	N	N	N	N	N	N	N	N
Plaice	N	N	N	N	N	N	N	N	N	N	N	N
Sandeels	N	N	N	N	N	N	N	N	N	N	N	N
Sole												
Whiting	N	N	N	N	N	N	N	N	N	N	N	N
Key		Spawning				Peak Spawning			N	Nursery		

All the species listed in Table 5-3, except for lemon sole and sprat are listed as UK BAP priority marine species. Cod is on the OSPAR List of Threatened and/or Declining Species and Habitats [52]. In addition, cod is listed as 'Vulnerable' globally on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species and should therefore be considered as a priority for protection. All other species from Table 5-3 are listed as Least Concern IUCN [28].

Figure 5-7: Sensitivity Maps for Selected Species [14] [3]



Elasmobranch Species

Elasmobranch species (sharks, skates, and rays) are also an important component of the North Sea ecosystem. Elasmobranchs have a low fecundity and slow growth rate, leaving them vulnerable to overfishing pressures and pollution events, and the subsequent recovery of populations in response to disturbance events is low. Historically, many elasmobranch species have been fishery targets due to their fins and liver oils [33]. While many species are no longer subjects of targeted fisheries, they are still under threat from commercial pelagic and demersal fishery by-catch.

In a survey of the distribution of elasmobranchs in UK waters undertaken by Ellis et al. in 2004 a total of 26 elasmobranch species were recorded throughout the North Sea and surrounding waters. Species which have been recorded in the SNS at various times throughout the year and may therefore be present in the vicinity of Block 48/21 are listed in Table 5-4 [14].

Table 5-4: Elasmobranch Species Likely to be Found in the Vicinity of the Durango Location

Common Name	Latin Name	Depth Range (m)	Global IUCN Status Note 1
Blonde skate	*Raja brachyura*	10 – 900	Near Threatened
Common smoothhound	*Mustelus mustelus*	5 – 350	Endangered
Cuckoo skate	*Leucoraja naevus*	12 – 290	Least Concern
Small spotted catshark	*Scyliorhinus canicula*	< 400	Least Concern
Spiny dogfish	*Squalus acanthias*	15 – 528	Vulnerable
Spotted skate	*Raja montagui*	< 530	Least Concern
Starry smoothhound	*Mustelus asterias*	0 – 100	Near Threatened
Thornback skate	*Raja clavata*	10 – 300	Near Threatened
Tope shark	*Galeorhinus galeus*	0 – 2000	Critically Endangered
Undulate skate	*Raja undulata*	50 – 200	Endangered

Note 1: Status as of February 2024.

Of these species, blonde skate, common smooth-hound, spiny dogfish, starry smooth-hound, thornback skate and tope shark are of most concern due to their unfavourable conservation status [28]. In addition, spotted skate, thornback skate, and spiny dogfish are listed on the OSPAR list of threatened and/or declining species and habitats [52].

5.5.4 Seabirds

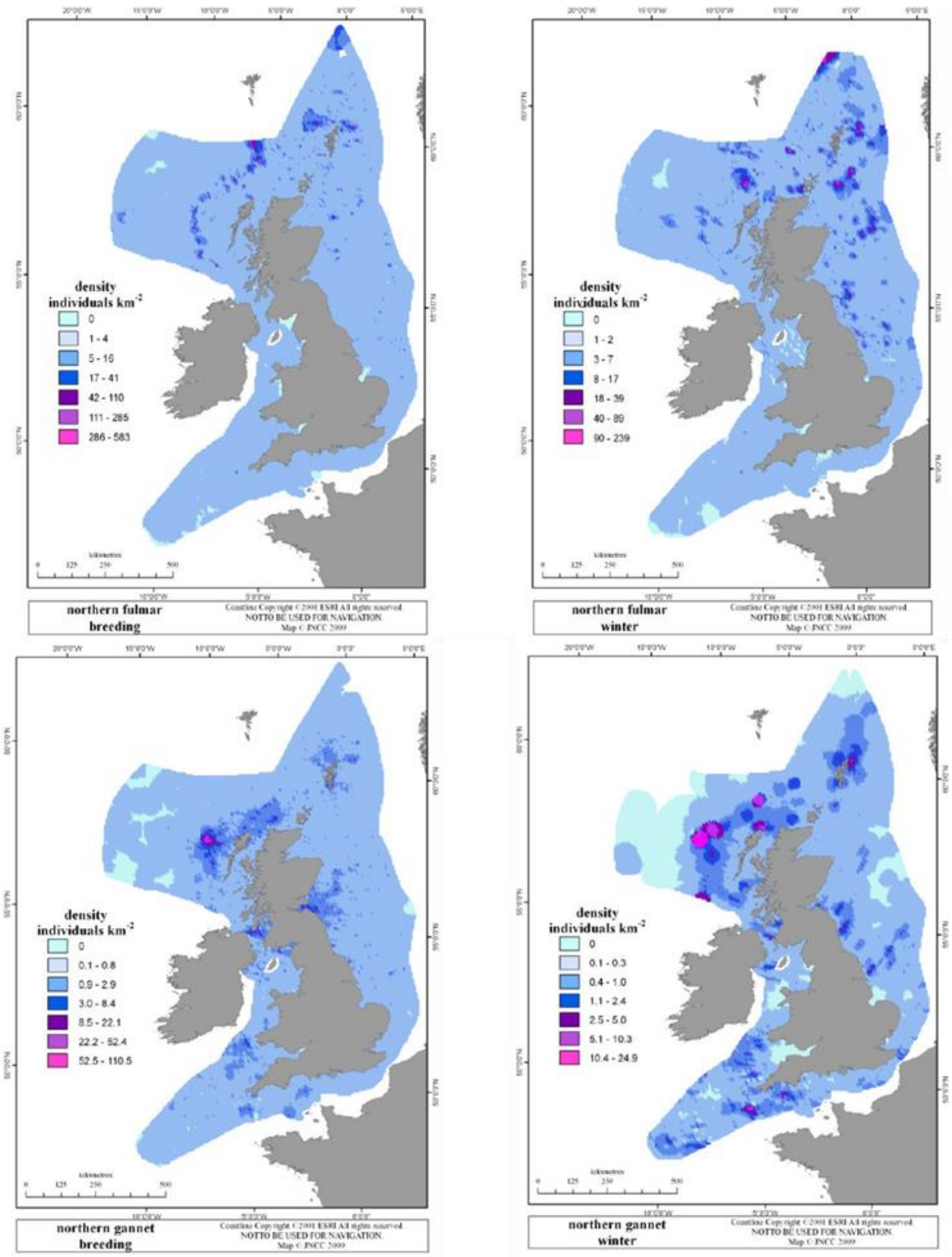
The offshore waters of the SNS are visited by numerous seabirds, mainly for feeding purposes in and around the shallow sandbanks [11]. Regional Sea 2 also includes several areas suitable for cliff-nesting seabirds and some of the most important sites for wintering and passage waterbirds in a national and international context, including the Wash and Thames Estuary. Therefore, individuals found offshore in the vicinity of the Durango installation location may originate from onshore colonies or be passing migrants. The number of seabirds is generally lower in Regional Sea 2 compared to further north [11].

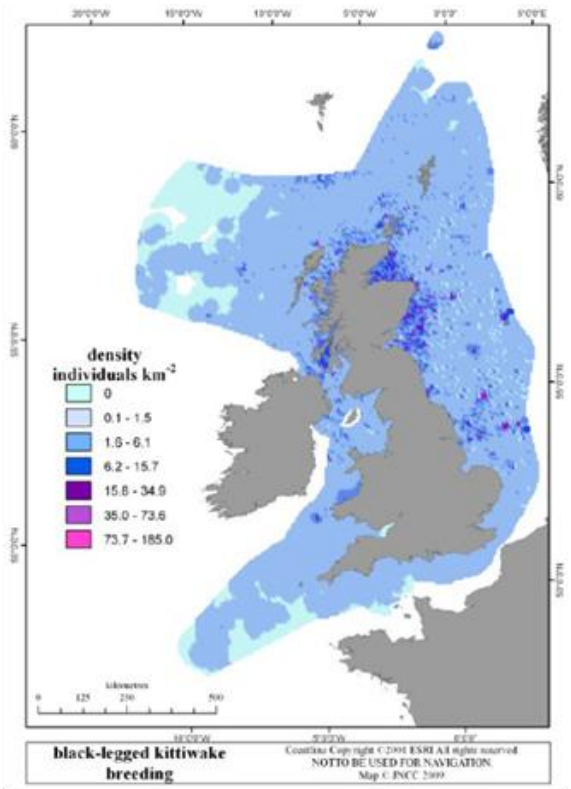
The most common species of seabird found in this area of the SNS include: Northern fulmar (*Fulmarus glacialis*), Great Skua (*Stercorarius skua*), Black legged kittiwake (*Rissa tridactyla*), Great black backed gull (*Larus marinus*), Common gull (*Larus canus*), Lesser black backed gull (*Larus fuscus*), Herring gull (*Larus argentatus*), Common guillemot (*Uria aalge*), Razorbill (*Alca torda*), Little auk (*Alle alle*) and Atlantic puffin (*Fratercula arctica*) [32] (Figure 5-8).

Fulmars are present in the highest numbers during the early and late breeding seasons, leading to peak densities in September. Kittiwakes are widely distributed throughout the year. Lesser black-backed gulls are mainly summer visitors, while in contrast, guillemot numbers are greatest during winter months. In addition, substantial numbers of terns migrate northwards through the offshore North Sea area in April and May, with return passage from July to September [11].

Durango is also approximately 120km from the Flamborough and Filey Coast Special Protection Area (SPA) where the northern gannet, black-legged kittiwake, northern fulmar, herring gull, Common guillemot, and Atlantic puffin are known to breed.

Figure 5-8: Seabird Density Surface Maps for the Species Identified as Frequently Occurring in the SNS [32].

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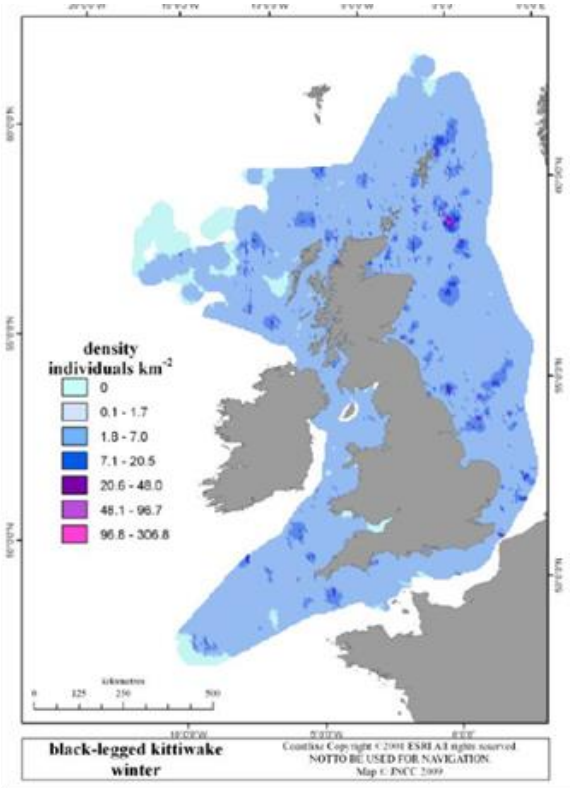
0.1 - 1.5
1.6 - 6.1
6.2 - 15.7
15.8 - 34.9
35.0 - 73.6
73.7 - 185.0
kilometres
0 125 250 500
black-legged kittiwake
breeding
Contains Copyright © 2008 ESRI All rights reserved
NOTTO BE USED FOR NAVIGATION
Map © JNCC 2009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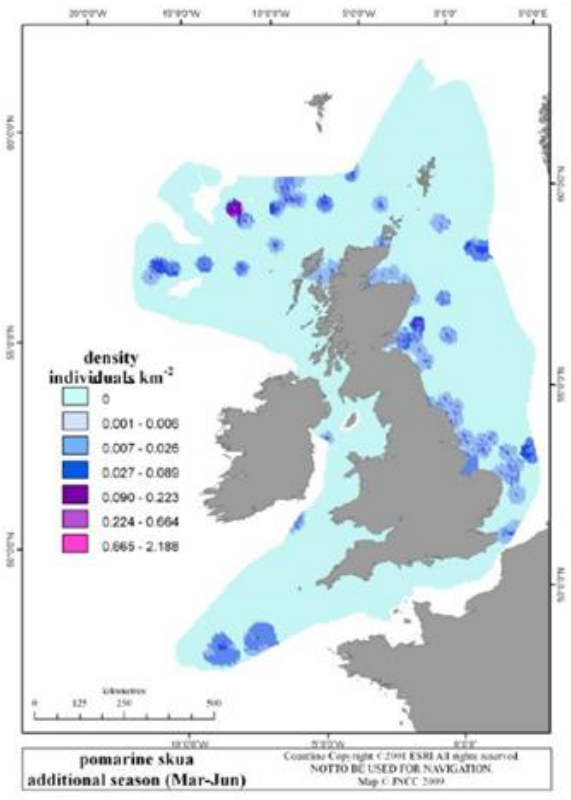
individuals km-2
0
0.1 - 1.7
1.8 - 7.0
7.1 - 20.5
20.6 - 48.0
48.1 - 96.7
96.8 - 306.8
kilometres
0 125 250 500
black-legged kittiwake
winter
Contains Copyright © 2008 ESRI All rights reserved
NOTTO BE USED FOR NAVIGATION
Map © JNCC 2009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individuals km-2
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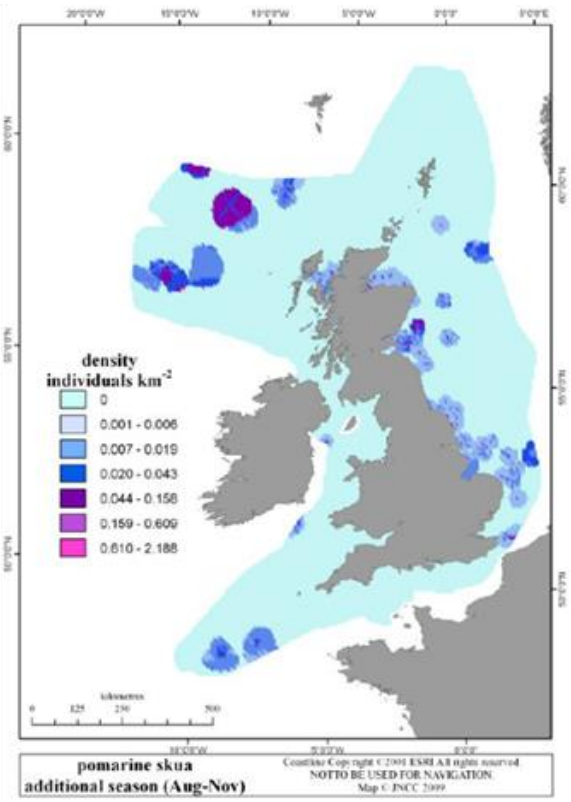
0.001 - 0.006
0.007 - 0.026
0.027 - 0.089
0.090 - 0.223
0.224 - 0.664
0.665 - 2.188
kilometres
0 125 250 500
pomarine skua
additional season (Mar-Jun)
Contains Copyright © 2008 ESRI All rights reserved
NOTTO BE USED FOR NAVIGATION
Map © JNCC 2009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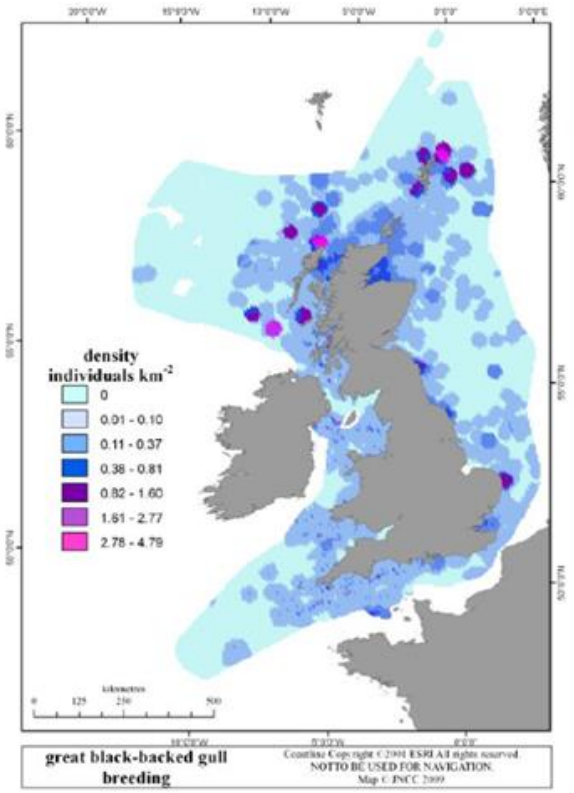
individuals km-2
0
0.001 - 0.006
0.007 - 0.019
0.020 - 0.043
0.044 - 0.158
0.159 - 0.609
0.610 - 2.188
kilometres
0 125 250 500
pomarine skua
additional season (Aug-Nov)
Contains Copyright © 2008 ESRI All rights reserved
NOTTO BE USED FOR NAVIGATION
Map © JNCC 2009


density
individuals km-2
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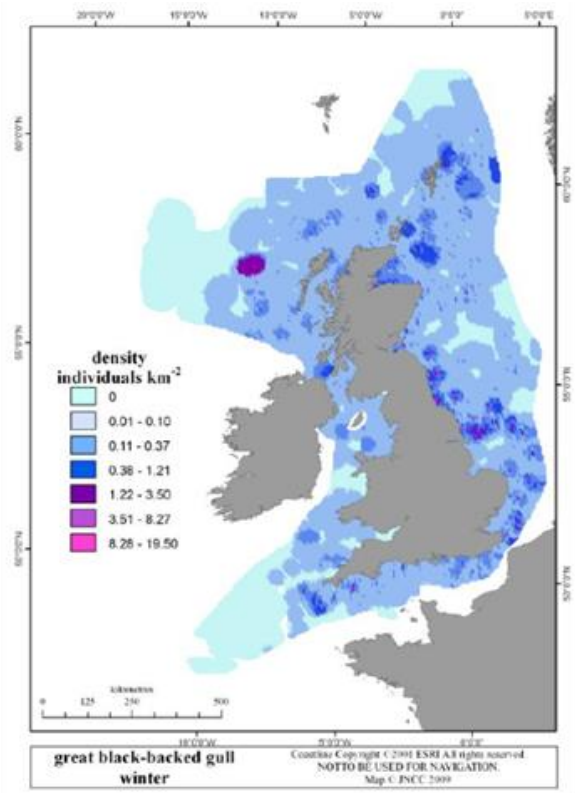
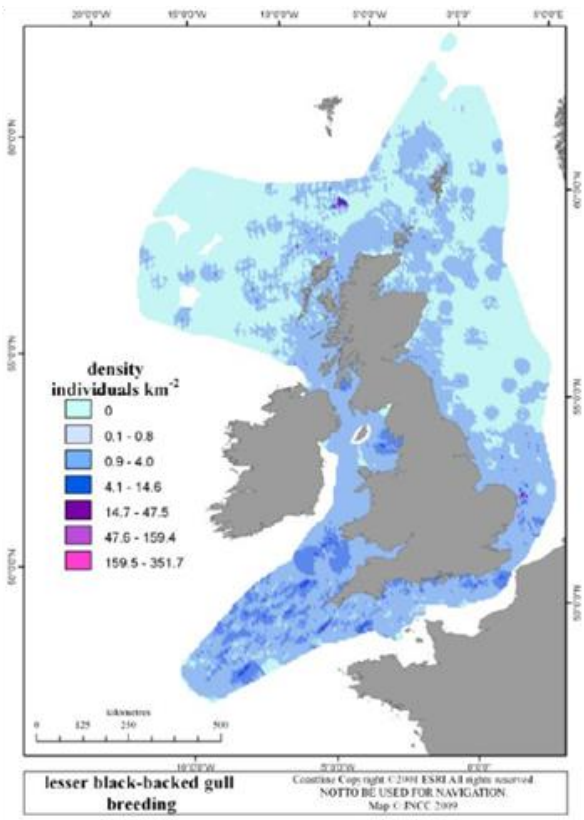
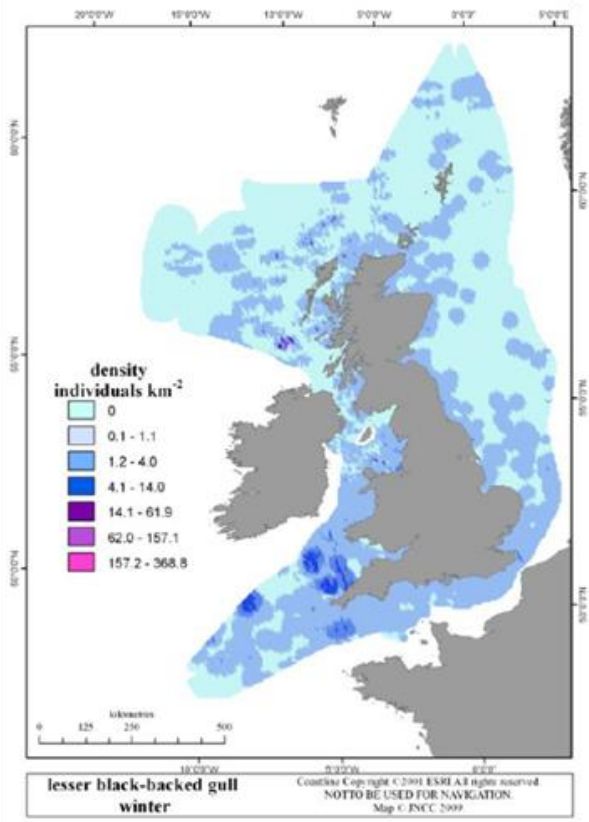
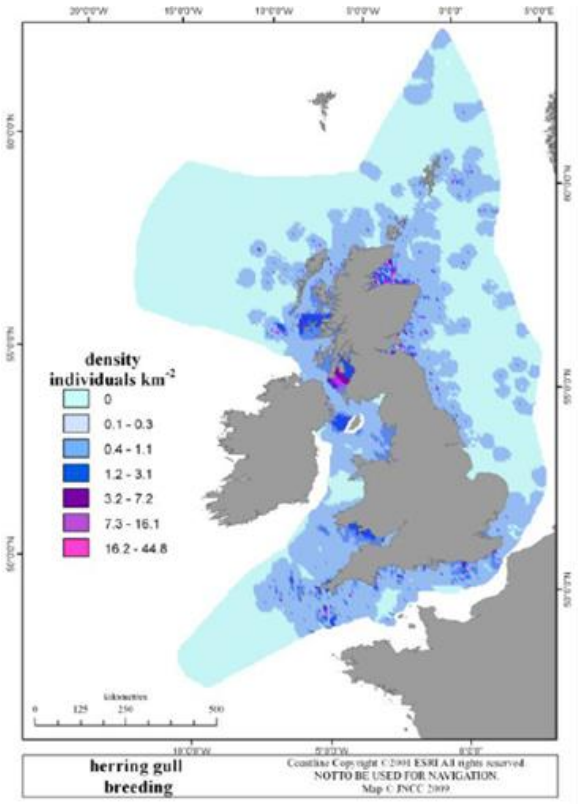
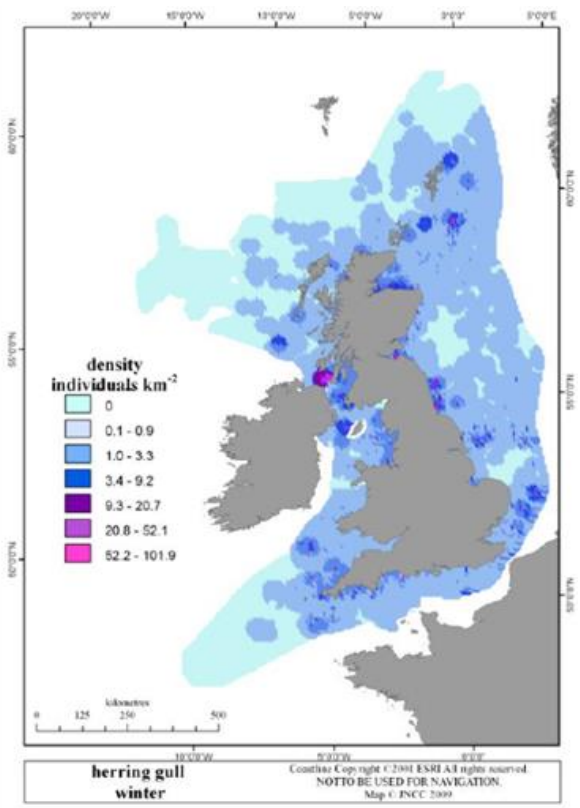
0.01 - 0.10
0.11 - 0.37
0.38 - 0.81
0.82 - 1.60
1.61 - 2.77
2.78 - 4.79
great black-backed gull
breeding

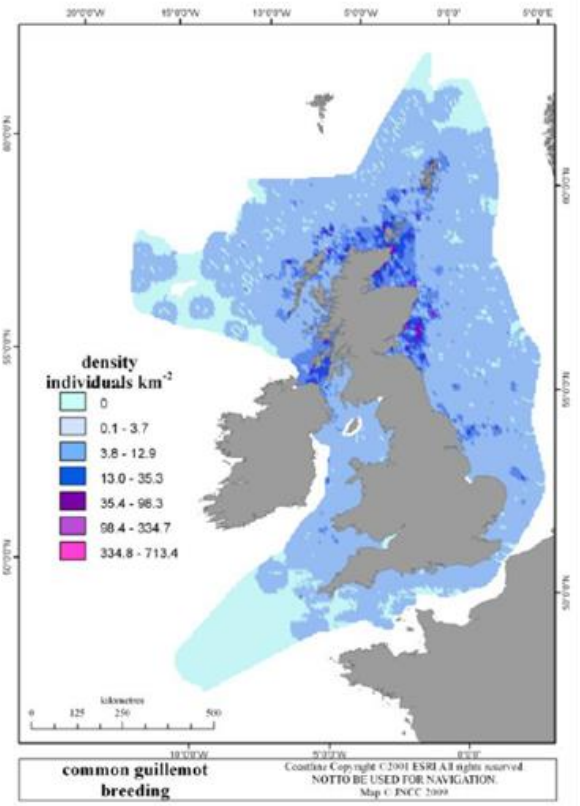

density
individuals km-2
0
0.01 - 0.10
0.11 - 0.37
0.38 - 1.21
1.22 - 3.50
3.51 - 8.27
8.28 - 19.50
great black-backed gull
winter

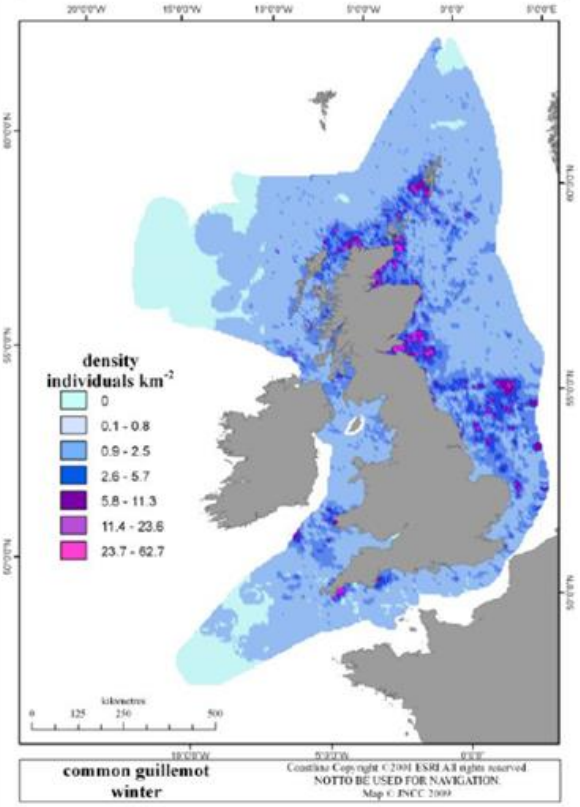

density
individuals km-2
0
0.1 - 0.8
0.9 - 4.0
4.1 - 14.6
14.7 - 47.5
47.6 - 159.4
159.5 - 351.7
lesser black-backed gull
breeding

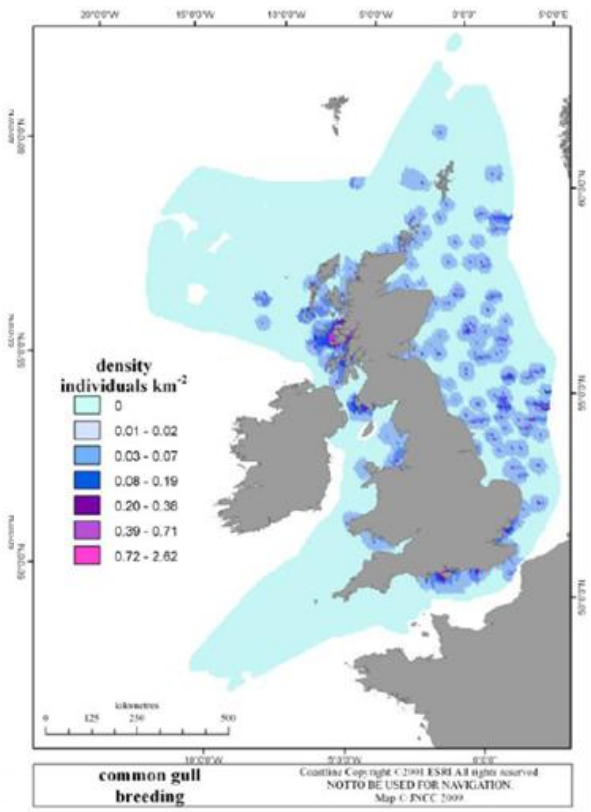

density
individuals km-2
0
0.1 - 1.1
1.2 - 4.0
4.1 - 14.0
14.1 - 61.9
62.0 - 157.1
157.2 - 368.8
lesser black-backed gull
winter

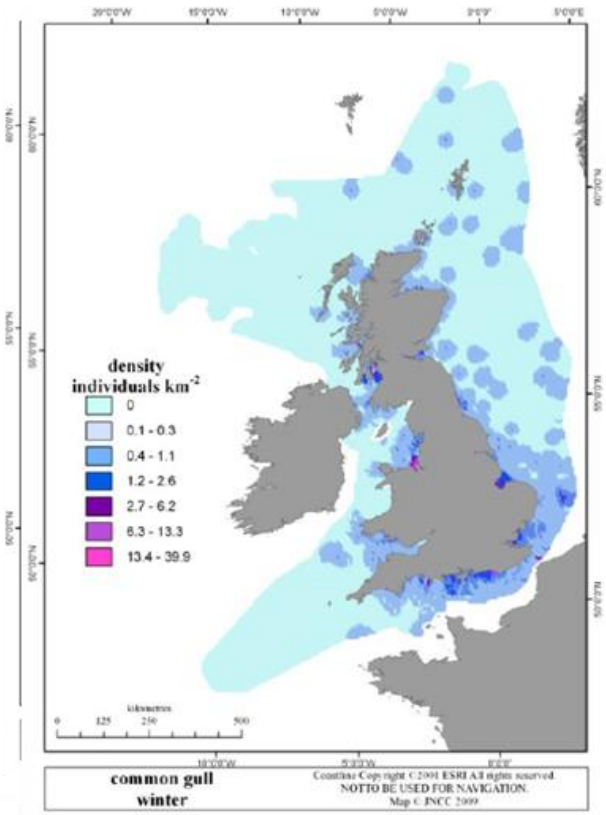

density
individuals km-2
0
0.1 - 0.3
0.4 - 1.1
1.2 - 3.1
3.2 - 7.2
7.3 - 16.1
16.2 - 44.8
herring gull
breeding

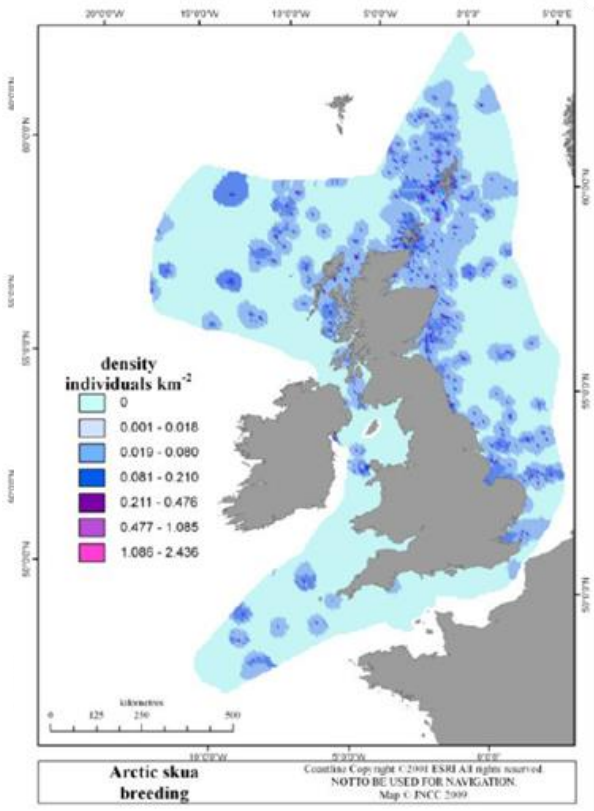

density
individuals km-2
0
0.1 - 0.9
1.0 - 3.3
3.4 - 9.2
9.3 - 20.7
20.8 - 52.1
52.2 - 101.9
herring gull
winter

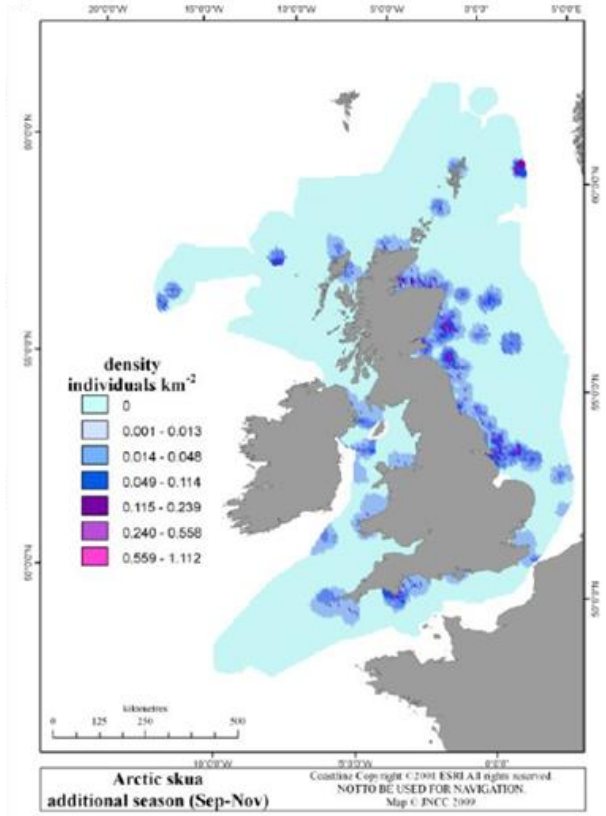

density
individuals km-2
0
0.1 - 3.7
3.8 - 12.9
13.0 - 35.3
35.4 - 98.3
98.4 - 334.7
334.8 - 713.4
common guillemot
breeding


density
individuals km-2
0
0.1 - 0.8
0.9 - 2.5
2.6 - 5.7
5.8 - 11.3
11.4 - 23.6
23.7 - 62.7
common guillemot
winter


density
individuals km-2
0
0.01 - 0.02
0.03 - 0.07
0.08 - 0.19
0.20 - 0.38
0.39 - 0.71
0.72 - 2.62
common gull
breeding


density
individuals km-2
0
0.1 - 0.3
0.4 - 1.1
1.2 - 2.6
2.7 - 6.2
6.3 - 13.3
13.4 - 39.9
common gull
winter


density
individuals km-2
0
0.001 - 0.018
0.019 - 0.080
0.081 - 0.210
0.211 - 0.476
0.477 - 1.085
1.086 - 2.436
Arctic skua
breeding


density
individuals km-2
0
0.001 - 0.013
0.014 - 0.048
0.049 - 0.114
0.115 - 0.239
0.240 - 0.558
0.559 - 1.112
Arctic skua
additional season (Sep-Nov)

5.5.5 Marine Mammals

5.5.5.1 Cetaceans

Cetaceans (whales, dolphins, and porpoises) are protected under Annex IV of the Council Directive 92/43/EEC (also known as the Habitats Directive). Cetacean abundance in the SNS is relatively low compared to the northern and central North Sea, except for the harbour porpoise (*Phocoena phocoena*).

The relative abundance and density of cetaceans in the vicinity of the Durango field location can be derived from data obtained during the Small Cetacean Abundance of the North Sea (SCANS-IV) aerial and ship-based surveys. This project identified the abundance and density of cetacean species within predefined sectors of the North Sea and North-East Atlantic. The Durango field location is situated within SCANS-IV Block 'NS-C' (Table 5-5), in which harbour porpoise, bottlenose dolphin, minke whale, white-beaked dolphin and common dolphin have been recorded [65]. The density of the harbour porpoise within the SCANS-IV Block 'NS-C' is higher than the total surveyed area, suggesting that the area may be important for these species (Table 5-5). Densities for minke whales were like the total surveyed area, whereas densities for white-beaked dolphins were a magnitude lower.

In addition to the cetaceans, other species have been observed or have been modelled to have a presence in the North Sea [65]. These include the Atlantic white-sided dolphin (*Lagenorhynchus acutus*), Risso's dolphin (*Grampus griseus*), and the short-beaked common dolphin (*Delphinus delphis*).

Table 5-5: Cetacean Abundance and Density Recorded in SCANS-IV Aerial Survey Area Block 'NS-C' [65]

Species	SCANS-IV Block 'NS-C'	
	Abundance	Density Note1
Harbour porpoise	36,286	0.6027
Bottlenose dolphin	2,520	0.0419
White-beaked dolphin	894	0.0149
Minke whale	412	0.0068
Common dolphin	192	0.0032
Note1: Density is the number of animals per km^2		

The UK Statutory Nature Conservation Bodies have identified Marine Mammal Management Units (MMMU's) to provide information on the geographical range and abundance of marine mammals, and therefore understand the potential effects of anthropogenic activities on populations [26]. The abundance of cetacean species within their respective MMMUs is shown in Table 5-6.

It is evident that harbour porpoises are the most abundant species in the North Sea compared to other species identified in Table 5-6, despite its MMMU being smaller in area. White-sided dolphins are the next most abundant within the UK sector of its MMMU; however, these were not recorded in significant numbers in SCANS-IV Aerial Survey Area Block 'NS-C'.

Table 5-6: Estimates of Cetacean abundance in the Relevant MMMUs [26]

Species	Management unit	Abundance of animals	95% Confidence Interval	Density Note 1
Bottlenose dolphin	Greater North Sea (639,886km^2)	0	-	-
Harbour porpoise	North Sea (678,206km^2)	227,298	176,360 – 292,948	0.335
Risso's dolphin Note 2	Marine Atlantic Note 3	-	-	-
Common dolphin	Celtic and Greater North Sea (1,560,875km^2)	56,556	33,014 – 96,920	0.036
Minke whale		23,528	13,989 - 39,572	0.015
White-beaked dolphin		15,895	9,107 – 27,743	0.010
White-sided dolphin		69,293	34,339 – 139,828	0.044

Note 1: Density (individuals per km) was calculated using the total area of the Management Unit (MU) and the abundance of animals within that MU
Note 2: There is no current abundance estimate available for Risso's dolphin
Note 3: 'Marine Atlantic' Management Unit comprises all UK waters and extends to the seaward boundary used by the EC for Habitats Directive reporting

In addition to the above marine mammal abundance surveys, the Atlas of Cetacean Distribution in Northwest European Water [56] provides a comprehensive review of cetacean sightings in northwest European waters. The seasonal sightings data for ICES Rectangles 35F1 is summarised in Table 5-7. Of the species identified during the survey, only the harbour porpoise has been observed in ICES Rectangle 35F1 [56].

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

Table 5-7: Cetacean Sightings in ICES Rectangle 35F1 [56]

Species	January	February	March	April	May	June	July	August	September	October	November	December
White-beaked dolphin												
Key	ND = No data		Very Low (< 0.01)		Low (0.01-10)			Medium (10-100)		High (>100)		

5.5.5.2 Pinnipeds

Two species of seals; the grey seal (*Halichoerus grypus*) and the harbour (or common) seal (*Phoca vitulina*) are found in the North Sea around the English East Coast (Figure 5-9; Figure 5-10). Both species are listed under Annex II of the EC Habitats Directive and protected under the Conservation of Seals Act 1970 (from 0 to 12 nautical miles from the coast) and listed as UK BAP priority marine species.

On the east coast of England, established colonies of grey seals are present at Donna Nook, at the mouth of the Humber, and around Blakeney on the North Norfolk coast [59]. Like all seals, grey seals spend a significant proportion of their time hauled out on land during the breeding, moulting and pupping seasons and also between tides and foraging trips [59]. Grey seals forage down to depths of 100m and at distances of up to 100km from their haul-out sites and, therefore, whilst unlikely, could be present in the vicinity of the pipelines, particularly at their westernmost extent. Models of marine usage by grey seals show that there are high levels of foraging activity along the east coast of England. The Durango installation is located approximately 37km north of the nearest landfall at Blakeney in East Anglia, and thus the distribution of grey seals is considered very low (1-15 individuals per 25km^2) [57].

Harbour seals are the smaller of the two species and tend to be found closer to the coast [59]. As with grey seals, the UK harbour seal population is predominantly found around the Scottish coast with smaller colonies around The Wash and along the east coast of England [59]. Harbour seals are restricted to their haul-out sites and the surrounding waters during pupping (June and July) and during their annual moult (August) [59]. This species can be found offshore from late August through to the following June and tends to forage within 40 – 50km of its haul-out sites. Therefore, the harbour seal distribution in the vicinity of the Durango installation location is considered very low (0-10 individuals per 25km^2) [57].

Figure 5-9: Grey Seal (*Halichoerus grypus*) at Sea Density

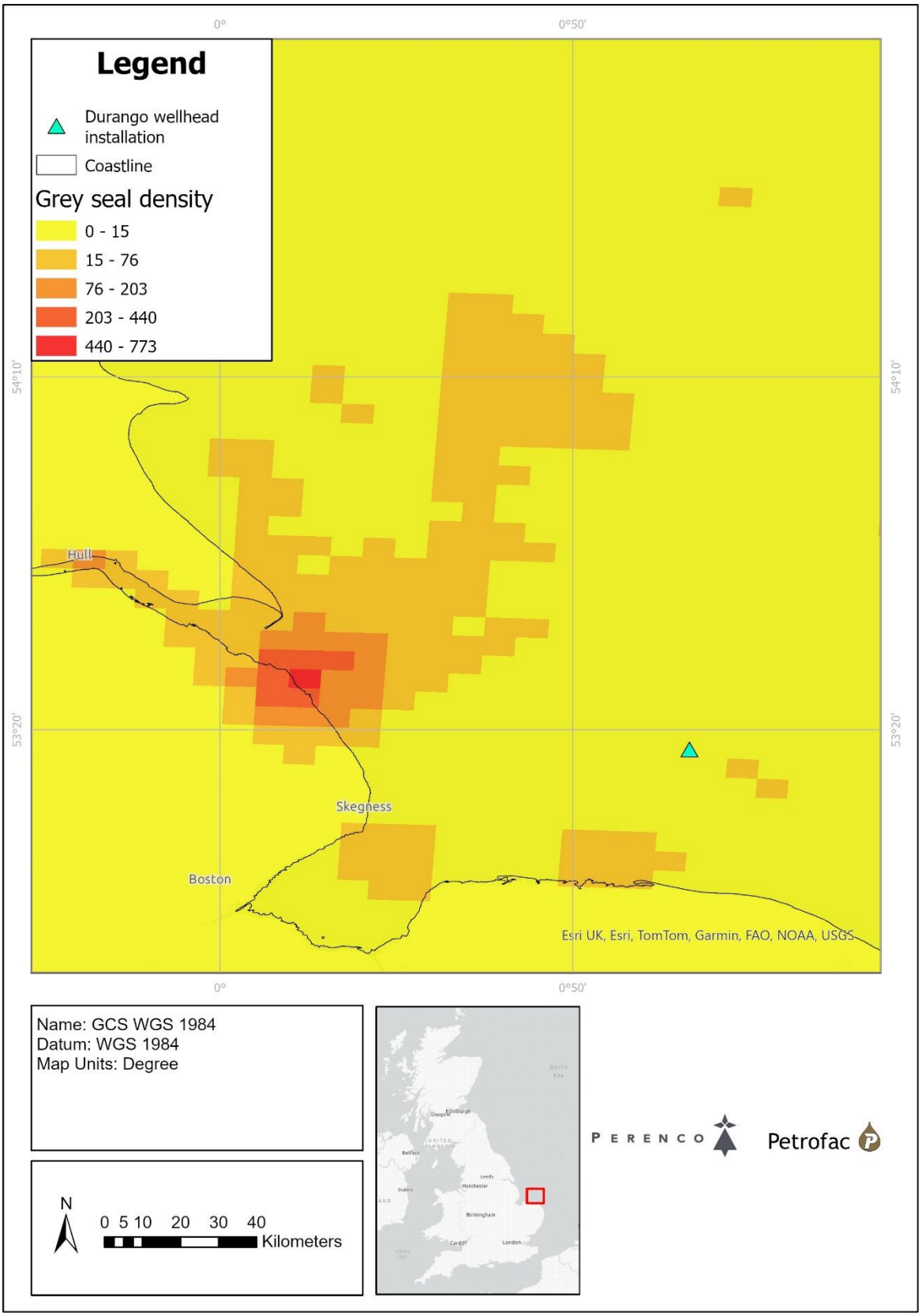
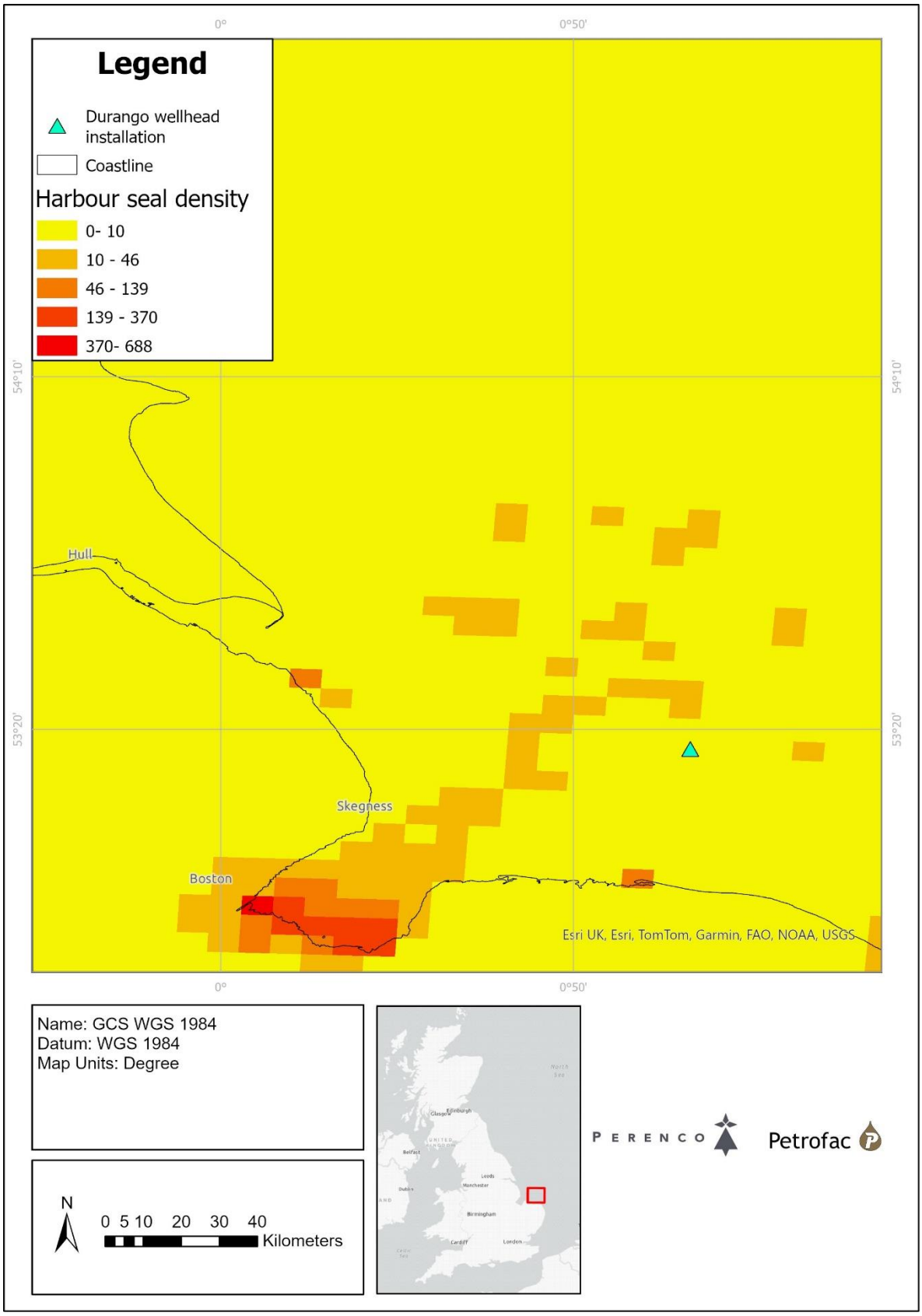


Figure 5-10: Harbour Seal (*Phoca vitulina*) at Sea Density.



5.6 Management

5.6.1 Conservation Areas

The UK is party to a number of international agreements to establish an ecological network of MPA's in UK waters. As a signatory to the OSPAR Convention, the UK must establish an ecologically coherent and well-managed network of MPAs across the North-East Atlantic by 2016 [29]. These commitments are transposed through national legislation and regulations. The main types of MPA's in UK waters are:

- SAC's (also known as European Sites of Community Importance which are designated for habitats and species listed under the EU Habitats Directive. These qualifying features include three marine habitat types (shallow sandbanks, reefs and submarine structures made by leaking gases) and four marine species (grey seal, harbour seal, bottlenose dolphin and harbour porpoise) [29]. In the UK there are 115 SAC's with marine components [29].
- SPA's which are designated to protect birds under the EU Wild Birds Directive. The Directive requires conservation efforts to be made across the sea and land area. In the UK 112 SPAs with marine components have been designated, including four wholly marine SPA's [29].
- MCZ's which are designated under the Marine and Coastal Access Act (2009) to protect nationally important marine wildlife, habitats, geology, and geomorphology and can be designated anywhere in English, Welsh territorial or UK offshore waters [29]. To date there are 97 designated MCZ's in UK waters [29].

SAC's and SPA's form part of the European Natura 2000 network. Other international designations such as Ramsar Wetlands of International Importance (hereafter referred to as Ramsar sites), and national designations such as Sites of Special Scientific Interest also form part of the UK MPA network through their protection of marine, coastal terrestrial and geological features [29]. OSPAR MPA's encompass existing MPA's designated under existing legislation and Conventions including SAC's, SPA's and MCZ's [29].

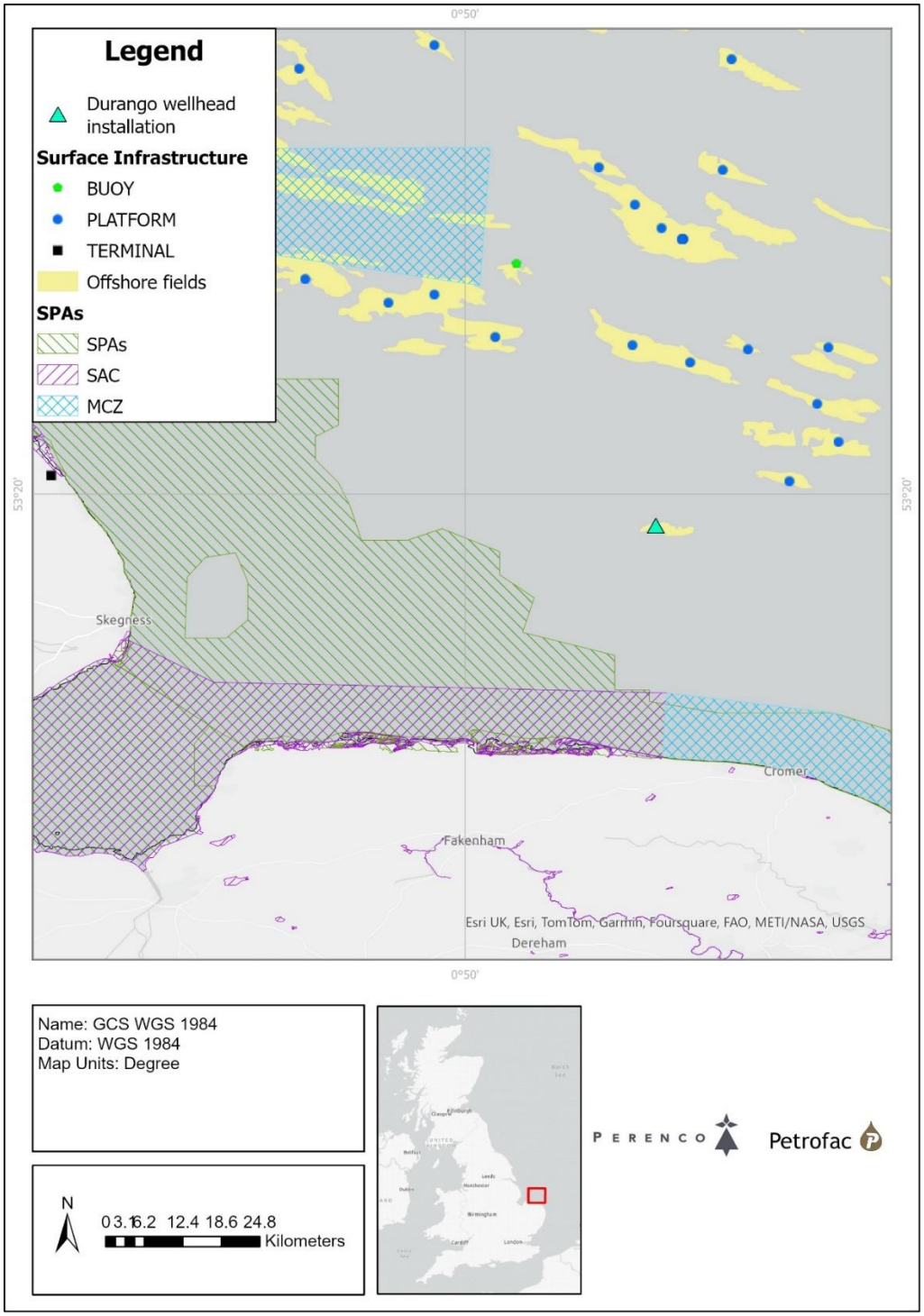
The Durango field is not located within the boundary of any MPAs; however, there are six MPAs located within 40km of Durango installation, as shown in Table 5-8 and Figure 5-11.

Table 5-8: MPA's Within 40km of the Durango Installation

Site Name	Distance and Direction	Qualifying Features and Site Description
North Norfolk Sandbanks and Saturn Reef SAC	35.0km east	**Features:** Annex I habitats; Sandbanks which are slightly covered by sea water all the time (1110) and Reefs (1170). **Description**: The North Norfolk Sandbanks are the most extensive example of the offshore linear ridge sandbank type in UK waters. The site encloses a series of 10 main sand banks and associated smaller banks. Invertebrate communities are typical of sand sediments in the SNS such as polychaete worms, isopods, crabs, and starfish. Areas of *S. spinulosa* biogenic reef are present within the site, consisting of thousands of fragile sand-tubes made by ross worms (polychaetes) which have consolidated together to create solid structures rising above the seabed.

Southern North Sea SAC	35.7km northeast	**Features:** Annex II species; Harbour porpoise (*Phocoena phocoena*) (1351). **Description**: The site has been identified as an area of importance for harbour porpoises and supports 17.5% of the UK North Sea Management Unit (MU) population. This site covers an area of 36,951km^2. Most of this site lies offshore, though it does extend into coastal areas of Norfolk and Suffolk. The northern two-thirds of the site is recognised as important for porpoises during the summer season (April – September), whilst the southern part supports persistently higher densities during the winter (October – March).
Inner Dowsing, Race Bank and North Ridge SAC	7.1km southwest	**Features:** Annex I Habitat: Sandbanks which are slightly covered by sea water all the time and reefs. **Description:** The tops of the sandbanks are characterised by low diversity communities of polychaete worms and amphipod crustaceans. The trough areas between the sandbank features contain a diverse mosaic of biotopes on mixed and gravelly sands. A biogenic reef created by ross worm (*S. spinulosa*) has been recorded within the site. The complex reef habitats support a variety of bryzoans, hydroids, sponges, and anemones as well as the common lobster and the commercial fishery targeted pink shrimp.
The Wash & North Norfolk Coast SAC	27.4km southwest	This site comprises of a mixture of habitats including tidal rivers, sand beaches, sea cliffs and bogs. As such, there are a number of designated features for this site; Coastal lagoons, perennial vegetation of stony banks, Mediterranean and thermos-Atlantic halophilous scrubs, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, fixed coastal dunes with herbaceous vegetation, humid dune slacks, otter and petalwort.
The Greater Wash SPA	16.8km southwest	**Features:** Seabirds and waterbirds. **Description:** The Greater Wash SPA straddles the 12 nautical mile limit and is proposed to protect different tern species during the breeding season (Sandwich tern, little tern and common tern) as well as a range of seabird species during the non-breeding season (red-throated diver, common scoter and little gull).
North Norfolk Coast SPA	36.7km southwest	The site has been classified due to the following qualifying features: *Botaurus stellaris*; Great bittern (breeding) *Anser brachyrhynchus*; Pink-footed goose (non-breeding) *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding) *Anas penelope*; Eurasian wigeon (non-breeding) *Circus aeruginosus*; Eurasian marsh harrier (breeding) *Circus pygargus*; Montagu's harrier (breeding) *Recurvirostra avosetta*; Pied avocet (breeding) *Calidris canutus*; Red knot (non-breeding) *Sterna sandvicensis*; Sandwich tern (breeding) *Sterna hirundo*; Common tern (breeding) *Sterna albifrons*; Little tern (breeding) Waterbird assemblage

Figure 5-11: Durango Location in Relation to UK Offshore Infrastructure and MPAs.



5.6.2 National Marine Plans

Table 5-9 details policies and objectives contained within relevant marine plans and highlights how these have been addressed by the proposed decommissioning strategy [41].

Table 5-9: Marine Planning Objectives and Policies Relevant to the Proposed Decommissioning Strategy.

Relevant Objectives	Associated Policies	Addressed by Project
Economic Productivity - To promote the sustainable development of economically productive activities, taking account of spatial requirements of other activities of importance to the East marine plan areas.	**EC1** - Proposals that provide economic productivity benefits which are additional to the Gross Value Added currently generated by existing activities should be supported.	The proposed decommissioning strategy is in line with minimising taxpayer costs for decommissioning oil & gas infrastructure in the SNS.
Employment and Skill Levels - To support activities that create employment at all skill levels, taking account of the spatial and other requirements of activities in the East Marine Plan areas.	**EC2** - Proposals that provide additional employment benefits should be supported, particularly where these benefits have the potential to meet employment needs in localities close to the marine plan areas.	The proposed operations will utilise local contractors in the area and a support base close to the proposed operations.

Relevant Objectives	Associated Policies	Addressed by Project
Heritage Assets - To conserve heritage assets, and nationally protected landscapes and ensure that decisions consider the seascape of the local area.	**SOC2** - Proposals that may affect heritage assets should demonstrate, in order of preference: a) that they will not compromise or harm elements which contribute to the significance of the heritage asset; b) how, if there is compromise or harm to a heritage asset, this will be minimised; c) how, where compromise or harm to a heritage asset cannot be minimised it will be mitigated against, or; d) the public benefits for proceeding with the proposal if it is not possible to minimise or mitigate compromise or harm to the heritage asset. **SOC3** - Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference: a) that they will not adversely impact the terrestrial and marine character of an area; b) how, if there are adverse impacts on the terrestrial and marine character of an area, they will minimise them; c) how, where these adverse impacts on the terrestrial and marine character of an area cannot be minimised they will be mitigated against; d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	The proposed decommissioning strategy is not anticipated to have an impact on any heritage assets or the character of the marine area.
Healthy Ecosystem - To have a healthy, resilient and adaptable marine ecosystem in the East marine plan areas.	**ECO1** - Cumulative impacts affecting the ecosystem of the East marine plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation.	Refer to Section 7. Environmental & Social impact assessment.
	ECO2 - The risk of the release of hazardous substances as a secondary effect due to any increased collision risk should be considered in proposals that require authorisation.	The proposed decommissioning strategy minimises the risk of release of hazardous substances which would be limited to vessel fuel inventory during decommissioning operations.
Biodiversity - To protect, conserve and, where appropriate, recover biodiversity that is in or dependent upon the East marine plan areas.	**BIO1** - Appropriate weight should be attached to biodiversity, reflecting the need to protect biodiversity as a whole, taking account of the best available evidence including habitats and species that are protected or of conservation concern in the East marine plans and adjacent areas (marine, terrestrial).	The proposed decommissioning strategy reduces any potential impact on biodiversity in the East marine plan and terrestrial areas.

Relevant Objectives	Associated Policies	Addressed by Project
MPAs - To support the objectives of MPAs (and other designated sites around the coast that overlap or are adjacent to the East marine plan areas), individually and as part of an ecologically coherent network.	**MPA1** - Any impacts on the overall MPA network must be considered in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network	Refer to Section 5.6.1. The decommissioning strategy will not significantly impact the objectives of MPAs.
Governance - To ensure integration with other plans, and in the regulation and management of key activities and issues, in the East marine plans, and adjacent areas.	**GOV2** - Opportunities for co-existence should be maximised wherever possible.	Refer To Section 5.7
	GOV3 - Proposals should demonstrate in order of preference: a) that they will avoid displacement of other existing or authorised (but yet to be implemented) activities; b) how, if there are adverse impacts resulting in displacement by the proposal, they will minimise them; c) how, if the adverse impacts resulting in displacement by the proposal, cannot be minimised, they will be mitigated against, or; d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts of displacement.	Refer To section 5.7

5.7 Societal

5.7.1 Commercial Fisheries

The North Sea is one of the world's most important fishing grounds, and major UK and international fishing fleets operate in the SNS, targeting a mix of demersal, shellfish and pelagic fish stocks.

The Durango field is located within ICES Rectangle 35F1. The Durango field has a low fishing intensity compared to the wider North Sea region. Annual fishing effort in ICES Rectangle 35F1 is only available for 2012 and 2013, with an average of 726 days [39]. This annual mean is consistent with large areas of the SNS. Monthly fishing effort is generally low compared to the wider North Sea region but is highest between March and July. The most frequently used gear type is static gears, particularly traps which target shellfish species. This is reflected in the landings data which indicates that shellfish species are the most significant component of the fishery in terms of landed tonnage and value (over 95% for both). The most frequently caught species include the Norway lobster (*Nephrops norvegicus*), crabs, lobsters, and scallops [39].

5.7.2 Oil & Gas Activities

Oil and gas activity within the SNS is generally high and targets several existing gas fields.

The Durango Field infrastructure lies towards the southwest edge of a collection of gas fields in the SNS and therefore oil and gas activity surrounding the Durango location is considered to be moderate to high [48]. The nearest oil and gas infrastructure is the PUK operated Waveney Normally Unattended Installation, followed by Elgood subsea well (14.7km) and Blythe platform (23.1km), both operated by IOG North Sea Limited (Figure 5-12).

A total of five wells have been drilled in the UKCS block of interest. Among them, three are in abandoned phase 3, one is in abandoned phase 1, and the remaining one with the status of completed (shut in).

5.7.3 Marine Aggregates

The licensed aggregate production site, Outer Dowsing, operated by Westminster Gravels Ltd in operation 01/01/2015 – 31/12/2029), is situated 15.2km north of production area 515/2 and 11.8km north of production area 515/1, relative to the Durango installation. Additionally, the Inner Dowsing production area 481/2, operated by Van Oord Ltd is located 27.7km west.

The active Sheringham Shoal offshore windfarm, operated by SCIRA Offshore Energy Limited, is located within the UCKS block 48/21, 13km south of Durango. However, an expansion of the existing wind farm is currently undergoing the planning process. Pending approval, the extension is anticipated to approximate the installation distance of 5km. Additionally, the Dudgeon extension currently in planning will be near the installation in 7.1km [9] (Figure 5-13).

5.7.4 Commercial Shipping

The density of shipping traffic in the SNS is relatively high due to the presence of fishing vessels, some ferries between the UK and the rest of Europe and cargo and offshore support vessels [11].

Shipping traffic at the Durango installation location within UKCS Block 48/21 is recorded as 'very high', requiring a Vessel Traffic Survey (VTS) and a Collision Risk Assessment (CRA) under the Consent to Location application process [46].

5.7.5 Telecommunications & Cables

No telecommunications cables pass through UKCS block 48/21, except for a small amount of cabling associated with the Sheringham Shoal offshore windfarm [31].

5.7.6 Military Activity

Block 48/21 does not lie within a known military practice and exercise area [11]; [47].

5.7.7 Wrecks

There are no protected wrecks recorded within block 48/17 [42].

5.7.8 Tourism

Recreational vessel usage increases during the summer months. As such, the installation decommissioning area may experience elevated numbers of recreational angling, cruising, and sailing vessels during this period.

Figure 5-12: Durango Installation in Relation to Surrounding Oil and Gas Activity

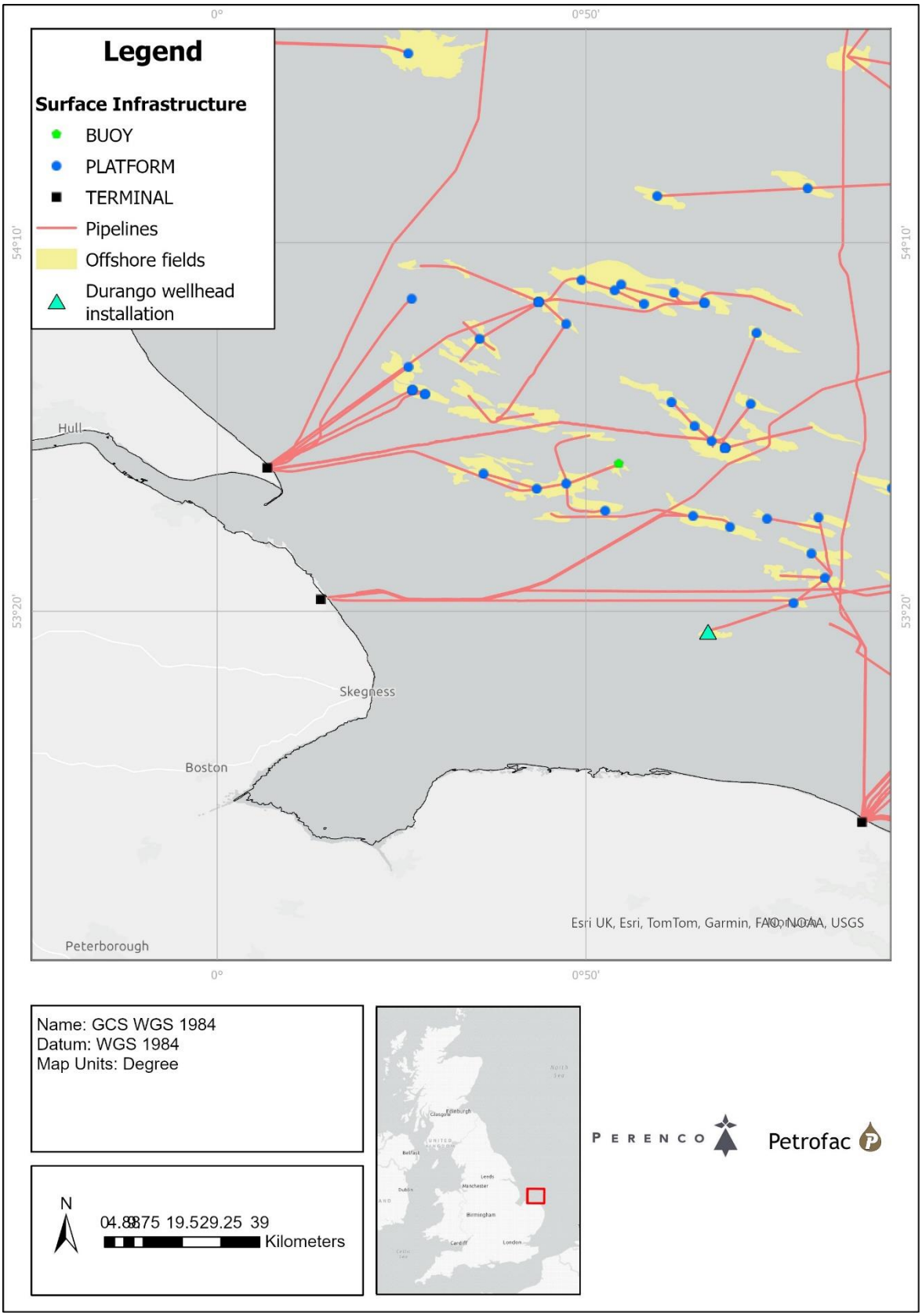
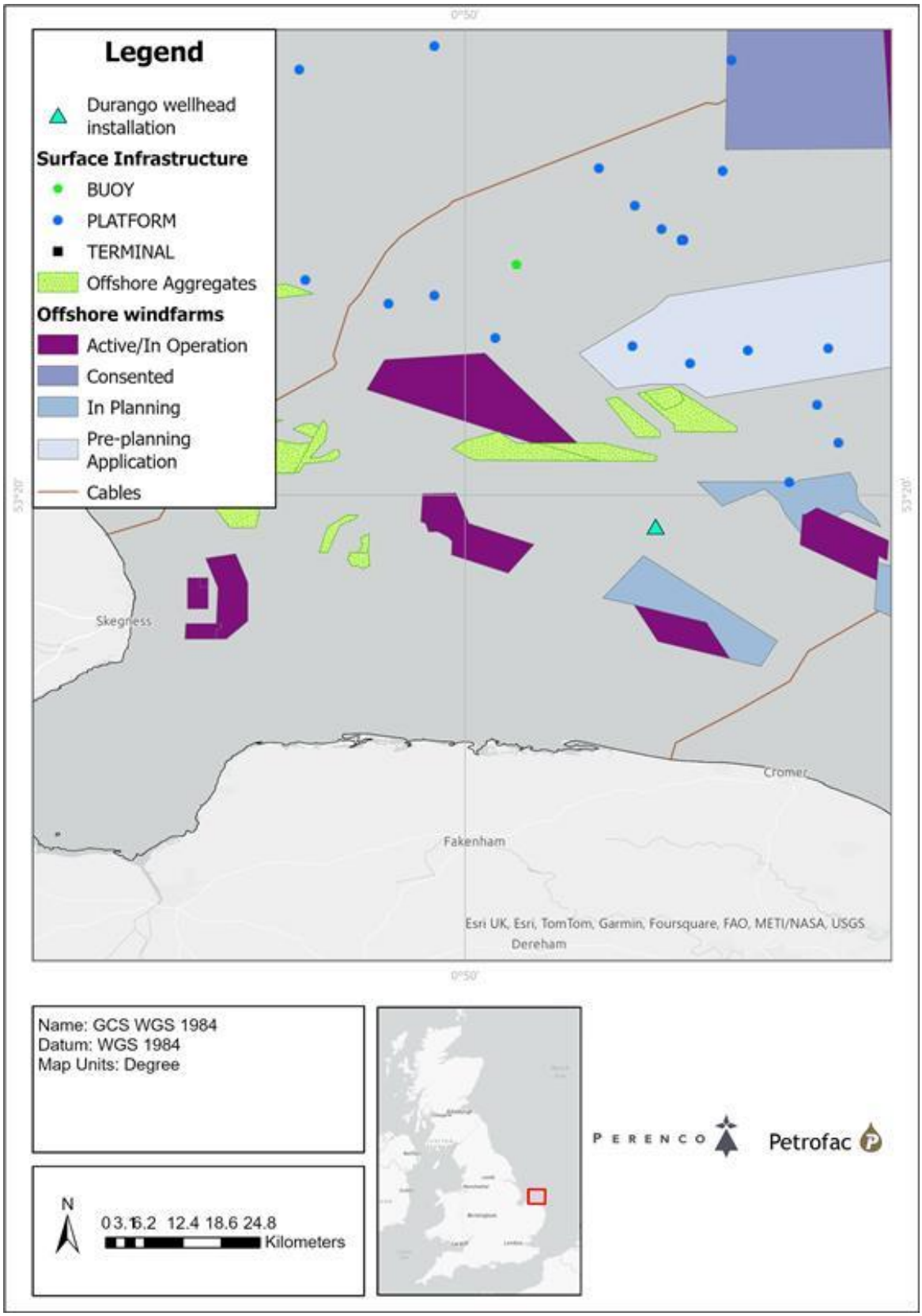


Figure 5-13: Durango Installation in Relation to Surrounding Aggregate, Offshore Renewables and Cable Activity.



6 Environmental Impacts Identification Summary

Table 6-1 provides details of the potential impacts associated with the preferred decommissioning option as identified in the Environmental Impacts Identification (ENVID). All significant potential impacts have been scoped in for further assessment in the section 7.

Table 6-1: Assessment of Impacts from the Preferred Decommissioning Option

Assessment Topic	Project Activity / Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	MPAs	Shipping	Commercial Fisheries	Oil & Gas & CCS Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
General																						
Physical presence	Use of decommissioning vessels	*	*	*	*	*	*	*	*	*	*	A	A	A	*	*	*	*	*	*	*	*
	Removal of 500m subsea exclusion zone	*	*	*	*	*	*	*	*	*	*	P	P	P	*	*	*	*	*	*	*	*
Seabed Disturbance	Overtrawl survey	A	A	*	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Excavation around pipeline end	A	A	*	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Positioning of Jack Up Barge (JUB)	A	A	*	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Removal of infrastructure	A	A	*	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Noise emissions	Underwater cutting	*	*	*	*	*	*	A	*	A	*	*	*	*	*	*	*	*	*	*	*	*
	Use of survey vessels.	*	*	*	*	*	*	A	*	A	*	*	*	*	*	*	*	*	*	*	*	*
	Use of survey equipment	*	*	*	*	*	*	A	*	A	*	*	*	*	*	*	*	*	*	*	*	*
Marine discharges	Vessel discharges (operational/domestic)	*	A	*	*	A	*	A	A	A	*	*	*	*	*	*	*	*	*	*	*	*
Atmospheric emissions	Use of survey vessels.	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Waste (Hazardous/non-hazardous)	Operational/domestic waste from a survey vessel.	*	*	A	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	A
	Decommissioning waste	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	A
Accidental Events	Vessel collision	*	A	A	A	A	A	A	A	A	*	A	A	A	*	*	*	*	*	*	*	*

Key:

	Potential for significant effects		No potential for significant effects	A Adverse effect	P Beneficial effect	* No interaction	

7 Environmental & Social Impact Assessment

7.1 Assessment Methodology

7.1.1 Introduction

The method PUK has used to determine if the project is likely to have any significant effects on the environment is described in this section and follows EIA good practice guidance [19; 6; 62; 27]. The process commences with the identification of project activities (or aspects) that could impact environmental and socio-economic receptors (i.e., components of the receiving environment), with consideration given to both planned (routine) activities and unplanned (accidental) events. The terms “impact” and “effect” have different definitions in EIA, and one may occur as a result of the other. Impacts are defined as changes to the environment as a direct result of project activities and can be either beneficial or adverse.

Effects are defined as the consequences of those impacts upon receptors. Impacts that could potentially result in significant effects are then subject to detailed assessment based on best available scientific evidence and professional judgement so that, where necessary, measures can be taken to prevent, reduce or offset what might otherwise be significant adverse effects on the environment through design evolution or operational mitigation measures. Residual effects are those that are predicted to remain assuming the successful implementation of the identified mitigation measures and are reviewed by PUK to confirm that the project complies with legal requirements and does not adversely impact the East Offshore Marine Plan policy goals and objectives.

7.1.2 Identification of Impacts

Environmental and social receptors that may be impacted by the project, have been identified in the receptor-based activity and events matrix in Table 6-1. The matrix has been populated by PUK after the completion of an ENVID, regarding the requirements of Article 3(1) of the EIA Directive [19], the Business, Energy, and Industrial Strategy (BEIS) Guidance [4] and relevant Department for Energy Security and Net Zero (DESNZ) Offshore SEA Reports (2003-2022).

It is noted that the type of impacts which could occur from the project can be categorised as follows:

- **Direct:** resulting from a direct interaction between a planned or unplanned project activity and a receptor;
- **Indirect:** occurring as a consequence of a direct impact and may arise as a result of a complex pathway and be experienced at a later time or spatially removed from the direct impact;
- **In-combination (or Intra-Project):** arising from different activities within the Project resulting in several impacts on the same receptor or where different receptors are adversely affected to the detriment of the entire ecosystem;
- **Cumulative (or Inter-Project):** resulting from incremental changes caused by other past, present or reasonably foreseeable projects/proposals together with the Project itself.

The nature, duration, scale and frequency of the effects resulting from these impacts will vary and are described using the terminology in Table 7-1.

Table 7-1: categories and definitions of effects

Category	Descriptor	Definition
Nature	Adverse	Unfavourable consequences on receptors.
	Beneficial	Favourable consequences on receptors.
Duration	Short-term	Effects are predicted to last for a few days or weeks.
	Medium-term	Effects are predicted to last for a prolonged period, between one and five years.
	Long-term	Effects are predicted to last for a prolonged period, greater than 5 years.
	Temporary	Effects are reversible.
	Permanent	Effects are irreversible.
Scale	Local	Effects are limited to the area surrounding the project site or are restricted to a single habitat/biotope or community.
	Regional	Effects occur beyond the local area to the wider region.
	National	Effects occur at a national level (UKCS).
	Transboundary	Effects occur at an international level (outside of the UKCS).
Frequency	One-off	Effects which occur only once.
	Intermittent	Effects that occur on an occasional basis.
	Continuous	Effects that occur continuously.

PUK has undertaken a preliminary assessment of the impacts identified in Table 6-1 to determine whether there is the potential for any significant effects on the environment to occur.

Where it has been identified that a project activity has the potential to result in a likely significant effect on the environment, a detailed assessment of the impact(s) and effect(s) has been undertaken, using the significance criteria defined in Section 7.1.3. The results of the assessment are documented in section 7.2. For some project activities, potential impacts have been identified, but none of the resulting effects are likely to be significant. These impacts have therefore been scoped out from detailed assessment.

In accordance with BEIS guidance [4], there is no requirement to assess accidental events such as spills from vessels within the EA. This has therefore been scoped out of further assessment.

7.1.3 Evaluation of Impact Significance

This section describes the criteria used for determining the likely significance of effects on the environment to ensure the assessment process is as transparent and consistent as possible. Where uncertainty exists, this has been acknowledged in the assessment text.

Planned Activities

For planned activities, the significance of effects has been evaluated by considering the sensitivity of the receptor affected in combination with the magnitude of impact that is likely to arise, having regard to the criteria detailed in Annex III of the EIA Directive, including:

- The magnitude and spatial extent of the impact (geographical area and size of the population likely to be affected);
- The nature of the impact;
- The transboundary nature of the impact;
- The intensity and complexity of the impact;
- The probability of the impact;
- The expected onset, duration, frequency and reversibility of the impact;
- The accumulation of the impact with the impact of other existing and/or approved projects and/or projects not yet approved, but that PUK is aware of;
- The possibility of effectively reducing the impact.

Sensitivity Criteria

Sensitivity is a function of the value of the receptor (a measure of its importance, rarity and worth), its capacity to accommodate change when pressure is applied (resistance or tolerance), and its subsequent recoverability (resilience). The criteria presented in Table 7-2 has been used as a guide in this assessment to determine the sensitivity of receptors.

Table 7-2: Determining Sensitivity.

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

Definitions:

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

Magnitude of Impact Criteria

The magnitude of impact considers the characteristics of the change that are likely to arise (e.g., a function of the spatial extent, duration, reversibility, and likelihood of occurrence of the impact) and can be adverse or beneficial. Where it is not possible to quantify impacts, a qualitative assessment has been carried out, based on the best available scientific evidence and professional judgement. The criteria presented in Table 7-3 has been used as a guide in this assessment to define the magnitude of impact.

Table 7-3: Determining Magnitude of Impact

Magnitude	Definition
Substantial	Permanent or long-term (>5 years) change in baseline environmental conditions, which is certain to occur. Impact may be one-off, intermittent, or continuous and/or experienced over a very wide area (i.e., transboundary in scale). Impact is likely to result in environmental quality standards or threshold criteria being routinely exceeded.
Major	Medium to long-term (1 – 5 years), reversible change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent, or continuous and/or experienced over a wide area (i.e., national in scale). Impact could result in one-off exceedance of environmental quality standards or threshold criteria.

Magnitude	Definition
Moderate	Short to medium-term (< 1 year), temporary change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent, or continuous and/or regional in scale (i.e., beyond the area surrounding the Project site to the wider region). Impact is unlikely to result in exceedance of environmental quality standards or threshold criteria.
Minor	Short-term (a few days to weeks), temporary change in baseline environmental conditions, which could possibly occur. Impact may be one-off, intermittent and/or localised in scale, limited to the area surrounding the proposed Project site. Impact would not result in exceedance of environmental quality standards or threshold criteria.
Negligible	Immeasurable or undetectable changes (i.e., within the range of normal natural variation).

Significance of Effect

For planned activities, the overall significance of an effect has been determined by cross-referencing the sensitivity of the receptor with the magnitude of impact, using the matrix shown in Table 7-4.

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

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

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

Table 7-4: Significance Evaluation Matrix (Planned Activities)

		Magnitude of Impact				
		Negligible	**Minor**	**Moderate**	**Major**	**Substantial**
Receptor Sensitivity	**Low**	Negligible	Minor	Minor	Minor	Minor / Moderate note1
	Medium	Negligible	Minor	Minor	Moderate	Moderate / Major[1]
	High	Negligible	Minor	Moderate	Major	Major
	Very High	Negligible	Minor / Moderate[1]	Moderate / Major[1]	Major	Major

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

Unplanned Events

In accordance with BEIS guidance [4], there is no requirement to assess accidental events such as spills from vessels within the EA. This has therefore been scoped out of further assessment.

7.2 Insignificant Impacts

With regards to the aspects presented in Table 6-1 following the methodology outlined above, the aspects for which PUK consider there to be minimal or non-significant impact and therefore have been screened out from further detailed assessment within this EA report are described below.

7.2.1 Energy and Emissions

Although the project will produce atmospheric emissions and consume energy to undertake (both onshore and offshore), these activities are required to be undertaken to meet decommissioning obligations for the infrastructure. Decommissioning activity is anticipated to be completed within 10 days using two vessels, and therefore, any associated emissions during the decommissioning campaign will be minimal.

Details of anticipated emissions and their relationship to UK emissions are presented in Appendix A. These contributions are far below any thresholds for emissions in the UKCS or on a global scale and are not significantly larger than general vessel operations in the region. Future legacy survey frequency will be determined and agreed with OPRED, however, the resulting emissions from these surveys are determined to be negligible as they will be extremely small in the context of UKCS and global emissions.

Sensitivity: High

Magnitude: Negligible

Significance: Negligible

Best practices will be employed to minimise this environmental footprint. This includes optimal operational planning and procurement of vessels which operate effective environmental management systems minimising their emissions.

As a result, no further assessment is required.

7.2.2 Operational Discharges to Sea

Before Durango decommissioning activities, wells will be P&A and all pipework and subsea flowlines shall be flushed clean to an agreed standard with OPRED and disconnected at the Durango location.

Any potential residual hydrocarbon volumes that may escape to sea during the Durango decommissioning operations are expected to be minimal and will be considered under the individual permit consent applications for the decommissioning activities through the PETS.

Sensitivity: Medium

Magnitude: Negligible

Significance: Negligible

Potential residual volumes discharged to sea during cutting operations will be assessed and permitted under an OPPC permit applied for via the UK energy portal.

Vessel-based discharges will be limited to those generally associated with the decommissioning vessel controlled via established methods under (the Convention on Marine Pollution). Approved contractor procedures will assess and minimise vessel-based discharges.

As a result, no further assessment is required.

7.2.3 Physical Presence of Vessels in Relation to Other Sea Users

Shipping traffic at the Durango installation location within UKCS Block 48/21 is recorded as ‘very high’. The requirement to deploy vessels to the area will be limited to a single decommissioning vessel. The 500m subsea exclusion zone around Durango will remain in place during decommissioning activities. A temporary surface 500m exclusion zone will be applied around the decommissioning vessel.

It is anticipated that the vessel will require 10 days to complete the removal of the subsea installation, which will include travel to and from the port. The project area is designated as having a very high shipping activity within it.

Sensitivity: Medium

Magnitude: Negligible

Significance: Negligible

Vessel traffic will be managed by issuing the Kingfisher Notices to mariners and vessel-operated Automated Identification Systems (AIS). There will be an overall positive benefit of opening of 500m subsea exclusion zone following seabed clearance at the Durango installation location.

As a result, no further assessment is required.

7.2.4 Waste Generation

Waste generated from decommissioning activities will be limited to vessel-generated waste and the Durango subsea infrastructure. All waste will be handled and recovered or disposed of in line with existing waste management legislation following the principles of the waste hierarchy. Raw materials will be returned to shore with the expectation to recycle most of the returned non-hazardous material. Other non-hazardous waste which cannot be reused or recycled will be disposed of to a landfill site.

Details for the Durango installation which will be recovered to shore are presented in Table 7-5 below:

Table 7-5: Installation waste summary

Installation	Weight (Tonnes (te)	Destination
Well head and Xtree	18.7	Re-use
WHPS frame	32.62	Recycling
Vessel hazardous waste *	<0.13	Landfill
Vessel non-hazardous waste*	0.1	Landfill

* Typical waste generation for Island condor obtained from ASCO waste reports. 0.013te/day (Hazardous), 0.010te/day (Non-hazardous), for expected 10 days campaign.

Only licensed contractors will be used for waste handling and treatment/disposal.

Sensitivity: Medium

Magnitude: Negligible

Significance: Negligible

As a result, no further assessment is required.

7.2.5 Noise Emissions

Noise emissions associated with the preferred decommissioning option are those from underwater cutting activities, operation of the vessel for subsea recovery operations and post-decommissioning surveys.

Underwater cutting will be limited to two cuts using a diamond wire saw on PL 2555 to allow removal of the Xtree and to remove pipeline snagging risk and eight cuts on PLU 2556 using ROV shears.

Previous decommissioning activities using similar cutting methods have indicated that associated noise levels from these operations fall far below those which may be considered significant in their potential to impact fish or marine mammals.

The operation of a single vessel for 10 days within an area classed as having very high shipping density is not expected to add any significant noise to the surrounding area.

Sensitivity: Medium

Magnitude: Minor

Significance: Minor

Effective operational planning will minimise vessel time in the area. Cutting activities will be planned and carried out efficiently to prevent excessive noise generation.

Any required surveys will be scheduled and planned efficiently to minimise vessel operation time. If required, geotechnical survey equipment will be selected based on the lowest sound volume capable to achieving required survey results. Standard mitigations for minimising impacts on marine mammals will be employed where required.

As a result, no further assessment is required.

7.3 Assessment of Potentially Significant Impacts

7.3.1 Seabed disturbance

Decommissioning activities for Durango will interact with the seabed in the following ways:

- Positioning of the JUB (Spud cans and anchors).
- Excavation and cut of PL 2555 at the Wellhead Protection Structure (WPS) location.
- Removal of the Xtree wellhead and WPS structure.
- Indirect disturbance through re-suspension and deposition of seabed sediments.

The Haeve JUB will ‘jack-up’ onto the seabed, with each of its four legs terminating in a spud, with an area of 22 square metres that will be placed on the seabed. As such, the four spud cans will disturb a total area of 88m^2 with a spud can penetration of two metres into the seabed. In addition, before the legs of the Haeve are installed on the seabed, anchors will be used to assist in the final positioning. Each of the four anchors has an estimated disturbance area of nine square metres and the anchor chains have a length of 500 metres, of which 250 metres of chain will be laid on the seabed with a lateral movement of two metres. The estimated seabed disturbance from anchors is therefore 2,036m^2 (anchors plus anchor chains). The total area of seabed disturbed from the mooring of the Haeve is therefore 2,124m^2 (0.002km^2).

A single cut will be made on PL 2555 below the seabed level to prevent the formation of any snagging hazard post-completion of the Durango decommissioning activities. To make the cut the seabed will be excavated to a depth big enough to allow cutting by a diamond wire saw. To cut the 8” line an excavated area of approximately 1m^2 has been assumed to a depth of 1m resulting in a total seabed impact volume of 1m^3.

The Xtree is located within the boundaries of the WPS. As such any disturbance will occur within the disturbance footprint of the WPS removal. The WPS measures 12.2m by 12.2m. For the removal of the Xtree and WPS a total seabed disturbance area of 149m^2 has been assumed.

Table 7-6: Potential Seabed Impact From Durango Decommissioning Operations

Activity	Total area (m^2)	Total volume (m^3)
JUB spudcans	88	176
JUB anchors	2,036	2,036
Seabed cut of PL 2555	1	1
Removal of Xtree wellhead and WPS	149	298
Total	**2,274**	**2,511**

As detailed in Table 7-6 total seabed impact because of the Durango decommissioning operations is expected to be 2,274m^2 (0.002km^2). Published data sources and data from previous surveys indicate that the seabed habitat at this location is dominated by Circalittoral coarse sediment (A5.14). This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g., *Neopentadactyla*) may also be prevalent in these areas along with the lancelet *Branchiostoma lanceolatum*.

Recent surveys completed in the nearby Guinevere field [22] identified macrofauna throughout the survey area as having some small-scale variability in terms of abundance, richness and species composition associated with the sediment composition across the survey area. The most abundant phyla group identified within the samples are the crustaceans, representing 51.8% by 16 species, followed by annelids by 16 species (24.9%), molluscs by 14 species (18.2%), and echinoderms by three species (1.6%). The infauna community was dominated by annelids in terms of species richness, followed by crustaceans and molluscs. The faunal assemblage was similar across all samples, with multivariate analyses finding no significant difference between groups. The species richness and diversity were also similar across the survey area, with only small-scale variations recorded. *S. spinulosa* individuals were recorded at 5 stations, however, only 15 individuals were recorded across the survey area, and there was no evidence of a biogenic reef in either the grab or image data. Additionally, no evidence of a biogenic reef was recorded.

No evidence of biogenic reefs was recorded during recent Geotechnical surveys at the Durango location [25].

Indirect disturbance may occur through re-suspension and deposition of seabed sediments; however, it is likely to be temporary and short-term in all instances. Resuspension of sediments is not predicted to exceed levels of natural variability. Overall, it is expected that these effects will be limited and occur within close proximity to the disturbance footprint.

The disturbance associated with any post-decommissioning overtrawl surveys has not been included in this assessment as they cannot be quantified at this time. Overtrawl surveys or other alternative methods of seabed verification are an important element of the decommissioning process to ensure that no snagging hazards are present before the removal of exclusion zones or approval to leave the pipeline and other materials in situ.

Following approval of the Durango installation DP, it will be necessary to confirm that no snagging hazards are present in the wellhead area. A clear seabed will be validated by an independent verification survey of the area. This clean seabed verification aims to ensure the seabed is left in a safe condition for future fishing efforts, in line with the current decommissioning guidance.

The main impact of the completion of overtrawl surveys will be physical damage to the seabed in the survey area.

Typically, overtrawl surveys are targeted trawls whereby bottom trawl gear is towed across the target area to determine if any snagging hazards are present. The targeted nature of these surveys will limit damage to the seabed to specific areas around the wellhead area.

Specific survey methods will be discussed and agreed upon with OPRED before commencement. Where possible to do so preference will be given to non-intrusive survey methods such as Side Scan Sonar and Remotely Operated Vehicle surveys to determine a clear seabed. Where these are deemed inconclusive targeted overtrawling may be undertaken to ensure no residual risk of snagging remains post-decommissioning. Should overtrawling be required, it will be conducted by fishing vessel(s) using trawl gear that is appropriate for the area.

The INNS, slipper limpet *Crepidula fornicata* has been observed in high densities within the work area. PUK will take steps to prevent the spread of this species to other areas by ensuring that any equipment used for trawls is free of specimens before leaving the site and working in other regions.

Surveys shall be conducted, and any debris identified shall be recovered and recycled/disposed of accordingly.

Due to the limited nature of the activity, both spatially and temporally, any effects from physical damage to the seabed and the resulting settlement of suspended sediments would be small in nature and duration.

As such, while the proposed decommissioning activities will cause some seabed impact, this will be temporary and over a very limited area and is not expected to cause any significant impacts on the wider area or protected species/habitat.

Sensitivity: Medium

Magnitude: Minor

Significance: Minor

To minimise impacts on the seabed, proposed cut locations will be carefully planned to avoid excessive disturbance. Cutting of PL 2555 will be carried out using a diamond wire saw to prevent the deposition or garnet.

Options for Post decommissioning surveys will be discussed with OPRED. Where possible to do so preference will be given to non-intrusive survey methods such as Side Scan Sonar and Remotely Operated Vehicle surveys to determine a clear seabed.

7.4 Transboundary impacts

No transboundary impacts are associated with the described decommissioning operations.

7.5 Cumulative impacts

No cumulative impacts are associated with the described decommissioning operations.

8 Assessment Conclusions

Following a detailed review of the proposed decommissioning option, the environmental sensitivities present in the area and potential impacts on other sea users and the environment, it has been determined that the decommissioning of the Durango installation will not present any significant impacts.

The majority of impacts associated with the decommissioning option are well understood and can be managed through the implementation of established mitigation measures. The only impacts with the potential to be significant were those associated with seabed disturbance. However, following further assessment these were also determined not to be significant following the implementation of stated mitigation measures. Overall, the decommissioning option presented within this report is determined as having a negligible impact.

In addition, the EA is considered by PUK to be in alignment with the objectives and marine planning policies of the East marine plan area.

Based on the assessment findings of this EA, including the identification and subsequent application of appropriate mitigation measures it is considered that the proposed Durango decommissioning activities do not pose any significant impact to environmental or societal receptors within the UKCS or internationally.

9 Environmental Management

This section describes the arrangements that will be put into place to ensure that the mitigation and other measures of control, including the reduction or elimination of potential impacts are implemented and conducted effectively. This section also serves to outline the key elements of relevant corporate policies and how PUK will manage the environmental aspects of the Durango decommissioning operations.

9.1 Introduction

PUK hold ISO 14001 standard certification. Additionally, PUK operates under a Safety and SEMS, which forms part of the PUK Operating Management System (POMS). The POMS provide the framework for PUK to achieve safe and reliable operations day-in and day-out and ensures compliance with PUK's HSSE Policy.

In addition to enabling the implementation of identified mitigation and control measures, the SEMS provides the means to monitor the effectiveness of these measures through checks and environmental performance. The SEMS, by design, will enable PUK to control activities and operations with a potential environmental impact and provide assurance on the effectiveness of the environmental management.

9.2 Scope of the SEMS

The SEMS provides the framework for the management of Health, Safety and Environmental (HSE) issues within the business. This EMS is intended for application to all of PUK's activities as directed under the OSPAR recommendation 2003/5, promoting the design, use and implementation of Environmental Management Systems by the Offshore Industry. PUK, as a business, is centred on oil and gas exploration activities both onshore and offshore, with the offshore components of their business including seismic and drilling operations. As a relatively small operator, PUK intends to resource such projects through the utilisation of contractors, should these not be available within the business itself.

The SEMS focuses on:

- Clear assignment of responsibilities;
- Excellence in HSE performance;
- Sound risk management and decision-making;
- Efficient and cost-effective planning and operations;
- Legal compliance throughout all operations;
- A systematic approach to HSE critical business activities; and
- Continual improvement.

9.3 Principle of the SEMS

The following subsections describe the principles followed through the utilisation of the SEMS.

9.3.1 Improvement Programmes and the Management of Change

The purpose of employing an improvement programme is to:

- Ensure the continuous development of the PUK policy commitment.
- Introduce changes and innovations that ensure the achievement of performance standards where current performance is below expectations.

The SEMS also makes provision for the management of change. Changes may occur for a number of reasons and at a number of levels. A 'management of change' procedure specifies the circumstances under which formal control of change is required to ensure that significant impacts remain under control and/or new impacts are identified, evaluated, and controlled.

9.3.2 Roles and Responsibilities

PUK will review existing environmental roles and responsibilities for staff participating in the Durango DP. These will be amended and recorded in individual job descriptions to ensure that they consider any changes required for the management of the impacts identified in this EA.

9.3.3 Training and Competence

The competence of staff with environmental responsibilities is a critical means of control. The SEMS, in conjunction with the Human Resources department of PUK, allows for the appointment of suitably competent staff. The development and implementation of training programmes facilitate understanding and efficient application.

9.3.4 Communication

Internal environmental communication generally employs existing channels such as management meetings, minutes, poster displays, etc. External communication with stakeholders and interested parties is controlled through a communication programme. This establishes links between each stakeholder, the issues that are of concern to them, and the information they require to assure them that their concerns and expectations are being addressed. This EA and the consultation process that informed its production will be used to design the ongoing communication programme. Communication and reporting will employ information derived from the monitoring programme.

9.3.5 Document Control

The control of the SEMS documents is managed in the PUK Document Control System.

9.3.6 Records

Records provide evidence of conformance with the requirements of the SEMS and the achievement of the objectives and targets in improvement programmes. The PUK SEMS specifies those records that are to be generated for these purposes and controls their creation, storage, access, and retention.

9.3.7 Monitoring and Audit

Checking techniques employed within PUK's SEMS are a combination of monitoring, inspection activities and periodic audits.

The requirement for monitoring and inspection stems from the need to provide information to several different stakeholders, but primarily regulators, and PUK management. As such, there is a requirement for the results of monitoring and inspection to be integrated with the PUK internal and external communication programme.

Monitoring and inspection activities focus on:

- Checks that process parameters remain within design boundaries (process monitoring);
- Checks that emissions and discharges remain within specified performance standards – (emissions monitoring); and
- Checks that the impacts of emissions and discharges are within acceptable limits (ambient monitoring).

9.3.8 Incident Reporting and Investigation

The PUK SEMS stipulates documented procedures to control the reporting and investigation of incidents.

9.3.9 Non-confidence and Corrective Action

The checking techniques outlined above are the means of detecting errors or non-conformances. PUK's SEMS includes procedures for the formal recording and reporting of detected non-conformance, the definition of appropriate corrective action, the allocation of responsibilities and monitoring of close out.

9.3.10 Review

PUK's SEMS includes arrangements for management review. This provides the means to ensure that the EMS remains an effective tool to control the environmental impacts of operations and to re-configure the EMS in the light of internal or external changes affecting the scope or significance of the impacts. Of particular importance is the role management review plays in the definition and implementation of the improvement programme, and the management of change.

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Appendix A Emissions Assessment

Table 10-1: Total Emissions from Proposed Decommissioning Operations

Aspect	Total Fuel Use (tonnes) Note 2	Emissions (te) Note 1							
		CO_2	CO	NO_X	N_2O	SO_2	CH_4	VOC	CO_2e Note 3
JUB	220	704.00	3.45	13.07	0.05	0.88	0.04	0.44	717.93
Decommissioning Vessel	110	352.00	1.73	6.53	0.02	0.44	0.02	0.22	358.97

Note 1: Emission factors from DECC (2008).

Note 2: Assumes that the Decommissioning Vessel will consume 11 tonnes of diesel fuel per day for 10 days.

Note 3: Values for the non-carbon dioxide (CO_2) Green House Gases, methane (CH_4) and nitrous oxide (N_2O), are presented as CO_2 equivalents (CO_2e), using Global Warming Potential (GWP) factors from the Intergovernmental Panel on Climate Change (IPCC)'s Fifth assessment report (GWP for CH_4 = 28, GWP for N_2O = 265).

A quantitative comparison between the predicted CO_2e emissions generated during the proposed decommissioning operations and the local, regional and UK total CO_2e emissions has been made. Although there will be a short-term and localised increase in emissions from the proposed operations, the total emissions will contribute a small percentage to the offshore and UK total CO_2e emissions <0.008% and <0.0003%, respectively).

Table 10-2: Comparison of CO2e Emissions from the Proposed Operations

Emission Source	Estimated CO_2e Emissions (te) Note 1
Durango Decommissioning Operations Note 2	1076.90
UKCS Offshore CO_2 Emissions for 2021 Note 3	15,030,000
UK Net CO_2 Emissions 2021 Note 4	426,500,000

Note 1: Emission factors from DECC (2008).

Note 2: Totals from Table 10-1

Note 3: Based on total offshore emissions from OEUK (2022).

Note 4: Based on UK net total CO_2 emissions for 2021 (BEIS, 2023).

The Climate Change Act 2008 (as amended) requires the government to set legally binding 'carbon budgets' to act as stepping-stones towards the 2050 Net Zero target. These carbon budgets restrict the total amount of Greenhouse Gas (GHG) that the UK can emit over five-year periods, ensuring continued progress towards the UK's long-term climate target. Table 10-3 details the carbon budget of relevance to the proposed Durango decommissioning operations and confirms whether the UK is on track to meet these climate targets.

Table 10-3: UK Carbon Budgets (HM Government, 2021)

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Levels	Due to Meet Target
4th carbon budget (2023 to 2027)	1,950 million tonnes CO_2e	51% by 2025	Off track

Table 10-4 presents the predicted CO_2e emissions generated from the proposed decommissioning operations against the fourth UK carbon budget. It can be seen from this that the CO_2e emissions generated during the operations contribute only a very small amount to the fourth UK carbon budget, equal to ca. 0.0000552% of the UK budget.

Table 10-4: Comparison of the Proposed Operations CO2e Emissions against relevant UK Carbon Budgets

Emission Item	Carbon Accounting Period
	4th Carbon Budget (2023 to 2027)
UK Carbon Budget CO_2e Target	1,950,000,000 tonnes CO_2e
CO_2e Emissions Generated from Durango Decommissioning Operations	1076.90
% of UK Carbon Budget CO_2e emitted during Durango decommissioning Operations	5.52256E-05%

To minimise the emissions generated, Perenco will look to reduce vessel time in the field as far as practicable. In addition, Perenco's contractor selection process will aim to ensure that the engines, generators, and other combustion plant on the JUB and decommissioning vessel are maintained and correctly operated to ensure that they work as efficiently as possible.

Given the above, the impact on the environment from atmospheric emissions has been scoped out from further assessment.