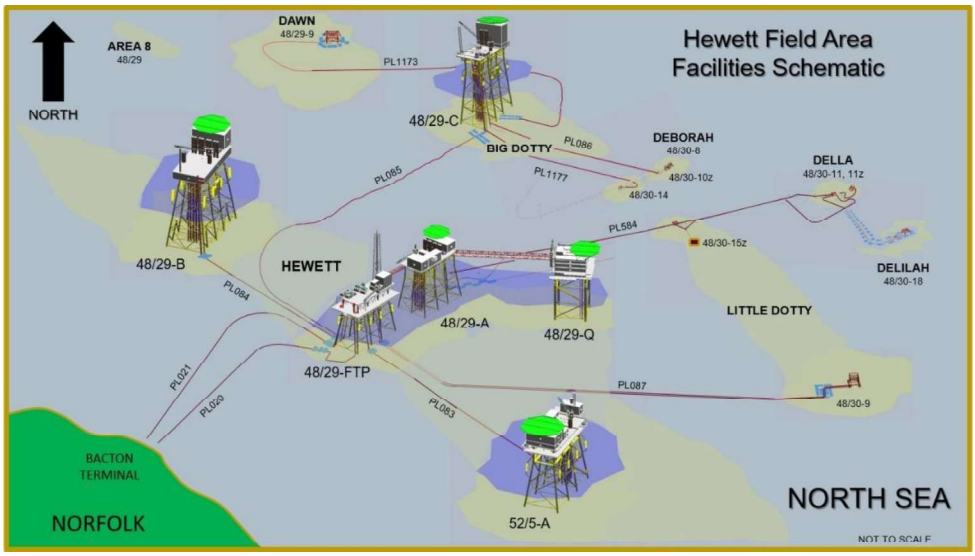
HEWETT AREA SUBSEA PIPELINES
DECOMMISSIONING ENVIRONMENTAL APPRAISAL



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ABBREVIATIONS

Abbreviation	Explanation
%	Percentage
"	Inch
<	Less than
µm	Micrometre(s)
ALARP	As Low As Reasonably Practicable
BAT	Best Available Techniques
BEIS	Department for Business, Energy & Industrial Strategy
BEP	Best Environmental Practice
BRIG	Biodiversity Reporting and Information Group
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Coordinated Environmental Monitoring Programme
CH_4	Methane
CMAPP	Corporate Major Accident Prevention Policy
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CoP	Cessation of Production
CSV	Construction Support Vessel
dB	Decibel
DECC	Department of Energy and Climate Change (now BEIS)
DP	Decommissioning Programme
DP	Dynamically Positioned
DSV	Dive Support Vessel

Abbreviation	Explanation
E&A	Exploration and appraisal
EA	Environmental Appraisal
EBS	Environmental Baseline Survey
EC	European Commission
EMS	Environmental Management System
EMT	Environmental Management Team
Eni	Eni UK Limited
ENVID	Environmental Impact Identification
EOL	End of Line
EPA	Environmental Protection Agency
EPS	European Protected Species
ERL	Effects Range Low
ERT	Environment Resource Technology
ESAS	European Seabirds At Sea
EU	European Union
FCS	Favourable Conservation Status
FOCI	Features of Conservation Interest
FTP	Field Terminal Platform
HSE	Health, Safety and Environment
Hz	Hertz
ICES	International Council for the Exploration of the Sea
IMS	Integrated Management System
JNCC	Joint Nature Conservation Committee
kg	Kilogramme

Abbreviation	Explanation
kHz	KiloHertz
km	Kilometer
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
m/s	Metres per second
MARPOL	International Convention for the Prevention of Pollution from Ships
MCAA	The Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MFE	Mass Flow Excavator
MMO	Marine Management Organisation
MPA	Marine Protected Area
MTM	Midline Termination Module
MU	Marine Unit
N/A	Not Applicable
N_2O	Nitrous oxide
NE	Natural England
NFFO	National Federation of Fishermen's Organisations
NM	Nautical Mile
NOA	North Atlantic Oscillation
NORM	Naturally Occurring Radioactive Materials
NOX	Nitrogen oxide pollutants
NTSA	North Sea Transition Authority
°	Degrees
°C	Degrees Celsius

Abbreviation	Explanation
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OSPAR	Oslo-Paris Convention
P&A	Plug and Abandon
PAH	Poly Aromatic Hydrocarbon
PETS	Portal Environmental Tracking System
PEXA	Practice and Exercise Area
PLEM	Pipeline End Manifold
PSD	Particle Size Distribution
RAF	Royal Air Force
RLV	Reel Lay Vessel
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFF	Scottish Fishermen's Federation
SNCB	Statutory Nature Conservation Bodies
SNS	Southern North Sea
SO_2	Sulphur dioxide
SOL	Start of Line
SOPEP	Ship Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Area
THC	Total Hydrocarbon
TOC	Total organic carbon
TOM	Total organic matter

Abbreviation	Explanation
ToP	Top of Pipe
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
US	United States
VOC	Volatile organic compound
WHPS	Wellhead Protection Structure

1.0 NON-TECHNICAL SUMMARY

1.1 Project Background

This non-technical summary provides an overview of the findings of the Environmental Appraisal (EA) conducted by Eni UK Limited (hereafter referred to as 'Eni') for the decommissioning of the subsea pipelines in the Hewett Gas Field located in United Kingdom Continental Shelf (UKCS) Blocks 48/28a, 48/29a, 48/30a, 52/4a and 52/5a in the Southern North Sea (see Figure 1-1). The Hewett area contains the main Hewett field, and six adjacent satellite fields: Big Dotty, Little Dotty, Deborah, Dawn, Della, and Delilah (see Figure 1-2). The Hewett Gas Field is coming to end of its productive time and is currently being decommissioned.

A total of 33 subsea gas pipelines, chemical pipelines and cores, control umbilicals, and various smaller elements (jumpers, flexible flowlines), along with associated stabilisation material, are to be decommissioned as part of the Hewett Decommissioning Project. Full details are given in appendix B. In summary there are:

- 10 Gas pipelines
- 4 Chemical / Service pipelines
- 15 Control umbilicals
- 4 Assorted jumpers and flexible flowlines

The purpose of this EA report is to document the potential for, and significance of, environmental and societal impacts resulting from the ten (10) Hewett Area Subsea Pipelines Decommissioning Programmes (DPs) and to summarise the proposed mitigation measures required to minimise these impacts.

Decommissioning of the Hewett Area Subsea Installations is outside the scope of this report and is addressed in a separate DP and EA report. In addition, the Hewett field platform installations are already subject to a DP, which was approved in March 2021.

1.2 Proposed Decommissioning Activities

Eni is proposing to decommission 33 Hewett subsea gas pipelines, chemical pipelines and cores, and control umbilicals as well as various smaller elements (jumpers, flexible flowlines) via several decommissioning solutions as described in Table 1.1.

A Dive Support Vessel (DSV) and Construction Support Vessel (CSV) will be mobilised to decommission the Hewett subsea pipelines.

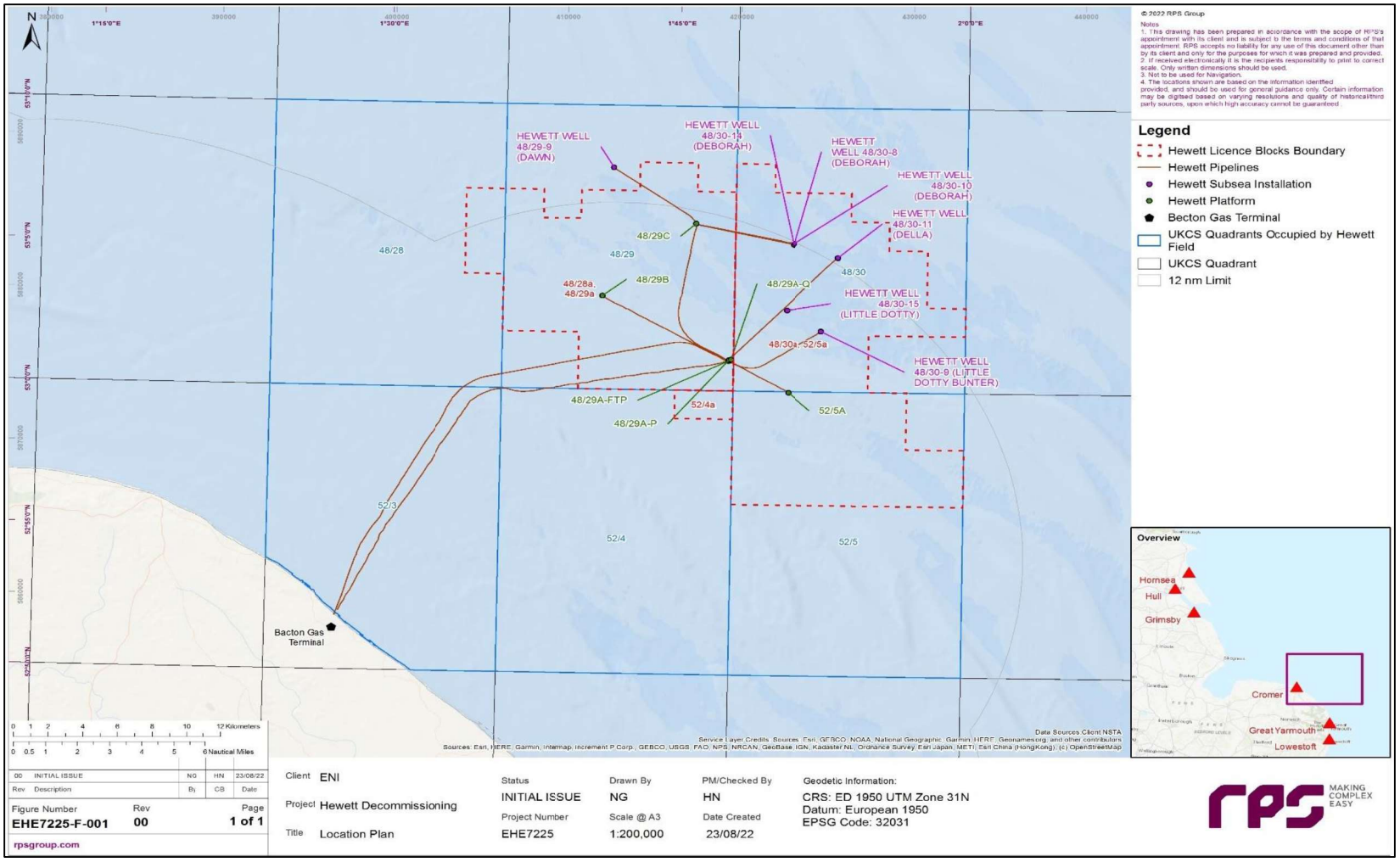


Figure 1-1: **Hewett Field Area Location**

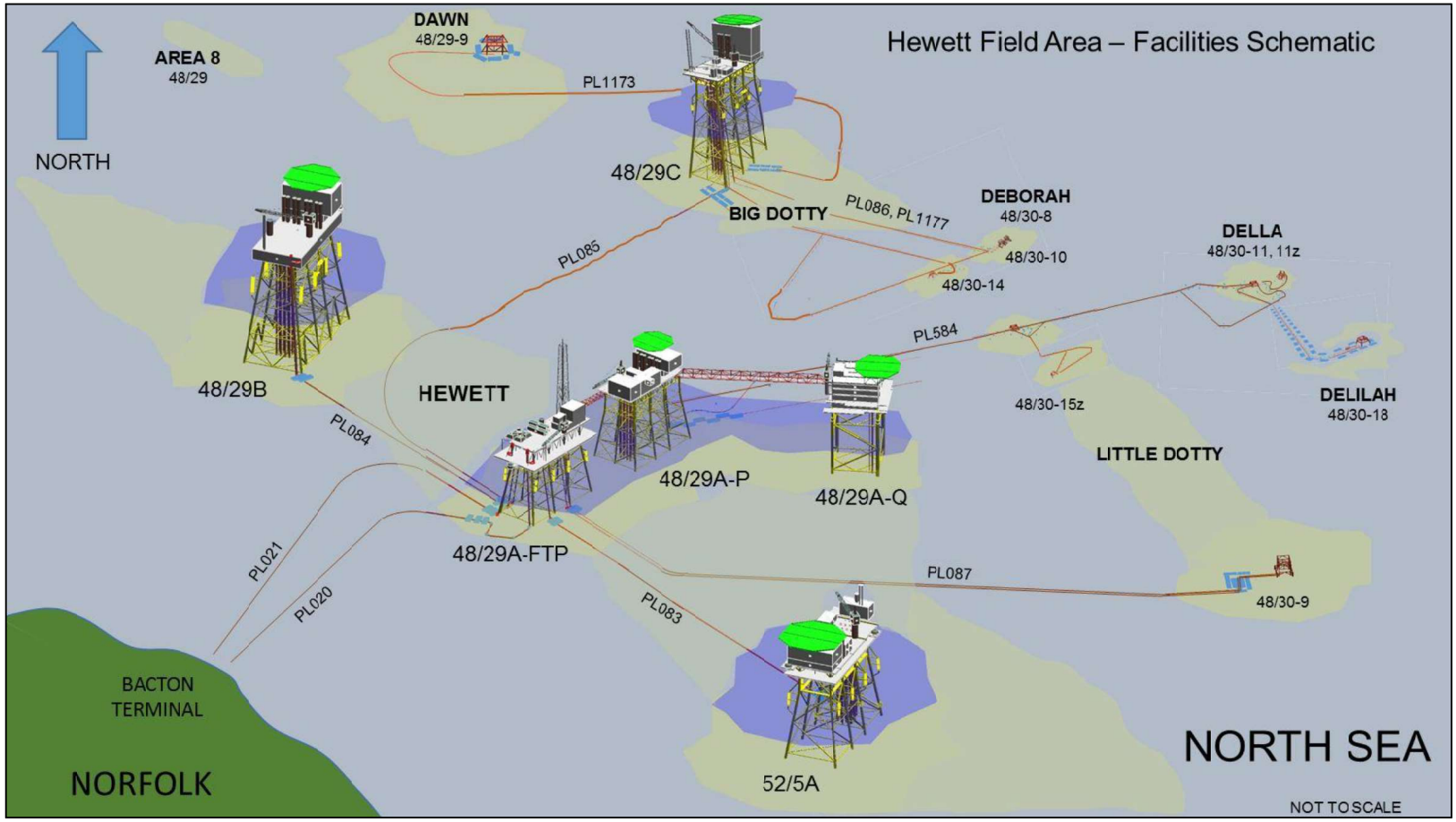


Figure 1-2 Hewett Field Facilities Schematic

The decommissioning solutions for the various pipeline components are given in Table 2.1. The environmental impacts of the decommissioning solutions are assessed within this EA.

Table 1-1: Summary of Decommissioning Solutions

Proposed Decommissioning Solution	Reason for Selection
Group 1 – Export Pipelines PL20 & PL21 **Leave In-Situ** Disconnection and removal of the pipeline ends and spools at 48/29A-FTP Platform end (already completed). Cut ends within trench left to naturally backfill due to dynamic seabed. Exposed/spanning pipeline sections, trenched to a minimum depth of burial of 0.6m ToP, Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities
Group 2 – Concrete Coated Infield Pipeline (incl piggyback pipeline) PL83, PL84, PL85, PL86 (incl PL135.1 & PL135.2) PL87 (incl PL136.1 & PL136.2) **Leave In-Situ** Disconnection and removal of the pipeline end and spools (already completed). Cut ends within trench left to naturally backfill due to dynamic seabed.	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities

Proposed Decommissioning Solution	Reason for Selection
Exposed/spanning pipeline sections, trenched to a minimum depth of burial of 0.6m ToP. Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ.	
Group 3 Non-Concrete Coated Infield Pipeline (in piggyback umbilical) PL584 (incl PL585 & PL586) PL1173 (incl PL1174.1, PL1174.2) PL1177 (incl PLU4688) **Leave In-Situ** Disconnection and removal of the pipeline end and spools (already completed). Cut ends within trench left to naturally backfill due to dynamic seabed. Exposed / spanning pipeline sections trenched to a minimum depth of burial of 0.6m ToP. Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ.	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities
Group 4 – Umbilicals (standalone) PLU4689, PLU4690, PLU4743, PL1323, U30-8	Comparatively assessed as preferred option. Meets regulatory convention requirements.

Proposed Decommissioning Solution	Reason for Selection
Full Removal Recovery of the entire line by reverse installation utilising Reel Lay vessel. Umbilical will be exposed in trench if buried as required. Stabilisation mats over umbilical will be removed and recovered. Umbilical and mats returned to shore for recycling or appropriate treatment and disposal.	
Group 5 – Flexible Flowlines and Jumpers PL1324, PL1325, PL1629.1, PL1629.2, PL1629.3, PL1629.4, PL1630, PL446, PL446.1 **Full Removal** Disconnection of the jumper ends and recovery of the entire line by reverse installation utilising Reel Lay vessel or Cut & Lift. Stabilisation mats over Jumpers will be removed and recovered. Returned to shore for recycling or appropriate treatment and disposal.	Comparatively assessed as preferred option. Meets regulatory convention requirements.
Group 6a - Exposed Mattresses / Partially Buried Mattresses **Full Removal** Returned to shore for recycling or appropriate treatment and disposal.	Comparatively assessed as preferred option. Meets regulatory convention requirements. Surveys will be performed immediately prior to Mattress removal and if found to

Proposed Decommissioning Solution	Reason for Selection
In the event of unsafe conditions and practical difficulties in recovery, mattresses shall be left in-situ	be fully buried then left in Situ as per Group 6b.
Group 6b - Buried Mattresses **Left In-Situ** Buried Mattresses left in Situ.	Mattresses shown to be fully buried with minimum of 0.6m burial cover. Mattresses form part of pipeline stabilisation feature and were included as part pipeline decommissioning option within the Comparative Assessment Mattresses have been shown to be stably buried over last 20 years of regular offshore surveys. No seabed disturbance in a SAC & MCZ protected areas
Group 7a – Exposed Grout Bags Returned to shore for recycling or appropriate treatment and disposal. In the event of unsafe conditions and practical difficulties in recovery grout bags shall be left in-situ.	Full Removal Meets regulatory convention requirements. Surveys will be performed immediately prior to Grout bag removal and if found to be fully buried then left in Situ as per Group 7b.
Group 7b - Buried Grout Bags **Left In-Situ** Buried grout bags left in Situ.	Grout bags shown to be fully buried with minimum of 0.6m burial cover. Grout bags forming part of pipeline stabilisation feature and were included as part pipeline decommissioning option within the Comparative Assessment Grout bags have been shown to be stably buried over last 20 years of regular offshore surveys. No seabed disturbance in a SAC & MCZ protected areas

Proposed Decommissioning Solution	Reason for Selection
Notes: 1. The burial extent of each pipeline is presented in **Error! Reference source not found.** 2. All recovered quantities shall be returned to shore for appropriate reuse, recycling, or disposal. 3. All pipelines, umbilicals and jumpers will be flushed and cleaned prior to removal commencing. 4. PL20 is currently subsea in 2 sections following previous removal of the damaged section from KP15.635 to KP15.156. The PL20 pipeline cut end sections left at these KPs of PL20 shall be capped and buried to at least 0.6m. 5. All pipeline crossings will be left in-situ during decommissioning. Trenching or cut & lift as the case maybe will be stop at a minimum of 10 m either side of the crossing ensuring that we do not disturb the crossing or risk adversely affecting live pipelines. Any free-span or instability found will be subject to remediation by mattressing of at the location. 6. For protection and stabilisation features (such as concrete mattresses), where they protect a pipeline left in-situ and these protection / stabilisation features become exposed or partially buried, they shall remain in-situ to maintain the pipeline protection / stability. An assessment will be performed to determine if the feature can be recovered on a case-by-case basis, without impacting the pipeline protection / stabilisation (the assessment will also consider if the feature poses a snagging risk), If not OPRED will be consulted where the recovery of exposed / partially buried features is not deemed feasible. 7. Concrete Mattresses that have disintegrated, have broken into pieces or broken into individual blocks will not be recovered as it is deemed they will self-bury. These will be monitored as part of the future survey campaigns to assess their location and determine if they are deemed to be a risk to other user of the sea.	

1.3 Baseline Environment

An overview of the key environmental and societal features in the vicinity of the Hewett subsea pipelines that may be affected by the proposed decommissioning works is provided in Table 1-2. This information has been compiled from a number of published sources as well as data collected during several surveys undertaken in the Hewett Field Area in preparation for the proposed decommissioning work.

Table 1-2: **Summary of Environmental and Societal Features in the vicinity of the Hewett Subsea Pipelines**

Feature	Description
Physical Environment	
Location	The Hewett subsea pipelines are located approximately 82km west of the UK/Dutch transboundary line at their closest point and come ashore to the UK at Bacton. The pipeline cross Blocks 48/28, 48/29, 48/30, 52/03, 52/04 and 52/05.
Bathymetry	The seabed across the Hewett pre-decommissioning survey areas ranged from 19.6m to 40.8m in depth to surface to Lowest Astronomical Tide (LAT). Station ST02 was relocated due to the presence of megaripples.
Seabed Sediments	Seabed sediments across the survey area predominantly comprised sand with varying proportions of shell fragments, with areas of coarse sediment, mixed sediment and clay outcrops. The survey area has been largely described as the EUNIS level 4 biotope complex 'Faunal communities of Atlantic circalittoral sand' (MC521) mosaicked with biotopes '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) and 'Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay' (MC1251). Locations with a higher proportion of coarse sediment were described as 'Atlantic circalittoral coarse sediment (MC32).
Oceanography	In this region of the Southern North Sea, the tidal front keeps the water column permanently vertically mixed and there is little variation between surface and bottom temperatures, as well as the annual mean temperatures (approximately 10 ºC). The annual mean significant wave height is 1.2m and the significant wave height exceeds 4m for 1.3% of the time.
Meteorology	Wind speeds range from 1–11 m/s in the summer months and 14-32 m/s in the winter months. The predominant wind direction is from south and north-west.
Biological Sensitivities	
Marine Protected Areas (MPAs)	All Hewett subsea pipelines are located within or cross the Southern North Sea Special Area of Conservation (SAC), and the Haisborough, Hammond and Winterton SAC. Truck pipelines also cross the Greater Wash SPA, and Cromer Shoal Chalk Beds MCZ. The following MPAs are also located within 40km of the Hewett subsea pipelines: North Norfolk Sandbanks and Saturn Reef SAC (7 km north east), and The Wash and North Norfolk Coast SAC (25 km west).
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. The phytoplankton community is dominated by the dinoflagellate genus Tripos (*T. fusus, T. furca, T. lineatus*), along with high numbers of the diatom, *Chaetoceros*. The zooplankton community in the North Sea is dominated by calanoid copepods, although other Genera such as *Paracalanus* and *Pseudocalanus* are also abundant.
Benthic Fauna	Benthos describes the organisms that live within and on the seabed. Benthic organisms can be classified further into infauna, organisms that live within the sediment, and epifauna, organisms that live on top of the seabed. The 'circalittoral coarse sediment' habitat surrounding the Hewett subsea pipelines may be characterised by robust

Feature	Description
	infaunal polychaetes, mobile crustacea and thick shelled bivalves capable of surviving in this high energy environment. Epibenthic fauna observed during the habitat survey were sparse in the sandy, coarse and clay areas; the most frequently observed taxa included crabs (*Brachyura* including *Liocarcinus sp*.), hermit crabs (*Paguridae* including *P. bernhardus*), starfish (*A. rubens*) and faunal turf (Hydrozoa/Bryozoa). *S. spinulosa* reef is listed as an Annex I habitat under the Habitats Directive (Council Directive 92/43/EEC) and a UK Biodiversity Action Plan (BAP) priority marine habitat. The areas of mixed sediment were created by aggregations of the ross worm (*S. spinulosa*). These areas provided shelter and a surface for attachment for epifauna and therefore the communities here were more diverse and included anemones (*Actiniaria* including *Sagartiidae*, *Urticina sp*. and *Metridium sp*.), crabs (*Brachyura* including *N. puber* and *C. pagurus*), hermit crabs (*Paguridae* including *P. bernhardus*), starfish (*A. rubens*), tunicates (*Ascidiacea*), shrimp (*Caridea*) and faunal turf (Hydrozoa/Bryozoa including *F. foliacea*).
Fish	A number of fish species are likely to be present within the vicinity of the Hewett subsea pipelines. Fish species observed during the Hewett pre-decommissioning surveys include: common dragonet, pogge, dab, juvenile gadoid fish, sandeels, sole, yellow sole, mackerel, gobies and butterfish. Fish species spawning within the area include: herring, mackerel, sprat, whiting, cod, plaice, sole, lemon sole, sandeel and thornback ray. All of these fish also have nursery sites in the area, apart from sprat and sole. In addition, the Hewett subsea pipelines are in an area of low probability of 0 group fish (defined as fish in the first year of their lives and can also be classified as juvenile) for herring, horse mackerel, sprat and whiting, and moderate probability for anglerfish, blue whiting, cod, haddock, hake, mackerel, Norway pout, plaice and sole. Sandeels (*Ammodytidae*) were observed but cannot be identified to species level from photographic data, therefore the UK BAP priority species *Ammodytes marinus* may be present (Fugro, 2023).
Seabirds	The Hewett subsea pipelines lie adjacent to several SPAs on the Norfolk coastline, which have been designated for the protection of breeding colonies of seabirds. Given the proximity to the coastline, the Hewett subsea pipelines lie within the maximum breeding foraging ranges of most seabird species. The most abundant species likely to be present in the vicinity of the subsea pipelines are fulmar, kittiwake and guillemot in the breeding season; kittiwake, great black-backed gull, guillemot and razorbill overwintering and guillemot in the post-breeding dispersal period. An ornithological boat-based survey undertaken in July 2021 (RSK Biocensus) confirmed no birds were nesting on the Hewett field platforms. Sensitivity of seabirds to oil pollution across the blocks of interest is highest during winter months (very high to extremely high across all Blocks during December, January and February); high to very high during March, April, and November across all blocks, and predominantly low to medium from May to October, with slightly higher (high) sensitivity during August in Block 28/28.
Marine Mammals	A number of cetacean species have the potential to be in the vicinity of the Hewett subsea pipelines, including harbour porpoise, white-beaked dolphin and minke whale, although white-sided dolphin and common dolphin are also known to be present in the

Feature	Description
	central North Sea. Harbour porpoise are the most abundant of these species. Seasonal sightings data indicates that low densities of white-beaked dolphin have been observed in May and low densities of harbour porpoise have been observed in March, May, June, August, September and December. In addition, both harbour seals and grey seals have been sighted throughout the year along the Norfolk coast, but their at-sea density is low in the vicinity of the Hewett subsea pipelines.
Societal Aspects	
Fisheries	The Hewett subsea pipelines are located predominantly within ICES Rectangle 35F1, although the truck lines cross into 34F1 as they approach Bacton. Commercial fishing within the Hewett Field is undertaken by vessels from a number of EU states deploying a range of gear types. Fishing effort within ICES Rectangle 35F1 is generally low, with less than 100 days fished per year, with peak effort during the summer months (2010 to 2014). The dominant gear type was beam trawls and landings data shows a dominance of demersal flatfish species such as plaice, sole, turbot and dab. Data shows that fishing pressure throughout the Hewett Field Area is generally low with an average of 0 to 73 hours of fishing per year between 2009 and 2017.
Shipping	Shipping density is considered to be very high/high in the vicinity of the Hewett subsea pipelines. A vessel traffic survey (Xodus, 2021a) identified 25 shipping lanes passing close to the Hewett field.
Oil and Gas Activity	The closest oil and gas facilities are associated with the Perenco operated Leman Field located to the north-west approximately 26km.
Offshore Renewables	The nearest wind farm areas are the active Dudgeon and Sheringham Shoal wind farms located to the northwest, approximately 26.5km and 31.8km away respectively.
Military activities	There is a military Practice and Exercise area (PEXA) situated approximately 60km to the north, which is used by the Royal Air Force (RAF).
Wrecks	A total of eight known shipwrecks are located within the Hewett Field Area, but none are protected. No wrecks were observed during the pre-decommissioning survey.
Cables	The 'STRATOS 1' telecommunication cable is situated approximately 9 km west of the closest Hewett subsea pipeline which runs from north-east to south-west.
Aggregate and Dredging Activity	There are no licensed offshore aggregate areas, dredging areas or known dumping areas in the vicinity of the Hewett subsea pipelines. The closest is 'Humber 3' Aggregate Production Area located approximately 50km North West of the Hewett Field.

1.4 Impact Assessment

1.4.1 Environmental Impact Identification

Potential environmental and societal impacts arising from the proposed Hewett Subsea Pipelines DP were initially determined through an Environmental Impact Identification (ENVID) workshop held on 12th May 2022. The workshop was attended by the following representatives from Eni: Chief Safety and Environment Engineer, Subsea coordinator, Marine & Subsea Coordinator / Senior Superintendent / FLO, Make Safe Coordinator, and the Project Engineering Manager.

The ENVID identified that no planned activities or unplanned events have the potential to result in significant effects on the marine environment, with embedded mitigation measures in place. However, for completeness it was recommended that the following aspects be subject to further assessment as these are likely to have the greatest impact on the marine environment from a Project perspective:

- Seabed disturbance from:
  - Removal of umbilicals, jumpers and flexible flowlines;
  - Abrasive cutting discharge (i.e., garnet);
  - Removal of mattresses and grout bags, including disturbance from work baskets;
  - Pipeline trenching operations;
  - Excavation of mattresses (if required);
  - In situ marine growth removal (if required); and
  - General seabed operations and diver activity.
- Underwater noise emissions from:
  - Use of propellers / DP thrusters on vessels;
  - Use of trenching machine;
  - Use of cutting tools; and
  - Use of mass flow excavator (propeller noise).

In addition to the above, the ENVID identified 12 activities that are subject to regulatory compliance with various permits and consents required in advance of the project (Table 1-3). Consent for these activities will be obtained via Master Application Templates (MATs) and Supplementary Applications Templates (SATs), through the UK Energy Portal Environmental Tracking System (PETS).

Table 1-3: ENVID Activities Assessed as Requiring Environmental Permit Consents & Reporting

Project Activity	Environmental Permit Consents & Reporting
Physical Presence - Presence of DSV / RLV / CSV (includes transit to and from port)	• All vessels to have an appropriate SOPEP certificate in place • Up to date Eni OPEP in place
Seabed Disturbance – Abrasive cutting discharge (i.e., garnet)	• Marine Licence (ML-SAT) • Assessed in the EA report and the Environmental Assessment Justification (EAJ) Document
Seabed Disturbance – Excavation umbilical, jumpers and flexible flowlines	
Seabed Disturbance – Excavation of mattresses	
Removal or placement of mattresses and grout bags, including disturbance from work baskets	
Underwater Noise – Use of propellers / DP thrusters on vessels	• Assessed in the EA report and the Environmental Assessment Justification (EAJ) Document
Underwater Noise – Use of cutting tools	
Underwater Noise – Use of mass flow excavator (propeller noise)	
Underwater Noise – Use of trenching machine	
Energy Use & Atmospheric Emissions - Fuel consumed	• Assessed in the EA report and the Environmental Assessment Justification (EAJ) Document • Fuel consumption to be recorded for EEMS reporting
Removal and disposal of pipeline ends (ferrous metal and plastic)	• Waste brought onshore needs to be recorded for EEMS reporting
Removal and disposal of mattresses (plastic and rubber)	
Removal and disposal of recovered umbilicals (metals and plastic)	

Project Activity	Environmental Permit Consents & Reporting
Naturally Occurring Radioactive Material (NORM)	• NORM Permit

In addition, as the subsea pipelines are located within or in close proximity to a number of MPAs, an assessment has been undertaken to determine whether there are likely to be any significant effects on the conservation objectives of these MPAs as a result of the Hewett Subsea Pipelines DP, either alone or in-combination with other plans or projects.

A summary of the results of the assessment is provided in Section 8. A justification as to why the other aspects were scoped out of further assessment is provided in Table 1-4.

Table 1-4: Justification for Aspects Scoped out from Further Assessment

Aspect	Justification
Physical Presence	The DP vessels (DSV and CSV) required for the proposed removal options will be present for a lot of the decommissioning work within the 500m safety exclusion zones surrounding the Hewett subsea installations, which are clearly marked on navigation charts and have been in place for a number of years. Work undertaken outside existing 500m safety exclusion zones will have embedded mitigation.
Energy Use and Atmospheric Emissions	Atmospheric emissions will be produced during the proposed decommissioning activities as a result of the fuel consumed by offshore vessels, diesel-powered equipment and generators. It is predicted that these emissions will only result in localised and short-term impacts on air quality, with prevailing met-ocean conditions expected to lead to the rapid dispersion and dilution of the emissions. The contribution to UKCS and global atmospheric emissions will be negligible.
Marine Discharges	Routine marine discharges from the vessels used during the decommissioning work will include grey water (domestic waste water), black water (sewage), macerated food waste, rainwater run-off from deck and ballast water. Given the hydrodynamic regime in the area these discharges will rapidly disperse. All vessels will comply with the requirements of the MARPOL convention and the International Maritime Organisation Ballast Water Management Convention. Any impact to the marine environment is therefore considered to be negligible.
Waste Management	The impacts of waste management are largely onshore and therefore outside the scope of the EA. Offshore, all vessels will be compliant with MARPOL and will have waste management plans in place that adhere to the waste hierarchy principle of reduce, reuse recycle. As such, there be no significant impact to the marine environment.
Accidental Events	Prior to the proposed decommissioning activities commencing, the subsea pipelines will have been flushed, and the cleaning of associated pipelines/umbilicals and disconnection of pipelines tie-in spool pieces undertaken as part of the preparatory work preceding the decommissioning of the pipelines. As such, the source of a worst-case accidental release of hydrocarbons to sea will be from the loss of diesel inventory from a vessel in the unlikely event of a collision. Diesel is a light oil, containing a large percentage of light and volatile compounds and, once spilt, is likely to remain on the sea surface and be subject to high rates of evaporation. It is not expected to persist for a prolonged period of time and therefore significant impacts are not anticipated.

Aspect	Justification
	This risk from dropped objects is not considered to be significant as industry-standard dropped object procedures will be employed and debris clearance surveys will be conducted post-decommissioning. Removal of the Hewett subsea pipelines will require the use of subsea hydraulic cutting tools that could fail and result in a release of a small number of litres of hydraulic fluid. However, in the event this did occur, it is anticipated that the hydraulic fluid would be rapidly dispersed in the marine environment given the highly dynamic nature of the area. The risk to the marine environment is therefore low.

1.4.2 Summary of Assessment Results

1.4.2.1 Seabed Disturbance

It is estimated that the total area of seabed likely to be temporary disturbed by the proposed decommissioning activities is ca. 317,575 m^2 (0.32 km^2).

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

Of note, aggregations of *S. spinulosa* biogenic reef were identified in the vicinity of the whole Hewett survey area. Research has shown that *S. spinulosa* has a limited tolerance to the direct physical impact, with recovery not expected for an extended period of time. Patches of *S. spinulosa* were classified at a maximum reefiness of 'high' on eight transects, 'medium' on nine transects, 'low' on nine transects and 'not a reef' on 14 transects (including the entirety of all stations where *S. spinulosa* was present and transects TR25_V2 and TR26_V2). *S. spinulosa* was regularly observed throughout the majority of the offshore survey area, with the proportion of the 'low' reef to 'high' reef categories ranging from 6.7 % along transect TR03 to 72.5 % along transect TR16. Due to an absence of geophysical data, it was not possible to delineate the potential reef areas. There is therefore potential for a small, direct impact to patches of *S. spinulosa* present within the survey area during decommissioning operations.

During the proposed decommissioning activities there will be a temporary increase in turbidity through sediment resuspension resulting in smothering of some sensitive benthic species. However, the subsea pipelines are located within a highly dynamic area with strong near-seabed currents and highly mobile sediments and, as such, the fauna found here are robust infauna that are adapted to frequent disturbances and natural fluctuations in sediment loading and resuspension. *S. spinulosa* is also considered to be tolerant to smothering.

Some demersal spawning fish may be temporarily displaced due to the proposed decommissioning activities, however there are suitable spawning grounds in similar sediments nearby. The spawning grounds for herring and sandeel in the vicinity of the Hewett Field Area are not considered to be critical spawning habitat for these species. Given the nature of the operations, any displacement of fish will be highly localised and of short duration.

In summary, based on the nature of the seabed habitats and species present in the vicinity of the subsea pipelines, and the comparatively small area of seabed that will be impacted by the proposed decommissioning activities (ca. 0.32 km^2) the residual effects on seabed communities and fish spawning and nursery grounds are predicted to be **Minor** and not significant. Given the mitigation measures proposed and the fact that *S.*

spinulosa were classified at a maximum reefiness of 'high' on only eight transects, a few potential areas of *S. spinulosa* reef may be subject to limited direct impact, with slow recovery possible.

1.4.2.2 Underwater Noise Emissions

Vessel operations (in particular the use of dynamic positioning systems) and the use of underwater cutting tools have been identified as the primary sources of underwater noise that could potentially arise from the subsea pipelines decommissioning activities.

There is potential for fish to be disturbed by the underwater noise emissions generated during the decommissioning activities, leading to temporary displacement from the area. Demersal spawning species that spawn on specific habitat substrates, such as herring and sandeels, are particularly vulnerable to disturbances. However, although both species spawn in the vicinity of the subsea pipelines, the area which would be impacted represents only a small proportion of the spawning grounds available for these species in the southern North Sea. In addition, this area of the southern North Sea has a high volume of vessel traffic and, as such, it is anticipated that the additional underwater noise generated by the planned vessels and use of cutting tools is likely to be insignificant.

The underwater noise emissions generated during the proposed decommissioning activities are not predicted to result in injury to marine mammals but do have the potential to cause a temporary disturbance out to a distance of ca. 1.6 km from the noise source. However, the percentage of the relevant Marine Mammal Management Unit reference population which would be disturbed is very small.

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

1.4.2.3 Cumulative Impacts

Cumulative impacts may arise from incremental changes caused by other past, present or reasonably foreseeable projects/proposals together with the proposed Hewett subsea pipeline decommissioning activities. Ongoing industrial activities located closest to the Hewett Field Area include the Perenco operated Leman Field located approximately 26km to the north-west, IOG's Vulcan Satellites Hub Project, located 12km north west of the Hewett Field Area, the 'Humber 3' Aggregate Production Area located approximately 50km to the north east and the Dudgeon and Sheringham Shoal operational wind farms (both operated by Equinor) located approximately 20km and 32km north west of the Dawn field respectively. In addition, the Sheringham and Dudgeon extension project may be in construction within the timescales of the Hewett decommissioning work. However, given the distances between the Hewett Field Area and these activities and projects and the fact that any impacts arising from the proposed Hewett decommissioning operations will be localised, no significant cumulative effects on marine receptors are predicted.

1.4.2.4 Transboundary Impacts

The closest Hewett subsea pipelines are located approximately 82km west of the UK/Dutch transboundary line. Any impacts arising from emissions, discharges and seabed disturbance generated as a result of the proposed decommissioning activities are predicted to be highly localised and are therefore not expected to result in any significant transboundary impacts. If it is decided to utilise disposal options outside of the UK, Eni will ensure regulations governing transfrontier shipment of waste are complied with.

1.4.2.5 Marine Protected Areas

Of note is that all the Hewett subsea pipelines, are located within, or cross the boundary of the Southern North Sea SAC designated for the protection of harbour porpoise. The underwater noise emissions generated during the proposed decommissioning activities have the potential to cause disturbance to harbour porpoise out to a

distance of ca. 1.6km from the noise source, equivalent to an area of ca. 8km^2. This equates to ca. 0.02% of the Southern North Sea SAC total area. It has been calculated that less than three individuals may be temporarily disturbed within this area, which is equivalent to 0.0013% of the harbour porpoise North Sea MU reference population. Given the low number of harbour porpoises which may be impacted, there is considered to be sufficient foraging habitat in the wider vicinity to accommodate any temporary displacement of harbour porpoise from the Hewett Field Area whilst the decommissioning activities are ongoing. In addition, it is assumed that any potential effects on harbour porpoise prey species (specifically sandeels, herring, mackerel, cod and whiting) from underwater noise would be the same or less than those for harbour porpoise. Therefore, in view of the conservation objectives of the SAC, no LSE on the Southern North Sea SAC are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

All Hewett subsea pipelines are also located within or cross the Haisborough, Hammond and Winterton SAC. Truck pipelines also cross the Greater Wash SPA, and Cromer Shoal Chalk Beds MCZ. The following MPAs are also located within 40km of the Hewett subsea pipelines: North Norfolk Sandbanks and Saturn Reef SAC (7 km northeast), and The Wash and North Norfolk Coast SAC (25 km west). However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of these MPAs as a result of the proposed Hewett decommissioning activities, either alone or in-combination with other plans or projects. This is primarily due to the fact that any impacts arising from the emissions and discharges generated by the proposed decommissioning operations are predicted to be highly localised and temporary.

1.4.3 Mitigation Measures

The mitigation measures Eni will adopt for the Hewett Subsea Pipelines DP to ensure any potential environmental or societal impacts are minimised, as far as practical, are summarised in Table 1-5.

Table 1-5: **Mitigation Measures**

Physical Presence
• Some work undertaken within existing 500m exclusion zones; • Notifications will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins; • The operations will be undertaken by a carefully selected specialist contractor in compliance with all national and international shipping regulations and guidelines; • An Eni representative will be on-board each vessel at all times to ensure compliance with approved operating procedures; • Operations will be planned to minimise the number of boat movements, as far as reasonably practicable; • Communications and positioning equipment will be placed on-board the vessels to maintain communications with other shipping vessels (the most likely to have communication equipment on board) and provide accurate information on the position of the vessels; • The vessels will meet all national and international regulations for shipping including the appropriate signals and lights, and the regulations defined by the International Maritime Organisation for avoiding collisions at sea; and • Operating criteria for weather conditions (e.g., wind, waves and visibility) will be established and operations suspended if the criteria are not met.
Seabed Disturbance
• Minimise abrasive material required; • Tool use will be minimised where feasible whilst still achieving the desired result; • Working areas will be minimised, as far as practicable; and • Leave buried and frond mattresses in situ.
Underwater Noise Emissions
• Operations will be planned to reduce vessel movements and minimise the overall duration of the project; and • No use of explosives.
Energy Use and Atmospheric Emissions
• Vessel time in the field will be reduced, as far as practicable; and • Eni's contractor selection process will aim to ensure that the engines, generators and other combustion plant on the vessels to be used during the proposed decommissioning activities are maintained and correctly operated to ensure that they work as efficiently as possible.
Marine Discharges
• Any waste water discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention; and • Vessels will operate in compliance with the International Maritime Organisation Ballast Water Management Convention.
Waste Management
• A Materials Inventory has been developed for the Project to identify the types of waste generated and the management procedures for each waste stream will be included in the contractor's Waste Management Plan. The principles of the Waste Management Hierarchy will be followed;

• Good housekeeping standards will be maintained on board all vessels in accordance with the contractor waste management strategy; • Transfer notes will accompany all non-hazardous waste to shore and consignment notes will be in place for any hazardous waste; • Checks will be carried out on the selected waste yard to ensure all permits and licenses are in place for the handling and disposal of the waste types identified. Eni will ensure that waste is transferred by an appropriately-licensed carrier who should have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste; • The amount of NORM Waste is unknown at this time, however, there remains a possibility that it will be present during decommissioning activities. Eni will ensure appropriate RSR permits are in place and conditions that dictate the management and control of radioactive waste are met; and • Marine growth, if found, will be removed onshore at the waste yard and will be done with appropriate odour control implemented through an odour management plan and will be disposed of in accordance with the principles of the Waste Management Hierarchy.
Accidental Events
• Shipping and fishing bodies will be kept informed of the project and appropriate notifications made in a timely manner; • Vessels selected to undertake the decommissioning activities will have effective operational systems and onboard control measures; • Dropped object procedures will be employed throughout the proposed operations. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Post-decommissioning debris clearance surveys will aid in the identification of any dropped objects should they occur; • Appropriate maintenance and pre-use checks on hydraulic equipment will be undertaken. Where possible equipment with automatic hydraulic shut-off will be used to minimise the volume of fluid released in the event of a hydraulic line failure; and • All vessels undertaking decommissioning activities will have an approved SOPEP.

1.5 Conclusions

The EA has confirmed that the Hewett Subsea Pipelines DP can be executed with no significant adverse effects on the marine environment.

Comprehensive identification of potential impacts from the Hewett Subsea Pipelines DP to environmental and societal receptors was achieved through an ENVID workshop. The ENVID identified that no planned activities or unplanned events have the potential to result in significant effects on the marine environment, with embedded mitigation measures in place. However, for completeness it was recommended that activities resulting in seabed disturbance and underwater noise emissions be subject to further assessment as these are likely to have the greatest impact on the marine environment from a Project perspective, which could be reduced via additional mitigation. Following further assessment and upon implementation of the identified mitigation measures, it has been concluded that all residual effects from these aspects are Minor and not significant, with the majority of impacts being localised and temporary in nature.

Of note is that all the Hewett subsea pipelines are located within or cross the Southern North Sea Special Area of Conservation (SAC), and the Haisborough, Hammond and Winterton SAC. Truck pipelines also cross the Greater Wash SPA, and Cromer Shoal Chalk Beds MCZ. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of these MPAs as a result of the proposed Hewett decommissioning activities, either alone or in-combination with other plans or projects.

Eni operates under a HSE IMS, certified to ISO14001:2015 and has established contractor selection and management procedures. Eni will develop an interface document for the Project when a removals contractor

is appointed to help ensure the mitigation measures identified in this EA report are successfully implemented during the proposed decommissioning activities.

2.0 INTRODUCTION

2.1 Background

Eni UK Limited (hereafter referred to as 'Eni') is Operator of the Hewett Gas Field located in United Kingdom Continental Shelf (UKCS) Blocks 48/28a, 48/30a, 48/29a, 52/4a and 52/5a in the southern North Sea, approximately 22km north-east of the Norfolk coast and 82 km west of the UK/Dutch transboundary line. The Hewett Gas Field, which commenced production in 1968, has come to the end of its productive life and is in the process of being decommissioned.

The Hewett field area contains the main Hewett field, consisting of five horizons vertically situated above each other, and six adjacent satellite fields: Big Dotty, Little Dotty, Deborah, Dawn, Della, and Delilah (see Figure 1-2).

Export from the Hewett field ceased in December 2020 and a well abandonment campaign is ongoing. Several of the pipelines have been flushed, cleaned and water gapped with the remainder scheduled for 2023 and beyond.

Eni as Operator of the Hewett Gas Field and on behalf of the Section 29 notice holders[1] is now applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval to leave In-Situ Gas Hewett subsea pipelines, buried mattresses and grout bags; and for the removal of the Hewett subsea umbilicals, flexible flowlines and Jumpers, exposed and partially exposed mattresses and grout bags, in accordance with the Petroleum Act 1998. This includes removal of 33 subsea gas pipelines, chemical pipelines and cores, and control umbilicals as well as various smaller elements (jumpers, flexible flowlines etc.).

A summary of the Hewett subsea pipelines to be decommissioned is provided in Table 2-1.

[1] Chrysaor Petroleum Company U.K. Limited (0% equity), Eni Hewett Limited (0%), Eni LNS Limited (0%), Eni UK Limited (89.3133%) and Perenco Gas (UK) Limited (10.68667%).

Table 2-1: Hewett Area Subsea Pipelines Being Decommissioned

		Description
Hewett Export Pipelines	PL20	Export Pipeline from Disconnected End Adjacent to FTP to Bacton Onshore Terminal Sphere Receiver. Trunk Line (concrete coated). Note: PL20 is in two sections after a failed section of the line was removed in 2017. Diameter: 30 inch Length: 27.320 km
	PL21	Export Pipeline from Disconnected End Adjacent to FTP to Bacton Onshore Terminal Sphere Receiver. Trunk Line (concrete coated) Diameter: 30 inch Length: 32.690 km
Hewett Infield Pipelines	PL83	Production Pipeline from Cut Point A to Cut Point B Concrete Weight Coated Infield Pipeline Diameter: 24 inch Length: 3.930 km
	PL84	Production Pipeline from Disconnection point A to Disconnection point B Concrete Weight Coated Infield Pipeline Diameter: 24 inch Length: 8.382 km
	PL85	Production Pipeline from Disconnection point A to Disconnection point B Note: includes PL135.1 and PL135.2 2.375" service lines piggybacked to PL86) Concrete Weight Coated Infield Pipeline Diameter: 24 inch Length:9.303 km
Deborah Pipelines	PL86	Production Pipeline from Disconnected End Adjacent 48/30- 8 to Cut Point A Concrete Weight Coated Infield Pipeline Diameter: 10 inch Length: 5.750 km
	PL135.1	Service Pipeline Line from Disconnected End Adjacent 48/30-8 to Cut Point A Piggybacked to PL86 Diameter: 2.375 inch Length: 6.000 km
	PL135.2	Service Pipeline Line from Cut Point A to Disconnected End adjacent to Well 48/30-14 Piggybacked to PL86 Diameter: 2.375 inch Length: 6.000 km

		Description
	PL446	Flexible Jumper from Adjacent Well 48/30-10 to Adjacent Well-48/30-8 Diameter: 6 inch Length: 0.015 km
	PL446.1	Flexible Jumper from PL135.1 to 48/30-10 Subsea Well Tie in Flange Diameter: 2 inch Length: 0.070 km
	PL1177	Production Pipeline from Disconnected End Adjacent to Well 48/30-14 to Disconnected End A Non-Concrete Weight Coated Infield Pipeline Diameter: 8 inches Length: 5.900 km
	PLU4688	Control Umbilical from Disconnected End A to Disconnected End Adjacent to SS well 48/30-14 Piggybacked to PL1177 Diameter: 3.3 inch Length: 5.930 km
	PLU4689	Hydraulic Umbilical from Disconnection Point A to Disconnected End Adjacent to 48/30-8 Subsea well Diameter: 2.98 inches Length: 5.805 km
	PLU4690	Hydraulic Umbilical from Topside Hydraulic Control Panel (48/29C Platform) to Subsea Hydraulic Control System (48/30-10 Well) Diameter: 2.98 inch Length: 5.905 km
	U30-8	Redundant Hydraulic Umbilical not connected at either end Length: 5.900 km
Dawn Pipelines	PL1173	Production Pipeline from Disconnected End Adjacent to Well 48/29- 9 to Cut Point A Non-Concrete Weight Coated Infield Pipeline Diameter: 8 inches Length: 6.070 km
	PL1174.1	Elec Hydraulic CI Umbilical from Cut Point A to Disconnected End Adjacent to Well-48/29- 9 Piggybacked to PL1173 Diameter: 4.9 inch Length: 6.100 km
	PL1174.2	Elec Hydraulic CI Umbilical from Cut Point A to Disconnected End Adjacent to Well-48/29- 9 Piggybacked to PL1173

		Description
		Diameter: 4.9 inch Length: 6.100 km
Little Dotty Pipelines	PL87	Production Pipeline from Disconnected End Adjacent Well-48/30- 9 to Cut Point A Concrete Weight Coated Infield Pipeline Diameter: 8 inches Length: 6.090 km
	PL136.1	Service Pipeline Line from Disconnected End Adjacent 48/30-9 to Cut Point A Piggybacked to PL87 Diameter: 2.375 inch Length: 6.040 km
	PL136.2	Service Pipeline Line from Disconnected End Adjacent 48/30-9 to Cut Point A Piggybacked to PL87 Diameter: 2.375 inch Length: 6.040 km
	PLU4743	Hydraulic Umbilical from Disconnection Point A to Disconnected End Adjacent to 48/30-9 Subsea Well Diameter: 2.95 inch Length: 7.650 km
	PL1324	Electro Hydraulic CI Umbilical Jumper from Midline Termination Module to Adjacent to Subsea Well 48/30-15 Diameter: 4.72 inch Length: 0.254 km
	PL1325	Flexible Jumper from Adjacent to Subsea Well 48/30-15 to Adjacent to Midline Termination Module Diameter: 8 inch Length: 0.254 km
Della Pipelines	PL584	Production Pipeline from Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform Non-Concrete Weight Coated Infield Pipeline Diameter: 10 inches Length: 9.198 km
	PL1323	Electro Hydraulic Chemical Injection Umbilical from Cut Point A Adjacent to Platform 48/29 A-P to Cut Point F Adjacent to Subsea Well 48/30-11 Diameter: 5.16 inches Length: 9.550 km
	PL585	Redundant Hydraulic CI Umbilical from Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform

		Description
		Diameter: 3.82 inch Length: 9.362 km
	PL586	Redundant Hydraulic CI Umbilical from Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform Diameter: 3.82 inch Length: 9.362 km
Delilah Pipelines	PL1629.1	Electro Hydraulic Chemical Injection Umbilical from Adjacent to Della PLEM to Adjacent to Delilah Umbilical JUT Diameter: 6.43 inch Length: 0.260 km
	PL1629.2	Electro Hydraulic Chemical Injection from Adjacent to Della PLEM to Adjacent to Delilah Tree Connector Diameter: 6.43 inch Length: 0.255 km
	PL1629.3	Electro Hydraulic Chemical Injection Umbilical from Delilah Umbilical JUT to Delilah Umbilical JUT Diameter: 6.43 inch Length: 0.250 km
	PL1629.4	Electro Hydraulic Chemical Injection Umbilical from Delilah Umbilical JUT to Delilah Umbilical JUT Diameter: 6.43 inch Length: 0.250 km
	PL1630	Flexible Jumper from Adjacent to Delilah Xmas Tree to Adjacent to Della PLEM Diameter: 8 inch Length: 0.268 km

2.2 Scope and Purpose of the Environmental Appraisal

This Environmental Appraisal (EA) report has been written by Eni to support the Hewett Area Subsea pipelines Decommissioning Programmes and has been prepared in accordance with regulatory guidelines (OPRED, 2018). It sets out to describe, in a proportionate manner, the potential environmental and societal impacts resulting from the decommissioning of the Hewett subsea pipelines and demonstrate the extent to which these impacts will be mitigated and controlled to an acceptable level.

The flushing and cleaning of associated pipelines/umbilicals and disconnection of pipelines tie-in spool pieces undertaken as part of the preparatory work preceding the decommissioning and subsequent removal of the subsea pipelines is outside the scope of this EA and will be consented under appropriate environmental permits and consents.

3.0 POLICY AND REGULATORY CONTEXT

3.1 Regulatory Context

The Petroleum Act 1998 (as amended by the Energy Act 2008 and 2016) is the principal legislation governing decommissioning in the UKCS. The responsibility for ensuring the requirements of the Petroleum Act is complied with rests with the UK Department of Business, Energy and Industrial Strategy (BEIS) and is managed through its regulatory body, the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

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

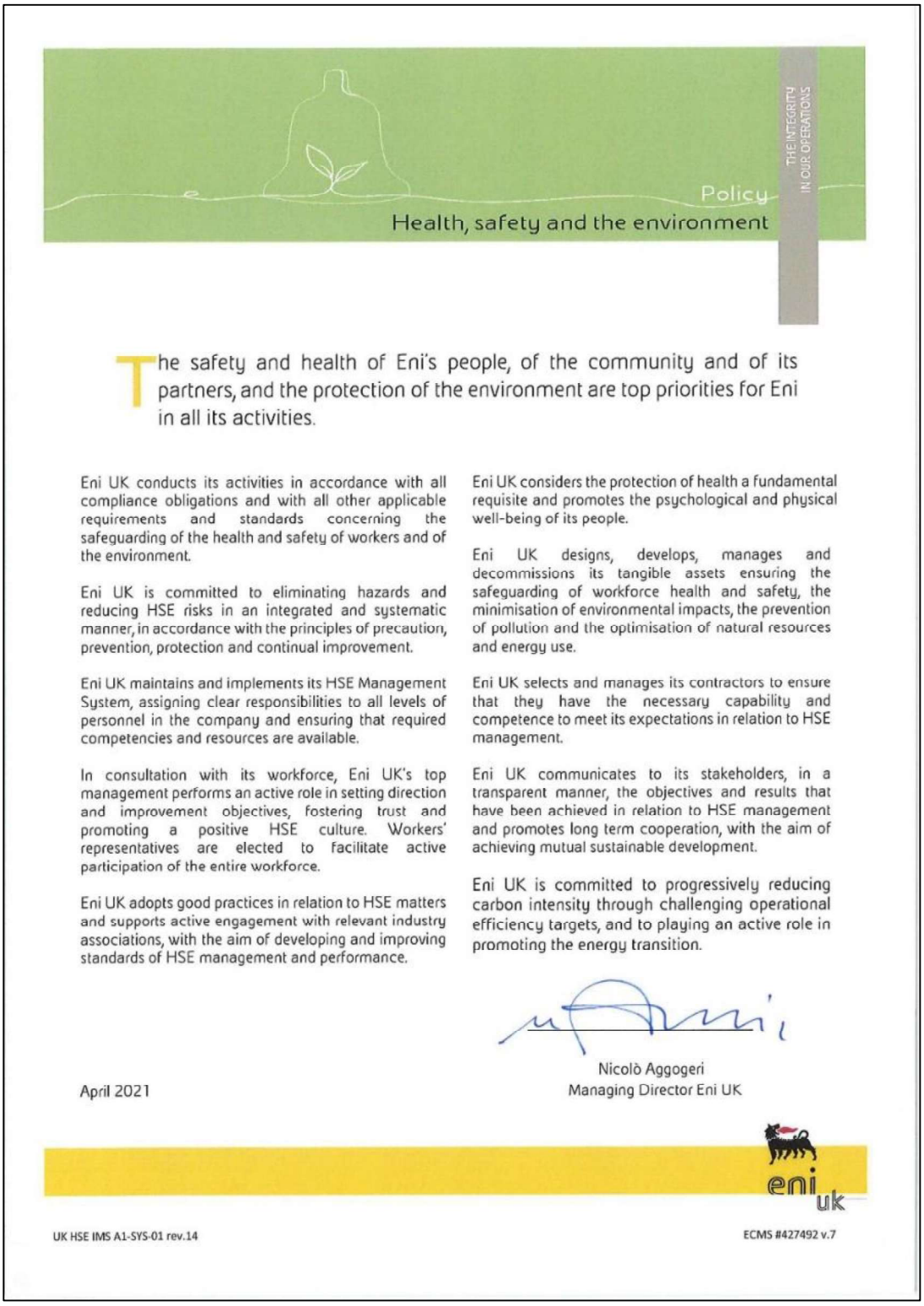
The UK's international obligations on decommissioning are primarily governed by the 1992 Convention for the Protection of the Marine Environment of the Northeast Atlantic (the Oslo Paris (OSPAR) Convention). OPRED is also the competent authority on decommissioning in the UK for OSPAR purposes.

3.2 Marine Planning Policy

The Marine Coastal Access Act 2009 introduced a range of measures to deliver the UK Government's vision of "clean, healthy, safe, productive and biologically diverse oceans and seas", including the introduction of marine plan areas. The Hewett subsea pipelines lie within the East Offshore Marine Plan area. The plan documents a set of objectives and associated policies which need to be met in order to deliver the Government's vision for the area, Eni considers that the Hewett Area Subsea Pipelines DP is in broad alignment with the objectives and policies of the East Offshore Marine Plan, as documented in Appendix A.

3.3 Environmental Management

Eni is committed to conducting its activities in a manner that protects people and the environment and is in compliance with applicable regulatory requirements. The Eni UK Health, Safety and Environmental (HSE) Policy shown in Figure 3.1, supported by the Corporate Major Accident Prevention Policy (CMAPP) and Integrated Management System (HSE IMS), sets out guiding principles and mechanisms for managing HSE risks, impacts and compliance. Eni's HSE IMS is certified to ISO 14001: 2015. As part of HSE IMS, Sustainability and Biodiversity and Ecosystem Services (BES) Policies, Eni applies a Mitigation Hierarchy framework combined with precautionary principle and stakeholder engagement, to reduce the risks of decommissioning. This reflects Eni's commitment towards continuous improvement of BES management performance towards no net loss and net gain of biodiversity, to follow the currently employed industry guidance and best practice as well as search for scientific solutions into novel mitigation and innovation technologies.



Policy

Health, safety and the environment

THE INTEGRITY IN OUR OPERATIONS

The safety and health of Eni's people, of the community and of its partners, and the protection of the environment are top priorities for Eni in all its activities.

Eni UK conducts its activities in accordance with all compliance obligations and with all other applicable requirements and standards concerning the safeguarding of the health and safety of workers and of the environment.

Eni UK is committed to eliminating hazards and reducing HSE risks in an integrated and systematic manner, in accordance with the principles of precaution, prevention, protection and continual improvement.

Eni UK maintains and implements its HSE Management System, assigning clear responsibilities to all levels of personnel in the company and ensuring that required competencies and resources are available.

In consultation with its workforce, Eni UK's top management performs an active role in setting direction and improvement objectives, fostering trust and promoting a positive HSE culture. Workers' representatives are elected to facilitate active participation of the entire workforce.

Eni UK adopts good practices in relation to HSE matters and supports active engagement with relevant industry associations, with the aim of developing and improving standards of HSE management and performance.

Eni UK considers the protection of health a fundamental requisite and promotes the psychological and physical well-being of its people.

Eni UK designs, develops, manages and decommissions its tangible assets ensuring the safeguarding of workforce health and safety, the minimisation of environmental impacts, the prevention of pollution and the optimisation of natural resources and energy use.

Eni UK selects and manages its contractors to ensure that they have the necessary capability and competence to meet its expectations in relation to HSE management.

Eni UK communicates to its stakeholders, in a transparent manner, the objectives and results that have been achieved in relation to HSE management and promotes long term cooperation, with the aim of achieving mutual sustainable development.

Eni UK is committed to progressively reducing carbon intensity through challenging operational efficiency targets, and to playing an active role in promoting the energy transition.

Nicolò Aggogeri
Managing Director Eni UK

April 2021

UK HSE IMS A1-SYS-01 rev.14

ECMS #427492 v.7

Figure 3-1: Eni HSE Policy

4.0 STAKEHOLDER CONSULTATION

A dialogue with stakeholders on decommissioning the Hewett Gas Field has continued since October 2017 to allow early recognition and implementation of recommendations. Table 4-1 provides a summary of the feedback received during the wider Hewett decommissioning informal consultations held to date which is of relevance to the Hewett Area Subsea Pipelines DP.

Meetings to discuss decommissioning of the Hewett Area Subsea Pipelines were held with OPRED Environmental Management Team (EMT) on 21st May 2021 and with the Joint Nature Conservation Committee (JNCC) and Natural England (NE) on 10th June 2021. No additional recommendations in relation to this EA Report were made over and above those already noted in Table 4-1.

The Hewett Area Subsea Pipelines DP provides further information on planned and completed stakeholder engagement.

Table 4-1: Hewett Stakeholder Engagement

Stakeholder	Discussion Topics / Recommendations	Eni's Response / Comments Noted	Addressed in EA
OPRED EMT	October 2017: 1. Pre-decommissioning Environmental Baseline Seabed Survey design (incl. subsea wells locations): engage Natural England. April 2019: 2. EA Scope: proportionate to the size of the project and assessment of the worst-case scenarios. 3. Conservation Objectives and integrity of the MPAs sites within Hewett Field, specifically for SNS SAC harbour porpoise and the potential impacts on prey availability to be assessed. 4. *Sabellaria spinulosa* presence summarising various surveys undertaken by Eni to be presented. 5. Engage other Operators for cumulative impacts and assess any potential for synergies.	1. Eni has engaged with NE. 2. Worst- case scenarios have been assessed. 3. The EA report has been written to facilitate the competent authority undertaking a Habitat Regulations Assessment. 4. Addressed by the relevant maps within this EA which are based on two survey efforts to map *S. spinulosa* presence. 5. Eni contacted Perenco, Chrysaor, INEOS and IOG to establish their approach to developing other EAs and to obtain advice on lessons learned.	1. See feedback received from NE below 2. Sections 7 - 9 3. Section 9 4. Sections 6.1 & 6.4.2 5. Section 8.3
JNCC	October 2017: 1. Pre-decommissioning Environmental Baseline Seabed Survey design (incl. subsea wells locations): reference stations, *S. spinulosa* 'reefinness' assessments guidance and survey to have 100% coverage. Engage Natural England. April 2019: 2. Southern North Sea SAC: consideration to be given to updated Conservation Objectives, specifically noise potential effects on supporting habitats and availability of prey and in-combination effects with other projects (spatial and temporal). For noise levels recommendation to use the newest NOAA 2016/2018 study or Southall *et al.* 2019.	1. Survey design amended and survey completed according to advice provided. Eni engaged Natural England. 2. Addressed in the relevant sections of this EA.	1. Section 6.1 and feedback received from NE below 2. Sections 6.2, 8.2.3 & 9.1

Stakeholder	Discussion Topics / Recommendations	Eni's Response / Comments Noted	Addressed in EA
NE	December 2017: 1. Pre-decommissioning Environmental Baseline Seabed Survey design (incl. subsea wells locations): reference stations selection in similar sediment type and in the similar water depth. 2. Minimise the introduction of new hard substrate materials to the seabed and consideration given to materials that can be removed.	1. Survey design amended and survey completed according to advice provided.	1. Section 6.1
Environment Agency (EA)	August 2018: 1. Marine Growth advice if brought onshore. 2. Transfrontier Shipment of Waste process.	1. Eni will follow the regulations and requirements. 2. Eni will follow the regulations and requirements.	1. Section 5.4 2. Section 5.4
National Federation of Fishermen's Organisations (NFFO)	April 2018: 1. Pre-decommissioning Environmental Baseline Seabed Survey design and FLO arrangements. 2. Fishing activity on Hewett field – reach out to the MMO and Inshore Fisheries Conservation Authority (IFCA). 3. Overtrawlability versus pre-clearance ROV survey and debris clearance. Support the use of guard vessels.	1. FLO arrangements implemented for the duration of the survey. 2. Eni obtained fish landings data from the MMO. 3. The use of guard vessels for decommissioning of the subsea pipelines is not considered necessary.	1. N/A 2. Section 5.3 and Section 6.5.1 3. N/A
Scottish Fishermen's Federation (SFF)	June 2018: 1. SFF indicated that all aspects of the Hewett decommissioning should be discussed with NFFO. 2. Consider undertaking Fishing Intensity Study in the wider Hewett area via NFFO.	1. Eni engaged with NFFO 4. Fisheries Interaction Risk Assessment completed for the Pipelines CA. The results have been incorporated in this EA report.	1. See row above 2. Section 6.5.1

5.0 DECOMMISSIONING ACTIVITIES

5.1 Proposed Decommissioning Strategy

Eni is proposing to decommission a total of 33 subsea gas pipelines, chemical pipelines and cores, and control umbilicals as well as various smaller elements (jumpers, flexible flowlines). The decommissioning solutions for the various pipeline components are given in Table 5-1. Further detail on the proposed activities is provided in Section 5.3.

Table 5-1: **Subsea Pipelines Decommissioning Information**

Proposed Decommissioning Solution	Reason for Selection
Group 1 – Export Pipelines PL20 & PL21 **Leave In-Situ** Disconnection and removal of the pipeline ends and spools at 48/29A-FTP Platform end (already completed). Cut ends within trench left to naturally backfill due to dynamic seabed. Exposed/spanning pipeline sections, trenched to a minimum depth of burial of 0.6m ToP, Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities
Group 2 – Concrete Coated Infield Pipeline (incl piggyback pipeline) PL83, PL84, PL85, PL86 (incl PL135.1 & PL135.2) PL87 (incl PL136.1 & PL136.2) **Leave In-Situ** Disconnection and removal of the pipeline end and spools (already completed).	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities

Proposed Decommissioning Solution	Reason for Selection
Cut ends within trench left to naturally backfill due to dynamic seabed. Exposed/spanning pipeline sections, trenched to a minimum depth of burial of 0.6m ToP. Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ.	
Group 3 Non-Concrete Coated Infield Pipeline (in piggyback umbilical) PL584 (incl PL585 & PL586) PL1173 (incl PL1174.1, PL1174.2) PL1177 (incl PLU4688) **Leave In-Situ** Disconnection and removal of the pipeline end and spools (already completed). Cut ends within trench left to naturally backfill due to dynamic seabed. Exposed / spanning pipeline sections trenched to a minimum depth of burial of 0.6m ToP. Exposed Stabilisation mats recovered. Buried Stabilisation mats left in Situ.	Comparatively assessed as preferred option. Most of the pipelines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance. Lower energy use Reduced risk to personnel engaged in the activity. No requirement to introduce new material (Rock Placement) into SAC & MCZ protected areas. Crossings progressively buried over time. No interaction with third-party facilities
Group 4 – Umbilicals (standalone)	Comparatively assessed as preferred option.

Proposed Decommissioning Solution	Reason for Selection
PLU4689, PLU4690, PLU4743, PL1323, U30-8 **Full Removal** Recovery of the entire line by reverse installation utilising Reel Lay vessel. Umbilical will be exposed in trench if buried as required. Stabilisation mats over umbilical will be removed and recovered. Umbilical and mats returned to shore for recycling or appropriate treatment and disposal.	Meets regulatory convention requirements.
Group 5 – Flexible Flowlines and Jumpers PL1324, PL1325, PL1629.1, PL1629.2, PL1629.3, PL1629.4, PL1630, PL446, PL446.1 **Full Removal** Disconnection of the jumper ends and recovery of the entire line by reverse installation utilising Reel Lay vessel or Cut & Lift. Stabilisation mats over Jumpers will be removed and recovered. Returned to shore for recycling or appropriate treatment and disposal.	Comparatively assessed as preferred option. Meets regulatory convention requirements.
Group 6a - Exposed Mattresses / Partially Buried Mattresses **Full Removal**	Comparatively assessed as preferred option. Meets regulatory convention requirements.

Proposed Decommissioning Solution	Reason for Selection
Returned to shore for recycling or appropriate treatment and disposal. In the event of unsafe conditions and practical difficulties in recovery, mattresses shall be left in-situ	Surveys will be performed immediately prior to Mattress removal and if found to be fully buried then left in Situ as per Group 6b.
Group 6b - Buried Mattresses **Left In-Situ** Buried Mattresses left in Situ.	Mattresses shown to be fully buried with minimum of 0.6m burial cover. Mattresses form part of pipeline stabilisation feature and were included as part pipeline decommissioning option within the Comparative Assessment Mattresses have been shown to be stably buried over last 20 years of regular offshore surveys. No seabed disturbance in a SAC & MCZ protected areas
Group 7a – Exposed Grout Bags Returned to shore for recycling or appropriate treatment and disposal. In the event of unsafe conditions and practical difficulties in recovery grout bags shall be left in-situ.	Full Removal Meets regulatory convention requirements. Surveys will be performed immediately prior to Grout bag removal and if found to be fully buried then left in Situ as per Group 7b.
Group 7b - Buried Grout Bags **Left In-Situ** Buried grout bags left in Situ.	Grout bags shown to be fully buried with minimum of 0.6m burial cover. Grout bags forming part of pipeline stabilisation feature and were included as part pipeline decommissioning option within the Comparative Assessment Grout bags have been shown to be stably buried over last 20 years of regular offshore surveys.

Proposed Decommissioning Solution	Reason for Selection
	No seabed disturbance in a SAC & MCZ protected areas

Notes:

1. The burial extent of each pipeline is presented in **Error! Reference source not found.**
2. All recovered quantities shall be returned to shore for appropriate reuse, recycling, or disposal.
3. All pipelines, umbilicals and jumpers will be flushed and cleaned prior to removal commencing.
4. PL20 is currently subsea in 2 sections following previous removal of the damaged section from KP15.635 to KP15.156. The PL20 pipeline cut end sections left at these KPs of PL20 shall be capped and buried to at least 0.6m.
5. All pipeline crossings will be left in-situ during decommissioning. Trenching or cut & lift as the case maybe will be stop at a minimum of 10 m either side of the crossing ensuring that we do not disturb the crossing or risk adversely affecting live pipelines. Any free-span or instability found will be subject to remediation by mattressing of at the location.
6. For protection and stabilisation features (such as concrete mattresses), where they protect a pipeline left in-situ and these protection / stabilisation features become exposed or partially buried, they shall remain in-situ to maintain the pipeline protection / stability.
   An assessment will be performed to determine if the feature can be recovered on a case-by-case basis, without impacting the pipeline protection / stabilisation (the assessment will also consider if the feature poses a snagging risk), If not OPRED will be consulted where the recovery of exposed / partially buried features is not deemed feasible.
7. Concrete Mattresses that have disintegrated, have broken into pieces or broken into individual blocks will not be recovered as it is deemed they will self-bury. These will be monitored as part of the future survey campaigns to assess their location and determine if they are deemed to be a risk to other user of the sea.

5.2 Project Schedule

The proposed schedule for the Hewett subsea pipelines decommissioning project is shown in Figure 5-1. It is currently envisaged that the subsea pipelines will be decommissioned at some point between 2026 and 2030.

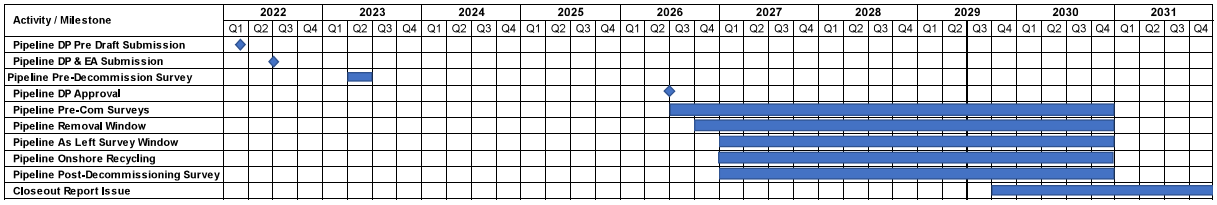


Figure 5-1: **Hewett Area Subsea Pipelines Decommissioning Project Schedule**

5.3 Proposed Removal Activities

Removal of the Hewett subsea pipelines can only occur after Eni has completed a series of preparatory works. These activities will be consented via the appropriate environmental permits and consents applied for on the OPRED Portal Environmental Tracking System (PETS). The preparatory works include:

1. Plug and abandonment (P&A) of the subsea wells in accordance with Oil & Gas UK Guidelines;

2. Flushing and cleaning of associated pipelines and umbilicals;
3. Disconnection and possible removal of pipeline tie-in spool pieces (note all discounted pipeline ends will be protected with existing stabilisation materials).

Pipeline and umbilical cleaning and flushing operations will use Best Environmental Practice (BEP) and the Best Available Techniques (BAT) to minimise as far as possible both residual hydrocarbon and other chemical levels in line post flush. The flushing and cleaning of pipelines and disconnection of pipeline tie in spools are detailed in the Pipelines DP.

Following completion of the above work, selected Hewett subsea pipelines (Group 4 and Group 5) will be removed with the use of a dynamically positioned (DP) diving support vessel (DSV) and a reel lay vessel (RLV) / Multi-Service Vessel (MSV) / Construction Support Vessel (CSV). The pipelines that will remain in situ (Group 1 and Group 2) will have spans and exposures trenched and back filled to minimum 0.6 m top of pipe (ToP).

Eni proposes to cut the pipelines using subsea diamond wire cutters and hydraulic shears. Eni confirms they do not plan to use explosives.

Total fuel consumption during the pipeline decommissioning operations is expected to be in the region of 4,853 tonnes across all vessels involved (1 x DSV and 1 x RLV/MSV/CSV) (Table 7-7). Throughout the proposed decommissioning activities, Eni will ensure that vessel work programmes are designed to minimise operational durations and reduce manning. Vessels will be selected to ensure that there are effective operational systems and that on board control measures are in place.

5.4 Waste Management

The project waste hierarchy aligns with the principles of the EU Waste Framework Directive (Directive 2008/98/EC) (see Figure 5-2). Contractor and onshore site selection process will be implemented to ensure compliance with waste hierarchy and all applicable waste regulations and Duty of Care.

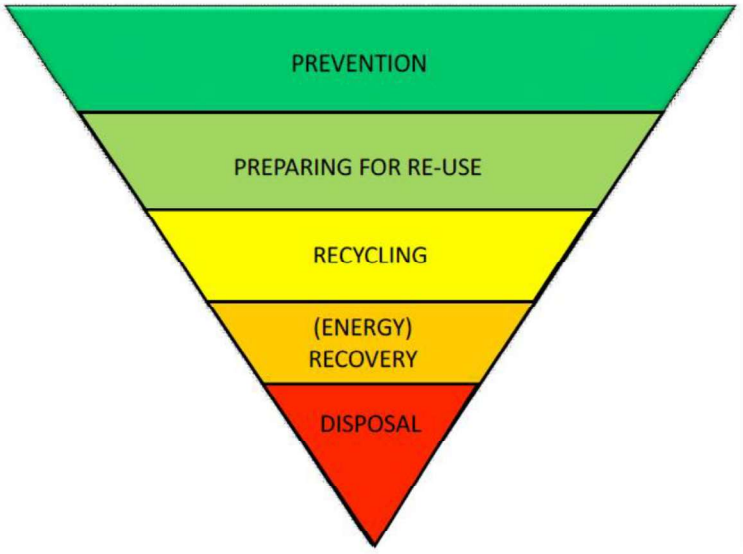


Figure 5-2: Waste Hierarchy (EU Waste Framework Directive)

As the re-use of pipelines (or parts thereof) is first in the order of preferred waste management options, it has been fully assessed and deemed unfeasible due to the age and the extent to which the subsea pipelines have passed their design life. While re-use opportunities were explored by Eni UK as part of the associated Comparative Assessment (CA) process, ENI has assessed the possibility of re-use of PL21 and confirmed

that it is not suitable for the proposed CCS initiative. This EA has been conducted on the basis that no viable re-use opportunities will remain for PL21.

Table 5-2 summarises the current estimated overall breakdown of materials to be removed. The current plan is to transport the flowlines, umbilicals and mattresses to an onshore decommissioning facility for re-use, recycling and disposal using an appropriately licenced contractor. It is not currently possible to predict the market for re-usable materials with confidence, however, there is a target material re-use / recycling rate of better than 95%.

The contractor and site selection process is at an early stage and therefore the potential transfrontier shipments of waste cannot be dismissed with certainty. Should any pipelines be considered for removal and disposal outside of the UK, an application under the Transfrontier Shipment of Waste Regulations shall be made to the Environment Agency.

All other wastes generated offshore during decommissioning will be segregated and recorded by type, before being transported to onshore waste facilities through licensed waste contractors.

A comprehensive Waste Management Plan will be developed for all waste disposal activities prior to the commencement of those activities. In addition, a detailed audit programme will be developed to ensure that all waste disposal routes and facilities are fully audited to ensure regulatory compliance prior to commencement of activities.

The amount of naturally occurring radioactive material (NORM) is unknown at this time, however, it remains the possibility that low levels of NORM may be present during decommissioning activities therefore Eni will ensure appropriate Radioactive Substance Regulation (RSR) permits are in place and conditions that dictate the management and control of radioactive waste are met, including the requirement to minimise radioactive waste volumes, for monitoring and measurement regimes, and to meet storage conditions and duration.

Table 5-2: Estimated Waste Inventory (Subsea Pipelines & Stabilisation Features)

Pipeline / Stabilisation Feature	Haz-Mat Bitumen Coal Tar Pipe coating (Te)	Haz-Mat NORM (Te)	Concrete (Te)	Ferrous Metal (Te)	Non-Ferrous Metal (Te)	Plastics (Te)	Total (Te)
Pipelines							
PL20	527.4	0	27,457.3	9,145.9	0	0	37,130.6
PL21	2,216.8	0	28,897.4	9,525.7	0	0	40,639.9
PL83	40.1	0	1,022.9	747.8	0	0	1,810.8
PL84	84.2	0	2,148.1	2,144.1	0	0	4,376.4
PL85	426.5	0	4,986.9	2,680.1	0	0	8,093.5
PL86	59.8	0	982.8	481.1	0	0	1,523.7
PL135.1	0	0	0	50.3	0	7.1	57.4
PL135.2	0	0	0	50.3	0	7.1	57.4
PL87	51.2	0	869.6	352.0	0	0	1,272.8
PL136.1	0	0	0	52.8	0	7.5	60.3
PL136.2	0	0	0	52.8	0	7.5	60.3
PL446	0	0	0	1.6	0	0.9	2.5
PL446.1	0	0	0	0.2	0	0.1	0.3
PL584	0	0	0	1,064.2	0	49.6	1,113.8
PL1173	0	0	0	426.2	0	4.4	430.6
PL1177	0	0	0	397.8	0	4.6	402.4
PL1325	0	0	0	28.8	0	3.1	31.9
PL1630	0	0	0	29.2	0	3.1	32.3
Umbilicals	0						
PLU4689	0.8	0	0	51.3	0	11.7	63.8
U30-8 (redundant)	0.8	0	0	51.3	0	11.7	63.8
PLU4743	0.8	0	0	52.2	0	12.1	65.1
PLU4690	0.7	0	0	50.5	0	9.6	60.8
PLU4688	0.8	0	0	51.3	0	27.8	79.9
PL1174.1 & PL1174.2	1.3	0	0	94.2	0.8	41.8	138.1
PL585/586	1.7	0	0	127.2	0	49.0	177.9
PL1323	2.1	0	0	143.6	5.4	93.5	244.6
PL1324	0	0	0	0.2	0.1	2.3	2.6

PL1629.1.PL1629.2, PL1629.3,PL1629.4	0.1	0	0	6.1	0.3	2.5	9.0
Concrete Mats	0	0	6,206.3	0	0	47.7	6,254.0
Frond Mats	0	0	0	0	0	46.0	46.0
Grout Bags	0	0	77	0	0	0	77.0
Total	**3,415.1**	**0**	**72,648.30**	**27,858.8**	**6.60**	**450.7**	**104,379.50**

5.5 Post Decommissioning

Post decommissioning, appropriate debris clearance and verification work will be undertaken. Further environmental survey and monitoring requirements will be agreed with OPRED and reported in a close-out report, including any observed immediate consequences of the decommissioning.

6.0 ENVIRONMENTAL BASELINE

This section provides an overview of the key environmental features in the vicinity of the Hewett subsea pipelines that may be affected by the proposed decommissioning works. The information has been used to assess the level of impact that the activities will potentially have on the environment.

6.1 Pre-Decommissioning Environmental Surveys

Several surveys have been undertaken in the Hewett Field Area in preparation for decommissioning as detailed below.

Pre-Decommissioning Environmental Baseline and Habitat Assessment Survey (Fugro, 2023).

The most recent surveys included a habitat assessment survey, which aimed to describe all habitats within the survey area and to identify the presence and extent of any Annex I habitats or species of conservation interest. This environmental survey was also required to establish the physio-chemical and biological properties of the sediments across the survey area. In particular, these surveys focused on assessing the distribution of *S. spinulosa* reefs.

Ten environmental sampling stations were predetermined by Eni: four were positioned along the route of the export pipelines and six were positioned along the interfield lines. One reference station was predetermined by Eni. At each environmental sampling station, video and stills photographic data were to be acquired prior to three macrofaunal and one physico-chemical grab samples.

Ten camera transect locations were selected to investigate potential areas of *S. spinulosa* reefs identified from previous investigations. Two new proposed transect locations were predetermined by Eni to investigate potential seafloor features identified on the geophysical data and to provide spatial coverage. The sites for transects and sampling stations are shown below in Figure 6-1.

To assess the habitats present within the survey area, detailed analysis of photographic data was undertaken noting the locations of any observed changes in sediment type and/or associated faunal community. Taxa were recorded to the lowest possible taxonomic level, which allowed for an assessment of protected species, as well as important epifaunal assemblages, to determine if these assemblages consisted of the component habitats. It should be noted that many species cannot be identified from photographic data alone and, as such, higher taxonomic levels were used. Following the review of this data, sensitive habitats and species were assessed. Transects in which potential *S. spinulosa* were observed were evaluated and percentage cover estimated for the species.

It should be noted that biological communities and marine environments can be highly dynamic and temporally variable, so the biotopes and habitats identified by the current assessment are representative of the survey area at the sampling time only.

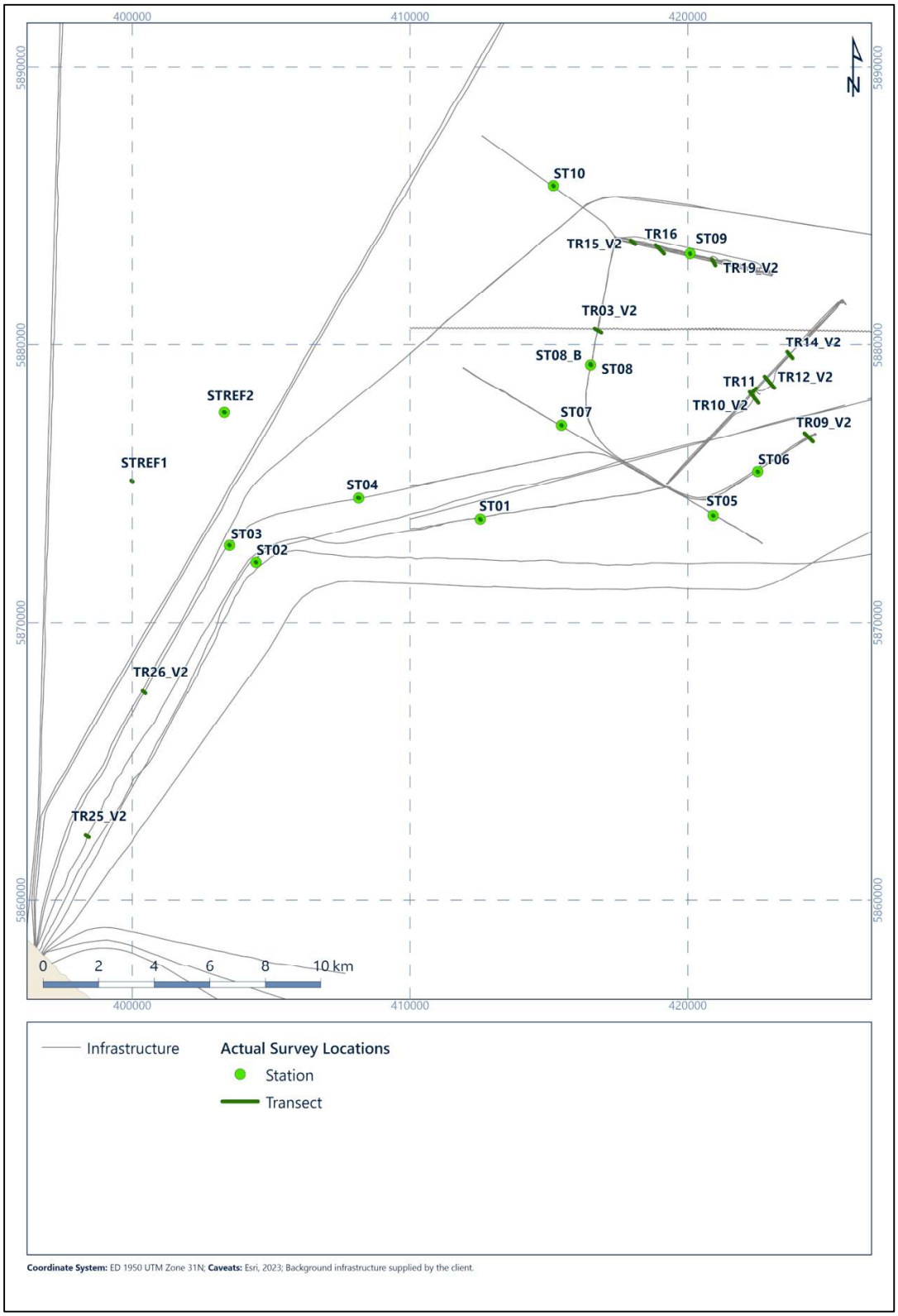


Figure 6-1 Completed environmental sampling stations for transect surveys and for sediment/faunal sampling stations (Fugro, 2023).

Pre-Decommissioning Environmental Baseline and Habitat Assessment Survey (Benthic Solutions Limited, 2021).

The aim of the survey was to determine the status and spatial extent of benthic habitats and communities along the Hewett pipelines and record the current physical, chemical and faunal characteristics at predetermined sampling points. Of note was the Hewett pipelines cross the following protected areas: southern North Sea special area of conservation (SAC), Haisborough, Hammond and Winterton SAC, Greater Wash special protection area (SPA) and Cromer Shoal Chalk Beds marine conservation zone.

The main objectives of the environmental baseline survey were to identify habitats of potential conservation interest defined as those listed in Annex I of the EC Habitats Directive, the OSPAR List of Threatened and/or Declining Species and Habitats and the UK Biodiversity Action Plan Priority Habitat descriptions, and to acquire baseline data to describe the sediment physico-chemical and biological characteristics.

Four seabed sampling stations selected along the route of the export pipelines and a further six seabed sampling stations were nominated by Eni along the interfield flowlines. The locations of these stations were selected to ensure the different seabed habitats along the route of the pipelines were surveyed, based on BGS seabed sediment data and broad-scale seabed habitat type, but avoiding duplicating the seabed sampling data collected in 2018 (Fugro, 2018) in the vicinity of the platforms and subsea wells. In addition, sampling point 2 on PL020 was targeted to coincide with one of the sampling stations from the 2017 PL020 survey (BSL, 2017). A reference station was selected to the north of the PL021 pipeline (Figure 6-2).

Fifteen camera transects were selected from the desktop review (Fugro, 2020) of the geophysical data acquired from the period 2018 to 2019 (Fugro, 2020). These were selected on the basis to ground truth potential areas of *Sabellaria spinulosa*, based on the data from 2018 to 2019. An additional two camera transects (TR25 and TR26) were added to the survey by Eni to investigate the pipeline in the Cromer Shoal Chalk Beds MCZ (Figure 6-3).

In autumn 2021, the survey was unfortunately terminated before completion of the scope due to a long period of forthcoming marginal weather conditions, preventing safe deployment of both camera and grab sampling devices. A new survey was undertaken during April 2023.

***Sabellaria spinulosa* Reef Assessment Report (Fugro, 2020)**

On the instruction of ENI UK Limited, Fugro undertook a review of geophysical data obtained along pipelines and umbilicals within the Hewett gas field, located within United Kingdom Continental Shelf (UKCS) Blocks 48/29, 48/30, 52/2, 52/4 and 52/5 of the SNS. The purpose of the review was to delineate potential areas of *S. spinulosa* reef. High resolution multibeam echosounder (MBES) data along pipelines and umbilicals were collected by A-2-Sea in September 2019 and provided by ENI UK Limited. Side scan sonar (SSS), MBES, and sub-bottom image data were collected along the pipelines by Fugro between December 2018 and April 2019.

Side scan sonar data were reviewed in detail and areas with a 'mottled' appearance were delineated as potential areas of *S. spinulosa* reef. MBES data were also viewed in conjunction with the SSS. Although both data were utilised, SSS has been found in previous studies to be more effective at detecting potential areas of *S. spinulosa* reef (Limpenny *et al.,* 2010). The SSS data for this review were also found to be more useful in delineating potential reef areas.

Video transects were acquired in 2018 and used to ground-truth SSS data from the Hewett Field. Results from these video transects were also utilised to further aid the detection and delineation of potential *S. spinulosa* reef. Figure 2.1 presents an example of delineated potential *S. spinulosa* reef using both SSS data and ground-truthing data obtained within the Hewett platform 48/29-B survey area.

A total of 35 areas of potential *S. spinulosa* reef were identified along the pipeline and umbilical routes (refer to Section 6.4.2). To establish the presence of *S. spinulosa* reef along the pipeline and umbilical routes, a total of 20 video transects have been proposed. These transects have been classified as either priority 1 or priority

2. Priority 2 transects are those which are either considered less likely to represent potential *S. spinulosa* reef or are in close proximity to other transects which have been selected to investigate a larger feature.

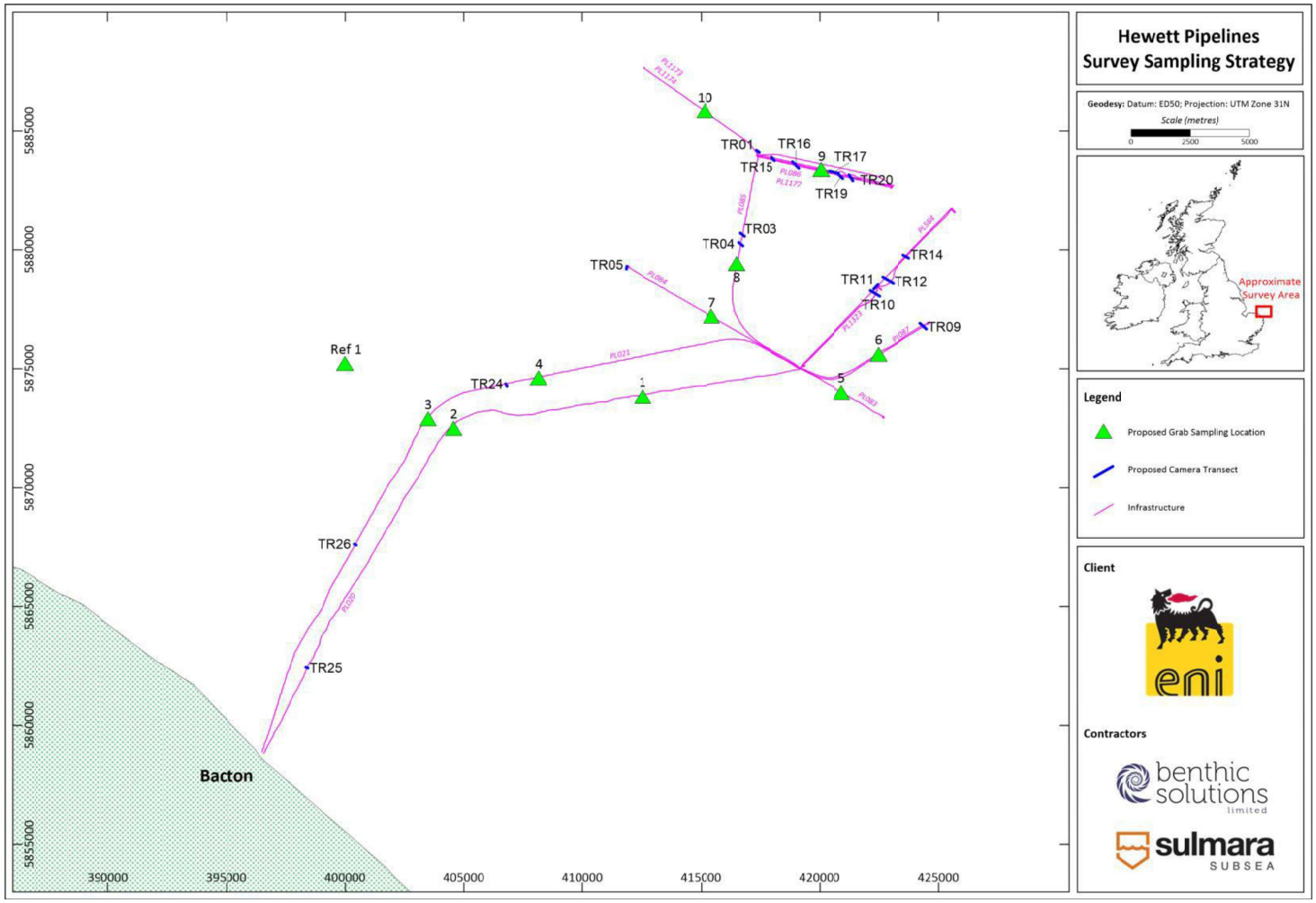


Figure 6-2: Hewett Pipelines Sampling Locations (Fugro, 2020)

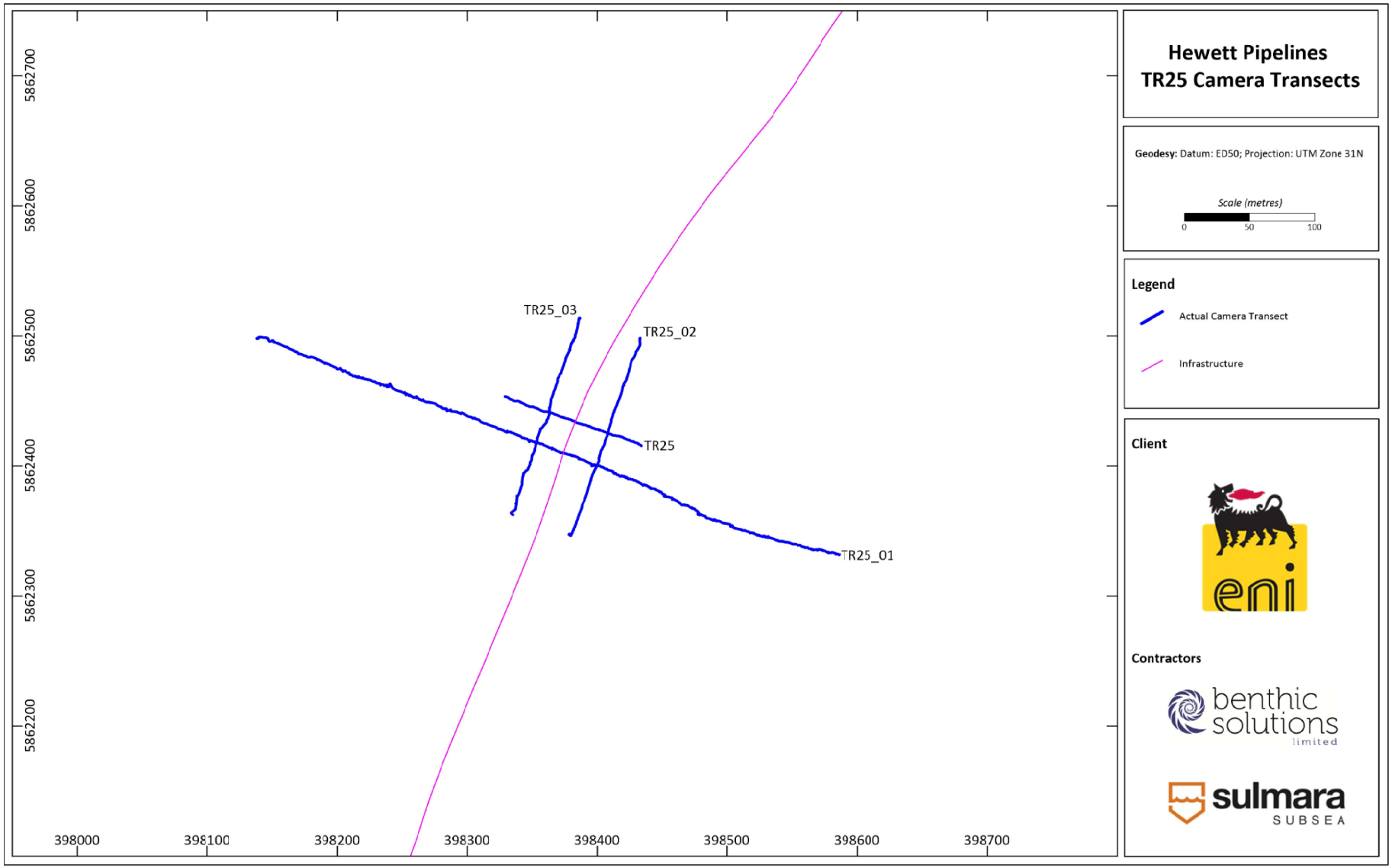


Figure 6-3: Camera Transects Completed (Fugro, 2020)

6.2 Marine Protected Areas

The Hewett subsea pipelines are located within 40km of six marine protected areas (MPAs) as illustrated in Figure 6-4. A brief description of the MPAs and their qualifying features are detailed in Table 6-1. Of note is that all the subsea pipelines are located (in part) within the Southern North Sea SAC, designated for the protection of harbour porpoise.

Table 6-1: Marine Protected Areas in the vicinity of the Hewett Field Area (JNCC, 2019b)

Marine Protected Area	Qualifying Features and Site Description
Southern North Sea SAC	**Features:** Annex II species: Harbour porpoise (*Phocoena phocoena*). **Description:** The site has been identified as an area of importance for harbour porpoise and supports 17.5% of the UK North Sea Marine Unit (MU) population. This site covers an area of 36,951 km^2 with the majority of the site lying offshore, though it does extend into coastal areas of Norfolk and Suffolk. The northern two thirds of the site are recognised as important for porpoises during the summer season, whilst the southern part (in which the Hewett Field Area is located) supports persistently higher densities during the winter.
Hainsborough, Hammond and Winterton SAC	**Features:** Annex I habitats: Sandbanks which are slightly covered by sea water all the time and Reefs. **Description:** The site contains a series of sandbanks that were formed via headland associated geological processes since the 5th Century AD. These sandbanks are curved and orientated parallel to the coast, composed of sandy sediment and lie in fully saline water with intermediate coastal influence. The site contains a mosaic of different physical habitats with correspondingly different biological communities. The fauna of the sandbank crests is predominantly low diversity polychaete (bristle worms) and amphipod (shrimp-like crustaceans) communities which are typical of mobile sediment environments. The banks are separated by troughs which contain more gravelly sediments and support diverse infaunal and epifaunal benthic communities with occurrences of reefs of the tube-building ross worm *S. spinulosa*. Aggregations of *S. spinulosa* provide additional hard substrate for the development of rich epifaunal communities.
Greater Wash SPA	**Features:** Annex I bird species: Red throated diver (*Gavia stellata*), little gull (*Hydrocoloeus minutus*), little tern (*Sternula albifrons*), sandwich tern (*Sterna sandvicencis*), common tern (*Sternula albifrons*); and Migratory species: common scoter (*Melanitta nigra*). **Description:** The site is located predominantly in the coastal waters of the mid-southern North Sea between the counties of Yorkshire and Suffolk, covering an area of 3,536km^2. This area supports the largest breeding populations of little terns within the UK SPA network by protecting important foraging areas and supports the second largest aggregations of non-breeding red-throated diver and little gull. The SPA includes a range of marine habitats, including intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef, including *Sabellaria* reefs and mussel beds.
North Norfolk Sandbanks and Saturn Reef SAC	**Features:** Annex I habitats: Sandbanks which are slightly covered by sea water all the time and Reefs. **Description:** Located in the southern North Sea, 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

Marine Protected Area	Qualifying Features and Site Description
	communities are typical of sandy sediments in the southern North Sea such as polychaete worms, isopods, crabs and starfish. Areas of *S. spinulosa* biogenic reef are present within the site, consisting of thousands of fragile *Sabellaria* sandtubes which hve become aggregated to create solid reef-like structures sitting proud of the seabed.
Cromer Shoal Chalk Beds Marine Conservation Zone (MCZ)	**Features:** Broad Scale Habitats: High energy infralittoral rock, Moderate energy infralittoral rock, High energy circalittoral rock, Moderate energy circalittoral rock, Subtidal coarse sediment, Subtidal sand and Subtidal mixed sediments; Features of Conservation Interest (FOCI): Peat and clay exposures, Subtidal chalk and North Norfolk Coast (subtidal); One geological feature. **Description:** The site is located between Weybourne and Happisborough, extending around 10 km out to sea and covering an area of 321 km^2. This area is designated for the presence of seaweed-dominated infralittoral rock, which is a habitat for a variety of small animals that shelter and feed amongst seaweeds. The site also contains chalk beds that serve as nursery areas for juvenile fish and support populations of lobsters and crabs. Other common species include sea squirts, hermit crabs and pipefish.
The Wash and North Norfolk Coast SAC	**Features:** Annex I habitats: Sandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, Large shallow inlets and bays, Reefs, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*); Annex II (primary) species: harbour seal (*Phoca vitulina*) and Annex II (qualifying) species: Otter (*Lutra Lutra)* **Description**: The submerged sandbanks at the site support sublittoral communities including beds of brittlestars (*Ophiothrix fragilis*), sandmason worm (*Lanice conchilega*) and the tellin (*Angulus tenuis*). Areas of biogenic reef, formed by the polychaete worm *Sabellaria spinulosa* are located within the SAC. This is the only known location of well-developed stable *Sabellaria* reef in the UK (standing up to 30m tall) and supporting fauna such as the pink shrimp (*Pandalus montagui*). The intertidal flats at the site provide ideal conditions for harbour seal breeding and hauling out, as well as supporting the largest colony of common seals in the UK (7% of the total population).

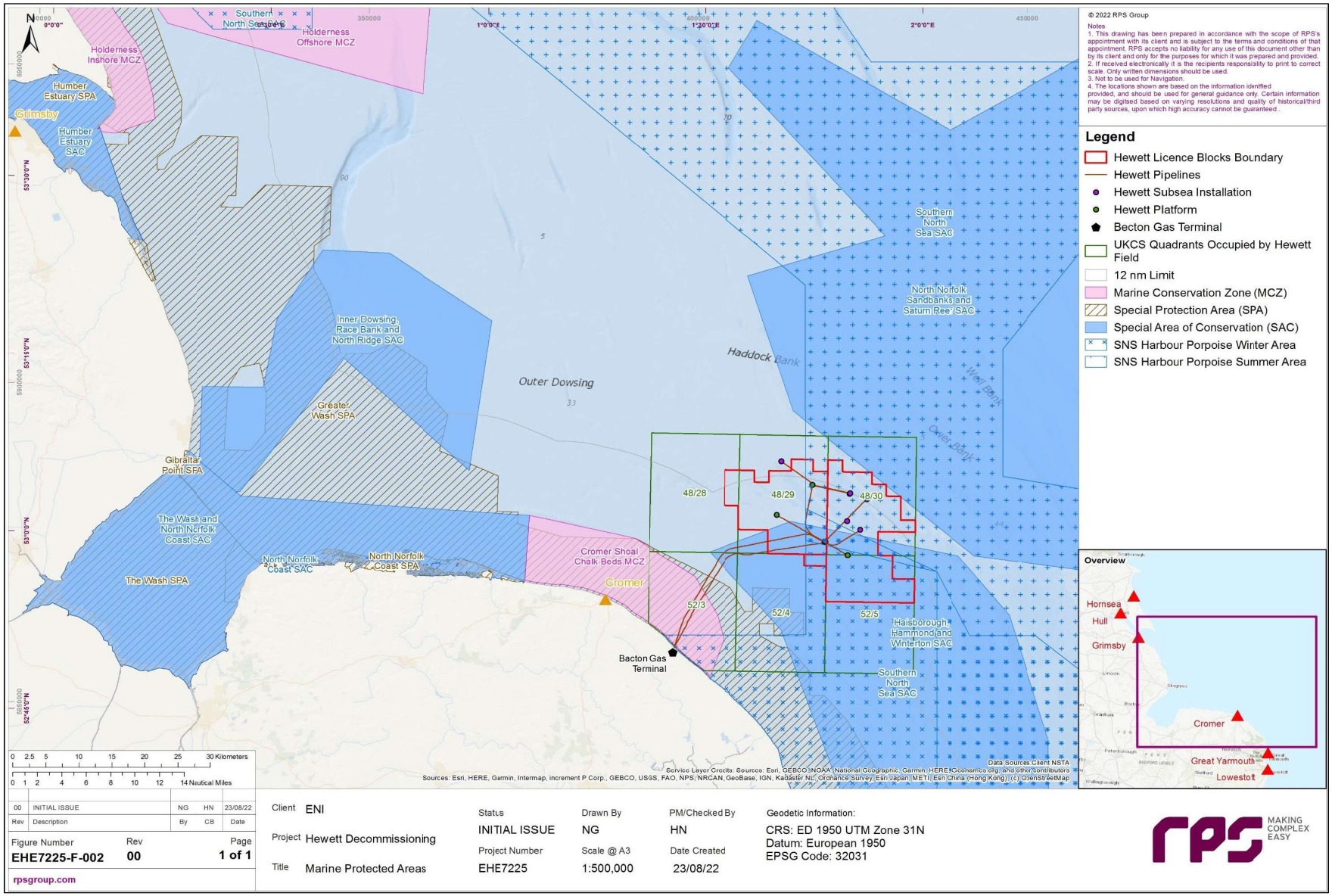


Figure 6-4: Marine Protected Areas in the vicinity of the Hewett Field Area

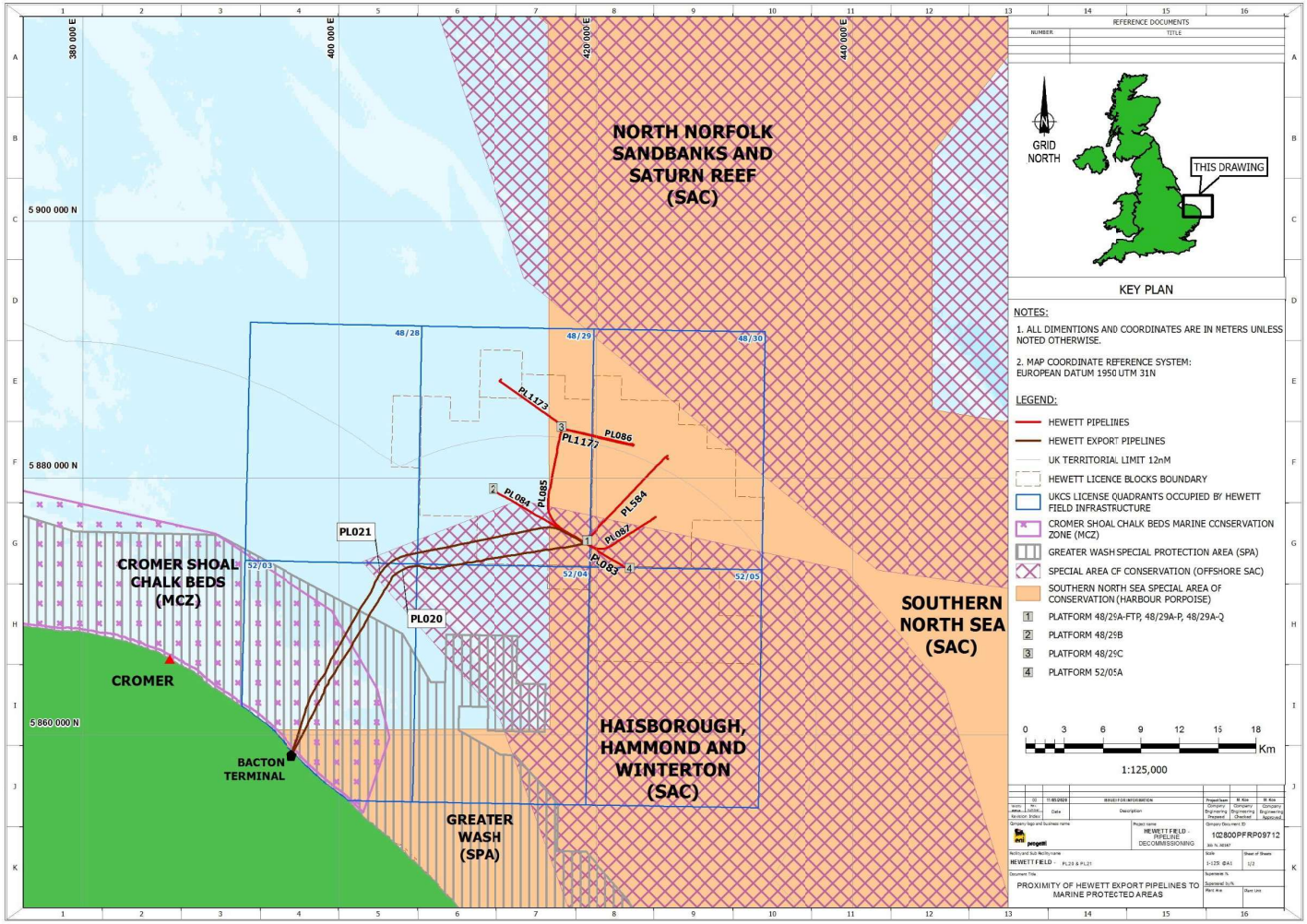


Figure 6-5: Marine Protected Areas in the vicinity of the Hewett Field Area (Enlarged)

6.3 Physical Environment

6.3.1 Bathymetry

The seabed across the subsea pipeline survey areas ranged from 19.6 metres to 40.8 metres (see Table 6-2).

Table 6-2: Summary of Bathymetry within Survey Area

Station/Transect	Depth (m)	
Station		
ST01	Start of Line (SOL)	31.8
	End of Line (EOL)	32.2
ST02	SOL	24.2
	EOL	26.3
ST03	SOL	24.2
	EOL	26.4
ST04	SOL	32.5
	EOL	31.1
ST05	SOL	24.7
	EOL	24.9
ST06	SOL	32.3
	EOL	32.5
ST07	SOL	31.3
	EOL	28.4
ST08	SOL	37.0
	EOL	37.1
ST08_B	SOL	37.0
	EOL	36.4
ST09	SOL	39.5
	EOL	39.8
ST10	SOL	34.1
	EOL	34.5
ST REF 1	SOL	29.3
	EOL	29.0
ST REF 2	SOL	31.2
	EOL	31.4
		Transects
TR03_V2	SOL	37.7

	EOL	37.4
TR09_V2	SOL	36.9
	EOL	35.3
TR10_V2	SOL	39.4
	EOL	38.6
TR11	SOL	36.6
	EOL	36.3
TR12_V2	SOL	35.9
	EOL	36.2
TR14_V2	SOL	40.8
	EOL	40.2
TR15_V2	SOL	37.5
	EOL	37.0
TR16	SOL	38.6
	EOL	38.1
TR19_V2	SOL	38.9
	EOL	38.7
TR25_V2	SOL	19.6
	EOL	20.2
TR26_V2	SOL	24.5
	EOL	24.7

6.3.2 Sediment Characteristics

Sediment samples were collected and analysed for their geotechnical composition properties during the pre-decommissioning survey, including particle size distribution (PSD), sediment composition (Wentworth scale (Wentworth, 1922), sorting (particle homogeneity), the proportion of total organic matter (TOM) and proportion of total organic carbon (TOC). The results are presented in Table 6-3. This characterised the sediment across the project footprint and its potential mobility if disturbed.

The seafloor observed across the survey area was varied. The main sediment type observed from the photographic data was sand with small scale ripples and varying proportions of shell fragments. This sediment type has been classified as the EUNIS biotope complex 'Faunal communities of Atlantic circalittoral sand' (MC521). Within this main habitat, patches of the biotope '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) were regularly observed, along with smaller areas of the biotope 'Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay' (MC1251). One station (ST02) contained a higher gravel component and was assigned the EUNIS level 3 designation 'Atlantic circalittoral coarse sediment' (MC32).The main photographs of the biotope complexes described above at sampling locations are provided below in Figure 6-6, Figure 6-7, Figure 6-7, and Figure 6-8. The habitat FOCI and priority habitat 'Subtidal sands and gravels' has the potential to occur within the survey area; however, this habitat is widely distributed within the North Sea and already included within UK MPA network.

The TOM content ranged from 0.32 % at station ST05 to 0.86 % at station ST04, with a mean of 0.59 % and moderate variability (RSD 38 %). The mean TOM content was slightly lower than the reference station (0.73 %) and the SNS mean background content (1.18 %; UKOOA, 2001).

The TOC content ranged from < 0.02 % at station ST03 to 0.25 % at station ST04, with a mean of 0.09 % and high variability (RSD 104 %). The mean TOC content was slightly lower than the reference station (0.13 %). The high variability was due to the low values recorded.

The mean particle size (µm) across the survey area ranged from 259 µm at station ST07 to 2372 µm at station ST02, with a mean of 679 µm and high variability (RSD 91 %). The mean particle size (µm) was slightly lower than the mean particle size at the reference station (777 µm).

Table 6-3: Sediment Types Identified at the Subsea Pipeline Locations

Parameter	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08	ST09	ST10	ST REF 2
Mean Particle Size (µm)	937	2494	522	671	350	271	257	326	534	568	740
Wentworth (1922) Description	Coarse sand	Granule	Coarse sand	Coarse sand	Medium sand	Medium sand	Medium sand	Medium sand	Coarse sand	Coarse sand	Coarse sand
Sediment homogeneity	Very poorly sorted	Very poorly sorted	Moderately well sorted	Very poorly sorted	Well sorted	Well sorted	Well sorted	Poorly sorted	Moderately sorted	Moderately well sorted	Moderately sorted
Skewness	Very coarse skewed	Coarse skewed	Coarse skewed	Very coarse skewed	Symmetrical	Symmetrical	Symmetrical	Very coarse skewed	Coarse skewed	Coarse skewed	Coarse skewed
TOM (%)	0.68	0.84	0.42	0.86	0.32	0.34	0.35	0.54	0.81	0.77	0.73
TOC (%)	0.08	0.25	<0.02	0.25	0.03	0.03	0.04	0.09	0.04	0.04	0.13

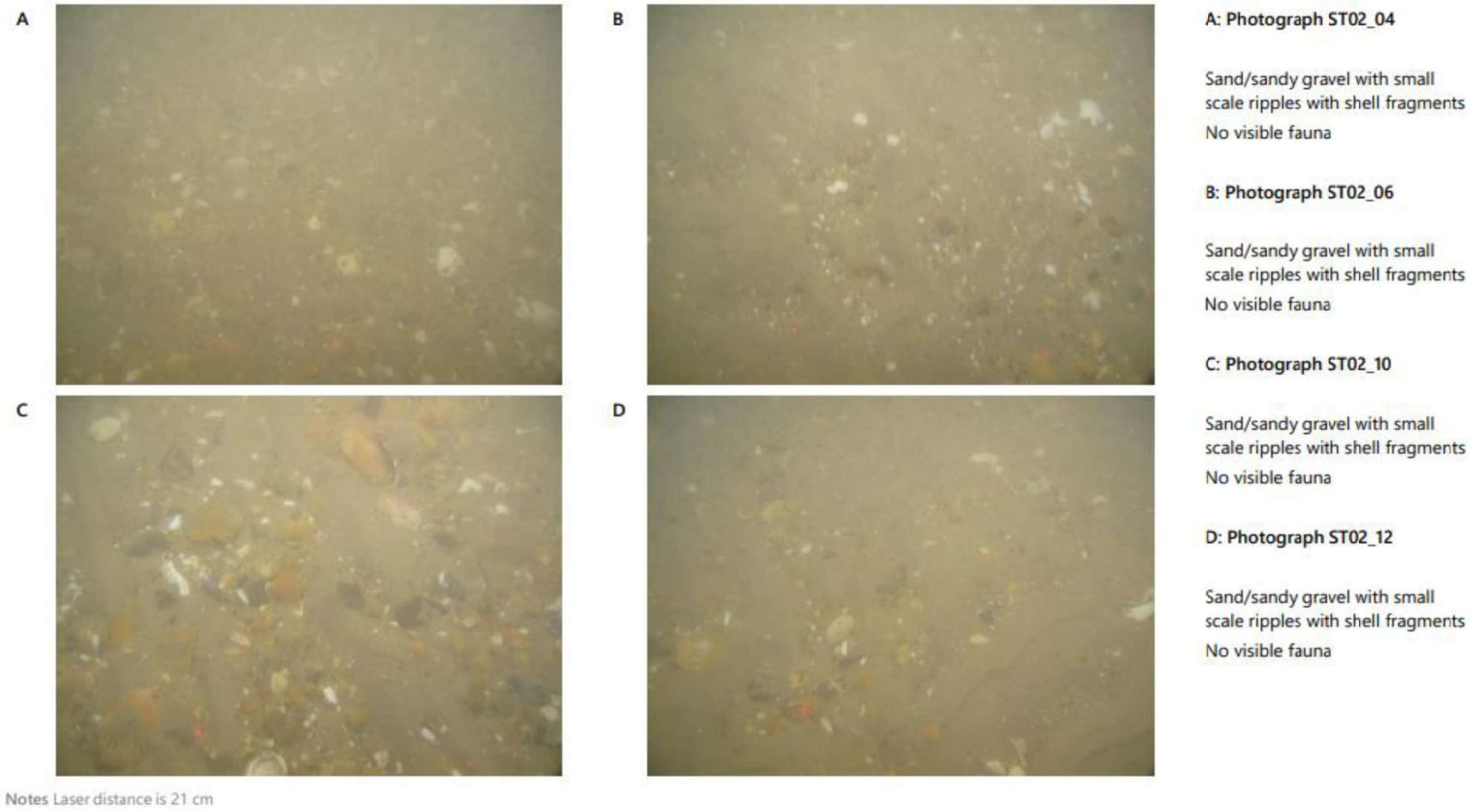
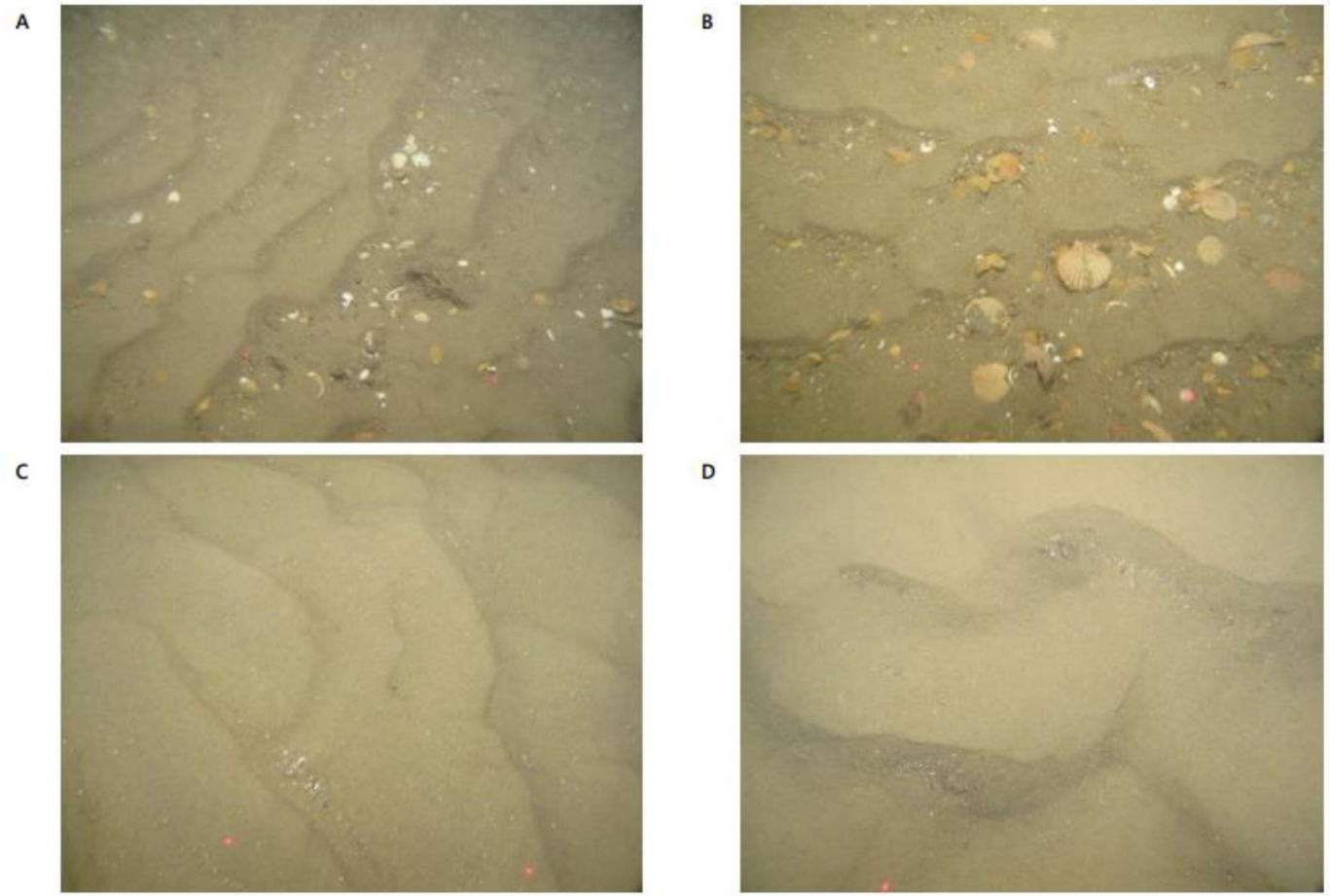


Figure 6-6 Example photographs of 'Atlantic circalittoral coarse sediment (MC32). Observed at station ST01, ST02, ST04, ST08, ST09, STREF1 and STREF2 and transects TR25 and TR26.



A: Photograph TR03_V2_47

Sand with small scale ripples and shell fragments

Ross worm tubes (*Sabellaria spinulosa*)

B: Photograph TR12_42

Sand with small scale ripples and shell fragments

Shrimp (Caridea)

C: Photograph ST05_03

Sand with small scale ripples

No fauna observed

D: Photograph ST07_11

Sand with small scale

No fauna observed

Notes Laser distance is 21 cm

Figure 6-7 Example seabed photographs of 'Faunal communities of Atlantic circalittoral sand' (MC521). Observed on all transects and several stations, including ST03, ST05, ST06, ST07, ST08_B and ST10, within the survey area.

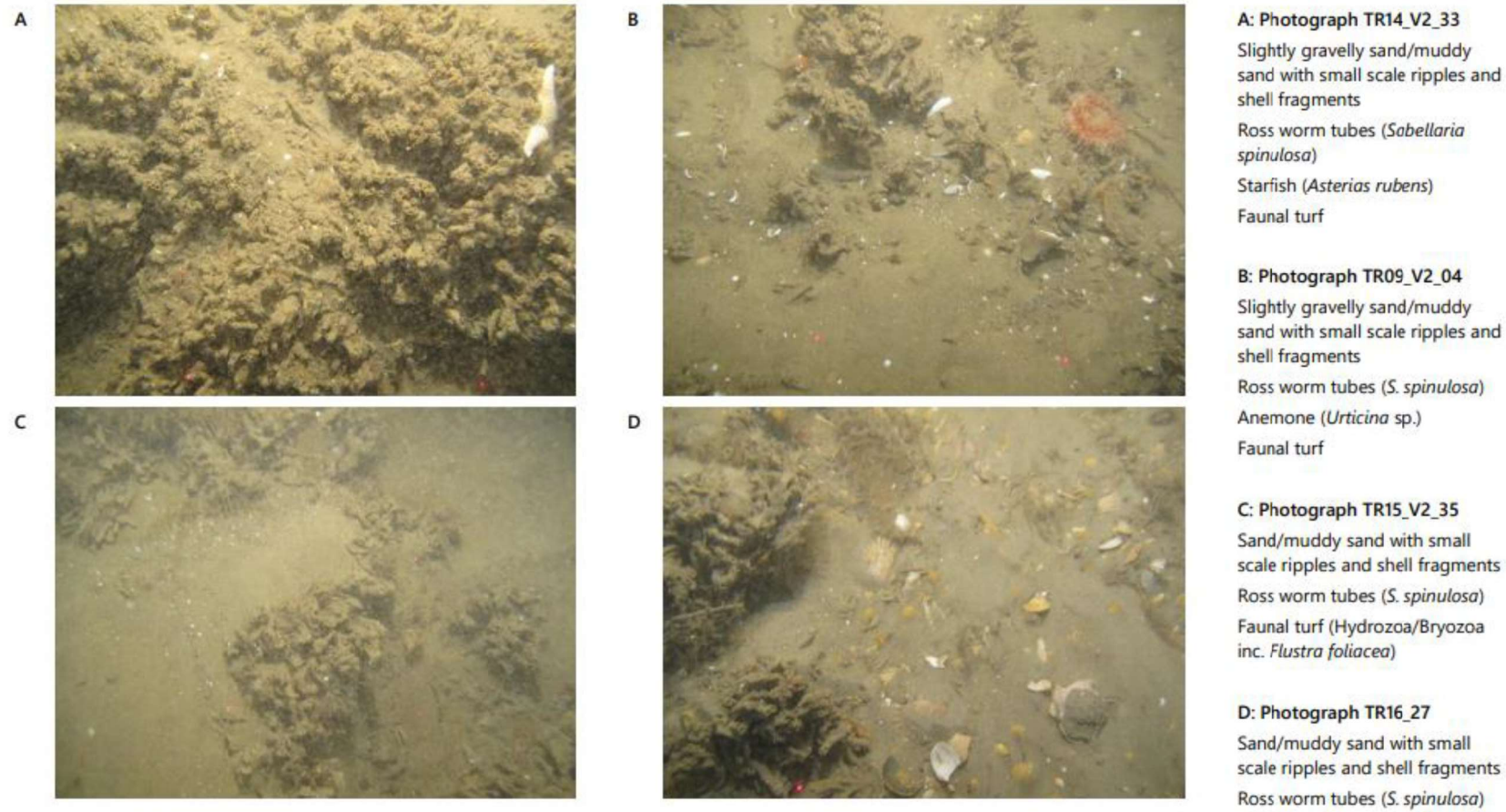


Figure 6-8 Example seabed photographs of '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211). Observed on all transects, with the exception of nearshore transects TR25_V2 and TR26_V2.

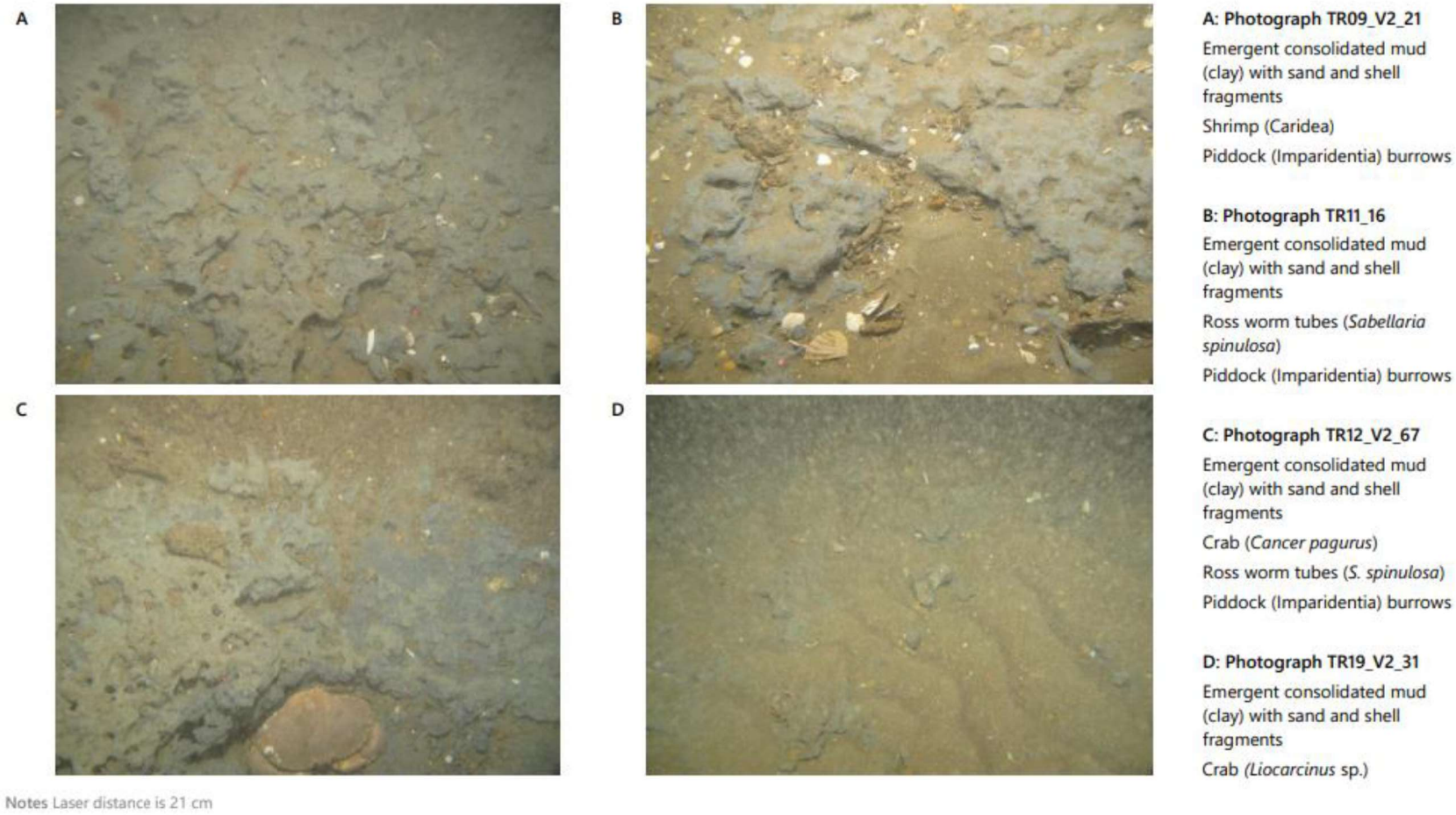


Figure 6-9 Example seabed sediment photographs of 'Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay' (MC1251). Observed in the north-east of the Hewett survey area in areas of firm clay, (transects TR09_V2, TR11, TR12_V2 and TR19_V2).

6.3.3 Sediment Hydrocarbon Content

The sediment samples collected during the pipeline pre-decommissioning environmental baseline survey were analysed for hydrocarbon content, including Total Hydrocarbon Content (THC), total n-alkanes (nC10-nC36) and polycyclic aromatic hydrocarbons (PAHs), specifically the United States Environmental Protection Agency The results are presented in Figure 6-4.

The profile observed is typical of sediment in the SNS and could be considered background for the area (Fugro, 2023).

Table 6-4: Hydrocarbon Concentrations in Sediment

Location	Parameter – maximum concentration			
	THC (µg/g Dry Sediment)	Total n-alkane (nC_{10} to nC_{36}) (µg/g)	Total US EPA16 PAH (µg/g Dry Sediment)	2-6 ring PAHs (µg/g Dry Sediment)
ST01	2.0	0.115	<29.3	0.130
ST02	1.0	0.050	<12.1	0.0657
ST03	0.9	0.086	<20.6	0.0929
ST04	2.9	0.207	45.4	0.198
ST05	<0.5	0.029	<4.0	<0.0124
ST06	<0.5	0.026	<4.0	<0.0121
ST07	<0.5	0.026	<4.3	<0.0137
ST08	2.2	0.196	<36.9	0.185
ST09	0.8	0.080	<6.9	<0.0207
ST10	0.7	0.080	<9.0	<0.0247
ST REF 2	1.8	0.139	<8.2	0.0361

6.3.4 Sediment Metal Content

The sediment samples acquired from the ten subsea survey areas were analysed for selected metals: aluminium, arsenic, barium, cadmium, chromium, copper, iron, mercury, nickel, lead, vanadium and zinc. The current OSPAR Co-ordinated Environmental Monitoring Programme (CEMP) environmental focus around heavy metals is on cadmium, mercury and lead (OSPAR, 2014a), all of which have the potential for bioaccumulation. The concentrations of metals in the sediments of relevance to the UKOOA, ERT and ERL concentrations, are presented in Table 6.5.

Cadmium concentrations ranged from < 0.01 µg/g at seven stations to 0.02 µg/g at stations ST01 and ST02. All stations had concentrations below the SNS mean background concentration (0.16 µg/g; UKOOA, 2001).

Chromium concentrations ranged from 1.83 µg/g at station ST03 to 8.16 µg/g at station ST10, with a mean of 4.94 µg/g and moderate variability (RSD 44 %). The mean concentration was lower than the SNS mean background concentration (10.70 µg/g; UKOOA, 2001).

Copper concentrations ranged from < 0.4 µg/g at stations ST05, ST06 and ST10 to 1.5 µg/g at stations ST01 and ST04, with a mean of 0.7 µg/g and high variation (RSD 75 %). The mean copper concentration was lower than the SNS mean background concentration (3.83 µg/g; UKOOA, 2001).

Mercury concentrations ranged from < 0.03 µg/g at ten stations, including the reference station, to 0.04 µg/g at station ST02. The minimum reporting value for mercury was higher than the respective SNS background mean concentration (0.02 µg/g; UKOOA, 2001). Station ST02 had a concentration higher than the SNS mean background concentration.

Lead concentrations ranged from 2.1 µg/g at station ST07 to 7.6 µg/g at station ST09, with a mean of 4.9 µg/g and moderate variation (RSD 43 %). The mean lead concentration was lower than the SNS mean background concentration (8.39 µg/g; UKOOA, 2001).

Zinc concentrations ranged from 5.2 µg/g at station ST07 to 18.0 µg/g at station ST09, with a mean of 10.0 µg/g and moderate variability (RSD 43 %). The mean zinc concentration was lower than the SNS mean background concentration (15.88 µg/g). Station ST09 had a concentration higher than the SNS mean background concentration.

Chromium concentrations ranged from 1.83 µg/g at station ST03 to 8.16 µg/g at station ST10, with a mean of 4.94 µg/g and moderate variability (RSD 44 %). The mean concentration was higher than the SEA2 mean concentration.

The highest concentrations of most metals were observed at stations ST01, ST02, ST04, ST09 and ST10.

Table 6-5: Metal Concentrations in Sediment

Sample Station	Recorded Exceedance of Mean Background levels (mg/kg dry weight)											
	Arsenic	Chromium	Copper	Iron	Aluminium	Nickel	Lead	Vanadium	Zinc	Barium	Cadmium	Mercury
ST01	6.89	7.85	1.5	6160	3740	3.7	6.7	20.1	12.1	21.6	0.02	<0.03
ST02	28.1	3.7	0.9	12600	1130	3.6	7.3	23.6	13.7	6.13	0.02	0.04
ST03	9.37	1.83	0.5	3430	490	1.3	4.3	9.4	6.6	2.46	<0.01	<0.03
ST04	6.92	6.95	1.5	7610	3100	3.5	5.7	18.0	11.6	30.7	0.01	<0.03
ST05	10.0	2.33	<0.4	3980	574	1.1	2.4	10.4	5.9	2.06	<0.01	<0.03
ST06	6.23	4.95	<0.4	3220	919	1.4	2.3	8.6	5.8	2.98	<0.01	<0.03
ST07	5.02	3.62	0.5	3500	873	1.5	2.1	8.7	5.2	4.31	<0.01	<0.03
ST08	10.8	5.00	0.6	6400	1430	2.0	4.8	18.8	9.2	10.6	<0.01	<0.03
ST09	40.5	4.96	0.5	16200	1350	3.0	7.6	49.3	18.0	5.51	<0.01	<0.03
ST10	28.9	8.16	<0.4	9840	824	5.2	6.0	33.9	12.1	3.58	<0.01	<0.03
ST REF 2	13.5	3.81	1.1	6660	1260	3.6	8.0	20.6	13.0	6.91	0.02	<0.03

6.3.5 Oceanography

A summary of temperature and salinity properties for the Hewett Field Area are provided in Table 6-6.

As the tidal front keeps the water column permanently vertically mixed, preventing the development of thermoclines (OSPAR, 2010), there is little variation between sea surface and bottom temperatures, as well as in the annual mean temperatures, which are approximately 10ºC.

Saline water of North Atlantic origin enters the southern North Sea via the Dover Straits, and this tends to lead to generally more salty water in the most southerly parts of the North Sea. Although slightly lower than in winter (when averages are 35.0-35.2%), salinity values remain relatively high in summer along the centre of the English Channel (between 34.75-35.0%), owing to the eastward movement of Atlantic water. Salinity values decrease towards the coast in both summer and winter but normally remain above 34.5%, except locally at river mouths where there is dilution from freshwater discharge (DECC, 2016).

Table 6-6: Temperature and salinity in the Hewett Field Area (Physe, 2013 and DECC, 2016)

	Summer	Winter	Annual
Mean Sea Surface Temperature (ºC) (0-5m)	12.1	8.3	10.2
Mean Seabed Temperature (ºC) (below 30m)	11.9	8.0	9.9
Mean Sea Surface Salinity (%) (0-5m)	34.5	34.5	34.5
Mean Seabed Salinity (%) (0-5m)	34.5	34.5	34.5

The wave climate in the Hewett Field Area is seasonal (DECC, 2016) with maximum mean wave heights of around 1.6m during the winter months and 0.8m in the summer. Wave periods vary between 3 to 7 seconds (83% of time). The annual mean significant wave height is 1.2m and, as shown in Table 6-7, the significant wave height exceeds 4m for 1.3% of the time. The waves are multidirectional, but predominantly from the north (Physe, 2013).

Table 6-7: All-Yearly Significant Wave Height Exceedance (Fugro Geos, 2011 and Physe, 2013)

Exceedance (%)	0.04	1.3	4.8	9.3	18	33	59	90.5
Wave Height (m)	6.0	4.0	3.0	2.5	2.0	1.5	1.0	0.5

6.3.6 Meteorology

Winds in this region of the southern North Sea are generally from between south and north-west, with the frequency of northerly and easterly winds increasing in spring (DECC, 2016) as illustrated in Figure 6-10. Wind strengths are generally between Beaufort scale 1- 6 (1 – 11 m/s) in the summer months, with a greater proportion of strong to gale force winds of Beaufort scale 7 – 12 (14 – 32 m/s) in winter (UKHO, 2013).

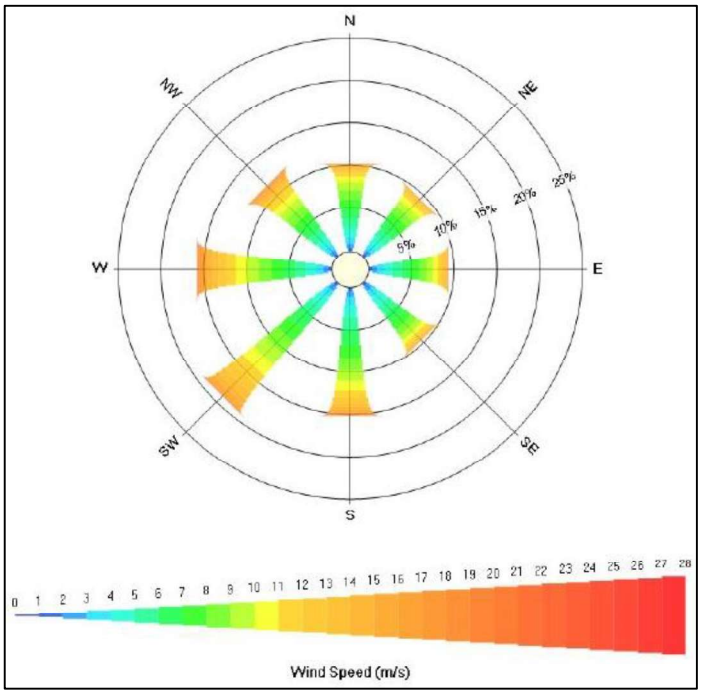


Figure 6-10: Hewett Field Area Wind Speed Rose – Annual (Physe, 2013)

6.4 Biological Sensitivities

6.4.1 Plankton

Plankton acts as an important link between the biological and physical components of the ecosystem. Members of the plankton are key producers and primary consumers in marine ecosystems, which makes them pivotal in energy/biomass transfer and, as such, their population changes will have impact on organisms at higher trophic levels with environmental and economic consequences (DECC, 2016).

Plankton are drifting organisms that inhabit the pelagic zone within the North Sea and include single celled organisms such as bacteria as well as plants (phytoplankton) and animals (zooplankton). Phytoplankton are the autotrophic components of the plankton community and a key part of the ecosystems food web that the Hewett Field Area is located in. Therefore, the distribution of plankton directly influences the movement and distribution of other marine species.

The composition of plankton community reflects environmental conditions of the shallow, well-mixed waters. The Southern North Sea region is largely enclosed by land and, as a result, the environment is dynamic, with considerable tidal mixing and nutrient-rich run-offs from the land [eutrophication reinforced by increased rainfall which is caused by the NAO (North Atlantic Oscillation) (DECC, 2016)]. Under these conditions, nutrient availability is fairly consistent throughout the year, therefore organisms with high nutrient uptake that thrive in dynamic waters, such as diatoms, are particularly successful (Leterme *et al.,* 2006).

The phytoplankton community 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 (DECC, 2016).

The zooplankton community in the North Sea is dominated by calanoid copepods, although other genera such as *Paracalanus* and *Pseudocalanus* are also abundant. There is also a high biomass of larval stages present in the region. Euphausiids, *Acartia*, and decapod larvae are all important components of the zooplankton

assemblage (DECC, 2016). Meroplankton are the larval stages of benthic organisms that spend a short period of their lifecycle in a pelagic stage. An important group within this category are the Echinodermata, whose larvae are the distributive stages of starfish and sea urchins, and they remain part of the plankton community until they settle on the benthos (SAHFOS, 2001). Fish larvae (e.g., sand eel) are also an important component of the zooplankton community.

6.4.2 Benthos

The seabed sediments observed across the survey sites mainly consisted of small-scale ripples, with varying proportions of shell fragments, which was classified as MC521. The other biotopes observed in the study area were MC2211, MC1251, MC2211 and MC32. The accompanying photographs per sediment type are shown in Section 6.3.2. Further detail of these sediment types is given in the following section.

Faunal Communities of Atlantic Circalittoral Sand (MC521)

The EUNIS level 4 biotope complex 'Faunal communities of Atlantic circalittoral sand' (MC521) is characterised by fine sands or muddy sands with a low cohesion potential (EEA, 2022). Faunal communities of echinoderms are indicative of this habitat type, accompanied by a variety of polychaetes and bivalves and amphipods (EEA, 2022).

From photographic data, this biotope complex was observed across the majority of the Hewett survey area and comprised sand with small scale ripples and varying quantities of shell fragments. It was observed on all transects and several stations (e.g., ST03, ST05, ST06, ST07, ST08_B and ST10) within the survey area.

Fauna was not observed or sparse in these sandy areas, mainly characterised by crabs (Brachyura including *Liocarcinus* sp.), hermit crabs (*Paguridae* including *Pagurus bernhardus*), starfish (*Asterias rubens*) and faunal turf (Hydrozoa/Bryozoa including *Flustra foliacea*). Sandeels (Ammodytidae) were observed on several transects with sandy sediments. Figure 4.3 presents example seafloor photographs of this biotope complex.

Atlantic Circalittoral Coarse Sediment (MC32)

The EUNIS level 3 biogeographical marine region 'Atlantic circalittoral coarse sediment' (MC32) is characterised by coarse sands, gravel and shingles in depths of over 15 m to 20 m (EEA, 2022). Faunal communities tend to be sparse.

From the photographic data this habitat type was observed on several transects (e.g. station ST01, ST02, ST04, ST08, ST09, STREF1 and STREF2 and transects TR25 and TR26) and comprised sand with varying proportions of gravel (e.g. shingle, small pebbles) and shell fragments.

Fauna was not observed or sparse along these transects. Where present, the most regularly observed epifauna comprised encrusting ross worm tubes (S. spinulosa) and faunal turf (Hydrozoa/Bryozoa including Flustra foliacea).

***Sabellaria spinulosa* on Stable Atlantic Circalittoral Mixed Sediment (MC2211)**

The EUNIS level 5 biotope '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (MC2211) is characterised by high abundances of the tube-building polychaete *S. spinulosa* on mixed sediment (sand, gravel and mud) (EEA, 2022). This species typically forms loose aggregations of tubes grown into a matrix which in turn can develop into reefs. These reefs consolidate the sediment and encourage the settlement of other species, leading to a diverse infaunal and epifaunal community.

From the photographic data, this biotope was observed across the offshore section of the Hewett survey area in varying quality, from an impoverished version of the biotope, where the sediment was mainly sand (e.g., transect TR03_V2) with low lying *S. spinulosa* tubes present, to dense aggregations of *S. spinulosa* on mixed sediment. This biotope was observed on all transects, with the exception of nearshore transects TR25_V2 and TR26_V2. It was not observed on any of the environmental sampling stations.

Fauna was diverse in these areas as the tubes provide shelter and places for epifaunal attachment. Regularly observed species included anemones (Actiniaria including Sagartiidae, *Urticina* sp. and *Metridium* sp.), crabs (Brachyura including *Necora puber* and *Cancer pagurus*), hermit crabs (Paguridae including *Pagurus bernhardus*), starfish (*Asterias rubens*), tunicates (Ascidiacea), shrimp (Caridea) and faunal turf (Hydrozoa/Bryozoa including *Flustra foliacea*).

Piddocks with a Sparse Associated Fauna in Atlantic Circalittoral Very Soft Chalk or Clay (MC1251)

The EUNIS level 5 biotope 'Piddocks with a sparse associated fauna in Atlantic circalittoral very soft chalk or clay' (MC1251) occurs on circalittoral soft rock, which is sufficiently soft to be bored by bivalves, with the piddock *Pholas dactylus* the most widespread borer recorded. While it is typically too soft for rich epifaunal communities to establish, sessile fauna may include sponges and mobile fauna often includes crabs (*Necora* puber and *Cancer pagurus*; EEA, 2022). This habitat has most frequently been reported from tide-swept areas off the south-east of England (Tillin & Hill, 2016).

From the photographic data, this biotope was observed in the north-east of the Hewett survey area in areas of firm clay, (transects TR09_V2, TR11, TR12_V2 and TR19_V2), intersected by areas of '*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment' (Section 4.2.3) and 'Faunal communities of Atlantic circalittoral sand' (Section 4.2.2).

As is typical of this biotope, the clay itself had little or no attached epifauna with potential piddock (Imparidentia) burrows evident. The most commonly occurring mobile epifauna recorded in this biotope were crabs (Brachyura including *N. puber*, *Liocarcinus sp*. and *C.pagurus*). Ross worm tubes (*S. spinulosa*) were also present.

The baseline analysis of sediment macrofauna identified features of the benthic taxa communities. Table 6-8 outlines the taxa identified at each survey station.

Taxonomic Groups

A total of 2,038 animals and 164 taxa were identified during the surveys. Animals in the taxa Annelida were the most dominant and abundant taxon found during the surveys, followed by Arthropoda. The most abundant Annelida species was *S. spinulosa*, with 333 individuals being identified from the survey. This was followed by *Sphaerosyllis bulbosa* (156 individuals), *Polycirrus* (66 individuals) and *Exogone naidina* (62 individuals).

The macrofaunal community was dominated by polychaetes, in particular *S. spinulosa*, present at three stations. Variation in the dominant macrofauna was largely driven by the presence or absence of this biogenic reef forming taxon. Additionally, sediment type was a significant driver for the differences in the macrofaunal community observed across the survey area (Fugro, 2023).

Table 6-8: Taxonomic groups identified at each survey station.

Taxonomic group	ST REF 1_FA		ST REF_2 FA	
	Number of Taxa	Abundance	Number of Taxa	Abundance
Annelida	26	97	12	131
Arthropoda	7	21	1	2
Mollusca	2	3	1	9
Cnidaria	1	2	1	1
Nemertea	2	2	2	7
Other phyla*	1	2	0	0
Total Taxa	39	127	21	150
Taxonomic group	**ST 01_FA**		**ST01_FB**	
	Number of Taxa	Abundance	Number of Taxa	Abundance
Annelida	39	209	33	235
Arthropoda	13	70	10	32
Mollusca	6	7	3	10
Cnidaria	1	2	1	1
Nemertea	1	2	1	1
Other phyla*	1	22	1	7
Total Taxa	61	312	49	286
Taxonomic group	**ST 02_FA**		**ST02_FB**	

	Number of Taxa	Abundance	Number of Taxa	Abundance
Annelida	11	29	2	3
Arthropoda	0	0	0	0
Mollusca	1	1	1	3
Cnidaria	0	0	0	0
Nemertea	2	5	0	0
Other phyla*	0	0	0	0
Total Taxa	14	35	3	6
Taxonomic group	**ST 03_FA**		**ST03_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	6	12	3	13
Arthropoda	2	4	2	2
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	0	0	0	0
Other phyla*	0	0	0	0
Total Taxa	8	16	5	15
Taxonomic group	**ST 04_FA**		**ST04_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	36	182	38	213
Arthropoda	11	92	14	109

Mollusca	6	16	8	33
Cnidaria	2	6	2	3
Nemertea	2	3	2	11
Other phyla*	1	4	3	28
Total Taxa	58	303	67	397
Taxonomic group	**ST 05_FA**		**ST05_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	1	1	2	3
Arthropoda	2	7	2	2
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	0	0	0	0
Other phyla*	0	0	0	0
Total Taxa	3	8	4	5
Taxonomic group	**ST 06_FA**		**ST06_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	2	4	3	4
Arthropoda	1	3	3	8
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	0	0	0	0

Other phyla*	0	0	1	1
Total Taxa	3	7	7	13
Taxonomic group	**ST 07_FA**		**ST07_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	2	2	3	9
Arthropoda	1	1	1	13
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	0	0	0	0
Other phyla*	0	0	0	0
Total Taxa	3	3	4	22
Taxonomic group	**ST 08_FA**		**ST08_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	11	20	13	37
Arthropoda	2	2	2	3
Mollusca	1	3	1	1
Cnidaria	0	0	0	0
Nemertea	0	0	1	1
Other phyla*	0	0	1	1
Total Taxa	14	25	18	43
Taxonomic group	**ST 09_FA**		**ST09_FB**	

	Number of Taxa	Abundance	Number of Taxa	Abundance
Annelida	9	48	8	25
Arthropoda	5	69	4	9
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	1	1	0	0
Other phyla*	0	0	0	0
Total Taxa	15	118	12	34
Taxonomic group	**ST 10_FA**		**ST10_FB**	
	Number of Taxa	**Abundance**	**Number of Taxa**	**Abundance**
Annelida	2	6	8	29
Arthropoda	1	1	3	3
Mollusca	0	0	0	0
Cnidaria	0	0	0	0
Nemertea	1	1	1	1
Other phyla*	0	0	0	0
Total Taxa	4	8	12	33

*Other phyla include: Phoronida, Echinodermata and Chordata.

During the *S. spinulosa* Reef Assessment Report (Fugro, 2020), a total of 35 areas of potential *S.spinulosa* reef were identified along the pipeline and umbilical routes. The areas are summarised in Table 6-9 below.

Table 6-9: Location of Potential *S. spinulosa* Reef

Pipeline Number	Description of Potential *S. spinulosa* Reef
PL20	Three areas of potential *S. spinulosa* reef were identified along the middle section of the pipeline route.
PL084	One area of potential *S. spinulosa* reef was identified in the north-western end of the pipeline route.
PL085	Three areas of potential *S. spinulosa* reef were identified in close proximity to each other along the middle section of the pipeline route. One small area was located in the northern section of the pipeline route.
PL087/PLU4743	Three areas of potential *S. spinulosa* reef were identified in close proximity to each other along the northern end of pipeline/umbilical route.
PL1173	One area of potential *S. spinulosa* reef was identified along the south-east section of the pipeline route near platform 48/29-C.
PL584/PL1323	Twelve areas of potential *S. spinulosa* reef were identified in close proximity to each other along the middle section of the pipeline route.
PL1177/PL086/U30-8R/PLU4690	Eleven areas of potential *S. spinulosa* reef were identified between the western end of the pipeline route and the middle section of the pipeline route.
Other Routes	No areas of potential *S. spinulosa* reef were identified along pipeline routes PL21, PL83, PL1629 and PL446.

During the recent environmental baseline survey (Fugro, 2023), patches of *S. spinulosa* were classified at a maximum reefiness of 'high' on eight transects, 'medium' on nine transects, 'low' on nine transects and 'not a reef' on 14 transects (including the entirety of all stations where *S. spinulosa* was present and transects TR25_V2 and TR26_V2). *S. spinulosa* was regularly observed throughout the majority of the offshore survey area, with the proportion of the 'low' reef to 'high' reef categories ranging from 6.7 % along transect TR03 to 72.5 % along transect TR16. The presence of this species in the survey areas means that it is likely that Annex I 'Reefs' habitat is present in the survey area. Furthermore, the near proximity of the Saturn reef may function as a gamete source population resulting in recruitment between reefs in the near area. However, this cannot be confirmed since little is known about the connectivity between *S. spinulosa* reefs. Due to an absence of geophysical data, it was not possible to delineate the potential reef areas.

Example photographs of *S. spinulosa* from survey stations are displayed in Section 6.3.2.

All video and geophysical data collected during the pre-decommissioning environmental baseline surveys (Fugro, 2023) has been reviewed by Fugro using the Joint Nature Conservation Committee (JNCC) guidelines for assessment of 'reefiness' of *S. spinulosa* aggregations (Gubbay, 2007) and JNCC / Centre for Environment, Fisheries and Aquaculture Science (Cefas) recommended methodologies (Jenkins *et al.,* 2015).

Table 6-10 provides an estimated coverage of *S. spinulosa* over each ground truthed transect, with potential *S. spinulosa* categorised following the 'reefiness' structure matrix. *S. spinulosa* reef is listed as an Annex I habitat under the Habitats Directive (Council Directive 92/43/EEC) and a UK BAP priority marine habitat (JNCC, 2007).

Table 6-10: **Summary of estimated *S. spinulosa* reefiness structure, identified at the Subsea Pipeline Survey Areas (Fugro, 2023)**

Transect	Percentage of transect (%)				
	Total Length of Transect	Not Reef	Low Reef	Medium Reef	High Reef
ST01	54.5	100	-	-	-
ST04	50.8	100	-	-	-
ST08	43.7	100	-	-	-
STREF1	62.2	100	-	-	-
STREF2	43.1	100	-	-	-
TR03_V2	280.7	93.3	4.4	2.3	-
TR09_V2	436.6	52.6	26.0	13.0	8.4
TR10_V2	499.0	56.6	30.1	10.2	3.2
TR11	282.6	64.3	26.1	6.7	2.8
TR12_V2	542.5	63.8	23.7	7.1	5.3
TR14_V2	304.7	49.0	32.5	14.2	4.3
TR15_V2	195.7	95.1	3.5	0.6	0.9
TR16	442.1	27.5	42.4	23.7	6.5
TR19_V2	252.7	19.4	1.8	2.7	0.9
TR25_V2	143.0	100	-	-	-
TR26_V2	134.2	100	-	-	-

During the recent environmental baseline survey (Fugro, 2023), patches of *S. spinulosa* were classified at a maximum reefiness of 'high' on eight transects, 'medium' on nine transects, 'low' on nine transects and 'not a reef' on 14 transects (including the entirety of all stations where S. spinulosa was present and transects TR25_V2 and TR26_V2). *Sabellaria spinulosa* was regularly observed throughout the majority of the offshore survey area, with the proportion of the 'low' reef to 'high' reef categories ranging from 6.7 % along transect TR03 to 72.5 % along transect TR16. The presence of this species in the survey areas means that it is likely that Annex I 'Reefs' habitat is present in the survey area. Furthermore, the near proximity of the Saturn reef may function as a gamete source population resulting in recruitment between reefs in the near area. However, this cannot be confirmed since little is known about the connectivity between *S. spinulosa* reefs. Due to an absence of geophysical data, it was not possible to delineate the potential reef areas.

Example photographs of *S. spinulosa* from survey stations are displayed in Section 6.3.2.

6.4.3 Fish and Shellfish

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

- Pelagic species occur in shoals swimming in mid-levels of the water, typically making extensive seasonal movements or migrations between sea areas. Pelagic species include herring, mackerel, blue whiting and sprat;
- Demersal species live on or near the seabed and include haddock, cod, plaice, sandeel, sole and whiting.

Table 6-11 identifies the fish species which were observed in the vicinity of the Hewett subsea pipelines during the Pre-Decommissioning Survey.

Table 6-11: **Fish and shellfish species identified within the Hewett Field Area**

Species
Lesser sandeel (*Ammodytes sp*)
Flatfish (Pleuronectiformes)
Crabs (*Liocarcinus* sp, Brachyura including *Necora puber* and *Cancer pagurus*)
Hermit crabs *(Paguridae including Pagurus bernhardus).*
Anemones (Actiniaria including Sagartiidae, *Urticina* sp. and *Metridium* sp.)
Starfish (*Asterias rubens*)
Tunicates (Ascidiacea)
Shrimp (Caridea)
Fish (Gnathostomata)

The North-East Atlantic and North Sea is split into statistical grids called International Council for the Exploration of the Sea (ICES) Rectangles in order to map statistical information about the area. The majority of the Hewett subsea pipelines are located within ICES Rectangle 35F1. The export pipelines (PL020 & PL021) cross into 34F1 as they approach Bacton. A number of spawning and nursery grounds for fish species are located within the vicinity of the Hewett Field Area as listed in Table 6-12 and illustrated in Figure 6-11 and Figure 6-12.

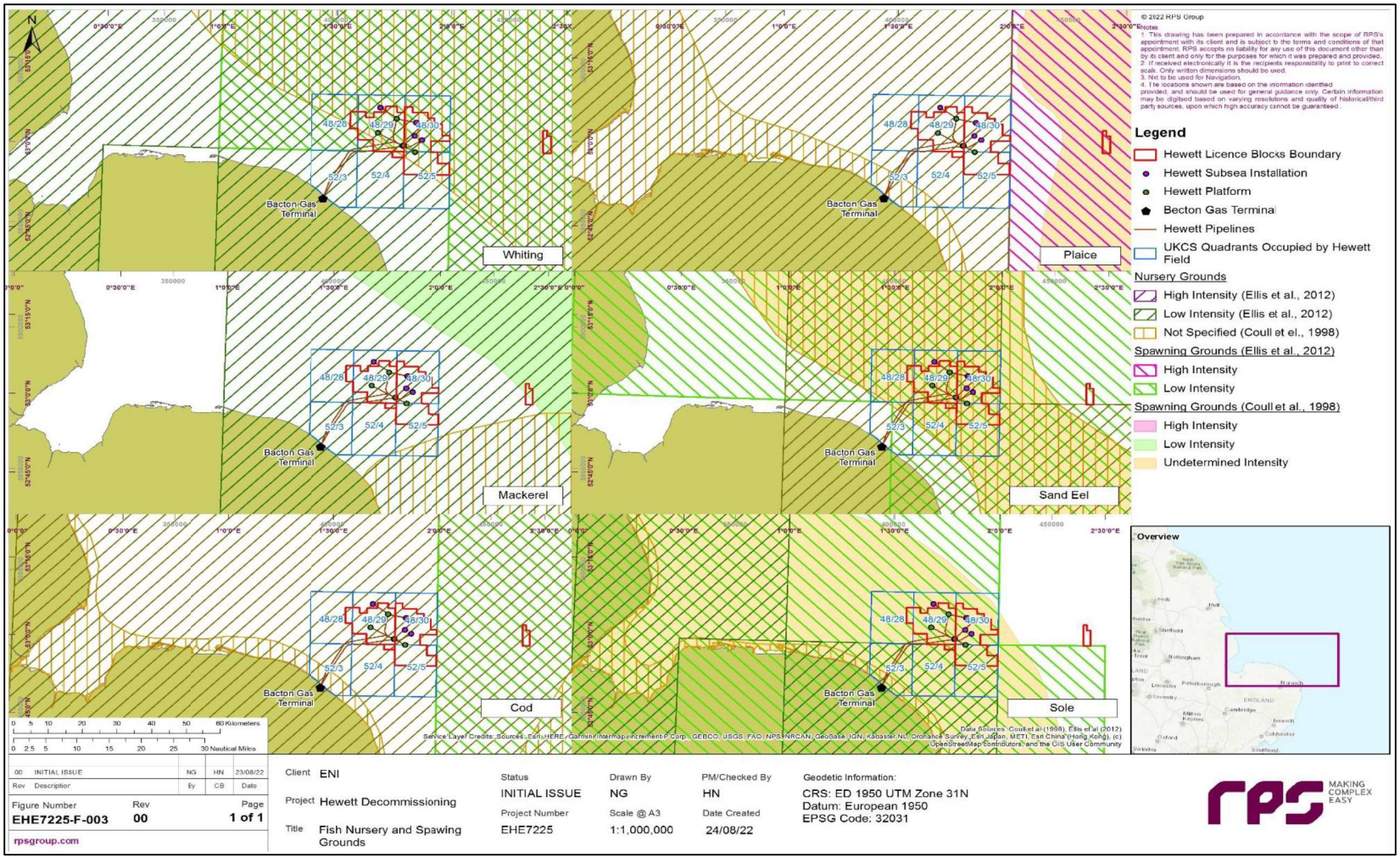


Figure 6-11: **Fish Spawning and Nursery Grounds (1 of 2) in the vicinity of the Hewett Field Area**

Figure 6-12: Fish Spawning and Nursery Grounds (2 of 2) in the vicinity of the Hewett Field Area

Table 6-12: **Spawning and nursery grounds in the vicinity of the Hewett Field Area (Coull *et al*., 1998; Ellis *et al*., 2012)**

Species	J	F	M	A	M	J	J	A	S	O	N	D
Herring (N)												
Mackerel (N)												
Sprat					*	*						
Whiting (N)												
Cod (N)												
Plaice (N)	*	*										
Sole				*								
Lemon sole (N)												
Sand eel (N)												
Thornback ray (N)				*	*	*	*	*				
Spawning	Peak spawning *						N = Nursery area					

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

Fish species observed during the Hewett pre-decommissioning surveys include: common dragonet, pogge, dab, juvenile gadoid fish, sandeels, sole, yellow sole, mackerel, gobies and butterfish (Fugro, 2023).

All of the species mentioned above, with the exception of haddock, lemon sole and all the species identified during the Pre-Decommissioning Survey, are listed as UK BAP priority marine species (JNCC, 2007). Cod is on the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2014b). In addition, cod and haddock are 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 are listed as 'Least Concern' (IUCN, 2022).

6.4.4 Elasmobranchs

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 over-fishing pressures and pollution events, and 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 (Kunzlik, 1988). 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 conducted by CEFAS, 26 elasmobranch species were recorded throughout the North Sea and surrounding waters (Ellis *et al*., 2004). Species which have been recorded in the southern North Sea at various times throughout the year and may therefore be present in the vicinity of the Hewett Field Area are listed in Table 6-13 (Ellis *et al*., 2004).

Table 6-13: Distribution, Abundance and Current Status on the IUCN Red List of the Elasmobranchs Species Likely to be found in the Hewett Field Area (Ellis *et al.*, 2004; IUCN, 2022)

Common Name	Latin Name	Location	Depth range (metres)	Global IUCN Status[1]
Spurdog	*Squalus acanthias*	widespread	15-528	Vulnerable
Lesser-spotted dogfish	*Scyliorhinus canicula*	South and west British borders	6-308	Least Concern
Tope shark	*Galeorhinus galeus*	widespread	17-200	Critically Endangered
Starry smooth hound	*Mustelus asterias*	widespread	10-199	Near Threatened
Common smooth hound	*Mustelus mustelus*	South and west British borders	9-421	Endangered
Thorny Skate	*Amblyraja radiata*	North Sea	32-209	Vulnerable
Cuckoo Skate	*Leucoraja naevus*	Irish Sea, Celtic Sea & northern North Sea	12-290	Least Concern
Blonde Skate	*Raja brachyura*	South and west British borders	14-146	Near Threatened
Thornback Skate	*Raja clavata*	South and west British borders	7-192	Near Threatened
Spotted Skate	*Raja montagui*	South and west British borders	8-283	Least Concern
Undulate Skate	*Raja undulata*	English Channel	0-72	Endangered

[1]Status as of August 2022

Of these species spurdog, tope shark, common smooth hound, thorny skate, and undulate skate are of most concern due to their unfavourable conservation status (IUCN, 2022). In addition, spotty ray and thornback ray are listed on the OSPAR list of threatened and/or declining species and habitats (OSPAR, 2014b).

6.4.5 Marine Mammals

6.4.5.1 Cetaceans

Cetacean abundance in the southern North Sea is relatively low compared to the northern and central North Sea, with the exception of the harbour porpoise (*Phocoena phocoena*). Ten species of cetacean have been sighted in the southern North Sea, however only the harbour porpoise and the white-beaked dolphin (*Lagenorhynchus albirostris*) are considered to be regularly occurring. Harbour porpoise feed mainly on species found on or near the seabed, in the southern North Sea their diet is mainly comprised of whiting,

sandeels, European sprat, and herring (Ransijn *et al.,* 2019). White-beaked dolphins' diet is mainly comprised of pelagic species including herring, mackerel, horse mackerel, silvery pout and squid (DECC, 2016).

Minke whale is a frequent seasonal visitor, whilst bottlenose dolphin and white-sided dolphin are considered uncommon visitors (DECC, 2016).

Harbour porpoise are found in persistently high densities year-round at the Inner Silver Pit, in summer at the north-western edge of Dogger Bank, and in winter in offshore areas east of Norfolk and east of the Outer Thames estuary. Modelled density for harbour porpoise provides results of more than 3 animals/km^2 for the winter months (October-March) and roughly 1.5 animal/km^2 for the summer months (April-September) (see Figure 6-13) (Heinänen and Skov, 2015).

The UK Statutory Nature Conservation Bodies (SNCBs) have defined Marine Mammal Management Units (MMMUs) for six cetacean species (harbour porpoise, common dolphin, bottlenose dolphin, white-beaked dolphin, white-sided dolphin and minke whale) in UK waters to help provide an understanding of the geographical range and abundance of marine mammal populations, and subpopulations, to aid conservation and management purposes. The MMMUs within which the Hewett subsea pipelines are located, along with the corresponding abundance of animals within these units, are listed in Table 6-14.

Table 6-14: Estimates of Cetacean Abundance (IAMMWG, 2015)

Species	Management Unit	Abundance of Animals	95% Confidence Interval	Density [1]
Bottlenose dolphin	Greater North Sea (639,886 km^2)	0	-	-
Harbour porpoise	North Sea (678,206 km^2)	227,298	176,360 – 292,948	0.335
Risso's dolphin [2]	Marine Atlantic [3]	-	-	-
Common dolphin	Celtic and Greater North Seas (1,560,875 km^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

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

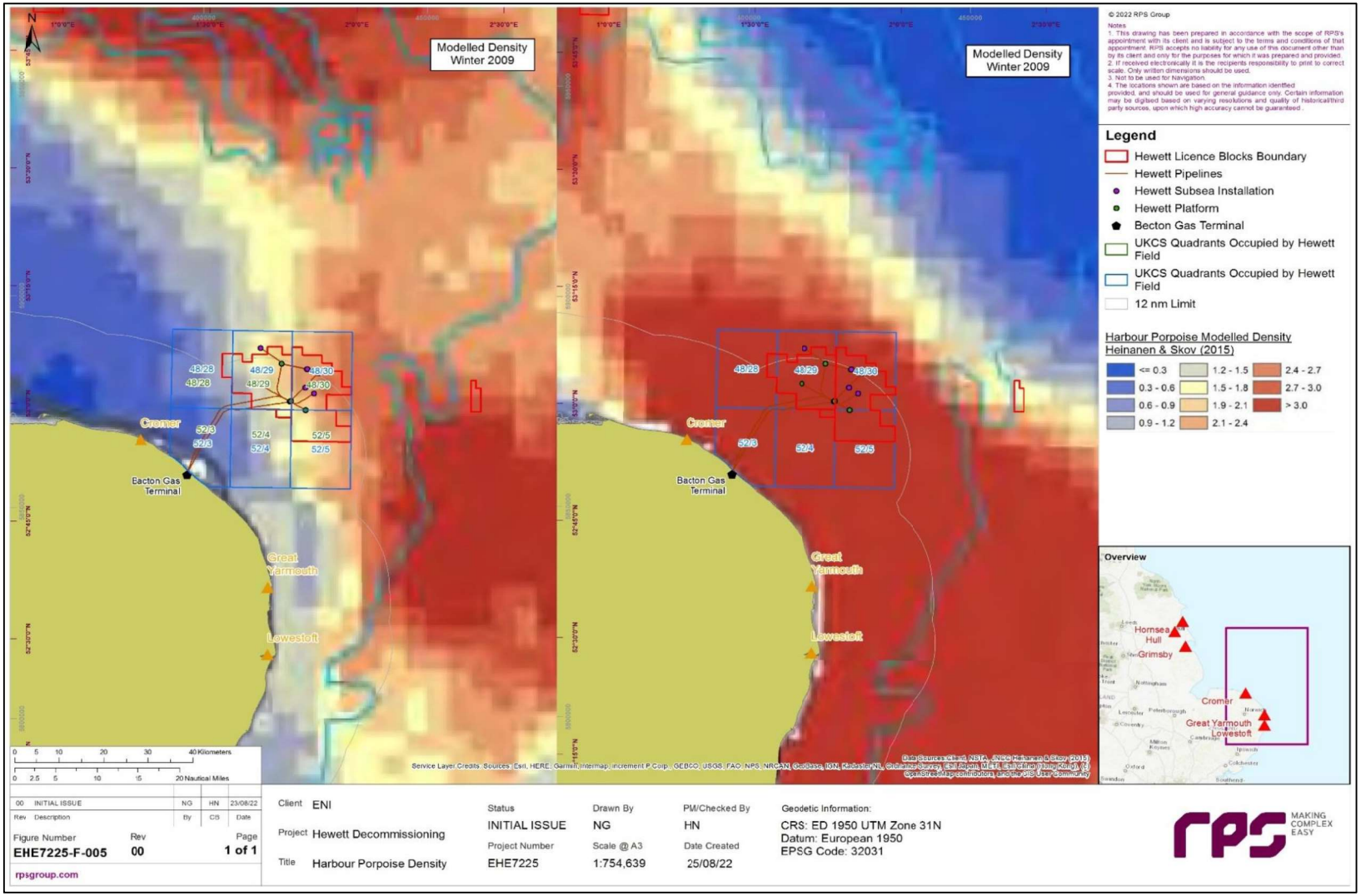


Figure 6-13: Persistently higher density area of harbour porpoise in winter and summer, based on modelled data (after Heinänen and Skov, 2015)

It is evident that harbour porpoises are the most abundant species in the North Sea, despite its MMMU being smaller in area (IAMMWG, 2015). White-sided dolphins are the next most abundant, however this species was not recorded in significant numbers in other surveys.

The relative abundance and density of cetaceans in the vicinity of the Hewett subsea pipelines can also be derived from data obtained during the Small Cetacean Abundance of the North Sea (SCANS-III) aerial and ship-based surveys. This project identified the abundance and density of cetacean species within predefined sectors of the North Sea and North-East Atlantic. The Hewett subsea pipelines are all situated within SCANS-III Block O in which harbour porpoise, minke whale and white-beaked dolphin have been recorded (see Table 6-15) (Hammond *et al.*, 2017). It should be noted that although density estimates are shown in Table 6-15, they are only an example of what densities could be encountered in the area due to the wide-scale nature of the SCANS-III survey and the fact the data was only collected in July 2016.

Table 6-15: Cetacean Abundance and Density Recorded in SCANS-III Aerial Survey Area Block O (Hammond *et al.*, 2017)

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

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

The density of the harbour porpoise within the SCANS-III Block O is higher than the total surveyed area, again indicating that the area is important for this species. Densities for minke whale were similar to the total surveyed area, whereas densities for the white-beaked dolphin were a magnitude lower as illustrated in Figure 6-14, Figure 6-15 and Figure 6-16.

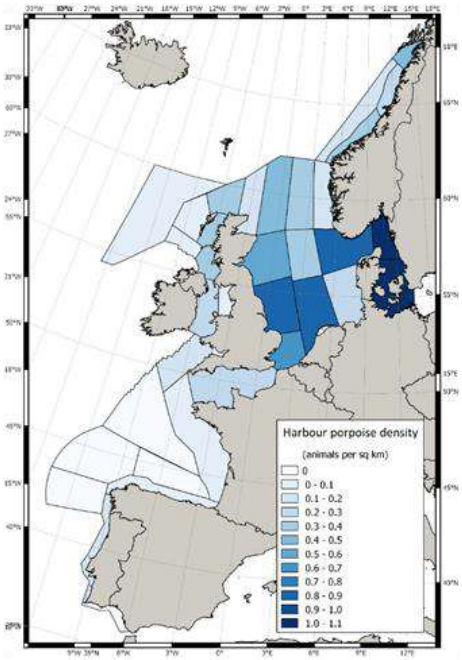


Figure 6-14: **Harbour Porpoise sightings observed in SCANS III Survey**

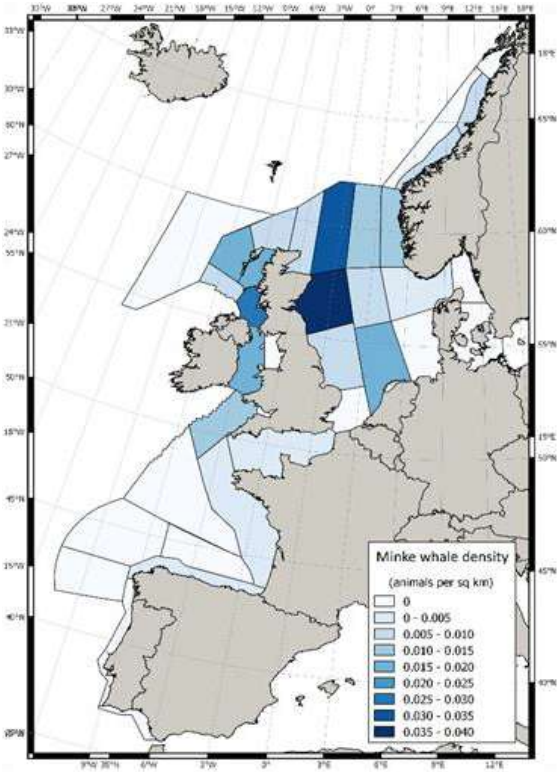


Figure 6-15: Minke whale sightings observed in SCANS III survey

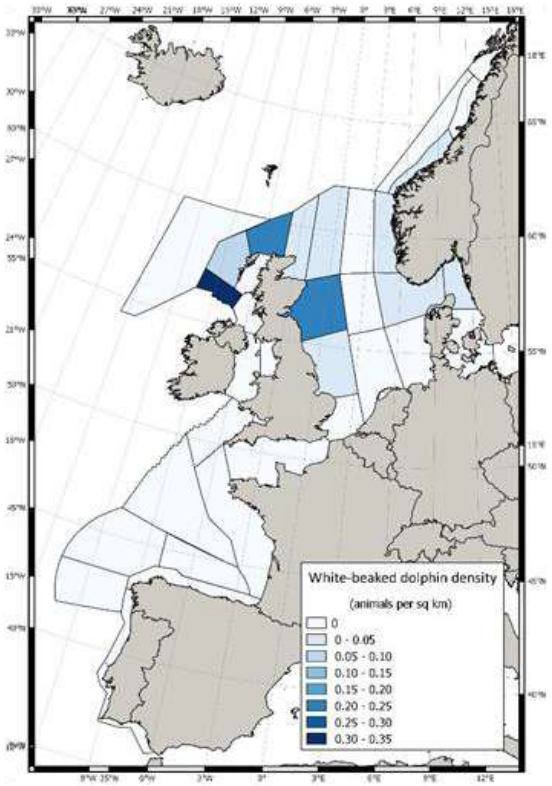


Figure 6-16: White beaked dolphin sightings observed in SCANS III survey

As the SCANS-III survey area encompasses a relatively large geographical area and is therefore unlikely to accurately reflect the abundance and densities of cetaceans which may be present within the vicinity of the Hewett subsea pipelines, data from the JNCC Atlas of Cetacean Distribution in north-west European Waters has been used to give a more localised indication of the season distribution of cetaceans. The seasonal sightings data for ICES Rectangle 35F1 indicates that low densities of harbour porpoise and the white-beaked dolphin have been recorded in the area (see Table 6-16) (Reid *et al*., 2003).

Table 6-16: **Cetacean Sightings in ICES Rectangle 35F1 (Reid *et al*., 2003*)***

Species / Month	J	F	M	A	M	J	J	A	S	O	N	D
Harbour porpoise												
White-beaked dolphin												
Key (Number of individuals per hour of sightings effort)												
High (<100)	Medium (10-100)		Low (0.01-10)			Very low (< 0.01)			No Occurrence			

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 and white-beaked dolphin, may be present at other times of the year.

All cetaceans (whales, dolphins and porpoises) are protected under Annex IV of the Council Directive 92/43/EEC (also known as the Habitats Directive). In addition, harbour porpoise is listed on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2014b) and under Annex II of the EC Habitats Directive, which requires the designation of SACs for these species in order to facilitate their conservation. All of the species that may occur in the vicinity of the Hewett subsea wells and manifolds are listed as UK BAP priority species (JNCC, 2007), but are of least concern on the IUCN Red List (IUCN, 2022).

6.4.5.2 Pinnipeds

Two species of seals, the grey seal (*Halichoerus grypus*) and the harbour (or common) seal (*Phoca vitulina*) are found along the English coast. Important numbers of grey and harbour seals are present off the east coast of England, particularly around The Wash where harbour seals forage over a wide area. Grey and harbour seals are both listed under Annex II of the EC Habitats Directive, requiring the designation of SACs in order to protect these species. In addition, harbour and grey seals are protected under the Conservation of Seals Act 1970 and are listed as UK BAP priority marine species (JNCC, 2007).

Grey seals are incredibly rare globally, and the UK hosts around 40% of the world's population and 95% of the EU population. Several colonies exist on the east coast of England, including Donna Nook, Blakeney Point, Horsey, Flamborough Head and The Wash. A total of 8,199 grey seals were counted between Donna Nook and Dover in August 2018 (DECC, 2016; SCOS, 2019).

Grey seals forage in the open sea and return regularly to haul out on land where they rest, moult and breed. Grey seal foraging movements are on two geographical scales: long and distant trips from one haul-out site to another; and local repeated trips to discrete foraging areas (McConnell *et al*., 1999). Foraging areas can be up to 100 km offshore and connected to haul-out sites by prominent high-usage corridors (Jones *et al.,* 2015). The distribution of grey seals in the vicinity of the Hewett subsea pipelines is low (<5 individuals per 25 km^2 in all blocks, except the northern edge of Block 48/30 where it ranges from 5 to 10 individuals per 25 km^2) as shown in Figure 6-17 (Russel *et al.,* 2017). Densities at sea are lower during pupping and breeding season, which in south-east Britain occurs between August and September, and during the moulting season from February to March (SCOS, 2018).

Around 30% of EU harbour seals are found in the UK. Their distribution on the east coast of the UK is restricted, concentrated in major estuaries including the Thames, The Wash and the Moray Firth. The south-east coast of England hosts several harbour seal colonies and haul-out sites, with 5,199 individuals recorded in the region in 2016. The largest colony in the UK is The Wash, with an estimated 3,632 individuals counted in 2018 (SCOS, 2019).

In general, the harbour seal tends to forage within 40-50 km of its haul-out sites (SCOS, 2018), however tagging studies have demonstrated that individuals from haul-out sites in The Wash forage for much greater distances than individuals from elsewhere in the UK (Sharples *et al.,* 2012). The distribution of harbour seals in the vicinity of the Hewett subsea pipelines is low (<1 individual per 25 km^2) as shown in Figure 6-17 (Russel *et al*., 2017). Additionally, harbour seals spend more time ashore at haul-out sites from June to July during breeding and in August during moulting season, and thus densities at sea are lower during this time (SCOS, 2018).

The UK SNCBs have defined management units for grey and harbour seals in inshore UK waters in order to provide an understanding of their geographical range, and abundance of their populations, and subpopulations, to aid conservation and management purposes. The Hewett subsea pipelines are located within the Southeast England management unit for seals (IAMMWG, 2013). Table 6-17 shows the seal count and estimated population for this management.

Table 6-17: **Population Sizes of Seals in the vicinity of Hewett Field Area (IAMMWG, 2013)**

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

[1] An independent population estimate for grey seals was calculated using counts obtained during the 2007 and 2008 summer surveys (Lonergan *et al*. 2011). This estimate was not available for harbour seals.

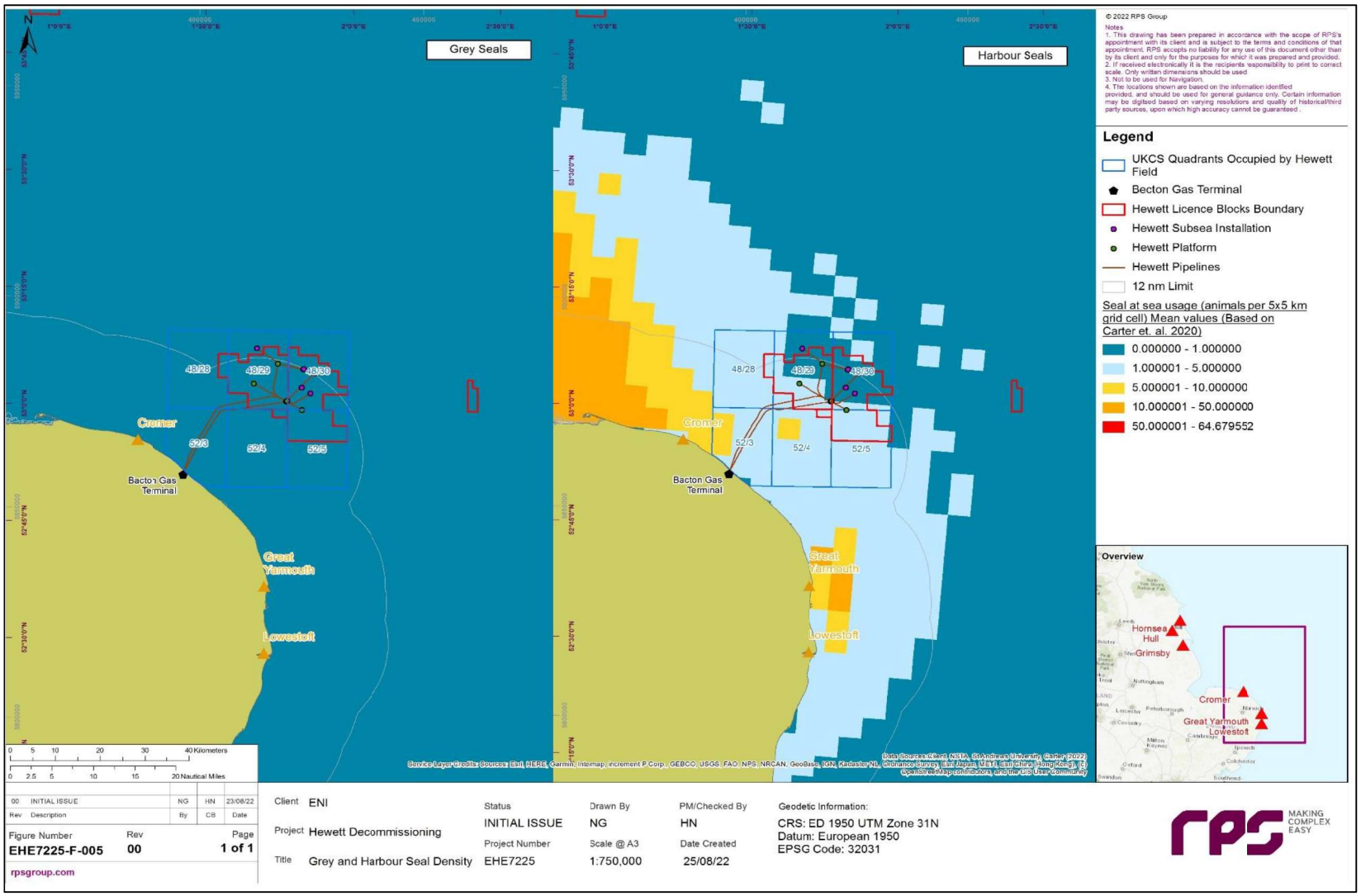


Figure 6-17: Seal Abundance in the vicinity of the Hewett Field Area (Russel *et al.*, 2017)

6.4.6 Seabirds

The offshore waters of the southern North Sea are visited by seabirds, mainly for feeding purposes in and around the shallow sandbanks. The adjacent coastline includes a number of 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 most Hewett subsea pipelines may originate from onshore colonies, or be passing migrants (DECC, 2016). Of note is that the Hewett subsea pipelines lie adjacent to several Special Protection Areas (SPAs) on the Norfolk coastline, which have been designated for the protection of breeding colonies of seabirds. Given the proximity to the coastline (22 km), the Hewett subsea pipelines lie within the maximum breeding foraging ranges of most seabirds, including common eider, fulmar, Manx shearwater, storm petrel, gannet, cormorant, Arctic skua, great skua, common gull, herring gull, lesser black-backed gull, kittiwake, sandwich tern, common tern, Arctic tern, guillemot, razorbill and puffin (Thaxter *et al*., 2012; Woodward *et al*, 2019).

The boundary of the Greater Wash SPA has been derived from surveys that have observed foraging behaviour of those qualified species: Red throated diver (*Gavia stellata*), little gull (*Hydrocoloeus minutus*), little tern (*Sternula albifrons*), sandwich tern (*Sterna sandvicencis*), common tern (*Sternula albifrons*) and common scoter (*Melanitta nigra*).

Common terns have a smaller foraging range than the larger sandwich tern. The maximum foraging distance recorded by Woodward *et al*. 2019 for common terns is 30 km, whilst for the sandwich tern it is 80 km. Little terns do not regularly occupy the Greater Wash; however, studies have suggested the foraging range of Little tern (related to its body size) is smaller than that of the larger tern species. This dictates that it nests close to shallow coastal waters with a supply of small shoaling fish such as Sand eels and clupeids and invertebrates which comprise its diet. Mean foraging range for little tern colony is less than 5 km from the colony. (Woodward *et al.,* 2019). All the identified tern species plunge-dive to seize fish from the top of water column (they usually dive to no more than 2m depth), often following spells of hovering.

Red-throated divers wintering in the North Sea are thought to feed predominantly on small fish such as herring, sprats, and Sand eels. Red-throated divers are highly sensitive to anthropogenic activity and move away from ships and other structures (O'Brien, 2018). Their maximum foraging range has been recorded as 9 km, therefore red-throated divers are unlikely to be within the vicinity of the subsea wells (Woodward *et al.,* 2019).

The common scoter, wintering in the North Sea, forages over sandy substrates on mussels, cockles and other bivalve molluscs, with other molluscs, crustaceans and small fish forming a smaller part of their diet (Natural England, 2012). The common scoter has been recorded foraging 30 km from the shore and they have a maximum recorded diving depth of 20m (Kaiser *et al*, 2006; Natural England, 2012).

The European Seabirds At Sea (ESAS) database is the most complete and longstanding dataset detailing the distribution of seabirds at sea, compiling a range of boat and transect data over a period of 29 years. The ESAS data (Table 6-18) suggests that seabirds do not use the area in the vicinity of the Hewett subsea pipelines in high densities, predicting a maximum of 4 seabirds per km^2 during the breeding season (March – September) and 6 seabirds per km^2 in winter (November – March). The most abundant species likely to be present in the vicinity of the subsea pipelines are fulmar, kittiwake and guillemot in the breeding season; kittiwake, great black-backed gull, guillemot and razorbill over winter and guillemot in the post-breeding dispersal period (JNCC, 2019a; Kober *et al*., 2010).

An ornithological boat-based survey completed between 30th June and 6th July 2021 confirmed no birds were nesting on the Hewett field platforms (RSK Biocensus, 2021).

Table 6-18: **Predicted Seabird Surface Density in the Vicinity of the Hewett Subsea Pipelines (Maximum number of individuals per km^2) (JNCC, 2019a; Kober *et al.*, 2010)**

Species	Season	J	F	M	A	M	J	J	A	S	O	N	D
Fulmar	Breeding												
	Winter												
Sooty shearwater	Winter												
Manx shearwater	Breeding												
Gannet	Breeding												
	Winter												
Pomarine skua	Other – spring												
	Other - autumn												
Arctic skua	Breeding												
Great skua	Breeding												
Kittiwake	Breeding												
	Winter												
Black-headed gull	Breeding												
Little gull	Winter												
	Other												
Great black-backed gull	Breeding												
	Winter												
Common gull	Breeding												
	Winter												
Lesser black-backed gull	Breeding												
Sandwich tern	Breeding												
Arctic tern	Breeding												
Guillemot	Breeding												
	Winter												
	Other												
Razorbill	Breeding												
	Winter												
	Other												
Atlantic puffin	Breeding												
	Winter												
All species combined	Breeding												
	Winter												

Key (Number of individuals per hour of sightings effort)				
6.0 – >10.0	4.0 – 6.0	1.0 - < 4.0	< 1.0	No Occurrence

Seabird populations are particularly vulnerable to surface pollution. The sensitivity of bird species to oil pollution varies considerably throughout the year and is dependent on a variety of factors, including time spent on the water, total biogeographical population, reliance on the marine environment and potential rate of population recovery. Species considered most vulnerable to sea surface pollution are those which spend a great deal of time on the sea surface, for example puffin, guillemot and razorbill. Species considered to be at lower risk, due to spending less time on the sea surface, include gannet, cormorant and kittiwake.

The Seabird Oil Sensitivity Index (SOSI) (Webb *et al*., 2016) combines seabird data collected between 1995 and 2015 and individual seabird species sensitivity index values to create a single measure of seabird sensitivity index values to create a single measure of seabird sensitivity to oil pollution. The SOSI score for each UKCS Block can be ranked into sensitivity categories, from 1 (Extremely High Sensitivity) to 5 (Low Sensitivity). An assessment of the median SOSI scores indicates that the sensitivity of seabirds to oil pollution across the blocks of interest is highest during winter months (very high to extremely high across all Blocks during December, January and February). Sensitivity is high to very high during March, April, and November across all blocks, and predominantly low to medium from May to October, with slightly higher (high) sensitivity during August in Block 28/28 (see Table 6-19 and Figure 6-18; Webb *et al.,* 2016).

Table 6-19: **Seabird Oil Sensitivity Index for UKCS Blocks 48/28, 48/29, 48/30, 52/03, 52/04, 52/05 and adjoining blocks (Webb *et al*., 2016)**

Quad / Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
48/23	2	2	3	3*	5	5	5	3	4	2*	2	2
48/24	1	2	2	2*	4	5	5	3	3	2*	2	2
48/25	1*	1	1	1*	3**	5**	4*	4	4*	2*	2	2
48/28	2	2	3	3*	5	5	5	3	4	2*	2	2
48/29	1	1	3	3*	4	5	5	4	5	3*	3	2
48/30	1*	1	3	3*	4**	5*	5	4	5	3*	3	2
49/21	1	1	4	4	5	5	5	5	5	5	3	2
49/26	1*	1	4	4*	5**	5**	5*	5	5	3*	3	2
52/03	2	2	3	3*	5	5	5	4	5	3*	3	2
52/04	2	1	2	2*	5	4	5	4	5	3*	3	2
52/05	1	1	3	3*	5	5	5	4	5	3*	3	2
53/01	1	2	3	3*	5**	3**	5*	5	5	3*	3	2

Key

1= Extremely High Sensitivity, 2=Very High Sensitivity, 3= High Sensitivity 4= Medium Sensitivity, 5=Low Sensitivity, N=No data;

	Indirect Assessment - Coverage gap populated with estimate based JNCC guidance (JNCC, 2016)
*1-5	Coverage gaps populated using data from the same block in adjacent month (Step 1)
**1-5	Coverage gaps populated using data from adjacent blocks within the same month (Step 2)

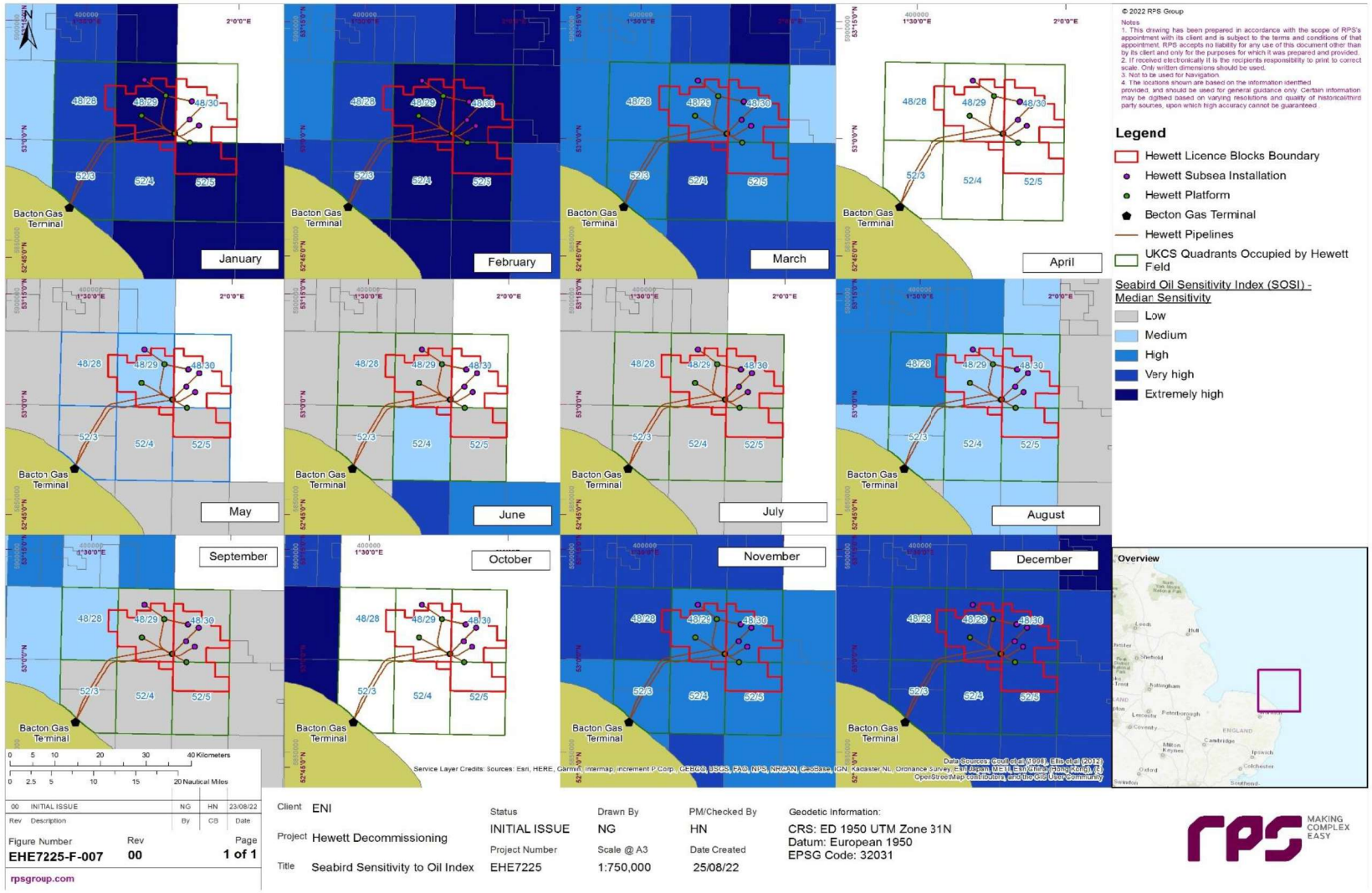


Figure 6-18: Seabird Oil Sensitivity Index for UKCS Blocks 48/28, 48/29, 48/30, 52/03, 52/04, 52/05 and adjoining blocks (after Webb *et al.*, 2016)

6.5 Socio-Economic Sensitivities

6.5.1 Commercial Fishing

The North Sea is one of the world's most important fishing grounds, and major UK and international fishing fleets operate in the southern North Sea, including vessels from England, Scotland, Belgium, Holland, Denmark and France (DECC, 2009). However, there is relatively limited fishing effort recorded near the Hewett field, with the majority of the effort concentrated in the north of the region, on the Dogger Bank, within the Wash and along the Suffolk coast (DECC, 2016).

Fishing effort and landings are recorded by ICES Rectangle on a monthly and annual basis. The majority of Hewett subsea pipelines are located within ICES Rectangle 35F1. The export pipelines (PL020 & PL021) cross into 34F1 as they approach Bacton, however it should be noted that the decommissioning option for these lines are 'leave in situ'. Figure 6-19 identifies the average landing values (2012-2016) by species and method in ICES Rectangles 35F1 and 34F1.

Fishing effort from 2010 to 2014 within ICES Rectangle 35F1 was generally low, with less than 100 days fished per year, with peak effort during the summer months. The dominant gear types within ICES Rectangle 35F1 were beam trawls targeting demersal or near demersal fish and shellfish. This is also reflected in the landings data, which demonstrate that demersal species make up the highest proportion of catch in terms of landings by weight and value. Landings data also shows a dominance of demersal flatfish species such as plaice, sole, turbot and dab (Marine Scotland, 2020). More up-to-date fisheries data is unavailable for ICES Rectangle 35F1 and the data from Marine Scotland only takes account of UK registered vessels; however, foreign vessels particularly those from Greece, Italy, Spain and Portugal are also known to undertake commercial fishing activities within UK waters (MMO, 2015).

A fisheries Interaction Risk Assessment has been undertaken within the Hewett Field Area which identifies the intensity of fishing within the vicinity of the subsea infrastructure. The study shows fishing pressure throughout the Hewett Field Area is generally low with an average of 0 to 73 hours of fishing per year between 2009 and 2017 (Xodus, 2021a).

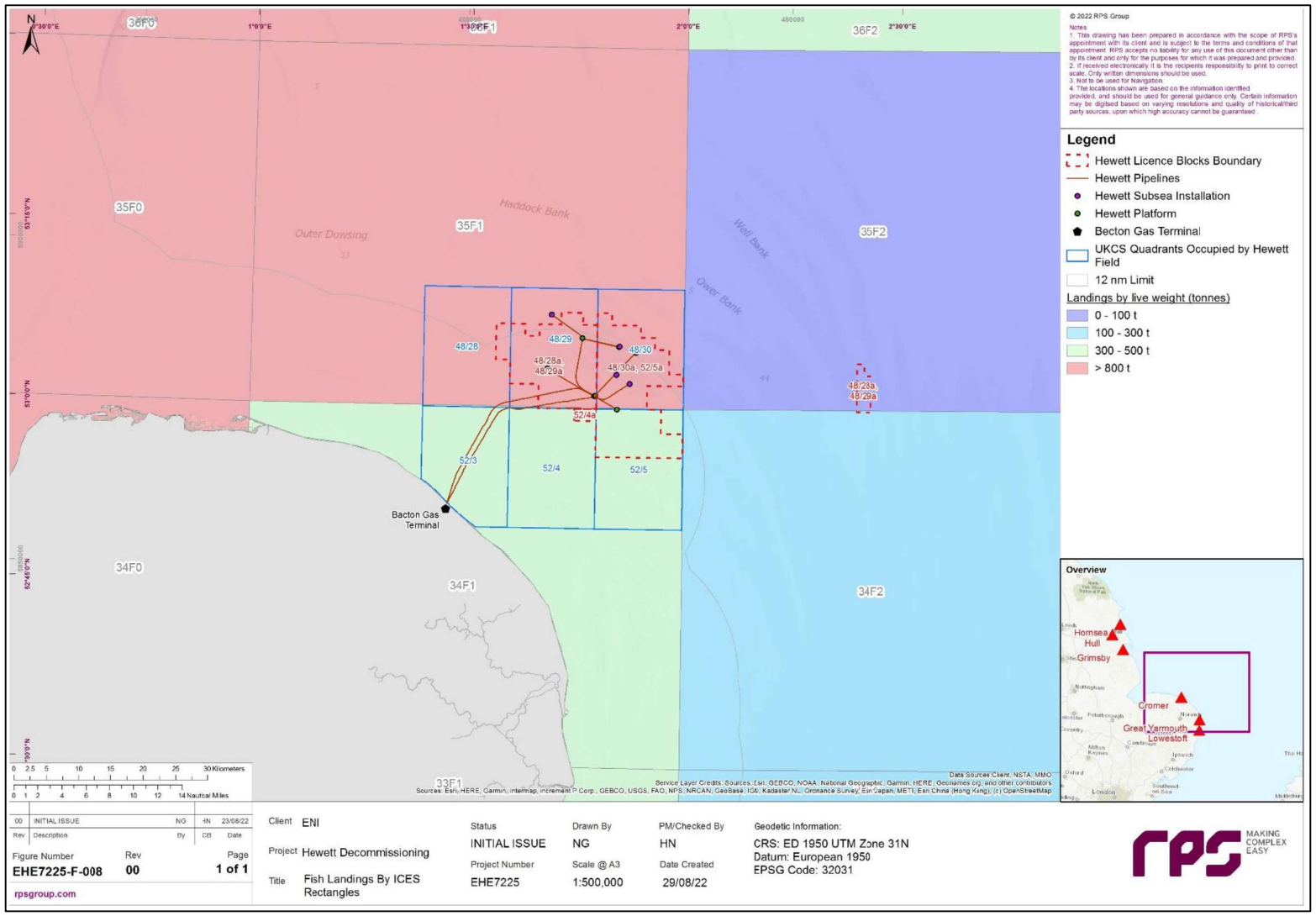


Figure 6-19: Fish Landings by ICES Rectangle in the proximity of the Hewett Field Area (MMO, 2015)

6.5.2 Shipping

The Hewett Field Area is located in part of the North Sea which contains some of the world's busiest shipping routes and ports. Oil and gas fields generate moderate vessel traffic in the form of support vessels, principally operating from Great Yarmouth and Lowestoft. Shipping density is considered to be very high in Blocks 48/28, 48/29, 52/04, and 52/05, and high in Block 48/30. There is no data available from Block 52/03(MMO, 2014 and DECC, 2016).

A vessel traffic survey has been undertaken by Xodus Group on behalf of Eni for the project. The overall study area (within 10 nautical miles (nm); 18.5km), centred on seven wells; 48/29-9, 48/30-9, 48/30-10, 48/30-11z, 48/30-14, 48/30-15z and 48/30-18) contained a total of 13,135 routine vessel tracks associated with 1,533 different vessels, which corresponds to an estimated 36 vessel transits per day. The majority of routine vessel tracks in the study area are associated with shipping lane traffic, accounting for 90.3% of all routine traffic across the whole study area. Compared to shipping lane traffic, in-field traffic represents a much lower proportion of routine tracks (9.7% for the whole study area) (Xodus, 2021b).

In total 25 shipping lanes were identified in the overall study area (see Figure 6.27) and the three most common port of origins within in this area were Immingham (2,043 tracks, 17.2%), Great Yarmouth (1,523 tracks, 12.8%) and Rotterdam (1,121 tracks, 8.4%). The most common destination ports were similar, with Immingham (2,483 tracks, 20%), Great Yarmouth (1,527 tracks, 12.9%) and Tees (1,185 tracks, 10.0%) being the most common (Xodus, 2021b).

For shipping lane traffic, cargo vessels accounted for the largest proportion of tracks across the overall study area, varying between a maximum of 70.0% of shipping lane traffic within 10 nm of 48/30-9, and a minimum of 62.1% within 10 nm of 48/29-9. Tanker vessel tracks were lower than cargo, representing between 22.1% (within the 10 nm study area of 48-30-9) and 19.7% (within the 10 nm study area of 48/29-9) of all shipping lane traffic (Xodus, 2021b).

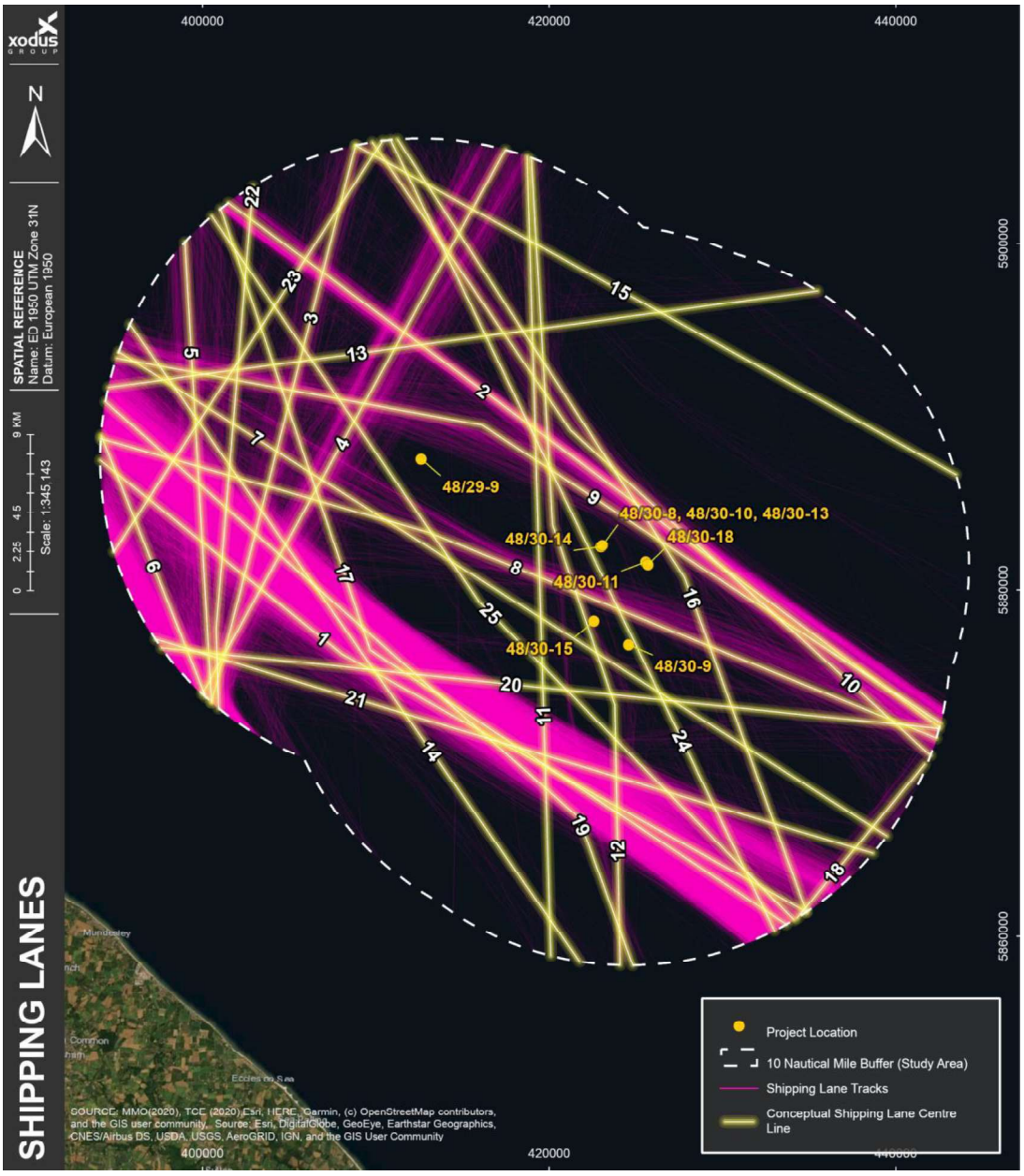


Figure 6-20: Shipping Lanes (Xodus, 2021b)

6.5.3 Oil and Gas Activities

The Hewett Field Area is located in a region well developed by the oil and gas industry. The only oil and gas facilities within approximately 26km of the Hewett Field Area are those associated with the Perenco operated Leman Field located north-west of Hewett, as illustrated in Figure 6-21).

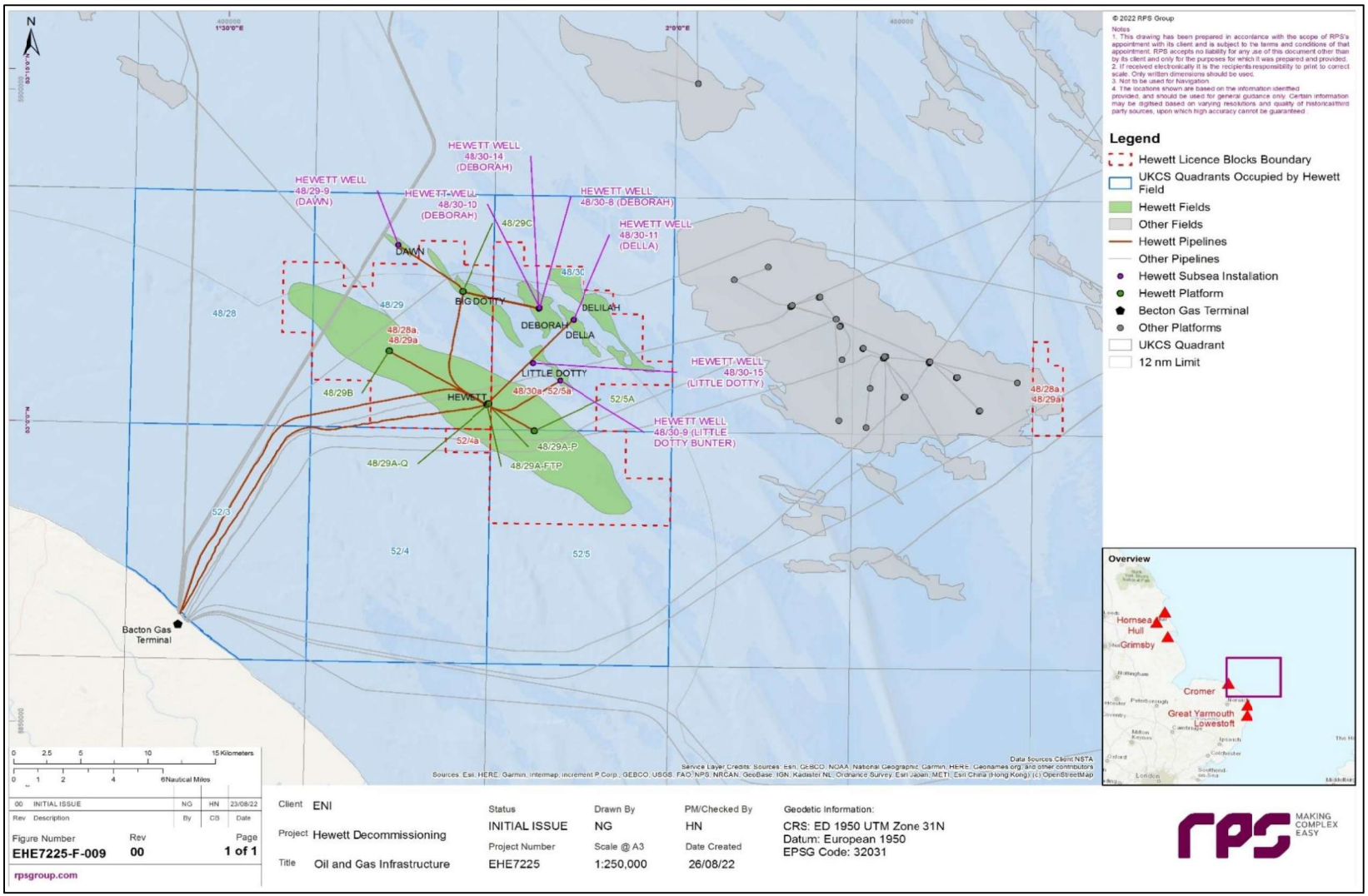


Figure 6-21: Oil and Gas Infrastructure in the vicinity of the Hewett Field Area

6.5.4 Offshore Renewable Activities

The nearest wind farm areas to the Hewett Field Area are the active Dudgeon and Sheringham Shoal wind farms located to the northwest, approximately 20 km and 32 km from Dawn subsea well 48/29-9 respectively, as illustrated in Figure 6-22 (Crown Estate, 2022). Sheringham and Dudgeon extension project submitted an application in Q3, 2021 and could be in construction within the timescales of the Hewett subsea pipelines decommissioning work.

6.5.5 Other Subsea Infrastructure

The nearest non-oil and gas subsea infrastructure to the project area is the 'STRATOS 1' telecommunication cable situated approximately 9 km west of Dawn subsea well 48/29-9 which runs from north-east (offshore North Sea) to south-west (Weybourne). Current records show this cable to be disused (KIS ORCA, 2022).

6.5.6 Offshore Aggregate and Dredging Areas

There are no licensed offshore aggregate areas, dredging areas or known dumping areas in the vicinity of the Hewett subsea pipelines (MMO, 2022). The nearest site is the 'Humber 3' Aggregate Production Area, located approximately 50 km to the northeast of the Hewett Field Area (Operator: DEME Building Materials Ltd). However, the Hewett field is surrounded by areas of high potential aggregate resource, sand and gravel (AGG 3) (DECC, 2016).

6.5.7 Military Activity

There is a military Practice and Exercise area (PEXA) situated approximately 60 km to the north of the Hewett Field Area. This area is used by the Royal Air Force (RAF) and is therefore an area of intense aerial activity (DECC, 2016).

6.5.8 Marine Archaeology

A total of eight known shipwrecks are located within the Hewett Field Area, but none are protected (Historic England, 2018). However, no shipwrecks were detected during the Hewett pre-decommissioning survey. The closest protected wreck is the Vortigern Destroyer, located approximately 22 km northwest of the Hewett Field Area (MMO, 2022). This wreck is protected by the Military Remains Act 19.

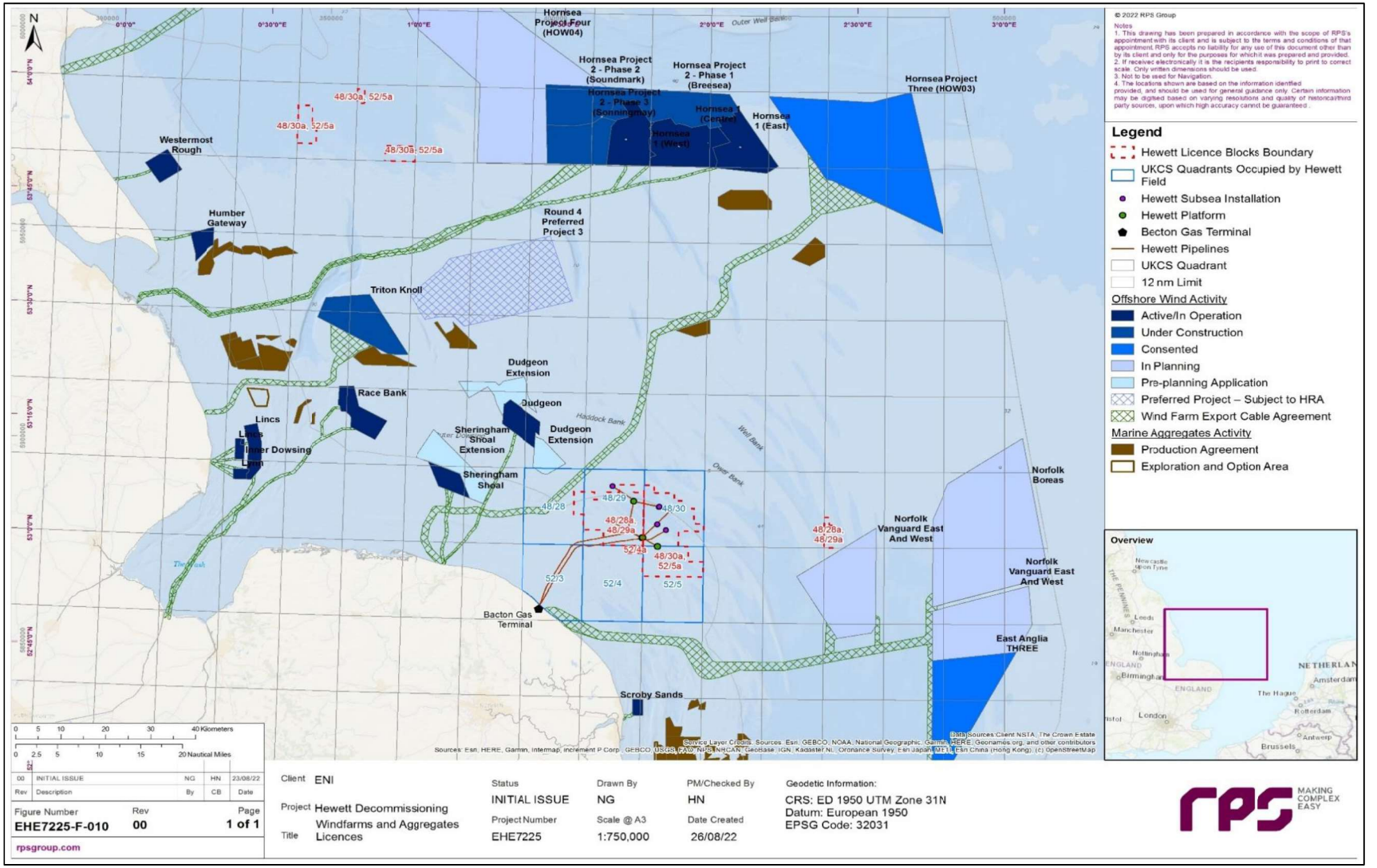


Figure 6-22: Windfarms in the vicinity of the Hewett Field Area

7.0 ENVIRONMENTAL ASSESSMENT METHODOLOGY

7.1 Environmental Impact Identification

Potential environmental and societal impacts arising from the proposed Hewett Area Subsea Pipelines DP were initially determined through an Environmental Impact Identification (ENVID) workshop held on 12th May 2022.

The objectives of the ENVID were to:

- Identify environmental and societal impacts and risks that may occur during the project;
- Determine the significance of the impact or risk using a simple scoring system; and
- Identify additional mitigation measures required (for potentially significant impacts or risks) to avoid or reduce adverse effects.

The activities (or aspects) identified during the ENVID workshop are summarised in the receptor-based activity and events matrix in Table 7-1.

The significance of the potential impacts resulting from the identified aspects was assessed during the ENVID workshop using the criteria defined in Section 7.2.

The ENVID identified that no planned activities with embedded mitigation measures in place, or unplanned events, have the potential to result in significant effects on the marine environment. However, for completeness it was recommended that the following aspects be subject to further assessment as these are likely to have the greatest impact on the marine environment from a Project perspective:

- Seabed disturbance from:
    - Removal of umbilicals, jumpers and flexible flowlines;
    - Abrasive cutting discharge (i.e., garnet);
    - Removal of mattresses and grout bags, including disturbance from work baskets;
    - Pipeline trenching operations;
    - Excavation of mattresses (if required);
    - In situ marine growth removal (if required); and
    - General seabed operations and diver activity.
- Underwater noise emissions from:
    - Use of propellers / DP thrusters on vessels;
    - Use of trenching machine
    - Use of cutting tools; and
    - Use of mass flow excavator (propeller noise).

A comprehensive assessment has been undertaken for these aspects, using the significance criteria defined in Section 7.2, the results of which are documented in Section 8. The potential for significant cumulative, in-combination and transboundary impacts to occur has also been assessed in Section 8.

A justification as to why the other aspects have been scoped out of detailed assessment is documented in Section 7.3.

In addition, as the majority of the Hewett subsea pipelines are located within the Southern North Sea SAC and are within 40km of five other MPAs (refer to Section 6.2), an assessment has been undertaken to determine whether there are likely to be any significant effects on the conservation objectives of these MPAs as a result of the proposed Hewett subsea pipelines decommissioning activities, either alone or in-combination with other plans or projects. This assessment is documented separately within Section 9.

Table 7-1: **Impact Identification Matrix**

Assessment Topic	Project Activity / Unplanned Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments & Features	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	Marine Protected Areas	Shipping	Commercial Fisheries	Oil & Gas Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
Planned Events																						
Physical Presence	- Presence of DSV / Reel Lay / Cut and Lift Vessel (includes transit to and from port)		A	A								A	A									
Seabed Disturbance	- Excavation (where required) and removal of mattresses, frond mats, and grout bags. - Pipeline Trenching	A					A	A			A											
	- Abrasive cutting discharge (i.e., garnet)	A					A	A			A											
	- Removal of umbilicals jumpers, flexible flowlines and unburied mattresses	A					A	A			A											
	- In situ marine growth removal - Removal only for access	A					A	A			A											
Underwater Noise Emissions	- Use of propellers / DP thrusters on vessels							A		A	A											
	- Use of cutting tools							A		A	A											

Assessment Topic	Project Activity / Unplanned Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments & Features	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	Marine Protected Areas	Shipping	Commercial Fisheries	Oil & Gas Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
	- Use of mass flow excavator (propeller noise)							A		A	A											
	- Pipeline Trenching operations, noise from use of trenching machine.							A		A	A											
Energy Use & Atmospheric Emissions	- Fuel consumed by offshore vessels, diesel-powered equipment and generators			A	A																	
Marine Discharges	- Routine vessel discharges to sea		A			A		A	A	A	A											
	- Potential for introduction of alien species (from ballast water)					A		A														
Waste Management	- Removal and disposal of subsea pipelines (ferrous metal, concrete, and plastic)			A																		A
	- Removal and disposal of mattresses, frond mats, and grout bags (plastic and concrete)			A																		A
	- Disposal of NORM																					A

Assessment Topic	Project Activity / Unplanned Event	Physical Receptors				Biological Receptors						Human Receptors										
		Seabed Sediments & Features	Water Quality	Air Quality	Climate	Plankton	Benthic Communities	Fish & Shellfish	Seabirds	Marine Mammals	Marine Protected Areas	Shipping	Commercial Fisheries	Oil & Gas Activity	Subsea Cables	Renewable Energy Activity	Cultural Heritage	Military Activity	Disposal, Dredging & Aggregate Activity	Seascape	Tourism & Leisure	Population & Human Health
Unplanned Events																						
Accidental Events	- Vessel collision (loss of diesel inventory)		A			A		A	A	A	A	A	A									
	- Dropped objects	A				A							A									
	- Loss of hydraulic fluids from cutting equipment Trenching Machine, MFE, ROV.		A			A		A														
	- Residual liquids (hydraulic fluid) released during lift or loss of load on-board vessel		A			A		A														
	- Loss of vessel power and use of mooring anchor	A					A	A			A											

Key:

	Negligible effect		Minor effect	A	Adverse effect	P	Positive effect		No interaction
	Low risk		Medium risk but ALARP						

7.2 Evaluation of Significance

7.2.1 Planned Activities

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

- The magnitude and spatial extent of the impact;
- 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 cumulative impact with the impact of other existing and / or approved projects and / or projects not yet approved, but that Eni is aware of;
- The possibility of effectively reducing the impact.

7.2.1.1 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 a 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.

7.2.1.2 Magnitude of Impact Criteria

The magnitude of impact considers the characteristics of the change that is likely to arise (e.g. a function of the spatial extent, duration, reversibility and likelihood of occurrence of the impact) and can be adverse or positive. Where it is not possible to quantify impacts, a qualitative assessment has been carried out, based on 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. international and/or transboundary in nature). Impact is likely to result in environmental quality standards or threshold criteria being routinely exceeded.
Major	Medium to long-term (1 – 5 years), reversible change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent or continuous and/or experienced over a wide area (i.e., national in scale). Impact could result in one-off exceedance of environmental quality standards or threshold criteria.
Moderate	Short to medium-term (< 1 year), temporary change in baseline environmental conditions, which is likely to occur. Impact may be one-off, intermittent or continuous and/or regional in scale (i.e., beyond the area surrounding the Project site to the wider region). Impact is unlikely to result in exceedance of environmental quality standards or threshold criteria.
Minor	Short-term (< 1 week), 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).

7.2.1.3 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.

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[1]
	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

[1] The choice of significance level is based on professional judgement and has been justified in the assessment text.

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 in order to prevent, reduce or offset adverse significant effects or enhance positive effects. The overall significance of the effect is then re-evaluated, taking the mitigation measures into consideration, to determine the residual effect utilising the methodology outlined above.

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

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

7.2.2 Unplanned Events

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

The consequence (significance of effect) has been determined using the methodology for planned events as described in Section 7.2.1 above. The likelihood of an unplanned event occurring has been determined using the criteria presented in Table 7-5 as a guide.

Table 7-5: Determining Likelihood of Occurrence

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

A risk category (low, medium or high) has then been assigned to the unplanned event using the matrix shown in Table 7-6.

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

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

Low risk events are not considered to be "significant" in EIA terms,but should still be controlled through good industry practice.

Table 7-6: Significance Evaluation Matrix (Unplanned Events)

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

[1] The consequence (significance of effect) has been determined using the methodology for planned events as described in Section 7.2.1 above.

7.3 Aspects Scoped Out from Detailed Assessment

7.3.1 Physical Presence

The DP vessels (DSV/RLV/CSV) required for the proposed decommissioning operations will be present on location within existing 500m safety exclusion zones surrounding the Hewett subsea pipelines or platforms for some of the pipeline decommissioning work required. These exclusion zones are clearly marked on navigation charts and have been in place since the field's facilities were installed.

This work, as well as work undertaken outside existing 500m safety exclusion zones, will also have the following embedded mitigation. Notifications will be made to regular users of the area via fisheries notices, Notices to Mariners and NAVTEX/NAVAREA warnings. Operations will be planned to minimise the number of boat movement, as far as reasonably practicable.

The operations will be undertaken by a carefully selected specialist contractor in compliance with all national and international regulations for shipping, including the appropriate signals and lights, and the regulations defined by the International Maritime Organisation for avoiding collisions at sea. An operating criteria for weather conditions (e.g., wind, waves and visibility) will be established and operations suspended if the criteria are not met.

An Eni representative will be on-board each vessel at all times to ensure compliance with approved operating procedures. Operations will be planned to minimise the number of boat movements, as far as reasonably practicable. Communications and positioning equipment will be placed on-board the vessels to maintain communications with other shipping vessels and provide accurate information on the position of the vessels.

Eni has therefore concluded that impacts arising from physical presence of the DSV and CSV do not warrant further assessment.

7.3.1.1 Seabirds

The central and southern North Sea underpin the success of many resident and/or migratory seabird species by supplying a diversity of prey items (BEIS, 2022). The area surrounding the proposed works is in close proximity to a number of Special Protection Areas (SPAs), designated for breeding seabird colonies along the Norfolk coast. The works are located 27km from the coastline, and are therefore within the foraging ranges of qualifying species of the Greater Wash SPA (Thaxter *et al*., 2012) including:

- Arctic skua *Stercocarius parasiticus*;
- Arctic tern *Sterna paradisaea*;
- Black-headed gull *Chroicocephalus ridibundus*;
- Black-legged kittiwake *Rissa tridactyla*;
- Common eider *Somateria mollissima*;
- Common guillemot *Uria aalge*;
- Common gull *Larus canus*;
- Common tern *Sterna hirundo*;
- Cormorant *Corvus marinus*;
- Great skua *Stercorarius akua*;
- Herring gull *Larus argentatus*;
- Lesser black-backed gull *Larus fuscus*;
- Manx shearwater *Puffinus puffinus*;
- Northern fulmar *Fulmarus glacialis*;

- Northern gannet *Morus bassanus*;
- Puffin *Fratercula arctica*;
- Razorbill *Alca torda*;
- Roseate tern *Sterna dougallii*;
- Sandwich tern *Thalasseus sandvicensis*;
- Storm petrel *Hydrobates pelagicus*.

The immediate vicinity of the proposed works is considered to overlap with low to moderate density distributions of black-legged kittiwake, herring gull, lesser black-backed gull, common guillemot, northern fulmar, northern gannet, and razorbill. Density is likely to be higher in July than January for lesser black-backed gull, northern fulmar, and northern gannet, coinciding with the breeding season for these populations (Waggitt *et al*., 2020). Furthermore, the European Seabirds at Sea (ESAS) database indicates that seabird densities within the immediate vicinity of the proposed works are low, at <6 individuals per km² during the breeding season (March-September) and 7 individuals per km² during winter (November-March) (Kober *et al*., 2010).

Black-legged kittiwake are considered abundant in the vicinity of the proposed works during the breeding season; whilst black-legged kittiwake, great black-backed gull, guillemot and razorbill are abundant over winter and guillemot in the post-breeding dispersal period (JNCC, 2019; Kober *et al*., 2010).

7.3.1.2 Seabird Vulnerability to Oil Pollution

Seabirds cross the air-water boundary by foraging below, or loafing on, the surface or along the shoreline and are therefore likely to come into contact with any surface oil pollution that may be present. Several factors influence a species' vulnerability to oil pollution, including time spent on the water, reliance on the marine environment, and population resilience to mortality. Whilst all seabird species can be considered vulnerable, sensitivity of all seabird species in an area is dependent on the use of the area as breeding, foraging, or resting grounds; and is therefore dependent on the time of year. The Seabird Oil Sensitivity Index (SOSI) was developed as a single measure of monthly sensitivity for areas of sea associated with UKCS Blocks, using seabird survey data collected between 1995-2015 (Webb *et al*., 2016). The SOSI score for the immediate vicinity of the proposed works and the surrounding UKCS Blocks is provided in **Error! Reference source not found.**. (Webb *et al*., 2016).

7.3.2 Energy Use and Atmospheric Emissions

Atmospheric emissions will be produced as a result of the fuel consumed by offshore vessels, equipment and generators. The main environmental effects of the emission of gases to the atmosphere are:

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

Estimated emissions from the proposed decommissioning activities are summarised in Table 7-7.

Table 7-7: Estimated Atmospheric Emissions from Pipeline Decommissioning Activities

	Total Fuel Use (tonnes)	Emissions (tonnes) [3]							
		CO_2	CO	NO_X	N_2O	SO_2	CH_4	VOC	CO_2e
Group 1:[1] Trunk Lines	1,099	3516.80	17.25	65.28	0.24	4.40	0.20	2.20	3620.92

Group 2: Concrete Weight Coated Infield Pipelines	1,416	4,531.20	22.23	84.11	0.31	5.66	0.25	2.83	4665.35
Group 3: Non-Concrete Weight Coated Infield Pipelines	1,075	3,440	16.88	63.86	0.24	4.30	0.19	2.15	3541.85
Group 4: Umbilicals[1]	1,263	4,041.60	6.57	15.79	0.278	5.05	0.1099	1.010	4161.26
Group 5:[2] Flexible Flowlines / Jumpers	-	-	-	-	-	-	-	-	-
Group 6:[2] - Mattresses	-	-	-	-	-	-	-	-	-
Total	4,853	15,530	63	229	1	19	1	8	15,959.56

1. All stand-alone umbilicals are included in this group. There are a number of umbilicals across the field that are piggybacked to pipelines. These are included and assessed in the relevant groups (Group 2 and Group 3).
2. Emissions from total vessel presence have been included in the calculations for Group 1 to Group 4 above. No additional atmospheric emissions are expected from Group 5 and 6.
3. Emission factors used from EEMS 2008 based on methodology proposed by OGUK and DECC (OGUK/DECC, 2008)

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

The contribution to UKCS and global atmospheric emissions will be negligible. To place this in context, the estimated CO_2e emissions predicted to be generated by the proposed Hewett subsea pipelines decommissioning options equate to approximately 0.109% of the total UK offshore CO2e emissions in 2018 (14,630,000 tonnes; OGUK, 2019) and less than 0.004% of the UK net total CO_2e emissions in 2019 (351,100,000; BEIS, 2021).

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

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

7.3.3 Waste Management

Good housekeeping standards will be maintained on board all vessels in accordance with the contractor waste management strategy; any wastewater discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention.

A Materials Inventory has been developed for the Project to identify the types of waste generated and the management procedures for each waste stream will be included in the contractor's Waste Management Plan. Eni will ensure the principles of the Waste Management Hierarchy are followed during the decommissioning activities. Transfer notes will accompany all non-hazardous waste to shore and consignment notes will be in place for any hazardous waste.

Checks will be carried out on the selected waste yard to ensure all permits and licenses are in place for the handling and disposal of the waste types identified. Eni will ensure that waste is transferred by an appropriately licensed carrier who should have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste.

The amount of NORM Waste is unknown at this time, however, there remains a possibility that it will be present during decommissioning activities.

Marine growth, if found, will be removed onshore at the waste yard, with appropriate odour control implemented through an odour management plan and disposal in accordance with the principles of the Waste Management Hierarchy.

In summary, the impacts of waste management are largely onshore and therefore outside the scope of this document. A large proportion of project waste consists of easily reprocessed scrap metal and no hazardous waste is anticipated. Implementation of a robust waste management plan will mitigate any expected impacts. On this basis, Eni has concluded that no further assessment of waste management is necessary.

7.3.4 Marine Discharges

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

Ballast water discharges will be in accordance with the International Maritime Organisation Ballast Water Management Convention, including a ballast water plan and logbook. The potential introduction of invasive species from ballast water is therefore considered unlikely to occur.

Given the above, Eni has concluded that impacts arising from marine discharges do not warrant further assessment.

7.3.5 Accidental Events

7.3.5.1 Vessel Collision

Prior to the proposed subsea pipeline decommissioning activities commencing, the subsea wells will be plugged and abandoned, and the pipelines flushed and cleaned. As such, the source of a worst-case accidental release of hydrocarbons to sea will be from the loss of diesel inventory from a vessel in the unlikely event of a collision.

As vessels required for the decommissioning programme are yet to be confirmed, no specific modelling has been undertaken, however modelling has been conducted for other large vessels which have been routinely used in the Hewett Field Area. For example, modelling of instantaneous release of 394.4m^3 of diesel for the Valaris 72 Rig at the Hewett 48/29-B Platform has demonstrated that the probability of the diesel release beaching on the UK coastline is highest in spring (40-50%), with the shortest arrival time after 9 hours. The maximum mass accumulated onshore across all beaching locations in any one season is 190 m^3 after 20 days. The probability of a release of diesel crossing into Dutch waters is 1-2% in winter, with the shortest arrival time after 2 days. A total of 17 marine protected areas may be subject to surface oiling (> 0.3 µm) or beaching.

The eastern coast of the UK contains extensive areas of sheltered mudflats and sandflats, saltmarsh, estuaries and wetlands, which are highly sensitive to oiling. Species most at risk include seabirds, especially during the breeding and moulting season where large rafts aggregate on the surface, and wildfowl utilising wetlands. However, diesel is a light oil, containing a large percentage of light and volatile compounds. Once spilt diesel is likely to remain on the sea surface and be subject to high rates of evaporation. It is therefore not expected to persist in the marine environment for a prolonged period of time.

Notifications will also be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins. Any spills from the DSV / CSV will be covered by their respective Shipboard Oil Pollution Emergency Plan (SOPEP).

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

7.3.5.2 Dropped Objects

The potential for dropped objects to occur is most likely to arise from lifting operations. However, dropped object procedures are industry-standard and will be employed throughout the proposed operations. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Post-decommissioning debris clearance surveys will aid in the identification of any dropped objects should they occur. As such, Eni has concluded that impacts from unplanned loss of materials to the sea do not require further assessment.

7.3.5.3 Leak of Hydraulic Fluid from Cutting Equipment Subsea

Removal of the Hewett subsea pipelines will require the use of subsea hydraulic cutting tools that could fail and result in a release of a small number of litres of hydraulic fluid. However, in the event this did occur, it is anticipated that the hydraulic fluid would be rapidly dispersed in the marine environment given the highly dynamic nature of the area.

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

7.3.5.4 Loss of Vessel Power and Use of Mooring Anchor

In the very unlikely event that the DP DSV or CSV loses power, the vessel may need to drop anchor to prevent it from drifting. Physical disturbance of the seabed from anchoring can cause displacement or mortality of benthic species, such as sessile organisms, that are unable to move out of the impacted area. Due to the temporary nature or anchoring, and the small area impacted, it is expected that recovery of the affected areas of seabed will occur once the anchor has been retrieved. Eni will ensure that the vessels selected to undertake the decommissioning activities have effective operational systems and that on board control measures are in place. As the risk of loss of vessel power occurring is Low, Eni has concluded that no further assessment is necessary.

8.0 ENVIRONMENTAL ASSESSMENT

This section documents the assessment undertaken for those aspects identified during the ENVID as likely to have the greatest impact on the marine environment from a Project perspective. Impacts to marine protected areas are documented separately in Section 9.0.

8.1 Seabed Disturbance

8.1.1 Quantification of Seabed Disturbance

The following decommissioning activities which have the potential to result in seabed disturbance were identified during the ENVID workshop:

- Removal of umbilicals, jumpers and flexible flowlines;
- Abrasive cutting discharge (i.e., garnet);
- Removal of mattresses and grout bags, including disturbance from work baskets;
- Pipeline trenching operations;
- Excavation of mattresses (if required);
- In situ marine growth removal (if required); and
- General seabed operations and diver activity.

Table 8.1 provides an estimate of the total area of seabed likely to be disturbed by the above listed decommissioning activities, which equates to 317,575 m^2 (0.32 km^2). 294,123 m^2 (0.29 km^2) of which lies within MPAs. Impacts relating to individual MPAs is discussed in Section 9.0.

Table 8-1 Seabed Disturbance

	Activity	Seabed Disturbance (m^2)	Seabed Disturbance within Marine Protected Area (m^2)
Group 1: Trunk Lines	Trenching of areas of spans / exposure operations	101,595	91,228 (90%)
Group 2: Concrete Weight Coated Infield Pipelines	Trenching of areas of spans / exposure operations	34,651	24,080 (67%)
Group 3: Non-Concrete Weight Coated Infield Pipelines	Trenching of areas of spans / exposure operations	8,801	6,287 (71%)
Group 4: Umbilicals[1]	MFE deburial along entire length of lines during full removal operations	172,528	172,528 (100%)
	Total	**317,575**	**294,123**

1. All stand-alone umbilicals are included in this group. There are a number of umbilicals across the field that are piggybacked to pipelines. These are included and assessed in the relevant groups (Group 2 and Group 3).
2. Seabed disturbance associated with the removal of flexible flowlines, jumpers, and exposed mattresses has been included in the overall calculations for Group 1 to Group 4 above. No additional seabed disturbance is expected.

8.1.2 Group 1: Trunk Lines

The majority of the seabed disturbance from Group 1: Trunk Line decommissioning will be from the trenching operations required to bury areas of spans / exposures. Approximately 50 percent of the trenching will occur within the Haisborough, Hammond & Winterton SAC (impacting Sandbanks and Ross Worms (*S. spinulosa*)) and the southern North Sea (SNS) SAC (impacting Harbour Porpoise). Approximately 40 percent of the trenching will occur within in the Greater Wash SPA (impacting Annex I bird species) and the Cromar Shoal Chalk Beds MCZ (impacting Broad Scale Habitats, Features of Conservation Interest and a Geological Feature).

Impacts are considered to be temporary in the Haisborough, Hammond & Winterton SAC (as the sandbanks and Ross worms (*S. Spinulosa*) habitats are expected to recover quickly in the dynamic SNS environment), and in the SNS SAC (as the seabed environment for harbour porpoise feeding is expected to recover quickly in the dynamic SNS environment). Within the Greater Wash SPA, impacts are also expected to be temporary since the visual disturbance to Annex I bird species is expected to be of limited duration. The impacts are expected to be more significant in the Cromer Shoals Chalk Beds MCZ due to the impact of trenching operations within this MCZ.

There is a moderate permanent impact to the seabed from 25.6 km of trunk line (approximately 40 percent of the total line length) left in-situ in the Haisborough, Hammond & Winterton SAC as its presence may impact the behaviour of the sandbanks, which is against the conservation objectives. The 25.6 km of line left in-situ in the Haisborough, Hammond & Winterton SAC includes approximately 3.6 km of spans and exposures which will be trenched and buried.

8.1.3 Group 2: Concrete Weight Coated Infield Pipelines

The majority of the area likely to be disturbed from the trenching operations required to bury areas of spans / exposures for 'Group 2: Concrete Weight Coated Infield Pipelines' is within the Haisborough, Hammond & Winterton SAC (impacting Sandbanks and Ross Worms (*S. Spinulosa*)) and the Southern North Sea SAC (impacting Harbour Porpoise). Overall, the likely area impacted is small in context of the area of the SACs, with the impacts being temporary in both the Haisborough, Hammond & Winterton SAC (as the sandbanks and ross worms habitats are expected to recover quickly in the dynamic SNS environment) and the Southern North Sea SAC (as the seabed environment for harbour porpoise feeding is expected to recover quickly in the dynamic SNS environment).

There could potentially be a small permanent impact to the seabed from 35 km of line left in-situ as its presence impacts the behaviour of the sandbanks within the Haisborough, Hammond & Winterton SAC which is against the conservation objectives. The 35 km of line left in-situ includes approximately 2.4 km of spans and exposures which will be trenched and buried.

8.1.4 Group 3: Non-Concrete Weight Coated Infield Pipelines

The majority of the area disturbed from the trenching operations required to bury areas of spans / exposures is within the Haisborough, Hammond & Winterton SAC (impacting Sandbanks and Ross Worms (*S. Spinulosa*)) and the Southern North Sea SAC (impacting Harbour Porpoise). The area impacted is very small in context of the area of the SACs with the impacts being temporary in both the Haisborough, Hammond & Winterton SAC (as the sandbanks and ross worms habitats are expected to recover quickly in the dynamic SNS environment) and the Southern North Sea SAC (as the seabed environment for harbour porpoise feeding is expected to recover quickly in the dynamic SNS environment).

As with the Group 2 pipelines, there could potentially be small permanent impact to the seabed from the 22.7 km of line left in-situ in this option as their presence impacts the behaviour of the sandbanks within the Haisborough, Hammond & Winterton SAC which is against the conservation objectives. The 22.7 km of line left in-situ includes approximately 0.63 km of spans and exposures which will be trenched and buried.

8.1.5 Group 4: Umbilicals

The area disturbed from the Mass Flow Excavator (MFE) deburial operations to allow full line removal is all located within the Haisborough, Hammond & Winterton (HHW) SAC (impacting Sandbanks and Ross Worms (*S. Spinulosa*)) and the Southern North Sea (SNS) SAC (impacting Harbour Porpoise). The area impacted is small in context of the area of the SACs. With the impacts being temporary in both the HHW SAC (as the sandbanks and ross worms habitats are expected to recover quickly in the dynamic SNS environment) and the SNS SAC (as the seabed environment for harbour porpoise feeding is expected to recover quickly in the dynamic SNS environment). There is no permanent impact associated with this full removal option as the lines are fully removed.

8.1.6 Protection and Stabilisation Material

Where there are protection and stabilisation materials applied to pipelines that have been comparatively assessed, the decommissioning option for the related pipeline shall dictate the approach for these materials. The rationale is that, should the pipelines be fully removed, the related protection and stabilisation materials shall also be removed; however, if the pipelines remain in-situ, then those related protection and stabilisation materials shall also remain in-situ. Additionally, where protection and stabilisation materials are decades old and of poor integrity, an onsite assessment shall be made on a case-by-case basis as to their recoverability. Eni shall consult with OPRED where recovery of mattresses is not considered to be feasible.

8.1.7 Potential Impacts to Seabed Communities

The excavation and trenching of the seabed surrounding the subsea pipelines, as well as the physical removal of infrastructure is expected to result in some mortality to benthic fauna, although mobile species should be able to avoid this impact. Of note is that aggregations of *S. spinulosa* were observed on all transects and five stations (ST01, ST04, ST08, ST REF 1 and ST REF 2) within the Eni Hewett Gas Field survey area, ranging from 'not a reef' to 'high' reef, with 'low' to 'high' reef reported on nine transects (Fugro, 2023). Table 8-2 shows the percentage of Reefiness structure for each Station and Transect of the Eni Hewett Gas Field survey area (Fugro, 2023b).

Table 8-2: Summary of estimated Sabellaria spinulosa reefiness structure

Transect	Total Length of Transect (m)	Proportion of Total Transect Length (%)				
		No Reef	Not a Reef	Low Reef	Medium Reef	High Reef
ST01	54.5	-	100	-	-	-
ST04	50.8	-	100	-	-	-
ST08	43.7	-	100	-	-	-
STREF1	62.2	-	100	-	-	-
STREF2	43.1	-	100	-	-	-
TR03_V2	280.7	-	93.3	4.4	2.3	-
TR09_V2	436.6	-	52.6	26.0	13.0	8.4
TR10_V2	499.0	-	56.6	30.1	10.2	3.2
TR11	282.6	-	64.3	26.1	6.7	2.8
TR12_V2	542.5	-	63.8	23.7	7.1	5.3

TR14_V2	304.7	-	49.0	32.5	14.2	4.3
TR15_V2	195.7	-	95.1	3.5	0.6	0.9
TR16	442.1	-	27.5	42.4	23.7	6.5
TR19_V2	252.7	-	19.4	1.8	2.7	0.9
TR25_V2	143.0	-	100	-	-	-
TR26_V2	134.2	-	100	-	-	-
Reefiness Assessment						
Key:		No Reef	Not a Reef	Low Reef	Medium Reef	High Reef
Notes The table only displays transects and stations where evidence of *S.spinulosa* was observed						

However, *S. spinulosa* were classified at a maximum reefiness of 'high' on only eight transects. It is therefore likely that patches of the Annex I 'Reefs' habitat is present in the vicinity of the decommissioning operations. Research has shown that *S. spinulosa* has a limited tolerance to the direct physical impact, with recovery not expected for an extended period of time.

The proposed decommissioning activities will also lead to an increase in turbidity through sediment resuspension resulting in potential smothering of sensitive benthic species. As previously noted, the subsea pipelines are located within a highly dynamic area with strong near-seabed currents and highly mobile sediments (DECC, 2016). The natural benthic faunal communities present in this area are therefore adapted to frequent disturbances and natural fluctuations in sediment loading and resuspension. Where sedimentation does impact negatively on benthic species, consequences are likely to be short-lived as most of the smaller sedentary species (such as polychaete worms) have short lifecycles and recruitment of new individuals from outside of the disturbed area will be rapid (Tillin and Tyler-Walters, 2014). *S. spinulosa* is unlikely to be significantly impacted as it relies on a supply of suspended solids and organic matter in order to filter feed and build protective tubes and therefore it is often found in areas with high levels of turbidity (Gibb *et al.*, 2014; Hendrick, 2007). Jackson & Hiscock (2008) indicates that evidence points towards *S. spinulosa* having very little sensitivity to smothering or to increases in sedimentation rates, and that its recoverability potential from such impacts is very high.

Given the above, the sensitivity of seabed communities to seabed disturbance in the vicinity of the subsea pipeline operations is considered to be **High,** with a high value and medium resistance and resilience. The magnitude of impact is considered to be **Moderate**, due to the localised and temporary nature of the predicted impacts and the relatively small area of seabed disturbed (ca. 0.32 km^2). Therefore, physical effects on seabed communities due to seabed disturbance are predicted to be **Moderate**.

8.1.8 Potential Impacts to Fish Spawning and Nursey Grounds

The proposed decommissioning operations may temporarily displace fish species from their spawning and nursery areas. Exposure to increased turbidity through sediment resuspension can also reduce the visual acuity of fish potentially affecting foraging behaviour. However, any disturbance will be highly localised (within an area of ca. 0.32 km^2) and of short duration and mobile species would be expected to return to the area shortly after the subsea pipelines have been decommissioned.

Egg development and hatching success is also known to be vulnerable to the effects of smothering. A number of studies have been conducted on the effects of sedimentation on fish egg development of commercially

valuable fish species, particularly in relation to dredging operations. Results are variable with some demonstrating mortality of fish eggs when smothered by even a thin veneer of sediment (DOER, 2000) and many studies showing no significant effects on fish egg and larval development and mortality (Auld and Schubel, 1978; Kiørboe *et al*., 1981). Of note is that commercially and ecologically important fish species such as herring and sand eels have spawning grounds in the Hewett Field Area. Both these species lay their eggs only in clean sandy and gravelly sediments. However, the Hewett Field Area is not considered to be critical spawning habitat for these species, with the spawning grounds for these species occurring over a much larger area.

Given the above, the sensitivity of fish spawning and nursery grounds to seabed disturbance in the vicinity of the subsea pipeline decommissioning operations is considered to be **Low,** with a medium value and very high resistance and resilience. The magnitude of impact is considered to be **Minor**, due to the localised and temporary nature of the predicted impacts and the relatively small area of seabed disturbed (ca. 0.32 km^2). Therefore, physical effects on fish spawning and nursery grounds due to seabed disturbance are predicted to be **Minor** and not significant.

8.1.9 Mitigation Measures

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

- Tool use will be minimised where feasible whilst still achieving the desired result;
- Working areas will be minimised, as far as practicable, and where possible, potential areas of *S. spinulosa* reef will be avoided;
- Abrasive material required will be minimised, as far as practicable; and
- buried and frond mattresses will be left in situ.

8.1.10 Residual Effects

Based on the nature of the seabed habitats and species present in the vicinity of the subsea pipelines, and the comparatively small area of seabed that will be impacted by the proposed decommissioning activities (ca. 0.32 km^2) the residual effects on seabed communities and fish spawning and nursery grounds are predicted to be **Minor** and not significant. Given the mitigation measures proposed and the fact that *S. spinulosa* were classified at a maximum reefiness of 'high' on only eight transects, a few potential areas of *S. spinulosa* reef may be subject to limited direct impact, with slow recovery possible.

8.2 Underwater Noise

The potential effects of underwater noise emissions on marine organisms depends on the characteristics of the sound (e.g., type, intensity, spectra, duration), the physical characteristics of the environment in which sound propagates, the acoustic sensitivity of the receiver, and their interaction in space and time. Potential effects range from masking biological communication and causing small behavioural reactions, to chronic disturbance, injury and mortality (OSPAR, 2009).

Marine fauna use sound for navigation, communication and prey detection (NMFS, 2016; Southall *et al*., 2007; Richardson *et al*., 1995). Therefore, the introduction of anthropogenic underwater sound has the potential to impact on marine animals if it interferes with the animal's ability to use and receive sound (OSPAR, 2009). Particularly loud sound can disturb marine animals, triggering avoidance response or, in extreme cases, has the potential to cause temporary, or even permanent, auditory threshold shifts (TTS and PTS respectively). In fish, the effects of "excessive" sound include avoidance reactions and changes in shoaling behaviour. Avoidance of an area may interfere with feeding or reproduction or cause stress-induced reduction in growth and reproductive output (Slabbekoorn *et al*., 2010).

A range of fish species use the area for nursery and/or spawning grounds at different times of the year including cod, herring, lemon sole, sand eel, plaice, mackerel, sprat and whiting (Coull *et al*. 1998 and Ellis *et al*. 2012).

Harbour porpoise, white-beaked dolphin, minke whale, grey and harbour seals are marine mammals that have been observed or identified as most likely to be present in the Hewett Field Area.

8.2.1 Sources of Underwater Noise

The potential sources of underwater noise from the subsea pipelines decommissioning have been identified as:

- Use of propellers / DP thrusters on vessels;
- Use of trenching machine;
- Use of cutting tools; and
- Use of mass flow excavator (propeller noise).

All of the above are non-impulsive noise sources.

8.2.1.1 Vessel Operations

Two vessels will be mobilised to decommission the Hewett subsea pipelines, a DSV and an MSV/CSV. The peak sound pressure level associated with these vessels is identified in Table 8-3.

Table 8-3: Source noise from decommissioning vessel (OSPAR, 2009)

Vessel	Description	Peak sound pressure level (dB re 1 µPa)	Frequency (Hz)	Total Duration (days)
DSV	Dive Support Vessel	180	20-10 000	22
MSV/CSV	Multi Service Vessel / Construction Support Vessel			11

8.2.1.2 Underwater Cutting Tools

Underwater cutting tools will be required to cut the subsea pipelines. The pipeline ends will be dredged and cut using subsea diamond wire cutters. A paper reported that the noise from underwater diamond wire cutting, during the severance of a 30 inch diameter conductor at a platform in the North Sea, was barely discernible above background noise levels including the noise of associated vessel presence (Pangerc *et al*., 2016). In addition, Anthony *et al*. (2009) has reported peak source intensities of 148 to 180 dB re 1µ Pa for a range of underwater cuttings tools, including a high-pressure water jet lance, chainsaw, grinder and oxy-arc cutter, with most energy in the frequency range 200 to 1,000Hz (Quijano *et al*., 2017).

8.2.2 Potential Impacts to Fish

The sensitivity to noise differs among fish species, especially according to the anatomy of the swimbladder and its proximity to the inner ear. Species known to have a high-sensitivity to noise include herring and sprat and species known to have a medium-sensitivity to noise include gadoids, such as cod, haddock and whiting. All these species may be present within the vicinity of the Hewett Field Area. In contrast, those species lacking a swim bladder altogether such as elasmobranchs (sharks and rays) and flatfish such as plaice and sole tend to be of relatively low auditory sensitivity.

Juvenile and larval fish, in their first year of life, are the most sensitive to environmental stressors, particularly anthropogenic noise (Aires *et al*. 2014). Physiological damage is of particular concern for fish eggs and larvae, since unlike adult fish they are unable to move away from a noise source and are therefore at greater risk of mortality (Turnpenny & Nedwell, 1994). However, there is no direct evidence of mortality or potential mortal injury to fish from ship noise and no data available on injury to eggs and larvae (Popper *et al*., 2014). Fish are therefore more likely to be disturbed by the continuous underwater noise emissions generated from the proposed subsea pipeline decommissioning operations, potentially leading to their displacement, albeit

temporarily, from the area. There is a range of evidence; however, from underwater video inspections of North Sea drilling and production platform jackets that show fish species, especially gadoids such as cod and saithe, swimming calmly in the immediate vicinity of the pipelines (Fujii, *2015*).

It is acknowledged that displacement is of particular concern for demersal spawning species, such as herring and sandeels, as these species are more restricted by habitat type, requiring a specific type of substrate on which to lay their eggs. However, although both species spawn in the vicinity of the subsea pipelines, the area which would be impacted represents only a small proportion of the spawning grounds available for these species in the southern North Sea. In addition, this area of the southern North Sea has a high volume of vessel traffic and, as such, it is anticipated that the additional underwater noise generated by the planned vessels and use of cutting tools is likely to be insignificant.

Given the above, the sensitivity of fish to underwater noise emissions from the proposed decommissioning activities is considered to be **Medium**, with a medium value and high resistance and resilience as fish have capacity to accommodate the pressure, with high recoverability in the short term. The magnitude of impact is predicted to be **Minor** as there is no potential for injury and any displacement from the area will be localised and temporary. Effects on fish from underwater noise emissions are therefore predicted to be **Minor** and not significant.

8.2.3 Potential Impacts to Marine Mammals

Not all marine mammal species have equal hearing capabilities, in terms of absolute hearing sensitivity and the frequency band of hearing and, consequently, vulnerability to impact from underwater noise differs between species (NOAA, 2018). Table 8-4 presents the marine mammal species that have been sighted within the vicinity of the subsea pipelines by their functional hearing group and associated estimated hearing range, as classified by NOAA, 2018. It can be seen that odontocetes (toothed whales, dolphins and porpoises) have a wider hearing frequency range compared to mysticetes (baleen whales).

Table 8-4: Functional Marine Mammal Hearing Groups (NOAA, 2018)

Hearing Group	Generalised Hearing Range (Hz)	Species
Low-frequency cetaceans	7 – 35 000	Minke whale
Mid-frequency cetaceans	150 –160 000	Common dolphin, white-beaked dolphin, white-sided dolphin,
High-frequency cetaceans	275 – 160 000	Harbour porpoise
Phocid pinnipeds [1] (underwater)	50 – 86 000	Harbour seal, Grey seal

[1] Earless or true seals

When marine mammals are exposed to intense sound, an elevated hearing threshold may occur, known as a threshold shift. If the hearing threshold returns to the pre-exposure level after a period of time, the threshold shift is known as a temporary threshold shift (TTS). If the threshold does not return to the pre-exposure level, it is known as a permanent threshold shift (PTS) (Finneran *et al*. 2000; Southall *et al*. 2007). Both TTS and PTS arise as a result of physiological changes to the auditory systems of marine mammals. The PTS and TTS onset thresholds for each of the functional marine mammal hearing groups, applicable to non-impulsive noise sources such as those associated with the Hewett decommissioning activities, are provided in Table 8-5.

Table 8-5: **Non-Impulsive PTS and TTS Onset Thresholds for Marine Mammals *(*NOAA, 2018*)***

Hearing Group	PTS Criteria – Weighted SEL_{cum} (dB re 1 μPa^2s)	TTS Criteria – Weighted SEL_{cum} (dB re 1 μPa^2s)
Low-frequency cetaceans	191	179
Mid-frequency cetaceans	198	178
High-frequency cetaceans	173	153
Phocid pinnipeds [2] (underwater)	201	181

None of the activities associated with the proposed subsea pipelines decommissioning operations are considered to generate significant noise levels which may cause injury to marine mammal species.

Underwater noise propagation modelling undertaken for other EA reports (e.g., Chrysaor, 2020 and NEO Energy, 2020) indicate that injury is unlikely to occur for any marine mammal species within the vicinity of DP vessel operations as the PTS thresholds will not be exceeded.

Cutting activities will be short term and intermittent in nature and the underwater noise generated is likely to be masked by the noise generated from the supporting decommissioning vessel(s).

Although it has been determined marine mammals will not be injured by the underwater noise generated during the proposed decommissioning operations, there is still a possibility of behavioural disturbance. Due to the complexity and variability of marine mammal behavioural responses, NOAA are continuing to work on developing additional guidance regarding the effects of anthropogenic sound on marine mammal behaviour. In the absence of detailed behavioural disturbance in NOAA, 2018, criteria of 120 dB re 1 µPa (unweighted SPL_{RMS}), which is applicable to all marine mammal hearing groups for behavioural disturbance of non-impulsive noise (NOAA, 2013), has been used in this assessment.

In order to determine the impact range within which marine mammals may exhibit behavioural changes, a simple sound propagation model has been used based on the equation by Richardson *et al*. (1995), which assumes spherical spreading as shown below:

$$\text{Transmission Loss} = 20\text{Log}(R/R_0)\ \text{dB}$$

R_0 = the reference range, usually 1 metre; R = the distance from the reference range.

This method provides a conservative estimate of sound propagation with distance as it struggles to extrapolate sound attenuation in the near field (within tens of metres of the noise source), due to interference between sound waves and reverberation. It therefore generally overestimates transmission of sound from the source, but in this instance is considered sufficient to examine a 'worst-case' scenario for behavioural impacts on marine mammals. Table 8-6 presents the predicted impact range within which marine mammals may exhibit behavioural changes as a result of the proposed decommissioning operations.

Table 8-6: Maximum Behavioural Impact Range to Marine Mammals (NOOA, 2013)

Hearing Group	Behavioural Criteria - unweighted SPL_{RMS} (dB re 1 µPa)	Maximum Noise Source (dB re 1 µPa)	Maximum Predicted Impact Range
Marine Mammals	120	184	1,585 m

It can be seen from Table 8-6 that behavioural responses may be elicited within approximately 1.6km of the worst case decommissioning noise source, although for the reasons provided above the distance quoted is conservative. To determine the magnitude of impact in terms of the actual number of animals impacted, it is possible to calculate the number of animals likely to experience some sort of behavioural impact using the density and abundance estimates from the MMMUs (IAMMWG, 2015; see Table 6.15) as shown in Table 8-7. In addition, density data from Russel *et al*., 2017 has been used for harbour seal and grey seal.

Table 8-7: Estimated Number of Marine Mammals Potentially Experiencing Behavioural Disturbance During Decommissioning Operations

Species	Estimated Density in the Area (animals / km^2)	Estimated Number of Animals that May Experience Behavioural Disturbance [3]	% of Reference Population Disturbed [4]
Harbour porpoise [1]	0.335	< 3	0.0013
White-beaked dolphin [1]	0.010	< 1	0.006
Minke whale [1]	0.015	< 1	0.004
Common dolphin [1]	0.036	< 1	0.002
White-sided dolphin [1]	0.044	< 1	0.001
Harbour seal [2]	0.04	< 1	N/A
Grey seal [2]	0.4	< 4	0.04

[1] Source: IAMMWG, 2015
[2] Source: Russel *et al.* (2017)
[3] Calculated as the estimated density x behavioural onset area
[4] Based on MMMU abundance data (IAMMWG, 2015)

It can be seen from Table 8-7 that there will be a number of individual animals likely to exhibit some form of change in behaviour for the period in which they encounter noise from the decommissioning activities, however in all instances the percentage of reference population disturbed is very small. It should be noted that all species of cetaceans are classified as European Protected Species (EPS). EPS are listed on Annex IV of the EU Habitats Directive', which is transposed into UK law through 'The Conservation of Offshore Marine Habitats and Species Regulations 2017 (OMR)'. It is an offence under the OMR to deliberately disturb, injure or kill a species designated as an EPS. The likelihood of an offence being committed is highly dependent on the temporal characteristics of the activity (JNCC, 2010). A disturbance offence is more likely where an activity causes persistent (i.e., sustained and chronic) noise in an area for long periods of time. For most cetacean populations in the UK, disturbance in terms of OMR is unlikely to result from single, short-term operations (JNCC, 2010). Given the fact that only a low number of individuals are likely to experience behavioural disturbance and no cetaceans are predicted to be injured, it is therefore considered unlikely that the decommissioning project would constitute an offence under OMR.

Research has shown that marine mammals are typically more tolerant of fixed location noise sources, as opposed to moving sources (Southall *et al*., 2007), which may be perceived as an approaching threat. However, the noise from the support vessels associated with the decommissioning will be stationary or slow moving in the area, meaning that marine mammals are less likely to be startled. In addition, as noted above, this area of the southern North Sea has a high volume of vessel traffic and, as such, it is anticipated that the additional underwater noise generated by the vessels and cutting activities is likely to be insignificant.

In conclusion, the sensitivity of marine mammals to underwater noise emissions from the proposed decommissioning activities is considered to be **Very High**, with a very high value as marine mammals are of international importance and high resistance and resilience. Reported responses of behavioural disturbance to marine mammals from vessel noise include avoidance, changes in swimming speed, direction and surfacing patterns, alteration of the intensity and frequency of calls (Erbe *et al*., 2019). Harbour porpoises and minke whales have been shown to respond to vessels by moving away from them, while some other species, such as common dolphins, have shown attraction (Palka & Hammond, 2001). The magnitude of impact is considered to be **Minor** as while there is potential for some behavioural disturbance, the area of potential disturbance will be localised and any impacts will be temporary. Effects on marine mammals from underwater

noise emissions are therefore predicted to be **Minor** and not significant, particularly relative to the underwater noise generated by existing levels of vessel traffic in the wider southern North Sea area.

It is also acknowledged that during the proposed decommissioning activities there is the potential for indirect effects on marine mammals due to changes in prey (fish) species distribution and/or abundance. However, as discussed in Section 8.2.2, impacts to fish from underwater noise emissions will be temporary and in a localised area, in close proximity to the source. As such, any impacts to marine mammals due to changes in prey resources are not predicted to be significant.

8.2.4 Mitigation Measures

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

- Operations will be planned to reduce vessel movements and minimise the overall duration of the project; and
- No use of explosives.

8.2.5 Residual Effects

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

8.3 Cumulative and In-combination Impacts

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

Ongoing industrial activities located closest to the Hewett Field Area include the Perenco operated Leman Field located approximately 26km to the north-west, the IOG operated Vulcan Satellites Hub Project located 12km northwest, the 'Humber 3' Aggregate Production Area located approximately 50 km to the northeast, and the Dudgeon and Sheringham Shoal operational wind farms (both operated by Equinor) located approximately 20 km and 32 km northwest respectively. In addition, the Sheringham and Dudgeon extension project could be in construction within the timescales of the Hewett subsea pipelines decommissioning work.

The emissions and discharges from the above listed activities and projects in conjunction with the proposed Hewett decommissioning activities are not expected to result in any significant cumulative effects on marine receptors. Routine marine discharges and atmospheric emissions from the proposed Hewett activities are predicted to rapidly disperse and the underwater noise emissions which will be generated are predicted to be insignificant against the noise produced by existing vessel traffic in this area of the southern North Sea. As such, there is unlikely to be any significant overlap with emissions and discharges from other activities in the vicinity of the Hewett Field Area and therefore no significant cumulative effects on marine receptors are predicted. In addition, given the limited area of seabed disturbed by the proposed decommissioning activities (317,575 m^2 (i.e., ca.0.3km^2)), coupled with the distance between the Hewett subsea pipelines and the developments listed above, no significant cumulative effects on seabed habitats and species are predicted.

In-combination impacts may arise from different activities within the subsea pipelines decommissioning project resulting in several impacts on the same receptor or where different receptors are adversely affected to the detriment of the entire ecosystem. An example of this in the marine environment would be marine fauna, such as fish, experiencing habitat loss from both seabed disturbance and underwater noise emissions. Water quality may also be adversely impacted by an increase in turbidity through sediment resuspension during seabed disturbance activities, as well as routine marine discharges from vessels. However, given the localised and

temporary nature of impacts resulting from the proposed decommissioning operations, no significant environmental effects are predicted as a result of in-combination impacts.

8.4 Transboundary Impacts

The Hewett subsea pipelines are located approximately 82 km west of the UK/Dutch transboundary line at their closest point. However, any impacts arising from emissions, discharges and seabed disturbance generated as a result of the proposed decommissioning activities are predicted to be highly localised and are therefore not expected to result in any significant transboundary impacts.

At this stage in the Project there remains potential for Transfrontier Shipment for disposal. In the event any waste from the Hewett subsea pipelines decommissioning activities is disposed of outside of the UK, Eni will ensure regulations governing transfrontier shipment of waste are complied with.

9.0 POTENTIAL IMPACTS TO MARINE PROTECTED AREAS

There are six marine protected areas (MPAs) located within 40 km of the project area: Southern North Sea SAC, Haisborough, Hammond and Winterton SAC, North Norfolk Sandbanks and Saturn Reef SAC, Greater Wash SPA, Cromer Shoal Chalk Beds MCZ, and The Wash and North Norfolk Coast SAC. The following subsections assess the likely significant effect of decommissioning operations on the coherence of the identified protected site, to ensure the objectives of each of the sites are not compromised.

Table 9-1 summarises the length of pipeline within each Marine Protected Area and the percentage of the site impacted. The total seabed disturbance within marine protected areas is 294,123 m^2.

Table 9-1: Percentage of MPA sites impacted by Pipeline Decommissioning

Pipeline No	Designated Site	Area of Protected Site (m^2)	Length (m) within MPA	Total Seabed disturbance (m^2)	% of MPA Impacted
PL21	Cromer Shoal Chalk Beds MCZ	321,000,000	9842.3	36,569.82	0.011392
PL20			9316.2		
PL21	Greater Wash SPA	3,536,000,000	12335.7	46,408.75	0.001312
PL20			11977.3		
PL84	Haisborough Hammond and Winterton SAC	1,468,000,000	6265.6	106,466.78	0.007253
PL21			17530.8		
PL20			16579.9		
PL83			4010.8		
PL87			4924.3		
PL584			2352.3		
PL85			4113		
PL21	Southern North Sea SAC	36,951,000,000	4936.9	104,677.66	0.000283
PL20			4684.3		
PL84			3276.8		
PL83			4010.8		
PL87			5340		
PL584			9181.8		
PL85			9732.3		
PL1325			249.7		
PL1630			237.5		
PL1173			1485.1		
PL86			5852.7		
PL1177			5851.5		

9.1 Southern North Sea SAC

The conservation objectives of the Southern North Sea SAC are to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status

(FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:

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

The Southern North Sea SAC covers an area of 36,951 km^2 and supports an estimated 17.5% of the UK North Sea MU population of harbour porpoises. All the Hewett subsea pipelines are located within the southern part of the SAC, except for the Dawn 48/29-9 subsea well which lies outside of the SAC boundary. The southern part of the site supports persistently higher densities of harbour porpoise during the winter months (October – March) and covers an area of 12,687 km^2.

As noted in Section 8.2, the underwater noise emissions generated during the proposed decommissioning activities are not predicted to result in injury to harbour porpoise but do have the potential to cause disturbance out to a distance of ca.1.6km from the noise source, equivalent to an area of ca. 8 km^2. This equates to ca. 0.02% of the Southern North Sea SAC total area and 0.06% of the southern (winter) area. It has been calculated that less than three individuals may be temporarily disturbed within this area, which is equivalent to 0.0013% of the harbour porpoise North Sea MU reference population. Given the low number of harbour porpoises which may be impacted, there is considered to be sufficient foraging habitat in the wider vicinity to accommodate any temporary displacement of harbour porpoise from the area whilst the decommissioning activities are ongoing.

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

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

Eni is aware that construction activities associated with a number of offshore wind farm projects could be ongoing within the SAC during the period when the proposed decommissioning work will be taking place (2022 to 2028), including:

- Hornsea Two offshore wind farm (status: consented) (summer area): construction could be ongoing during 2022, located 81 km north-north-west of the Hewett Field Area;
- Hornsea Four offshore wind farm (status: pre-application) (summer area): construction could be ongoing during 2023-2027, located 85 km north north-west of the Hewett Field Area;
- Dogger Bank Creyke Beck A and B Offshore Wind Farms (status: consented) (summer area) construction could be ongoing during 2022-2024, located 174 km north of the Hewett Field Area;
- Norfolk Vanguard offshore wind farms (status: consented but subject to re-determination) (summer area): construction could be ongoing during 2024-late 2020s, located 32 km south east of the Hewett Field Area;
- Norfolk Boreas offshore wind farm (status: in-planning) (summer area): construction could be ongoing during 2024-late 2020s, located 61 km east of the Hewett Field Area;
- East Anglia Three offshore wind farm (summer and winter area): construction could be ongoing during 2022-2024, located 67km south east of the Hewett Field Area.
- East Anglia One North offshore wind farm (winter area): construction could be ongoing during 2027-2030, located 71 km south east of the Hewett Field Area;
- East Anglia Two offshore wind farm (winter area): construction could be ongoing during 2026-2029, located 78 km south-south-east of the Hewett Field Area.

However, as any disturbance caused by the proposed Hewett decommissioning activities will result in a very small, temporary reduction in available habitat it is considered that this in-combination with the wind farm

projects is unlikely to prevent the site from contributing in the best possible way to species FCS. In addition, this area of the southern North Sea is subject to a relatively high volume of vessel traffic and therefore it is anticipated that the additional underwater noise generated by the proposed decommissioning activities is likely to be insignificant compared to the ambient noise level.

In addition to impacts from noise, there is the potential for impacts to supporting habitats and processes relevant to harbour porpoises and their prey within the SAC. As detailed in Table 9-1, removal of the Hewett subsea pipelines will disturb an area of seabed totalling ca. 0.04 km^2. This equates to 0.011392% of the Southern North Sea SAC total area. Harbour porpoise are strongly reliant on the availability of prey species due to their high energy demands and are highly dependent on being able to access prey species year-round. However, it is assumed that any potential effects on harbour porpoise prey species from underwater noise would be the same or less than those for harbour porpoise, i.e., if prey are disturbed from an area as a result of underwater noise, harbour porpoise will be disturbed from the same or greater area, therefore any changes to prey availability would not affect harbour porpoise as they would already be disturbed from the same area. In terms of the supporting habitats and processes relevant to the prey of the harbour porpoise, fish species such as sandeels, herring, mackerel, cod and whiting that form part of the harbour porpoise diet are present in the vicinity of the subsea pipelines. However, fish are not predicted to be significantly impacted by the proposed decommissioning activities. Given the flexibility of the harbour porpoise diet (SWF, 2012), there should be no adverse long-term changes regarding availability of prey.

In view of the conservation objectives of the SAC, no LSE on the Southern North Sea SAC are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

9.2 Haisborough, Hammond and Winterton SAC

The site's conservation objectives apply to both the site and the individual species and/or assemblage of species for which the site has been classified (refer to the qualifying features listed in Table 6-1). The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the FCS of its qualifying features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of the qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of the qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

These sandbanks are curved and orientated parallel to the coast, composed of sandy sediment and lie in full salinity water with intermediate coastal influence. The site contains a mosaic of different physical habitats with correspondingly different biological communities. The fauna of the sandbank crests is predominantly low diversity polychaete (bristle worms) and amphipod (shrimp-like crustaceans) communities which are typical of mobile sediment environments. The banks are separated by troughs which contain more gravelly sediments and support diverse infaunal and epifaunal communities with occurrences of reefs of the tube-building ross worm *S. spinulosa*. Aggregations of *S. spinulosa* provide additional hard substrate for the development of rich epifaunal communities.

As detailed in Table 9-1, removal of the Hewett subsea pipelines will disturb an area of seabed totalling ca. 0.11 km^2. This equates to 0.007253% of the SAC total area.

Aggregations of *S. spinulosa* were observed on transect TR09_V2 (8.4% high reef), but at only two of the five stations located within the SAC (Fugro, 2023). It is therefore possible that patches of the Annex I 'Reefs' habitat is present in the vicinity of the planned decommissioning operations within the SAC.

Impacts are also considered to be temporary in the Haisborough, Hammond & Winterton SAC (as the sandbanks and ross worms habitats are expected to recover quickly in the dynamic SNS environment).

There is a moderate permanent impact to the seabed from 25.6 km of trunk line (approximately 40 percent of the total line length), 35 km of concrete weight coated infield pipelines, and the 22.7 km of non-concrete weight coated infield pipelines, left in-situ in the Haisborough, Hammond & Winterton SAC as the presence may impact the behaviour of the sandbanks, which is against the conservation objectives. The line left in-situ in the Haisborough, Hammond & Winterton SAC includes approximately 6.6 km of spans and exposures which will be trenched and buried.

Any impacts arising from the emissions and discharges generated by the proposed decommissioning operations are predicted to be highly localised and are therefore not expected to result in significant impacts to the qualifying features of the SAC.

Therefore, in view of the conservation objectives of the SAC, no likely significant effects (LSE) on the Haisborough, Hammond and Winterton SAC are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

9.3 North Norfolk Sandbanks and Saturn Reef SAC

The conservation objectives for the North Norfolk Sandbanks and Saturn Reef SAC are for the features to be in favourable condition thus ensuring site integrity in the long term and contribution to FCS of Annex I Sandbanks which are slightly covered by sea water all of the time and Annex I Reefs. This contribution would be achieved by maintaining or restoring, subject to natural change:

- The extent and distribution of the qualifying habitats in the site;
- The structure and function of the qualifying habitats in the site; and
- The supporting processes on which the qualifying habitats rely.

The North Norfolk Sandbanks and Saturn Reef SAC is located approximately 3.5km from the nearest subsea pipeline, and as such, none of the site will be physically disturbed by the proposed decommissioning operations. In addition, any impacts arising from the emissions and discharges generated by the proposed decommissioning operations are predicted to be highly localised and are therefore not expected to result in significant impacts to the qualifying features of the SAC.

Therefore, in view of the conservation objectives of the SAC, no LSE on the North Norfolk Sandbanks and Saturn Reef SAC are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

9.4 Greater Wash SPA

The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified (refer to the qualifying features listed in Table 6-1). The objectives are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

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

The Greater Wash SPA designation covers migratory species and there may potentially be some negligible interaction with the proposed decommissioning operations; however, as this region of the southern North Sea is already subject to high densities of vessel traffic, the additional presence of project vessels for the duration

of the proposed decommissioning operations are unlikely to cause significance disturbance to seabirds foraging outside the SPA boundary.

Disturbance of the seabed may have indirect impacts on seabirds due to the potential for adverse effects on their prey. The diet of red-throated diver consists primarily of fish, although sometimes feeds on molluscs, crustaceans, insects and fish spawn. Common scoter feeds on benthic bivalve molluscs, and little gull feeds mostly on insects but also eats brine shrimp and other crustaceans, small molluscs, marine worms and small fish (RSPB, 2019). Disturbance to the seabed, may thus reduce the availability of the benthic prey on which these species feed; however, only a small area of seabed will be disturbed by the proposed decommissioning activities. As detailed in Table 9-1, removal of the Hewett subsea pipelines will disturb an area of seabed totalling ca. 0.05 km^2. This equates to 0.001312 % of the SAC total area.

Additionally, the proposed decommissioning activities are not expected to have a significant impact on fish populations. Therefore, any effect on seabird prey is considered to be **Negligible**.

Seabird populations are also particularly vulnerable to surface pollution, however, there is insufficient liquid hydrocarbon inventory associated with the Hewett Field to result in significant damage to the environment. Spill prevention measures will also be in place as detailed in Section 7.3.5.

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

9.5 Cromer Shoal Chalk Beds MCZ

The site's conservation objectives apply to the Marine Conservation Zone and the individual habitats or geological features of interest for which the site has been designated. These are listed below:

- High energy circalittoral rock – maintain in favourable condition;
- High energy infralittoral rock – maintain in favourable condition;
- Moderate energy circalittoral rock – maintain in favourable condition;
- Moderate energy infralittoral rock – maintain in favourable condition;
- North Norfolk coast (Subtidal) – maintain in favourable condition;
- Peat and clay exposures – maintain in favourable condition;
- Subtidal chalk – maintain in favourable condition;
- Subtidal coarse sediment – maintain in favourable condition;
- Subtidal mixed sediments – maintain in favourable condition; and
- Subtidal sand – maintain in favourable condition.

As detailed in Table 9-1, removal of the Hewett subsea pipelines will disturb an area of seabed totalling ca. 0.04 km^2. This equates to 0.011392% of the SAC total area.

Given that any impacts arising from the emissions and discharges generated by the proposed decommissioning operations are predicted to be highly localised and temporary, it is not predicted that the site's qualifying features will be significantly impacted.

Therefore, in view of the conservation objectives of the MCZ, no LSE on the Cromer Shoal Chalk Beds MCZ are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

9.6 The Wash and North Norfolk Coast SAC

The conservation objectives for The Wash and North Norfolk Coast SAC are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the FCS of its Qualifying Annex I habitats and Annex II species, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and,
- The distribution of qualifying species within the site.

The Wash and North Norfolk Coast SAC is located approximately 25 km from the nearest subsea pipeline, the Dawn (48/29-9) well. Given the distance to the SAC and the fact that any impacts arising from the emissions and discharges generated by the proposed decommissioning operations are predicted to be highly localised, it is not predicted that the site's qualifying features will be significantly impacted. Therefore, in view of the conservation objectives of the SAC, no LSE on The Wash and North Norfolk Coast SAC are predicted as a result of the proposed decommissioning activities either alone or in-combination with other plans or projects.

10.0 CONCLUSION

The Hewett Subsea Pipelines DP involves the removal of 33 subsea gas pipelines, chemical pipelines and cores, control umbilicals, and various smaller elements (jumpers, flexible flowlines), along with associated stabilisation material. This EA confirms that the Hewett Area Subsea Pipelines DP can be executed with minimal impact on the environment.

The baseline environment in the affected area is well understood and the potential for impacts to arise from the proposed decommissioning activities are known. Comprehensive identification of potential impacts from the Hewett Area Subsea Pipelines DP to environmental and societal receptors was achieved through an ENVID workshop. The ENVID identified that no planned activities or unplanned events have the potential to result in significant effects on the marine environment, with embedded mitigation measures in place. However, for completeness, it was recommended that activities resulting in seabed disturbance and underwater noise emissions be subject to further assessment as these are likely to have the greatest impact on the marine environment from a Project perspective, which could be reduced via further mitigation. Following further assessment and upon implementation of the identified mitigation measures, it has been concluded that all residual effects from these aspects are **Minor** and not significant, with the majority of impacts being localised and temporary in nature.

Of note is that all the Hewett subsea pipelines either cross or are located within the boundary of the Southern North Sea SAC designated for the protection of harbour porpoise. A further five MPAs are located within 40km of the pipelines, namely Haisborough, Hammond and Winterton SAC, North Norfolk Sandbanks and Saturn Reef SAC, Greater Wash SPA, Cromer Shoal Chalk Beds MCZ and The Wash and North Norfolk Coast SAC. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of these MPAs as a result of the proposed Hewett decommissioning activities, either alone or in-combination with other plans or projects.

The mitigation measures identified to reduce any adverse environmental effects arising from removal of the Hewett subsea pipelines are summarised in Table 10-1. Eni operates under a HSE IMS, certified to ISO14001:2015 and has established contractor selection and management procedures. Eni will develop an interface document for the Project when a removals contractor is appointed to help ensure the measures listed in Table 8.1 are successfully implemented during the proposed decommissioning activities.

Table 10-1: Mitigation Measures

Mitigation Measures
Physical Presence
• Some work undertaken within existing 500m exclusion zones; • Notifications will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins; • The operations will be undertaken by a carefully selected specialist contractor in compliance with all national and international shipping regulations and guidelines; • An Eni representative will be on-board each vessel at all times to ensure compliance with approved operating procedures; • Operations will be planned to minimise the number of boat movements, as far as reasonably practicable; • Communications and positioning equipment will be placed on-board the vessels to maintain communications with other shipping vessels (the most likely to have communication equipment on board) and provide accurate information on the position of the vessels; • The vessels will meet all national and international regulations for shipping including the appropriate signals and lights, and the regulations defined by the International Maritime Organisation for avoiding collisions at sea; and

• Operating criteria for weather conditions (e.g., wind, waves and visibility) will be established and operations suspended if the criteria are not met.
Seabed Disturbance
• Minimise abrasive material required; • Tool use will be minimised where feasible whilst still achieving the desired result; • Working areas will be minimised, as far as practicable; and • Leave buried and frond mattresses in situ.
Underwater Noise Emissions
• Operations will be planned to reduce vessel movements and minimise the overall duration of the project; and • No use of explosives.
Energy Use and Atmospheric Emissions
• Vessel time in the field will be reduced, as far as practicable; and • Eni's contractor selection process will aim to ensure that the engines, generators and other combustion plant on the vessels to be used during the proposed decommissioning activities are maintained and correctly operated to ensure that they work as efficiently as possible.
Marine Discharges
• Any waste water discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention; and • Vessels will operate in compliance with the International Maritime Organisation Ballast Water Management Convention.
Waste Management
• A Materials Inventory has been developed for the Project to identify the types of waste generated and the management procedures for each waste stream will be included in the contractor's Waste Management Plan. The principles of the Waste Management Hierarchy will be followed; • Good housekeeping standards will be maintained on board all vessels in accordance with the contractor waste management strategy; • Transfer notes will accompany all non-hazardous waste to shore and consignment notes will be in place for any hazardous waste; • Checks will be carried out on the selected waste yard to ensure all permits and licenses are in place for the handling and disposal of the waste types identified. Eni will ensure that waste is transferred by an appropriately licensed carrier who should have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste; • The amount of NORM Waste is unknown at this time, however, there remains a possibility that it will be present during decommissioning activities. Eni will ensure appropriate RSR permits are in place and conditions that dictate the management and control of radioactive waste are met; and • Marine growth, if found, will be removed onshore at the waste yard and will be done with appropriate odour control implemented through an odour management plan and will be disposed of in accordance with the principles of the Waste Management Hierarchy.
Accidental Events
• Shipping and fishing bodies will be kept informed of the project and appropriate notifications made in a timely manner;

- Vessels selected to undertake the decommissioning activities will have effective operational systems and onboard control measures;
- Dropped object procedures will be employed throughout the proposed operations. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Post-decommissioning debris clearance surveys will aid in the identification of any dropped objects should they occur;
- Appropriate maintenance and pre-use checks on hydraulic equipment will be undertaken. Where possible equipment with automatic hydraulic shut-off will be used to minimise the volume of fluid released in the event of a hydraulic line failure; and
- All vessels undertaking decommissioning activities will have an approved SOPEP.

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12.0 APPENDIX A: MARINE PLANNING

Table 12-1: Marine Planning Objectives and Policies Relevant to the Proposed Hewett Area Subsea Pipelines Decommissioning Operations

Relevant Objectives	Associated Policies	Project Compliance
Economic Productivity - To promote the sustainable development of economically productive activities, taking account of spatial requirements of other activities of importance to the East marine plan areas.	EC1 - Proposals that provide economic productivity benefits which are additional to Gross Value Added currently generated by existing activities should be supported.	The Hewett Gas Field is at the end of its productive time and is in the process of being decommissioned. CoP applications have been approved for associated subsea wells and subsea installations. The possibility for in situ re-use or redevelopment is not viable.
Employment and Skill Levels - To support activities that create employment at all skill levels, taking account of the spatial and other requirements of activities in the East marine plan areas.	EC2 - Proposals that provide additional employment benefits should be supported, particularly where these benefits have the potential to meet employment needs in localities close to the marine plan areas.	Where possible, the proposed decommissioning work will utilise local contractors.
Heritage Assets - To conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area.	SOC2 - Proposals that may affect heritage assets should demonstrate, in order of preference: a) that they will not compromise or harm elements which contribute to the significance of the heritage asset; b) how, if there is compromise or harm to a heritage asset, this will be minimised; c) how, where compromise or harm to a heritage asset cannot be minimised it will be mitigated against, or; d) the public benefits for proceeding with the proposal if it is not possible to minimise or mitigate compromise or harm to the heritage asset. SOC3 - Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference:	The proposed decommissioning operations are not anticipated to have an impact on any heritage assets. As the infrastructure which is being decommissioned is subsea, any impact to the seascape of the local area will be temporary as a result of vessels on location during the removal activities.

Relevant Objectives	Associated Policies	Project Compliance
	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.	
Healthy Ecosystem - To have a healthy, resilient and adaptable marine ecosystem in the East marine plan areas.	ECO1 - Cumulative impacts affecting the ecosystem of the East marine plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation.	No significant cumulative impacts are predicted to occur. Refer to Section 8.3.
	ECO2 - The risk of release of hazardous substances as a secondary effect due to any increased collision risk should be taken account of in proposals that require an authorisation.	In the unlikely event of an accidental release of hydrocarbons or chemicals the impact to the marine environment is not anticipated to be significant. Refer to Section 7.3.5.1.
Biodiversity - To protect, conserve and, where appropriate, recover biodiversity that is in or dependent upon the East marine plan areas.	BIO1 - Appropriate weight should be attached to biodiversity, reflecting the need to protect biodiversity as a whole, taking account of the best available evidence including on habitats and species that are protected or of conservation concern in the East marine plans and adjacent areas (marine, terrestrial).	The proposed decommissioning operations will not significantly impact biodiversity. Refer to Sections 7 and 8.
Marine Protected Areas (MPAs) - To support the objectives of MPAs (and other designated sites around the coast that overlap or are adjacent to the East marine plan areas),	MPA1 - Any impacts on the overall MPA network must be taken account of in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network	The proposed decommissioning operations will not pose a risk of adversely affecting (either directly or indirectly) the integrity of any MPA, either

Relevant Objectives	Associated Policies	Project Compliance
individually and as part of an ecologically coherent network.		alone or in combination with other plans or projects. Refer to Section 9.
Governance - To ensure integration with other plans, and in the regulation and management of key activities and issues, in the East marine plans, and adjacent areas.	GOV2 - Opportunities for co-existence should be maximised wherever possible.	Residual effects on other sea users resulting from the physical presence of vessels on location in the Hewett Area during the proposed decommissioning operations are predicted to be Negligible and not significant. Refer to Section 7.3.1.
	GOV3 - Proposals should demonstrate in order of preference: a) that they will avoid displacement of other existing or authorised (but yet to be implemented) activities; b) how, if there are adverse impacts resulting in displacement by the proposal, they will minimise them; c) how, if the adverse impacts resulting in displacement by the proposal, cannot be minimised, they will be mitigated against or; d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts of displacement.	

13.0 APPENDIX B: DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

No.	Description	Pipeline no (as per PWA)	Diameter NB (Inches)	Approx Length (km)	Description of Components parts	Product Conveyed	From – To End points	Burial Status	Pipeline Status	Currents Contents
1	Gas Export Pipeline	PL20	30	27.320	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Disconnected End Adjacent to FTP to Bacton Onshore Terminal Sphere Receiver	6% of pipeline exposed[1] 1 x FishSAFE span: - (Length = 40m)[2]	Out of use	Seawater
2	Gas Export Pipeline	PL21	30	32.690	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Disconnected End Adjacent to FTP to Bacton Onshore Terminal Sphere Receiver	35% of pipeline exposed[1] 2 x FishSAFE spans: - (Length = 14.1m / 11.2m)[2]	Out of use	Seawater
3	Gas Pipeline	PL83	24	3.930	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Cut Point A to Cut Point B	13% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Seawater
4	Gas Pipeline	PL84	24	8.382	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Disconnection point A to Disconnection point B	26% of pipeline exposed [1] No FishSAFE spans[2]	Out of use	Seawater
5	Gas Pipeline	PL85	24	9.303	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Disconnection point A to Disconnection point B	31% of pipeline exposed[1] 1x FishSAFE span: - (Length = 11.9m)[2]	Out of use	Seawater

6	Gas Pipeline	PL86	10	5.750	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate, Water	Disconnected End Adjacent 48/30- 8 to Cut Point A	4% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Seawater
7	Service Pipeline	PL135.1	2.375	6.000	Carbon Steel (Fusion Bonded Epoxy Coating)	Methanol, MEG	Disconnected End Adjacent 48/30-8 to Cut Point A	Trenched & Buried (as per PL86)	Out of use	Seawater
8	Service Pipeline	PL135.2	2.375	6.000	Carbon Steel (Fusion Bonded Epoxy Coating)	Methanol, MEG	Cut Point A to Disconnected End adjacent to Well 48/30-14	Trenched & Buried (as per PL86)	Out of use	Seawater
9	Gas Pipeline	PL446	6	0.015	Composite Flexible pipe	Gas, Condensate, Water	Adjacent Well 48/30-10 to Adjacent Well-48/30-8	Surface laid	Out of use	Seawater
10	Service Pipeline	PL446.1	2	0.070	Composite Flexible pipe	Methanol, MEG	135.1 to 48/30-10 Subsea Well Tie in Flange	Surface laid	Out of use	Seawater
11	Gas Pipeline	PL1177	8	5.900	Carbon Steel (Fusion Bonded Epoxy Coating)	Gas, Condensate, Water	Disconnected End Adjacent to Well 48/30-14 to Disconnected End A	0% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Seawater
12	Umbilical	PLU4688	3.3	5.930	Hydraulic Control umbilical	Water Based Hydraulic Fluid, Methanol	Disconnected End A to Disconnected End Adjacent to SS well 48/30-14	Trenched & Buried (as per PL1177)	Out of use	Water Based Hydraulic Fluid

13	Umbilical	PLU4689	2.98	5.805	Hydraulic Control umbilical	Water Based Hydraulic Fluid, Methanol	Disconnection Point A to Disconnected End Adjacent to 48/30-8 Subsea well	29% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Water Based Hydraulic Fluid
14	Umbilical	PLU4690	2.8	5.905	Hydraulic Control umbilical	Water Based Hydraulic Fluid, Methanol	Topside Hydraulic Control Panel (48/29C Platform) to Subsea Hydraulic Control System (48/30-10 Well)	28% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Water Based Hydraulic Fluid
15	Umbilical (Redundant)	U30-8	2.98	5.900	Hydraulic Control umbilical	Water Based Hydraulic Fluid, Methanol	Umbilical not connected at either end	-	Out of use	Water Based Hydraulic Fluid
16	Gas Pipeline	PL1173	8	6.070	Carbon Steel (Fusion Bonded Epoxy Coating)	Gas, Condensate , Water	Disconnected End Adjacent to Well-48/29- 9 to Cut point A	5% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Seawater
17	Umbilical	PL1174.1	3.3	6.100	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, Methanol	Cut Point A to Disconnected End Adjacent to Well-48/29- 9	Trenched & Buried (as per PL1173 and piggybacked)	Out of use	Seawater
18	Umbilical	PL1174.2	3.3	6.100	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, Methanol	Cut Point A to Disconnected End Adjacent to Well-48/29- 9	Trenched & Buried (as per PL1173 and piggybacked)	Out of use	Seawater
19	Gas Pipeline	PL87	8	6.090	Carbon Steel (Coal Tar Enamel & Concrete Coating)	Gas, Condensate , Water	Disconnected End Adjacent Well-48/30- 9 to Cut Point A	2% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Seawater

20	Service Pipeline	PL136.1	2.375	6.040	Carbon Steel (Fusion Bonded Epoxy Coating)	Methanol, MEG, Corrosion Inhibitor	Disconnected End Adjacent 48/30-9 to Cut Point A	Trenched & Buried (as per PL87)	Out of use	Seawater
21	Service Pipeline	PL136.2	2.375	6.040	Carbon Steel (Fusion Bonded Epoxy Coating)	Methanol, MEG, Corrosion Inhibitor	Disconnected End Adjacent 48/30-9 to Cut Point A	Trenched & Buried (as per PL87)	Out of use	Seawater
22	Umbilical	PLU4743	3	7.650	Hydraulic Control umbilical	Water Based Hydraulic Fluid	Disconnection Point A to Disconnected End Adjacent to 48/30-9 Subsea Well	14% of pipeline exposed[1] No FishSAFE spans[2]	Out of use	Water Based Hydraulic Fluid
23	Umbilical jumper	PL1324	4.72	0.254	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, MEG Methanol	Midline Termination Module to Adjacent to Subsea Well 48/30-15	Surface Laid	Out of use	Water Based Hydraulic Fluid Seawater
24	Gas Jumper	P1325	8	0.254	Composite Flexible pipe	Gas, Condensate , Water	Adjacent to Subsea Well 48/30-15 to Adjacent to Midline Termination Module	Surface Laid	Out of use	Seawater
25	Gas Pipeline	PL584	10.375	9.198	Carbon Steel (Fusion Bonded Epoxy Coating)	Gas, Condensate , Water	Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform	8% of pipeline exposed[1] No reportable FishSAFE spans[2]	Out of use	Seawater
26	Umbilical	PL1323	5.16	9.550	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, MEG Methanol	Cut Point A Adjacent to Platform 48/29 A-P to Cut Point F Adjacent to Subsea Well 48/30-11	3% of pipeline exposed[1] No FishSAFE spans [2]	Out of use	Seawater

27	Umbilical (Redundant)	PL585	3.82	9.362	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, MEG Methanol	Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform	Trenched & Buried (as per PL584)	Out of use	Water Based Hydraulic Fluid Methanol, MEG
28	Umbilical (Redundant)	PL586	3.82	9.362	Electro, Hydraulic & Chemical Control umbilical	Water Based Hydraulic Fluid, MEG Methanol	Disconnected end Adjacent to Well-48/30- 11 to Cut Point C Adjacent to Hewett Platform	Trenched & Buried (as per PL584)	Out of use	Water Based Hydraulic Fluid Methanol, MEG
29	Umbilical jumper	PL1629.1	6.43	0.260	Chemical Core	MEG Methanol	Adjacent to Della PLEM to Adjacent to Delilah Umbilical JUT	Surface Laid	Out of use	Seawater
30	Umbilical jumper	PL1629.2	6.43	0.255	Chemical Core	MEG Methanol	Adjacent to Della PLEM to Adjacent to Delilah Tree Connector	Surface Laid	Out of use	Methanol, MEG
31	Umbilical jumper	PL1629.3	6.43	0.250	Hydraulic Core	Water Based Hydraulic Fluids	Delilah Umbilical JUT to Delilah Umbilical JUT	Surface Laid	Out of use	Water Based Hydraulic Fluid Methanol, MEG
32	Umbilical jumper	PL1629.4	6.43	0.250	Chemical Core (spare)	MEG Methanol	Delilah Umbilical JUT to Delilah Umbilical JUT	Surface Laid	Spare, Not Used, Not Connected	Unknown
33	Gas Jumper	PL1630	8	0.268	Composite Flexible pipe	Gas, Condensate , Water	Adjacent to Delilah Xmas Tree to Adjacent to Della PLEM	4% of pipeline exposed[1] No FishSAFE spans [2]	Out of use	Gas, Condensate, Water, Methanol, MEG, Corrosion Inhibitor

[1] As per pipeline survey length

[2] As per FishSAFE reporting criteria “Significant” pipeline span (greater than 10m length AND 0.8m Height)

Stabilisation Feature	Total Number	Total Weight (Te)	Locations	Exposed / Buried / Condition / Date Installed

Concrete Mats on PL20	167	1394	KP 0.000 to KP 0.253 – 118 mats	Partially Buried - Condition unknown - 1994
			KP 0.478 to KP 0.540 – 3 mats	Buried (DOC 0.7m to 2.75m) - Condition unknown - 1994
			KP 2.178 to KP 2.235 – 18 mats	Buried (DOC 1.28m to 2.97m) - Condition unknown – 1994 & 1997
			KP 2.580 to KP 2.690 – 6 mats	Exposed – Condition Good - 2019
			KP 2.893 to KP 2.936 – 6 mats	Partially Buried - Condition unknown - 1997
			KP 2.931 to KP 2.999 – 6 mats	Exposed – Condition Good - 2019
			KP 3.142 to KP 3.177 – 2 mats	Partially Buried - Condition unknown - 1998
			KP 3.353 to KP 3.377 – 8 mats	Partially Buried - Condition unknown - 2002
Concrete Mats on PL21	112	935	KP 0.000 to KP 0.032 – 11 mats	Partially Buried - Condition unknown - 1994
			KP 0.084 to KP 0.128 – 6 mats	Partially Buried - Condition unknown - 1996
			KP 0.150 to KP 0.190 – 12 mats	Partially Buried - Condition unknown - 1994
			KP 0.232 to KP 0.259 – 1 mat	Partially Buried - Condition unknown - 1999
			KP 0.252 to KP 0.311 – 10 mats	Exposed – Condition Good - 2019
			KP 0.340 to KP 0.393 – 11 mats	Partially Buried - Condition unknown - 1997
			KP 0.390 to KP 0.420 – 1 mat	Partially Buried - Condition unknown - 2001
			KP 0.440 to KP 0.457 – 1 mat	Partially Buried - Condition unknown - 2001
			KP 0.473 to KP 0.491 – 1 mat	Partially Buried - Condition unknown - 1999
			KP 4.571 to KP 4.611 – 6 mats	Partially Buried - Condition unknown - 1997
			KP 4.667 to KP 4.778 – 11 mats	Exposed – Condition Good - 2018
			KP 4.810 to KP 4.872 – 19 mats	Buried (DOC 0.6m to 2.64m) - Condition unknown - 1994
			KP 4.850 to KP 4.890 – 3 mats	Buried (DOC 1.82m to 2.76m) - Condition unknown - 1998
			KP 4.898 to KP 4.936 – 11 mats	Buried (DOC 2.2m to 2.8m) - Condition unknown - 1997
			KP 4.948 to KP 4.975 – 8 mats	Buried (DOC 2.6m to 2.86m) - Condition unknown - 1998
Concrete Mats on PL83	86	718	KP 0.005 to KP 0.020 – 5 mats	Buried (DOC – Out of Range) - Condition unknown - 1994
			KP 0.051 to KP 0.145 – 31 mats	Partially Buried - Condition unknown - 1994
			KP 0.153 – 1 mat	Exposed – Condition Good - 2020
			KP 0.177 to KP 0.225 – 9 mats	Exposed – Condition Good - 2019
			KP 0.278 to KP 0.303 – 11 mats	Exposed – Condition Good - 2020
			KP 0.384 - 1 mat	Exposed – Condition Good - 2020
			KP 0.482 to KP 0.507 – 3 mats	Exposed – Condition Good - 2019

			KP 0.521 to KP 0.557 – 3 mats	Exposed – Condition Good - 2020
			KP 0.565 to KP 0.578 – 2 mats	Partially Buried - Condition unknown - 1997
			KP 0.697 to KP 0.727 – 11 mats	Exposed – Condition Good - 2019
			KP 1.623 to KP 1.657 – 1 mat	Partially Buried - Condition unknown - 1995
			KP 1.980 to KP 2.015 – 3 mats	Exposed – Condition Good - 2019
			KP 4.005 to KP4.024 – 5 mats	Partially Buried - Condition unknown 1994
Concrete Mats on PL 84	62	518	KP 0.005 to KP 0.020 – 5 mats	Buried - Condition unknown - 1994
			KP 1.723 to KP 1.788 – 22 mats	Partially Buried - Condition unknown - 1994
			KP 8.082. to KP 8.150 – 22 mats	Partially Buried - Condition unknown – 1994
			KP 8.161 to KP 8.189 – 2 mats	Partially Buried - Condition unknown – 1999
			KP 8.346 to KP 8.400 – 5 mats	Partially Buried - Condition unknown – 1994
			KP 8.427 to KP 8.445 – 6 mats	Partially Buried - Condition unknown - 1994
Concrete Mats on PL 85	67	559	KP 0.005 to KP 0.020 – 5 mats	Buried (DOC – Out of Range) - Condition unknown - 1994
			KP 4.628 to KP 4.740 – 14 mats	Exposed – Condition Good - 2019
			KP 10.146 to KP 10.183 – 5 mats	Exposed – Condition Good - 2019
			KP 10.159 to KP 10.204 – 16 mats	Exposed – Condition Unknown - 1994
			KP 10.297 to KP 10.351 – 21 mats	Partially Buried - Condition unknown - 1994
			KP 10.425 to KP 10.441 – 6 mats	Buried (DOC – Out of Range) - Condition unknown - 1994
Concrete Mats on PL 87	20	167	KP 0.000 to KP 0.030 – 8 mats	Exposed – Condition Unknown – 1994
			KP 4.468 to KP 4.489 – 12 mats	Exposed - Condition Good - 2019
Concrete Mats on PL135.1	9	75	KP 0.000 to KP 0.070 – 6 mats	Exposed – Condition Unknown - 1995
			KP 0.035 to KP 0.043 – 3 mats	Exposed – Condition Unknown - 1999
Concrete Mats on PL 584	18	150	KP 0.000 to KP 0.020 – 0 mats	Exposed – Condition Unknown - 1995
			KP 0.246 to KP 0.267 – 0 mats	Exposed – Condition Good - 2018
			KP 0.329 to KP 0.344 – 4 mats	Exposed – Condition Good - 2018
			KP 1.245 to KP 1.286 – 13 mats	Exposed – Condition Good - 2019
			KP 9.137 to KP 9.156 – 1 mat	Partially Buried - Condition unknown - 2000
Concrete Mats on PL1173 / PL1174	45	376	KP 0.000 to KP 0.080 – 7 mats	Buried– Condition Unknown - 1995
			KP 3.546 to KP 3.572 – 10 mats	Exposed – Condition Good - 2018
			KP 4.347 to KP 4.464 – 18 mats	Buried – Condition Unknown - 1995

			KP 5.927 to KP 6.038 – 10 mats	Buried – Condition Unknown - 1995
Concrete Mats on PL1177 / PLU4688	29	242	KP 0.000 to KP 0.050 – 17 mats	Buried – Condition Unknown - 1995
			KP 5.628 to KP 5.798 – 12 mats	Buried – Condition Unknown - 1995
Concrete Mats on PL1323	45	359	KP 0.071 to KP 0.164 – 15 mats	Buried – Condition Unknown - 1997
			KP 2.269 to KP 2.325 – 12 mats	Buried – Condition Unknown - 1997
			KP 4.699 to KP 4.829 – 0 mats	Buried – Condition Unknown - 1997
			KP 9.371 to KP 9.439 – 18 mats	Buried – Condition Unknown - 1997
Concrete Mats on PL1324 / PL1325	43	359	KP 0.000 to KP 0.259 – 43 mats	Buried – Condition Unknown - 1997
Concrete Mats on PL1629 / PL1630	45	376	KP 0.000 to KP 0.263 – 45 mats	Buried – Condition Unknown - 1998
Concrete Mats on U30-8 Umbilical	1	8.3	KP 0.231 to KP 0.233 – 1 mat	Buried – Condition Unknown - 1999
Total Concrete Mats on all Pipelines	**749**	**6254**	**All Pipelines (Locations as above)**	**Various conditions as above**
Frond Mats on PL20	176	8.2	KP 0.000 to KP 0.253 – 100 mats	Buried - Condition unknown - 1994
			KP 0.478 to KP 0.540 – 12 mats	Buried - Condition unknown - 1994
			KP 2.178 to KP 2.235 – 26 mats	Buried - Condition unknown - 1994 & 1997
			KP 2.725 to KP 2.755 – 10 mats	Buried - Condition unknown - 1993
			KP 2.893 to KP 2.936 – 12 mats	Buried - Condition unknown - 1997
			KP 3.142 to KP 3.177 – 6 mats	Buried - Condition unknown - 1998
			KP 3.353 to KP 3.377 – 10 mats	Buried - Condition unknown - 2002
Frond Mats on PL21	161	9.1	KP 0.060 to KP 0.065 – 2 mats	Buried - Condition unknown - 1995
			KP 0.084 to KP 0.128 – 14 mats	Buried - Condition unknown - 1996
			KP 0.145 to KP 0.190 – 18 mats	Buried - Condition unknown – 1994 & 1995
			KP 0.195 to KP 0.205 – 3 mats	Buried - Condition unknown - 1995
			KP 0.232 to KP 0.259 – 5 mats	Buried - Condition unknown - 1999
			KP 0.271 to KP 0.304 – 7 mats	Buried - Condition unknown - 1995
			KP 0.340 to KP 0.393 – 18 mats	Buried - Condition unknown - 1997
			KP 0.390 to KP 0.420 – 4 mats	Buried - Condition unknown - 2001
			KP 0.416 to KP 0.438 – 6 mats	Buried - Condition unknown – 1995

			KP 0.440 to KP 0.457 – 2 mats	Buried - Condition unknown – 2001
			KP 0.473 to KP 0.491 – 4 mats	Buried - Condition unknown – 1999
			KP 0.493 to KP 0.508 – 12 mats	Buried - Condition unknown – 1995 & 1999
			KP 4.571 to KP 4.611 – 12 mats	Buried - Condition unknown – 1997
			KP 4.810 to KP 4.872 – 28 mats	Buried - Condition unknown – 1994
			KP 4.873 to KP 4.888 – 2 mats	Buried - Condition unknown – 1995
			KP 4.898 to KP 4.936 – 12 mats	Buried - Condition unknown – 1997
			KP 4.948 to KP 4.975 – 12 mats	Buried - Condition unknown - 1998
Frond Mats on PL83	122	7.1	KP 0.051 to KP 0.145 – 40 mats	Buried - Condition unknown – 1994
			KP 0.193 to KP 0.235 – 16 mats	Buried - Condition unknown – 1998
			KP 0.271 to KP 0.304 – 11 mats	Buried - Condition unknown – 1995
			KP 0.402 to KP 0.429 – 5 mats	Buried - Condition unknown – 1995
			KP 0.427 to KP 0.468 - 6 mats	Buried - Condition unknown – 1997
			KP 0.565 to KP 0.578 – 4 mats	Buried - Condition unknown – 1997
			KP 1.235 to KP 1.245 – 4 mats	Buried - Condition unknown – 1995
			KP 1.620 to KP 1.670 – 24 mats	Buried - Condition unknown – 1996
			KP 2.496 to KP 2.541 – 12 mats	Buried - Condition unknown - 1996
Frond Mats on PL84	134	7.2	KP 0.886 to KP 0.914 – 14 mats	Buried - Condition unknown – 1995 & 1997
			KP 0.919 to KP 0.942 – 7 mats	Buried - Condition unknown – 1997
			KP 1.715 to KP 1.783 – 20 mats	Buried - Condition unknown – 1993
			KP 1.723 to KP 1.788 – 39 mats	Buried - Condition unknown – 1994 & 2000
			KP 2.155 to KP 2.215 – 18 mats	Buried - Condition unknown – 1993
			KP 8.082 to KP 8.150 – 7 mats	Buried - Condition unknown – 1994
			KP 8.154 to KP 8.195. – 17 mats	Buried - Condition unknown – 1995, 1997 & 1999
			KP 8.228 to KP 8.245. – 3 mats	Buried - Condition unknown – 1995
			KP 8.274 to KP 8.279 – 2 mats	Buried - Condition unknown – 1995
			KP 8.346 to KP 8.400 – 7 mats	Buried - Condition unknown - 1994
			KP 4.618 to KP 4.633 – 7 mats	Buried - Condition unknown – 1997
			KP 10.051 to KP 10.056 – 2 mats	Buried - Condition unknown – 1995
			KP 10.103 to KP 10.140 – 6 mats	Buried - Condition unknown – 1997

Frond Mats on PL 85	86	4.4	KP 10.146 to KP 10.204 – 41 mats	Buried - Condition unknown – 1994, 1996 & 2000
			KP 10.274 to KP 10.286 – 4 mats	Buried - Condition unknown - 1994
			KP 10.297 to KP 10.351 – 26 mats	Buried - Condition unknown – 1994
Frond Mats on PL 87	20	0.9	KP 0.000 to KP 0.030 – 9 mats	Buried - Condition unknown - 1994
			KP 5.997 to KP 6.017 – 5 mats	Buried - Condition unknown – 1994
			KP 6.103 to KP 6.140 – 6 mats	Buried - Condition unknown - 1997
Frond Mats on PL135.1	3	0.2	KP 0.000 to KP 0.070 – 3 mats	Buried - Condition unknown - 1995
Frond Mats on PL584	16	0.8	KP 9.137 to KP 9.171 – 16 mats	Buried - Condition unknown – 1995 & 2000
Frond Mats on PL1173 / PL1174	30	1.4	KP 0.000 to KP 0.080 – 15 mats	Buried– Condition Unknown - 1995
			KP 4.347 to KP 4.464 – 4 mats	Buried– Condition Unknown – 1995
			KP 5.927 to KP 6.038 – 11 mats	Buried– Condition Unknown – 1995
Frond Mats on PL1177 / PLU4688	39	1.8	KP 0.000 to KP 0.050 – 8 mats	Buried– Condition Unknown – 1995
			KP 5.628 to KP 5.798 – 31 mats	Buried– Condition Unknown - 1995
Frond Mats on PL1323	75	3.4	KP 0.071 to KP 0.164 – 15 mats	Buried– Condition Unknown - 1997
			KP 2.269 to KP 2.325 – 9 mats	Buried– Condition Unknown – 1997
			KP 4.699 to KP 4.829 – 34 mats	Buried– Condition Unknown – 1997
			KP 9.371 to KP 9.439 – 17 mats	Buried– Condition Unknown - 1997
Frond Mats on PL1324 / PL1325	34	1.5	KP 0.000 to KP 0.259 – 34 mats	Buried– Condition Unknown - 1998
Total Frond Mats on all Pipelines	**896**	**46.0**	**All Pipelines (Locations as above)**	**Conditions as above**
Grout Bags	3062	77[1]	PL1323	Condition Unknown - 1997
Deposited Rock	n/a	Unknown	All Pipelines	Buried – various installation dates

[1] Exact quantity is unknown