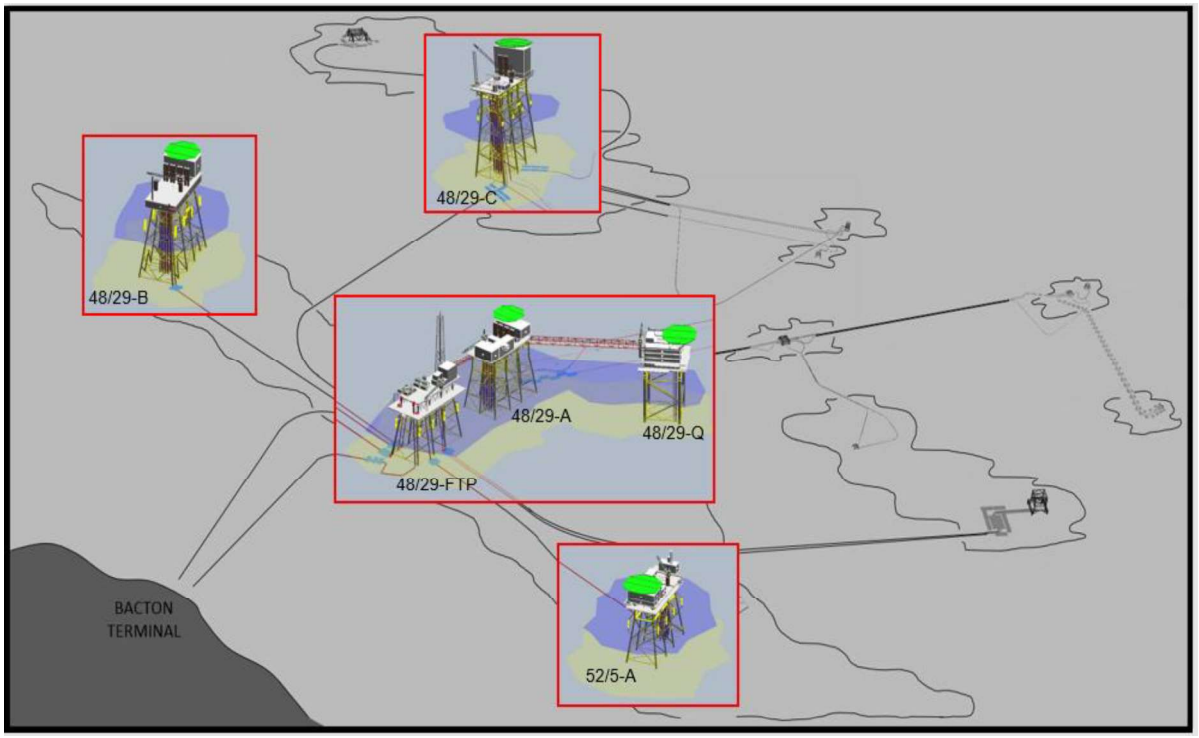
HEWETT PLATFORMS DECOMMISSIONING ENVIRONMENTAL APPRAISAL



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Revision History

Rev.	Date	Description
0	10/03/2020	Consultation Draft
1	03/11/2020	Issued after Public Consultation to address feedback received
2	02/02/2021	Amended section 5.6 Project Schedule in line with updated Decommissioning Programme rev.09

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Abbreviation	Explanation
%	Percentage
"	Inch
<	Less than
º C	Degrees Celsius
º	Degrees
µm	Micrometre(s)
ALARP	As Low As Reasonably Practicable
BEIS	Department for Business, Energy & Industrial Strategy
BRIG	Biodiversity Reporting and Information Group
CA	Comparative Assessment
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Coordinated Environmental Monitoring Programme
CoP	Cessation of Production
DECC	Department of Energy and Climate Change (merged into BEIS in 2016)
DP	Decommissioning Programme
dB	Decibel
EA	Environmental Appraisal
EBS	Environmental Baseline Survey
EC	European Commission
EMS	Environmental Management System
ENVID	Environmental Impact Identification
EPS	European Protected Species
EU	European Union
FCS	Favourable Conservation Status
FTP	Field Terminal Platform
HRA	Habitat Regulation Assessment
HLV	Heavy Lift Vessel
ICES	International Council for the Exploration of the Sea
IMS	Integrated Management System
Kg	Kilogramme
kHz	KiloHertz
Km	Kilometer
JNCC	Joint Nature Conservation Committee

Abbreviation	Explanation
LAT	Lowest Astronomical Tide
LSA	Low Specific Activity scale
LSE	Likely Significant Effect
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi Beam Echo Sounder
MCAA	The Marine and Coastal Access Act
MCV	Monohull Crane Vessel
MCZ	Marine Conservation Zone
MEI	Major Environmental Incident
MMO	Marine Management Organisation
MMO(b)	Marine Mammal Observers
MPA	Marine Protected Area
m/s	Metres per second
MU	Marine Unit
N/A	Not Applicable
NFFO	National Federation of Fishermen's Organisations
NM	Nautical Mile
NORM	Naturally Occurring Radioactive Materials
NPAI	Not Permanently Attended Installation
NUI	Normally Unmanned Installation
O&GUK	Oil & Gas UK
OSC	Ocean Science Consulting Limited
OCNS	Offshore Chemical Notification Scheme
ODU	Offshore Decommissioning Unit
OGA	Oil and Gas Authority
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OSRL	Oil Spill Response Ltd
OSPAR	Oslo-Paris Convention
P&A	Plug and Abandon / Plugging and Abandonment
PAH	Poly Aromatic Hydrocarbon
PAM	Passive Acoustic Monitoring
PSD	Particle Size Distribution

Abbreviation	Explanation
PETS	Portal Environmental Tracking System
PEXA	Practice and Exercise Area
PON	Petroleum Operations Notice
RAF	Royal Air Force
ROV	Remotely Operated Vessel
SAC	Special Area of Conservation
SFF	Scottish Fishermen's Federation
SLV	Single-Lift Vessel
SNCB	Statutory Nature Conservation Bodies
SNS	Southern North Sea
SOPEP	Ship Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Area
SSS	Side-Scan Sonar
THC	Total Hydrocarbon
TOC	Total organic carbon
TOM	Total organic matter
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association

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 Hewett Limited (hereafter referred to as 'Eni') for the decommissioning (complete removal and return to shore) of the platforms in the Hewett 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.

The Hewett field infrastructure comprises six platforms (as detailed in Table 1-1), 32 platform wells, and a further eight subsea wells tied back to the platforms. The 49/29-A Complex is self-contained with gas turbine power generation and consists of three bridge-linked platforms: 48/29-A, 48/29-FTP and 48/29-Q (the latter housing the living quarters and the operational helideck). The 49/29-A Complex is classed as one location due to the proximity of the three platform (marked as location '1' on Figure 1-1). The remaining three platforms; 48/29-B (location '2'), 48/29-C (location '3') and 52/5-A (location '4'), are not permanently attended installations (NPAI), with production tied back to the 48/29-A Complex via 24'' interfiled pipelines.

Table 1-1 - Hewett field platforms

Location	Installation	Installation Type
1. 48/29-A Complex site	**48/29-FTP**	Field Terminal Platform
	48/29-A	Production platform (including Bridge from platform 48/29-A to platform 48/29-FTP)
	48/29-Q	Accommodation platform (including Bridge from platform 48/29-A to platform 48/29-Q)
2. Bravo site	**48/29-B**	Satellite platform
3. Charlie site	**48/29-C**	Satellite platform
4. 52/5-A site	**52/5-A**	Satellite platform

The purpose of the EA is to document the potential for, and significance of, environmental and societal impacts resulting from the proposed Platforms Decommissioning Programme (DP) for all six Hewett platforms and summarise the proposed mitigations and control measures required to minimise any impacts to an acceptable level.

This Platform EA report only considers the preparation for and subsequent removal and transportation to shore of the six Hewett platforms, as well as the removal of the vent stack and redundant compressor package on the 52/5-A platform. Decommissioning of the subsea infrastructure associated with the Hewett field is outside the scope of this report and will be addressed in a separate DP and EA report. In addition, well plug and abandonment and the flushing and cleaning operations that will be undertaken on the topsides as part of the preparatory work preceding the platform decommissioning activities are also outside the scope of this Platform EA report and will be consented under appropriate environmental permit and consents.

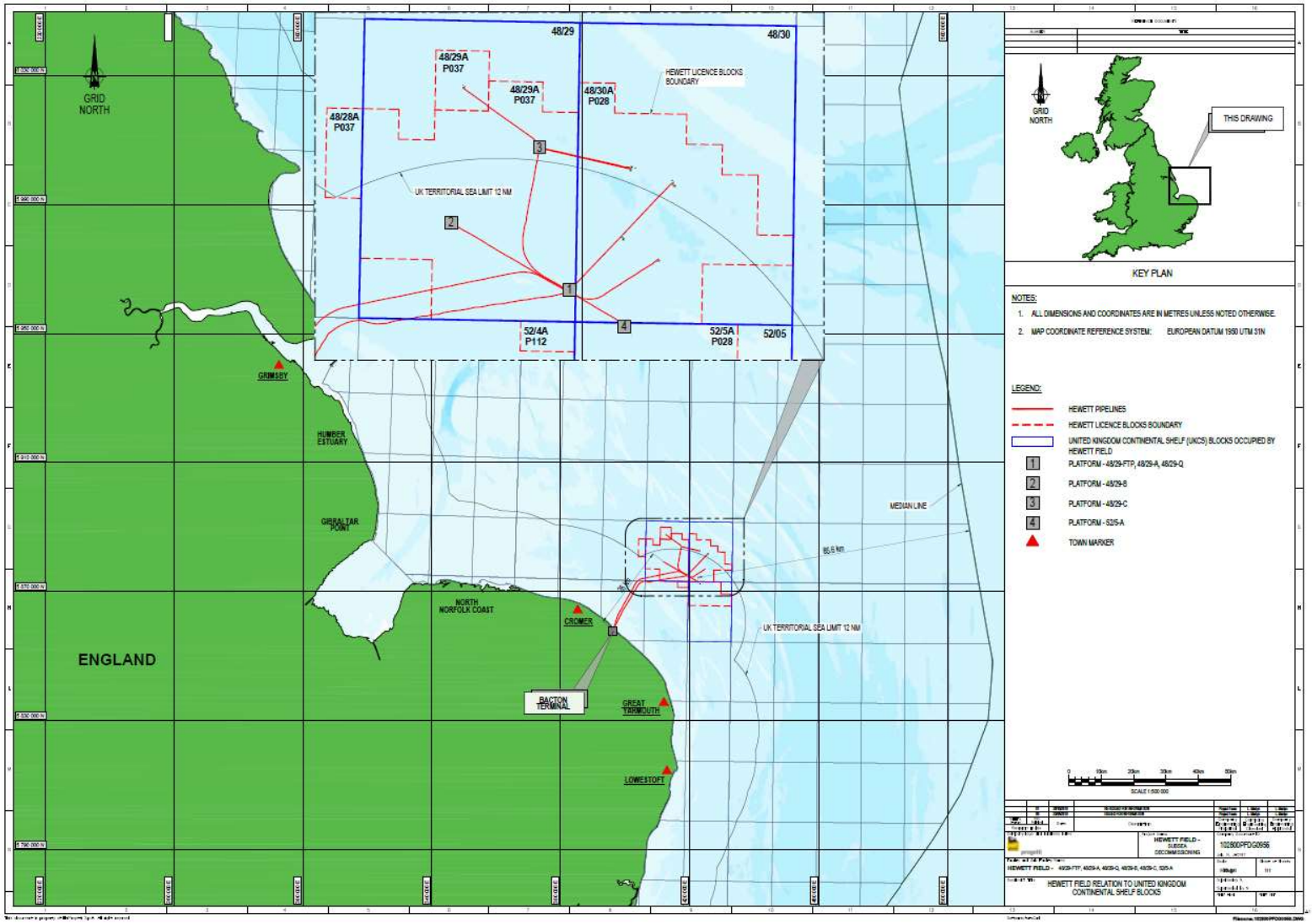


Figure 1-1 - Hewett Field Area Location

1.2 Proposed Decommissioning Activities

Eni is proposing to recover the six Hewett platforms to shore for reuse, recycling or disposal. This work is scheduled to be undertaken sometime between 2022 and 2028.

Table 1-2 below, summarises the platform removal methods which are currently being considered by Eni. A final decision on the decommissioning method will be made following a commercial tendering process. As the preferred removal option has not yet been selected, the EA has assessed the option which results in a worst-case scenario in terms of environmental and societal effects. Any deviations from the removal methods currently described in this EA report will aim to reduce the magnitude of the environmental impact of decommissioning operations.

Table 1-2 - Decommissioning Strategy and Removal Options

Infrastructure	Decommissioning Strategy	Removal Options	Worst-Case Scenario Assessed
Topsides	Complete removal and recovery to shore for reuse, recycling or disposal.	Some preparation works are required prior to removal including piece small removal of specific items and installation of lifting points. Following this the topside will be removed via one of the following options: 1. Single lift removal by Single Lift Vessel / Monohull Crane Vessel; or 2. Modular/piece-large removal by Heavy Lift Vessel (HLV) for re-use/recycling/disposal 3. Offshore removal 'piece small' for onshore reuse/disposal	A walk to work (W2W) HLV jack-up vessel will be used for the preparation works. This vessel may require rock to be deposited on the seabed to assist with stability and mitigate against scour. Following this the topsides will be subject to modular/piece-large removal by HLV. The marine spread anticipated for these works includes: • A HLV of 7000Te capacity with dynamic positioning or 3000Te vessel with anchoring • A maximum of 2 support barges • A maximum of 2 Tugs (1 x 280Te pull capacity and a low capacity) • A standby vessel (for all activities) • A supply vessel (as required)
Jackets	Complete removal and recovery to shore for reuse, recycling or disposal	The jackets will be removed either in a single lift or cut and recovered in several pieces 1. Removal as complete unit (in a single lift) by HLV 2. Removal in several pieces and transport by work barge Prior to removal, areas of seabed will have to be cleared to allow access. It is assumed that piles will be cut internally to 3m below seabed level; however, if internal cutting is not possible external cutting will be required.	Water jetting using an ROV will be used to clear the seabed to allow access. Mattresses and other stabilisation material may also need to be moved. It is assumed that external cutting of the piles will be required using an abrasive cutting tool system. Each jacket will then be removed as a complete unit by HLV. A cargo barge and tugs will need to be present for all HLV activities, firstly to provide a vessel onto which the jacket sections can be lifted and secondly to transport the jacket sections to shore.

In addition to the topsides and jackets removal work, during 2020, Eni proposes to remove the vent stack and redundant compressor package on the 52/5-A platform to clear any obstructions for rig access to facilitate the P&A of the platform wells. Removal and transportation to shore of this material will be managed by the current field supply vessel and disposal arrangements to Great Yarmouth or Lowestoft Harbour, minimising any environmental or societal impacts.

1.3 The Baseline Environment

An overview of the key environmental and societal features in the vicinity of the Hewett platforms that may be affected by the proposed decommissioning works is provided in Table 1-3. 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 1-3 - Summary of Environmental and Societal Features in the vicinity of the Hewett Platforms

Feature	Description
Physical Environment	
Location	The Hewett platforms are located approximately 22km north-east of the Norfolk coastline and 77km west of the UK/Dutch transboundary line. Five of the Hewett platforms (48/29-A Complex, 48/29-B and 48/29-C) are located in UKCS Block 48/29, with the remaining platform (52/5-A) located in Block 52/5.
Bathymetry	The seabed across the Hewett Field Area ranged from 16.3 – 40.3 m in depth to surface to Lowest Astronomical Tide (LAT) and was found to be relatively flat. Meggaripples were observed throughout with the greatest height observed at 48/29-B and the greatest length observed at 48/29-C. Sandwaves were only observed at three sample stations with the highest observed at 52/5-A and longest length at 48/29-B.
Seabed Sediments	Seabed sediments observed in the vicinity of the Hewett platforms consisted of rippled sand, with varying proportions of shell fragments. Particle size analysis found the sediments to be comprised of medium to coarse sand and total organic matter and total organic carbon content were reported as low. Total hydrocarbon levels recorded across the Hewett Field Area were comparable to the available regional datasets (ranging 0.3 µg/g to 3.1 µg/g) and were below the OSPAR likely sediment effect threshold level of 50 µg/g. Polycyclic aromatic hydrocarbons levels were also considerably lower than the thresholds where impacts to sediment fauna would be expected. In general, metal concentrations were below the mean background concentrations for the SNS and the concentrations of bioavailable metals are not expected to result in detrimental effects on sediment macrofaunal communities.
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 10ºC). 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 – 11m/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)	The 48/29-A Complex, 48/29-C & 52/5-A platforms are located within the Southern North Sea Special Area of Conservation (SAC), designated for the protection of harbour porpoise. The 48/29-A Complex and 52/5-A platforms are located within the boundary of the Haisborough, Hammond and Winterton SAC, designated of the presence of Annex I habitats sandbanks which are slightly covered by sea water all the time, and *Sabellaria spinulosa* reefs. The following five MPAs are also located within 40km of the Hewett platforms (distances in brackets is to the closest platform): North Norfolk Sandbanks and Saturn Reef SAC (4.2km), Greater Wash Special Protection Area (SPA) (9km), Cromer Shoal Chalk Beds Marine Conservation Zone

Feature	Description
	(MCZ) (15.8km), The Outer Thames Estuary SPA (38.5km) and The Wash and North Norfolk Coast SAC (39.6km).
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 Ceratium (*C. focus*, *C. furca, C, lineatum*), along with high numbers of the diatom, *Chaetoceros*. The zooplankton community in the North Sea is dominated by calanoid copepods, although other groups 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 at the Hewett platforms may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. The following species have all been observed within the Hewett field area: crabs, shrimp, anemones, hydroids, bryozan, *S. Spinulosa*, heart urchins and barnacles. The infaunal community in region of the Hewett platforms is largely dominated by arthropods, annelids and molluscs. From the video and geophysical data collected during the pre-decommissioning environmental baseline survey, *S. spinulosa* classified as 'Low Reef' was identified 114 m north east of the 48/29-B platform and 276 m north east of 48/29-C platform. 'Low Reef' *S. spinulosa* was also recorded approximately 48 m south of the 48/29-B platform during a separate borehole survey. *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. Further areas were identified as 'not a reef'; however, due to the mobile sands of the Hewett Field Area it was not possible to rule out the potential for *S. spinulosa* in locations where it was not observed during video photography. Certain patches in the vicinity of the platforms were therefore reclassified from 'not a reef' to 'no emergent *Sabellaria*'. In addition, a feature interpreted as a spudcan depression approximately 55m from the 52/5-A platform was assessed for its potential to represent Annex I stony reef habitat. The classification of 'reefiness' ranged from 'not a reef' to 'medium reef'. Two sections of the transect were classed as 'medium reef' due to the elevation of cobbles (64 mm to 5 m), percentage of cobble and boulder coverage (> 40% to 95%) and epifaunal species composition in excess of 80%. These areas were located on the outer edges of the spudcan depression associated with historic jack-up activities and may be anthropogenic in origin.
Fish	A number of fish species are likely to be present within the vicinity of the Hewett platforms. Fish species observed during the survey of the Hewett field area include, common dragonet, pogge, dab, juvenile gadoid fish, sandeels, 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 Field platforms 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.

Feature	Description
Seabirds	The Hewett platforms 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, the Hewett platforms lie within the maximum breeding foraging ranges of most seabird species. The most abundant species likely to be present in the vicinity of the Hewett platforms 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. Seabird sensitivity to oil pollution within Blocks 48/29 and 52/5 is extremely high in January and February, very high in December, high in March, April and October, and medium to low from May to September.
Marine Mammals	A number of cetacean species have the potential to be in the vicinity of the Hewett platforms, including harbour porpoise, white-beaked dolphin and minke whale, although white-sided dolphin and common dolphin are also known to be present in the 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 platforms.
Societal Aspects	
Fisheries	The Hewett platforms are located within ICES Rectangles 34F1 (platform 52/5-A) and 35F1 (platforms 48/29-A Complex, 48/29-B and 48/29-C). Commercial fishing within the Hewett Field is undertaken by vessels from a number of EU states deploying a range of gear types. 87.8% of sightings in ICES Rectangle 34F1 are of UK registered vessels (2011-2015) comprised of potters and whelkers (although these usually operate nearer to shore), followed by beam trawlers and trawlers. Brown crab fishing has steadily increased. 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.
Shipping	Shipping density is considered to be very high/high in the vicinity of the Hewett platforms. A vessel traffic survey identified 22 shipping lanes passing close to the Hewett Field Area, which corresponds to an average of 53 vessels per day.
Oil and Gas Activity	The closest oil and gas facilities to the Hewett Field Area are associated with the Perenco operated Leman Field located to the north-west approximately 18.5 km.
Offshore Renewables	The nearest wind farm areas to the Hewett Field Area are the active Dudgeon and Sheringham Shoal wind farms located to the northwest, approximately 25 km and 32 km away respectively.
Military activities	There is a military Practice and Exercise area (PEXA) situated approximately 60km to the north of the Hewett Field Area, which is used by the Royal Air Force (RAF).
Wrecks	A total of 8 known shipwrecks are located within the Hewett Field Area, but none are protected. No wrecks were observed during the Hewett pre-decommissioning survey.
Cables	The 'STRATOS 1' telecommunication cable is situated approximately 13 km west of Hewett Platform 48/29-B 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 platforms.

1.4 Impact Assessment

1.4.1 Environmental Issues and Identification

An initial screening of the potential impacts to environmental and societal receptors from the proposed Hewett Platforms DP project was undertaken by Eni in an environmental impact identification (ENVID) workshop. During the workshop, the significance of potential impacts was categorised as either 'Low', 'Medium', 'Medium-High' or 'High'. Suitable controls and mitigation measures were then captured such that the potential impacts could be prevented or reduced to as low as reasonably practicable (ALARP). The potential impacts were then reassessed to determine if the overall significance had been reduced. This process enabled identification of aspects thought to be potentially significant and requiring comprehensive assessment and aspects that could be scoped out from further assessment.

The ENVID workshop concluded that there were no aspects considered to have a High or Medium-High impact to identified receptors.

The following aspects were considered to have a Low impact to receptors and were scoped out from further assessment:

- Physical presence
- Energy use and atmospheric emissions
- Waste management
- Marine discharges

The following aspects were considered to be potentially significant (presenting a Medium impact to at least one receptor) and therefore required further assessment:

- Seabed disturbance
- Underwater noise
- Accidental releases

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

1.4.2 Summary of Assessment Results

A summary of the results of the comprehensive assessment undertaken for those aspects considered to have a Medium impact to receptors, and therefore identified as potentially significant, is provided below.

1.4.2.1 Seabed Disturbance

It is estimated that the total area of seabed likely to be disturbed by the proposed platform decommissioning activities is ca 747,484 m^2 (0.75 km^2). The majority of disturbance will be temporary in nature as a result of anchoring of the HLV and excavation activities around the jacket legs and pipeline ends. 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 pipeline ends and jackets will facilitate the restoration of the seabed within the Hewett Field Area. There will be no direct physical loss of any of the identified *S. spinulosa* aggregations characterised as having 'low reefiness' at 48/29-B and 48/29-C or of the Stony reef feature identified at 52/5-A.

There is also likely to be a temporary increase in turbidity during the proposed decommissioning operations through sediment resuspension resulting in smothering of some sensitive benthic species. However, the

Hewett platforms 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 considered to be tolerant to smothering and high levels of turbidity and stony reef are known to be moderately sensitive to siltation.

In the event a W2W HLV jack-up vessel is deployed and the deposition of stabilisation / scour mitigation material is required, this material will permanently alter the seabed. This physical change will be limited to an area of approximately 20,112 m^2 (0.02 km^2) and will result in soft sediment habitats being replaced by hard / coarse substratum habitats, albeit in a relatively small area compared to the soft sediment habitat available in the wider southern North Sea.

Some demersal spawning fish may be temporarily displaced due to the operations, however there are suitable spawning grounds in similar sediments nearby. The spawning grounds for herring and sandeel in the vicinity of the Hewett platforms 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, with the identified control and mitigation measures in place (see 1.4.3) and considering the nature of the seabed habitats and species present in the vicinity of the Hewett platforms, the comparatively small area of seabed that will be impacted by the proposed decommissioning operations and the fact that no identified areas of *S. spinulosa* reef or stony reef will be subject to direct physical impact, residual effects on seabed communities and fish are considered to be Low and not significant.

1.4.2.2 Underwater Noise

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 Hewett decommissioning operations.

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

The underwater noise emissions generated during the proposed platform 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. 3 km from the noise source. However the percentage of the relevant Marine Mammal Management Unit reference population which would be disturbed is very small. It is therefore considered unlikely that the proposed decommissioning activities would constitute an offence under The Conservation of Offshore Marine Habitats and Species Regulations 2017.

In summary, there is no evidence to suggest that the underwater noise emissions generated during the proposed platform decommissioning operations would result in injury or significant disturbance to fish or marine mammals. The overall impact has therefore been assessed as Low and no significant residual effects are predicted.

1.4.2.3 Accidental Releases

The greatest inventory of accidental release to sea will be as a result of ship collision. As all platform hydrocarbon inventories will have been removed prior to the decommissioning commencing, the greatest impact from collision will be the vessel diesel inventory. However, as diesel is a light oil it is likely to remain on the sea surface and be subject to high rates of evaporation. It is therefore not expected to persist in the marine environment for a prolonged period of time. The likelihood of a collision is considered Rare due

to the administrative (e.g. vessel management systems) and engineering controls (e.g. navigational aids) that will be applied.

It is also possible that residual oily water will remain after cleaning and flushing of the topsides or that the release of hydraulic fluids could occur during cutting. However, such releases are unlikely given the control measures and the volume of any release would be very small.

In summary, with the identified mitigation measures in place (see Section 1.4.3), it is considered that the risk to the marine environment from an accidental release during the decommissioning operations is Low and no significant residual effects are predicted.

1.4.2.4 Transboundary Impacts

The Hewett Field Area is located approximately 77km from the UK/Netherlands median 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 the Hewett Platforms DP project decides to utilise disposal options outside of the UK, Eni will ensure regulations governing transfrontier shipment of waste are complied with.

1.4.2.5 Cumulative Impacts

Cumulative impacts may arise from incremental changes caused by other past, present or reasonably foreseeable projects/proposals together with the proposed Hewett Platforms DP project. Discussions with other Southern North Sea oil and gas operators (IOG, Perenco, Chrysaor and INEOS) have not identified any oil and gas projects which would result in a significant cumulative impact with the Hewett Platforms DP project. In addition, although a planned extension project has been identified at the Dudgeon and Sheringham wind farms (located 24km and 32km northwest respectively), given the distance between the projects it is unlikely that there will be any significant cumulative impacts if the two projects were ongoing concurrently.

1.4.2.6 Marine Protected Areas

The Hewett platforms are located within 40 km of seven MPAs; Haisborough, Hammond and Winterton SAC, North Norfolk Sandbanks and Saturn Reef SAC, Southern North Sea SAC, Greater Wash SPA, Cromer Shoal Chalk Beds MCZ, The Wash and North Norfolk Coast SAC and the Outer Thames Estuary SPA (see Section 6.2). The 48/29-A Complex, 48/29-C & 52/5-A platforms are located within the Southern North Sea SAC. The 48/29-A Complex and 52/5-A platforms are also located within the Haisborough, Hammond and Winterton SAC. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of any of these MPAs as a result of the proposed Hewett Platforms DP, either alone or in-combination with other plans or projects.

1.4.3 Control and Mitigation Measures

The control and mitigation measures Eni will adopt for the Hewett Platforms DP project to ensure any potential environmental or societal impacts are avoided or reduced to as low as reasonably practicable (ALARP) are summarised in Table 1-4.

Table 1-4 - Control and Mitigation Measures

Impact	Control and Mitigation Measures
Physical Presence	• Work will be conducted within the existing 500m safety exclusion zones surrounding the Hewett platforms • Where required Consent to Locate permits will be in place for vessels • Existing collision risk management plans will be reviewed • Notifications will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins. • Operations will be planned to minimise the number of boat movement, as far as reasonably practicable.
Energy Use and Atmospheric Emissions	• The design of the platforms removal programme will ensure that the time between the various lifting activities is reduced, as far as is practicable, to minimise the total duration of vessels working offshore. • If possible, a dismantling location will be selected close to the Hewett Field Area, which will optimise vessel transit times, thereby reducing fuel consumption and associated atmospheric emissions. • Engines, generators and other combustion plant on the vessels will be maintained and correctly operated to ensure that they work as efficiently as possible.
Waste Management	• A Materials Inventory has been developed for the Platforms DP project to identify the types of waste generated and the management procedures for each waste stream will be included in a project 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 will have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste.
Marine Discharges	• Any waste water discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention. • Vessels shall implement the requirement of the Ballast Water Management Convention.
Seabed Disturbance	• Jacket legs will be cut internally, if possible, to avoid seabed disturbance. • Where external cuts are required, excavations will be planned, managed and implemented in such a way that seabed disturbance is minimised. • Tool use will be minimised where feasible whilst still achieving the desired result. • Where cutting of jacket legs and pipelines requires removal of mattresses and other stabilisation materials, temporary placement of equipment will be within the footprint of planned excavations and mattresses will be reused, where possible, to minimise seabed disturbance. • An anchor management plan will be developed for moored HLV, to ensure anchors and anchor lines deployed will avoid identified *S. spinulosa* reefs and Stony reefs. • Where vessels are required to hold position for only short duration, dynamic positioning (DP) vessels will be used in favour of moored vessel. • If pre-lay rock is required for the W2W HLV jack-up vessel, this will be deployed from a DP rock placement vessel using a fall pipe lowered to the working depth above the spud can locations. The rate and locations of deployment will be controlled on board the vessel and monitored using high resolution survey / sonar equipment to insure that levelling of the seabed has been achieved. • In case of scour being detected, the situation will be closely monitored, and remedial plans, which may include further rock placement, put in place to prevent escalation. In the event of severe scour after a storm type event resulting in

Impact	Control and Mitigation Measures
	destabilization of the vessel, in the first instance the vessel will initiate an emergency jacking procedure, before developing a recovery plan which may include further rock placement. If required, a DP rock placement vessel would be used and the dump fall pipe will be positioned accordingly to optimise placement of rock at the specific scour area required, thus minimising seabed disturbance. • The amount of deposit material will be minimised whilst still achieving the required level of stabilisation / scour mitigation.
Underwater Noise	• Operations will be planned to reduce vessel movements and minimise the overall duration of the project. • Where vessels are required to hold position for extended durations, jack-up or moored vessel will be used in favour of DP vessels. • Internal cutting techniques will be utilised where possible, which do not produce any significant noise emissions. • Where internal cuts are not possible, the preference for external cuts will be mechanical methods because they produce significantly less noise than of abrasive methods.
Accidental Releases	• Vessel work programmes will be designed to minimise use of vessels, minimise operational duration and reduce manning. Shipping and fishing bodies will be kept informed of the project and appropriate notifications made in a timely manner. • A robust programme of topsides and pipelines cleaning and flushing prior to platforms decommissioning will ensure required levels of cleanliness are achieved and minor releases of residual oily water are prevented so far as reasonably practicable. • Appropriate maintenance and pre-use checks on hydraulic equipment will be undertaken to prevent hydraulic line failure during subsea cutting activities. • All vessels undertaking decommissioning activities will have an approved Shipboard Oil Pollution Emergency Plan (SOPEP).

1.5 Conclusions

This EA report confirms that the Hewett Platforms DP can be executed with no significant adverse effects on the marine environment.

An initial screening of the potential impacts to environmental and societal receptors from the proposed Hewett Platforms DP project concluded that the only aspects considered to be potentially significant (presenting a Medium impact to at least one receptor) and therefore requiring further assessment were seabed disturbance, underwater noise and accidental releases. Following further assessment and implementation of the identified additional control and mitigation measures the level of impact from these aspects has been reduced to 'Low' and is therefore not considered to be significant.

In addition, the Hewett platforms are located within 40km of seven marine protected areas (MPAs). However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of any MPAs as a result of the proposed Hewett Platforms DP, either alone or in-combination with other plans or projects.

Eni operate under an Integrated Management System and a Health, Safety and Environmental Management System Interface document will be developed for the project when a removals contractor is appointed to help ensure the identified mitigation and control measures are successfully implemented.

2.0 INTRODUCTION

2.1 Hewett Field Area Description

The Hewett Field Area is located in United Kingdom Continental Shelf (UKCS) Blocks 48/28a, 48/29a, 48/30a, 52/4a and 52/5a in the Southern North Sea, approximately 22km north-east of the Norfolk coast and 77km west of the UK/Dutch transboundary line. Five of the Hewett platforms (48/29-FTP, 48/29-A, 48/29-Q, 48/29-B and 48/29-C) are located in Block 48/29, with the remaining platform (52/5-A) located in Block 52/5. Field information is summarised in Table 2-1 and the location of the Hewett platforms is illustrated in Figure 1-1.

Table 2-1 - Field Information

Field	Hewett	**Production Type**	Gas
Water Depth (m)	20.4 to 36	**UKCS Blocks**	48/29 and 52/5
Distance to Median (km)	77	**Distance to UK Coastline (km)**	22

2.2 History of the Hewett Field

Development of the Hewett field began in 1968, consisting of a field terminal platform, 48/29-FTP, bridge linked to a production platform, 48/29-A and an additional single production platform 52/5-A, 4km south-east of the FTP. Following this, the 48/29-B platform was installed, 8km to the north-west of the FTP, in 1973. The next platform followed in 1976, with 48/29-C being installed over the Big Dotty Reservoir, located in the north of the Hewett Field Area, 9km from FTP. The living-quarters platform 48/29-Q was added to the 48/29-A Complex in 1992, being bridge-linked to 48/29-A.

Since 2008, the Hewett field platforms have been owned by Eni Hewett Limited (hereafter referred to as 'Eni') and operated by Petrofac Facilities Management Limited ('Petrofac'), who has been appointed by Eni as the Installation Operator. In 2019, a phased Cessation of Production (CoP) began with platform 48/29-B. Eni is now proposing to completely remove and return to shore the six Hewett platforms.

2.3 Purpose and Scope of the Environmental Appraisal

This Platform EA report has been written by Eni to support the Hewett Platforms Decommissioning Programme (DP) and sets out to describe, in a proportionate manner, the potential environmental and societal impacts resulting from the decommissioning of the Hewett platforms and demonstrate the extent to which these impacts will be mitigated and controlled to an acceptable level.

The scope of this EA only considers the preparation for and subsequent removal and transportation to shore of the six Hewett platforms, as well as the removal of the vent stack and redundant compressor package at the 52/5-A platform. Decommissioning of the subsea infrastructure associated with the Hewett field is outside the scope of the report and will be addressed in a separate DP and EA report. In addition, well plug and abandonment and the flushing and cleaning operations that will be undertaken on the topsides and pipelines, as part of the preparatory work preceding the platform decommissioning activities, are also outside the scope of this EA and will be consented under appropriate environmental permit and consents.

2.4 Description of Platforms to be Decommissioned

Table 2-2 provides details of the six Hewett platforms to be decommissioned.

Table 2-2 - Platform Decommissioning Information

Number of Platforms	Type	Total Topsides Weight (Te)	Total Jackets Weight (Te)
6	Fixed steel jacket	13,221	7,375
Platform Name	**Water Depth (relative to lowest astronomical tide)**	**Total Topsides Weight (Te)**	**Total Jackets Weight (including piles)Te)**
48/29-B	33.5m	2,221	1,636
48/29-C	36.6m	2,164	1833
52/5-A	21.3m	2,414	969
48/29-FTP	19.9m	1,968	671
48/29-A	22.6m	2,903	1049
48/29A-Q	24.5m	1,551	1217

The 49/29-A Complex consists of three bridge-linked platforms: 48/29-A, 48/29-FTP and 48/29-Q as illustrated in Figure 2-1. This Complex is self-contained with gas turbine power generation located on the Field Terminal Platform (FTP). This Complex is central to the operations of the Hewett Field as it receives gas from the production platforms and subsea wells, which is then passed to the onshore facility at Bacton along two 30" subsea pipelines. As the three platforms comprising the 48/29-A Complex are located in close proximity to each other, this report considers the 48/29-A Complex as one site.

Figure 2-1 - Aerial View of 48/29-A Complex Platforms (48/29-FTP, 48/29-A and 48/29-Q)

The remaining three platforms; 48/29-B, 48/29-C and 52/5-A (shown in Figure 2-2 to Figure 2-4), are not permanently attended installations (NPAI), with production tied back to the 48/29-A Complex via 24" pipelines.

Figure 2-2 - Aerial view of 48/29-B Platform (left is view from South-East, right is view from North-West)

Figure 2-3 - Aerial view of 48/29-C Platform (left is view from South-East, right is view from South-West)

Figure 2-4 - Aerial view of 52/5-A Platform

3.0 POLICY AND REGULATORY CONTEXT

3.1 Overview

The international obligations relevant to the proposed DP are the 1992 Convention for the Protection of the Marine Environment of the North East Atlantic Oslo Paris (OSPAR), the Convention for the Prevention of Pollution from Ships (MARPOL 73/78), the EU Habitats Directive (92/43/EEC) and the EU Birds Directive.

The decommissioning of offshore oil and gas installations and pipelines on the UKCS is controlled through the Petroleum Act 1998 (as amended by the Energy Act 2008 and 2016). The Act requires an operator to submit a draft DP for statutory and public consultation, and to obtain approval of the DP from the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). The draft DP is supported by EA.

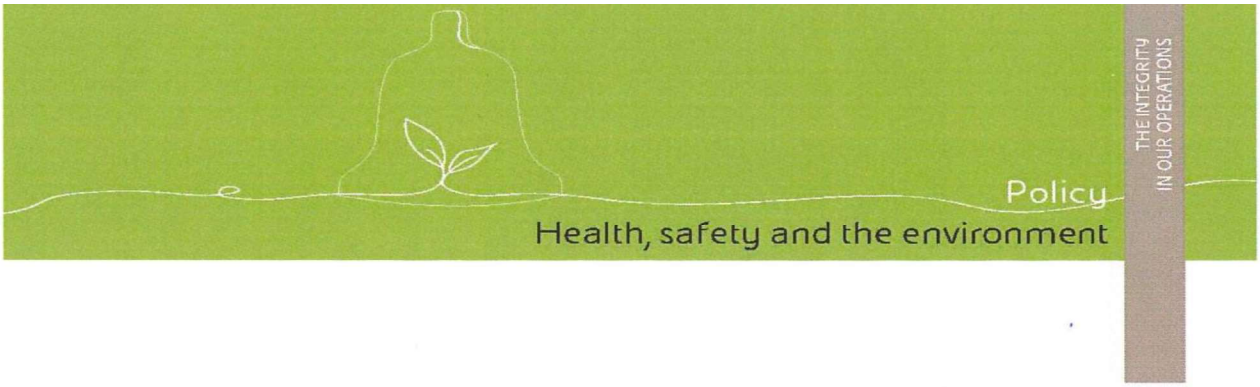
The Marine Coastal Access Act 2009 introduced a number of measures to deliver the United Kingdom Government's vision of "clean, healthy, safe, productive and biologically diverse oceans and seas", including the introduction of eleven marine plan areas. The Hewett Field lies within the East Inshore (48/29-A Complex, 48/29-B and 52/5-A) and Offshore Marine Plan areas (48/29-C). It is considered the Hewett Platforms DP is in alignment with the objectives of these plans.

3.2 Environmental Management

Eni is committed to conducting its activities in a manner that protects people and the environment and in compliance with applicable regulatory requirements. Eni Hewett Ltd adopts the Eni UK Health, Safety and Environmental (HSE) Policy shown in Figure 3-1, supported by Corporate Major Accident Prevention Policy (CMAPP) and Integrated Management System (HSE IMS) which set out guiding principles and mechanisms for managing HSE risks, impacts and compliance. Eni's HSE IMS is certified to ISO 14001: 2015.

Petrofac is currently the duty holder for all the Hewett platforms and has in place a HSE Policy and implements an operational HSE management system, which is certified to ISO 14001: 2015. A formalised HSE Management System Interface document is in place between Eni and Petrofac to provide the mechanism for implementing Eni's requirements through Petrofac's HSE management system and to manage and control operational activities.

A removals contractor will be appointed to complete the topsides and jackets lifts. At this point Petrofac may be retained as duty holder or the removals contractor may be assigned duty holder. If there is a change in duty holder role, the vigorous standards of operational control and environmental protection expected by Eni will be maintained by the new duty holder that has been assigned responsibility.



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

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 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.

December 2019

Manfredi Giusto
Managing Director Eni UK

Figure 3-1 - Eni HSE Policy

4.0 STAKEHOLDER CONSULTATION

A dialogue with Stakeholders has continued since October 2017 to allow early recognition and implementation of recommendations. Table 4-1 provides a summary of the informal consultations which have been held to date. The Hewett Platforms DP has further information on planned and completed stakeholder engagement.

Table 4-1 - Hewett Platforms Stakeholder Engagement

Stakeholder	Discussion Topics / Recommendations	Eni's Response / Comments Noted	Addressed in EA
Stakeholder Consultations			
OPRED Environmental Management Team (EMT)	1. Pre-decommissioning Platforms Environmental Baseline Seabed Survey design: engage Natural England. 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 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 row below within this table 2. Section 5.4 3. Section 9 4. Sections 6.4.2 & 8.1 5. Sections 7.3.6
Joint Nature Conservation Committee (JNCC)	1. Pre-decommissioning Platforms Environmental Baseline Seabed Survey design: reference stations, *Sabellaria spinulosa* 'reefinness' assessments guidance and survey to have 100% coverage. 2. Engage Natural England. 3. 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. 4. 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. 2. Eni engaged Natural England. 3. Addressed in the relevant sections of this EA. 4. Eni engaged market to check, whether any safe and feasible alternatives exist	1. Section 6.1 2. See row below within this table 3. Sections 6.2, 8.2.3 & 9 4. Sections 5.4.3 & 8.1

Stakeholder	Discussion Topics / Recommendations	Eni's Response / Comments Noted	Addressed in EA
Natural England (NE)	1. Pre-decommissioning Platforms Environmental Baseline Seabed Survey design: reference stations selection in similar sediment type and in the similar water depth. 2. Consideration to be given for jacket infrastructure removal – as alternative to removal potential use of infrastructure for future seaweed farming. 3. 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. 2. Eni considered this alternative, however the selected option is to return the clear seabed. 3. Eni engaged market to check, whether any safe and feasible alternatives exist.	1. Section 6.1 2. Section 5 3. Section 5
Environment Agency (EA)	1. Investigate reuse opportunities and factor in time 2. Marine Growth advice if brought onshore 3. Transfortier Shipment of Waste process	1. Ongoing 2. Eni will follow the regulations and requirements 3. Eni will follow the regulations and requirements	1. N/A 2. Section 5.5 3. Section 5.5
National Federation of Fishermen's Organisations (NFFO)	1. Pre-decommissioning Platforms Environmental Baseline Seabed Survey design and FLO arrangements. 2. Preference to remove all stabilisation material - cut and remove legs and other items rather than rock placement. 3. Fishing activity on Hewett field – reach out to the MMO and Inshore Fisheries Conservation Authority (IFCA). 4. Overtrawlability versus pre-clearance ROV survey and debris clearance. 5. Support the use of guard vessels.	1. FLO arrangements implemented for the duration of the survey. 2. Implemented for platforms removal. Where possible, all stabilisation material will be removed. 3. Eni obtained fish landings data from the MMO. 4. Awaiting further feedback. 5. Suitable guard vessel will be used throughout the decommissioning project.	1. N/A 2. Section 5.3 3. Section 6.5.1 4. N/A 5. Section 5.4
Scottish Fishermen's Federation (SFF)	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 2. Fishing Intensity Study will be considered for the subsea infrastructure decommissioning and not platforms decommissioning	1. See row above 2. N/A

5.0 DECOMMISSIONING ACTIVITIES

5.1 Proposed Decommissioning Strategy

Eni is proposing to completely remove the six Hewett platforms (topsides and jackets) and recover to shore, as described in Table 5-1. A final decision on the removal method will be made following an engineering feasibility and commercial tendering process, but the options currently under consideration are discussed in Section 5.2 (topsides removal) and Section 5.3 (jackets removal). For the purpose of this EA, the removal options which result in a worst-case scenario in terms of environmental and societal effects have been assessed (see Section 5.4).

As part the Platforms DP, Eni is also proposing to remove the vent stack and redundant compressor package on the 52/5-A platform to clear any obstructions for rig access to facilitate the P&A of the platform wells. This work is scheduled to be undertaken in 2020 and will involve partial removal of the redundant gas-turbine skid steelwork, ducting and housing, removal of redundant steelwork on the platform south side and removal of the vent stack assembly. Removal and transportation to shore of this material will be managed by the current field supply vessel and disposal arrangements to Great Yarmouth or Lowestoft Harbour, minimising any environmental impacts.

In preparation for removal of the platforms, Eni is undertaking a series of preparatory works. These activities fall outside of the scope of the Platforms DP and this EA and will be consented via the OPRED Environmental Tracking System (PETS) Energy Portal. These include:

1. Surveying
    a. Pre-decommissioning environmental baseline survey
    b. Structural surveying for structural integrity assessment
2. Hydrocarbon free
    a. Flushing and purging of topsides process equipment
    b. Flushing, pigging and flooding of pipelines connecting to platforms in line with approved Pipeline Works Authorisation (PWA)
    c. Platform and subsea wells decommissioning (plug and abandonment) in line with OGUK Well Decommissioning Guidelines
3. Lighthouse mode
    a. Disconnecting of the pipelines (water and air gapping)
    b. Topsides and safety equipment decommissioning
    c. Navigational Aids replacement
4. Dismantling
    a. Removal of potential obstructions

In addition to the above, in April 2019 Eni received OPRED approval for vent stack removal and preparation works at the 48/29-B platform to enable a jack-up drilling rig access to undertake the wells plug and abandonment (P&A) programme. This work was completed in November 2019.

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.

Throughout the proposed decommissioning activities, Eni will ensure that vessel work programmes are designed to minimise the use of vessels, 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. Platform and vessel design features minimise the potential for accidental spillages of hydrocarbons or other polluting materials.

Table 5-1 - Platform Decommissioning Methodology

Selected Option	Reason for Selection	Proposed Decommissioning Solution
Topsides		
Complete removal	The platforms will be completely removed. This method removes potential obstructions and returns the seabed to a natural state and condition that is favourable to other users of the sea and remove obstruction to fisheries. No users have yet been found for reuse of the installations.	The Platforms & Pipelines will be flushed, cleaned, made safe and hydrocarbon free. The "Making Safe" activities include well P&A getting to hydrocarbon (HC) Free. Preparation works for removal will be performed prior to removal by lift vessel and transported ashore for processing/ recycling/ disposal at a suitable onshore facility. Short Spool sections of pipelines and flowlines will be removed (water gapping) to fully isolate the pipelines from the jackets. This work will be subject to appropriate consents being obtained.
Jackets		
Complete removal	Leaves clear seabed, removes a potential obstruction to fishing operations and maximises recycling of materials	Complete removal, with the project aiming for the piles to be severed at a level of 3m below the natural seabed level, to ensure the remains will not be a hazard to other users of the sea. The waste management hierarchy will be applied. Re-use, re-cycling, recovery/processing will be prioritised to ensure the minimum amount practicable is channelled for disposal.
Wells		
Abandoned in accordance with Oil & Gas UK Guidelines for the Suspension and abandonment of Wells.	All platform wells need to be abandoned prior to platform removal to meet OGA and HSEx regulatory requirements	Well abandonment will be undertaken in accordance with approved well designs, applicable legislation and consents obtained and any associated conditions will be complied with.
Interdependencies		
Flushing of the pipelines will take place as part of the "making safe" work scopes on all platforms. After flushing short spool sections will be removed from both ends of the pipelines and flowlines to ensure isolation of the pipelines from the jackets and subsea wells (water gapping), subject to appropriate consents. After completion of the well P&A campaign, each of the platforms will be put into cold stack or lighthouse mode pending preparation for removal and later removal of the structures. Moving of some mattresses is likely to be required to provide access to cut and remove short spool sections from the pipelines and any mattresses placed around the jacket legs (to prevent scour) may need to be moved to allow access to dredge around the piles for cutting at an appropriate level below the sea bed. Some sediment will also be displaced during the spool cutting and jacket pile cutting operations.		

5.2 Topside Removal Options

Most of Hewett topsides structures comprise of 3 levels: a cellar deck, a main/mezzanine deck and a control room/ helideck. The Hewett main topsides were lifted into place as an empty structural skeleton, then pipework equipment added / hook-up offshore. Therefore, the removal method for topsides would most likely be section by section as original compartmentalized construction dictates this approach. Prior to removal, all the platforms will be in a 'cold stack' phase where they will remain unmanned, power generation will be permanently isolated and the topsides will be vented and purged.

A summary of the options under consideration for topsides removal is shown in Table 5-2.

Table 5-2 - Topside Removal Options

Option	Description
1. Single lift removal by Single Lift Vessel (SLV)/Monohull Crane Vessel	Removal and transportation to shore of topsides as complete units. No prior weight-reduction other than items removed to achieve CoP and HC-free state. Once at shore, processing for re-use of selected equipment, recycling, break-up, and/ or disposal.
2. Modular/ piece-large removal by Heavy Lift Vessel (HLV) for re-use/ recycling/ disposal	The platforms were not constructed using a modular approach. In consideration of this, "modular" deconstruction is taken to denote a strategy of removing large, heavy items separately, such as – for example – a self-contained accommodation module, helideck or gas turbine enclosure. Such "modules" would be transported either for reuse in alternate location(s) and/ or recycling or disposal. For the six platforms, "modular" is taken to be similar to a "piece-large" approach, wherein virtually all heavy items supported on the topsides are removed, followed by the 'remainder' topsides removed as one or more pieces.
3. Offshore removal 'piece small' for onshore reuse/ disposal	Removal of topsides by first disassembling topsides into relatively small components limited by crane vessel handling capacity then transporting to shore using work barge. Items will then be sorted for re-use, recycling or disposal.
Proposed removal method and disposal route:	**A final decision on decommissioning method will be made following a commercial tendering process. Due consideration will be given to the requirement of permits and consents for any proposed transboundary shipments of waste.**

5.3 Jackets Removal Options

The Hewett jackets will be removed either in a single lift or cut and recovered in several pieces as detailed in Table 5-3. The piles will be cut internally at a level of 3.0m below the seabed ('seabed cutline'). If any unforeseen difficulties are encountered where external cutting is deemed necessary, excavation of the seabed around the piles will be required for access to enable a cut.

Table 5-3 - Jacket Removal Options

Option	Description
1. Onshore Disposal using HLV	Removal of the jacket as complete unit and transport ashore for break up, recycling and/ or disposal. Re-use of selected equipment would take place where practicable.
2. Onshore Disposal using 'Piece Small'	Remove jacket in several pieces using attendant work barge and transport to shore yard.
Proposed removal method and disposal route:	**A final decision on decommissioning method will be made following a commercial tendering process. Due consideration will be given to the requirement of permits and consents for any proposed transboundary shipments of waste.**

Prior to removal of the jackets, areas of seabed will have to be cleared to allow access; this may be done by water jetting using an ROV. This is a method of jetting which uses high pressured water to clear sediment within a targeted area. Any impact is localized and limited to suspended sediment throughout the water column and subsequent smothering effects.

Underwater cutting will be required to cut the jacket legs, piles and connection spools into sections for lifting. Although the method of cutting is not yet known the most probable are:

- Diamond Wire
- Hydraulic shears
- Abrasive Water Jet Cutters

The removal of mattresses and other stabilisation material for the specific platform decommissioning scope shall be selected specifically to access cuts to risers and jackets preparation and will be dependent on the condition of the mattresses. Mattresses that shall not interfere with access shall be removed in a broader mattress removal campaign, as part of the DP for the Hewett subsea infrastructure.

Due to shallow water turbulence effects in the Southern North Sea, it is anticipated that the seabed will shortly self-level out and fill up any man-made holes due to wave and current action.

5.4 Worst-case Scenarios

The following sub-sections outline the worst-case scenario removal options which have been assessed in this EA report. Any deviations from the proposed removal methods will aim to reduce the magnitude of the environmental impact of decommissioning operations.

5.4.1 Topsides Preparation Works

Some preparation works will need to be undertaken to allow the removal of the topsides, these include:

- Piece small removal of specific items;
- Installation of lifting points.

The worst-case scenario considered for these activities would be the use of a HLV DP2 jack- up vessel which will also act as a Walk to Work (W2W) vessel such as the GeoSea Innovation which would be jacked down on the seabed at each platform location. This vessel may also require rock to be deposited on the seabed to assist with stability and potentially to mitigate against scour.

The seabed in the Hewett Field Area is known to be mobile. Records show that scour, requiring mitigation by rock placement, occurred during drilling operations with the ENSCO 72 at the nearby Deborah field (UKCS Block 48/30) in 2009. At Deborah, 1,733 tonnes of rock was deposited impacting an area of approximately 1,085 m3. Scour monitoring will therefore be undertaken whilst the jack-up vessel is on location in the Hewett Field Area and contingency seabed reparation carried out as necessary. In the first instance, consideration will be given to increasing the depth of the foundation of the jack-up vessel, by initiating an emergency jacking procedure. If this is unsuccessful, rock may need to be deposited. It is estimated that a total up to 1,800 tonnes of graded rock material will be required to stabilise the jack-up vessel at each platform location.

There may also be a requirement to deposit (pre-lay) up to 4,220 tonnes of rock at the proposed spud can locations to form a stable substrate so the legs of the jack-up vessel can be safely jacked down onto the seabed at each platform location. Pre-lay rock (4,147 tonnes) was recently deposited at the 48/29-B platform, when the spud cans of the Valaris 72 jack-up rig were unable to penetrate or disperse (through cycling) historic footprint berms from the previous citing of a jack-up rig.

Any rock which is deposited will be deployed from a dynamically positioned (DP) rock-placement vessel using a fall pipe lowered to the working depth above the relevant structures. The rate and locations of deployment will be controlled on board the vessel and monitored using a remotely operated underwater vehicle.

The marine spread anticipated for the topsides preparation works are:

- HLV W2W Jack-Up Vessel
- A maximum of 2 support barges
- A maximum of 2 Tugs (1 x 280Te pull capacity and a low capacity)
- A standby vessel (for all activities)
- A supply vessel (as required)

The anticipated durations for each vessel in the field for topsides preparation work are detailed in Table 5-4.

Table 5-4 - Expected vessel durations for topsides preparation work

	Number of days Topsides						
Vessel	**48/29-Q**	**48/29-FTP**	**48/29-A**	**48/29-B**	**48/29-C**	**52/5-A**	**Total**
W2W HLV Jack-up	15	15	27.5	21.5	13	22.5	114.5

5.4.2 Topsides Removal

The piece large/ piece small removal of specified items will be required prior to topsides deck removal, the remaining topsides deck shall be separated into two sections for lifting.

The worst-case scenario considered for topsides removal is a marine spread consisting of:

- A HLV of 7000Te capacity with dynamic positioning or 3000Te vessel with anchoring
- A maximum of 2 support barges
- A maximum of 2 Tugs (1 x 280Te pull capacity and a low capacity)
- A diving support vessel (DSV)
- A standby vessel (for all activities)
- A supply vessel (as required)

The anticipated durations for each vessel in the field for topsides removal are detailed in Table 5-5.

Table 5-5 - Expected vessel durations for topsides removal

Vessel	Number of days Topsides						Total
	48/29-Q	48/29-FTP	48/29-A	48/29-B	48/29-C	52/5-A	
HLV	3.5	14.5	14.5	16.5	13	14.5	76.5
Cargo Barge and Tugs	25	40.5	83	80	31.5	51.5	311.5
Vessel	**Number of days riser, j-tube and caission**						**Total**
HLV	1.5	4	3.5	2	8	2	21
DSV	N/A	N/A	1.5	N/A	2	2	5.5

5.4.3 Jacket Removal

Underwater cutting will be required to cut the jacket legs, piles and connection spools into sections for lifting. If internal cutting is not possible external cutting will be required. The use of an abrasive cutting tool system is considered worst-case in terms of both the underwater noise emissions produced and seabed disturbance, as the abrasive material used will be discharged to the seabed.

The same HLV as proposed for topsides removal will be used for the jacket removal. A cargo barge (and tugs) will also need to be present for all HLV activities, firstly to provide a vessel onto which the jacket sections can be lifted and secondly to transport the jacket sections to shore.

The anticipated durations for each vessel in the field for jacket removal are detailed in Table 5-6.

Table 5-6 - Expected Vessel Durations for Jacket Removal

Vessel	Number of days for jacket preparation						Total
HLV	16	20.5	27	21	20.5	20.5	125.5
Vessel	**Number of days for jacket decommissioning**						**Total**
HLV	3	3	3	3.5	3.5	3.5	19.5
Cargo and Tugs	37	37	37	31.5	17.5	37.5	197.5

5.5 Waste Management

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

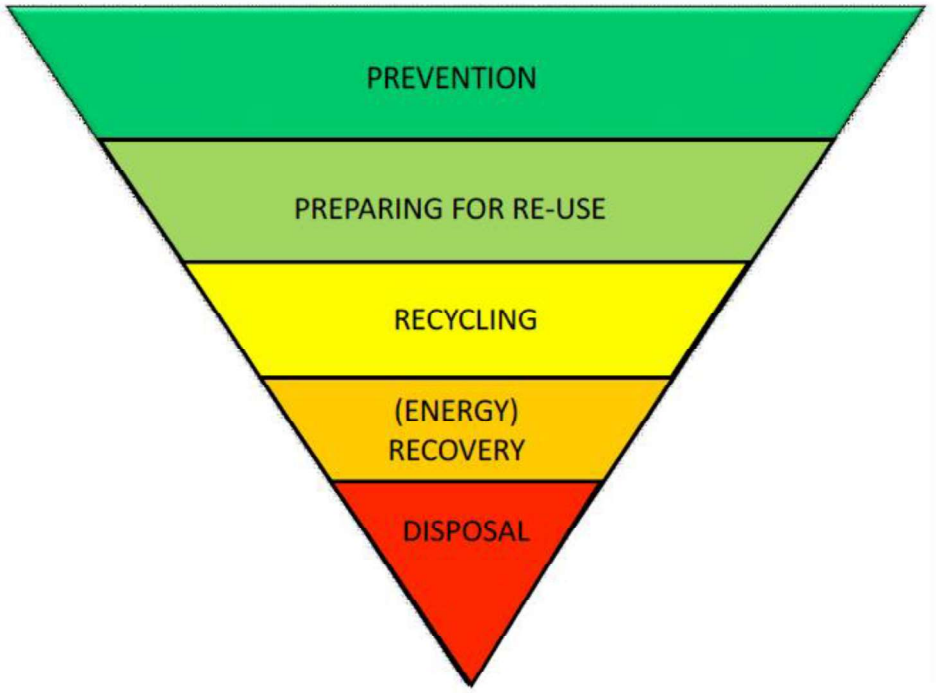


Figure 5-1 - Waste Hierarchy (EU Waste Framework Directive)

Recyclable metals, predominantly steel and iron, are estimated to account for the greatest proportion of the materials inventory. Topsides and jackets structures will be transported to an onshore decommissioning facility for segregation, re-use and recycling. Contractor and site selection process is in early stages and thus the potential transboundary shipment of waste cannot be dismissed for certainty.

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. Table 5-7 summarises the current estimated overall breakdown of materials to be removed. These quantities relate to the platform installations only, exclude well materials, and are limited to everything above the seabed cutline (jacket piling below this level are not included and will be left in place).

Table 5-7 - Estimated Waste Inventory

Installation	Hazardous material (Te)	Concrete (Te)	Ferrous Metal (Te)	Non-Ferrous Metal (Te)	Plastics (Te)	WEEE (Te)	Total (Te)
48/29-FTP	213	56	2,361	2	3	4	2,639
48/29-A	141	101	3,702	2	0	5	3,951
48/29A-Q	242	110	2,344	26	35	12	2,769
48/29-B[2]	148	388	3,277	35	6	3	3,857
48/29-C	166	116	3,670	37	6	1	3,996
52/5-A[3]	199	53	3,096	14	9	12	3,383
Total[1] **Te**	**1,109**	**824**	**18,450**	**116**	**59**	**37**	**20,595**
%age	5.4%	4.0%	89.5%	0.6%	0.3%	0.2%	100%

[1] **Weights exclude the estimated 1,276 Te of marine growth associated with each of the six platform jackets.**
[2] **Vents stack of 8.4 Te under approved DP assumed as removed.**
[3] **Weights include the vent stack and redundant compressor package to be removed prior to P&A operations.**

A comprehensive Waste Management Plan will be developed for all waste disposal activities prior to 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.

As a worst-case, it is anticipated that equipment contaminated with naturally occurring radioactive material (NORM) scale or sludge will be encountered during the project. 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.

5.6 Project Schedule

The schedule for the Hewett platforms decommissioning project is shown in Figure 5-2. The key project milestones for the platforms decommissioning work are:

- Removal of vent stack and redundant compressor package on 52/5-A: 2020-21
- Platforms Removal Window Start (First Platform Available): 2022
- All Platform Preparatory Works Complete: 2023
- Platforms Removal & Disposal Window End: 2028
- Platforms Decommissioning Programme Close-Out Report: within 1 year after removal

The strategy of the project intends, primarily for commercial reasons, to allow a significant time window in which a potential decommissioning contractor would be able to remove the platforms, following preparation works.

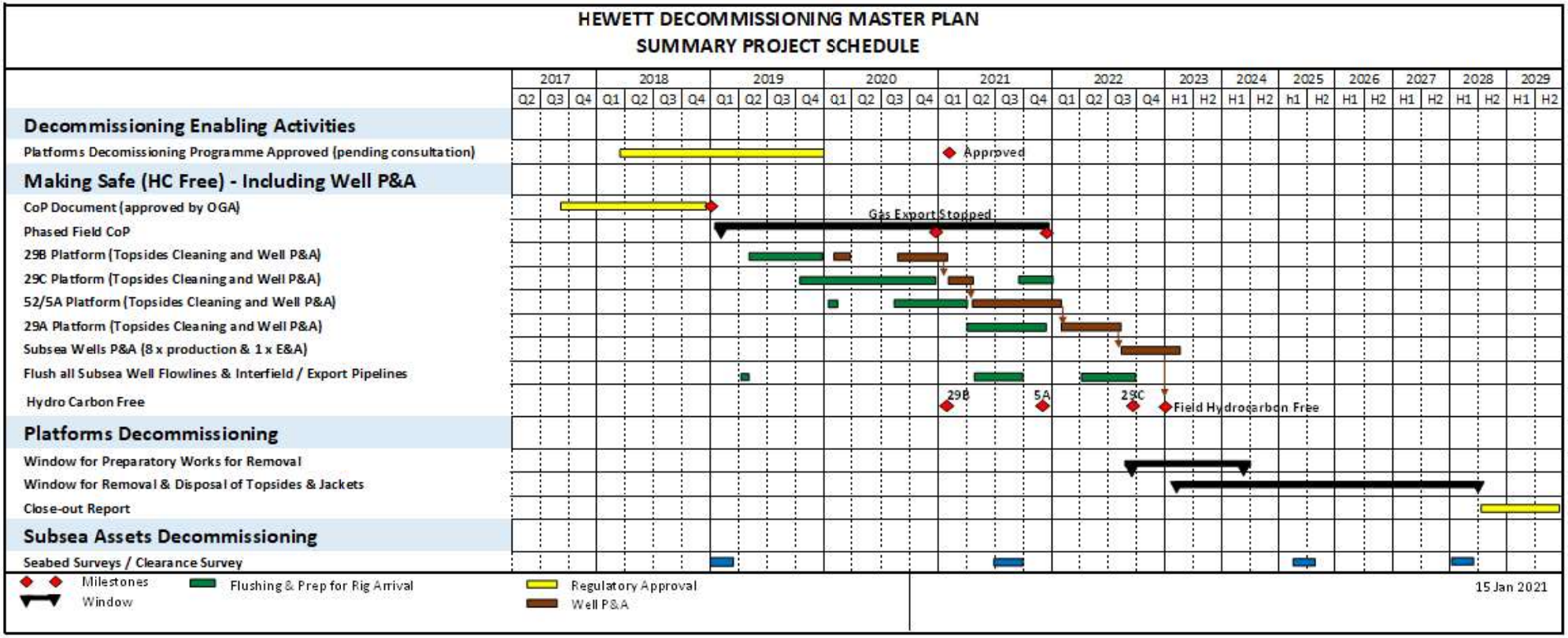


Figure 5-2 - Hewett Decommissioning Project Schedule

6.0 ENVIRONMENTAL BASELINE

This section provides an overview of the key environmental and societal features in the vicinity of the Hewett platforms 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 Environmental Surveys

Several surveys have been undertaken in the Hewett Field Area in preparation for decommissioning. The location and key findings of these surveys are shown in Figure 6-1 (48/29-A), Figure 6-2 (48/29-B), Figure 6-3 (48/29-C) and Figure 6.4 (52/5-A).

Hewett Pre-Decommissioning Habitat Assessment and Environmental Baseline Survey (Fugro, 2018-2019): nine separate 2km by 2 km areas in the Hewett Field Area were subject to geophysical site surveys, shallow geotechnical, habitat assessments and environmental surveys, including the platform sites. The survey work was conducted on board the MV Fugro Venturer from 18 August to 12 September 2018. Grab samples were successfully collected at all 47 proposed platform locations, including the three reference stations. The primary stations were arranged in tidally aligned cruciforms centred on the platforms. Complete suites of samples (three macrofauna and one physico-chemical sample) were acquired at all stations. At platform 48/29-A Complex, 14 stations were sampled, and at platforms 48/29-B, 52/5-A and 48/29-C, 10 stations were sampled. Digital photographic stills and video footage were successfully acquired along all 58 proposed environmental camera locations. An overview chart showing the location of the stations in relation to the Hewett platforms is provided in Appendix B.

Remotely Operated Vehicle (ROV) Survey (OSC, 2019): due to the presence of *S. spinulosa* in the area, an ROV survey was undertaken between 20 February and 2 March 2019 to ascertain potential occurrence of dead or alive *S. spinulosa* at the 48/29-B and 48/29-C platforms. ROV data was acquired along 43 parallel survey lines, approximately 250m in length, as shown in Figure 6-2 (48/29-B) and Figure 6-3 (48/29-C). Analysis of the footage was performed by Ocean Science Consulting Limited (OSC). However the data was of limited quality due to very low visibility. As such, though *S. spinulosa* was identified, it is inconclusive as to whether it was alive or dead.

***Sabellaria spinulosa* Assessment (Fugro, 2019a):** video footage and photos were obtained at a number of locations close to each platform during a borehole survey undertaken by Gardline from April to May 2019. The data was provided to Fugro for analysis with the aim of assessing the potential presence of *S. spinulosa* and the results are shown in Figure 6-1 (48/29-A), Figure 6-2 (48/29-B), Figure 6-3 (48/29-C) and Figure 6-4 (52/5-A).

***Stony Reef Assessment* (Fugro, 2019b):** photographic data and video data for one camera transect (across a feature interpreted as a spudcan depression) were collected by Gardline (from April to May 2019) and interpreted by Fugro. The area of seabed investigated was approximately 50m^2. The classification of 'reefiness' observed ranged from 'not a reef' to 'medium reef'. Due to the possible anthropogenic origin of the cobbles and boulders, these areas may not fulfil the definition of an Annex I habitat.

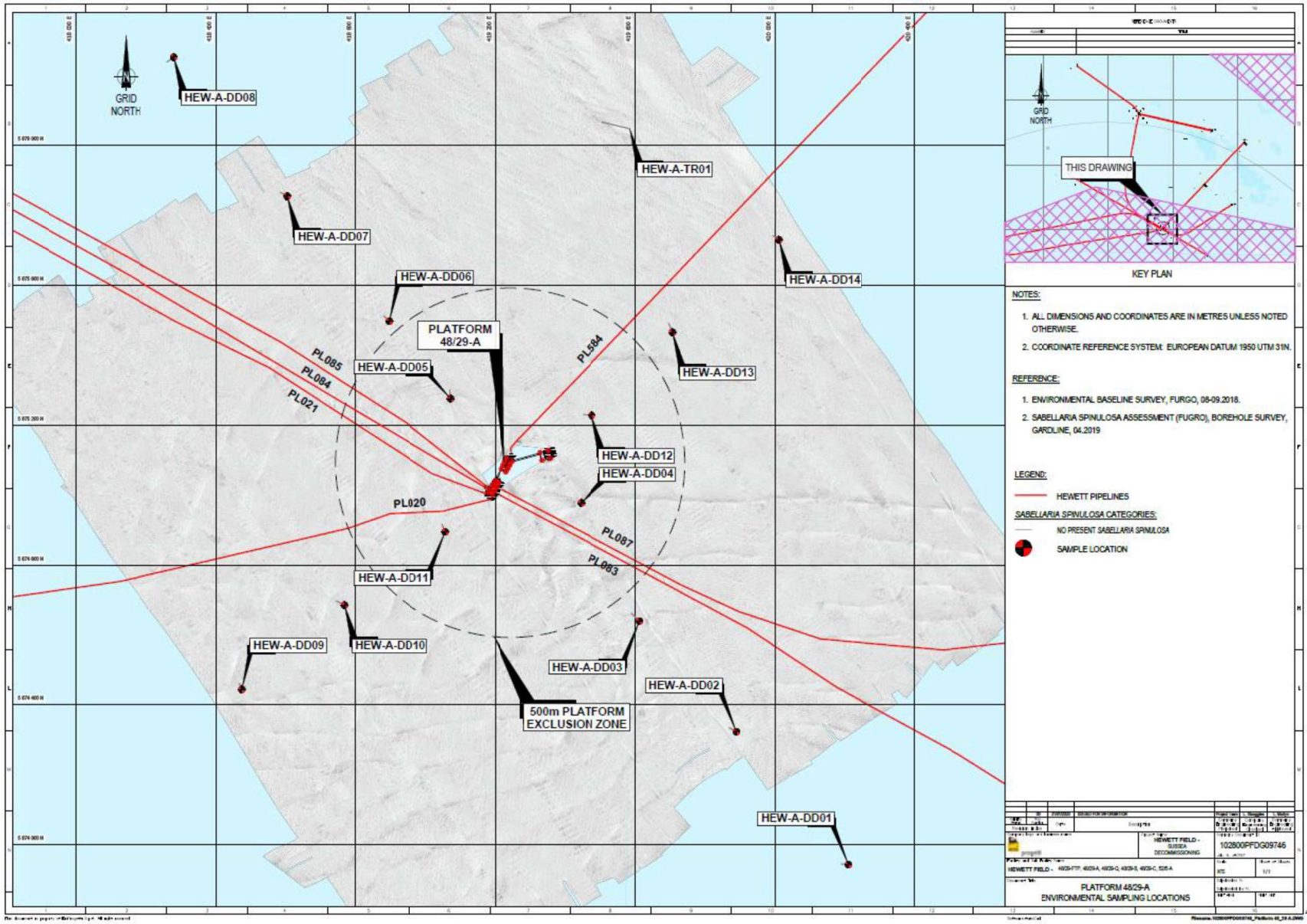


Figure 6-1 - Environmental Survey Locations at Platform 48/29-A Complex

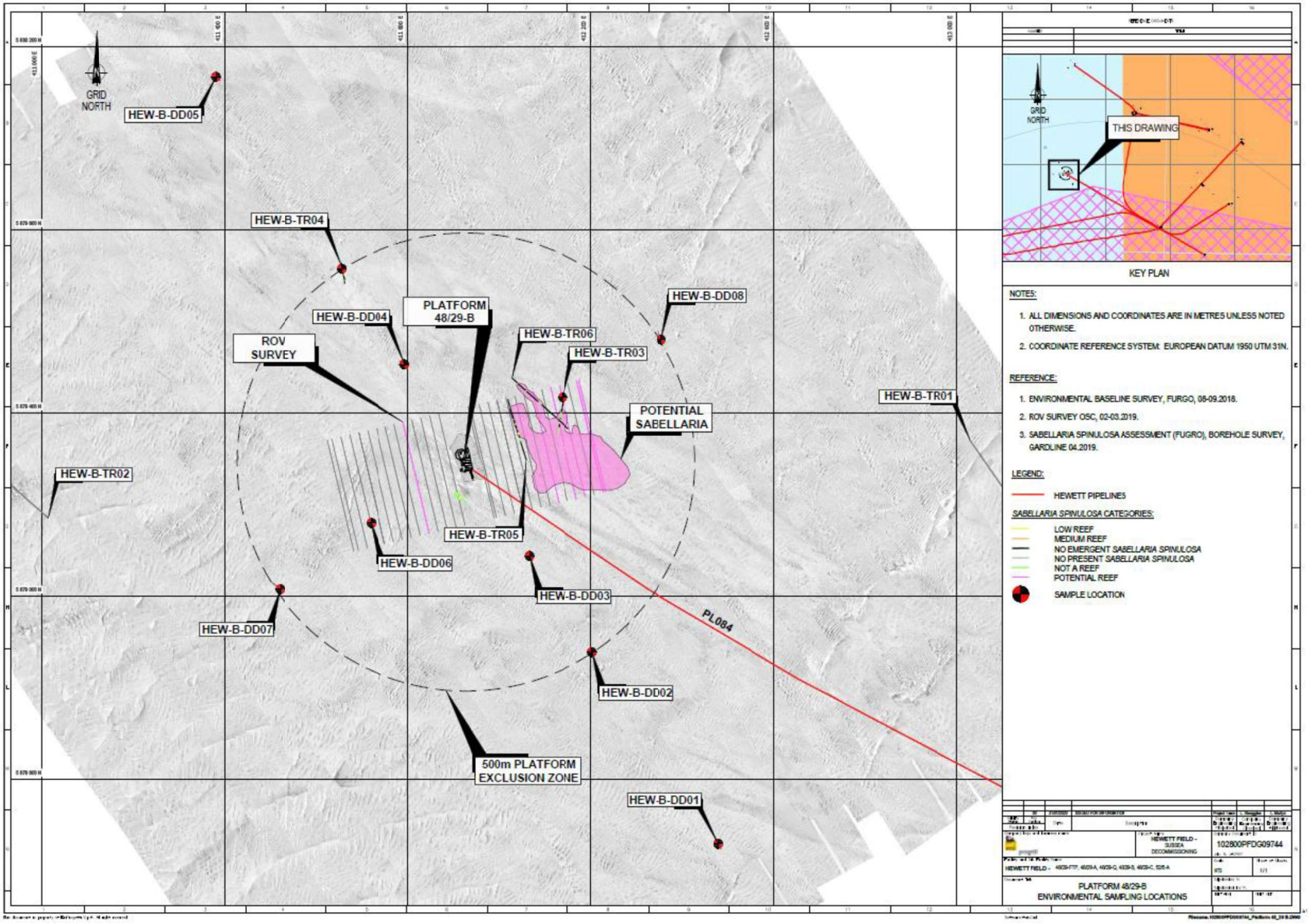


Figure 6-2 - Environmental Survey Locations at Platform 48/29-B

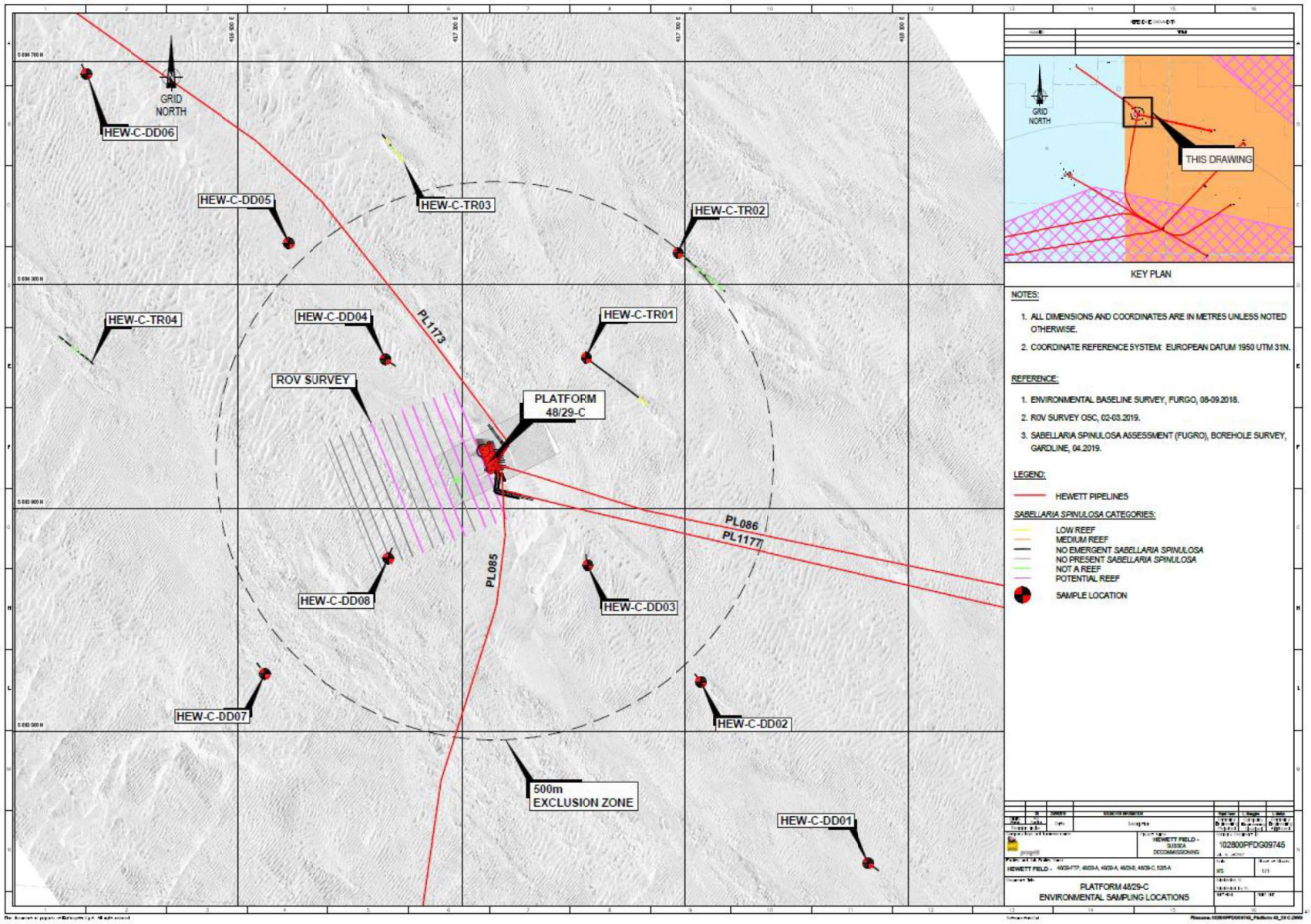


Figure 6-3 - Environmental Survey Locations at Platform 48/29-C

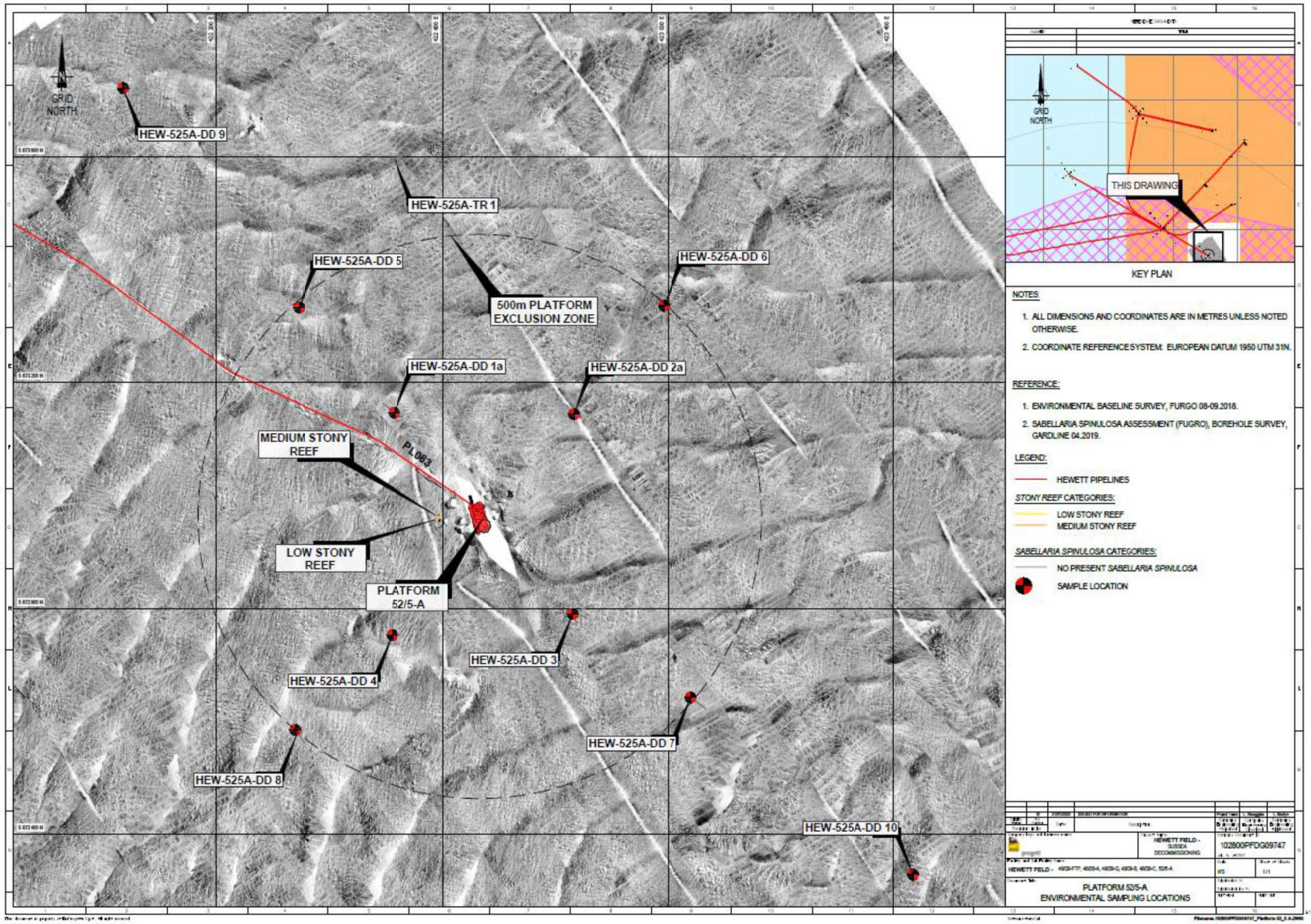


Figure 6-4 - Environmental Survey Locations at Platform 52/5-A

6.2 Marine Protected Areas

The Hewett platforms are located within 40km of seven marine protected areas (MPAs) as illustrated in Figure 6-5. The 48/29-A Complex, 48/29-C & 52/5-A are located within the Southern North Sea SAC. The 48/29-A Complex and 52/5-A are also located within the boundary of the Haisborough, Hammond and Winterton SAC. The qualifying features of these sites are detailed in Table 6-1.

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

Marine Protected Area	Qualifying Features and Site Description	Distance From Operations
Haisborough, 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 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 *Sabellaria spinulosa*. Aggregations of *Sabellaria spinulosa* provide additional hard substrate for the development of rich epifaunal communities.	52/5-A and 48/29-A are within the SAC area. 48/29-B = 1.7km 48/29-C = 6.3km
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 Management Unit population. This site covers an area of 36,951 km^2. The majority of this site lies offshore, though it does extend into coastal areas of Norfolk and Suffolk. The northern two thirds of the site are recognised as important for porpoises during the summer season, whilst the southern part supports persistently higher densities during the winter. The Hewett Field Area is located in both summer and winter areas.	48/29-A, 48/29-C & 52/5-A are within the SAC area. 48/29-B = 4.4km

Marine Protected Area	Qualifying Features and Site Description	Distance From Operations
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.	52/5-A= 9.0km 48/29-A=10.2km 48/29-B =11.5km 48/29-C = 17km
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 communities are typical of sandy sediments in the southern North Sea such as polychaete worms, isopods, crabs and starfish. Areas of *Sabellaria spinulosa* biogenic reef are present within the site, consisting of thousands of fragile sandtubes made by ross worms (polychaetes) which have consolidated together to create solid structures rising above the seabed.	48/29-C = 7.0km 48/29-A=12.1km 52/5-A= 12.6km 48/29-B= 14.2km
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; 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 321km^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.	48/29-B =15.8km 52/5-A= 19.8km 48/29-A=21.8km 48/29-C = 23km

Marine Protected Area	Qualifying Features and Site Description	Distance From Operations
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 *Sabllaria 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).	48/29-B =39.6km 52/5-A= 49.2km 48/29-A=46.0km 48/29-C =46.2km
The Outer Thames Estuary SPA	**Features:** Annex I bird species: Red throated diver (*Gavia stellata*), little tern (*Sternula albifrons*), common tern (*Sternula albifrons*); **Description:** The Outer Thames Estuary SPA is located on the east coast of England between the counties of Norfolk (on the north side) and Kent (on the south side) and extends into the North Sea. The site comprises areas of shallow and deeper water, high tidal current streams and a range of mobile mud, sand, silt and gravely sediments extending into the marine environment, incorporating areas of sand banks often exposed at low tide. Intertidal mud and sand flats are found further towards the coast and within creeks and inlets inland down the Blyth estuary and the Crouch and Roach estuaries. The diversity of marine habitats and associated species is reflected in existing statutory protected area designations, some of which overlap or abut the SPA.	52/5-A= 38.5km 48/29-A=40.4km 48/29-B =45.3km 48/29-C =49.3km

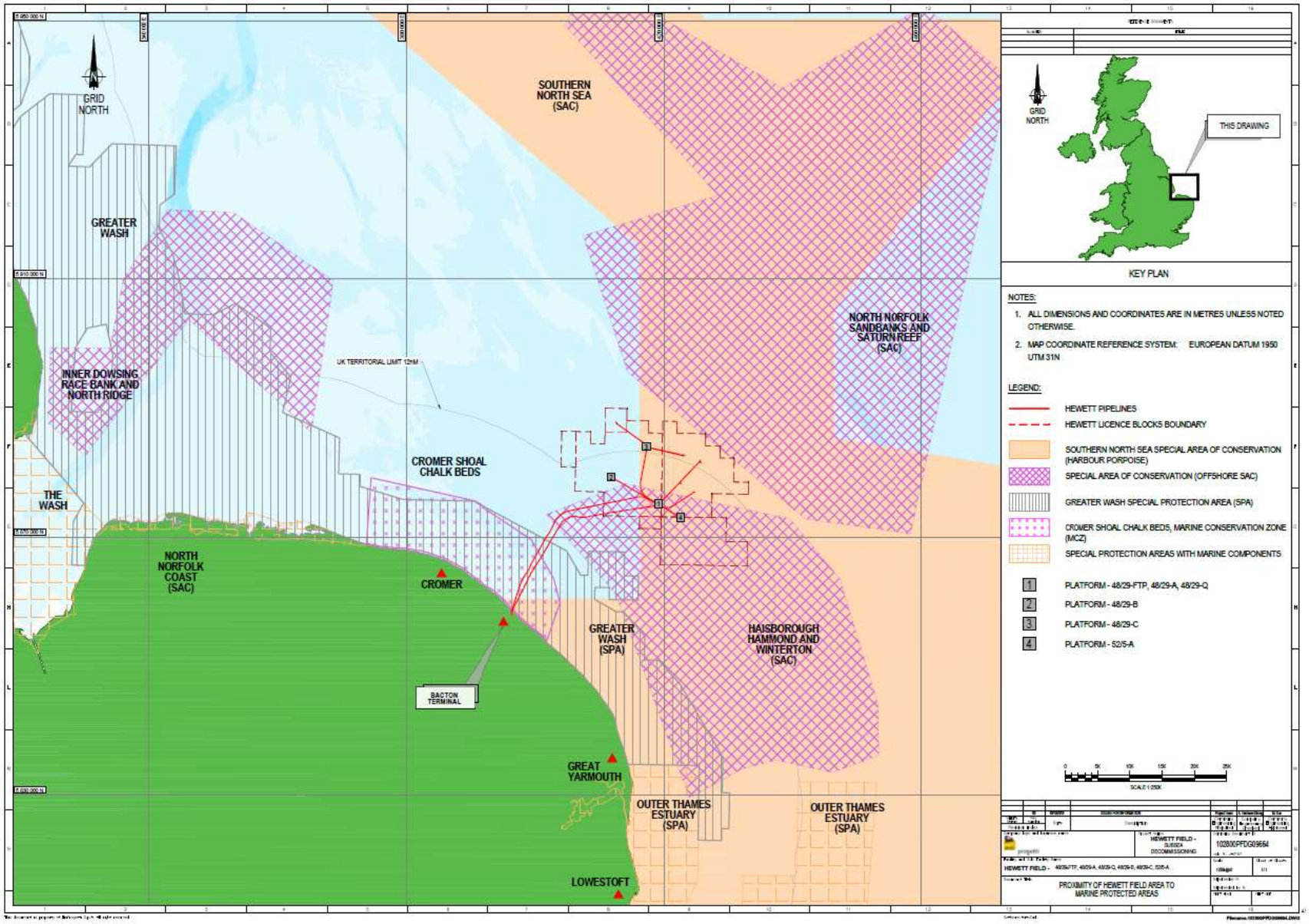


Figure 6-5 - Marine Protected Areas in the vicinity of the Hewett Field Area

6.3 Physical Environment

The southern North Sea is a dynamic ecosystem characterised by a sandy, flat, shallow and extremely dynamic seabed with presence of pronounced sandwaves, complex metocean conditions and considerable tidal mixing (DECC, 2006).

6.3.1 Bathymetry

Water depths across the Hewett Field Area ranged from 16.3 – 40.3m Lowest Astronomical Tide (LAT) (Table 6-2). The greatest difference in depth within each sample area is at 48/29-A of - 17.8 m LAT followed by 52/5-A of - 17.7m LAT. The average seabed gradient is between 1-4° and maximum seabed gradient is 48° at 48/29-A. Meggaripples occurred at each four of the platforms survey areas with the greatest height observed at 48/29-B and the greatest length observed at 48/29-C. Sandwaves were only observed at three of the platforms survey areas with the highest observed at 52/5-A and longest in length at 48/29-B (Fugro, 208-2019).

Table 6-2 - Summary of Bathymetry

Parameter	48/29-A	48/29-B	48/29-C	52/5-A
Minimum water depth within the survey area (m LAT):	16.6	27.0	29.2	16.3
Maximum water depth within the survey area (m LAT):	34.4	35.8	40.3	34.0
Average seabed gradient within the survey area (°):	<1	4	4	5
Maximum significant seabed gradient within the survey area (°):	48	47	32	30
Megaripples height (m)	0.5	5	0.7	0.7
Megaripples wavelength (average m)	6	7.5	19	8
Sand waves - heights (m)	-*	7.5	3.5	8-10
Sand waves - wavelength (m)	-*	200	90	130
*Data collected but no sand waves identified				

6.3.2 Sediment Characteristics

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

The sediment type demonstrated little variation throughout the survey areas, classified predominantly as medium sand under the Wentworth description, with sediment at a minority of stations at platforms 48/29-B, 48/29-C and 52/5-A classified as coarse sand. TOM and TOC content were reported as low across the Hewett Field Area. All survey areas were dominated by the sand fraction, which is typical of SNS sediments.

Table 6-3 - Sediment Types Identified at the Hewett Platform Locations

	48/29-A	48/29-B	48/29-C	52/5-A
Mean PSD (µm)	329	483	443	406
Sediment Composition	Medium sand	Medium - coarse	Medium - coarse	Medium - coarse
Sediment homogeneity	Moderate - well sorted	Very poorly sorted – moderately well sorted	Very poorly sorted - moderately well sorted	Poorly sorted-well sorted
Mean TOM (%)	0.44	0.73	0.87	0.47
Mean TOC (%)	-[1]	0.09	0.09	0.07

[1] The TOC content ranged from below the minimum reported value (<0.02% at 12 stations) to 0.10%.

Photographs of sediment observed at each platform are included in Figure 6-6 (48/29-A Complex), Figure 6-7 (48/29-B), Figure 6-8 (48/29-C) and Figure 6-9 (52/5-A).

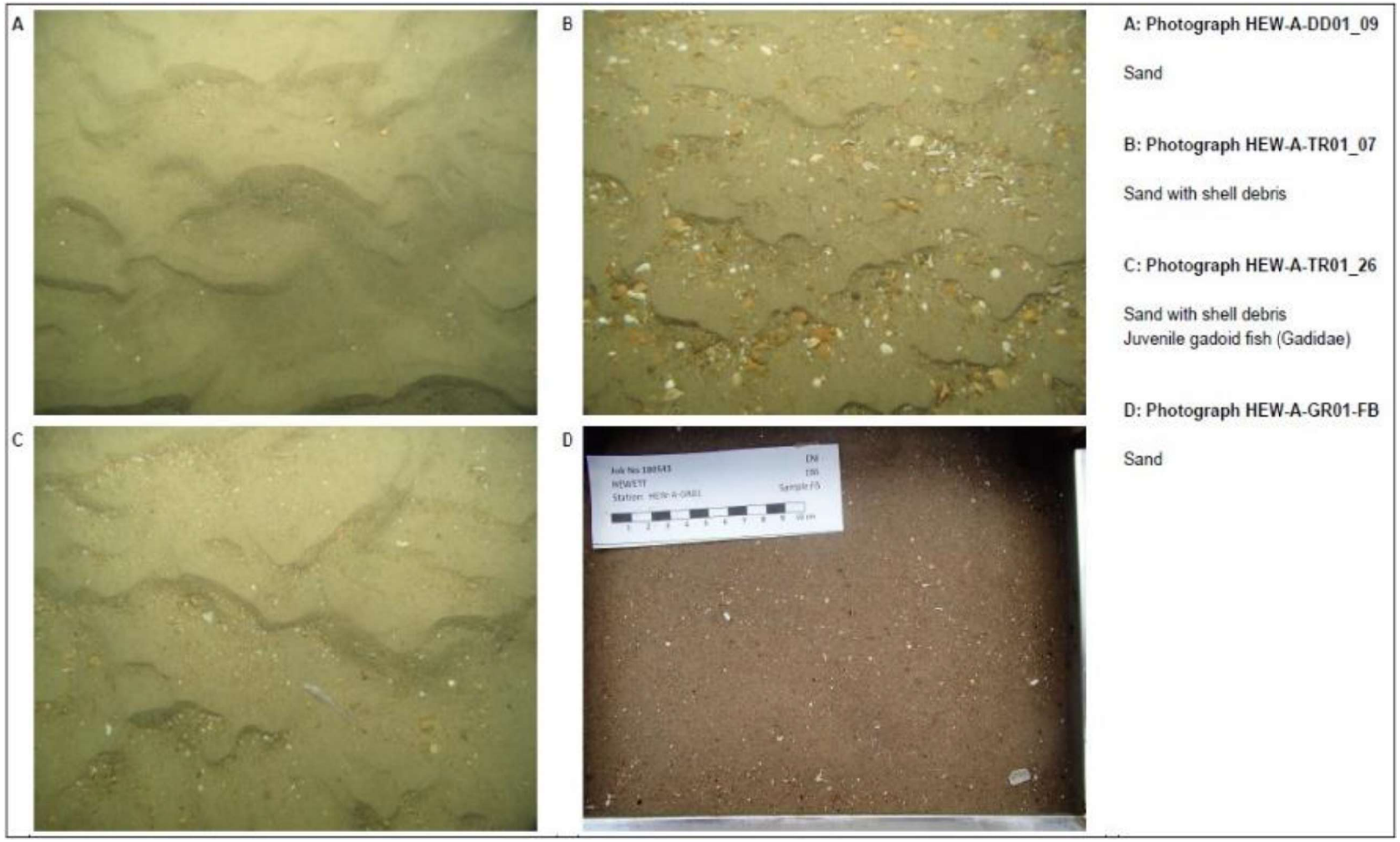


Figure 6-6 - Example seabed sediment photographs at platform 48/29-A Complex

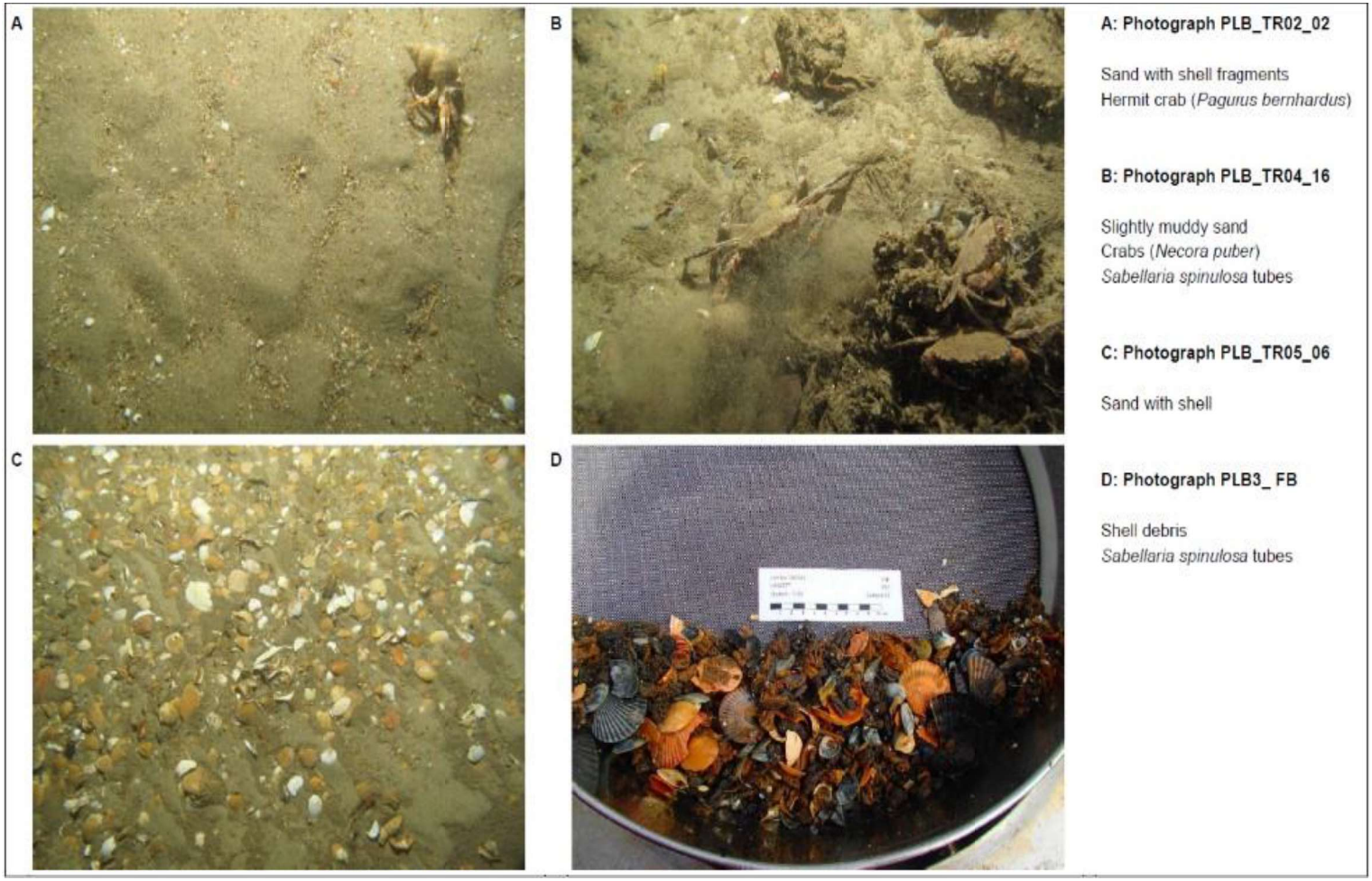


Figure 6-7 - Example seabed sediment photographs at platform 48/29-B

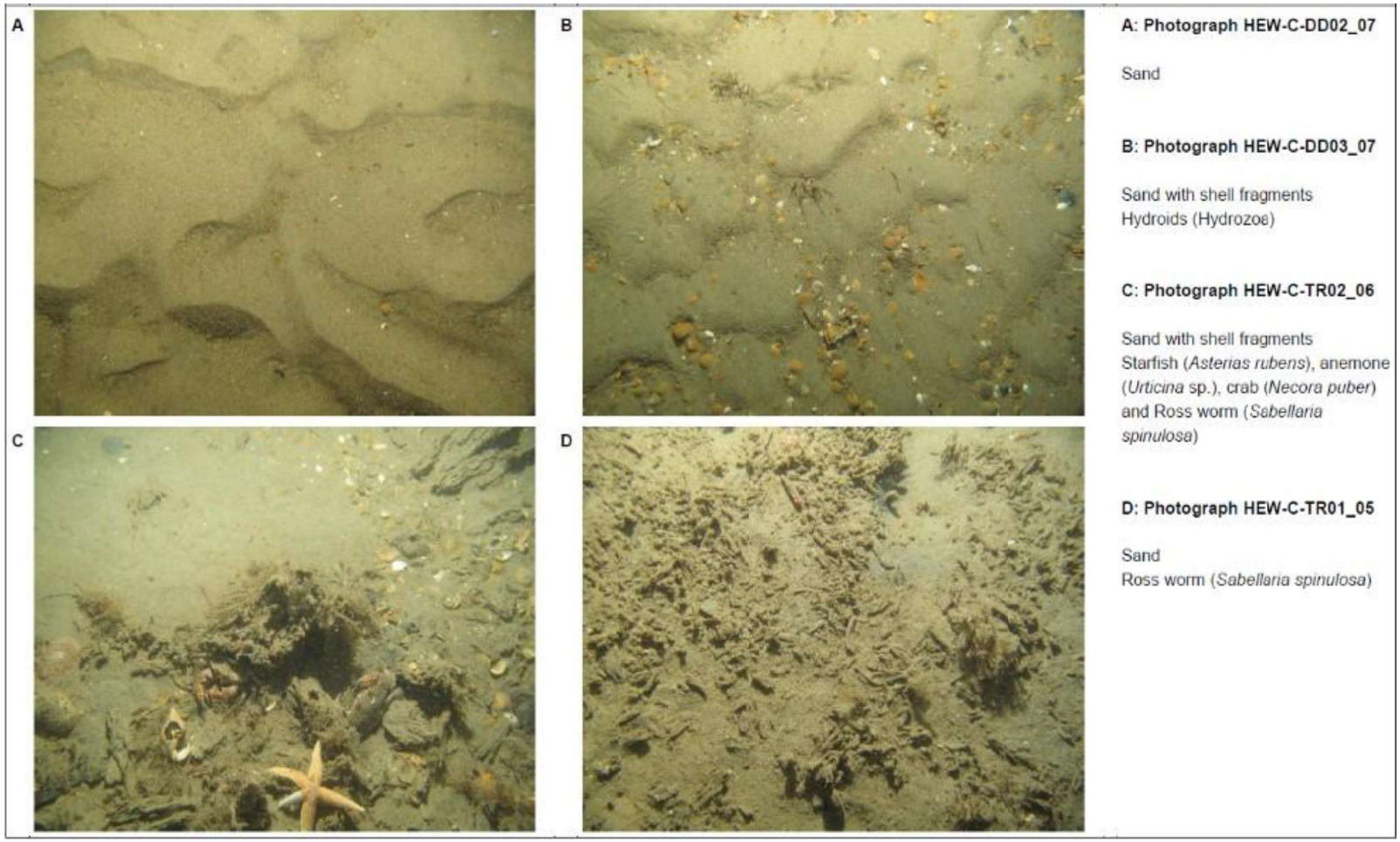


Figure 6-8 - Example seabed sediment photographs at platform 48/29-C

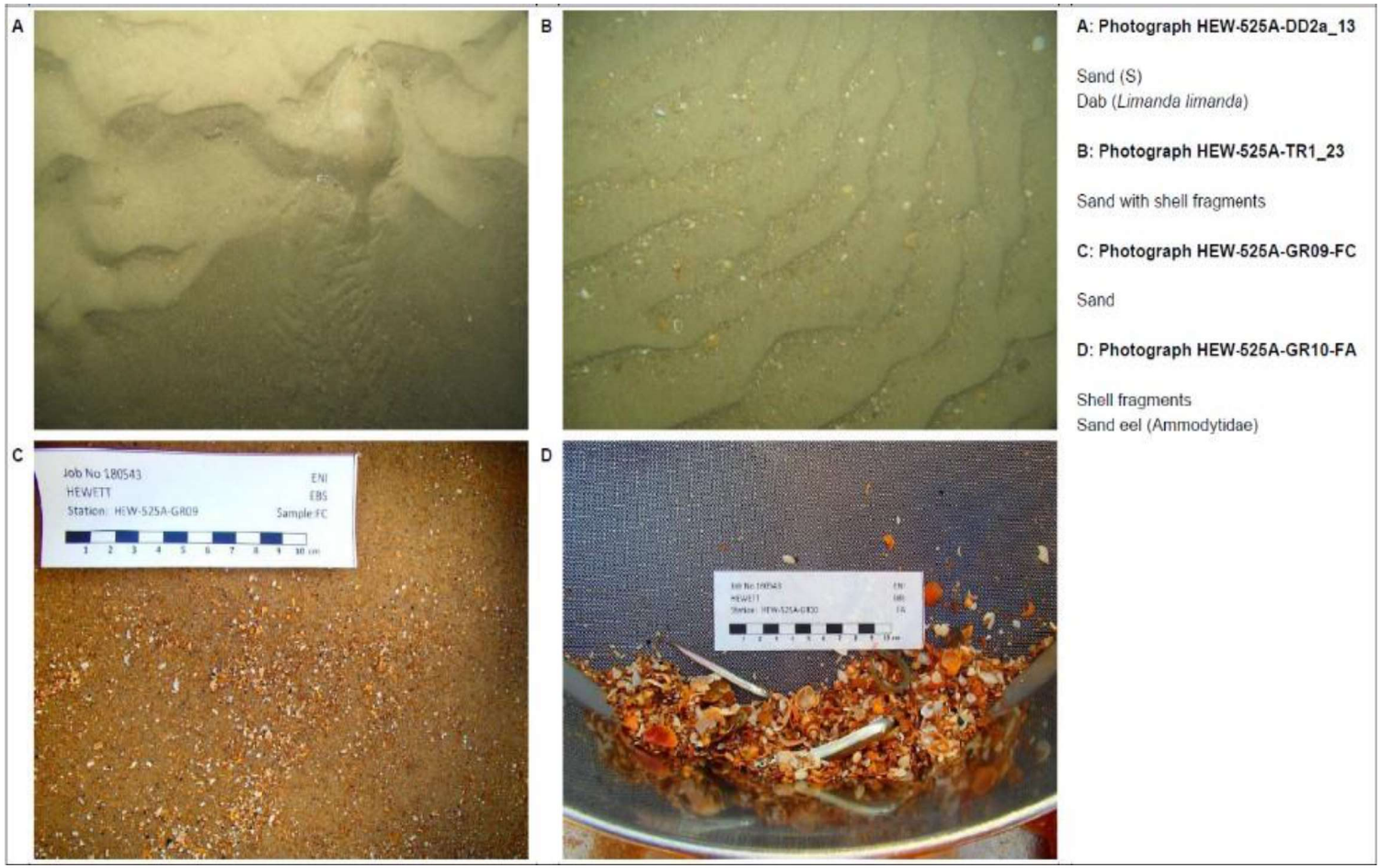


Figure 6-9 - Example seabed sediment photographs at platform 52/5-A

6.3.3 Sediment Hydrocarbon Content

The sediment samples collected during the pre-decommissioning environmental baseline survey were analysed for hydrocarbon content including Total Hydrocarbon Content (THC), total n-alkanes (nC_{10}-nC_{36}) and polycyclic aromatic hydrocarbons (PAHs), specifically the United States Environmental Protection Agency (US EPA) 16 priority PAHs and alkylated PAHs. The results were compared to SNS background values from 1975 to 1995 (UKOOA, 2001), data collected from the major sandbanks in the SNS off the coast of Norfolk and Lincolnshire in 2001 (ERT, 2003a) and United States Effects Range Low (ERLs) criteria which represent the low point (10th percentile) on a continuum of chemical concentrations over which adverse biological effects have been observed from ecotoxicological studies (OSPAR, 2006). The results are presented in Table 6-4.

Table 6-4 – Maximum Hydrocarbon Concentrations in Sediment

Location	Parameter – maximum concentration			
	THC (µg/g)	**Total n-alkane (nC_{10} to nC_{36}) (µg/g)**	**Total US EPA16 PAH (ng/g Dry Sediment)**	**Total 2 to 6 ring PAH (µg/g Dry Sediment)**
48/29-A	0.5 (HEW-A-GR01)	0.02 (HEW-A-GR02, HEW-A-GR05 & HEW-A-GR08)	2.0 (HEW-A-GR10)	0.002 (HEW-A-GR08, HEW-A-GR10 & HEW-A-GR12)
48/29-B	1.1 (PLB5 and PLB8)	0.09 (PLB5 and PLB9)	13.0 (PLB8)	0.044 (PLB8)
48/29-C	3.1 (Hew-C-GR10)	0.17 (HEW-C-GR04),	25 (Hew-C-GR10)	0.092 (HEW-C-GR10)
52/5-A	0.5 (HEW-525A-GR1, HEW-525A-GR 4 and HEW-525A-GR 9)	0.03 (HEW-525A-GR1)	3.4 (HEW-525A-GR1)	0.012 (HEW-525A-GR1)
SNS Background - Mean (UKOOA, 2001)	4.34	0.33	-	0.208
Area 1 - Sandbanks, SEA2 Survey – Mean (ERT, 2003a)	1.6	0.16	-	0.058
ERL (OSPAR, 2006)	50		85-665*	-

*ERL for each individual EPA 16 PAH

In summary, the total hydrocarbon (THC) concentrations across the four platform survey areas showed low to moderate variation and were lower than both the mean background concentration in the SNS (4.34 µg/g; UKOOA, 2001) and the mean concentration taken from the SEA2 sandbanks survey (1.6 µg/g; ERT, 2003a). Sediment hydrocarbon levels were also well below levels that could potentially negatively impact sediment faunal communities (50 µg/g, OSPAR, 2006).

The mean total n-alkane (nC_{10} to nC_{36}) concentrations across the four platform survey areas were also lower than the SNS background concentration (0.33 µg/g; UKOOA, 2001) and SEA2 sandbanks survey mean (0.16 µg/g; ERT, 2003a) concentrations.

PAH concentrations were generally lower than the cited background data and were below the effect threshold level (ERL) threshold concentrations, as reported by OSPAR, indicating that detrimental effects on the marine

macrofaunal community are unlikely. A number of individual US EPA 16 PAHs exceeded their respective background assessment concentrations (BAC) values; however, this was likely a result of low TOC content across the survey areas rather than elevated PAH concentrations.

In addition, a visual comparison of the gas chromatography–flame ionisation detection (GC-FID) hydrocarbon profiles was undertaken to provide information on the potential origins of the hydrocarbons present in marine sediment samples. The GC-FID profiles obtained for all the sediment samples within the Hewett Field Area were broadly similar and were generally typical of a background SNS sediment. At 48/29-C platform, however, the profile at station HEW-C-GR04 was indicative of an enhanced mineral oil-based fluid (EMOBF), similar in composition to Enviromul. A similar profile was noted at station HEW-C-GR03, but the drilling fluid present was at a lower level. These stations are located approximately 250m from the platform in a north-west and south-east direction, respectively. However, the concentrations of fluids detected were very low and did not increase the sediment THC concentrations above typical background levels for the SNS (the drilling fluid component was present at < 1 µg/g).

6.3.4 Sediment Metal Content

The sediment samples acquired from the four platform survey areas were analysed for selected metals: aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, strontium, vanadium and zinc. The current OSPAR Co-ordinated Environmental Monitoring Programme (CEMP) focuses on the following heavy metals; cadmium, mercury and lead (OSPAR, 2014), all of which have the potential for bioaccumulation. The concentrations of metals in the sediments were compared to the UKOOA (2001), ERT (2003a) and published ERL concentrations, with exceedances above these criteria presented in Table 6-5.

Table 6-5 – Metal Concentrations in Sediment

Platform	Sample Station	Recorded Exceedance of Mean Background levels (µg/g)							
		Arsenic 10.9**	Chromium 4.00**	Copper 3.83*	Iron 7595*	Manganese 122**	Lead 8.39*	Vanadium 17.0**	Zinc 10.0**
48/29-A	HEW-A-GR04	16.0							
48/29-B	PLB1 / HEW-B-001	11.0							
	PLB2 / HEW-B-002	14.7							
	PLB3 / HEW-B-003		4.22						
	PLB4 / HEW-B-004	11.4						21.1	
	PLB5 / HEW-B-005		7.39			226		19.3	12.8
	PLB6 / HEW-B-006	13.9							
	PLB7 / HEW-B-007	15.4	5.84		7870	225		26.4	14.1
	PLB8 / HEW-B-008	30.4	4.86	8.23	9910	348	8.87	37.3	30.1
48/29-C	HEW-C-GR01	21.8	4.04		7930	245		28.3	12.3
	HEW-C-GR02	24.0	5.54		8800	251		31.2	18.0
	HEW-C-GR03	20.0	4.29		7770	151	10.10	26.6	50.4
	HEW-C-GR04	24.6	6.41	9.00	10700	301	13.10	33.1	75.5
	HEW-C-GR05	13.6	6.22	12.40		117		22.5	25.9
	HEW-C-GR06	14.5	4.07	6.30		106		21	11.6

Platform	Sample Station	Recorded Exceedance of Mean Background levels (µg/g)							
		Arsenic 10.9**	Chromium 4.00**	Copper 3.83*	Iron 7595*	Manganese 122**	Lead 8.39*	Vanadium 17.0**	Zinc 10.0**
	HEW-C-GR07	24.5	6.22		9580	210		32.3	16.6
	HEW-C-GR08	26.8	4.66		9610	225		33.4	14.0
	HEW-C-GR09	15.0	4.55			151		21.8	12.5
	HEW-C-GR010		7.22						13.6
52/5-A	HEW-525A-GR1	16.3							
	HEW-525A-GR2	12.1							
	HEW- 525A-GR3	20.4				133		19.3	
	HEW-525A-GR4	11.0							
	HEW-525A-GR5	11.9	5.58	20.2					82.4
	HEW-525A-GR6	22.4				170		20	
	HEW-525A-GR9	12.7							
	HEW-525A-GR10	11.4							
ERL (OSPAR, 2014)		-	81.0	34.0	-	-	47.0	-	150

***Mean estimated from data reported at stations greater than 5 km from active platforms in the SNS from 1975 to 1995 (UKOOA, 2001) (µg/g)**
****Data collected from the major sandbanks off the coast of Norfolk and Lincolnshire in the southern North Sea (SNS) in 2001 (ERT, 2003b) (µg/g)**

The concentrations of metals in the sediments demonstrated low to moderate variation across the four platform survey areas. In general, metal concentrations were below the mean background concentrations for the SNS. The metal concentrations recorded across the four platform survey areas were comparable to, or lower than the reference stations. None of the sediment heavy and trace metal concentrations recorded across all four platform survey areas and reference stations exceeded their respective OSPAR CEMP ERL values, where available. Consequently, the concentrations of bioavailable metals in the platform survey areas are not expected to result in detrimental effects on sediment macrofaunal communities.

Arsenic concentrations were reported above the ERT (2003a) values at all platforms and reference stations, however, no relationship between the concentration and distance from the Hewett infrastructure could be identified and it is likely that arsenic concentrations are a natural feature of the sediments in the area.

Copper and zinc concentrations were reported above respective UKOOA (2001) and ERT (2003a) values at locations 500m from platforms 48/29-B and 52/5-A, however sample stations located closer to the platforms reported concentrations below respective UKOOA/ERT values, suggesting it is unlikely that these metals originated from activity at the platforms. High copper and zinc concentrations reported at Platform 48/29-C were measured in the sediments located closest to the platform.

There was no evidence of elevated sediment barium concentrations around any of the platforms that would indicate the presence of seabed cuttings deposits in the areas surveyed.

6.3.5 Oceanography

The southern North Sea is a dynamic ecosystem characterised by a sandy, flat, shallow and extremely dynamic seabed with presence of pronounced sandwaves, complex metocean conditions and considerable tidal mixing (DECC,2016).

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 stratification (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 (Marine Scotland, 2019, 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

Significant local variations in patterns of semi-diurnal tidal and residual circulation occur in the vicinity of sandbanks. Observations indicate that residual near-bed currents are strongest towards obstacles such as bank crestline and in opposing directions around the edges of the bank. Studies have also demonstrated a clockwise near-bed residual circulation around the bank with maximum semi-diurnal amplitude of ca. 0.75m/s. This residual circulation pattern is thought to be important in the formation and maintenance of linear sandbanks and will also influence the dispersion of soluble and particulate contaminants (DECC, 2016).

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

Annual data indicates that winds in the Hewett field are multidirectional, with average yearly speeds of 2-13 m/s. Winds from south-west, west and south are generally predominant between July and March. The wind regime changes between April and June, when more north-easterly and easterly winds are present (Physe, 2013). 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).

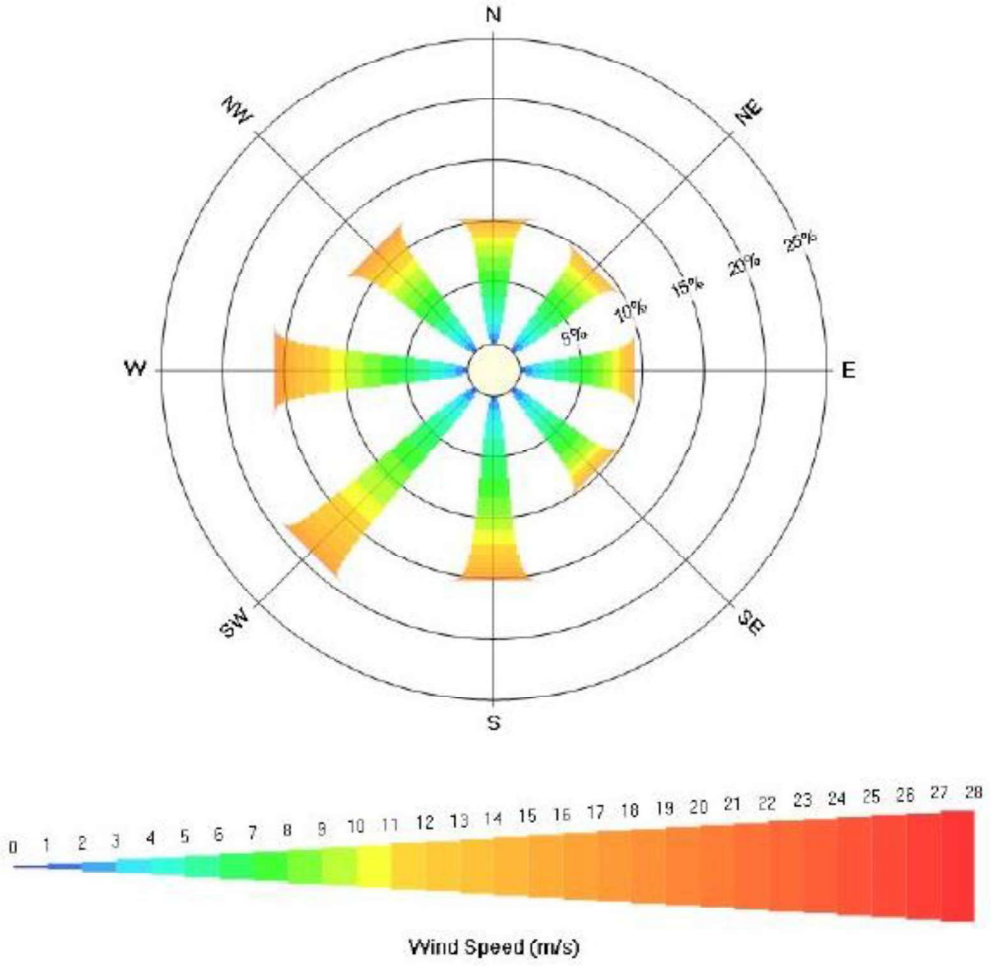


Figure 6-10 - Hewett Field Wind Speed Rose – Annual (Physe, 2013)

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).

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 Ceratium (*C. focus, C. furca, C. lineatum*), 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 is driven to a large extent by the peak of food availability represented by the phytoplankton bloom. The zooplankton community is dominated by crustaceans Calanus spp. copepod species, and in particular *Calanus Finmarchicus* and *Calanus Helgolandicus*, although other groups such as *Paracalanus spp., Pseudocalanus spp., Acartia spp., Temora spp*. and cladocerans such as *Evadne spp.* are also abundant (DECC, 2016). There has been a marked decrease in copepod abundance in the southern North Sea, which has been linked to changes in global weather phenomena (DECC, 2016). Calanoid copepods are an important prey item for many species at higher trophic levels, including sandeels.

6.4.2 Benthos

Seabed sediments observed across the four platform survey areas consisted of rippled sand, with varying proportions of shell fragments, hence classified as the biotope complex 'Circalittoral coarse sediment' (A5.14). The biotope complex is described as tide-swept circalittoral coarse sands, gravels and shingle generally in water depths over 15m to 20m. This habitat may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. The seabed within the four platform survey areas and reference stations was categorised within the broad habitat of 'subtidal sands and gravels', a priority habitat within UK waters. However, this habitat is widely distributed and represented elsewhere within the Marine Protected Area (MPA) network (Fugro, 2018-2019).

The epifaunal community associated with the mobile sands across the four platform survey areas and reference stations was sparse. The most common taxa observed during video and still image analysis collected during the pre-decommissioning environmental survey included crabs (Paguridae), hydroid/bryozoan turf (Hydrozoa/Bryozoa) (see Table 6-8), as well as small fish (Pisces, including Gobiidae and Gadiformes).

Table 6-8 - Epifaunal community in the Hewett Field Area (excluding fish)

Fauna	Class	48/29-A	48/29-B	48/29-C	52/5-A
Crustacea	Crabs (*Paguridae including agurus bernhardus*; *Brachyura* including *Necora puber and Cancer pagurus*)	✓	✓	✓	✓
	Shrimp (Caridae)		✓		
Anthozoa	Anemones (*Actiniaria* including *Sagartia* sp., *Metridium dianthus* and *Urticina* sp.)		✓	✓	
Hydrozoa	Hydroids e.g. faunal turf (Hydrozoa - *Nemertesia* sp. and *Hydrallmania falcate*)	✓	✓	✓	✓
Gymnolaemata	Bryozoan (*Vesicularia spinosa*, *Alcyonidium diaphanum* and *Flustra foliacea*)		✓	✓	
Polychaetes	*S. Spinulosa*		✓	✓	
Echinoidea	Heart urchins (*Spatangus sp.)*		✓		
Maxillopoda	Barnacles (*Sessilia*)				✓

The baseline analysis of sediment macrofauna identified features of the benthic taxa communities. Table 6-9 outlines the taxa identified at each sample area described below. All but one of the platform survey areas were dominated by annelids, with platform 48/29-A dominated by arthropods. The polychaetes *Polycirrus*, *S. bombyx* and *O. borealis,* and the arthropod *U. brevicornis* were amongst the most dominant taxa recorded. As is typical in sandy sediments, the number of taxa and individuals was often low, resulting in a degree of heterogeneity across the areas surveyed.

Table 6-9 - Taxonomic groups identified at each asset survey area

Taxonomic group	48/29-A			48/29-B		
	Number of Taxa	Composition of taxa (%)	Abundance	Number of Taxa	Composition of taxa (%)	Abundance
Annelida	10	38.5	79	52	56.5	870
Arthropoda	13	50.0	268	25	27.2	283
Mollusca	2	7.7	2	7	7.6	122
Echinodermata	-	-	-	3	3.3	7
Other phyla	1	3.8	2	5	5.4	46
Total Taxa	**26**	**100**	**351**	**92**	**100**	**1,328**
Taxonomic group	**48/29-C**			**52/5-A**		
	Number of Taxa	**Composition of taxa**	**Abundance**	**Number of Taxa**	**Number of Taxa**	**Abundance**
Annelida	70	57.4	1,222	10	43.5	75
Arthropoda	34	27.9	331	9	39.1	170
Mollusca	9	7.4	1,502	1	4.4	2
Echinodermata	3	2.4	22	-	-	-
Other phyla	6	4.9	169	3	13.0	7
Total Taxa	**122**	**100**	**3,246**	**23**	**100**	**254**

A total of 351 animals and 37 taxa were identified at platform 48/29-A, although of these taxa, 11 were used to record juveniles, damaged and fish and therefore these taxa were removed prior to statistical analysis to avoid spurious enhancement of diversity indices. Arthropod was the dominant taxonomic group, with arthropod *Urothoe brevicornis* being the most dominant and most abundant taxon across the platform 48/29-A survey area, whereas the annelid *Nephtys cirrosa* was the second most dominant and third most abundant taxon. *Stenothoe marina* was the scarcest identified taxa. The top five most abundant taxa at each station were broadly similar across the entire survey area and represented ≥ 79 % of the total abundance at each station, due to the very limited number of individuals recorded.

A total of 1,328 animals and 116 taxa were identified at platform 48/29-B. Of these taxa, 24 were used to record juveniles, damaged and fish, hence removed prior to statistical analysis. Annelida was the dominant taxonomic group, with annelida *Spiophanes bombyx* being the most dominant and third most abundant taxon across the platform 48/29-B survey area. Individuals of the genus *Polycirrus* were the second most dominant and fifth most abundant group. The two most dominant taxa occurred in all stations sampled. *S. spinulosa* was reported as the most abundant, but sixth most dominant taxon, mainly due to its high numbers recorded at two sample stations (PLB3 and PLB5). *Gastrosaccus spinife*r was the scarcest identified taxa. The top five most abundant taxa at each station varied across the entire survey area and represented ≥ 43 % of the total abundance at each station sampled.

A total of 3,246 animals and 150 taxa were identified at platform 48/29-C. Of these taxa, 28 were used to record juveniles and damaged specimens, hence removed prior to statistical analysis. The number of taxa and individuals per 0.2m^2 reported at each station across the 48/29-C survey area are displayed spatially in Figure 6-11 and Figure 6-12, proving this is by far, the most diverse and abundant biomass area. A high variation was demonstrated between dominance and abundance ranks. Annelida was the dominant taxonomic group, with mollusca being the most abundant. The polychaete genus *Polycirrus* was the most dominant and third most abundant group of individuals across the platform 48/29-C survey area. The mollusc *Abra alba* was the second most dominant and first most abundant taxon, due to its high numbers present in station HEW-

C_GR10. The top five most abundant taxa at each station varied across the entire survey area and represented ≥ 41 % of the total abundance at each station sampled. The genus *Polycirrus* was the most abundant group of individuals at three stations. *O. borealis* and *S. spinulosa* dominated two stations each. *Nephtys cirrosa* and *Urothoe marina* dominated a station each.

A total of 254 animals and 26 taxa were identified at platform 52/5-A. Of these taxa, 3 were used to record juveniles and damaged specimens, hence removed prior to statistical analysis. Annelida was the dominant taxonomic group, with Arthropoda being the most abundant. The arthropd *Eurydice spinigera* was the most dominant and second most abundant taxon across the survey area, whereas the srthropod *Urothoe brevicornis* was the second most dominant and first most abundant taxon. The top five most abundant taxa at each station varied across the entire survey area and represented ≥ 77 % of the total abundance at each station sampled.

Univariate analysis demonstrated a predominantly low to moderate variation for all macrofaunal community indices assessed. Overall diversity was interpreted as moderate for the 48/29-A and 52/5-A platform survey areas, and as good for 48/29-B and 48/29-C platform survey areas. Multivariate analysis indicated that physical parameters (e.g. depth, proportion of sand) were influencing the macrofaunal community within the areas surveyed. *S. spinulosa* also influences the macrofaunal community across the Hewett Field Area, with epifaunal taxa (e.g. anemones of the order Actiniaria) demonstrating increased abundance within elevated *S. spinulosa* abundance. Several mobile taxa (e.g. the brittlestar *Amphipholis squamata* and the ribbon worms Nemertea, including *Cerebratulus* sp.) also featured elevated abundance in association with increased abundance of *S. spinulosa*.

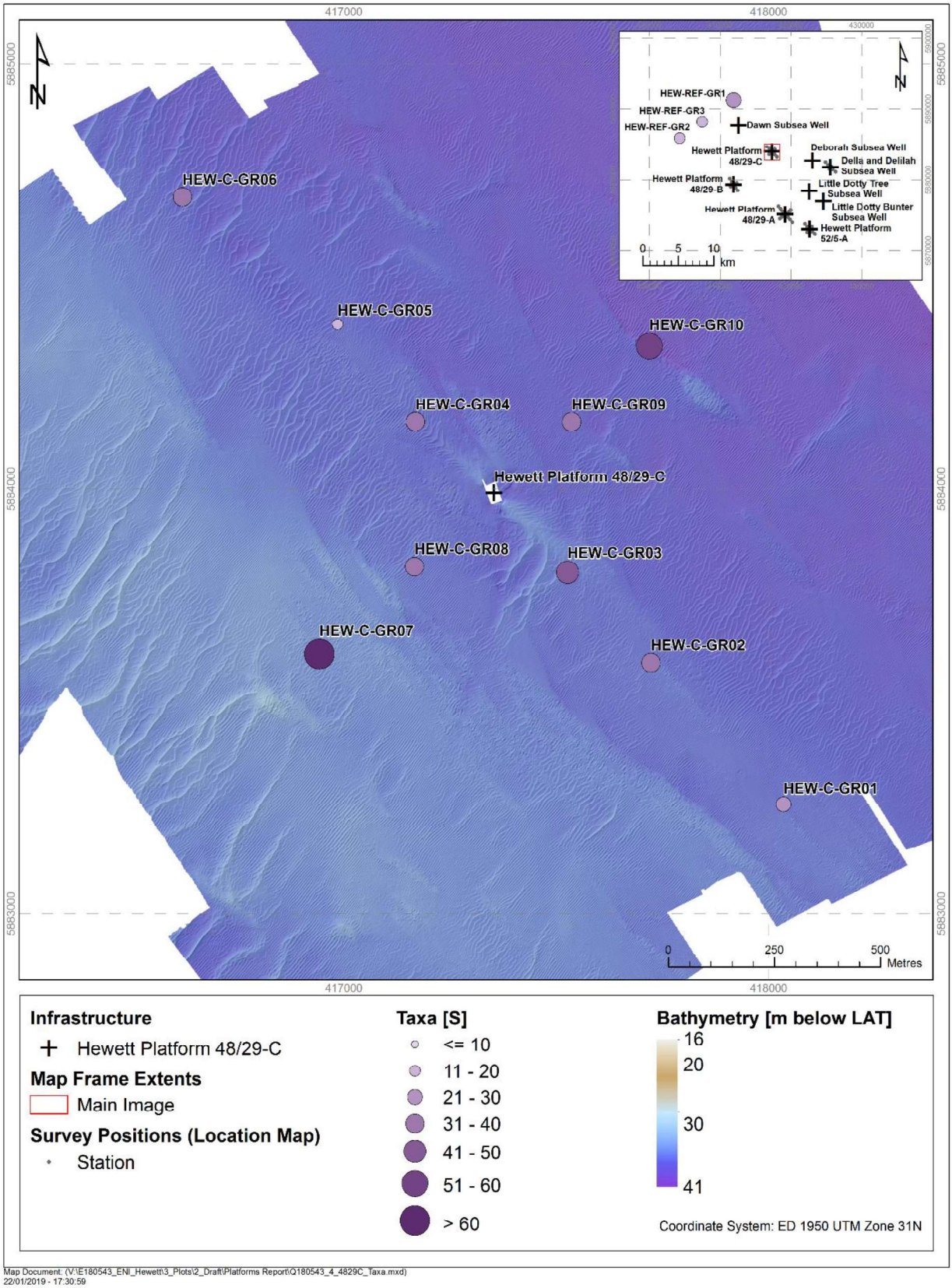


Figure 6-11 - Spatial Distribution of Mean Number of Taxa per 0.2m^2 at Platform 48/29-C

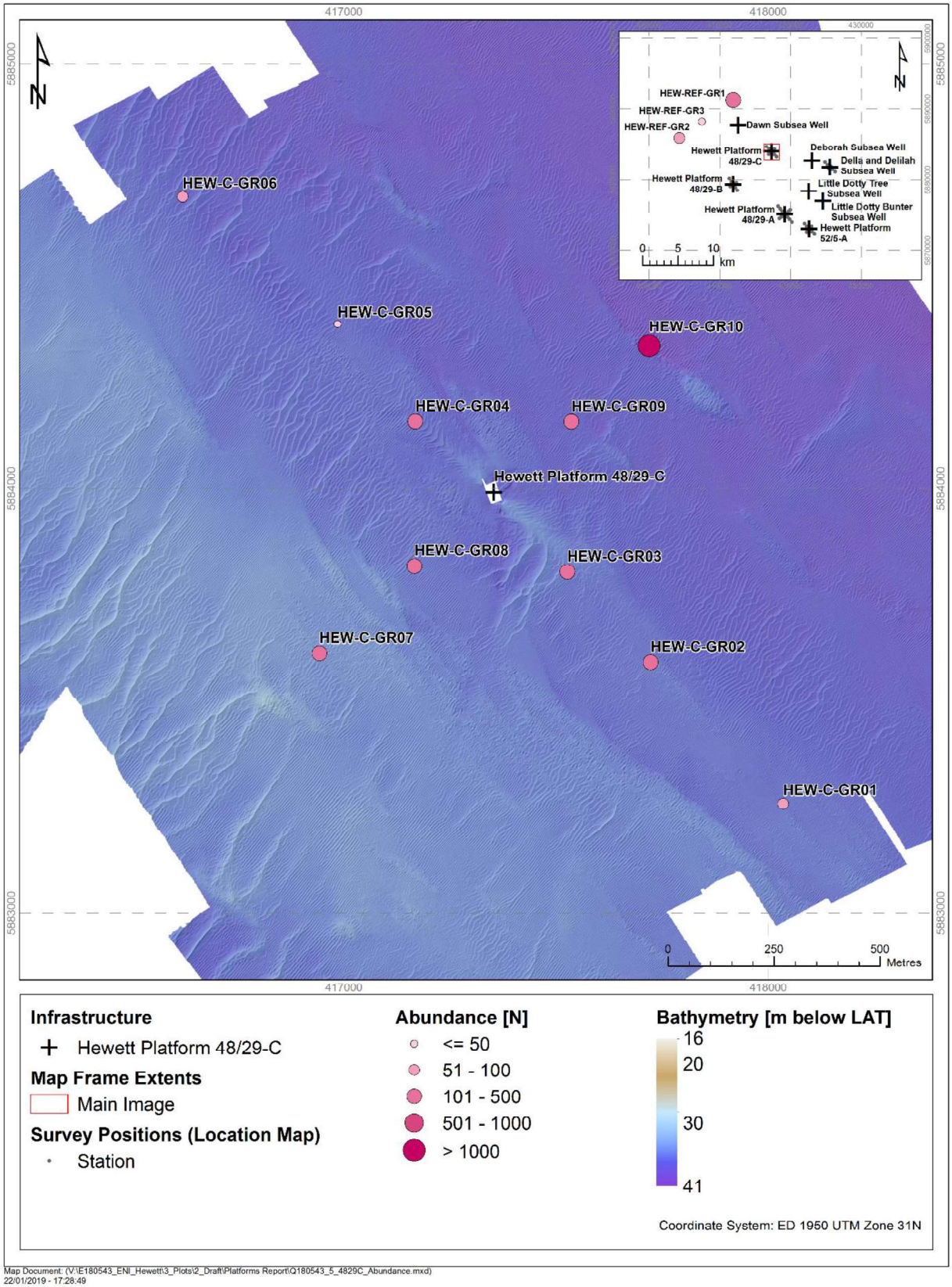


Figure 6-12 - Spatial Distribution of Mean Number of Individuals per 0.2m^2 at Platform 48/29-C

All video and geophysical data collected during the pre-decommissioning environmental baseline survey were reviewed by Fugro using the 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).

S. spinulosa classified as 'Low Reef' was identified 114 metres north east of the 48/29-B platform (Figure 6-2) and 276m north east of 48/29-C platform at the closest point (Figure 6-3). 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 - *S. spinulosa* identified at the 48/29-B and 48/29-C platform survey areas (Fugro 2019a)

Transect	Percentage of transect (%)				
	No emergent *Sabellaria*	Not Reef	Low Reef	Medium Reef	High Reef
48/29-B Survey Area					
HEW-B-TR03	62.5	37.4	0	0	0
HEW-B-TR04	87.3	12.6	0	0	0
HEW-B-TR05	83.7	11.9	4.3	0	0
HEW-B-TR06	91.4	8.7	0	0	0
48/29-C Survey Area					
HEW-C-DD07	84.0	16.0	0	0	0
HEW-C-DD08	90.5	9.5	0	0	0
HEW-C-TR01	83.9	1.5	14.6	0	0
HEW-C-TR02	22.7	77.3	0	0	0
HEW-C-TR03	22.2	23.8	54.0	0	0
HEW-C-TR04	68.3	31.7	0	0	0

At the 48/29-B platform, a total of 37 patches of potential *S. spinulosa* were ground-truthed throughout the video transects. Overall, elevation varied from 0 cm to 10 cm, with most of the patches observed having a tube elevation between 2 cm and 5 cm. All the *S. spinulosa* patches along all transects was classified as 'not a reef', except for a small patch on transect HEW-B-TR05, which was classified as 'low reef'. The area of 'low reef' covered approximately 4.3% of the transect and at 5.9 m in length, qualified for the biotope 'area' criterion of 25 m^2. On further examination of the SSS, along with the video review, a potential area of *S. spinulosa* was delineated, equating to approximately 30,776m^2 as depicted in Figure 6-2. However, the presence / absence of *S. spinulosa* within this area could not be confirmed without further ground truthing (Fugro, 2018).

At the 48/29-C platform, a total of 21 patches of potential *S. spinulosa* were ground-truthed throughout the video transects. Overall, elevation varied from 0 cm to 5 cm, with most of the patches having a tube elevation between 2 cm to 5 cm. Most of the *S. spinulosa* patches along all transects were classified as 'not a reef', except for a 20 m long patch on transect HEW-C-TR01 and several patches totalling 34m in length on transect HEW-C-TR03, which were classified as 'low reef' and qualifying for the biotope 'area' criterion of 25m^2.

Further areas at the 48/29-B and 48/29-C platforms were identified as 'not a reef', however due to the mobile sands of the Hewett Field Area; it was not possible to rule out the potential for *S. spinulosa* in locations where it was not observed during video photography. Certain patches were therefore reclassified from 'not a reef' to 'no emergent *Sabellaria*'.

No *S. spinulosa* reef was observed at the 48/29-A and 52/5-A platforms during the pre-decommissioning environmental baseline survey.

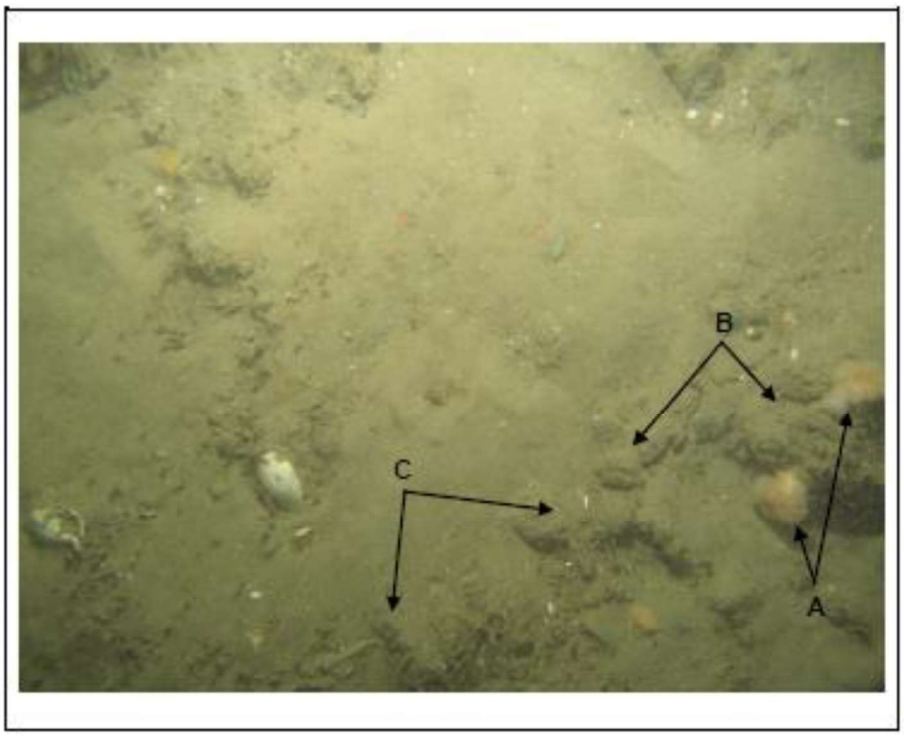
During the ROV survey, further potentially dead or alive *S. spinulosa* was identified in areas east and west of 48/29-B and east of 48/29-C. Potential areas of reef were slightly raised from the seabed and generally located in small aggregations, though there were some larger areas. It was not possible to determine if these potential reefs were alive, due to the poor visibility and the effect of survey-induced disturbances. The restricted results of this study suggest that the majority of detected *S. spinulosa* reefs were not alive and intact, as there was evidence of external damage and erosion (OSC, 2019).

An additional *S. spinulosa* Assessment (using the same criteria for assessing reefiness as noted above) was undertaken by Fugro using visual footage obtained by Gardline during a borehole survey. Of the area surveyed at platform 48/29-B 26% was identified as 'Low Reef' (located approximately 48m south of the platform) and 74% as 'Not a Reef', 100% of areas at platform 48/29-C were identified as 'Not a Reef' and 100% of areas at platform 48/29-A and platform 52/5-A were identified as 'No Emergent *S. spinulosa*' (Fugro, 2019b). The type of reef and percentages of *S. spinulosa* identified at each location are provided in Table 6-10.

Photographs of the observed 'Low Reef' and 'Not a Reef' taken during the pre-decommissioning environmental baseline survey are provided in Figure 6-13 and Figure 6-14 respectively, and maps of the identified *S. Spinulosa* aggregations at platform 48/29-B and platform 48/29-C from all surveys are provided in Figure 6-15 and Figure 6-16 respectively.

Table 6-11 - *S. spinulosa* identified at each Gardline borehole survey area (Fugro 2019b)

Asset	Percentage of transect (%)				
	No emergent *Sabellaria*	Not Reef	Low Reef	Medium Reef	High Reef
48/29-A	100	0	0	0	0
48/29-B	0	74	26	0	0
48/29-C	0	100	0	0	0
52/5-A	100	0	0	0	0

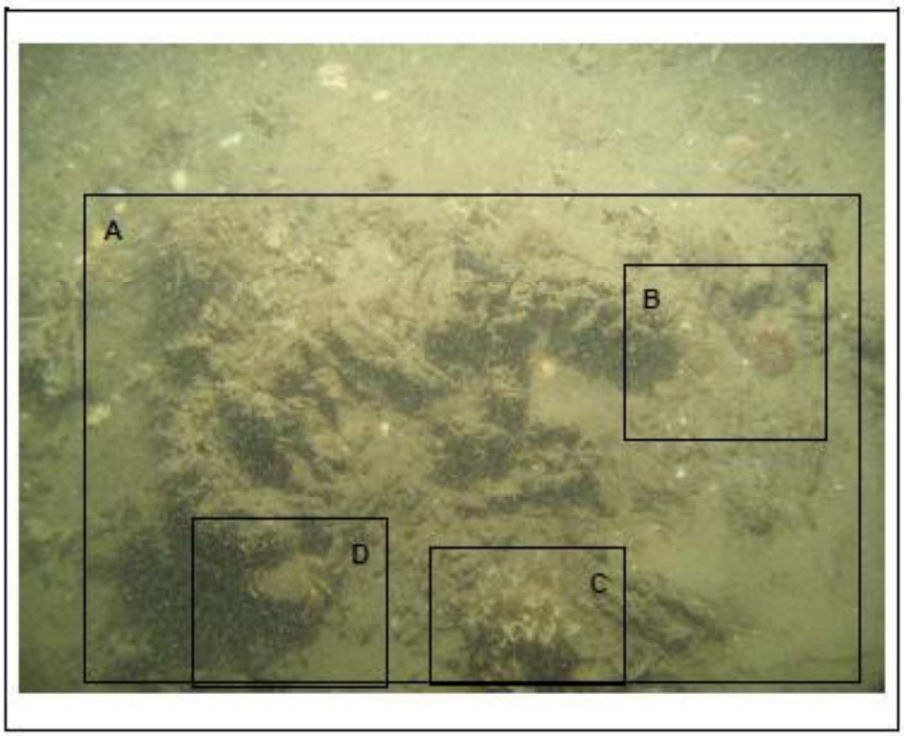


Photograph:
PLB_TR03_17

Easting: 412 135.9 mE
Northing: 5 879 403.7 mN
Depth: 35.0 m BSL

Sediment Type:
Rippled sand with shell fragments. Consolidated *Sabellaria* patches

Fauna:
A: Plumose anemone (*Metridium senile*)
B: Ross worm (*Sabellaria spinulosa*)
C: Faunal turf (Hydrozoa/Bryozoa)



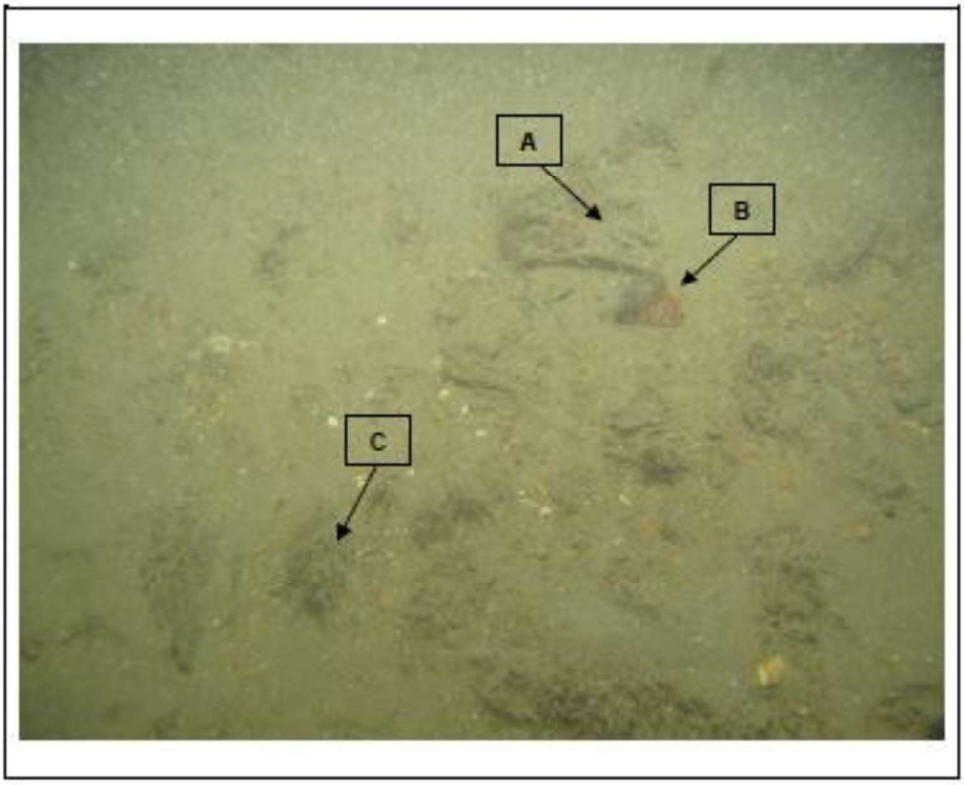
Photograph:
PLB_TR03_25

Easting: 412 133.1 mE
Northing: 5 879 382.3 mN
Depth: 37.0 m BSL

Sediment Type:
Rippled gravelly sand with consolidated *Sabellaria* patches and shell fragments

Fauna:
A: Ross worm (*Sabellaria spinulosa*)
B: Anemone (*Urticina sp.*)
C: Bryozoan (***Flustra foliacea***)
D: Velvet swimming crab (*Necora puber*)

Figure 6-13 - Photograph of *S. Spinulosa* identified at platform 48/29-B

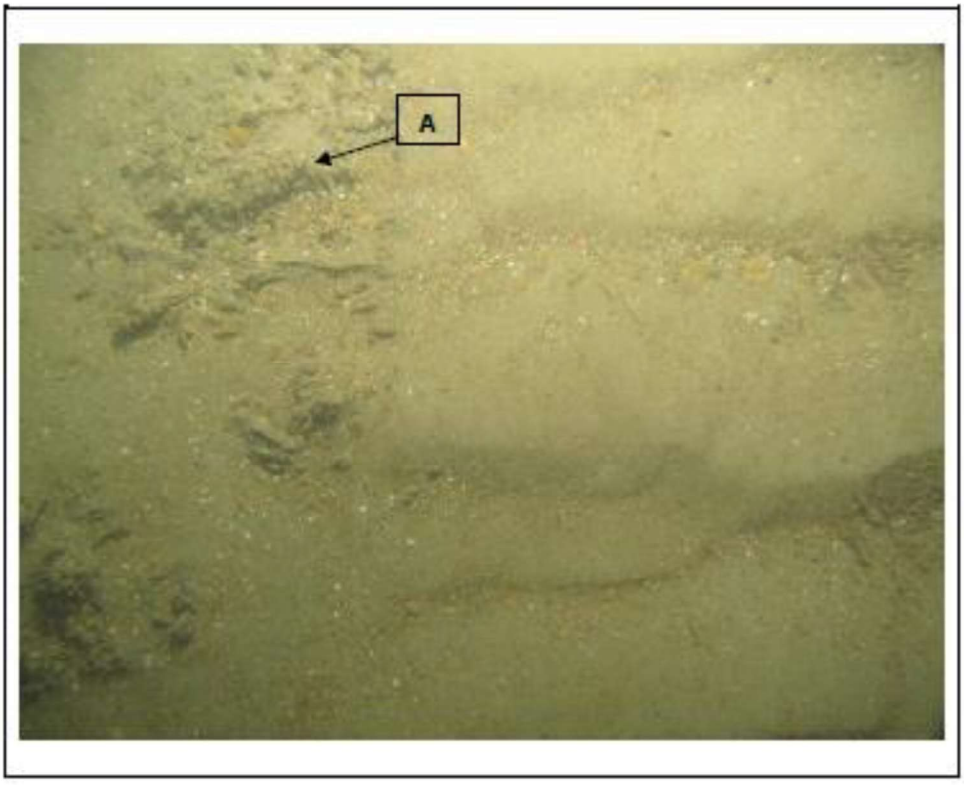


Photograph:
HEW_C_DD07_04

Easting: 416 939.6 mE
Northing: 5 883 613.2 mN
Depth: 36.0 m BSL

Sediment Type:
Rippled sand with shell fragments

Fauna:
A: Ross worm (*Sabellaria spinulosa*)
B: Anemone (*Urticina* sp.)
C: Faunal turf (Hydrozoa/Bryozoa)



Photograph:
HEW_C_DD07_05

Easting: 416 941.7 mE
Northing: 5 883 610.5 mN
Depth: 36.0 m BSL

Sediment Type:
Rippled sand with shell fragments

Fauna:
A: Ross worm (*Sabellaria spinulosa*)

Figure 6-14 - Photograph of *S. Spinulosa* identified at platform 48/29-C

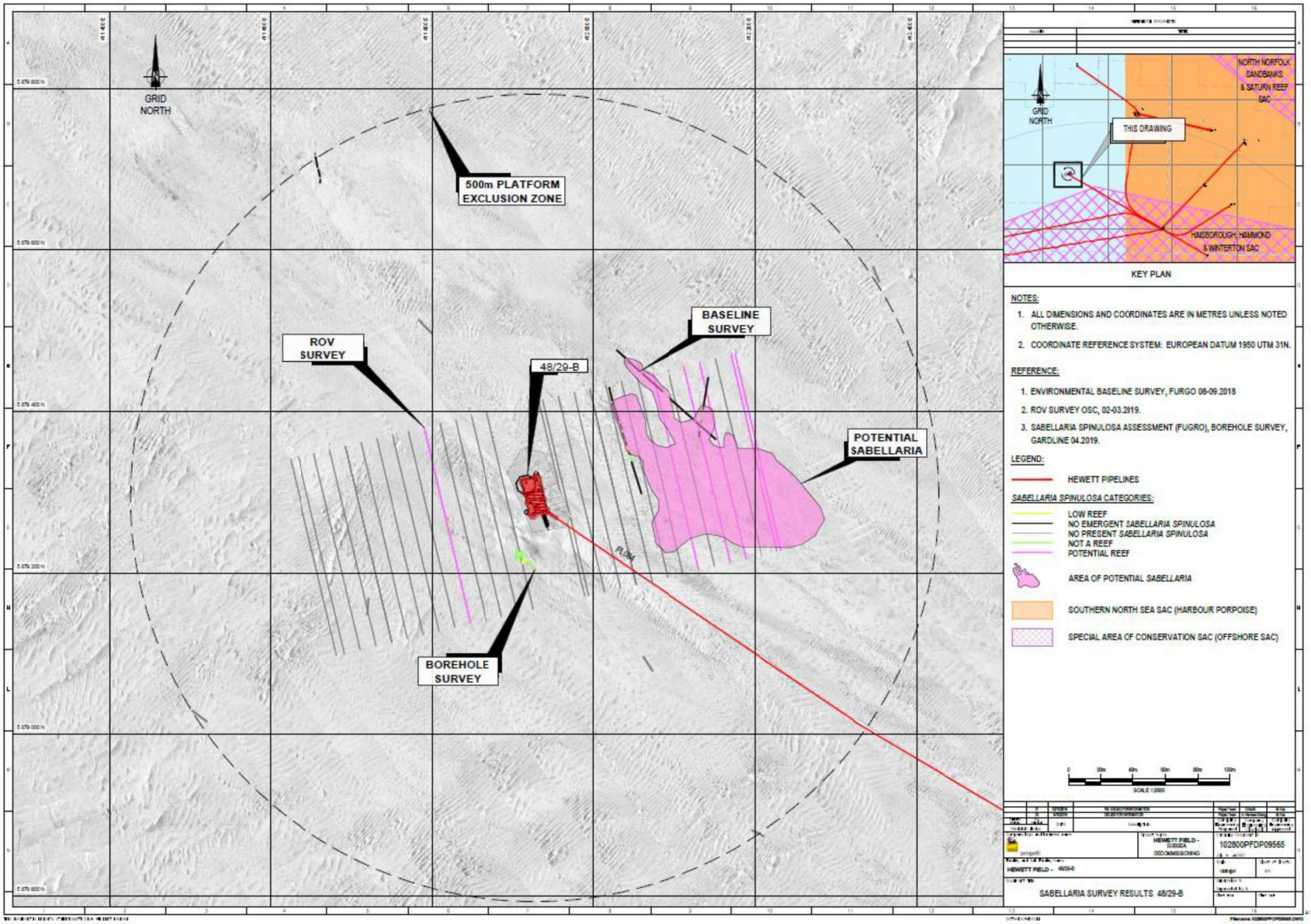


Figure 6-15 - Proximity of *S. Spinulosa* to platform 48/29-B

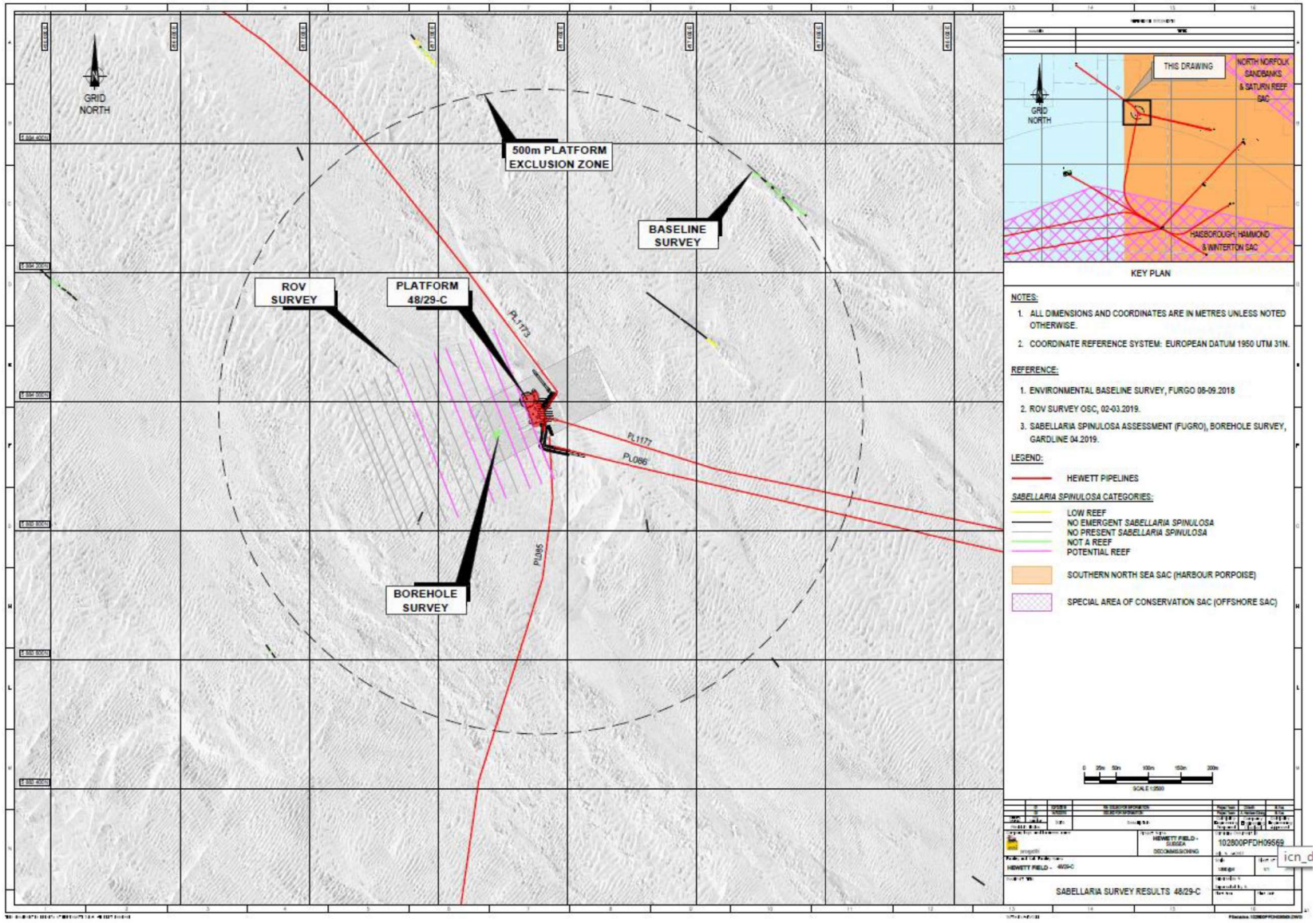


Figure 6-16 - Proximity of *S. Spinulosa* to platform 48/29-C

As noted above, no *S. spinulosa* reef was identified at platform 52/5-A in any of the surveys, however during the Gardline Borehole Survey an area in close proximity to platform 52/5-A (approximately 55m to the west) exhibited two EUNIS biotopes, 'Atlantic and Mediterranean moderate energy circalittoral rock' (A4.2) and 'Sublittoral sand' (A5.2) across a feature interpreted as a spudcan depression. Fugro undertook an assessment into the reefiness of this feature (investigating an area of approximately 50m^2) using the JNCC recommended methodologies for the identification of stony reef habitats (Irving, 2009).

Fauna observed across the transect included velvet swimming crabs (*Necora puber*), anemones (Actiniaria including *Metridium* sp. and *Sagartia* sp.), sponges (Porifera including *Suberites* sp.), ross worms (*Sabellaria spinulosa*), faunal turf (Hydrozoa/Bryozoa), edible crabs (*Cancer pagurus*) and fish species including dragonets (*Callionymus* sp.) and flatfish (Pleuronectiformes).

The classification of 'reefiness' observed ranged from 'not a reef' to 'medium reef'. Two sections of the transect were classed as 'medium reef' due to the elevation of cobbles (64mm to 5m), percentage of cobble and boulder coverage (> 40% to 95%) and epifaunal species composition in excess of 80%. The high percentage cover of cobbles and boulders located on the outer edges of the spudcan depression may be anthropogenic in origin associated with historic jack-up activities in the area rather than being formed by geological processes (geogenic).

The type of stony reef and percentages are shown in Table 6-12. Photographs of the identified medium reef are provided in Figure 6-17 and a map showing the location of the reef relative to the platform is provided in Figure 6-18. Stony Reef was not observed at any other locations in the Hewett Field Area.

Table 6-12 - Stony Reef identified at platform 52/5-A (Fugro 2019e)

Asset	Percentage of transect (%)			
	Not Reef	Low Reef	Medium Reef	High Reef
52/5-A	36	11	53	0

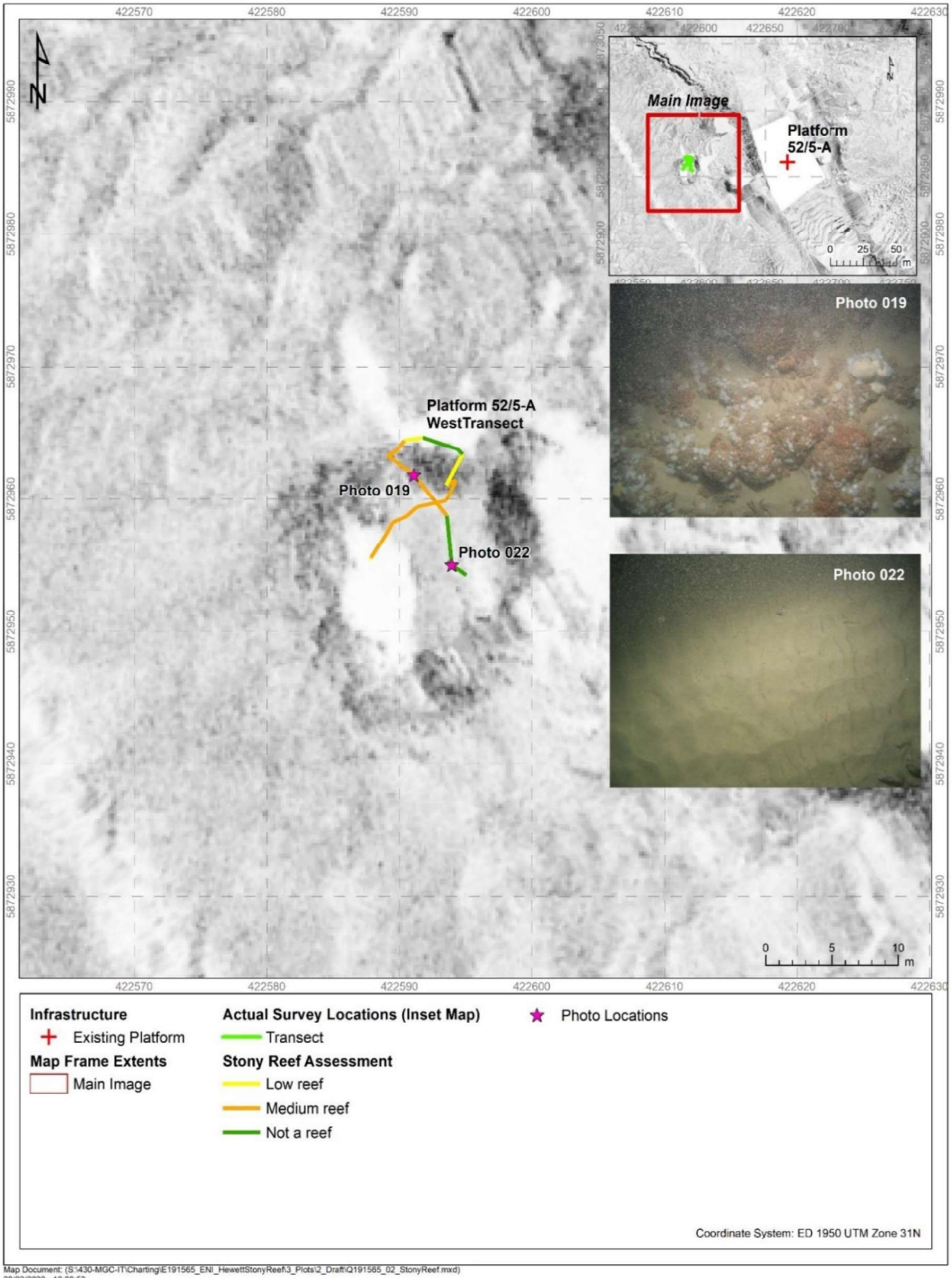


Figure 6-17 - 'Stony reef' assessment classifications overlain on side scan sonar data, platform 52/5-A (Fugro, 2019b)

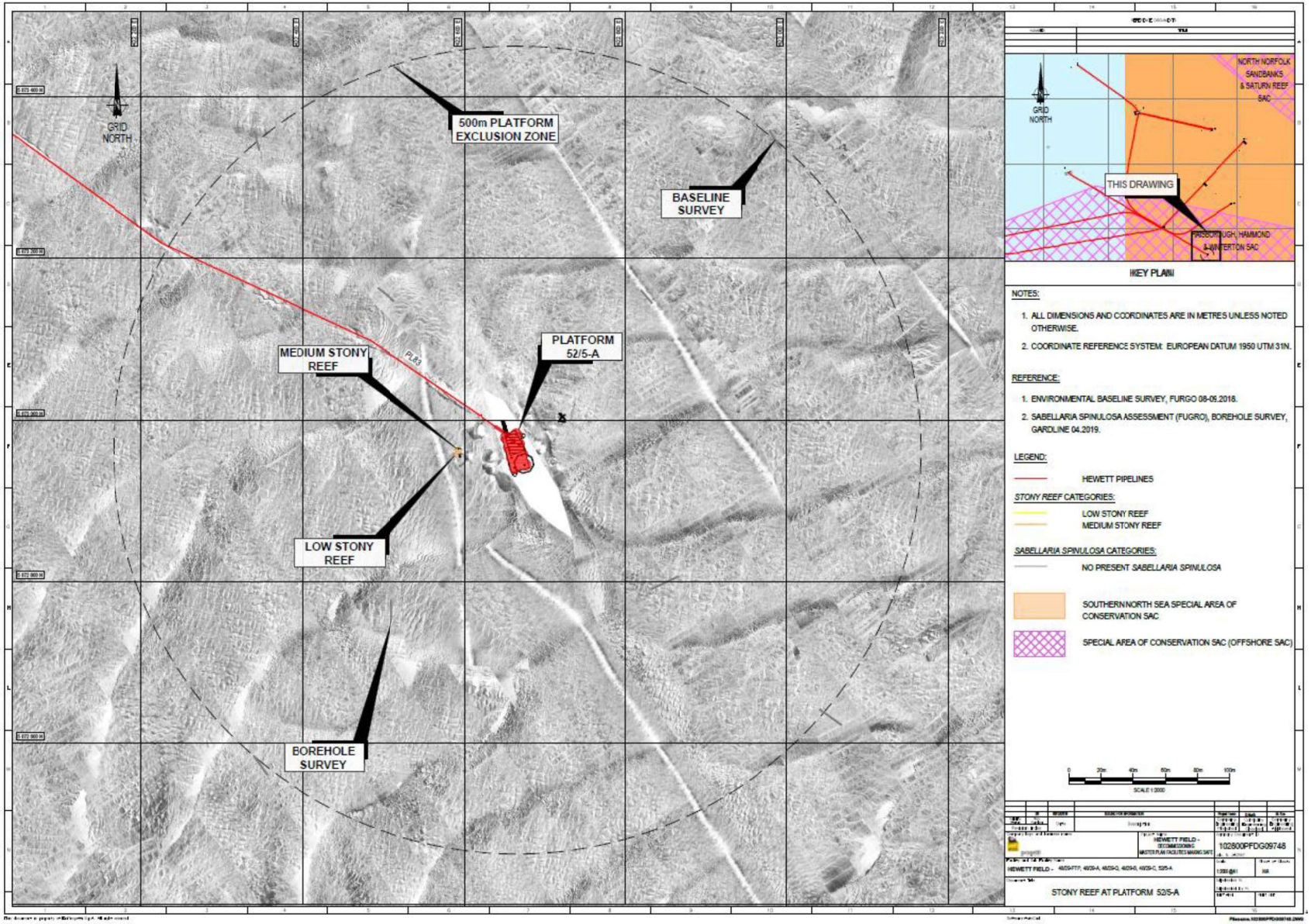


Figure 6-18 - Proximity of *Stony Reef* to platform 52/5-A

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 6-13 identifies the fish species which were observed in the vicinity of the Hewett platforms during the Pre-Decommissioning Survey (Fugro, 2018-2019):

Table 6-13 - Fish species identified within the Hewett Field Area (*Fugro, 2019c*)

Fauna / Class	Species	48/29-A	48/29-B	48/29-C	52/5-A
Actinopterygii	Common Dragonet (*Callionymus sp.*)		✓	✓	
	Pogge (*Agonus cataphractus*)		✓	✓	
	Dab (*Limanda limanda*)	✓	✓		✓
	Juvenile Gadoid fish (*Gadidae*)	✓	✓		
	Sand Eels (*Ammodytidae*)	✓	✓		
	Gobies (Pisces including Gobiidae)	✓	✓	✓	✓
	Butterfish (*Pholis gunnellus*)		✓	✓	
	Unidentified Scorpaeniformes (order)		✓	✓	

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 Hewett platforms are located within ICES Rectangles 34F1 (platform 52/5-A) and 35F1 (platforms 48/29-A, 48/29-B and 48/29-C). A number of spawning and nursery grounds for fish species are located within these ICES Rectangles as listed in Table 6-14 and illustrated in Figure 6-19.

Table 6-14 - Spawning and nursery grounds in the vicinity of the Hewett Field Area – ICES Rectangles 34F1 and 35F1 (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)												
Sandeel (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 Field platforms are in an area of low probability of 0 group fish for herring horse mackerel (*Trachurus trachurus*), sprat and whiting, and moderate probability for anglerfish (*Lophius piscatorius*), blue whiting (*Micromesistius poutassou*), cod, haddock (*Melanogrammus aeglefinus*), hake (*Merluccius merluccius*), mackerel, Norway pout (*Trisopterus esmarkii*), plaice and sole (Aires et al. 2014).

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' (including those identified during the Pre-Decommissioning Survey), aside from sole which is listed as 'Data Deficient' (IUCN, 2019).

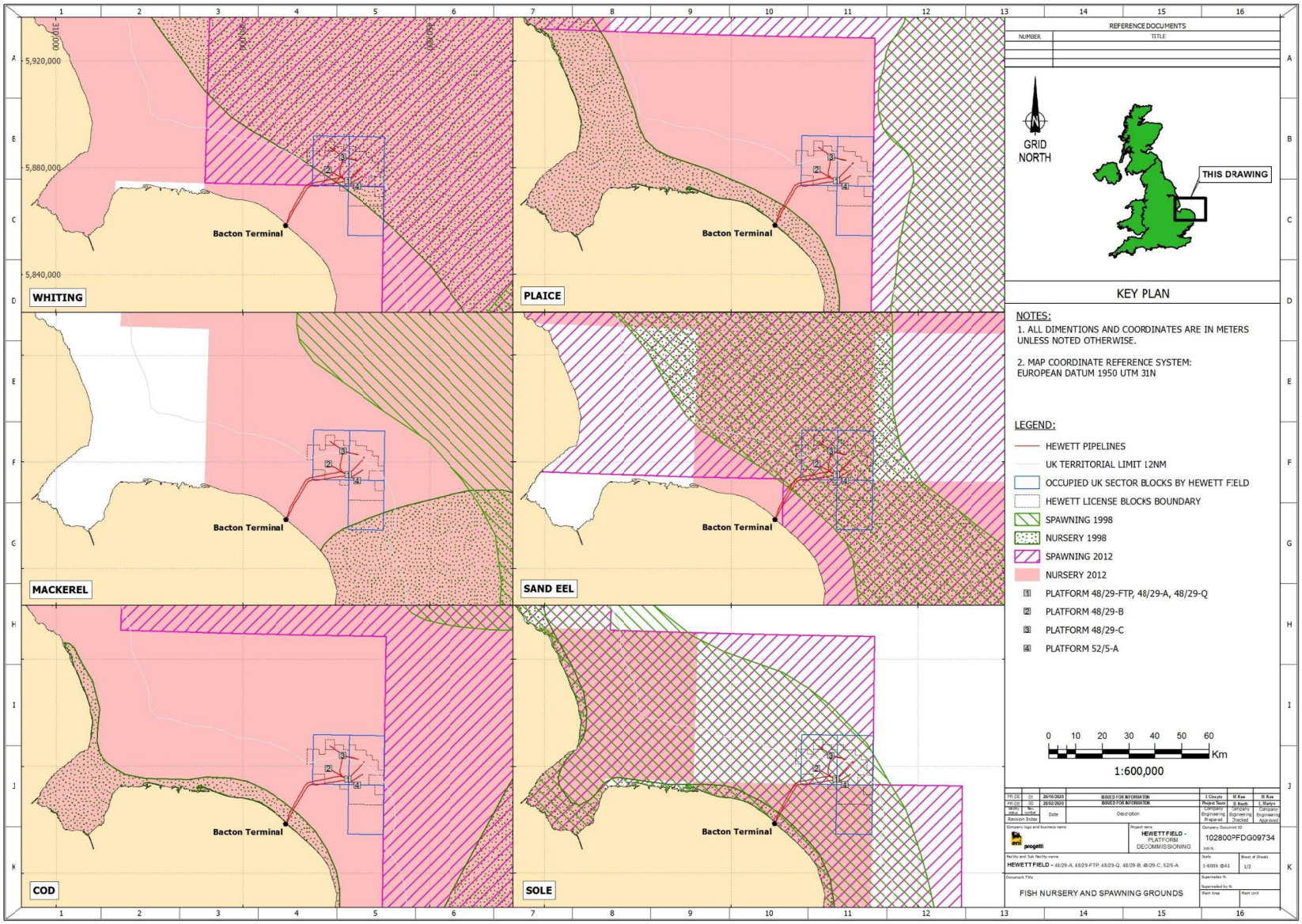


Figure 6-19 - Fish Spawning and Nursery Grounds (1 of 2) in the vicinity of the Hewett Field Area

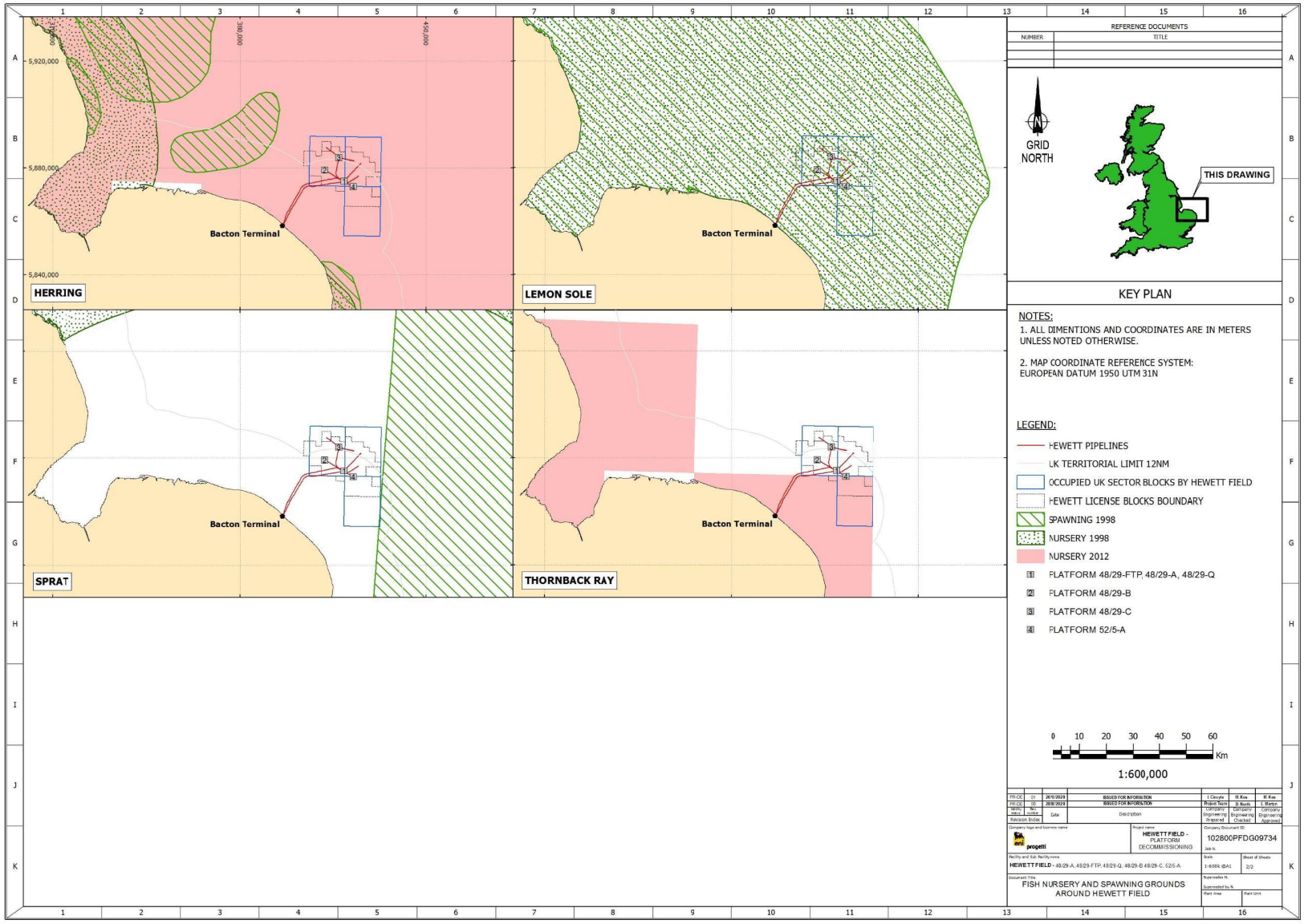


Figure 6-20 - Fish Spawning and Nursery Grounds (2 of 2) in the vicinity of the Hewett Field Area

6.4.4 Marine Mammals

6.4.4.1 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. Minke whale is a 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 provide 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) (Heinänen and Skov, 2015). The Southern North Sea SAC has been designated to protect these areas.

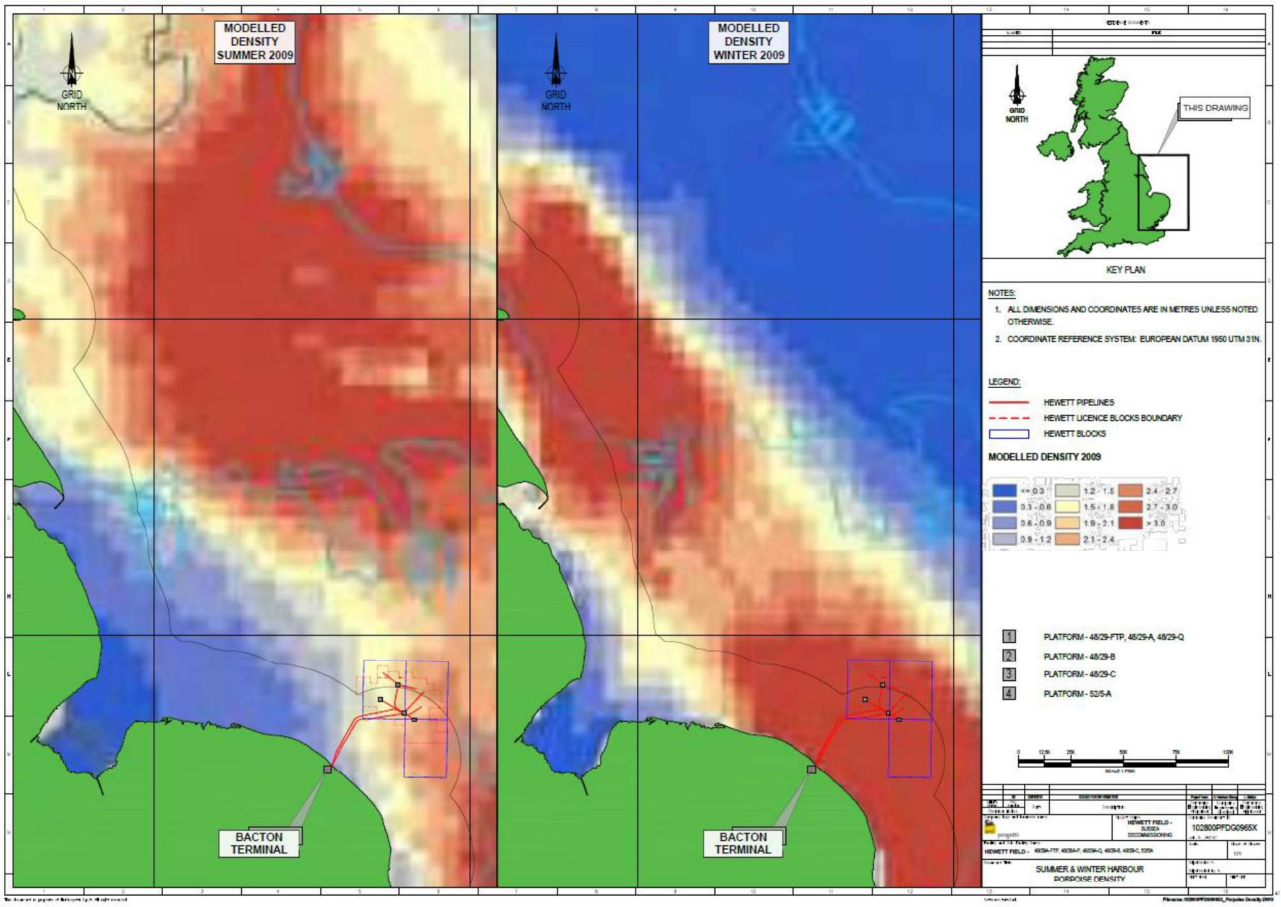


Figure 6-21 - Persistently higher density area of harbour porpoise in winter and summer, based on modelled data (after Heinänen and Skov, 2015)

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 in order to provide an understanding of the

geographical range and abundance of marine mammal populations, and subpopulations, to aid conservation and management purposes. The MMMUs within which the Hewett platforms are located, along with the corresponding abundance of animals within these units, are listed in Table 6-15.

Table 6-15 - 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) 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

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 platforms 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 platforms are all situated within SCANS-III Block O in which harbour porpoise, minke whale and white-beaked dolphin have been recorded (see Table 6-16) (Hammond *et al*. 2017). It should be noted that although density estimates are shown in Table 6.16, 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 6-16 - 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 6-22, Figure 6-23 and Figure 6-24.

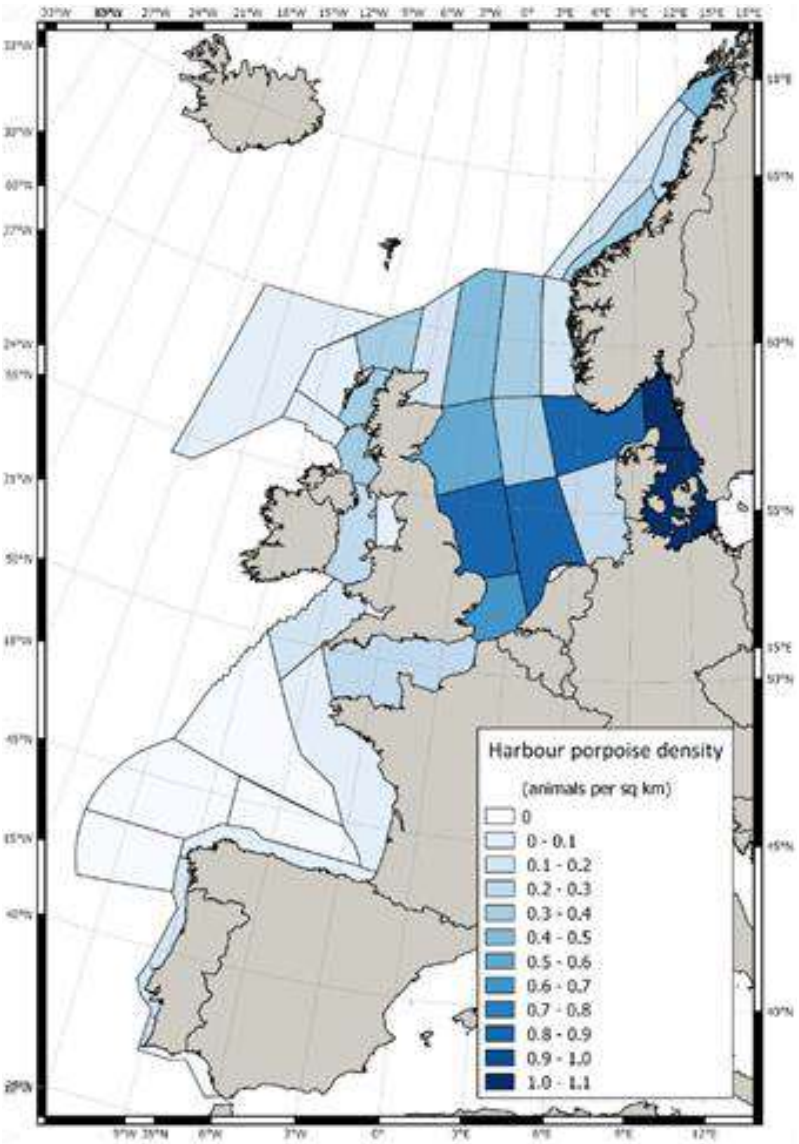


Figure 6-22 - Harbour Porpoise sightings observed in SCANS III survey

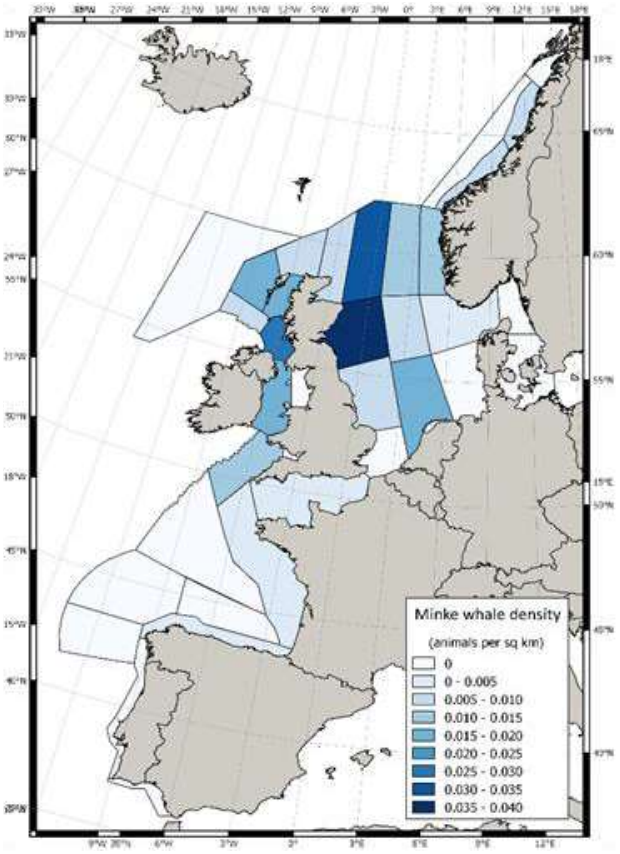


Figure 6-23 - Minke whale sightings observed in SCANS III survey

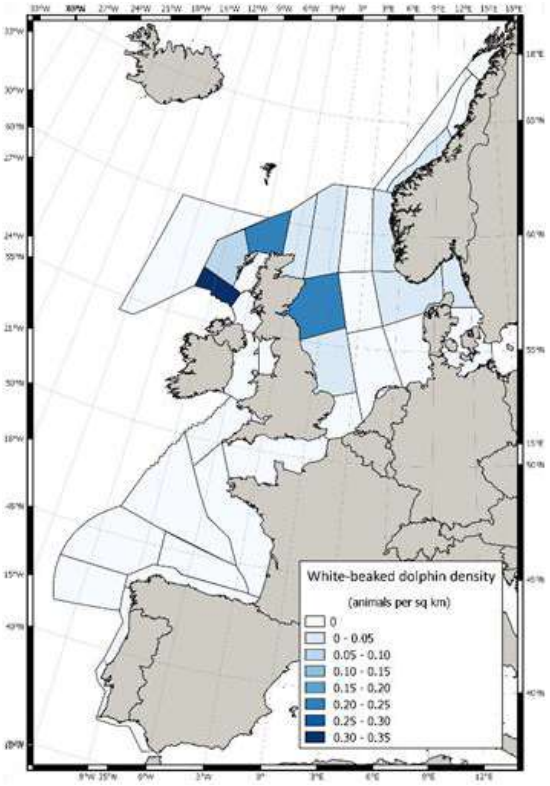


Figure 6-24 - White beaked dolphin sightings observed in SCANS III survey

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 platforms, 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 Rectangles 34F1 and 35F1 indicates that low densities of harbour porpoise and the white-beaked dolphin have been recorded in the area (see Table 6-17 and Table 6-18) (Reid *et al.,* 2003).

Table 6-17 - Cetacean Sightings in ICES Rectangle 34F1 (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			

Table 6-18 - 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 platforms are listed as UK BAP priority species (JNCC, 2007), but are of least concern on the IUCN Red List (IUCN, 2019).

6.4.4.2 Pinnipeds

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

Grey and harbour seals are both listed under Annex II of the 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 (DTI, 2004), 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 6,085 grey seals were counted between Donna Nook and Dover in August 2016 (DECC, 2016; SCOS, 2018).

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 platforms is low (<5 individuals per 25 km^2) as shown in Figure 6-25 (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 (February to March) (SCOS, 2018).

Around 30% of the 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 3,377 individuals counted in 2016 (SCOS, 2018).

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 platforms is also low (<1 individual per 25 km^2) as shown in Figure 6-25 (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).

Of note is that during the Project Pre-decommissioning Environmental Baseline Survey conducted in August and September 2018 only one grey seal was observed over the full duration of the survey (Fugro, 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 Field Platforms are located within the South East England management unit for seals (IAMMWG, 2013). Table 6-19 shows the seal count and estimated population for this management.

Table 6-19 - 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.

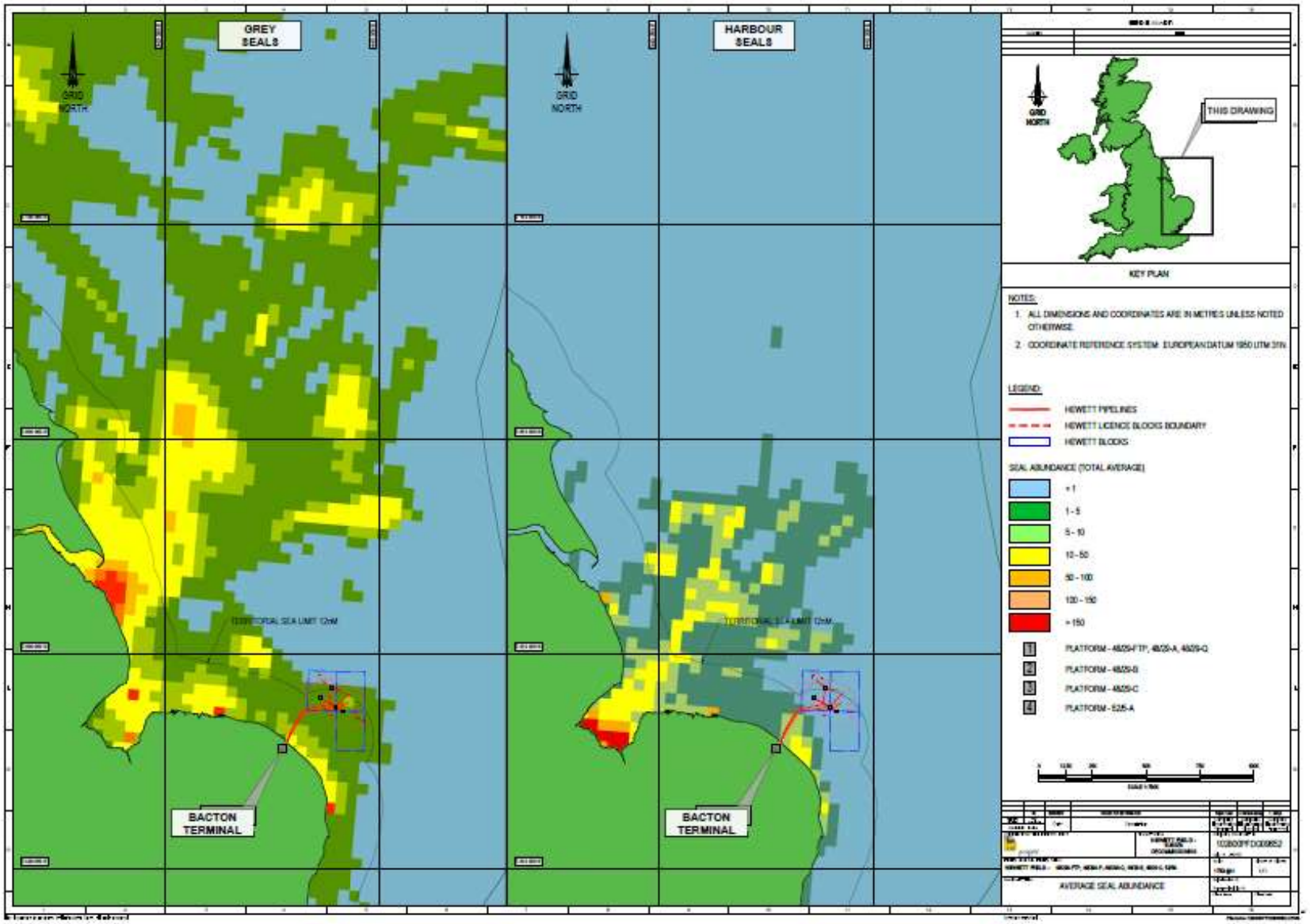


Figure 6-25 - Seal Abundance in the vicinity of the Hewett Field Area (Russel *et al.*, 2017)

6.4.5 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 Hewett platforms may originate from onshore colonies, or be passing migrants (DECC, 2016). Of note is that the Hewett platforms lie adjacent to several SPAs on the Norfolk coastline, which have been designated for the protection of breeding colonies of seabirds. In addition, given the proximity to the coastline (26km) the Hewett platforms lie within the maximum breeding foraging ranges of most seabirds, including common eider, fulmar, Manx shearwater, storm petrel, gannet, cormorant, Arctic skua, great skua, black-headed gull, common gull, herring gull, lesser black-backed gull, kittiwake, sandwich tern, roseate tern, common tern, Arctic tern, guillemot, razorbill and puffin (Thaxter *et al.*, 2012).

The closest SPA to the Hewett platforms is the Greater Wash SPA (9km at its closest point; see Section 6.2), the boundary of which has been derived from surveys that have observed foraging behaviour of the following qualifying 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 for common terns is 30km, though the mean of all the maximum foraging ranges recorded by different studies is 15.2km (Natural England, 2012), whilst for the sandwich tern the distance is 49km (Natural England, 2012). Little terns do not regularly occupy the Greater Wash and studies have suggested the foraging range of little tern (related to its body size) is smaller than that of the larger tern species (mean is less than 6.3km; Natural England, 2012). This dictates that it nests close to shallow coastal waters with a supply of small shoaling fish such as sandeels and clupeids and invertebrates which comprise its diet. All the identified tern species plunge-dive to seize fish from the top of water column (they usually dive to no more than 2 metre 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 sandeels. Red-throated divers are highly sensitive to anthropogenic activity and move away from ships and other structures (O'Brien, 2018). 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 Hewett platforms are within water depths of approximately 30m and therefore it is not expected that the common scoter will be foraging nearby.

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 6-20) suggests that seabirds do not use the area in the vicinity of the Hewett platforms 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 platforms 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).

Table 6-20 - Predicted Seabird Surface Density in the Vicinity of the Hewett Platforms (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 in Blocks 48/29 and 52/5 is consistent within both blocks during winter months assessed as extremely high in January and February, very high in December, and high in March, April (indirect assessment taken from March result) and October. In summer months there is slight variance between the two blocks but all months have been assessed as medium or low from May to September (see Table 6-21 and Figure 6-24; Webb *et al.*, 2016, JNCC, 2017).

Table 6-21 - Seabird Oil Sensitivity Index for UKCS blocks 48/29, 52/05 and adjoining blocks (Webb *et al.*, 2016, JNCC, 2017)

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
49/26	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

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
52/09	1	1	2	2*	5	2	5	4	5	2*	2	2
52/10	1	1	2	2*	5	3	5	4	5	3*	3	2
53/01	1	2	3	3*	5**	3**	5*	5	5	3*	3	2
53/06	1	2	2	2*	5	3	3*	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;

Coverage gaps populated with estimate based JNCC guidance (JNCC, 2017):	
*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)

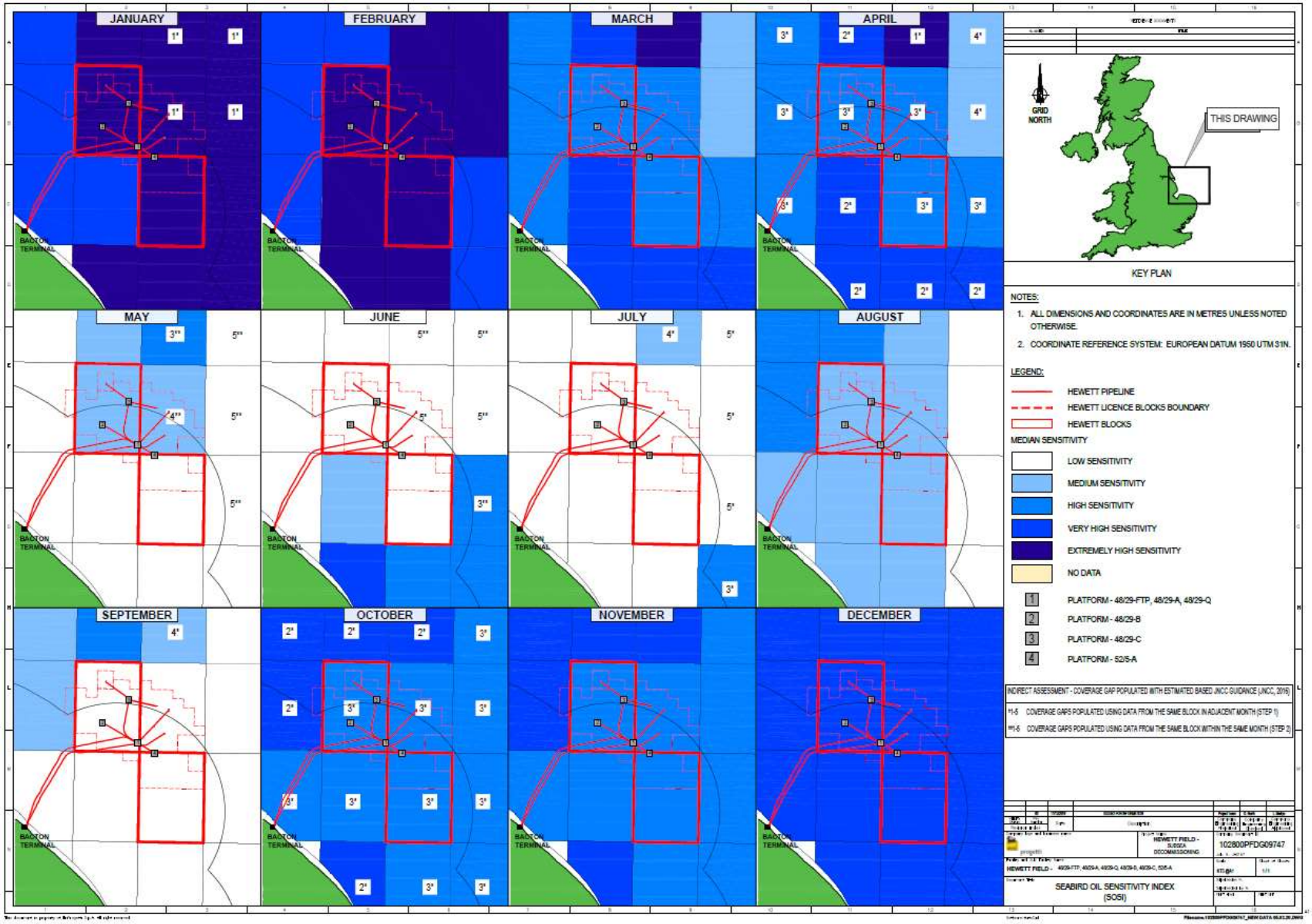


Figure 6-26 - Seabird Oil Sensitivity Index for UKCS Blocks 48/29, 52/05 and adjoining blocks (Webb *et al.*, 2016, JNCC, 2017)

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 Area, 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 is recorded by ICES Rectangle on a monthly and annual basis. The Hewett platforms are located within ICES rectangles 34F1 and 35F1. Figure 6-27 identifies the average landing values (2012-2016) by species and method in ICES Rectangle 34F1 and ICES Rectangle 35F1.

Commercial fishing within the vicinity of the Hewett Field Area is undertaken by vessels from a number of EU states deploying a range of gear types. Of the sightings in ICES rectangle 34F1, 87.8% are of UK registered vessels (2011-2015). The highest proportion of UK vessels are potters and whelkers at 62.4%, followed by beam trawlers at 6.8% and trawlers (all) at 5.6%. Brown crab fishing has steadily increased into 2017, making it the highest in the district. Potters and whelkers usually operate nearshore away from the Hewett Field Area. Of the non-UK fleet, the majority of sightings in 34F1 are French vessels, comprising 9.0% of the observations. These are primarily trawlers that transit through the area to fishing grounds further north (MMO, 2015).

Within ICES Rectangle 35F1, fishing effort from 2010 to 2014 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, 2015). 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).

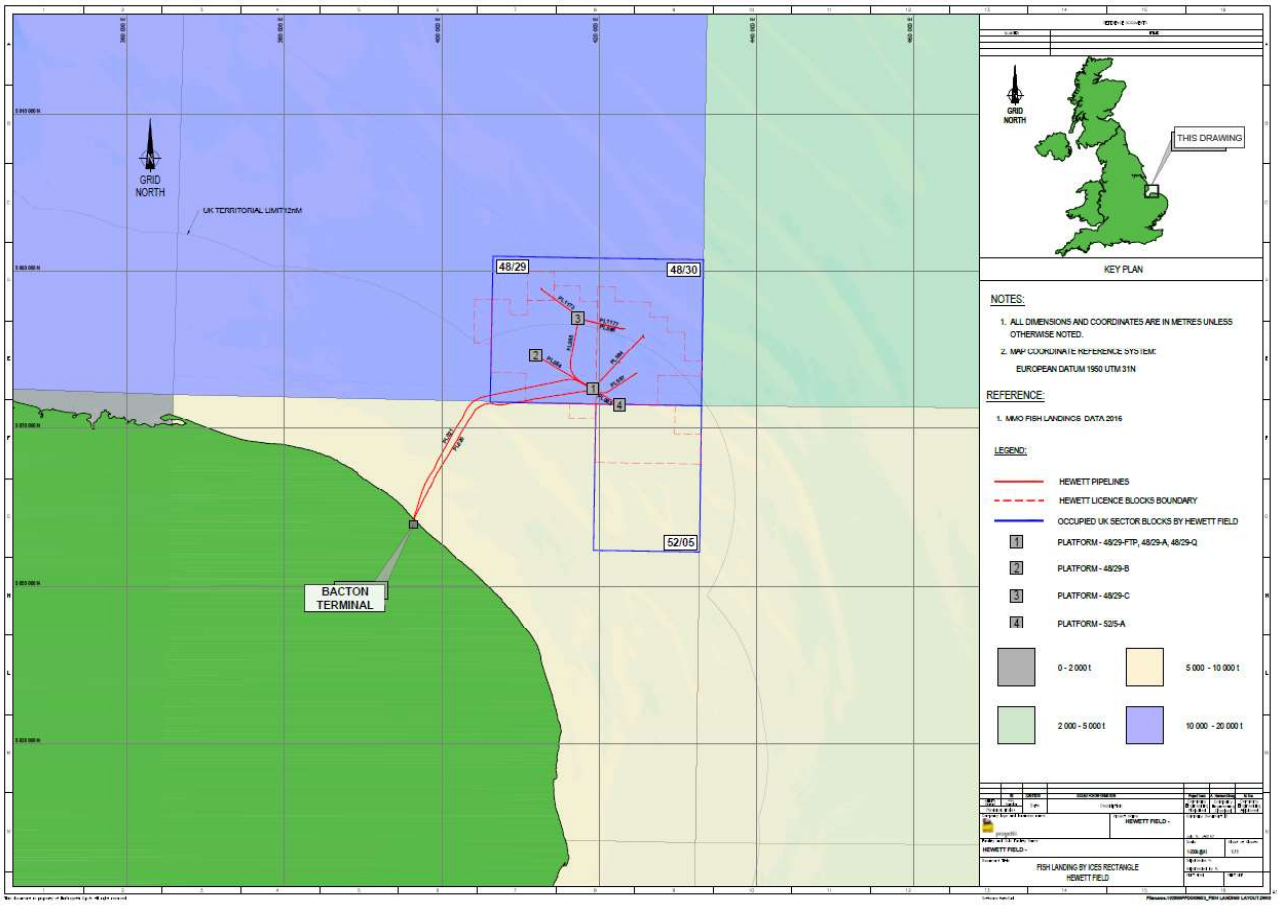


Figure 6-27 - Fish Landings by ICES Rectangle in the proximity of the Hewett Field Area (MMO, 2015)

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 (as illustrated in Figure 6-28). Oil and gas fields generate moderate vessel traffic in the form of support vessels, principally operating from Great Yarmouth and Lowestoft (DECC, 2016). Shipping density is considered to be very high in Block 48/29 and high in Block 52/05 (MMO, 2014 and OESEA3 A1h, 2016).

A vessel traffic survey has been undertaken for the decommissioning project. This identified 22 shipping lanes passing close to the Hewett Field Area (within 10nm, centred on 48/29-B) and a total of 19,495 vessel tracks, which corresponds to an average of 53 vessels per day (Xodus, 2019). The traffic in the region was found to be very high with the majority of vessels (89.5%) associated with shipping between ports on the east coast of the UK and mainland Europe. The densest areas of vessel activity were located to the south and west of the Hewett Field Area (Xodus, 2019).

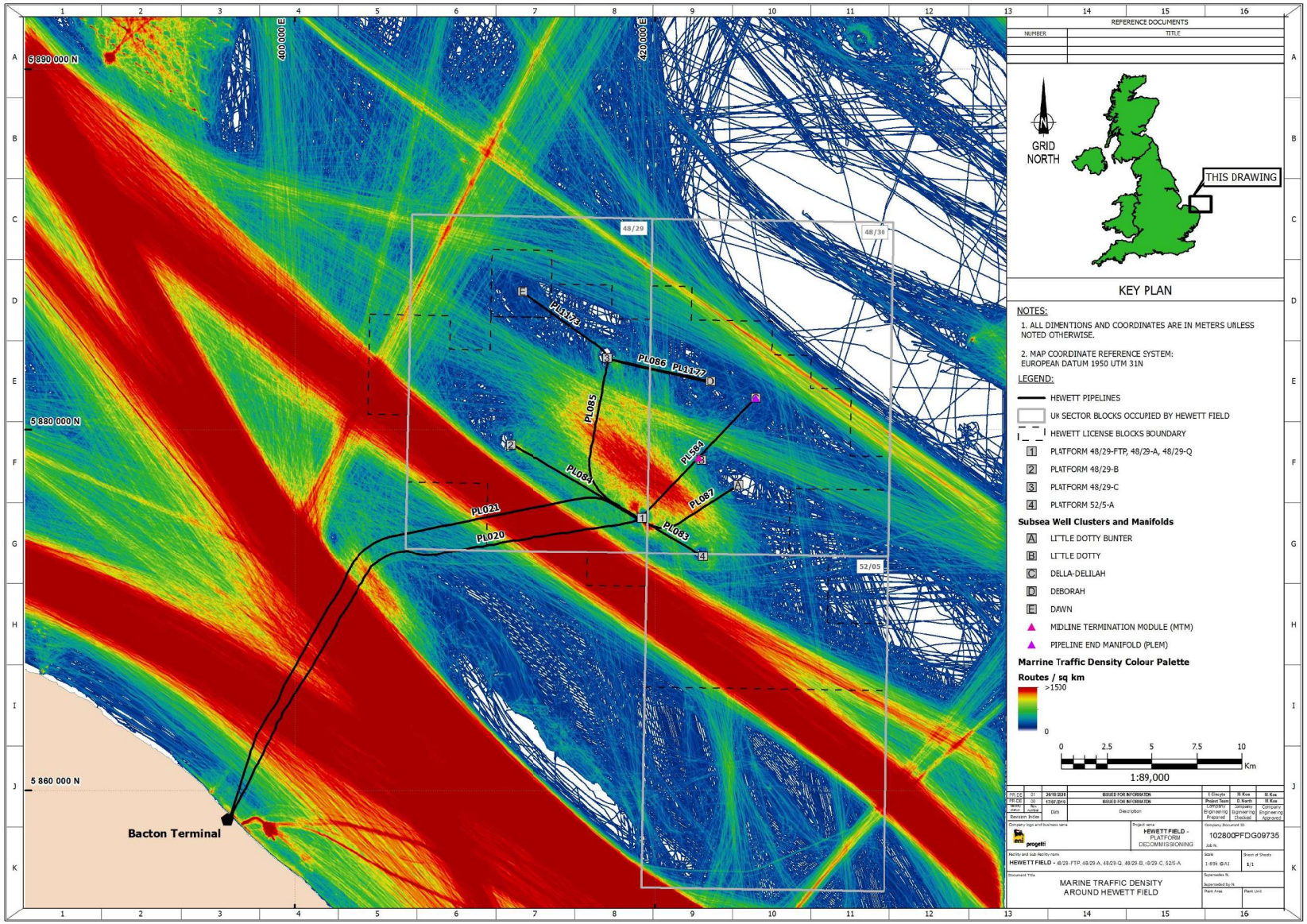


Figure 6-28 - Marine Traffic Density

6.5.3 Oil and Gas Activities

The Hewett field 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 6-29 below.

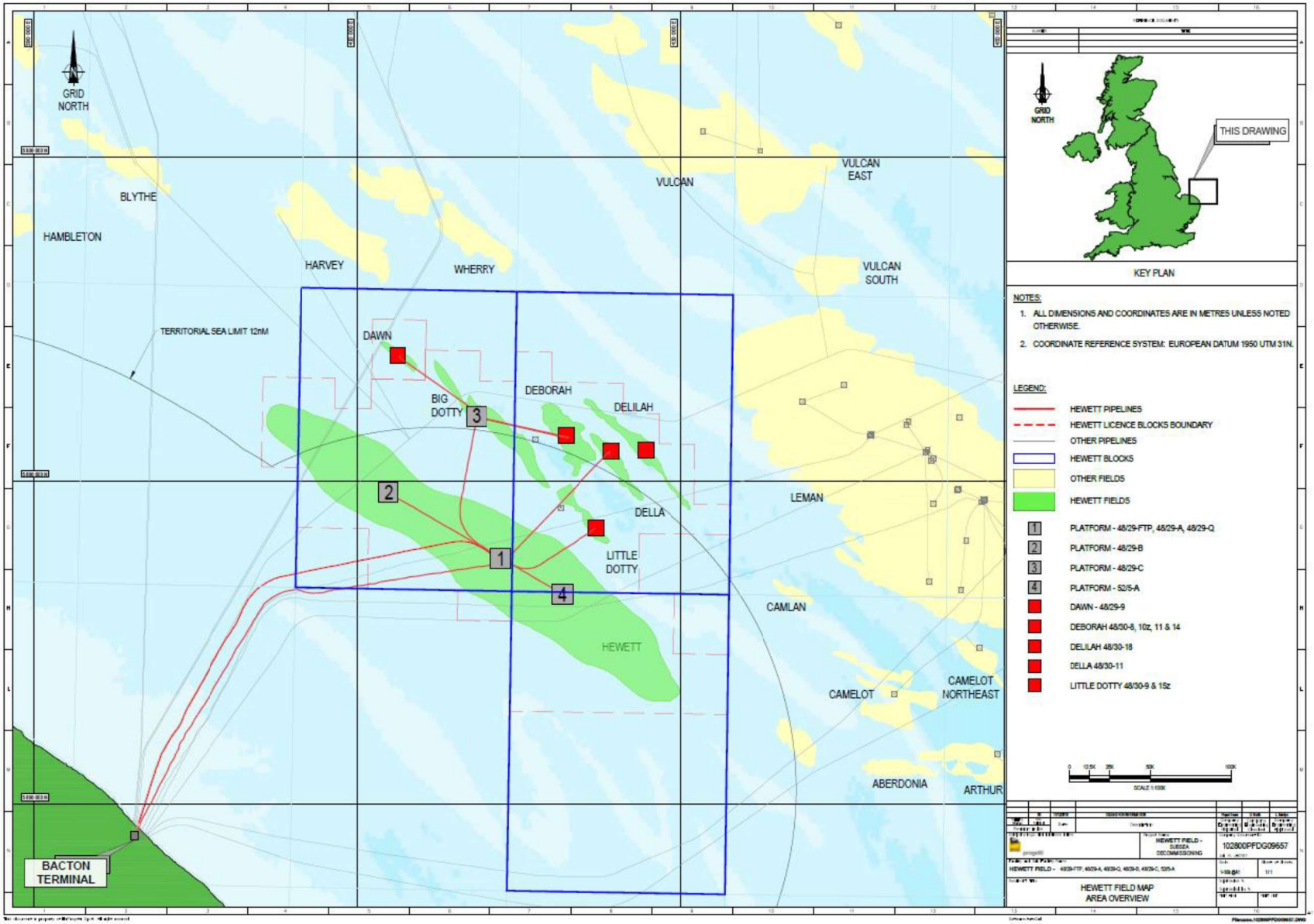


Figure 6-29 - Oil and Gas Infrastructure in the vicinity of the Hewett Field

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 24km and 32km respectively as illustrated in Figure 6-30. At the time of writing this document, Dudgeon and Sheringham extension projects are expected to submit an application in Q3, 2021 and could be in construction within the timescales of the proposed Hewett platform decommissioning work.

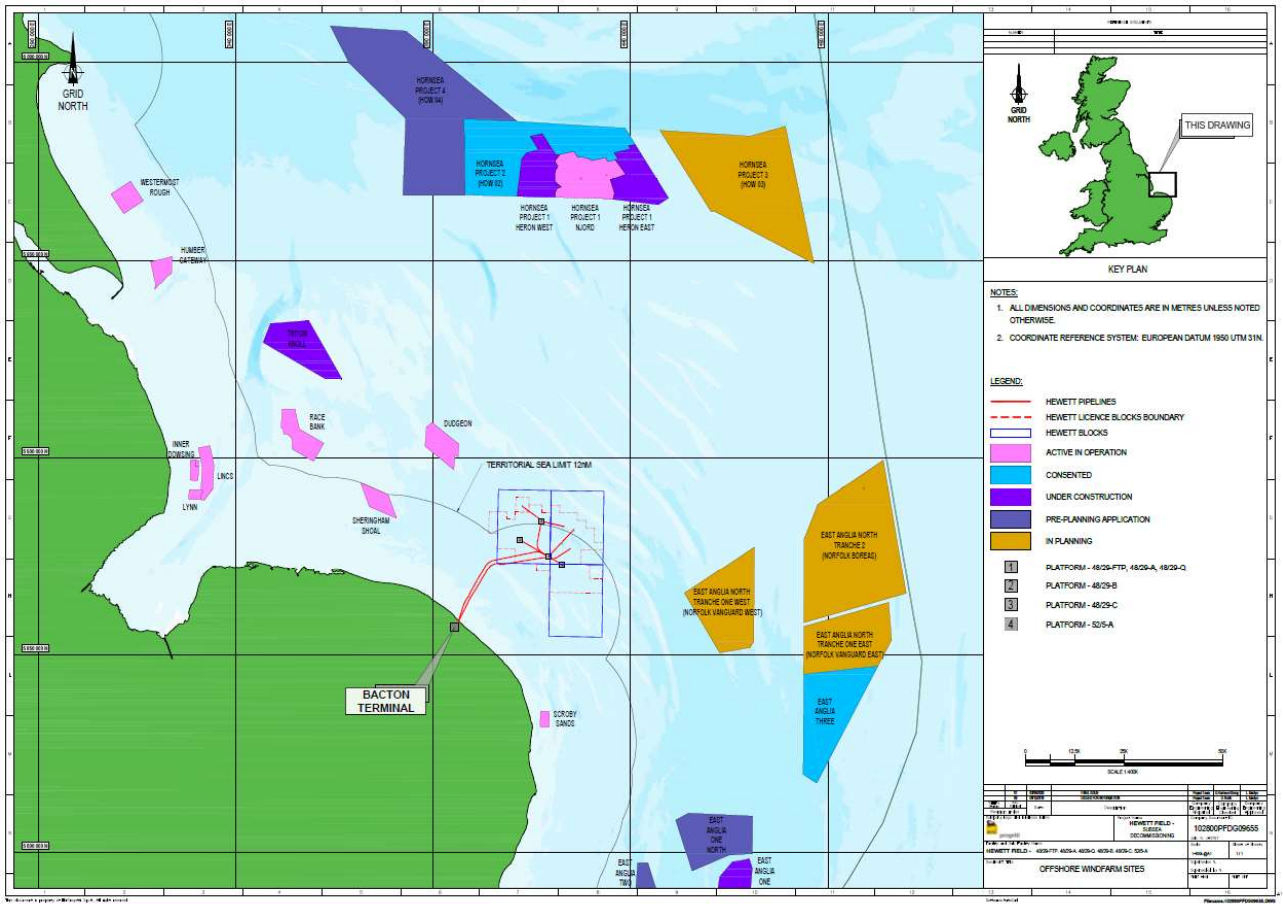


Figure 6-30 - Windfarms in the vicinity of the Hewett Field Area

6.5.5 Other Subsea Infrastructure

The nearest non-oil and gas subsea infrastructure to the Hewett Field Area is the 'STRATOS 1' telecommunication cable situated approximately 14km west of the 48/29-B platform which runs from north-east (offshore North Sea) to south-west (Weybourne). Current records show this cable to be disused (KIS ORCA, 2019).

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 platforms (MMO, 2019). The nearest site is the 'Humber 3' Aggregate Production Area, located approximately 50km to the north east of the Hewett Field Area (Operator: DEME Building Materials Ltd.)

However, the Hewett Field Area is surrounded by areas of high potential aggregate resource, sand and gravel (AGG 3) (DEFRA 2019).

6.5.7 Military Activity

There is a military Practice and Exercise area (PEXA) situated approximately 60km 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 8 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 22km northwest of the Hewett Field Area (MMO, 2019). This wreck is protected by the Military Remains Act 19.

7.0 ENVIRONMENTAL ISSUES IDENTIFICATION

Potential environmental and societal impacts arising from the planned platforms decommissioning activities were initially determined through an Environmental Impact Identification (ENVID) Workshop held on 20th May 2019 at Eni House London.

7.1 Impact Assessment Methodology

In order to assess significance of potential impacts associated with the Hewett Platforms DP, the project followed Eni's Environmental Aspects Identification methodology (opi-sg-hse-028-ups-r01) and Risk Management and Reporting Professional Operating Instructions (opi-sg-hse-001-ep-r01).

This method of evaluation was applied to all activities and related aspects identified as having the potential to interact with the environment and to cause environmental or societal impacts. Significance was categorised as Low, Medium, Medium-High and High (refer to Appendix A for significance definitions). Suitable controls and mitigation measures were then captured such that the potential impacts would be avoided or reduced to as low as reasonably practicable (ALARP).

The potential impacts were then reassessed to determine if the overall significance had been reduced. This process enabled identification of aspects thought to be potentially significant and aspects that could be scoped out, therefore focusing the need for further assessment.

7.2 Assessment Results

The results of the ENVID workshop are summarised in Table 7-1. The scoping exercise identified that there were no aspects considered to have High or Medium-High impact to identified receptors. The following aspects were considered to present a Medium impact to at least one receptor:

- Seabed disturbance
- Underwater noise
- Accidental releases

A comprehensive assessment has therefore been undertaken for these aspects, the results of which are documented in Section 8.

All other aspects identified, as listed below, were considered to have Low significance:

- Physical presence
- Energy use and atmospheric emissions
- Waste management
- Marine discharges

These aspects are not considered to require further assessment and a justification for screening out these aspects has been provided in Section 7.3.

Cumulative effects, in-combination impacts and transboundary issues were also considered to have Low significance, as justified in Sections 7.3.6 to 7.3.8.

In addition, due to the Hewett Field Area being located within or in close proximity to a number of MPAs (refer to Section 6.2), an assessment has been undertaken to determine whether there will be any likely significant effects on the conservation objectives of these MPAs as a result of the Platforms DP, either alone or in-combination with other plans or projects. This assessment is documented separately within Section 9.

Table 7-1 - Impact Assessment Summary (Green = low significance, yellow = medium significance)

Theme	Aspect	Air Quality	Use of Resources	Water quality	Seabed conditions	Benthos	Plankton	Fish and shellfish	Marine mammals	Seabirds	Conversation Objectives	Fisheries	Shipping	Other sea users	Disposal Facilities	Interested Parties	Cumulative Impacts	In-combination	Transboundary issues
Physical Presence	Presence and transiting of HLV, transportation and support vessels																		
	Removal of 500 m safety zone																		
Seabed Disturbance	Anchoring of HLV to remove topsides and jackets																		
	Use of W2W HLV jack-up vessel: deployment of spudcans																		
	Rock placement for stabilisation / scour mitigation																		
	Removal / redeployment of mattresses and other stabilisation material																		
	Excavation of seabed, removal of riser and cutting of pipeline ends																		
	External cutting of jacket legs																		
	Dropped objects (accidental event)																		
Underwater Noise	Use of propellers / DP thrusters on vessels																		
	Use of cutting tools for jacket legs, piles and connection spools																		
Marine Discharges	Routine vessel discharges to sea																		
	Introduction of invasive species (from ballast water)																		
Energy Use & Atmospheric Emissions	Power generation on HLV, transportation and support vessels																		
	Diesel-powered equipment and generators																		
Waste Management	Onshore disposal of waste transferred to shore																		
	Marine growth removal																		
Accidental Releases	Vessel collision (loss of diesel inventory)																		
	Residual liquids released during lift or loss of load																		
	Loss of hydraulic fluids from cutting equipment																		

7.3 Aspects Not Requiring Further Assessment

7.3.1 Physical Presence

The vessels required for Platforms DP work will be present on location within the existing 500m safety exclusion zones surrounding each of the Hewett platforms. These zones are clearly marked on navigation charts and have been in place for a number of years. If an anchored HLV is used, the anchor lines may extend outside the 500m safety exclusion zones, although this is unlikely to present a significant hazard to shipping or fishing vessels which would not usually transit immediately adjacent to an existing exclusion zone.

Where required, Consent to Locate permits will be in place, existing collision risk management plans will be reviewed and notifications will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins.

HLV, transportation and support vessels will travel from / to the coast (destination currently unknown) for the duration of the Hewett Platforms DP project, as detailed in Section 5.4. However, in the wider context of traffic in the southern North Sea, the impact on other sea users from these additional boat movements is considered to be negligible. Operations will be planned to minimise the number of boat movement, as far as reasonably practicable.

As it is proposed to fully remove the topsides and jackets, there will be no mechanism for associated long-term impact through physical presence. In addition, once clear a seabed state has been achieved, the 500m safety exclusion zones surrounding each of the Hewett platforms will be withdrawn. This will result in a positive impact as an area of circa 0.79 km^2 (per installation) will be made available to other sea users.

7.3.2 Energy Use and Atmospheric Emissions

Atmospheric emissions will be produced during the proposed decommissioning operations as a result of the fuel consumed by offshore vessels, diesel-powered equipment and generators, although these are not expected to be significantly greater than those created from the usual operation of the platforms for the production of gas.

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).

It is predicted that the atmospheric emissions generated will result in slight short term reduction of the air quality in the immediate vicinity of the proposed decommissioning operations; however, the contribution to the worldwide levels of atmospheric emissions is negligible. In addition, due to the exposed and generally windy conditions offshore, the gaseous emissions disperse rapidly.

The design of the platforms removal programme will ensure that the time between the various lifting activities is reduced, as far as practicable, to minimise the total duration of vessels working offshore. In addition, it is proposed to select a dismantling location close to the Hewett Field Area, if possible, which will optimise vessel transit times, thereby reducing fuel consumption and associated atmospheric emissions. Eni will also ensure that the engines, generators and other combustion plant on the vessels are maintained and correctly operated to ensure that they work as efficiently as possible.

7.3.3 Waste Management

Good housekeeping standards will be maintained on board all vessels in accordance with the project waste management strategy.

The impacts of waste management are largely onshore and therefore outside the scope of this EA report. A large proportion of project waste consists of easily reprocessed scrap metal and there will be limited quantities of hazardous waste (refer to Section 5.5). A Materials Inventory has been developed for the Hewett Platforms DP project to identify the types of waste generated and the management procedures for each waste stream will be included in a project 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 will have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste.

Marine growth will be removed by high pressure cleaning, either offshore or onshore at a dismantling yard. Removal offshore will result in marine growth falling to the seabed where it will degrade naturally, with no expected adverse effects to the seabed (OGUK, 2013). Maximising marine growth removal offshore will be beneficial to reduce additional management burden onshore; however, removal offshore poses some challenges in terms of the costs and timescales involved. It is therefore expected some marine growth will be retained on structures for onshore removal, with appropriate odour control implemented through an odour management plan and disposal in accordance with the principles of the Waste Management Hierarchy.

7.3.4 Marine Discharges

Any waste water discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention. In addition, since the entry into force of the Ballast Water Management Convention (BWC) in September 2017, any vessel to be used for the Hewett Platforms DP project will have restrictions to avoid the introduction of invasive species from ballast water. Vessels used for the project are expected to be of local UK or North Sea origin and therefore have already adopted the treaty by the International Maritime Organisation, in order to prevent the spread of potentially harmful aquatic organisms and pathogens in ships ballast water. If a vessel was used which originates from a location that has not adopted the treaty, Eni will expect such vessel to implement the requirements of the treaty. As such, the potential introduction of invasive species from ballast water is considered unlikely to occur.

7.3.5 Cumulative Impacts

Cumulative impacts may arise from incremental changes caused by other past, present or reasonably foreseeable projects/ proposals together with the proposed Hewett Platforms DP project.

Fishing activity in the surrounding area is low; there are no licences or applications for commercial marine aggregate extraction or dredging within the immediate vicinity of the Hewett Field Area. It is acknowledged that shipping density in the area is very high; however, the proposed decommissioning operations will be taking place primarily within the existing 500m safety exclusion zones surrounding each of the platforms. No significant cumulative effects on shipping or navigation are therefore predicted. HLV, transportation and support vessels will travel from / to the coast (destination currently unknown) for the duration of the project; however, the additional disturbance from the presence of small number of vessels in this region of the southern North Sea will not result in any significant cumulative effects.

Discussions with IOG have identified that the Vulcan Satellites Hub Development Project, located 12km northwest of the Hewett Field Area, is planned for 2020 and is expected to be completed by Q2 of 2021. Although removal of the vent stack and redundant compressor package on the 52/5-A platform is scheduled to be undertaken in 2020, this material will be managed by the current field supply vessel and disposal arrangements to Great Yarmouth or Lowestoft Harbour, minimising any environmental impacts. Other work

associated with the removal of disposal of the topsides and jackets is not planned to commence until 2022 at the earliest. It is therefore unlikely that the Vulcan Satellites Hub Development Project will result in any significant cumulative impacts with the Hewett Platforms DP project.

A search of the National Infrastructure Planning Portal has identified a planned extension project at the Dudgeon and Sheringham wind farms (located 24km and 32km northwest respectively). An application is planned to be submitted in Q3 2021, with construction timescales likely coinciding with the Hewett Platforms DP project (Planning Inspectorate, 2019). However, given the distance between the projects it is unlikely that the wind farm extension project will result in any significant cumulative impacts with the Hewett Platforms DP project.

Discussions with other Southern North Sea oil and gas operators (Perenco, Chrysaor and INEOS) have not identified any oil and gas projects which would result in a significant cumulative impact with the Hewett Platforms DP project.

7.3.6 In-combination Impacts

In-combination impacts may arise from different activities within the Hewett Platforms DP project resulting in several impacts on the same receptor or where different receptors are adversely effected to the detriment of the entire ecosystem.

Fish will be impacted from underwater noise at each stage of the project due to planned vessel movements, reliance on dynamic positioning and from cutting operations. Seabed disturbance may also impact fish spawning and nursery grounds. The impact of underwater noise and seabed disturbance has been considered for further assessment and the in-combination impacts to fish and the wider food web have been included in this assessment.

Water quality may also be adversely impacted by an increase in turbidity through sediment resuspension during seabed disturbance activities, routine marine discharges from vessels and marine growth removal offshore. Any variation to water quality will, however, be very localised and temporary in nature, given the hydrographic regime in the Hewett Field Area.

7.3.7 Transboundary Impacts

The Hewett Field Area is located approximately 77km from the UK/Netherlands median line. Any impacts arising from emissions, discharges and seabed disturbance generated as a result of the proposed project are predicted to be highly localised and are therefore not expected to result in any significant transboundary impacts. The probability of an accidental release of hydrocarbons crossing the UK / Netherlands transboundary line is very low as discussed in Section 8.3.

If the Hewett Platforms DP project decides to utilise disposal options outside of the UK, Eni will ensure regulations governing transfrontier shipment of waste are complied with.

8.0 ENVIRONMENTAL ASSESSMENT

During initial screening, the following aspects were considered to have potential significant impact and were selected for more detailed assessment:

- Seabed disturbance
- Underwater Noise
- Accidental Events

The assessment has been completed with an indication of the predicted effectiveness of mitigation measures and a statement of whether, with the commitment of additional controls, impacts identified for further assessment are reduced to ALARP.

Impacts to marine protected areas have been assessed and summarised in Section 9.0.

8.1 Seabed Disturbance

The following decommissioning activities have been identified as having the potential to result in disturbance to the seabed:

- Preparation works which may utilise a W2W HLV jack-up vessel that will deploy spud cans onto the seabed for stability. This jack-up vessel may also require stabilisation / scour mitigation material to be deposited.
- Excavation of sediment for access to cutting locations for jacket legs removal, including potential smothering from sediments entering the water column and then settling on the surrounding seabed.
- Excavation of sediment for access to cutting locations for pipelines water gap and risers removal, including potential smothering from sediments entering the water column and then settling on the surrounding seabed.
- Removal of mattresses and other stabilisation materials to access cutting locations, including setting aside removed material.
- HLV anchoring and anchor line scour from standoff to working locations, including sediment re-suspension and settlement.

8.1.1 Quantification of Seabed Disturbance

Table 8-1 provides an estimate of the total area of seabed likely to be disturbed by the proposed decommissioning activities, which equates to ca 747,484 m^2 (0.75 km^2).

It is proposed that internal cutting of the jacket legs will be undertaken to minimise seabed disturbance, where possible, but external cuts at a depth of 3m below the seabed have been assessed, as a worst-case. It is estimated that external cutting of the jacket legs would disturb an area of approximately 6,776m^2 for all platforms.

Pipelines will be cut and separated at 12m from the platform riser, including excavation for the cutting locations. This section of the pipeline from the cut to the riser will then be removed to create a water gap. The area of the required excavations has a large number of mattresses and other stabilisation materials, which will require removal or relocation to facilitate the excavations. It is expected existing stabilisation materials will be moved to cover the cut ends of the pipeline and to support excavations, in favour of using additional new stabilisation materials. It is estimated that these activities could disturb an area of approximately 624m^2 for all platforms.

For the topsides and jackets removal operations, a worst-case for seabed disturbance is considered to be the use of a moored HLV to be located immediately adjacent to each of the platforms using an eight anchor mooring system. The HLV will have two positions; a working location close to the platform and a stand-off position. When the HLV moves between the stand-off and working positions, the anchor lines will drag across the seabed, resulting in direct physical seabed disturbance and sediment re-suspension and settlement.

In addition, it is assumed that the anchor lines on the seabed are subject to a lateral movement of ca. 5m. The total area of seabed disturbance for all platforms from the HLV is estimated to be 714,944 m^2 (0.71 km^2) as shown in Table 8-1 and illustrated by the red shaded areas in Figure 8-1 (platform 48/29-A Complex), Figure 8-2 (platform 48/29-B), Figure 8-3 (platform 48/29-C) and Figure 8-4 (platform 52/5-A).

A HLV DP2 jack-up vessel may also be required for the topsides preparation work. It is assumed that the vessel would have four spud cans of 7 m radius, impacting a total area of 616 m^2. However, there may also be a requirement to deposit (pre-lay) rock at the proposed spud can locations to form a stable substrate so the legs of the jack-up vessel can be safely jacked down onto the seabed. In addition, given the mobile nature of the seabed in the Hewett Field Area, there may be a requirement to deposit rock around the spud cans to mitigate scour. It is therefore assumed that a radius of 20m around each spud can could be disturbed by rock dump material, impacting a total area of 25,140m^2 for all platforms.

It was identified in the ENVID workshop that there is a potential for seabed disturbance from dropped objects, failure during lifting or sinking of vessels. These events are accidental and difficult to quantify due to potential variance in object and spatial spread. Dropped objects are likely to fall within an area of seabed already impacted by the planned activities. Total failure of any of the vessels planned for use is highly unlikely and therefore the risk has been assessed as Low.

Although analysis of the sediment samples collected during the pre-decommissioning environmental survey indicates the presence of an enhanced mineral oil-based fluid approximately 250m southeast from 48/29-C platform (section 6.3.3), given the distance from the platform it is unlikely this sediment will be disturbed or remobilised as a result of the proposed platform decommissioning operations.

Consideration of any post-decommissioning surveys required will be included in the Hewett subsea DP and has been excluded from the estimated seabed impact.

Table 8-1 - Seabed Disturbance

Activity	Source of Disturbance	Description of Impact	Area Impacted (square metres)						
			48/29-A	48/29-FTP	48/29-Q	48/29-B	48/29-C	52/5-A	Total
External cutting of jacket legs	Each jacket leg requires cutting 3 m below the seabed. To allow access of an ROV, excavation to 4 m below the seabed will be required for use of abrasive water jet cutters. Any abrasive material discharged to the seabed during external cutting activities will be located within the area impacted by the excavations.	To excavate to 4 metres below the seabed, excavations will extend laterally 7 m from each jacket leg impacting an area of ca. 154 m^2. Platform 48/29-Q has 4 legs and all other platforms have 8 legs. The areas calculated are worst case as given the proximity of the jacket legs the impact areas surrounding each jacket leg in reality will overlap.	1,232	1,232	616	1,232	1,232	1,232	**6,776**
Removal of riser and cut of pipeline ends	Pipelines will be cut 12 m from the platform riser and this section fully removed. Excavation will extend laterally 4 m from each pipeline. One pipeline requires cutting at 48/29-A, six at 48/29-FTP, one at 48/29-B, four at 48/29-C and one at 52/5-A. 48/29-Q has no pipelines.	Sediment will be excavated and deposited either side of the sections that are being removed. The area of seabed disturbance assumes a corridor width of 4 m for the 12 m length from the riser impacting an area of 48 m^2.	48	288	0	48	192	48	**624**
Removal of mattresses and other stabilisation materials	Lifting of mattresses other stabilisation materials to facilitate excavations. Temporary placement of equipment and items on the seabed.	Mattresses and other stabilisation materials will only be removed from areas requiring excavation. Temporary placement of equipment and items has been included in the lateral extent for the excavation.	Included in the above estimates.						
Use of an anchor moored HLV to remove topsides and jackets	Eight anchors and anchor lines are required for the HLV. Anchor lines will extend 1,200 m from the HLV. The HLV will move 120 m from standoff to working locations.	Each anchor will directly cover an area of 25 m^2. There will be a 600 m length of each anchor line in contact with the seabed and the lines will sweep ca. 3 degrees when the HLV travels 120 m from the standoff to working location. In addition, it is assumed that the anchor lines on the seabed are subject to a lateral movement of ca. 5 m. In total, therefore, the lines are assumed to sweep ca. 3.55 degrees from the standoff to working location. This equates to an area of seabed of 11,146 m^2 per anchor line being disturbed.	446,840 Note 1			89,368	89,368	89,368	**714,944**
Use of W2W HLV jack-up vessel	In the scenario of piece-small dismantling, preparation work may be completed with a small jack-up crane vessel. The seabed will disturbed by the spud scans but also the use of stabilisation / scour mitigation material may be required.	It is assumed that the vessel has 4 spud cans, each of which has a radius of 7 m, impacting an area of 154 m^2, equating to 616 m^2 for all four. However, in the event that pre-lay rock needs to be deposited for stabilisation it is assumed that a radius of 20m around each spud can would be disturbed, impacting an area of 1,257 m^2. Any rock deposited for scour mitigation would be within this disturbance area.	5,028	5,028	5,028	5,028	5,028	5,028	**25,140**
		Totals:	**465,340**			**95,676**	**95,820**	**95,676**	**747,484**

Note 1: The HLV is assumed to move five times at the 48/29-A Complex platforms to account for topsides then jacket removal.

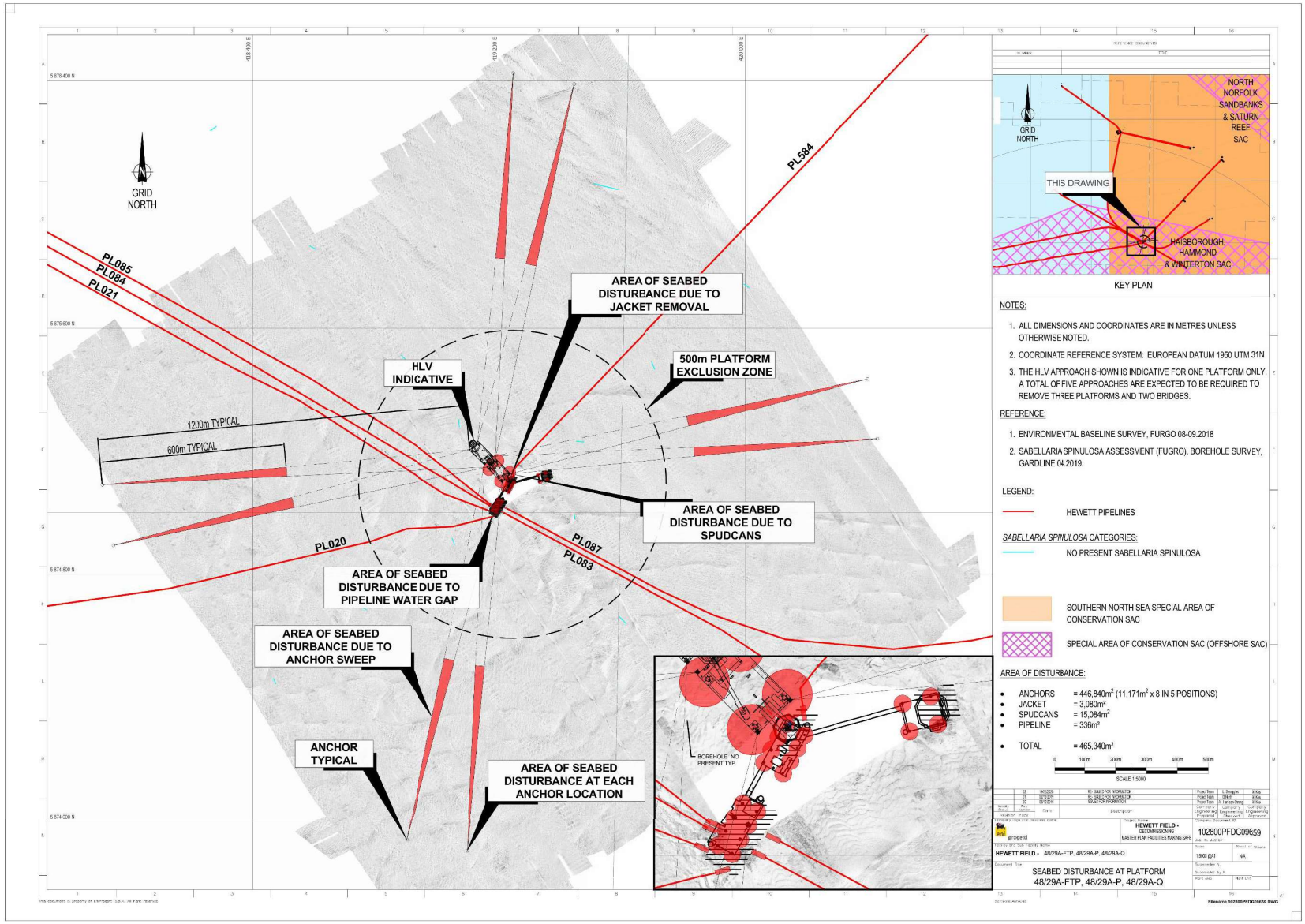


Figure 8-1 - Areas of seabed disturbance at platform 48/29-A Complex (including 48/29-A, 48/29-Q, 48/29-FTP)

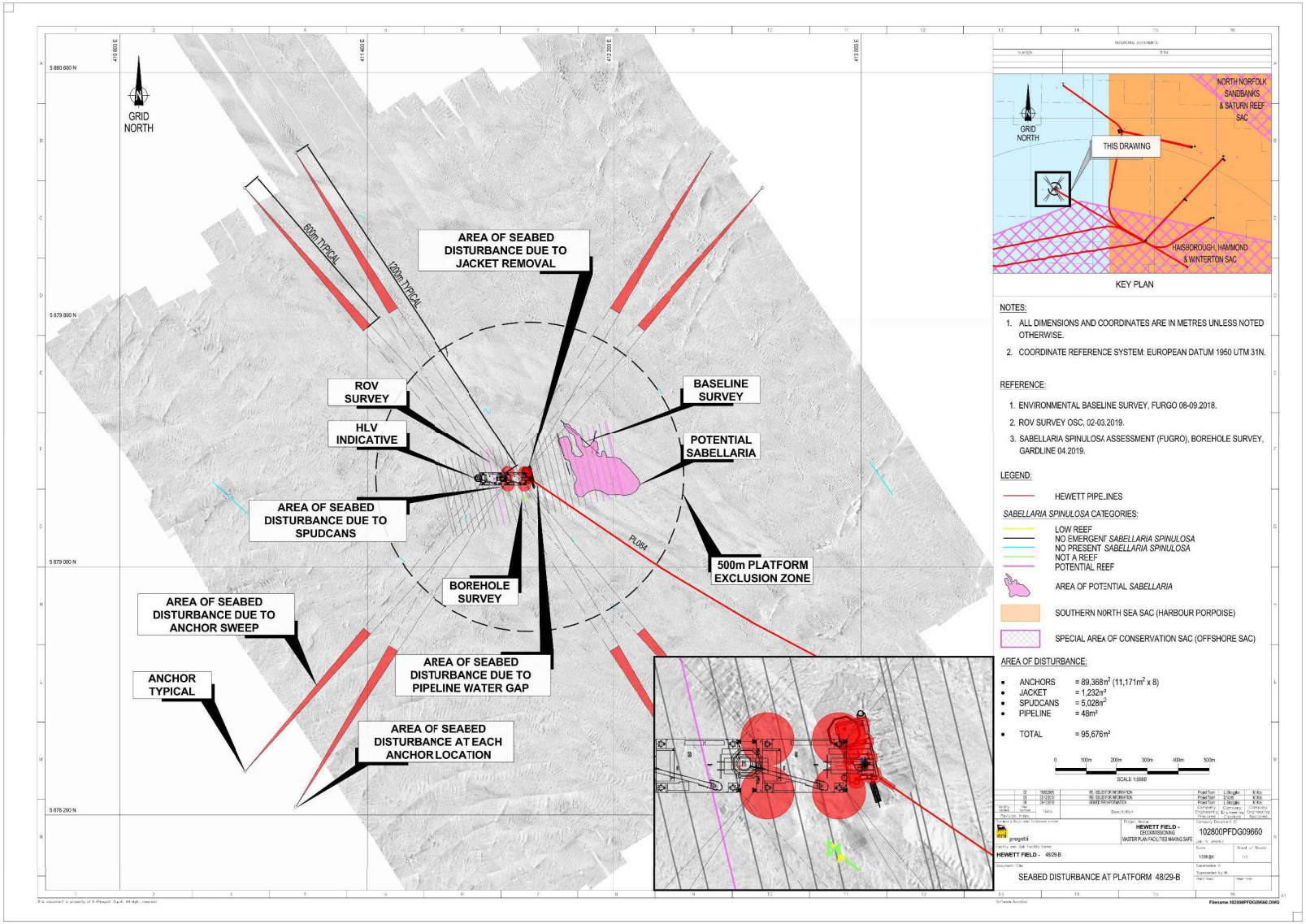


Figure 8-2 - Areas of seabed disturbance at platform 48/29-B

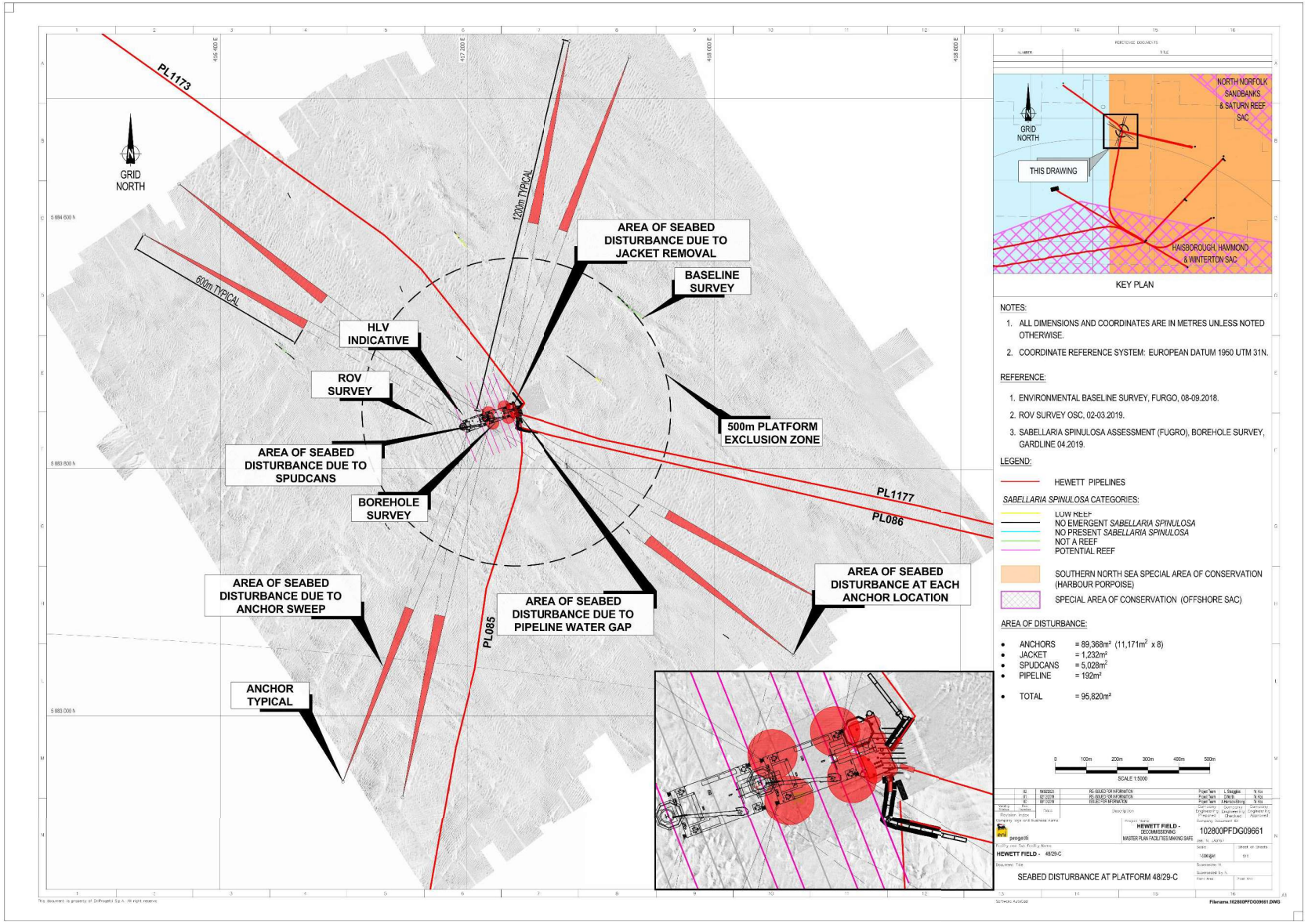


Figure 8-3 - Areas of seabed disturbance at platform 48/29-C

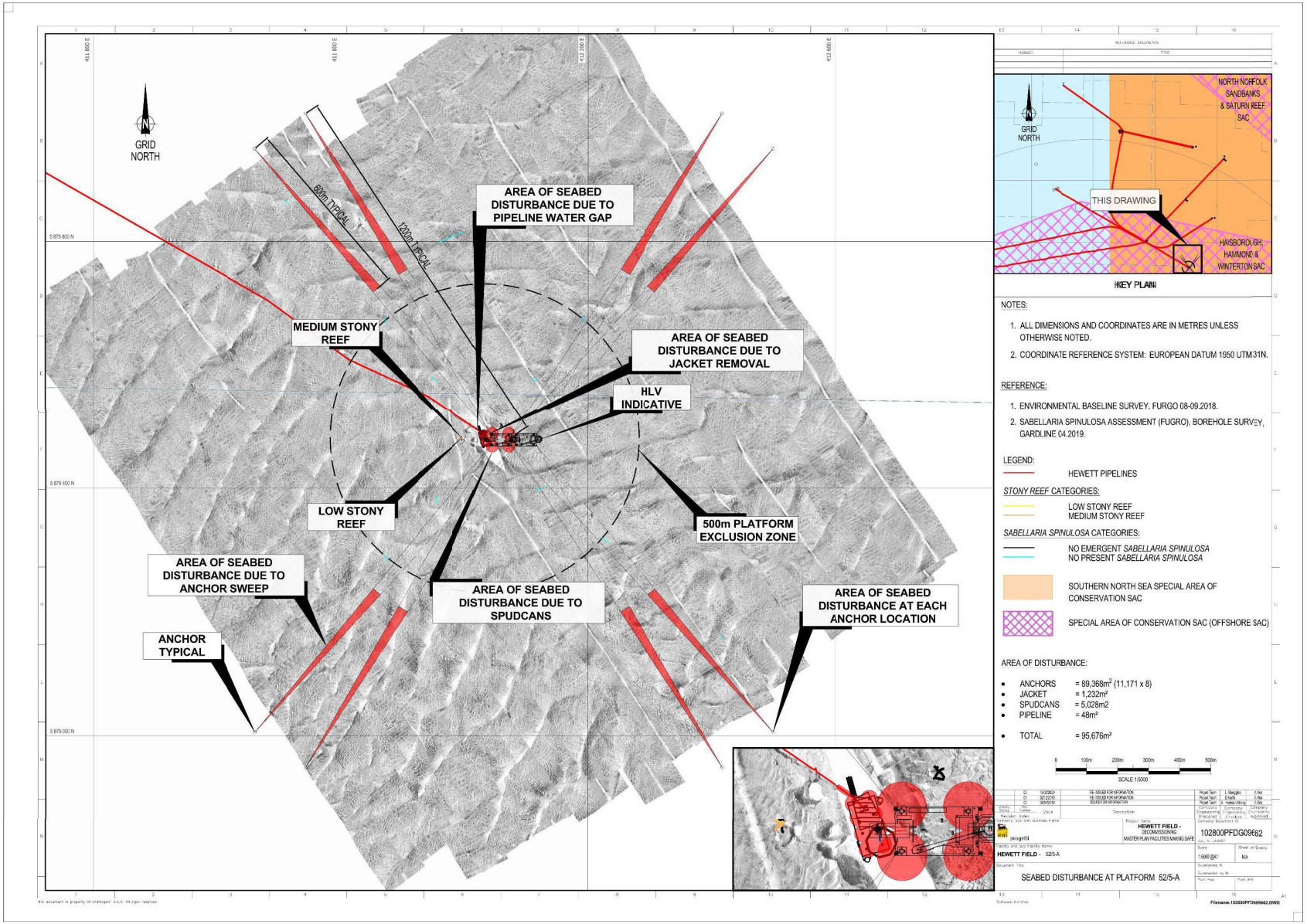


Figure 8-4 - Areas of seabed disturbance at platform 52/5-A

8.1.2 Potential Impacts to Seabed Communities

The excavation of the seabed surrounding the jacket legs and pipelines (out to a distance of 12m from the platform riser) is expected to result in mortality to benthic fauna, although mobile species should be able to avoid this impact. Of note is that aggregations of *S. spinulosa* biogenic reef were identified in the vicinity of the 48/29-B platform and 48/29-C platform, and Stony reef was identified in the vicinity of the 52/5-A platform during the pre-decommissioning environmental surveys (refer to Section 6.4.2). There will however be no direct physical loss of these features as the *S. spinulosa* aggregations characterised as having 'low reefiness' are located at least 48m from 48/29-B and 276m from 48/29-C and the identified stony reef features located approximately 55m from 52/5-A. It is therefore considered that any effects on seabed communities resulting from excavation activities are Low (magnitude is Slight and the likelihood is Probable).

The anchors used to position the HLV, and the movement of the anchor lines across the seabed will also result in impacts to benthic communities within an area of ca. 714,944 m^2. 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. However, anchoring of the HLV is a transient operation and, as such, it is expected that recovery of affected areas of seabed will be relatively rapid once the HLV has completed the lift and the anchors and anchor lines are retrieved. Recolonisation of the affected areas is anticipated to take place in a number of ways; including mobile species moving in from the edges of the area, juvenile recruitment from plankton or from burrowing species digging back to the surface. Abrasion at the surface of *S. spinulosa* reefs is known to damage the tubes and result in sub-lethal and lethal damage to the worms (Gibb *et al.* 2014). Recruitment rates are high however and *S. spinulosa* is often one of the first to settle on newly exposed surfaces (OSPAR, 2010). Stony reefs are also considered highly sensitive to physical damage as a result of abrasion. The anchor and anchor line placement will therefore be positioned to avoid direct physical impact to the identified *S. spinulosa* aggregations and the stony reef. The impact to seabed communities as a result of physical damage from the footprint of the HLV is therefore considered to be Low (magnitude is Slight and the likelihood is Probable).

The proposed excavations and HLV anchor deployment may also lead to an increase in turbidity through sediment resuspension resulting in smothering of some sensitive benthic species. The Hewett platforms are located within a highly dynamic area with strong near-seabed currents and highly mobile sediments (DECC, 2016). As such, the fauna found here are robust infauna that are adapted to frequent disturbances and natural fluctuations in sediment loading and resuspension. Where sedimentation does impact negatively on benthic species, consequences are likely to be short-lived as most of the smaller sedentary species (such as polychaete worms) have short lifecycles and recruitment of new individuals from outside of the disturbed area will be rapid (Tillin and Tyler-Walters, 2014). *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) indicate 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. Stony reef are known to be moderately sensitive to siltation, with a study by Tyler-Walters *et al.,* 2003 indicating a capacity to recover within 5 years. The impact to seabed communities from increased turbidity caused by excavations and anchor deployment is therefore considered to be Low (magnitude is Slight and the likelihood is Probable).

Retrieval of mattresses and other stabilisation materials will result in hard / coarse substratum habitats being replaced by sediment habitats, more typical of this area of the southern North Sea. Temporary placement of equipment and mattresses will cause direct mortality to marine fauna directly below the placement, however, these areas will already have been impacted as a result of the excavation activities or previous placement of mattresses. The area of the pipeline cut end requiring stabilisation is already covered in mattresses, so although mattresses will be removed, the pipeline cut and the mattresses replaced, the area will continue to

remain unchanged. As a result of the changes in seabed substrata there will be subsequent localised changes in benthic communities from epifaunal species that can colonise hard substrata to those that favour of soft sandy sediments. Taxa including tunicates, sponges, sessile tube dwelling polychaetes (*S. spinulosa*) and encrusting organisms such as bryozoans could be lost. In contrast, any rock deposited for stabilisation or scour mitigation in the event a W2W HLV jack-up vessel is deployed will result in soft sediment habitats being replaced by hard / coarse substratum habitats, albeit in a relatively small area (25,140m^2) in comparison to the soft sediment habitat available in the wider southern North Sea. The impact to seabed communities as a result of the retrieval of mattresses and other stabilisation materials and from the placement on the seabed of rock is therefore considered to be Low (magnitude is Slight and the likelihood is Probable).

8.1.3 Potential Impacts to Fish Spawning and Nursey Grounds

Demersal fish may be temporary displaced from an area of ca. 747,484m^2 (0.75 km^2). In addition, commercially and ecologically important fish species such as herring and sandeels, both of which have spawning grounds in the vicinity of the project, lay their eggs only in clean sandy and gravelly sediments. Given the mobile nature of demersal fish species, any displaced fish are likely to find suitable spawning areas in adjacent locations. The spawning grounds for both herring and sandeels in the vicinity of the Hewett Field Area are part of wider spawning grounds for these species in the North Sea and the area is not considered to be critical spawning habitat for these species.

Exposure to increased turbidity through sediment resuspension may also temporary displace fish species from their spawning and nursery areas and reduce the visual acuity of fish potentially affecting foraging behaviour. However any disturbance of this nature is considered to be highly localised and of short duration and mobile species would be expected to return shortly after cessation of the decommissioning operations.

Egg development and hatching success is also vulnerable to the effects of smothering, although as noted above, the Hewett platforms are located within a highly dynamic area with strong near-seabed currents and highly mobile sediments (DECC, 2016). 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 recent studies demonstrating mortality of fish eggs when smothered by even a thin veneer of sediment (DOER, 2000) and older studies showing no significant effects on fish egg and larval development and mortality (Auld and Schubel, 1978; Kiørboe et al., 1981).

Once the jacket legs and pipelines have been cut and the anchors have been retrieved, the seabed sediments are likely to resettle and be subject to the natural tidal influences in sediment transport in the area. Given the above, the impact to fish spawning and nursey grounds from physical disturbance, increased turbidity and smothering is therefore considered to be Low (magnitude is Slight and the likelihood is Probable).

8.1.4 Mitigation

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

- Jacket legs will be cut internally, if possible, to avoid seabed disturbance.
- Where external cuts are required, excavations will be planned, managed and implemented in such a way that seabed disturbance is minimised.
- Tool use will be minimised where feasible whilst still achieving the desired result.
- Where cutting of jacket legs and pipelines requires removal of mattresses and other stabilisation materials, temporary placement of equipment will be within the footprint of planned excavations and mattresses will be reused, where possible, to minimise seabed disturbance.
- An anchor management plan will be developed for moored HLV, to ensure anchors and anchor lines deployed will avoid identified *S. spinulosa* reefs and Stony reef.

- Where vessels are required to hold position for only short duration, dynamic positioning (DP) vessels will be used in favour of moored vessel.
- If pre-lay rock is required for the W2W HLV jack-up vessel, this will be deployed from a DP rock placement vessel using a fall pipe lowered to the working depth above the spud can locations. The rate and locations of deployment will be controlled on board the vessel and monitored using high resolution survey / sonar equipment to insure that levelling of the seabed has been achieved.
- In case of scour being detected, the situation will be closely monitored, and remedial plans, which may include further rock placement, put in place to prevent escalation. In the event of severe scour after a storm type event resulting in destabilization of the vessel, in the first instance the vessel will initiate an emergency jacking procedure, before developing a recovery plan which may include further rock placement. If required, a DP rock placement vessel would be used and the dump fall pipe will be positioned accordingly to optimise placement of rock at the specific scour area required, thus minimising seabed disturbance.
- The amount of deposit material will be minimised whilst still achieving the required level of stabilisation / scour mitigation.

8.1.5 Residual Effects

In summary, with the identified control and mitigation measures in place and considering the nature of the seabed habitats and species present in the vicinity of the Hewett platforms, the comparatively small area of seabed that will be impacted by the proposed decommissioning operations and the fact that no identified areas of *S. spinulosa* reef or stony reef will be subject to direct physical impact, residual effects on seabed communities and fish are considered to be Low and not significant.

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. 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, 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 Hewett Platforms DP have been identified as:

- Vessel operations (e.g. use of propellers / Dynamic Positioning (DP) thrusters)
- Use of underwater cutting tools

Vessel Operations

The Hewett decommissioning activities will mobilise a variety of vessels which shall use DP thrusters, including heavy lift vessel, W2W HLV vessel, DSVs, cargo barges and tugs. Table 8-2 provides a breakdown of the vessels predicted to be required for the project and identifies the maximum sound pressure level is sourced from large vessel including HLV and W2W (HLV jack up) vessel, which have a peak sound pressure level at 1m of 190 dB re 1 µPa.

Table 8-2 - Source noise from decommissioning vessel (OSPAR, 2009)

Vessel	Description	Peak sound pressure level (dB re 1 µPa)	Frequency (Hz)	Total Duration (days)
HLV	Crane vessel to lift topsides and jackets	190	6-30 000	242.5
W2W HLV jack-up	Support vessel for additional manning	190	6-30 000	114.5
Cargo Barge and Tugs	Support vessel and transport	180	20-10 000	509
DSV	Dive support vessel	180	20-10 000	5.5

Underwater Cutting

Underwater cutting will be required to cut the jacket legs, piles and connection spools into sections for lifting. The preferred and likely method of cutting is internal cutting techniques, which is unlikely to produce any significant noise emissions. Should internal cutting not be possible, mechanical (diamond wire) and abrasive (water jet) cutters would be considered for external cutting. Table 8-3 provides potential noise emissions of typical cutting tools and identifies that abrasive methods are worst-case, producing a peak sound pressure level at 1m of 190 dB re 1 µPa.

Table 8-3 Underwater cutting noise emission thresholds

Method	Peak sound pressure level (dB re 1 µPa)	Frequency (Hz)	Reference
Diamond Wire	15 dB	5000	NOAA-NMFS, 2016
Water Jet	190 dB	250-1000	Hinzmann *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 Hewett platform 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 installations (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 Hewett Field Area, 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 vessel and use of cutting tools is likely to be insignificant.

It is therefore considered that any impact on fish as a result of the underwater noise generated by the proposed platform decommissioning operations is Low (magnitude is Slight and the likelihood is Probable).

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 could be present within the vicinity of the Hewett Field Area 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	White-beaked dolphin, common dolphin and 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 – 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	199	179
Mid-frequency cetaceans	198	178
High-frequency cetaceans	173	153
Phocid pinnipeds (underwater)	201	181

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

Underwater noise propagation modelling undertaken for other EA reports (e.g. Chrysaor, 2020) indicate that injury is unlikely to occur for any marine mammals species within the vicinity of vessel operations.

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). In addition, the highest noise levels are associated with the wet jet cutters, which if required to be used, will generate noise very close to the seabed, where absorption rates are highest.

It can be seen from Table 8-6 that none of the noise sources associated with the decommissioning (the highest of which is 190 dB re 1 µPa) will exceed any of the PTS / TTS thresholds. It is therefore concluded that marine mammals will not be injured or experience a temporary, recoverable reduction in hearing sensitivity as a result of the project.

However 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 platform 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)	Noise Source (dB re 1 µPa)	Maximum Predicted Impact Range
Marine Mammals	120	190	3,163 m

It can be seen from Table 8-6 that behavioural responses may be elicited ca. 3km from the 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 estimates from the SCANS III survey data (Hammond et al. 2017) and the density and abundance estimates from the MMMUs (IAMMWG, 2015) 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 the Platform Decommissioning Operations

Species	Estimated Density in the Area (animals / km²)	Estimated Number of Animals that May Experience Behavioural Disturbance [3]	% of Reference Population Disturbed [4]
Harbour porpoise [1]	0.888	28	0.01
White-beaked dolphin [1]	0.002	< 1	0.0004
Minke whale [1]	0.01	< 1	0.001
White-sided dolphin [5]	0.04	< 2	0.003
Common dolphin [5]	0.036	< 2	0.004
Harbour seal [2]	0.4	13	N/A
Grey seal [2]	0.2	7	0.06

1 Source: Hammond et al. (2017) – SCANS-III Block O
2 Source: Russel et al. (2017)
3 Calculated as the estimated density x behavioural onset area
4 Based on MMMU abundance data (IAMMWG, 2015)
5 Based on MMMU density 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 operations, however the percentage of reference population disturbed is 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 in the UK offshore area 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 (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 Hewett Platforms DP 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 operations 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.

During the proposed platform decommissioning operations there is also 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.

It is therefore considered that any impact on marine mammals as a result of the underwater noise generated by the proposed platform decommissioning operations is Low (magnitude is Slight and the likelihood is Probable).

8.2.4 Mitigation Measures

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

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

8.2.5 Residual Effects

In summary, there is no evidence to suggest that the underwater noise emissions generated during the proposed platform decommissioning operations would result in injury or significant disturbance to fish or marine mammals. The overall impact has therefore been assessed as Low and no significant residual effects are predicted.

8.3 Accidental Releases to Sea

A number of events resulting in accidental releases to the sea were identified during the ENVID workshop. Of these, it was considered there could potentially be a significant impact in the event the diesel inventory on the HLV or one of the other support vessels is lost due to a vessel collision. Impacts may be also arise from residual liquids released during lift of loss of load or hydraulic fluid released during cutting activities.

All platform hydrocarbon inventories are described in the Hewett Field Oil Pollution Emergency Plan, OPEP (Petrofac, 2017, ref. BMS-AA-I-1538), however all hydrocarbon inventories will have been removed from the platforms prior to decommissioning operations commencing; the platform wells will be plugged and abandoned (P&A) to prevent blowout and on completion of P&A, appropriate material change to the Safety Case will be undertaken and the OPEP will be updated accordingly, including removal of all Major environmental incident (MEI).

8.3.1 Vessel Collision

The greatest inventory of accidental release to sea will be as a result of ship collision. As all platform hydrocarbon inventories will have been removed prior to the decommissioning commencing, the greatest impact from collision will be the vessel diesel inventory. This scenario is highly unlikely due to administrative (e.g. vessel management systems) and engineering controls (e.g. navigational aids) that will be applied, however this event has been considered as a worst case scenario.

A navigational risk assessment conducted for a 10nm radius of the 48/29-B platform (an area which includes all the platforms to be decommissioned), calculated a combined total collision frequency of 0.0016, which can be reduced to 0.0002 considering presence of a patrol vessel, enforcing the 500m exclusion zone (within which all proposed work will be conducted). Vessel work programmes will be designed to minimise use of vessels, minimise operational duration and reduce manning. Vessels will also be selected to ensure that there are effective operational systems and on board control measures are in place.

As vessels required for the decommissioning are yet to be confirmed, no specific modelling has been undertaken, however modelling has been conducted for similar large vessels in the Hewett Field Area. For example, modelling of instantaneous release of 394.4m^3 of diesel for the Valaris 72 Rig at platform 48/29-

B has demonstrated that the probability of a 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.

Given the rigorous management of vessel programmes, increased activity at the platforms during decommissioning and the results of modelling from within the field for large diesel inventories, it is considered the risk from vessel collision during the decommissioning is Low (magnitude is Local and likelihood is Rare). All vessels undertaking decommissioning activities will have an approved Shipboard Oil Pollution Emergency Plan (SOPEP).

8.3.2 Residual Liquids Released During Lift of Loss of Load

There is the potential for residual oily water or residual chemicals to remain following cleaning and flushing operations which could accidentally be released during topside preparation for removal and topside separation. However, all topsides pipework and vessels will be cleaned and flushed to agreed cleanliness criteria prior to decommissioning. Systems will either contain filtered seawater with oil in water content below agreed concentration, nitrogen purged or be fully air gapped and empty, open to air. Pipelines requiring cut will be cleaned and flushed to the agreed cleanliness criteria and water gapped with filtered seawater. It is anticipated that agreed cleanliness criteria will be aligned with accepted industry thresholds for discharge of oil in produced water, as reasonably practicable, under The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended), aiming for 30 mg/l or less. Given the above, it is therefore considered the risk to the marine environment from residual liquids released during lift of loss of load is Low (magnitude is Slight and likelihood is Rare).

8.3.3 Hydraulic Fluid Released During Cutting Activities

The platform decommissioning operations 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 into the marine environment. However, in the event this did occur, it is anticipated that the hydraulic fluid would be rapidly dispersed in the marine environment given the highly dynamic nature of the area.

Where hydraulic lines are in operation subsea, a fluid of minimal environmental impact, such as Aqualink may be used. In addition, hydraulic cutting tools will be subject to rigorous maintenance and pre-use checks to identify and prevent potential fail and accidental release. 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.

Given the above, it is therefore considered the risk to the marine environment from an accidental release of hydraulic fluid during cutting activities is Low (magnitude is Slight and likelihood is Rare).

8.3.4 Mitigation

The prevention of hydrocarbon releases is of the highest environmental priority for the Hewett Platforms DP project. The following mitigation measures will be implemented to ensure the risk of a release is minimised:

- Vessel work programmes will be designed to minimise use of vessels, minimise operational duration and reduce manning. Shipping and fishing bodies will be kept informed of the project and appropriate notifications made in a timely manner.
- A robust programme of topside cleaning and flushing will ensure required levels of cleanliness are achieved and minor releases of residual oily water are prevented so far as reasonably practicable.
- Appropriate maintenance and pre-use checks on hydraulic equipment will be undertaken to prevent hydraulic line failure during subsea cutting activities.

8.3.5 Residual Effects

In summary, with the identified mitigation measures in place, it is considered that the risk to the marine environment from an accidental release during the decommissioning operations is Low and no significant residual effects are predicted.

9.0 POTENTIAL IMPACTS TO MARINE PROTECTED AREAS

The Hewett platforms are located within 40 km of seven MPAs; Haisborough, Hammond and Winterton SAC, North Norfolk Sandbanks and Saturn Reef SAC, Southern North Sea SAC, Greater Wash SPA, Cromer Shoal Chalk Beds MCZ, The Wash and North Norfolk Coast SAC and the Outer Thames Estuary SPA (see Section 6.2). The 48/29-A Complex, 48/29-C & 52/5-A platforms are located within the Southern North Sea SAC. The 48/29-A Complex and 52/5-A platforms are also located within the Haisborough, Hammond and Winterton SAC.

The following sub-sections assess whether there will be any likely significant effects on the conservation objectives of these MPAs as a result of the Platforms DP, either alone or in-combination with other plans or projects.

9.1 Haisborough, Hammond and Winterton SAC

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 in Section 6.2).

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 Favourable Conservation Status (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.

The 48/29-A Complex and 52/5-A platforms are located within the boundary of the Haisborough, Hammond and Winterton SAC with 48/29-B 1.7km and 48/29-C 6.3km to the north of the SAC boundary.

The Haisborough, Hammond and Winterton SAC covers an area of 146, 759 ha (1,467.59km^2). As detailed in Section 8.1.1, the proposed decommissioning operations at the 48/29-A Complex and 52/5-A platforms will disturb an area of seabed totalling ca. 561,01 m^2 (0.56 km^2). This equates to 0.04% of the Haisborough, Hammond and Winterton SAC total area.

The qualifying Annex I features of this SAC are 'sandbanks which are slightly covered by sea water all the time consist of sandy sediments that are permanently covered by shallow sea water' and biogenic reef constructed by *Sabellaria spinulosa*.

The majority of disturbance resulting from the platform decommissioning operations will be temporary in nature due to the anchoring of the HLV and excavation activities around the jacket legs and pipeline ends. The seabed sediments in the Hewett Field Area are comprised of medium to coarse sand and therefore should drop out of suspension quickly, in the immediate vicinity of the disturbance area. In addition, material resuspended would be the same as that currently present and the communities associated with the sandbank habitat are habituated to this sediment type.

Removal of the pipeline ends and jackets will also facilitate the restoration of the seabed within the Hewett Field Area to a natural state and will contribute to achieving the long term integrity of the site. It is acknowledged that in the event a W2W HLV jack-up vessel is deployed and the deposition of stabilisation / scour mitigation material is required, this material will permanently alter the seabed, but this physical change will be limited to an area of approximately 20,112m^2 (0.02 km^2), equating to only ca. 0.001% of the SAC total area. There will be no change to the physical processes associated with the sandbank form and function.

No aggregations of *S. spinulosa* biogenic reef were identified in the vicinity of the 52/5-A and 48/29-A Complex platforms. There will therefore be no direct physical loss of this habitat type within the SAC boundary and, as discussed in Section 8.1.2, *S. spinulosa* is considered to be tolerant to smothering and high levels of turbidity.

Any impacts arising from the emissions and discharges generated by the proposed platform 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. In addition, given the distance of the other two Hewett platforms, 48/29-B 1.7km and 48/29-C 6.3km to the north of the SAC boundary, no impacts to the qualifying features of the site are predicted as a result of the proposed operations at these platforms.

Eni is aware that the offshore cable corridor associated with the proposed Norfolk Vanguard offshore wind farm project crosses the Haisborough, Hammond and Winterton SAC, approximately 22km to the south of the Hewett Field Area. Although this project has yet to be consented, it is possible that construction activities could be ongoing during the period when the Hewett platforms are scheduled to be removed (2022 - 2028). The total footprint for temporary disturbance on sandbanks due to the installation of the proposed export cable is estimated to be 9.5km^2 (0.6% of the total SAC area). It also estimated that habitat within an area of 0.05km^2 (0.003% of the total SAC area) could be lost within the SAC due to the deposit of cable protection material and clump weights (Royal HaskoningDHV, 2018). However, given the distance between the two projects, coupled with the very small combined total temporary physical disturbance and permanent habitat loss areas (10.04 km^2 and 0.07 km^2 respectively, equivalent to 0.68% and 0.005% of the total SAC area) it is reasonable to conclude that there will be no adverse likely significant effects (LSE) on the integrity of the Haisborough, Hammond and Winterton SAC in relation to the conservation objectives for Annex I Sandbanks. Impacts to *S. spinulosa* are limited to smothering from the Hewett platforms decommissioning project and given the distance between the two projects it is unlikely there would be any overlap of sediment deposition. In addition, as *S. spinulosa* is not considered sensitive to increased suspended sediment loads or smothering through sediment deposition (JNCC and Natural England, 2013) it is unlikely that the two projects in combination would prevent the conservation objective of maintaining or restoring *S. spinulosa* reef in favourable condition being met.

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 platform decommissioning activities either alone or in-combination with other plans or projects.

9.2 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 36,951km^2 and supports an estimated 17.5% of the UK North Sea MU population of harbour porpoises. The 48/29-A Complex, 48/29-C and 52/5-A are located within the Southern North Sea SAC. The 48/29-A Complex and 52/5-A platforms are equidistance to the southern part of the SAC which is recognised as important for porpoises during the winter season (October - March) and the northern two thirds of the site which is recognised as important for porpoises during the summer season (April - September). The 48/29-C platform is located within the northern part of the site and is approximately 8.5km from southern part. The summer part of the site covers an area of 27,000km^2 and winter part of the site covers an area of 12,687 km^2, as the two partly overlap.

As noted in Section 8.2.3, the underwater noise emissions generated during the proposed platform 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. 3 km from the noise source, equivalent to an area of ca. 28 km^2. This equates to 0.08% of the Southern North Sea SAC total area, 0.1% of the summer area and 0.2% of the winter area. It has been calculated that up to 28 individuals may be temporarily disturbed within this area, which is equivalent to 0.01% 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 platform decommissioning activities are ongoing.

Draft Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs states that noise disturbance within the SAC from a plan/project, individually or in combination, is considered significant if it excludes harbour porpoises from more than (JNCC *et al.,* 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 Hewett platforms are scheduled to be removed (2022 - 2028), including:

- Hornsea Two offshore wind farm (summer area): construction could be ongoing during 2020-2022, located 82km north-north-west of the Hewett Field Area
- Hornsea Four offshore wind farm (still be consented) (summer area): construction could be ongoing during 2023-2027, located 85km north north-west of the Hewett Field Area
- Dogger Bank Creyke Beck A and B Offshore Wind Farms (summer area) construction could be ongoing during 2022-2024, located 174km north of the Hewett Field Area
- Norfolk Vanguard offshore wind farms (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 (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 71km 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 platform 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. The Hewett platforms are currently regularly visited by offshore vessels and this area of the southern North Sea has a high volume of vessel traffic. As such, it is anticipated that the additional underwater noise generated by the 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 Section 8.1.1, the proposed decommissioning operations at the 48/29-A Complex, 48/29-C & 52/5-A platforms will disturb an area of seabed totalling ca. 656,836m^2 (0.66 km^2). This equates to 0.002% 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 relevant to the prey of the harbour porpoise, fish species such as sandeels, herring, mackerel, cod and whiting that form part of the harbour porpoise diet and are present in the vicinity of the Hewett Field platforms.
However, fish spawning and nursey grounds are not predicted to be significantly impacted by seabed disturbance activities resulting from the proposed platform decommissioning activities (refer to Section 8.1.3). The permanent loss of approximately 0.02km^2 of habitat due to the deposit of stabilisation / scour mitigation material is ca. 0.00005% of the SAC total area. The loss of a relatively very small area of habitat that occurs widely within the SAC is not predicted to impact on harbour porpoise or their prey.

In view of the conservation objectives of the SAC, no LSEs on the Southern North Sea SAC are predicted as a result of the proposed platform 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 Favourable Conservation Status 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 7 km from the nearest Hewett platform (48/29-C). 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.

It is acknowledged that one of the sites qualifying features, biogenic reef constructed by *Sabellaria spinulosa*, is also present in the vicinity of the 48/29-B and 48/29-C platforms. However, as noted in Section 8.1.2, no identified areas of *S. spinulosa* characterised as having low 'reefiness' will be subject to direct physical impact from the proposed decommissioning operations and the species is considered to be tolerant to smothering and high levels of turbidity.

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 platform 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 in Section 6.2).

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 EU 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 covers an area of 3,536km^2 and is located approximately 9km from the nearest platform (52/5-A). However, as the designation covers migratory species there may be some negligible interaction with the proposed decommissioning operations. 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 significant disturbance to seabirds foraging inside or outside the SPA boundary.

Disturbance of the seabed may, however, 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 prey on which these species feed; however, only a small area of seabed will be disturbed by the proposed decommissioning activities (0.75 km^2) and this is outside of the SPA boundary. Additionally, the proposed decommissioning activities are not expected to have a significant impact on fish populations. Thus 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 8.3.4.

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.

The Cromer Shoal Chalk Beds MCZ is located approximately 15.8km from the nearest platform (48/29-B) platform. Given the distance to the site 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 significant 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 platform 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 Favourable Conservation Status 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 39.6km from the nearest platform (48/29-B). Given the distance to the site 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 platform decommissioning activities either alone or in-combination with other plans or projects.

9.7 The Outer Thames Estuary SPA

The conservation objectives for The Outer Thames Estuary 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 EU Bird 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 the each of the qualifying feature, and;
- The distribution of the qualifying features within the site.

The Outer Thames Estuary SPA is located approximately 38.5km from the nearest platform (52/5-A). Given the distance to the site 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 Outer Thames Estuary SPA are predicted, as a result of the proposed platform decommissioning activities either alone or in-combination with other plans or projects.

10.0 CONCLUSION

The Hewett Platforms DP involves the removal of the six Hewett platforms (topsides and jackets) and recovery to shore, as well as the removal of the vent stack and redundant compressor package at the 52/5-A platform. This EA report confirms that the DP can be executed with no significant adverse effects on the marine environment.

The baseline environment in the Hewett Field Area and the potential for impacts to arise from the proposed platform decommissioning activities are well known. An initial screening of the potential impacts to environmental and societal receptors from the proposed Hewett Platforms DP project concluded that the only aspects considered to be potentially significant (presenting a Medium impact to at least one receptor) and therefore requiring further assessment were seabed disturbance, underwater noise and accidental releases. Following further assessment and implementation of additional control and mitigation measures the level of impact from these aspects has been reduced to 'Low' and is therefore not considered to be significant.

In addition, the Hewett platforms are located within 40km of seven marine protected areas (MPAs). The 48/29-A Complex, 48/29-C & 52/5-A platforms are located within the Southern North Sea SAC and the 48/29-A Complex and 52/5-A platforms are located within the boundary of the Haisborough, Hammond and Winterton SAC. However, the EA has concluded that there will not be any likely significant effects on the conservation objectives of any MPAs as a result of the proposed Hewett Platforms DP, either alone or in-combination with other plans or projects.

The mitigation and control measures identified to reduce any adverse environmental or societal effects arising from the proposed platform decommissioning activities are summarised in Table 10-1.

Table 10-1 Mitigation and Control Measures

Physical Presence
• Work will be conducted within the existing 500m safety exclusion zones surrounding the Hewett platforms • Where required Consent to Locate permits will be in place for vessels • Existing collision risk management plans will be reviewed • Notifications will be made to regular users of the area via Notices to Mariners, NAVTEX/NAVAREA warnings and Kingfisher bulletins. • Operations will be planned to minimise the number of boat movement, as far as reasonably practicable.
Energy Use and Atmospheric Emissions
• The design of the platforms removal programme will ensure that the time between the various lifting activities is reduced, as far as is practicable, to minimise the total duration of vessels working offshore. • If possible, a dismantling location will be selected close to the Hewett Field Area, which will optimise vessel transit times, thereby reducing fuel consumption and associated atmospheric emissions. • Engines, generators and other combustion plant on the vessels will be maintained and correctly operated to ensure that they work as efficiently as possible.
Waste Management
• A Materials Inventory has been developed for the Platforms DP project to identify the types of waste generated and the management procedures for each waste stream will be included in a project 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 will have a Waste Carrier Registration, Waste Management Licence or Exemption, as appropriate for the type of waste.

Marine Discharges

- Any waste water discharged to sea from vessels will be treated to comply with the requirements of the MARPOL Convention.
- Vessels shall implement the requirement of the Ballast Water Management Convention.

Seabed Disturbance

- Jacket legs will be cut internally, if possible, to avoid seabed disturbance.
- Where external cuts are required, excavations will be planned, managed and implemented in such a way that seabed disturbance is minimised.
- Tool use will be minimised where feasible whilst still achieving the desired result.
- Where cutting of jacket legs and pipelines requires removal of mattresses and other stabilisation materials, temporary placement of equipment will be within the footprint of planned excavations and mattresses will be reused, where possible, to minimise seabed disturbance.
- An anchor management plan will be developed for moored HLV, to ensure anchors and anchor lines deployed will avoid identified *S. spinulosa* reefs and Stony reef.
- Where vessels are required to hold position for only short duration, dynamic positioning (DP) vessels will be used in favour of moored vessel.
- If pre-lay rock is required for the W2W HLV jack-up vessel, this will be deployed from a DP rock placement vessel using a fall pipe lowered to the working depth above the spud can locations. The rate and locations of deployment will be controlled on board the vessel and monitored using high resolution survey / sonar equipment to insure that levelling of the seabed has been achieved.
- In case of scour being detected, the situation will be closely monitored, and remedial plans, which may include further rock placement, put in place to prevent escalation. In the event of severe scour after a storm type event resulting in destabilization of the vessel, in the first instance the vessel will initiate an emergency jacking procedure, before developing a recovery plan which may include further rock placement. If required, a DP rock placement vessel would be used and the dump fall pipe will be positioned accordingly to optimise placement of rock at the specific scour area required, thus minimising seabed disturbance.
- The amount of deposit material will be minimised whilst still achieving the required level of stabilisation / scour mitigation.

Underwater Noise

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

Accidental Releases to Sea

- Vessel work programmes will be designed to minimise use of vessels, minimise operational duration and reduce manning. Shipping and fishing bodies will be kept informed of the project and appropriate notifications made in a timely manner.
- A robust programme of topside cleaning and flushing will ensure required levels of cleanliness are achieved and minor releases of residual oily water are prevented so far as reasonably practicable.
- Appropriate maintenance and pre-use checks on hydraulic equipment will be undertaken to prevent hydraulic line failure during subsea cutting activities.
- All vessels undertaking decommissioning activities will have an approved Shipboard Oil Pollution Emergency Plan (SOPEP).

Eni operate under an HSE IMS and a HSE Management System Interface document will be developed for the project when a removals contractor is appointed to help ensure the above listed mitigation and control measures are successfully implemented.

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APPENDIX A: ENVID MATRIX

	LIKELIHOOD OF OCCURRENCE	0	A	B	C	D	E
	CONSEQUENCE / MAGNITUDE	Practically non-credible occurrence	Rare occurrence	Unlikely occurrence	Credible occurrence	Probable occurrence	Likely/Frequent occurrence
1	Slight effect No stakeholder impact or temporary impact on the area. Involved area < 0.1 sq mile Spill (1)< 1 m3 – no sensitive impact on ground.	L	L	L	L	L	L
2	Minor effect Some local stakeholder concern or 1 year for natural recovery or impact on small no. of not compromised species. Involved area < 1 sq mile Spill (1)< 10 m3 –impact on localised ground.	L	L	L	M	M	M
3	Local effect Regional stakeholder concern or 1-2 years for natural recovery or 1 week for clean-up or threatening to some species or impact on protected natural areas. Involved area < 10 sq miles – Spill (1)< 100 m3.	L	L	M	M-H*	H	H
4	Major effect National stakeholder concern or impact on licences or 2-5 years for natural recovery or up to 5 months for clean-up or threatening to biodiversity or impact on interesting areas for science. Involved area < 100 sq miles – Spill (1)< 1000 m3.	L	M	M-H*	H	H	H
5	Extensive effect International stakeholder concern or impact on licences / acquisitions or > 5 years for natural recovery or > 5 months for clean-up or reduction of biodiversity or impact on special conservation areas.Involved area > 100 sq miles – Spill (1)> 1000 m3.	M	M-H*	H	H	H	H

	Risk Tolerability Criteria
L	Low or 'Broadly Acceptable' Risk Region – Risk is considered to be acceptable, based on current values of society or industry best practice but requires continuous monitoring to prevent deterioration.
M	Medium and Medium-High or 'Tolerable' Risk Region – Risk can be tolerated only if the costs to reduce it are disproportionate to the benefits, according to the 'As Low As Reasonably Practicable' (ALARP) concept. A higher degree of disproportionality is to be applied for those risks falling in the Medium-High Risk Region. The ALARP assessment may be qualitative or quantitative.
M-H*	
H	High or 'Unacceptable' Risk Region – Risk which is not acceptable, based on current values of society or industry best practice. The activity should not be allowed to take place until sufficient control or mitigation measures have been put in place to reduce the risk to levels which are ALARP or tolerable. Issues known to give rise to a breach in legislation are by default regarded as 'Unacceptable'.

APPENDIX B: HEWETT PRE-DECOMMISSIONING SURVEY – ENVIRONMENTAL SAMPLING LOCATIONS