PremierOil

COMPARATIVE ASSESSMENT SERVICES

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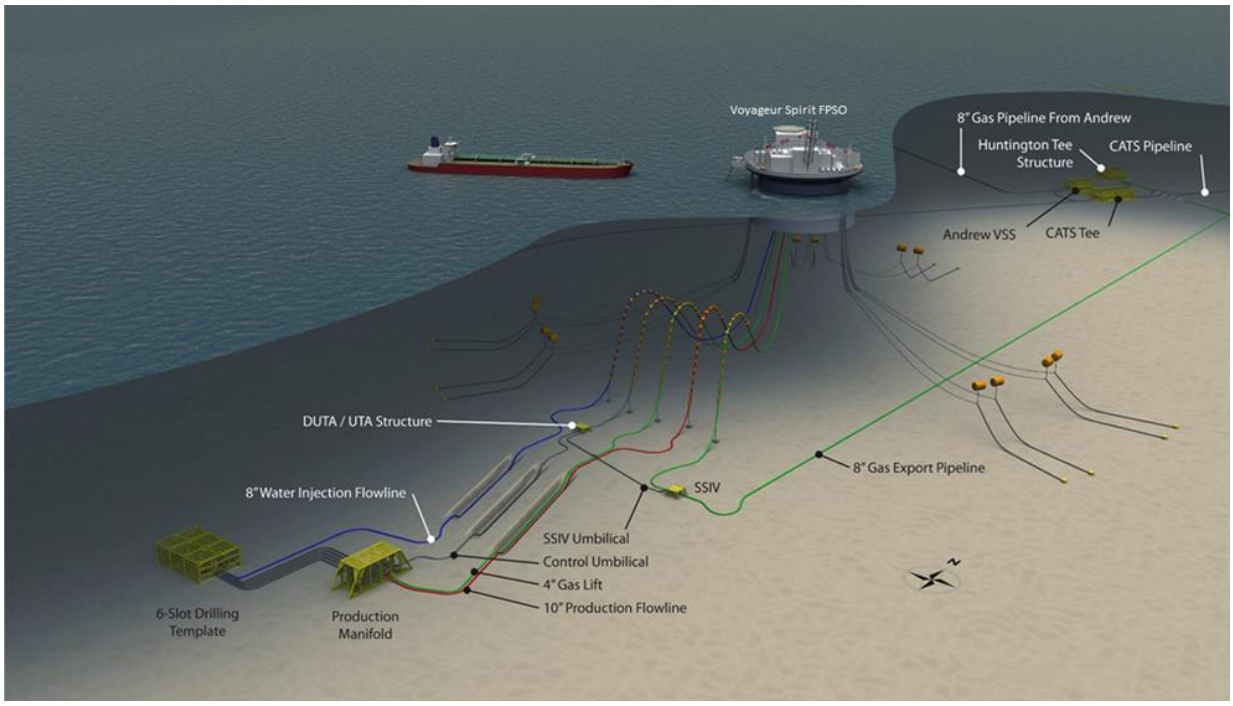

Huntington Decommissioning

Environmental Appraisal

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Distribution List

Name	Company/Organisation	No of Copies

Contents

Terms and Abbreviations

Abbreviation	Text in Full
ALARP	As Low As Reasonably Possible
AWMP	Active Waste Management Plan
BEIS	Business, Energy and Industrial Strategy
BGS	British Geological Society
BLP	Bridge Link Platform
BP	British Petroleum plc
CA	Comparative Assessment
CATS	Central Area Transmission Systems
CIEEM	Chartered Institute of Ecology and Environmental Management
CNRI	Canadian Natural Resources International
CNS	Central North Sea
CO_2	Carbon dioxide
CoP	Cessation of Production
CPUE	Catch Per Unit Effort
CSV	Construction Support Vessel
DECC	Department of Energy and Climate Change
°C	Degree(s) Celsius
DoB	Depth of Burial
DP	Decommissioning Programme

Abbreviation	Text in Full
DFPV	Drained, Flushed, Purged and Vented
DSV	Diving Support Vessel
DTI	Danish Technological Institute
DUTA	Dynamic Umbilical Termination Assemblies
EA	Environmental Appraisal
EMS	Environmental Management System
EMT	Environmental Management Team
ENVID	Environmental Impact Identification
EPS	Early Production Systems
ERUK	E.ON Ruhrgas UK Exploration and Production Ltd.
ES	Environmental Statement
ETAP	Eastern Trough Area Project
EU	European Union
EUNIS	European Nature Information System
FPSO	Floating Production Storage & Offloading
FPV	Floating Production Vessel
GJ	Gigajoule
HLLP	Huntington Late Life Project
HSE	Health & Safety Executive
HSES	Health, Safety, Environment and Security
ICES	International Council for the Exploration of the Seas
IEMA	Institute of Environmental Impact Assessment
in	Inch
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
kg	Kilogrammes
km	Kilometre
km^2	Square kilometre
KPI	Key Performance Indicator
LAT	Lowest Astronomical Tide
m	Metre
MAIB	Marine Accident Investigation Branch
MCDA	Multi Criteria Decision Analysis

Abbreviation	Text in Full
MCZ	Marine Conservation Zone
MDAC	Methane Derived Authigenic Carbonate
µg/g	Micrograms per gram
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
mg/l	Milligrams per litre
mm	Millimetre
MMO	Marine Management Organisation
MPA	Marine Protected Area
N/A	Not Applicable
N	North
NCMPA	Nature Conservation Marine Protected Area
NE	North east
NMP	National Marine Plan
NNE	North-Northeast
NORM	Naturally Occurring Radioactive Material
NtMs	Notices to Mariners
NW	Northwest
ODU	Offshore Decommissioning Unit
OGA	Oil & Gas Authority
OGUK	Oil & Gas UK
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OPEP	Oil Pollution Emergency Plan
OSPAR	Oslo Paris Convention – Convention for the Protection of the Marine Environment of the North East Atlantic
P&A	Plug and Abandon (Wells)
PL	Pipeline
Premier	Premier Oil E&P UK Limited
PMF	Priority Marine Features
QU	Quarters and Utilities
Repsol Sinopec	Repsol Sinopec North Sea Limited
SAC	Special Area of Conservation
SE	Southeast

Abbreviation	Text in Full
SEPA	Scottish Environmental Protection Agency
SFF	Scottish Fishermen's Federation
SMRU	Sea Mammal Research Unit
SNH	Scottish National Heritage
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Areas
SSE	South-Southeast
SSIV	Sub-Surface Isolation Valve
SSS	Side Scan Sonar
SSW	South-Southwest
Te	Tonne
THC	Total Hydrocarbon Concentration
TFSW	Trans Frontier Shipment of Waste
UKBAP	United Kingdom Biodiversity Plan
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
Umb	Umbilical
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UTA	Umbilical Termination Assemblies
VMS	Vessel Monitoring System
WNW	West-Northwest

EXECUTIVE SUMMARY

1 Introduction and Background

This section provides a non-technical summary of the findings for the Environmental Appraisal (EA) conducted by Premier Oil UK Limited (Premier) for the proposed decommissioning activities associated with the Huntington Field. Huntington is a light oil field located in Blocks 22/14b and 22/09 in the United Kingdom's Central North Sea (CNS) area and consists of a subsea template with 6 wells; 3 production and 3 water injection[1], tied back via a subsea manifold to an FPSO, the Voyageur Spirit.

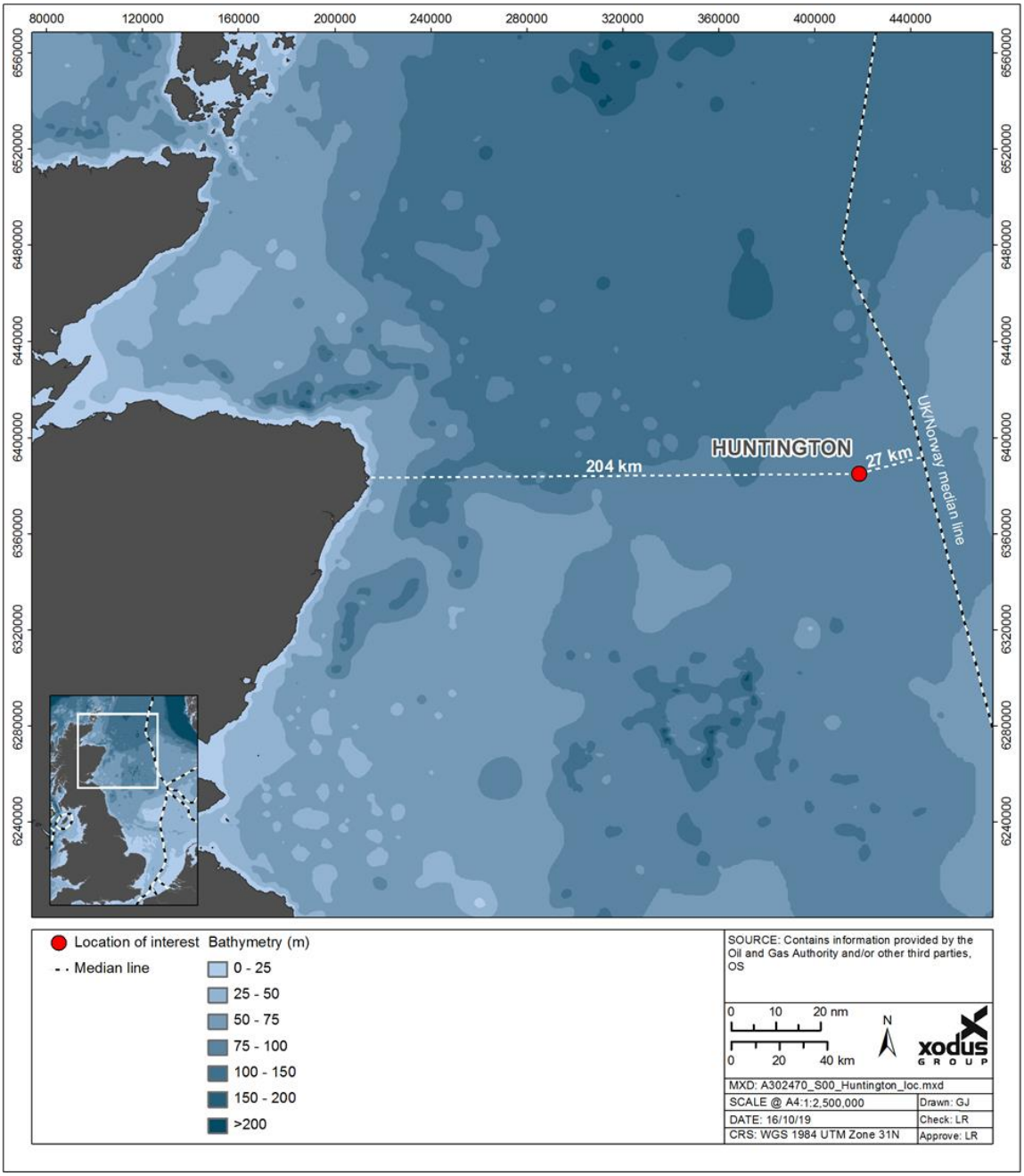

Figure 1-1 Location of the Huntington Field

[1] Originally, there were 4 production and 2 water injections wells. In 2018, the H2 well was converted into water injection.

2 Decommissioning Overview

As part of the planning for decommissioning and to obtain regulatory approval for the proposed activities, a Decommissioning Programme (DP) will be prepared for the Huntington Field, which is supported by the EA. The DP (Premier Oil E&P UK Limited, 2020a) and EA will cover the decommissioning of all flowlines and subsea infrastructure associated with the Huntington Field.

The DP and this supporting EA do not cover well plugging and abandonment (P&A), or the flushing and cleaning operations that will be undertaken prior to the commencement of the decommissioning activities. These activities will be carried out as part of the preparatory work preceding decommissioning, under existing field operational permits.

Further detail about the activities and infrastructure to be decommissioned is provided in Section 4 of this non-technical summary.

The Huntington Field has been producing via the Sevan-type FPSO, Voyageur Spirit, which is owned by Altera Infrastructure L.P. (hereon 'Altera'). The FPSO and associated mooring lines and suction anchors, which together form the mooring system, are to be removed and relocated by Altera prior to the commencement of Huntington decommissioning activities by Premier Oil. Any environmental impacts associated with the relocation of the FPSO and its mooring system will be covered separately by the relevant environmental consents and permits – these will be the responsibility of Altera and are therefore considered outwith the scope of this EA.

3 Proposed Schedule

The precise timing of the decommissioning activities is not yet confirmed and will be subject to market availability of cost-effective removal services and contractual agreements. The high-level Gantt chart featured in Figure 1-2 provides the overall schedule for the programme of decommissioning activities for the Huntington Field operated by Premier Oil.

Prior to commencing decommissioning works, Premier Oil will flush the subsea pipelines associated with the Huntington Field.

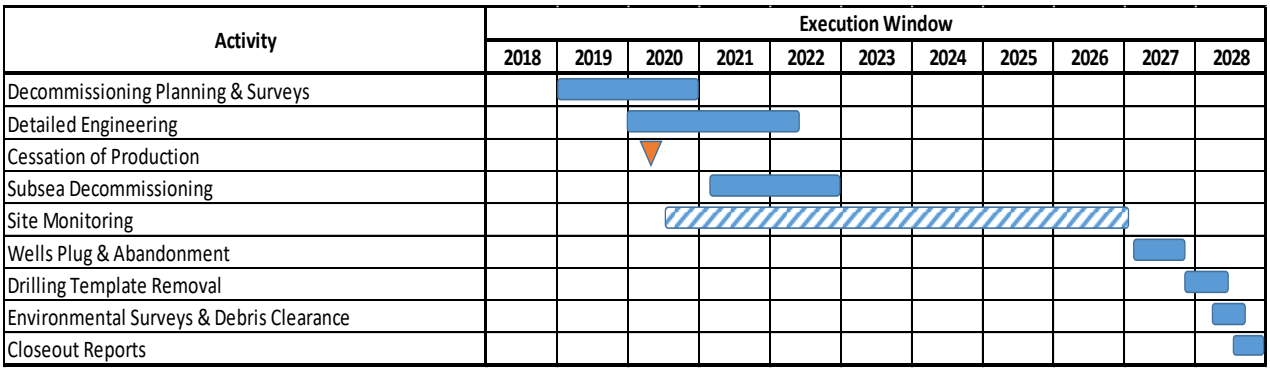

Figure 1-2 Gantt Chart of the project plan

4 Options for Decommissioning

All of the Huntington subsea infrastructure was assessed against the *Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines* (BEIS, 2018). The recommended Comparative Assessment (CA) process was applied. Equipment was initially organised into groups of items with similar characteristics, this allows for greater efficiency in dealing with the large inventory. The guidance identifies certain equipment which must be fully removed and some categories of pipelines which may be left decommissioned *in situ* subject to CA.

Once the equipment groups designated for full removal were identified the remaining groups were assessed further. All possible decommissioning options for the remaining groups were coarsely screened.

This involves consideration of each option against the primary criteria as specified within the Guidance: Safety; Environment; Technical; Societal and Economic. The options were scored against each criterion as either green, amber or red, pertaining to attractive, acceptable, or unattractive, respectively. This process eliminated the least favourable options from each equipment group in preparation for detailed evaluation of the remaining options. Those remaining options were then investigated in detail to develop quantitative and qualitative data for each option pertaining to the primary criteria and sub-criteria (e.g. safety data, environmental impact data, technical considerations, societal impacts and costs). Once this data was prepared in the form of published studies, a detailed evaluation was conducted to determine the final recommended decommissioning option for each item of equipment. This was facilitated by comparing the data for each sub-criterion across the options using a pair-wise analysis to produce a relative score for each sub-criterion that would be summed to produce an overall relative score for each option and thereby identify the emerging recommendation for the group.

The decision-making process underpinning the proposed DP is described in Section 2 and the selected decommissioning options, including those carried forward to CA, are summarised in Table 1-1 below. Table 1-2 depicts the decommissioning options reviewed in the CA Process, with the selected options in bold. Section 2 contains further details about the process and outcomes of the CA.

Table 1-1 Decommissioning Activities for Huntington Infrastructure

Decommissioning Option	Subsea installations / infrastructure
Full Removal	• Spools and Jumpers • Structures • Protection and Stabilisation • Mooring system (chains and suction anchors) • Dynamic Risers and Dynamic Umbilicals
Carried forward to CA	• Buried Rigid Flowlines • Buried Flexible Flowlines & Umbilicals

Table 1-2 CA Decommissioning Options Considered

CA Group No.	Subsea Infrastructure Description	Decommissioning Options Considered
1 Note 1	Trenched and Buried Rigid Flowlines	• Full removal via de-burial and cut and lift pipeline sections using a construction support vessel (CSV). • **Cut and remove pipeline ends (trench transitions) and remediate any remaining snag hazard with local gravel or rock placement.**
3 Note 1	Trenched and Buried Flexible Flowlines / Umbilicals	• **Full removal via reverse reel without de-burying the line first.** • Cut and remove pipeline ends (trench transitions) and remediate any remaining snag hazard with local gravel or rock placement.

Notes:

1. 11 CA groups were identified in total, only groups 1 and 3 were carried through to the Huntington CA evaluation. Groups 6, 7, 8, 9 and 10 were applicable to Huntington and were identified for full removal.

5 Environmental and Socio-Economic Baseline

The key environmental and social sensitivities in the Huntington Field are summarised in Table 1-3.

Table 1-3 Key Environmental and Social Sensitivities for the Huntington Field

Environmental Receptor	Description
Key Conservation interests	
OSPAR (2008) List of Threatened and/or Declining Habitats and Species	
Ocean quahog	Ocean quahog (Arctica islandica) is a slow growing species that is widely distributed in the wider area of the North Sea (JNCC, 2018a). Whilst this species was not directly observed in any survey sampling within the project area, it has been observed in the nearby East of Gannet and Montrose Fields NCMPA (14 km) and in sites within 50 km and in similar sediment types.
Seapens and burrowing megafauna communities	Historical surveys conducted at Huntington (Gardline, 2008, 2009, 2010) all recorded the presence of some sea pens; however, the reports and the seabed images do not suggest them to be abundant. Semi-quantitative assessment in Gardline (2010) describes *V. mirabilis* as 'occasional', though no systematic assessment using the SACFOR scale (JNCC, 2014a) was conducted during this survey. None of these reports recorded the presence of burrowing megafauna. Although the seabed images show some evidence of bioturbation in the form of movement tracks and small burrows, the seabed observed is not consistent with the presence of burrowing megafauna. These observations have been confirmed by the Draft Pre-decommissioning Environmental Survey (Fugro, 2020), which utilised the JNCC (2014) assessment criteria and concluded that the abundance of *P. phosphorea*, which was found across all stations and transects, was 'common', while the occurrence of faunal burrows, which were typically small (< 1 cm), were 'occasional'. Therefore, the OSPAR T&D habitat 'Sea pens and burrowing megafauna communities' was not deemed present in the Huntington survey area.
Conservation sites	
Special Areas of Conservation (SACs)	The are no SACs within 40 km of the project area. The nearest SAC to the Huntington Field is the Scanner Pockmark SAC, which is situated 84 km from the Project area. This site is designated for the presence of submarine structures formed by leaking gases, which are found within seabed depressions referred to as "pockmarks" and support reef-like communities distinct from the surrounding soft sediments (JNCC, 2018b). The SAC is a singular large depression which contains Methane Derived Authigenic Carbonate (MDAC) blocks made by leaking gases, which support a fauna typical of rocky reefs, including anemones *Urticina feline* and *Metridium senile* and squat lobsters (JNCC, 2018b).
Nature Conservation Marine Protected Area (NCMPAs)	The nearest NCMPA to the Huntington Field is the East of Gannet and Montrose Fields NCMPA located 14 km south west of the project area. This site is designated for the conservation of offshore deep-sea muds and ocean quahog aggregations, including sediment areas suitable for their colonisation (sand and gravel habitat). No living specimens of ocean quahog or infaunal siphons were observed during the site-specific surveys (Gardline, 2010) and the Huntington Field is not located on any large-scale features of functional significance (Gardline, 2009a&b; SNH, 2019c&d).
Special Protected Areas (SPAs)	There are no SPAs located in the vicinity of the project area.
Annex I Habitats	No Annex I Habitats were identified in any of the site-specific surveys.

Conservation Species	
Coastal and Offshore Annex II species most likely to be present in the project area	
Pinnipeds – Harbour and Grey Seals	Pinnipeds not expected in significant numbers, with densities estimated at approximately 0-1 individuals per 25 km^2 for both harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) (SMRU and Marine Scotland, 2017). This is due to the site being approximately 205 km offshore.
European Protected Species most likely to be present in the project area	
Harbour porpoise	The harbour porpoise (*Phocoena phocoena*) is a small, highly mobile species of cetacean that is common to all UK waters and can be found in the vicinity of the proposed decommissioning area in relative abundance. Particularly large numbers occur near the project area during the summer months, with a peak in numbers in July and August (Reid *et al*., 2003; Hammond *et al*., 2017). The relative density of harbour porpoise is roughly estimated at 0.6-0.7 animals/km^2 in the project area (Hammond *et al*., 2017).
White sided dolphin	The Atlantic White-sided dolphin (*Lagenorhynchus acutus*) species live mainly in cool waters (7-12°C), particularly seaward or along the edges of the continental shelf in depths of 100-500 m (Reid *et al*. 2003). However, the species can also be numerous in much deeper, oceanic waters. The species comes onto continental shelfs such as those of the north western North Sea (Reid *et al*. 2003). Little is known about the seasonal movements of *L. acutus*. They are found in deep waters around the north of Scotland throughout the year but enter the North Sea mainly in the summer (Reid *et al*., 2003; Hammond *et al*., 2017).
Minke whale	Minke whale (*Balaenoptera acutorostrata*) occur in water depths of 200 m or less throughout the northern North Sea and CNS. They are usually sighted in pairs or in solitude; however, groups of up to 15 individuals can be sighted feeding. It appears that animals return to the same seasonal feeding grounds. Sightings in relation to the project area are mainly and largest in spring and the summer months (Hammond *et al*., 2017). The relative density of minke whales is roughly estimated at 0.035-0.040 animals/km^2 in the project area (Hammond *et al*., 2017).
White- beaked dolphin	The white-beaked dolphin (*Lagenorhynchus albirostrisis*) are found mostly in continental shelf waters with depths between 50 m and 100 m, and rarely out to the 200 m isobath (Reid *et al*. 2003). Distribution of the species has been linked to sea surface temperature, local primary productivity and prey abundance. White-beaked dolphins are usually found in water depths of between 50 and 100 m in groups of around 10 individuals, although large groups of up to 500 animals have been seen. The species are roughly estimated to have a density of 0.20-0.25 animals/km^2 near the project area (Hammond *et al*., 2017).
Benthic environment	
Seabed type	An interpretation of multi-beam echo sounder and side scan sonar data revealed the seabed to be largely composed of low sonar reflectivity sediments with patches of moderate sonar reflectivity. There was no evidence of pockmarks, biogenic reefs or other such features protected under Annex I of the EU Habitats Directive within the survey area. EUNIS habitats A5.15 'Deep circalittoral coarse sediment' and A5.27 'Deep circalittoral sand' are predicted to be representative of the Huntington Field based on broad-scale habitat mapping (BGS, 2019). In particular, 'deep circalittoral sand' is the predominant substrate type within the CNS (BGS, 2019). The occurrence of habitats A5.15 and A5.27 also indicates the potential presence of PMF 'offshore subtidal sand and

	gravels' (JNCC, 2014b). However, these habitats are widely distributed within the North Sea and already included within UK MPA network. No other potentially sensitive habitats were observed within the Huntington survey area. Across most of the project area slightly silty shelly sand can be found which is generally less than 0.5 m thick at the seabed, although areas of minor coarse sediments accumulations and minor clay outcrops are scattered across the project area (Gardline, 2008a). Along the flowline and export pipeline routes a veneer of slightly silty shelly sand less than 0.5 m thick is also expected at the seabed through much of the route corridor, with areas of scattered/numerous clay outcrops and minor coarse sediment accumulations (Gardline, 2008b). Occasional boulders and debris are present in the vicinity of the project area with the majority being less than 1 m in height from the seabed (Gardline, 2010).
Benthic Fauna	The marine fauna and flora in the Huntington Field area is typical of the offshore, deeper waters of the CNS. Surveys carried out (Gardline 2008a; Gardline 2008b) showed that faunal density in the area is generally low and the seabed mainly comprised slightly silty shelly sand. Fauna identified during the surveys included crustaceans (*Pagurus Bernhardus*), echinoderms (starfish, possibly juvenile *Asterias rubens*), annelids (possible polychaete tube worm), molluscs (possibly *Dentalium vulgare*), cnidarians (*Sagartia elegans*, possible *Calliactis sp*., hydroids, mainly *Tubularia indivisa, Alcyonium digitatum*), and chordates (*Agonus cataphractus*). Faunal burrows, worm casts and general bioturbation were also observed throughout the survey area (Gardline, 2010).
Fish – spawning and nursery grounds	
Spawning grounds	The project is located within spawning grounds of cod, lemon sole (*Microstomus kitt)*, mackerel, *Nephrops,* Norway pout & sandeel (Coull *et al*., 1998; Ellis *et al*., 2012).
Nursery grounds	The following species have nursery grounds in the vicinity of the project: anglerfish, blue whiting, cod, European hake, herring, ling, mackerel, Norway lobster, Norway pout, plaice, sandeel, spotted ray, spurdog, and whiting (Coull *et al*., 1998; Ellis *et al*., 2012).
Probability of 0 age group fish aggregation	Aires *et al*. (2014) provides a predicted spatial distribution of 0-year group (i.e. juvenile) fish. The model predicted low densities for three commercial species within Block 22/14a and 22/09: herring, mackerel and anglerfish (Aires *et al*., 2014).
Seabirds	
According to the density maps provided in Kober *et al.* (2010), the following species could be found within the Huntington Field area: Northern fulmar (*Fulmarus glacialis)*, northern gannet (*Morus bassanus)*, common gull (*Larus canus)*, great black-backed gull (*Larus marinus)*, black-legged kittiwake (*Rissa tridactyla)*, common guillemot (*Uria aalge)*, little auk (*Alle alle)* and Atlantic puffin (*Fratercula arctica).* These are amongst the species commonly encountered in the CNS survey area (Gardline, 2010). In Block 22/14a and 22/09, the sensitivity of seabirds to oil pollution (determined by the Seabird Oil Sensitivity Index (SOSI)) is medium in January, March and April and low for all other months of the year (Webb *et al*., 2016). The SOSI values for Blocks 22/14a and 22/09 and the blocks around the Huntington Field are presented below.	

Seabird Oil Sensitivity Index (SOSI)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22/08	4	5	4	4*	5*	5	5	5	5	5*	N	4*
22/09	4	5	4	4*	5*	5	5	5	5	5*	N	4*
22/10	5	5	5*	5*	5	5	5	5	5	5*	N	5*
22/13	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/14a	5	5	4	4*	5*	5	5	5	5	5*	N	5*
22/15	5	5	5*	N	5*	5	5	5	5	5*	N	5*
22/18	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/19	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/20	5	5	5*	N	5*	5	5	5	5	5*	N	5*
Key	1 = Extremely high		2 = Very high		3 = High		4 = Medium		5 = Low		N = No data	
	* in light of coverage gaps, an indirect assessment of SOSI has been made											

Socio-economic Receptor	Description
Commercial fishing	

Amalgamated VMS data from 2007 – 2015 shows demersal trawling activity associated with oil and gas pipelines in this region from *Nephrops* and demersal trawling (Figure 3-4). The fishing intensity is generally low for mobile *Nephrops* trawling with high intensity occurring north west of the Huntington Field. In addition, amalgamated VMS data for pelagic herring trawling showed fishing intensity in the Huntington Field area classed as Low to Medium with high intensity pelagic herring trawling found north-west of the Huntington Field. ICES rectangle 44F1 experiences low/low-moderate levels of trawling activity (i.e. between 5 – 20 VMS tracks) over pipeline, when compared to the rest of the UKCS (Scottish Government, 2017a).

In 2018 fishing effort in ICES rectangle 44F1 were highest for August - November, accounting for 70% of the total number of days fished, with all other months contributing for the remaining 30% of fishing effort (Scottish Government, 2018). Effort within ICES rectangle 44F1 has been recorded as disclosive or no data for several months (predominantly March, April, May, June, July and December) each year between 2014 and 2018, indicating low levels of fishing activity during those times.

Trawls were the most utilised gear in rectangle 44F1. In total, trawls contributed to more than 99% of total fishing effort in the ICES rectangle 44F1 with <1% made up from seine nets (Scottish Government, 2018).

Fishing Landings in ICES Rectangle 44F1

Species type	2018		2017		2016		2015		2014	
	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)
Demersal	370	511,381	449	673,359	554	842,202	739	962,021	717	1,025,453
Pelagic	1	834	662	259,409	-	-	201	65,103	403	141,130
Shellfish	34	112,610	104	372,014	145	678,098	63	240,844	84	346,050
Total	**415**	**624,925**	**1,215**	**1,304,782**	**699**	**1,520,300**	**1003**	**1,267,968**	**1,204**	**1,512,633**

<table>
<tr><th colspan="2">Other sea users</th></tr>
<tr><td>Shipping activity</td><td>The Huntington Field is located in an area that experiences very low shipping intensity (Oil and Gas Authority (OGA), 2016).</td></tr>
<tr><td>Oil and Gas</td><td>The Huntington Field is located in the CNS in an area of extensive oil development with a number of fields located nearby, see below [Note 1]:
<table>
<tr><th>Installation</th><th>Installation Type</th><th>Operator</th><th>Distance and direction</th></tr>
<tr><td>CATS</td><td>Riser</td><td>BP</td><td>19.1 km NNE</td></tr>
<tr><td>North Everest</td><td>Platform</td><td>Chrysaor</td><td>19.1 km NNE</td></tr>
<tr><td>Montrose A</td><td>Platform</td><td>Repsol Sinopec</td><td>21.5 km SSW</td></tr>
<tr><td>Montrose</td><td>BLP</td><td>Repsol Sinopec</td><td>21.6 km SSW</td></tr>
<tr><td>Arbroath</td><td>Platform</td><td>Repsol Sinopec</td><td>28.5 km SSW</td></tr>
<tr><td>Nelson</td><td>Platform</td><td>Shell</td><td>29.6 km WNW</td></tr>
<tr><td>Mungo</td><td>Platform</td><td>BP</td><td>31.8 km SSE</td></tr>
<tr><td>ETAP</td><td>PDR</td><td>BP</td><td>32.9 km SSE</td></tr>
<tr><td>ETAP</td><td>QU</td><td>BP</td><td>33.1 km SSE</td></tr>
</table></td></tr>
<tr><td>Telecommunication</td><td>The closest telecommunication cables in the vicinity of the project area is the CNS fibre optic cable (15.6 km East-North-East).</td></tr>
<tr><td>Military activities</td><td>The Huntington Field is not located within any known military practice or exercise areas (British Crown and OceanWise, 2019; Oil and Gas Authority, 2019).</td></tr>
<tr><td>Renewables</td><td>There are no renewable sites near the project area (The Crown Estate, 2016).</td></tr>
<tr><td>Wrecks</td><td>There is one named wreck (Theresa Boyle) in the vicinity of the project area, approximately 23 km south west of the project area. This wreck is classified as a non-dangerous wreck (HES, 2019). There are no protected wrecks in the vicinity of the project area (Scottish Government, 2019b).</td></tr>
</table>

Notes:

1. FPSO = Floating Production Storage and Offloading, FSU = Floating Storage Platform, BP= Beyond Petroleum, and CNRI = Canadian National Resources International.

6 Impact Assessment Process

This EA Report has been prepared in line with the BEIS (2018) Decommissioning Guidelines and also with Decom North Sea's (2017) *EA Guidelines for Offshore Oil and Gas Decommissioning*. The BEIS Decommissioning Guidance states that an EA in support of a DP should be focused on the key issues related to the specific activities proposed; and that the impact assessment write-up should be proportionate to the scale of the project and to the environmental sensitivities of the project area.

The environmental impact assessment has been informed by a number of different processes, including identification of potential environmental issues through project engineer and marine environmental specialist review in a screening workshop, and consultation with key stakeholders (see Section 4.1).

The impact assessment screening workshop discussed the proposed decommissioning activities and any potential impacts these may pose. This discussion identified ten potential impact areas based on the proposed removal and decommissioning *in situ* activities. Two of the ten potential impacts were screened in for further assessment based on the potential severity and/or likelihood of their respective environmental impact. The ten potential impacts are detailed in Table 1-4 below, together with justification statements for the screening decisions.

Table 1-4 Environmental Impact Screening Summary for Huntington Decommissioning

Potential impact	Further assessment?	Rationale
Emissions to air	No	Emissions during decommissioning activities, (largely comprising fuel combustion gases) will occur in the context of the CoP. As such, emissions generated by infrastructure, equipment and vessels associated with operation of the Huntington asset will be replaced by those from vessels and equipment required for decommissioning activities, as well as the recycling of decommissioned materials. Reviewing historical EU Emissions Trading Scheme data and comparison with the likely emissions from the proposed workscope suggests that emissions relating to decommissioning will be minor relative to those generated during production. Review of available decommissioning EAs shows conclusively that atmospheric emissions in highly dispersive offshore environments do not present significant impacts and are extremely small in the context of UKCS and global emissions. Most submissions also note that emissions from short-term decommissioning activities are small compared to those previously arising from the asset over its operational life. The majority of atmospheric emissions for the Huntington Decommissioning Project relate to vessel time or are associated with the recycling of material returned to shore. As the decommissioning activities proposed are of short duration, this aspect is not anticipated to result in significant impacts. The estimated CO_2 emissions to be generated by the selected decommissioning options are 14,850 Te, this equates to 0.19% of the total UKCS vessel emissions (excluding fishing vessels) in 2017 (7,800,000 Te; BEIS, 2019). In addition to emissions associated with recycling of recovered materials, this CO_2 total has been calculated assuming an anticipated 50 days of vessel activity for the duration of the project. This is split across three likely vessel types, including, but not limited to: a DSV/CSV, trawler and survey vessel. This is a worst-case estimate of vessel days is also based on extensive overtrawling (which, as determined in Section 2.4.7, will not be required). Considering the above, atmospheric emissions do not warrant further assessment.
Seabed impacts	Yes	There is potential for decommissioning activities to generate disturbance to the seabed, including activities associated with the removal of Huntington's subsea installations, the reverse-reeling of flexible flowlines and umbilicals, and any remediation required post-decommissioning, including overtrawling. Seabed impacts may range in duration from short-term impacts, such as temporary sediment suspension or smothering, to permanent impacts, such as the introduction of new substrate or any

Potential impact	Further assessment?	Rationale
		consequential habitat or community level changes which may transpire. Additionally, seabed disturbance from the removal of infrastructure has the potential to modify the habitat in a way which might impact upon other sea users which utilise the seabed. The reverse reeling of trenched and buried flexible flowlines has the potential to generate clay berms in the muddy benthic habitat which defines the Huntington Field area (Section 3.4). Clay berms may pose a potential snagging hazard to commercial fishing gears which make contact with the seabed. The removal and relocation of the Voyageur Spirit FPSO and its associated mooring system and dynamic risers and dynamic umbilical falls under the jurisdiction of the Huntington FPSO (Voyageur Spirit) Float Off DP and its associated licences and consents (Altera). However, Premier is committed to leaving a clear seabed following decommissioning and will include the fourteen anchor points and temporary riser holding locations on the seabed in its Clear Seabed Verification Survey, following the decommissioning of the infrastructure listed above. The clear seabed will be validated by an independent verification survey over the installation sites and pipeline corridors. The methods used will be discussed and finalised with OPRED. Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the SFF, seabed clearance is likely to require conventional overtrawl survey methods. Impacts to the seabed from project activities have been assessed further in Section 6.1, whilst impacts to commercial fisheries generated by seabed disturbance are assessed in Section 0 below.
Physical presence of vessels in relation to other sea users	Yes	The presence of a small number of vessels for decommissioning activities will be short-term in the context of the life of the Huntington Field. A collective 50 days of total vessel time is anticipated for the project area, split across three vessel types. Activity will occur using similar vessels to those currently deployed for oil and gas installation, operation and decommissioning activities. The small number of vessels required will also generally be within the existing 500 m safety zone and the decommissioning of the Huntington FPSO will reduce the number of vessels in the area on the long-term. Other sea users will be notified in advance of planned activities through the appropriate mechanisms, meaning those stakeholders will have time to make any necessary alternative arrangements during the finite period of operations.

Potential impact	Further assessment?	Rationale
		Although the Huntington decommissioning project is estimated to require various vessels depending on the selected method of removal, these would not all be on location at the same time. Despite these management measures and the short-term nature of the proposed decommissioning activities, there exists the potential for residual impacts to commercial fisheries to result from the temporary limitation on access to fishing grounds. Assessment of potential impacts to commercial fisheries associated with changes in access to fishing grounds during decommissioning activities is addressed in Section 0 below.
Physical presence of infrastructure decommissioned *in situ* in relation to other sea users	No	The physical presence of infrastructure decommissioned *in situ* has limited potential of impacting other sea users and is limited to potential snagging risks to commercial fisheries. All subsea installations and surface-laid pipelines will be fully removed. Trenched and/or buried flexible flowlines will be reverse-reeled without prior deburial and the seabed will be subsequently surveyed and remediated as required. All jumpers, spool pieces and risers will be fully removed. The only infrastructure to be decommissioned *in situ* is the trenched and buried rigid flowline. The pipeline ends of the trenched and buried rigid flowline will be removed and recovered, with the cut ends remediated. Depth of Burial (DoB) surveys have confirmed the burial status of these flowlines and they are not expected to pose any risk of interaction with other sea users (see Appendix C). Future monitoring work will monitor the DoB of this pipeline. Mattresses and grout bags will be fully removed and be cleaned of marine growth if required, and either reused, recovered as aggregate for infrastructure projects or disposed of in landfill sites. In the instance that some mattresses are unable to be recovered OPRED will be consulted. The clear seabed will be validated by an independent verification survey over the installation sites and pipeline corridors. The methods used will be discussed and finalised with OPRED. Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the SFF, seabed clearance is likely to require conventional overtrawl survey methods. Assessment of potential snagging risks associated with the decommissioning of infrastructure *in situ*, as well as the condition of the seabed following the decommissioning of infrastructure via full removal, is provided in Section 0 below.
Water quality	No	All Huntington subsea infrastructure will be Drained, Flushed, Purged and Vented (DFPV) at CoP. This activity will be permitted.

Potential impact	Further assessment?	Rationale
		Vessel discharges are managed through existing, International Convention for the Prevention of Pollution from Ships (MARPOL) compliant controls, including bilge management procedures and good operating practices. Post-flushing and/or water jetting, residual liquids present during the decommissioning of pipelines and subsea infrastructure will be treated before being discharged to sea, such that the discharge will comprise treated water. Any residual remaining material will be in trace levels/volumes following the DFPV regime and will not pose any significant risk to water quality. All residual solids will be shipped to shore for disposal.
Underwater noise emissions	No	Vessel presence will be limited in scale (i.e. the size and number of vessels) and duration and, therefore, does not constitute a significant or prolonged increase in noise emissions across the project area. To remove the subsea installations, the cutting of flowlines will likely be done with shears, thereby minimising produced underwater noise during this activity. There is potential that external cuttings using diamond wire may be required; however, noise associated with this activity will be temporary and generated very close to the seabed, where absorption rates are highest. All other noise generating activities associated with the decommissioning of the Huntington Field are considered negligible in the context of ambient noise levels and are likely to be masked by project related vessel activities. Geophysical surveys undertaken for post-decommissioned infrastructure left *in situ* will be assessed in future, through the process of permit application. Multibeam echosounder survey equipment is likely to be used for imaging and identification of pipeline exposures. The JNCC (2017) Guidelines will be employed for mitigation of noise impacts to marine mammals for future survey work involving seismic survey equipment. None of the activities associated with the decommissioning of the Huntington Field are considered to generate significant noise levels which may cause injury or significant disturbance to marine species or other users. The project is not located within a marine mammal protection area and EAs for offshore oil and gas decommissioning projects generally show no potential injury or significant disturbance associated with the non-survey decommissioning activities covered within the project scope. On this basis, underwater noise does not require further assessment.
Resource use	No	Generally, resource use from the proposed activities will require limited raw materials and be largely restricted to fuel use. Any

Potential impact	Further assessment?	Rationale
		opportunities for increasing fuel efficiency and reducing use of resources will be identified and implemented. The estimated total energy usage for the project is 234,412.1 GJ. This is considered very low, compared to the resources generated during the production phase of the project. Considering the above, resource use does not warrant further assessment.
Onshore activities	No	The OPRED Guidance states that onshore activities are not in scope of Decommissioning EAs, and this topic does not require further assessment. It should be noted that, only licenced contractors which can demonstrate they are capable of handling and processing the material to be brought ashore will be considered for onshore activities and this will form an integral part of the commercial tendering process.
Waste	No	The recycling and disposal of wastes are covered by Premier Oil's Waste Management Strategy, which is compliant with relevant regulations relating to the handling of waste offshore, transfer of controlled, hazardous and special waste, and TFSW. The Waste Management Strategy is guided by Premier's HSES Policy and commitments to best practice in waste management. This includes the mapping and documenting of waste management arrangements for each phase of the HLLP in individual Active Waste Management Plans (AWMPs) and ongoing monitoring of waste procedures and performance review against target Key Performance Indicators (KPIs). Wastes will be treated using the principles of the waste hierarchy, focusing on the reuse and recycling of wastes where possible. Raw materials will be returned to shore with the expectation to recycle the majority of the returned material. There may be instances where infrastructure returned to shore is contaminated (e.g. by Naturally Occurring Radioactive Material (NORM), hazardous, and/or special wastes) and cannot be recycled. In these instances, the materials will require disposal. However, the weight and/or volume of such material is not expected to result in substantial landfill use. On this basis, no further assessment of waste is necessary.
Unplanned events	No	As the decommissioning activities will be taking place after well P&A, well blowout scenarios have been ruled out as a possibility and unplanned events have been limited to unplanned instantaneous diesel release from the largest vessel. This is expected to be a CSV or DSV type vessel, and the Seven Falcon is considered a relevant example of such a vessel to be used during decommissioning. It has a fuel capacity of 1,335 m^3.

Potential impact	Further assessment?	Rationale
		An instantaneous loss of vessel diesel inventory will be less than the worst-case loss of containment of crude oil aboard the Voyageur Spirit FPSO which was modelled as a part of Altera's Huntington Offshore Oil Pollution Emergency Plan (OPEP). The OPEP considers an instantaneous loss of 43,000 m^3 of crude from the FPSO and the corresponding dispersion modelling indicates a high probability of transboundary landfall to the Norwegian coastline (approximately 95% after 30 days during the summer months) and a very low probability of surface oiling landfall within the UK (< 5% after 30 days, limited to spring). The maximum beached emulsion volume would be up to approximately 44 Te (limited to the spring). A diesel inventory release during decommissioning would not result in such a scenario, as the modelled crude volumes far exceed the anticipated fuel inventory volume (1,335 m^3) and the specific gravity of diesel fuel makes it disperse at a much faster rate. Nonetheless, the scenario modelled in the existing OPEP serves as a worst-case assessment of potential unplanned release associated with the Huntington Field which have been carefully mitigated against. The fuel inventory of the CSV / DSV is likely to be split between a number of separate fuel tanks, significantly reducing the likelihood of an instantaneous release of the full inventory. Any spills from vessels in transit and outside the 500 m safety zone are covered by separate Shipboard Oil Pollution Emergency Plans (SOPEPs). Premier will support response of any vessel-based loss of fuel containment through the vessel owner's SOPEP. In addition to the mitigation measures outlined in the individual vessel SOPEPs, Premier maintains manned bridges, navigational aids and monitoring of safety zones (e.g. with Navaids, PowerBuoys, or other technology). As any impact from vessel-based fuel inventory release will be less than that already assessed and mitigated against within the OPEP for the operational phase of the Huntington Field, the potential impacts from accidental chemical/ hydrocarbon releases during decommissioning activities do not warrant further assessment. As the methodology for the post-removal subsea installation and flowline return to shore has not been defined in detail, there exists the remote possibility that during transport of those materials, elements may dislodge and drop from the transport vessel. Premier will cut and lift the short section of exposed pipeline at the ends; however, these sections are short and will be relatively easy to manoeuvre. Therefore, the likelihood of accidental loss of pipeline materials to the seabed during lift operations is low. Moreover, all subsea installations are considered sound and no issues regarding their integrity have been identified, therefore methods of removal

Potential impact	Further assessment?	Rationale
		are not anticipated to generate issues which result in material losses to sea. Premier's dropped object procedures are industry-standard. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. The post-decommissioning Clear Seabed Verification Survey will aid in the identification of in-field dropped objects. In line with the mitigation measures in place, unplanned loss of materials to the sea do not require further assessment.

The initial screening identified two potential environmental and societal impacts which require further assessment within the EA against the proposed decommissioning activities; they include: seabed impacts and impacts to commercial fisheries.

7 Environmental Management

The project has limited activity associated with it beyond the main period of preparation for decommissioning and removal of the Huntington infrastructure. The focus of environmental performance management for the project is therefore to ensure that the activities that will take place during the limited period of decommissioning happen in a safe, compliant and acceptable manner. The primary mechanism by which this will occur is through Premier's accredited Environmental Management System (EMS) and Health, Safety, Environment and Security (HSES) Policy.

To support this, a project Health, Safety and Environment (HSE) Plan will be developed which outlines how HSE issues will be managed and how the policies will be implemented effectively throughout the project. The plan will apply to all work carried out, whether onshore or offshore. Performance will be measured to satisfy both regulatory requirements including compliance with environmental consents, as well as to identify progress on fulfilment of project objectives and commitments.

Premier also operates a Waste Management Strategy specific to Huntington and will develop an Active Waste Management Plan (AWMP) for the decommissioning project to detail the types of materials identified as decommissioning waste and to outline the processes and procedures necessary to support the Decommissioning Programme for the Huntington infrastructure. The AWMP will detail the measures in place to ensure that the principles of the waste management hierarchy are followed during the decommissioning.

In terms of activities in the northern North Sea, the National Marine Plan has been adopted by the Scottish Government to help ensure sustainable development of the marine area. This Plan has been developed in line with UK, European Union (EU) and OSPAR legislation, directives and guidance. With regards to decommissioning, the Plan states that 'where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. As part of the conclusions to this assessment (Section 1), Premier has given due consideration to the Scottish National Marine Plan during Project decision making and the interactions between the Project and Plan.

8 Conclusion

Given the remote offshore location of the Huntington Field and the highly localised impacts of the proposed decommissioning activities, there is no potential for decommissioning to impact any European or nationally designated protected sites.

This EA has considered the Scottish National Marine Plan, adopted by the Scottish Government to help ensure sustainable development of the marine area. Premier considers that the proposed decommissioning activities are in alignment with its objectives and policies.

Based on the findings of this EA, including the identification and subsequent application of appropriate impact assessment methodologies, the proposed Huntington decommissioning activities do not pose any significant threat to environmental or societal receptors within the UKCS.

1 INTRODUCTION

In accordance with the Petroleum Act 1998, Premier Oil E&P UK Limited (hereafter, "Premier"), an established United Kingdom Continental Shelf (UKCS) operator, and on behalf of the Section 29 notice holders, is applying to the Department for Business, Energy and Industrial Strategy (BEIS) to obtain approval for decommissioning the Huntington surface and subsea infrastructure. The Huntington Field is currently in a producing state, with proposed Cessation of Production (CoP) on or after 13th April 2020.

The ownership and operation of the fields associated with the Huntington Field is as follows:

- Huntington Field is 100% owned and operated by Premier;
- The Voyageur Spirit Floating Production Storage and Offloading (FPSO) facility is owned and operated by Altera Infrastructure L.P (from hereon, 'Altera').

This Environmental Appraisal (EA) has been conducted to assess the potential environmental impacts that may result from activities intrinsic to the staged decommissioning of the Huntington Field and facilities. This EA supports the Decommissioning Programme (DP) being submitted to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), the offshore decommissioning regulator under BEIS, which covers decommissioning of the Huntington Field (Premier Oil E&P UK Limited, 2020a).

1.1 Project Overview

The Huntington Field is located in the Central North Sea (CNS), approximately 204 km east of Peterhead, Scotland and approximately 27 km west of the UK/Norway median line (Figure 1-1). Huntington is a light oil field located in Blocks 22/14a and 22/09 in the United Kingdom's CNS area and consists of a subsea template with 6 wells, 3 production and 3 water injection[2]; tied back via a subsea manifold to an FPSO, the Voyageur Spirit. Huntington came on stream in April 2013. Gas is exported via the CATS pipeline system and delivered at the Teesside Gas Terminal and crude oil offloaded via shuttle tanker.

CoP of the Huntington Field occurred on 5th April 2020.

Decommissioning activities within the Huntington Field will cover the decommissioning of subsea infrastructure associated with the Huntington Field. The decommissioning of surface infrastructure is limited to the removal and relocation of the Voyageur Spirit, a Sevan-type FPSO, and its suction-anchor-based mooring system (Figure 1-2). All surface infrastructure decommissioning activities are covered under the Huntington FPSO (Voyageur Spirit) DP and are considered outwith the scope of this EA (Premier Oil E&P UK Limited, 2020b). Activities associated with the decommissioning of the subsea infrastructure in the Huntington Field are covered by this EA, in support of the Huntington Field DP (Premier Oil E&P UK Limited, 2020a).

[2] Originally there were 4 production and 2 water injections wells. In 2018, the H2 well was converted into water injection.

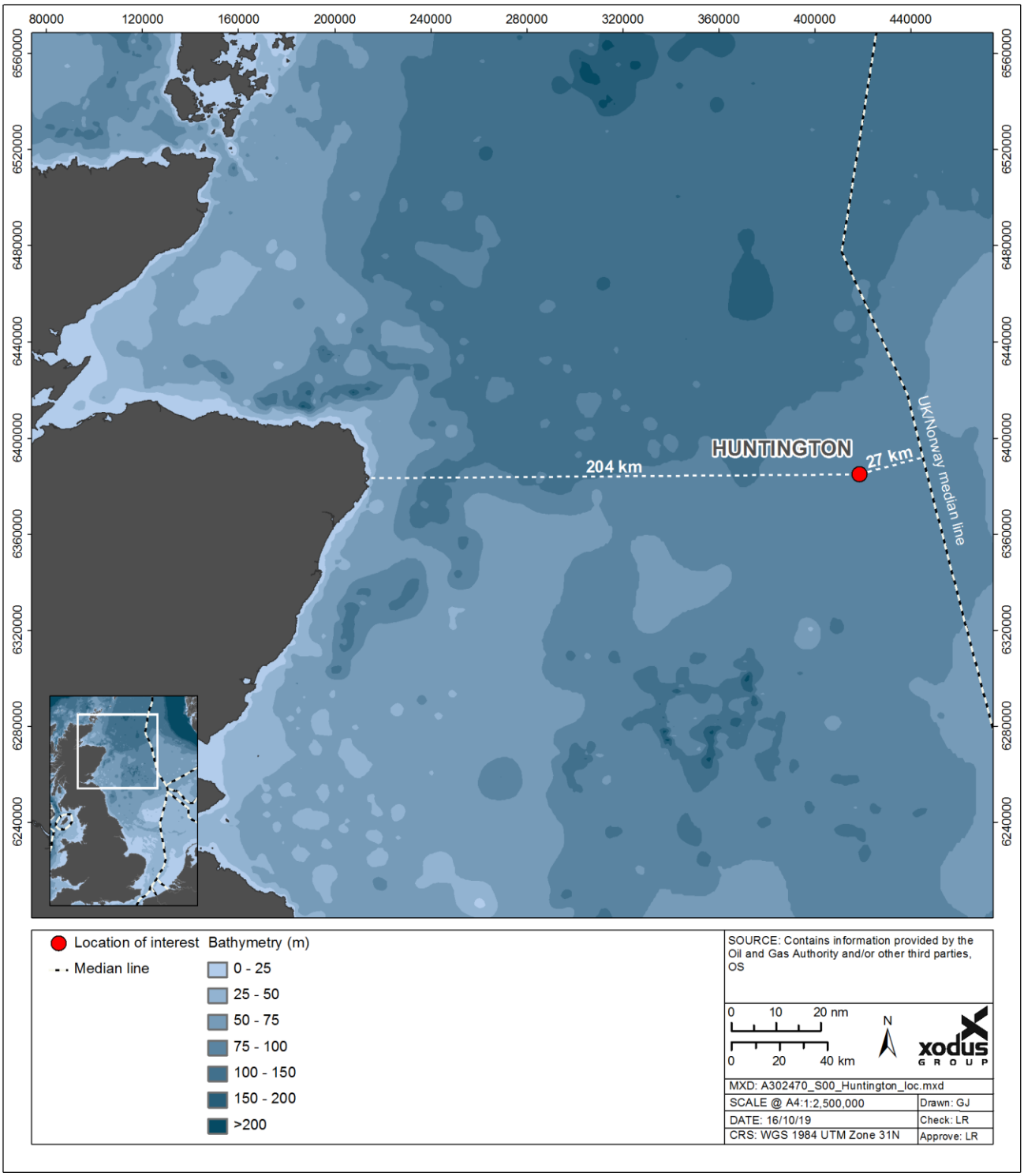

Figure 1-1 Location of the Huntington Field Area

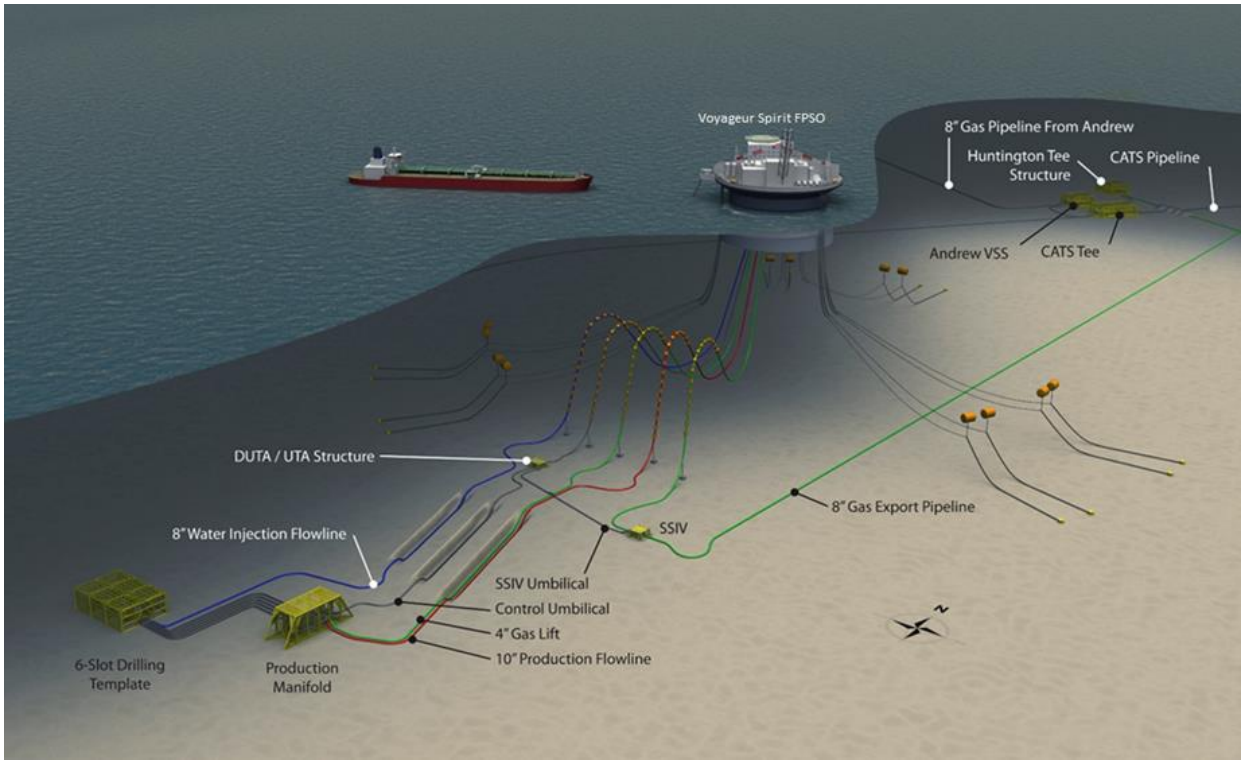

Figure 1-2 Overview of the Huntington Field

The proposed schedule for decommissioning activities associated with the Huntington Field have commenced and will be carried out through the end of 2028, after the post-decommissioning environmental and debris clearance surveys are completed.

Well plugging and abandonment P&A will be permitted as a standalone activity by Premier, prior to any of the surface or subsea decommissioning activities progressing. This means that each well will be systematically and permanently closed in accordance with well decommissioning best practice. Similarly, flushing and cleaning operations for subsea flowlines and installations will also have been completed under existing operational permits prior to commencement of decommissioning activities.

1.2 Purpose of the Environmental Appraisal Report

This EA Report has been prepared in line with the BEIS (2018) Decommissioning Guidelines and also with Decom North Sea's (2017) *EA Guidelines for Offshore Oil and Gas Decommissioning*. The BEIS Decommissioning Guidance states that an EA in support of a DP should be focused on the key issues related to the specific activities proposed; and that the impact assessment write-up should be proportionate to the scale of the project and to the environmental sensitivities of the project area.

The impact identification and assessment process take into account stakeholder engagement, comparison of similar decommissioning projects undertaken in the UKCS, expert judgement, and the results of supporting studies which aim to refine the scope of the DP. This EA Report documents this process and details, in proportionate terms, the extent of any potential impacts and any necessary mitigation/control measures proposed.

1.3 Regulatory Context

The Petroleum Act 1998 (as amended) governs the decommissioning of offshore oil and gas infrastructure, including pipelines, on the UKCS. The Act requires the operator of an offshore installation or pipeline to submit a draft DP for statutory and public consultation. The DP must outline in detail the infrastructure being decommissioned and the method by which the decommissioning will take place. Responsibility for ensuring compliance with the Petroleum Act 1998 rests with Department of Business,

Energy and Industrial Strategy (BEIS), and is managed through the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

Decommissioning is also regulated under the Marine and Coastal Access Act 2009 and Marine (Scotland) Act 2010 (the 'Marine Acts'). The UK's international obligations on decommissioning are primarily governed by the 1992 Convention for the Protection of the Marine Environment of the North East Atlantic (the Oslo Paris Convention (OSPAR)). OPRED is also the Competent Authority on decommissioning in the UK for OSPAR purposes and under the Marine Acts.

The primary guidance for offshore decommissioning from the regulator (BEIS, 2018), details the need for an EA to be submitted in support of the DP. The guidance sets out a framework for the required environmental inputs and deliverables throughout the approval process. It now describes a proportionate EA process that culminates in a streamlined EA report rather than a lengthy Environmental Statement (ES). The OPRED guidance is supported by Decom North Sea's (Decom North Sea, 2017) Environmental Appraisal Guidelines for Offshore Oil and Gas Decommissioning, which provide further definition on the requirements of the EA report.

In terms of activities in the CNS, the Scottish National Marine Plan has been adopted by the Scottish Government to help ensure sustainable development of the marine area. This Plan has been developed in line with UK, EU and OSPAR legislation, directives and guidance. With regards to decommissioning the Plan states that 'where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. Re-use or removal of decommissioned assets from the seabed will be fully supported where practicable and adhering to relevant regulatory process. As part of the conclusions to this assessment (Section 7), Premier has given due consideration to the National Marine Plan during Project decision making and the interactions between the Project and Plan.

1.4 Scope and Structure of this Environmental Appraisal Report

This EA report sets out to describe, in a proportionate manner, the potential environmental impacts of the proposed activities associated with the Huntington Field decommissioning and to demonstrate the extent to which these can be mitigated and controlled to an acceptable level. This is achieved in the following Sections, which cover:

- The process by which Premier has arrived at the selected decommissioning strategy (Section 2);
- A description of the proposed decommissioning activities (Section 2);
- A review of the potential impacts from the proposed decommissioning activities and justification for the assessments that support this EA (Section 5);
- A summary of the baseline sensitivities and receptors relevant to the assessment area that support this EA (Section 3);
- Assessment of key issues (Section 6); and
- Conclusions (Section 7).

This EA report has been prepared in line with Premier's environmental assessment requirements (Standard: Environmental Baseline Data Gathering and Environmental and Social Impact Assessment (Document No. CP-CP-PMO-HS-ZZ-ST-0020)) and has given due consideration to the relevant regulatory Decommissioning Guidelines (BEIS, 2018) and to Decom North Sea's *Environmental Appraisal Guidelines for Offshore Oil and Gas Decommissioning* (Decom North Sea, 2017).

2 PROJECT SCOPE

2.1 Consideration of Alternatives and Selected Approach

2.1.1 Decision Making Context

The latest guidance (BEIS, 2018) states that subsea installations (e.g. drilling template, wellheads, production manifold and risers) must, where practicable, be completely removed for reuse or recycling or final disposal on land. Any piles used to secure such installations in place should be cut below natural seabed level at such a depth as to ensure that any remains are unlikely to become uncovered. Should an Operator wish to make an application to leave in place a subsea installation because of the difficulty of removing it, justification in terms of the environmental, technical or safety reasons would be required. With regards to pipelines (including flowlines and umbilicals), these should be considered on a case-by-case basis. The guidance does provide general advice regarding removal for two categories of pipelines:

- For small diameter pipelines (including flexible flowlines and umbilicals) which are neither trenched nor buried, the guidance states that they should normally be entirely removed; and
- For pipelines covered with rock protection, the guidance states that these are expected to remain in place unless there are special circumstances warranting removal.

The guidance also highlights instances where pipelines could be decommissioned *in situ*. For example, pipelines that are adequately buried or trenched or which are expected to self-bury could be considered as candidates for *in situ* decommissioning. Where an Operator is considering decommissioning pipelines *in situ*, the decision-making process must be informed by 'Comparative Assessment' of the feasible decommissioning options. This Comparative Assessment takes account of safety, environmental, technical, societal and economic factors to arrive at a preferred decommissioning solution.

Finally, the guidance states that mattresses and grout bags installed to protect pipelines should be removed for disposal onshore, if their condition allows. If the condition of the mattresses or grout bags is such that they cannot be removed safely or efficiently, any proposal to leave them in place must be supported by an appropriate Comparative Assessment of the options.

2.1.2 Alternatives to Decommissioning

Options to re-use the Huntington Field infrastructure *in situ* for future hydrocarbon developments have been considered, but to date none have yielded a viable commercial opportunity. The primary reason for this is the absence of remaining hydrocarbon reserves in the vicinity of the infrastructure. Specific consideration was given to the gas export pipeline back to CATS. No reason to delay decommissioning of the infrastructure in a way that is safe and environmentally and socially acceptable has therefore been identified.

All of the Huntington Field subsea infrastructure was assessed for decommissioning against the *Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines* (BEIS, 2018). The recommended Comparative Assessment (CA) process was applied. For efficiency purposes the Huntington infrastructure was considered together with infrastructure from the Caledonia, Hunter, Rita and Johnston Fields. In accordance with normal practice for the Scoping phase of the CA, equipment was organised into groups of items with similar characteristics, facilitating greater efficiency in processing the latter phases of the CA. The guidance identifies certain equipment which must be fully removed and some categories of pipelines which may be left decommissioned *in situ* subject to CA. Once the equipment groups designated for full removal were identified the remaining groups were assessed further.

All possible decommissioning options for the remaining groups were coarsely screened against the primary criteria as specified within the BEIS (2018) Guidance: Safety; Environment; Technical; Societal; and Economic. The options were scored against each criterion either green, amber or red, pertaining to

attractive, acceptable or unattractive respectively. This process eliminated the least favourable options from each equipment group in preparation for detailed evaluation of the remaining options. Those remaining options were then investigated in detail to develop quantitative and qualitative data for each option pertaining to the primary criteria and sub-criteria (e.g. safety data; environmental impact data; technical considerations; societal impacts; and costs). Once this data had been prepared in the form of published studies, a detailed evaluation was conducted to determine the final recommended decommissioning option for each item of equipment. This was facilitated by comparing the data for each sub-criterion across the options using a Multi Criteria Decision Analysis (MCDA) tool which employs pairwise comparisons of quantitative and qualitative data to produce a relative score for each sub-criterion that can be summed to produce an overall relative score for each option, enabling identification of the emerging recommendation for the group.

2.1.3 Subsea Comparative Assessment

Prior to the eventual recommended decommissioning options being identified, Premier followed the CA evaluation process in which the decommissioning options are assessed against the five main criteria defined in the Guidance (BEIS, 2018), these were equally weighted.

The CA options which have been considered for decommissioning of the Huntington Field are outlined in Table 2-1 below and further details are provided in the Huntington Field Comparative Assessment Report. The selected options are in bold and covered in greater detail in Section 2.2. Only Groups 1 and 3 were carried through the CA process as all other groups were identified for full removal.

Table 2-1 CA Decommissioning Options Considered

CA Group No. Note 1	Subsea Infrastructure Description	Decommissioning Options Considered
1	Trenched and Buried Rigid Flowlines	• Full removal via de-burial and cut and lift pipeline sections using a construction support vessel (CSV). • **Cut and remove pipeline ends (trench transitions) and remediate any remaining snag hazard with local gravel or rock placement.**
3	Trenched and Buried Flexible Flowlines / Umbilicals	• **Full removal via reverse reel without de-burying the line first.** • Cut and remove pipeline ends (trench transitions) and remediate any remaining snag hazard with local gravel or rock placement.

Notes:

1. Eleven CA groups were identified in total and only groups 1 and 3 were carried through to the Huntington CA evaluation. Groups 6, 7, 8, 9 and 10, which were applicable to Huntington, were identified for full removal.

2.2 Scope of Proposed Decommissioning Operations

2.2.1 Description of the Infrastructure being Decommissioned

The Huntington Field consists of a subsea template with 6 wells: 3 production and 3 water injection. The template is tied back via a subsea manifold to an FPSO, the Voyageur Spirit, which is owned and operated by Altera. Processed oil is exported via shuttle tanker and dried gas is exported into the CATS system via an 11.8km 8" gas export pipeline (PL2805) and tee arrangement.

The flexible jumper at the CATS end of the gas export pipeline crosses over the 36" CATS Pipeline. The crossing is formed from concrete crossing ramps. It is assumed that the crossing shall be left undisturbed and decommissioning activities will maintain a sufficient distance from the crossing to ensure this is the case.

Table 2-2 provides an overview of the infrastructure within the Huntington Field which has been reviewed for decommissioning options through the CA Process described in Section 2.1.3. As the CA Process was undertaken collectively for all of Premier's assets under consideration for decommissioning, a total of eleven groups were defined to cover all of the possible infrastructure. However, only seven groups are applicable to the Huntington Field, with two groups associated with the surface infrastructure and five groups associated with the subsea infrastructure which forms the scope of this EA.

Table 2-2 Summary of the Equipment to be Decommissioned in the Huntington Field

CA Group No.	Infrastructure Description	Quantity within the Huntington Field
1	Trenched and Buried Rigid Flowlines	1
3	Trenched and Buried Flexible Flowlines / Umbilicals	4
6	Spools and Jumpers	18
7	Structures	17
8	Protection / Stabilisation	305 Mattresses [Note 3], 1,000 Grout Bags
9	Moorings & Piles [Note 1]	14 Suction Anchors, 12 Lower Chains, 12 Upper Chains, 12 Mooring Lines, 12 Buoys
10	Dynamic Risers & Dynamic Umbilicals [Note 2]	5

Notes:

1. The disconnection and recovery of the FPSO's mooring system forms a decommissioning activity covered by the Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b) and are not covered by this EA. The removal of Mooring and Piles is considered the responsibility of Altera.
2. The disconnection and recovery of the dynamic risers and dynamic umbilical forms a decommissioning activity covered by the Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b) and are not covered by this EA. However, aspects of this removal which include the temporary storage of dynamic risers and the dynamic umbilical on the seabed are to be covered by licensing undertaken by Premier.
3. 236 mattresses are associated with the Surface and Subsea Infrastructure DP with the remaining 69 associated with the FPSO Float Off DP.

2.2.2 Description of Proposed Decommissioning Activities

To facilitate the CA Process as efficiently as possible, the infrastructure to be decommissioned was organised into groups and all aspects of decommissioning, including those associated with the surface

infrastructure which are outwith the scope of this EA, were included. Thereafter, groups of equipment required to be fully removed in accordance with current guidance were identified and the remaining groups were assessed against the required criteria (i.e. safety, environmental, technical, societal and economic criteria). Through evidence-based evaluation of those remaining groups, final decommissioning recommendations were determined and presented to statutory stakeholders. The recommended decommissioning approach for each of the CA groups relevant to the decommissioning of the Huntington Field subsea infrastructure is provided in Table 2-3.

Table 2-3 Recommended Decommissioning Options for Each Group

CA Group No.	Infrastructure Description	Decommissioning Approach
1	Trenched and Buried Rigid Flowlines Note 1	Removal of surface laid sections using DSV or CSV. Remediation of cut ends with spot rock or gravel cover. Remaining buried pipeline decommissioned *in situ*.
3	Trenched and Buried Flexible Flowlines / Umbilicals Note 1	Full removal via reverse reeling operation using a suitable vessel without de-burying the line first.
6	Spools and Jumpers	Full removal using DSV or CSV. Sections are to be cut into manageable lengths and recovered to the vessel for return onshore and recycling / disposal.
7	Structures	Full removal using a DSV or CSV with a suitable crane. Where possible all piles shall be internally cut.
8	Protection / Stabilisation Note 2	Full removal using a DSV or CSV. Returned onshore for recycling/disposal. A number of grout bags may be redeployed/repurposed locally as snagging hazard mitigation.

Notes:

1. The decommissioning approach is the recommended option as a result of the CA process.
2. The base position is full removal of all mattresses. If difficulties arise during the removal of mattresses, then Premier shall open a dialogue with OPRED to agree an alternative decommissioning approach. Mattresses and stabilisation around the CATS pipeline crossover shall be left undisturbed.

2.3 General Assumptions

Prior to the commencement of the proposed Huntington Field decommissioning activities, preparatory activities shall be undertaken, part of Phase 1 of the full decommissioning regime for the Huntington area. These preparatory activities are outwith the scope of this EA and include activities associated with the FPSO Float Off and Submission of the CoP, including flushing operations, barrier testing, cutting of risers and removal of moorings. Both Premier and Altera will acquire the necessary licensing to cover their remits, as defined in the Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b).

Prior to the commencement of subsea decommissioning activities, all pipework will be flushed to an acceptable level, reflecting current guidance from OPRED and the HSE. This activity will be permitted under the licensing regime associated with the Float Off of the Voyageur Spirit FPSO. Wells are also outwith the scope of this EA and are to be plugged and abandoned prior to the commencement of Huntington Field subsea decommissioning activities and covered by their own relevant licenses.

The removal of the mooring system, dynamic risers and dynamic umbilical (and their associated stabilisation materials/mattresses) are outwith the scope of the DP for the Huntington Field surface and subsea infrastructure (Premier Oil E&P UK Limited, 2020a). However, while environmental impacts from the removal of the suction anchors and the lowering of the dynamic risers to the seabed will be covered by relevant environmental consents and permits (as per Premier Oil E&P UK Limited, 2020b), they introduce potential seabed impacts which will need to be addressed during the clear seabed verification survey which forms part of Phase 3 of the decommissioning of the Huntington Field area. Therefore, environmental impacts associated with potential seabed clearance requirements for the removal of this surface infrastructure have also been addressed within this EA as a part of the remit for Phase 3 of decommissioning.

The activities which will take place in Phases 2 & 3 of the decommissioning of the Huntington Field area (as detailed in Section 2.2.2 and Premier Oil E&P UK Limited, 2020a), will be the sole responsibility of Premier in terms of licensing and consents. An overview of the permits associated with the preparatory (i.e. Phase 1) activities and activities adherent to the decommissioning of the Huntington Field (i.e. Phases 2 & 3), including those which will be overseen by Altera, has been provided in Table 2-4 below.

Table 2-4 Permits Relevant to the Preparatory and Decommissioning Activities Relevant to the Huntington Field Decommissioning Programme (Surface and Subsea Infrastructure)

Phase	Activity	Operations	Premier Permit	Altera Permit
Phase 1 Note 1	Preparation for FPSO Float Off Note 2	Flushing operations (seawater and chemical gel pig) with returns to FPSO (zero discharge) Barrier Testing with subsea discharge Gas system purging and flooding Disconnection of dynamic risers & dynamic umbilical & lowering to seabed Mattress repositioning Moorings and Anchor Removal	PWA Cat 2 variation PLA MAT Chemical SAT *(Pipelines)* Oil Discharge SAT Marine Licence Note 3 *(Dynamic Risers & Umbilical)*	Chemical SAT *(Topsides)* Decommissioning Marine Licence (MAT Application Reference: DCA/112) Note 4 *(Moorings)*
	CoP Submission	Power generation equipment switched off and isolated Surrendering all associated permits for operations	Surrender Vent/Flare Consent Surrender ETS Permit	Surrender Consent to Locate Surrender Production Chemical SAT and Oil Discharge SAT Surrender PPC Permit
Phases 2 & 3	Decommissioning of pipelines, installations and stabilisation	Barrier Testing with subsea discharge Pipeline disconnection with subsea discharge of chemicals and hydrocarbons	PWA Cat 2 variation PLA MAT Chemical SAT	N/A

Phase	Activity	Operations	Premier Permit	Altera Permit
	features, and survey activities	Cutting and recovery of flowlines, spool, and jumpers Temporary storage on seabed and recovery of dynamic risers and umbilical Mattress repositioning / recovery	Oil Discharge SAT Marine Licence Note 3 *(Dynamic Risers & Umbilical)*	

Notes:

1. Phase 1 is outwith the scope of this EA and the Huntington Field DP (Premier Oil E&P UK Limited, 2020a). It covers preparatory activities which precede activities covered in this DP.
2. The FPSO Float Off activities, which include float off and riser and mooring system removal, are detailed in the approved Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b).
3. This Marine License covers the temporary laying of risers on the seabed, which will be recovered by Altera as a part of the FPSO Float Off activities. However, as this temporary seabed interaction will then be remedied by seabed clearance verification under Premier's decommissioning remit, this marine licence will be undertaken by Premier and is likely to be carried forward throughout the Phase 2 and 3 activities which form the basis of this DP.
4. This decommissioning MAT covers the environmental appraisal for the activities associated with the FPSO Float Off and includes details not covered in the Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b).

2.4 Method Statements

Appropriately licensed waste management companies will be identified through a selection process which ensures that the selected facility demonstrates a proven record of: (1) waste stream management throughout the deconstruction process; (2) the ability to deliver innovative re-use/recycling options; and (3) ensures the aims of the waste hierarchy are achieved. Geographic locations of potential disposal yard options may require the consideration of Trans-Frontier Shipment of Waste (TFSW), including hazardous materials. TFSWs will be reviewed by Premier as part of due diligence. Early engagement with the relevant waste regulatory authorities will ensure that any issues with TFSW are addressed. Premier will engage with other companies and industries to identify potential reuse opportunities. Premier believes that such opportunities are best achieved through the tendering and selection of a waste management contractor with the expert knowledge and experience in this area.

2.4.1 Mooring System Associated with the Voyageur Spirit FPSO

The decommissioning of the Mooring System of the Voyageur Spirit FPSO is a part of the workscope of the Huntington Float Off DP (Premier Oil E&P UK Limited, 2020b). However, the proposed removal activities have repercussions for the subsequent decommissioning of the Huntington Field and, as such, they are described in this EA.

The Voyageur Spirit, which is owned and operated by Altera, is expected to be relocated and re-used for another development (Premier Oil E&P UK Limited, 2020b). Prior to relocation, it will be secured by tugs before cutting the anchor chains at the seabed for removal. Once released from its moorings, the FPSO will be towed to a suitable port for handover as determined by Altera. Following the sail away of the FPSO, the fourteen suction anchors which form the Voyageur Spirit's mooring system will be deburied and removed.

Figure 2-1 Voyageur Spirit FPSO

Altera's Voyageur Spirit FPSO and its mooring system are not being considered for permanant decommissioning at this point in time, rather the vessel is intended for relocation and reuse. All environmental impacts associated with the removal of the FPSO from the Huntington Field are considered the responsibility of Altera and are, therefore, outwith the scope of this EA (Premier Oil E&P UK Limited, 2020b).

Potential environmental impacts associated with the removal of the FPSO and its surface infrastructure, including the disconnection and recovery of the mooring lines and suction anchors, will be covered in separate consents and permits as appropriate (refer to MAT Application Reference: DCA/112). The sail away activities covered under permits associated with Altera are detailed in Table 2-4. However, for due diligence potential legacy impacts which may result from post-removal seabed conditions at the anchor points are being considered as part of the seabed conditions within the Huntington Field, which is the responsibility of Premier.

2.4.2 Pipelines and Umbilicals

The Trenched and Buried Rigid Flowlines (Group 1 in the CA) are to be decommissioned by removing the ends and remediating any potential snagging risk. Once the flowlines are disconnected, the transition and surface laid sections will be cut and recovered using a DSV or CSV. The proposed method of cutting is with hydraulic shears. The cut ends within the base of the trench shall be remediated with local rock or gravel placement and the profile flushed with the surrounding seabed. In the Huntington Field there is one trenched and buried rigid flowline, PL2805. PL2805 is an 8" gas export pipeline 11.8km in length, running from the Huntington Gas Export SSIV to the Huntington Tee. The 8" gas export pipeline has no exposures along its buried length and is buried to an average of 1.687 m. There are no spans (i.e. an area of seabed loss below the pipeline which is > 0.8 m in height from the top of the pipeline and > 10 m long)

along its length. An estimated 144 m representing the transition sections at the ends of the pipeline are to be removed.

For the Trenched and Buried Flexible Flowlines / Umbilicals (Group 3 in the CA) the emerging recommended option, as a result of the CA process, is option 2B, Full Removal – Reverse Reel without De-burial. The flowlines will be disconnected and then recovered onto a suitable reel vessel. De-burial will occur during the reeling process. The full removal of the Trenched and Buried Flexible Flowlines and Umbilical by reverse reeling has the potential to create berms in the sediment. This will be fully addressed in Section 6.2.2. There are four Trenched and Buried Flexible Flowlines / Umbilicals in the Huntington Field.

A description of the rigid and flexible trenched and buried flowlines / umbilicals is in Table 2-5 below.

Table 2-5 Pipelines and Umbilicals

ID	Description	OD (mm)	Length (m)
PL2805	8” Gas Export Pipeline	219.1	11,800
PL2806	10” Production Flowline	394.5	1,860
PL2807	4" Gas Lift Flowline	164.3	1,870
PL2808	8" Water Injection Flowline	279.9	1,830
PLU2809	6” Static Umbilical	151.0	1,800

2.4.3 Spools and Jumpers

Spools and jumpers will be fully removed using a CSV or DSV where sections of spools and jumpers are cut into lengths that are manageable for transportation. The preferred method of cutting is by using hydraulic shears.

Table 2-6 Spools and Jumpers

ID	Description	OD (mm)	Length (m)
PL2805 Jumper 1	8” Gas Export SSIV jumper	270.5	84.0
PL2805 Jumper 2	8” Gas Export Tee jumper	270.5	85.0
PLU2809J SSIV	2” gas export SSIV control jumper.	52.0	130.0
PLU2809J WI1	4” control jumper.	71.5	100.0
PLU2809J WI2	4” control jumper.	71.5	100.0
PLU2809J P1	4” control jumper.	93.5	100.0
PLU2809J P2	4” control jumper.	93.5	100.0
PLU2809J P3	4” control jumper.	93.5	100.0
PLU2809J P4	4” control jumper.	93.5	100.0

ID	Description	OD (mm)	Length (m)
PL2806 JP1	6" production spool	170.3 Note 1	63.5
PL2806 JP2	6" production spool	170.3 Note 1	63.5
PL2806 JP3	6" production spool	170.3 Note 1	63.5
PL2806 JP4	6" production spool	170.3 Note 1	63.5
PL2807 JP1	2" gas lift spools	65.5 Note 1	64.0
PL2807 JP2	2" gas lift spools	65.5 Note 1	66.0
PL2807 JP3	2" gas lift spools	65.5 Note 1	67.0
PL2807 JP4	2" gas lift spools	65.5 Note 1	67.0
Huntington Tee	24" gas export spool	612.0 Note 1	38.0

Notes:

1. iFab Material Record Book states that the finished dry film thickness of the spool coating is 1mm. 2mm has therefore been added to the line pipe OD to account for the spool coating.

2.4.4 Dynamic Risers & Dynamic Umbilicals

The decommissioning of the Dynamic Risers & Dynamic Umbilicals are a part of the workscope of the Huntington Float Off DP (Premier Oil E&P UK Limited, 2020b). However, potential legacy impacts within the Huntington Field which may result from post-removal seabed conditions where the Dynamic Risers and Umbilical made contact with the seabed are the responsibility of Premier and are assessed in the impact assessment Sections below.

The four Dynamic Risers & one Dynamic Umbilical are to be cut with a Diamond Wire Saw and the upper sections of the risers will fall to the seabed. Buoyancy modules fitted to the dynamic sections will maintain the majority of the riser within the water column. Following this, and removal of the FPSO from the field, the risers and umbilicals shall be disconnected from their riser bases, and at their respective end connections, and recovered onto a suitable vessel-based reel. They shall be returned onshore for recycling and disposal.

Table 2-7 Dynamic Risers and Umbilical

ID	Description	OD (mm)	Length (m)
PL2806	Production Riser	350.5	325.0
PL2807	Gas Lift Riser	178.83	325.0
PL2808	Water Injection Riser	279.88	325.0
PL2805	Gas Export Riser	295.68	375.0
PLU2809	Dynamic Umbilical	185.5	325.0

2.4.5 Subsea Installations

Subsea installations shall be fully removed from the seabed except for the CATS pipeline crossing ramps, and the Huntington Tee which forms part of the CATS owned inventory of the pipeline/infrastructure, which will likely be decommissioned alongside the CATS pipeline. However, as this EA discusses the worst-case scenario for the Huntington Field decommissioning, the Tee has been included. Internal pile cutting is assumed for piled installations. Where installations are gravity based a 1.0 metre 'buffer' zone is assumed from the outside perimeter to account for the potential requirement for seabed intervention to mitigate suction effects. Installations will be lifted from the seabed using a CSV or DSV with a suitably rated subsea crane. A summary of the Huntington Field installations is provided in Table 2-8.

Table 2-8 Subsea Installations

Infrastructure	Description	Dimensions (m)	Weight (te)
CATS Pipeline Crossing Ramps	2 off concrete pipeline crossing ramps	5.85 x 3.0 x 1.81	26 (each)
Drilling Template	Steel framed piled template structure	15.3 x 13.4 x 7.75	246.8
Production Manifold	Production Manifold Cassette integrated into the Manifold Protection Structure		
Manifold Protection Structure	Steel framed piled manifold protection structure	27.42 x 10 x 6.41	201.5
SSIV Structure	Steel framed gravity-based structure	9 x 4.5 x 3.05	35.3
DUTA/UTA	Steel framed gravity-based structure	7 x 6 x 3.63	70.7
Holdback Clump Weight Structures	4 off steel framed gravity-based structures with steel ballast	6 x 6 x 1.9	316.3 (total)
Tether Base	5 off steel framed gravity-based tether bases	5 x 5 x 1.25	392.5 (total)
Huntington Tee	Steel framed gravity-based structure	15.74 x 11.94 x 4.53	126.5

2.4.6 Protection / Stabilisation

All protection / stabilisation is to be fully recovered using a DSV or a CSV. Concrete mattresses and grout bags which are recovered will be cleaned and either recycled as aggregate for infrastructure projects or disposed of in landfill sites. For protection / stabilisation which is unable to be recovered due to accessibility or integrity issues Premier will open a dialogue with OPRED about alternative decommissioning methodologies. Protection / stabilisation associated with the 36" CATS Pipeline crossover will be left undisturbed.

- 61 off 6 x 2 x 0.15 m bi-flex concrete protection mattress[3]

[3] All 61 off 6 x 2 x 0.15 m bi-flex mattresses are associated with the Surface and Subsea Field DP

- 236 off 6 x 3 x 0.15 m bi-flex concrete protection mattress[4]
- 1,000 off 25 kg grout bags (estimated)

2.4.7 Clear Seabed Verification

Following the decommissioning of the Huntington Field infrastructure, it is necessary to identify any potential snagging hazards associated with any changes to the seabed. A clear seabed will be validated by an independent verification survey of all of the installation sites and pipeline corridors, as well as any anchor points and 500 m exclusion zones. The aim of these clean seabed verification actions is to ensure the seabed is left in a safe condition for future fishing effort, in line with the current Decommissioning Guidance (BEIS, 2018).

Survey techniques which do not make contact with the seabed, such as Side Scan Sonar (SSS) and Remotely Operated Vehicle (ROV), will be implemented to verify the condition of the seabed during the post decommissioning survey. The survey methods will be discussed and finalised with OPRED prior to survey commencement to ensure the survey meets the requirements for clear seabed verification.

Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the Scottish Fishermen's Federation (SFF), seabed clearance is likely to require conventional overtrawl survey methods. Where there is evidence of snagging hazards requiring intervention (e.g. any spans, berms, dropped objects, etc.), then overtrawling will be undertaken to ensure no residual risk of snagging remains post-decommissioning. Should overtrawling be required, it will be conducted by fishing vessel(s) using trawl gear that is appropriate for the area. It is expected that any such intervention would be limited to the suction anchor points, dynamic umbilical and dynamic risers and reverse reeled flexible flowlines, as removal of surface laid flowlines and other subsea infrastructure is not anticipated to generate any snagging hazards. As a worst-case, the Clear Seabed Verification Survey shall cover each of the pipeline corridors to a width of 100 m centred on the pipeline route. Such a scenario is highly unlikely; however, this EA aims to address the worst-case event.

The latest survey data available for the Huntington Field pre-dates development drilling in the field and as such the current debris status is unknown. Pre- and post-decommissioning surveys shall be conducted, and any debris identified shall be recovered and recycled / disposed of accordingly.

2.5 Summary of Material Inventory

This section summarises the inventory of materials associated with the subsea infrastructure to be decommissioned. Comprehensive information about the materials present within the Huntington Field is provided.

The Huntington Field consists of a subsea template with 6 wells, 3 production and 3 water injection[5]. The template is tied back via a subsea manifold to an FPSO, the Voyageur Spirit. The template wells are connected to the subsea manifold via individual rigid steel spools and flexible control jumpers. The manifold is tied back to the FPSO via flexible production, gas lift and water injection flowlines, a static controls and chemical umbilical and associated dynamic flexible risers and dynamic umbilical which are arranged in a lazy-S configuration with distributed buoyancy. The dynamic risers are secured with tether bases and hold back clump weights. The dynamic umbilical is secured with a tether base to a gravity-based DUTA / UTA structure. The dynamic risers and dynamic umbilical form part of the materials inventory associated with the FPSO and are covered under a separate DP for the surface infrastructure (Premier Oil E&P UK Limited, 2020b).

[4] Of the 236 off 6 x 3 x 0.15 m mattresses, 175 are associated with the Surface and Subsea Field DP and 69 are associated with the FPSP Float Off DP.

[5] Originally there were 4 production and 2 water injections wells. In 2018, the H2 well was converted into water injection.

Processed oil is exported via shuttle tanker which connects to the FPSO via a floating hose. Dried gas is exported into the CATS system via a rigid pipeline and tee arrangement at the CATS pipeline tie-in.

All pipelines are trenched and buried with concrete mattresses and grout bags used to support and protect surface sections as required.

Table 2-9, Figure 2-2 and Figure 2-3 summarise the total and proportional weight of each component's constituent materials for the Huntington Field.

Table 2-9 Component Materials of Infrastructure to be Decommissioned

Component Type	Weight (Te)				
	Ferrous – all grades	Non-ferrous	Plastics & Misc.	Concrete	Total
Pipelines	1,576	14	363	1,395	3,348
Installations	1,229	12	0	215	1,390
Total	2,805	26	363	1,610	4,738

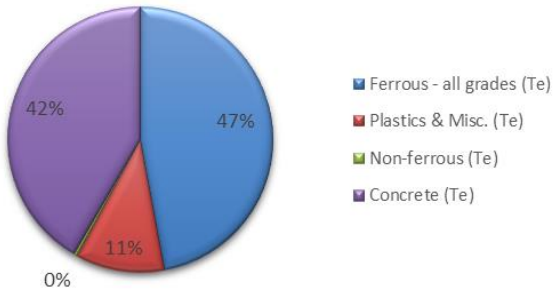

Figure 2-2 Proportion of constituents for pipelines in the Huntington Field

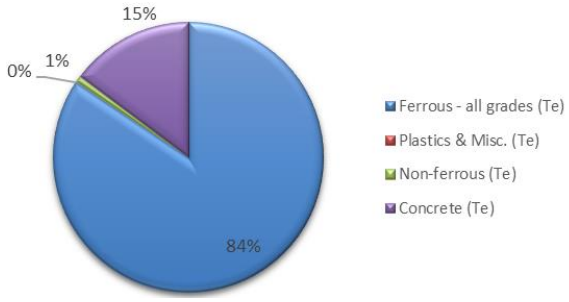

Figure 2-3 Proportion of constituents for installations in the Huntington Field

2.6 Waste Management

The management of waste during decommissioning is a highly regulated activity, which potentially requires compliance with both national and international legislation, depending on the destinations identified for dismantling and treating any wastes generated.

Premier's HSES Policy supports legal compliance and states that Premier will "do all that is reasonably practicable to prevent major accidents, ensure the safety of everyone involved with our operations and minimise environmental impacts."

Premier will meet statutory or supporting legislation requirements, assessing and managing risks and seeking ways to continually improve performance with respect to waste management activities during the Huntington Later Life Project (HLLP).

Premier's commitments to waste management during decommissioning are to:

1. Manage waste from decommissioning activities in accordance with the applicable regulatory framework and all other obligations required by Premier's HSES Policy.
2. Manage the activities of all contractors and sub-contractors within the decommissioning supply chain that generate and manage waste and ensure their compliance with legal obligations and Premier's HSES Policy.
3. Treat wastes where practicable using the principles of waste hierarchy, with a focus on reuse and recycling of wastes whenever possible.

4. Measure and monitor HLLP's performance with respect to waste management, including the setting of KPI's for the reuse and recycling of wastes.

2.7 Environmental Management Strategy

Premier is committed to operating responsibly and will never knowingly compromise our health, safety or environmental standards to meet our operational objectives. We will do all that is reasonably practicable to prevent major accidents, ensure the safety of everyone involved with our operations and minimise environmental impacts. Premier's HSES signed policy is shown in Figure 2-4.

Figure 2-4 Premier's HSES signed policy

2.8 Proposed Schedule

The precise timing of the decommissioning activities is not yet confirmed and will be subject to market availability of cost-effective removal services and contractual agreements. The high-level Gantt chart featured in Figure 2-5 provides the overall schedule for the programme of decommissioning activities for the Huntington Field operated by Premier Oil.

Prior to commencing decommissioning works, Premier Oil will flush the subsea pipelines associated with the Huntington Field.

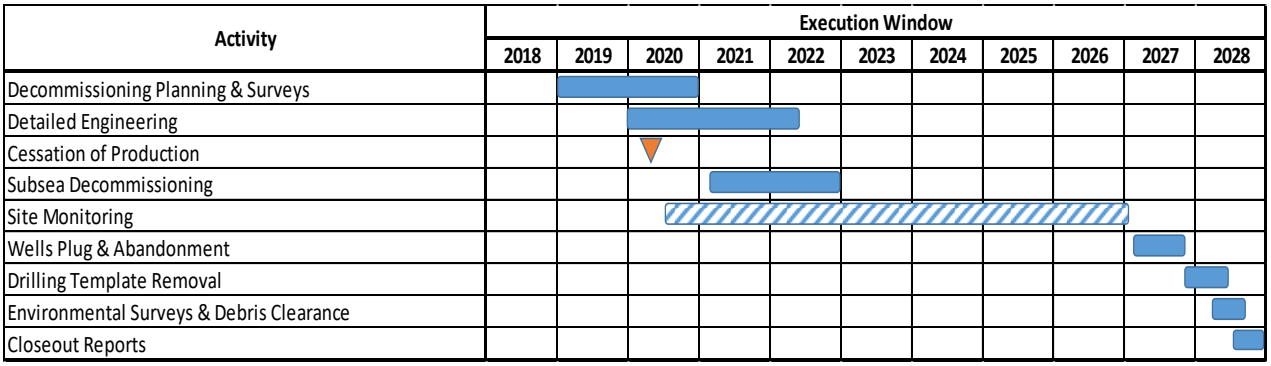

Figure 2-5 Gantt Chart of the project plan

3 ENVIRONMENTAL AND SOCIETAL BASELINE

3.1 Background

Information is provided here on the environmental baseline characteristics around the Huntington Field to help inform an assessment of the features that may be affected by the proposed decommissioning operations or may have a bearing on the nature and extent of relevant impacts. The potential interactions between project activities and environmental receptors are detailed and assessed in Section 6. As the activities associated with the DPs will form a nearly ongoing presence over seven years, environmental features and any relevant changes in their characteristics and sensitivities are described across the entire year.

The project scope (Section 2) and initial screening (Section 5) suggests that the majority of potentially significant environmental impacts would be felt within relatively close proximity of the proposed development location. Therefore, environmental sensitivities are described on a local scale, with broader scale data only used where appropriate to certain ecological characteristics, such as broadscale habitat classification. Certain activities or events, such as water quality impacts, could potentially have more spatially extensive environmental impacts. In these instances, those environmental sensitivities that may be affected are described on a greater spatial scale.

In this regard, Table 3-2 provides an overview of all the environmental and societal sensitivities in the area. Details have been provided on the receptors most likely to be impacted by the proposed activities in the sections below. This baseline characterisation describes the current conditions of the receiving environment comprising the Huntington Field Area and is considered sufficient to enable effective evaluation of the potential environmental interactions from proposed decommissioning activities.

3.2 Summary of Environmental Surveys

The Huntington Field was discovered in 2007 and has been subject to several surveys since then. Surveys for habitat assessment and environmental baseline data collection were conducted at the Huntington development between 2007 and 2010 (as detailed in Table 3-1 and Appendix D). These surveys gathered seabed samples and imagery in order to acquire an understanding of the range of seabed habitats and communities present, including the potential presence of any species or habitats of conservation concern, such as pockmarks, prior to the commencement of decommissioning activities.

There have been two cruciform-pattern environmental surveys conducted at Huntington (Gardline, 2008a&b; 2010), and a pipeline route survey where station selection was based on ground-truthing features of interest (Gardline, 2008a&b). The available survey data comprehensively covers the Huntington Field. The surveys were conducted prior to development drilling and the results may therefore not reflect the current, post-development, condition of seabed features and benthic fauna. Pre-decommissioning survey work is scheduled for 2020. The existing survey data is sufficient to broadly characterise the Huntington Field and highlight the potential for presence of protected species/habitats (of which none have been identified to date). The existing survey coverage is appropriate to support the approval of a Decommissioning Environmental Appraisal for Huntington, prior to any offshore works being undertaken. All of the previous and existing Huntington survey reports are listed in Table 3-1.

Table 3-1 Previous and Existing Huntington Environmental Survey Reports

Report Title	Survey date	Contractor	Contractor ref. no
Rig Site and Habitat Assessment Survey, Huntington M, UKCS Block 22/14, Volume 1: Results and Operations, Final Report	Nov-Dec 2007	UTEC	585B
Rig Site and Habitat Assessment Survey, Huntington M, UKCS Block 22/14, Volume 2 of 2: Habitat Investigation, (completed by Fugro for UTEC 585B)	Nov-Dec 2007	Fugro	9461.1V2.1
Oilexco North Sea Ltd., UKCS 2/14b Huntington Field Development, Huntington FPSO Site and Environmental Baseline Survey Report	June-July 2008	Gardline	7657.1 and 7657.3
Oilexco North Sea Ltd., UKCS 22/14b Huntington Drill Centre and Habitat Assessment Report, Huntington Site Survey	June-July 2008	Gardline	7657.2
Oilexco North Sea Ltd., Huntington FPSO to CATS T1 Gas Export Pipeline and Drill Centre to FPSO Flowline Routes and Environmental Baseline Surveys, UKCS Block 22/9 and 22/14b	June 2008	Gardline	7658
Huntington Field development UKCS 22/14b Central North Sea SL15 and FPF locations site survey. Geophysical survey Vol 5 environmental baseline report.	Sept-Oct 2010	Gardline	8493.5

3.2.1 Habitat Assessment surveys

3.2.1.1 Huntington Routes and Drill Centre Survey (Gardline, 2008; 2009)

A habitat assessment survey was undertaken from June to July 2008 from a Gardline Shipping survey vessel. The habitat assessment was completed in conjunction with a geophysical site survey and the environmental survey (Gardline 2008b; 2009). The object of the habitat assessment was to investigate the survey area for the presence of potentially sensitive habitats, protected under the UK's Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (EC Habitats Directive 92/43/EEC).

An interpretation of multi-beam echo sounder and side scan sonar data was undertaken to help identify sediment characteristics and any anomalies such as areas of high and patch reflectivity, which may indicate the presence of sensitive habitats, such as methane-derived authigenic carbonates (MDAC), *Sabellaria spinulosa* reefs or cold-water corals. Initial interpretation of the acoustic data revealed the seabed to be largely composed of low sonar reflectivity sediments with patches of moderate sonar reflectivity. There was no evidence of pockmarks, biogenic reefs or other such features protected under Annex I of the EU Habitats Directive within the survey area.

The locations of ten stations were selected in a cruciform pattern centred on the proposed Huntington Drill Centre, for investigation with a camera and video system. Two stations were adjusted slightly from the main cruciform arrangement to ensure additional replicates were taken of the moderately reflective seabed. All stations were sampled as part of the environmental baseline survey, with the recovered sediments sub-sampled for analysis of hydrocarbons, organic matter, metals, granulometry and macrofaunal assemblages.

There was no indication of the presence of potential Annex I habitats within the survey area.

3.2.1.2 Huntington Field Development SL15 and FPF Site Survey (Gardline, 2010)

Nine stations were investigated with a digital stills camera and video system followed by sampling by a 0.1 m^2 Day grab. The aim was to provide information on the presence of potentially sensitive habitats protected under the UK's Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (EC Habitats Directive 92/43/EEC). However, due to a forecast of prolonged bad weather, the survey was curtailed after grab sampling at six stations had been carried out.

The environmental sampling strategy was to create a cruciform pattern of five stations, centred on the proposed Huntington location, as well as sampling two stations adjusted to investigate the larger depressions identified during interpretation of the sonar data. Further investigation of the depressions with the camera system and grab sampling, revealed these areas contained densely packed shell aggregations, however, no increase in faunal densities was noted when compared to the surrounding area. Overall, the acquired data indicate that the depressions showed no evidence of an Annex I habitat because investigation indicated they were not formed by leaking gases (EC, 2007). Further discussion on the results is provided in Section 3.4.

No environmentally sensitive habitats protected under Annex I of the EU Habitats Directive were observed within the survey area.

3.2.2 Environmental Baseline Survey

3.2.2.1 Huntington Routes Survey (Gardline, 2008; 2009)

Gardline carried out pipeline route and flowline surveys, extending from the Huntington Drill Centre to Huntington FPSO location and from the Huntington FPSO to the CATS T1 Manifold. The Huntington Drill Centre to FPSO flowline and Huntington FPSO to CATS T1 gas export pipeline routes are 1.88 km and 12.02 km long respectively. The 300 m wide survey corridors were extended 500 m at each end.

The purpose of the survey was to determine the suitability of the pipeline routes and identify any shallow geological or topographical conditions that could impede pipe laying or trenching operations. The environmental baseline survey consisted of Day grab sampling and seabed imagery using digital stills camera and video system.

Five sample stations were selected along the pipeline routes for investigation with a camera and a video system. All stations were sampled as part of the survey, with the recovered sediments sub-sampled for analysis of hydrocarbons, organic matter, metals, granulometry and macrofaunal assemblages. The results from this survey are reported separately in Gardline (2008a&b; 2009a&b).

Environmental baseline surveys confirmed seabed in the Huntington Field area is shaped into natural gentle shoals and broad depressions; the difference in water depth between the shoals and depressions is minor. Depth ranged from approximately 88 m in the southeast of the drill centre geophysical site survey areas to 91 m in a depression in the centre-west of the SL15 well site survey area (Gardline, 2008a, 2009a and 2010).

Along the Huntington export pipeline route, water depth ranged from approximately 88 m to 90 m. There was no overall discernible depth gradient; the two shallowest areas were at the CATS T1 manifold at the far end of the route and in the middle of the route, and the deepest point was in between these two shallow areas (Gardline, 2008b, 2009b).

The seabed sediments at the Huntington Field predominantly comprise slightly silty shelly sand with occasional minor clay outcrops, coarse sediment accumulations and boulders and debris. Sampling confirmed the geophysical sediment interpretation, with most samples comprising poorly sorted muddy sand or slightly gravelly muddy sand, with gravel sized particles primarily being shell fragments (Gardline,2008a, 2009a and 2010).

Seabed sediments on the export pipeline route were predominantly slightly silty shelly sand with occasional minor coarse sediment accumulations which sampling showed in some cases to be due to high densities of shell fragments. There were also areas of the route where numerous outcroppings of the clay bedrock were observed. Particle size analysis showed a predominance of fine sand, with fines between 10% to 14% and gravels (including shells and shell fragments) between zero and <1.0%. Grab samples were not collected on the clay outcrops, so PSA for these areas is not available Gardline (2008b and 2009b).

THC at the Huntington Field and on the export pipeline route was in line with background concentrations for undisturbed sediment in the CNS, with the exception of one station in the infield area reported in Gardline (2008a and 2009a) where a very high concentration was recorded. There were black lumps in the grab sample from this station, and a chemical smell was noted in the sampling log. Chemical analysis showed that the source was likely to be a lubricating oil and unlikely to be associated with the exploration drilling that had previously occurred in the area. Heavy metals reported in Gardline (2008a and 2009a) were also in line with CNS background concentrations, with the exception of elevated concentrations of several metals in the same sample that gave the high THC result. In the Gardline (2010) well site survey, metals concentrations were generally low. Barium, copper, zinc and lead were slightly elevated above background concentrations, but not sufficiently to predict an impact on the faunal community. No reason for the slightly elevated levels of these metals was proposed. On the export pipeline route, heavy metals were all below background concentrations, with the exception of mercury at a single station, which was slightly elevated although not to the extent that the faunal community was expected to be affected (Gardline, 2009b).

Visible epifauna recorded from camera footage was consistent across the infield and export pipeline survey area and in line with expectations from this part of the CNS, comprising hermit crabs, starfish, molluscs, anemones, hydroids, soft coral and fish. In addition, annelid worm tubes were identified. The macrofauna from the grab samples was diverse, species rich and consistent across the survey area. There were many taxa found only in one sample, many of which were represented by a single individual. This suggests the community is undisturbed. There was no discernible difference in the macrofaunal community at the infield station where high THC and heavy metals concentrations were recorded (Gardline, 2009a). This suggests the contamination was restricted to the lumps of material observed in the grab, and the macrofauna was therefore not exposed. The fauna at the export route station with elevated mercury was also indistinguishable from nearby uncontaminated stations (Gardline, 2009b).

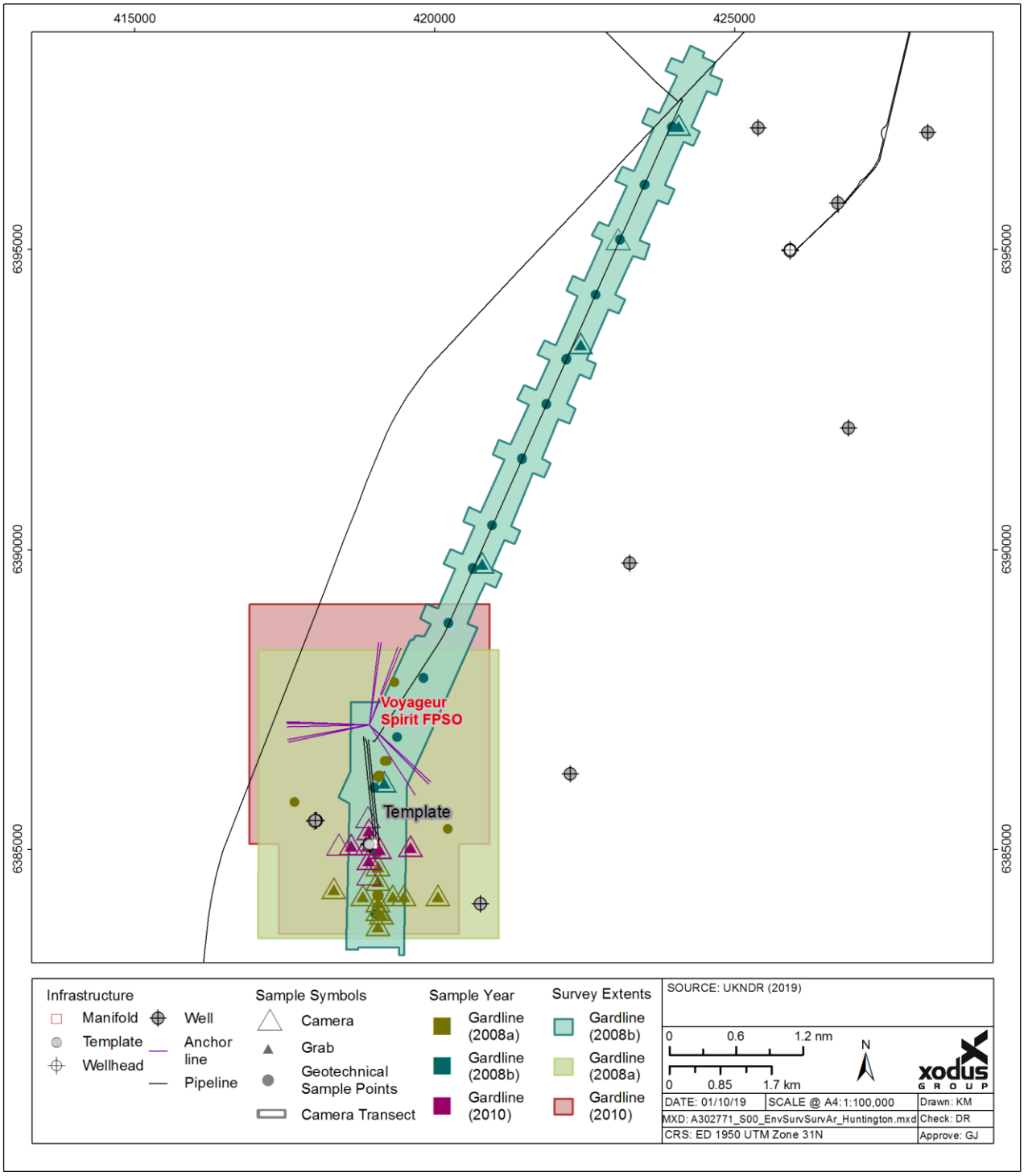

Figure 3-1 The greater Huntington Field geophysical survey effort and sample locations

3.2.2.2 Huntington Drill Centre Survey (Gardline, 2009)

An environmental baseline survey was completed in conjunction with a geophysical site survey and habitat assessment during June and July 2008 (Gardline, 2009a&b). The object of the survey was for seabed sampling from which to establish the baseline characteristics and benthic community at and around the proposed (at the time) Huntington Drill Centre location, along the Huntington Drill Centre to the Huntington FPSO location and from the Huntington FPSO location to the CATS T1 Manifold pipeline routes. Ten stations were sampled using a 0.1 m^2 Day grab in proximity to the Huntington Drill Centre. Stations were selected to allow investigation of any features of interest on the seabed, as highlighted by imaging analyses, with remaining stations to be located on a stratified random basis. Ten stations were selected in a cruciform template centred on the Huntington Drill Centre in line with the predominant north-south current direction. Two stations were adjusted from the cruciform arrangement to investigate areas of moderate (sonar) reflectivity, and one reference station was chosen 1,000 m east of the well location in an area of typical seabed. Four 0.1 m^2 Day grab samples were taken at each station. Sub-samples were taken from one of these for analyses of physico-chemical characteristics. The remaining three samples were retained for macrofaunal analysis.

An overview of all successful baseline sampling in the Huntington Field area is provided in Figure 3-1.

3.2.2.3 Huntington Field Development SL15 and FPF Locations Site Survey (Gardline, 2010)

An environmental baseline survey was conducted by Gardline between September and October 2010 at the SL15 well location by a research vessel. The survey coincided with a geophysical site survey and habitat assessment of the area. All previous and existing Huntington Environmental Baseline reports were reviewed in detail in order to establish their relevance and degree of coverage to the Huntington Field development architecture. The review identified that these reports were very relevant to all of the current facilities to the north of the SL15 drill centre, namely the FPSO and SSIV locations, as well as the pipeline route from the FPSO to the CATS Tee1. Therefore, the 2010 survey environmental phase focused on the area around the SL15 drill centre and to cover the environmental aspects of the other Huntington facilities areas as an integral part of the other survey work at those areas. The aim of the environmental survey was to acquire baseline data of sediment physico-chemical and biological characteristics in the vicinity of the SL15 well location.

Stations were based on a cruciform pattern, with one station at the well location and a further eight stations located at 250 m and 500 m increments in a north, south, east and west direction. Five stations were set in a cruciform arrangement while two stations deviated slightly to target areas of higher sonar reflectivity and two other stations targeted two small depressions. All nine stations were investigated with a digital stills camera and video system before commencing sampling with a 0.1 m^2 Day grab. However, three grab samples were not attempted due to time and weather constraints. Four grab samples were retained from each of the six sampled stations, three of which were utilised to obtain the macrofaunal data and the fourth sample was sub-divided for the physico-chemical data (hydrocarbons, organic matter contents, metal and particle size analyses).

An overview of all successful baseline sampling in the Huntington Field area is provided in Figure 3-1. Further discussion on the results is provided in Section 3.4.

3.2.3 Additional Environmental Surveys

A series of earlier site and habitat assessment surveys have also been conducted in support of offshore operations at Huntington. These surveys have typically sought to characterise the seabed in the local area by using a combination of analogue techniques, as well as seabed sampling methods, including digital stills camera/video systems and grab sampling. Information gathered regarding physical, chemical and biological characteristics observed in the Huntington Field development during this survey work is incorporated in the following sections where relevant.

Additionally, access has recently been granted to the Draft Pre-decommissioning Environmental Survey (Fugro, 2020), which characterised the baseline environment and assessed the habitat in UKCS Blocks 22/09 and 22/14a between 31st May 2020 – 3rd June 2020. This data, which is as yet to be finalised, has been used where appropriate below to support existing environmental baseline evidence from the Gardline (2008, 2009 and 2010) surveys.

3.3 Summary of Receptors

The baseline environment in the project area is summarised in Table 3-2. For most receptors, the information provided in Table 3-2 is considered sufficient to inform the environmental assessment of potential impacts within this EA. Specific receptors identified during the ENVID and consultation meetings as potentially of specific interest to stakeholders included commercial fisheries, seabed and benthic environment and water quality. These receptors are discussed in detail in the following Sections.

Table 3-2 Baseline Summary of Environmental and Societal Receptors

Environmental Receptor	Description
Key Conservation interests	
OSPAR (2008) List of Threatened and/or Declining Habitats and Species	
Ocean quahog	Ocean quahog (*Arctica islandica)* is a slow growing species that is widely distributed in the wider area of the North Sea (JNCC, 2018a). Whilst this species was not directly observed in any survey sampling within the project area, it has been observed in the nearby East of Gannet and Montrose Fields NCMPA (14 km) and in sites within 50 km and in similar sediment types.
Seapens and burrowing megafauna communities	Historical surveys conducted at Huntington (Gardline, 2008, 2009, 2010) all recorded the presence of some sea pens; however, the reports and the seabed images do not suggest them to be abundant. Semi-quantitative assessment in Gardline (2010) describes *V. mirabilis* as 'occasional', though no systematic assessment using the SACFOR scale (JNCC, 2014a) was conducted during this survey. None of these reports recorded the presence of burrowing megafauna. Although the seabed images show some evidence of bioturbation in the form of movement tracks and small burrows, the seabed observed is not consistent with the presence of burrowing megafauna. These observations have been confirmed by the Draft Pre-decommissioning Environmental Survey (Fugro, 2020), which utilised the JNCC (2014) assessment criteria and concluded that the abundance of *P. phosphorea*, which was found across all stations and transects, was 'common', while the occurrence of faunal burrows, which were typically small (< 1 cm), were 'occasional'. Therefore, the OSPAR T&D habitat 'Sea pens and burrowing megafauna communities' was not deemed present in the Huntington survey area.
Conservation sites	
Special Areas of Conservation (SACs)	The are no SACs within 40 km of the project area. The nearest SAC to the Huntington Field is the Scanner Pockmark SAC, which is situated 84 km from the Project area. This site is designated for the presence of submarine structures formed by leaking gases, which are found within seabed depressions referred to as "pockmarks" and support reef-like communities distinct from the surrounding soft sediments (JNCC, 2018b). The SAC is a singular large depression which contains Methane Derived Authigenic Carbonate (MDAC) blocks made by leaking gases, which support a fauna typical of rocky reefs, including anemones *Urticina feline* and *Metridium senile* and squat lobsters (JNCC, 2018b).
Nature Conservation	The nearest NCMPA to the Huntington Field is the East of Gannet and Montrose Fields NCMPA located 14 km south west of the project area. This site is designated for the

Environmental Receptor	Description
Marine Protected Area (NCMPAs)	conservation of offshore deep-sea muds and ocean quahog aggregations, including sediment areas suitable for their colonisation (sand and gravel habitat). No living specimens of ocean quahog or infaunal siphons were observed during the site-specific surveys (Gardline, 2010) and the Huntington Field is not located on any large-scale features of functional significance (Gardline, 2009a&b; SNH, 2019c&d).
Special Protected Areas (SPAs)	There are no SPAs in the vicinity of the project area.
Annex I Habitats	No Annex I Habitats were identified in any of the site-specific surveys.
Conservation Species	
Coastal and Offshore Annex II species most likely to be present in the project area	
Pinnipeds – Harbour and Grey Seals	Pinnipeds not expected in significant numbers, with densities estimated at approximately 0-1 individuals per 25 km^2 for both harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) (Seal Mammal Research Unit (SMRU) and Marine Scotland, 2017). This is due to the site being approximately 205 km offshore.
European Protected Species most likely to be present in the project area	
Harbour porpoise	The harbour porpoise (*Phocoena phocoena*) is a small, highly mobile species of cetacean that is common to all UK waters. As such the harbour porpoise can also be found in the vicinity of the proposed decommissioning area in relative abundance. Particularly large numbers occur near the project area during the summer months, with a peak in numbers in July and August (Reid *et al*., 2003; Hammond *et al*., 2017). The relative density of harbour porpoise is roughly estimated at 0.6-0.7 animals/km^2 in the project area (Hammond *et al*., 2017).
White sided dolphin	The Atlantic White-sided dolphin (*Lagenorhynchus acutus*) species live mainly in cool waters (7-12°C), particularly seaward or along the edges of the continental shelf in depths of 100-500 m (Reid *et al*. 2003). However, the species can also be numerous in much deeper, oceanic waters. The species comes onto continental shelfs such as those of the north western North Sea (Reid *et al*. 2003). Little is known about the seasonal movements of *L. acutus*. They are found in deep waters around the north of Scotland throughout the year, though mainly in the summer (Reid *et al*., 2003; Hammond *et al*., 2017).
Minke whale	Minke whale (*Balaenoptera acutorostrata*) occur in water depths of 200 m or less throughout the northern North Sea and CNS. They are usually sighted in pairs or in solitude; however, groups of up to 15 individuals can be sighted feeding. It appears that animals return to the same seasonal feeding grounds. Sightings in relation to the project area are mainly and largest in spring and the summer months (Hammond *et al*., 2017). The relative density of minke whales is roughly estimated at 0.035-0.040 animals/km^2 in the project area (Hammond *et al*., 2017).
White- beaked dolphin	The white-beaked dolphin (*Lagenorhynchus albirostrisis*) are found mostly in continental shelf waters with depths between 50 m and 100 m, and rarely out to the 200 m isobath (Reid *et al*. 2003). Distribution of the species has been linked to sea surface temperature, local primary productivity and prey abundance. White-beaked dolphins are usually found in water depths of between 50 and 100 m in groups of around 10 individuals, although large groups of up to 500 animals have been seen. The species are roughly estimated to have a density of 0.20-0.25 animals/km^2 near the project area (Hammond *et al*., 2017).

Environmental Receptor	Description
Benthic environment	
Seabed type	An interpretation of multi-beam echo sounder and side scan sonar data revealed the seabed to be largely composed of low sonar reflectivity sediments with patches of moderate sonar reflectivity. There was no evidence of pockmarks, biogenic reefs or other such features protected under Annex I of the EU Habitats Directive within the survey area. EUNIS habitats A5.15 'Deep circalittoral coarse sediment' and A5.27 'Deep circalittoral sand' are predicted to be representative of the Huntington Field based on broad-scale habitat mapping (BGS, 2019). In particular, deep circalittoral sand is the predominant substrate type within the CNS (BGS, 2019). The occurrence of habitats A5.15 and A5.27 also indicates the potential presence of PMF 'offshore subtidal sand and gravels' (JNCC, 2014b). However, these habitats are widely distributed within the North Sea and already included within UK MPA network. No other potentially sensitive habitats were observed within the Huntington survey area. Across most of the project area slightly silty shelly sand can be found which is generally less than 0.5 m thick at the seabed, although areas of minor coarse sediments accumulations and minor clay outcrops are scattered across the project area (Gardline, 2008a). Along the flowline and export pipeline routes a veneer of slightly silty shelly sand less than 0.5 m thick is also expected at the seabed through much of the route corridor, with areas of scattered/numerous clay outcrops and minor coarse sediment accumulations (Gardline, 2008b). Occasional boulders and debris are present in the vicinity of the project area, with the majority less than 1 m in height from the seabed (Gardline, 2010).
Benthic Fauna	The marine fauna and flora in the Huntington Field area is typical of areas of the CNS with similar water depths and sediments. Surveys carried out (Gardline 2008a; Gardline 2008b) showed that faunal density in the area is generally low and the seabed mainly comprised slightly silty shelly sand. Fauna identified during the surveys included crustaceans (*Pagurus Bernhardus*), echinoderms (starfish, possibly juvenile *Asterias rubens*), annelids (possible polychaete tube worm), molluscs (possibly *Dentalium vulgare*), cnidarians (*Sagartia elegans*, possible *Calliactis sp*., hydroids, mainly *Tubularia indivisa, Alcyonium digitatum*), and chordates (*Agonus cataphractus*). Faunal burrows, worm casts and general bioturbation were also observed throughout the survey area (Gardline, 2010).
Fish – spawning and nursery grounds	
Spawning grounds	The project area is located within spawning grounds of cod, lemon sole (*Microstomus kitt)*, mackerel, Norway lobster, Norway pout and sandeel (Coull *et al*., 1998; Ellis *et al*., 2012).
Nursery grounds	The following species have nursery grounds in the vicinity of the project: anglerfish, blue whiting, cod, European hake, herring, ling, mackerel, Norway lobster, Norway pout, plaice, sandeel, spotted ray, spurdog, and whiting (Coull *et al*., 1998; Ellis *et al*., 2012).
Probability of 0 age group fish aggregation	Aires *et al*. (2014) provides a predicted spatial distribution of 0-year group (i.e. juvenile) fish. The model predicted low densities for three commercial species within Block 22/14a and 22/09: herring, mackerel and anglerfish (Aires *et al*., 2014).
Seabirds	
According to the density maps provided in Kober et al. (2010), the following species could be found within the Huntington Field area: Northern fulmar (Fulmarus glacialis), northern gannet (Morus bassanus), common gull (Larus canus), great black-backed gull (Larus marinus), black-legged kittiwake (Rissa tridactyla), common	

Environmental Receptor	Description

guillemot (Uria aalge), little auk (Alle alle) and Atlantic puffin (Fratercula arctica). These are amongst the species commonly encountered in the CNS survey area (Gardline, 2010).

In Block 22/14a and 22/09 the sensitivity of seabirds to oil pollution, reflected by the Seabird Oiling Sensitivity Index (SOSI), is medium in January, March and April and then low for all other months of the year, although there is limited data available between November and December (Webb *et al*., 2016). The SOSI values for Blocks 22/14a and 22/09 and the blocks around the Huntington Field are presented below.

Seabird Oil Sensitivity Index (SOSI)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22/08	4	5	4	4*	5*	5	5	5	5	5*	N	4*
22/09	4	5	4	4*	5*	5	5	5	5	5*	N	4*
22/10	5	5	5*	5*	5	5	5	5	5	5*	N	5*
22/13	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/14a	5	5	4	4*	5*	5	5	5	5	5*	N	5*
22/15	5	5	5*	N	5*	5	5	5	5	5*	N	5*
22/18	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/19	5	5	5	5*	5*	5	5	5	5	5*	N	5*
22/20	5	5	5*	N	5*	5	5	5	5	5*	N	5*
Key	1 = Extremely high		2 = Very high		3 = High		4 = Medium		5 = Low		N = No data	
	* in light of coverage gaps, an indirect assessment of SOSI has been made											

Socio-economic Receptor	Description

Commercial fishing

Amalgamated VMS data from 2007 – 2015 shows demersal trawling activity associated with oil and gas pipelines in this region from *Nephrops* and demersal trawling (Figure 3-4). The fishing intensity is generally low for mobile *Nephrops* trawling with high intensity occurring north west of the Huntington Field. In addition, amalgamated VMS data for pelagic herring trawling showed fishing intensity in the Huntington Field area classed as Low to Medium with high intensity pelagic herring trawling found north-west of the Huntington Field. ICES rectangle 44F1 experiences low/low-moderate levels of trawling activity (i.e. between 5 – 20 VMS tracks) over pipeline, when compared to the rest of the UKCS (Scottish Government, 2017a).

In 2018 fishing effort in ICES rectangle 44F1 were highest for August - November, accounting for 70% of the total number of days fished, with all other months contributing for the remaining 30% of fishing effort (Scottish Government, 2018). Effort within ICES rectangle 44F1 has been recorded as disclosive or no data for several months (predominantly March, April, May, June, July and December) each year between 2014 and 2018, indicating low levels of fishing activity during those times.

Trawls were the most utilised gear in rectangle 44F1. In total, trawls contributed to more than 99% of total fishing effort in the ICES rectangle 44F1 with <1% made up from seine nets (Scottish Government, 2018).

<table>
<tr><th>Socio-economic Receptor</th><th colspan="10">Description</th></tr>
<tr><td colspan="11">Fisheries Landings in ICES Rectangle 44F1</td></tr>
<tr><td rowspan="2">Species type</td><td colspan="2">2018</td><td colspan="2">2017</td><td colspan="2">2016</td><td colspan="2">2015</td><td colspan="2">2014</td></tr>
<tr><td>Live weight (Te)</td><td>Value (£)</td><td>Live weight (Te)</td><td>Value (£)</td><td>Live weight (Te)</td><td>Value (£)</td><td>Live weight (Te)</td><td>Value (£)</td><td>Live weight (Te)</td><td>Value (£)</td></tr>
<tr><td>Demersal</td><td>370</td><td>511,381</td><td>449</td><td>673,359</td><td>554</td><td>842,202</td><td>739</td><td>962,021</td><td>717</td><td>1,025,453</td></tr>
<tr><td>Pelagic</td><td>1</td><td>834</td><td>662</td><td>259,409</td><td>-</td><td>-</td><td>201</td><td>65,103</td><td>403</td><td>141,130</td></tr>
<tr><td>Shellfish</td><td>34</td><td>112,610</td><td>104</td><td>372,014</td><td>145</td><td>678,098</td><td>63</td><td>240,844</td><td>84</td><td>346,050</td></tr>
<tr><td>Total</td><td>415</td><td>624,925</td><td>1,215</td><td>1,304,782</td><td>699</td><td>1,520,300</td><td>1003</td><td>1,267,968</td><td>1204</td><td>1,512,633</td></tr>
<tr><td colspan="11">Other sea users</td></tr>
<tr><td>Shipping activity</td><td colspan="10">The Huntington Field is located in an area that experiences very low shipping intensity (Oil and Gas Authority (OGA., 2016).</td></tr>
<tr><td>Oil and Gas</td><td colspan="10">The Huntington Field is located in the CNS in an area of extensive oil development with a number of fields located nearby, see below [Note 1]:
<table>
<tr><th>Installation</th><th>Installation Type</th><th>Operator</th><th>Distance and direction</th></tr>
<tr><td>CATS</td><td>Riser</td><td>BP</td><td>19.1 km NNE</td></tr>
<tr><td>North Everest</td><td>Platform</td><td>Chrysaor</td><td>19.1 km NNE</td></tr>
<tr><td>Montrose A</td><td>Platform</td><td>Repsol Sinopec</td><td>21.5 km SSW</td></tr>
<tr><td>Montrose</td><td>BLP</td><td>Repsol Sinopec</td><td>21.6 km SSW</td></tr>
<tr><td>Arbroath</td><td>Platform</td><td>Repsol Sinopec</td><td>28.5 km SSW</td></tr>
<tr><td>Nelson</td><td>Platform</td><td>Shell</td><td>29.6 km WNW</td></tr>
<tr><td>Mungo</td><td>Platform</td><td>BP</td><td>31.8 km SSE</td></tr>
<tr><td>ETAP</td><td>PDR</td><td>BP</td><td>32.9 km SSE</td></tr>
<tr><td>ETAP</td><td>QU</td><td>BP</td><td>33.1 km SSE</td></tr>
</table></td></tr>
<tr><td>Telecommunication</td><td colspan="10">The closest telecommunication cables in the vicinity of the project area is the CNS fibre optic cable (15.6 km East-North-East).</td></tr>
<tr><td>Military activities</td><td colspan="10">The Huntington Field is not located within any known military practice or exercise areas (British Crown and OceanWise (2019); Oil and Gas Authority, 2019).</td></tr>
<tr><td>Renewables</td><td colspan="10">There are no renewable sites near the project area (The Crown Estate, 2016).</td></tr>
<tr><td>Wrecks</td><td colspan="10">There is one named wreck (Theresa Boyle) in the vicinity of the project area, approximately 23 km south west of the project area. This wreck is classified as a non-dangerous wreck (HES, 2019). There are no protected wrecks in the vicinity of the project area (Scottish Government, 2019b).</td></tr>
</table>

Notes:

1. FPSO = Floating Production Storage and Offloading, FSU = Floating Storage Platform, BP= Beyond Petroleum, and CNRI = Canadian National Resources International.

3.4 Seabed Habitats and Benthos

The seabed habitat, including depths and sediment composition, have been confirmed across the Huntington Field by several environmental baseline surveys, as described in Section 3.2.2. Overall, depth across the decommissioning area ranged from approximately 88-91 m and the seabed sediments at Huntington predominantly comprise slightly silty shelly sand with occasional minor clay outcrops, coarse sediment accumulations and boulders and debris (Gardline, 2008a, 2009 and 2010).

Survey camera footage indicated hermit crabs, starfish, molluscs, anemones, hydroids, soft coral and fish as the dominant visible epifauna, as well as some annelid worms. Grab sampling showed a consistently diverse and rich array of macrofauna species across the survey area, suggesting the community remains undisturbed across the project area. This is confirmed by the lack of discernible change to the macrofaunal community at the infield station where elevated THC and heavy metals concentrations were recorded (Gardline, 2009a), as well as along the export route station with elevated mercury (Gardline, 2009b).

There were no habitats or species of conservation concern noted at Huntington during the surveys. The seabed observed across the survey area was largely homogeneous. The main sediment type observed was muddy sand, which was classified as the EUNIS biotope complex 'Deep circalittoral sand' (A5.27). The PMF habitats 'Offshore subtidal sands and gravels', and the priority habitat 'Subtidal sands and gravels' are likely to be present within the survey area (JNCC, 2014b). However, these habitats are widely distributed within the North Sea and already included within UK MPA network. No other potentially sensitive species or habitats were observed within the Huntington survey area.

Previous survey reports also detail the contaminants concentrations and fauna in the benthos at Huntington (Section 3.2.2). Heavy metal and THC concentrations at Huntington were recorded as being similar to background concentrations for undisturbed sediment in the CNS, with the exception of one sampling station where the very high THC concentrations were recording, and subsequent chemical analysis indicated likely contamination by lubricating oil (Gardline, 2008a; 2009a). In Gardline (2010) survey, barium, copper, zinc and lead were slightly elevated above background concentrations, but not sufficiently to predict an impact on the faunal community. On the export pipeline route, heavy metal concentrations were all below background concentrations, with the exception of mercury, which was recorded as being slightly elevated at a single station but not to the extent that the faunal community was expected to be affected (Gardline, 2009b).

3.5 Other Sea Users

3.5.1 Maritime Activities

The North Sea contains some of the world's busiest shipping routes, with significant traffic generated by vessels trading between ports at either side of the North Sea and the Baltic. North Sea oil and gas fields also generate moderate vessel traffic in the form of support vessels (DECC, 2016).

Regionally, the CNS contains numerous international ports and the area sees a moderate number of oil tankers, cargo vessels and ferries passing through (DTI, 2001). Shipping activity is assessed to be very low in Blocks 22/09 and 22/14a (OGA, 2016). Figure 3-2 below illustrates the relative vessel activity surrounding the Huntington Field.

An average of between 1 to 2 vessels per day pass within the project area with the majority of traffic consisting of small to medium sized cargo ships (ERUK, 2010). Other vessels that pass within the vicinity of the project area in low densities (2 transits or less) include cargo, passenger vessels, dredging or underwater operation vessels, recreational vessels and fishing vessels (MMO, 2015). A composite from AIS tracks of vessels using the project area in 2015 is presented in Figure 3-3.

There are no renewable energy sites within 40 km of the Huntington Field. The Hywind 2 Demonstration is the closest, located approximately 112 km to the west of the Huntington Field (The Crown Estate, 2016).

There are no military restrictions on Blocks 22/09 and 22/14a (OGA, 2019) and military activity does not generally take place in this region.

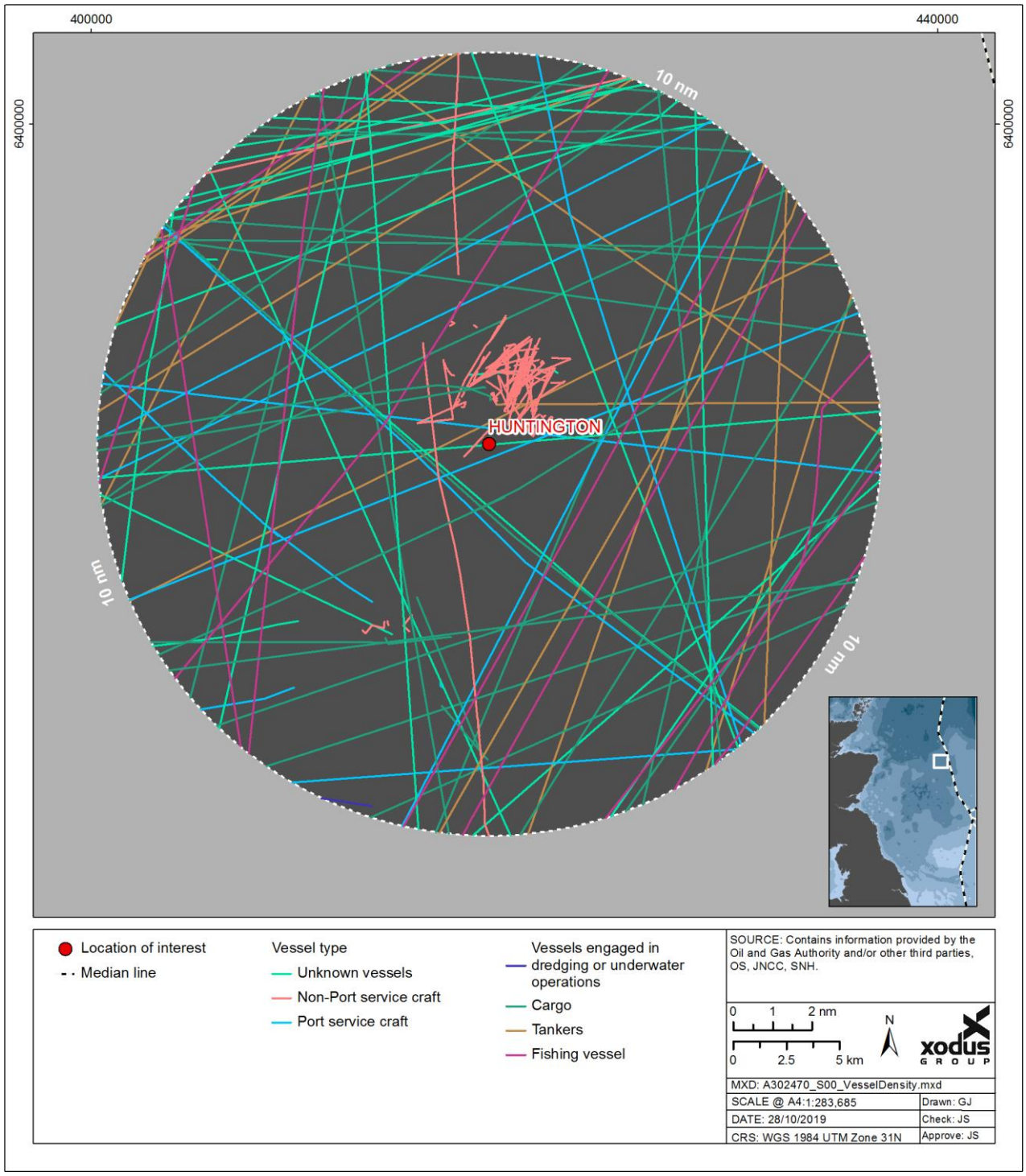

Figure 3-2 Vessel activity around the Huntington Field over period July 2016 - June 2017 (MMO, 2018)

3.5.2 Commercial Fisheries

This Section describes the type of fishing vessels occurring in the area, the weight and value of fish landed in the UK and the fishing effort. The study area considered to be relevant for the decommissioning activities is shown in relation to the International Council for the Exploration of the Sea (ICES) rectangle, 44F1. To provide the fullest picture of fisheries within the area, landings and effort trends for ICES rectangles 44F1 have been provided for the five most recent fishing years (2014-2018 inclusive; Table 3-3 and Table 3-4).

According to fishing data from the Scottish Government (2019a), the waters comprising the Huntington Field and surrounding area is fished for a variety of species by both UK and foreign vessels. ICES rectangle 44F1 is predominantly targeted for deep-water, demersal and pelagic species (Table 3-3). For the last five fishing years, the total landings value in ICES rectangle 44F1 was £6.2M, and the live weight was 4,526 Te (Table 3-4). Demersal species had the highest live weight landing, apart from 2017 where pelagic species had the highest live weight landing. In 2018 and 2016, pelagic species have had a very low contribution to the species landings in the ICES rectangle. Shellfish species contribute the lowest live weight total across the five years. However, they have consistently contributed a higher landings value than pelagic species for this ICES rectangle. Demersal fishing contributed the greatest total and greatest average monetary value between 2014 and 2018 across the Huntington Field area (Table 3-3). The total annual landings for the Huntington field area (as defined by ICES rectangles 44F1) were ≤1% of the total landings within the UKCS for the five most recent years.

Average annual fishing effort, as a measure of total fishing days per annum, was lower in ICES rectangle 44F1 than the UK average for the last five fishing years (Scottish Government, 2019a). The average landings value and live weight tonnage followed a similar pattern, though the differences from the UK average were more marked. When comparing between data sets, it is worthwhile considering the catch per unit effort (CPUE), a measure of the weight of catches versus per number of effort days (an indirect measure of fish availability). The average CPUE for ICES rectangle 44F1 was 3.9 Te/day, which is lower than the average for the UKCS across this period (4.3 Te/day) (Scottish Government, 2019a). The observation of a lower than average CPUE in 44F1 reflects the decrease of landings in that region from 2014-2018. Since 2014, landings have more than halved compared to the latest 2018 landings data (Scottish Government, 2019a). Pelagic fishing has witnessed the largest decrease in landings from ICES rectangle 44F1 with no landings recorded in 2016 and less than 1 tonne landed in 2018. Fishing effort, as a measure of total fishing days per annum, operating within ICES Rectangle 44F1 was low for the last published fishing year (i.e. < 500 total effort days).

Total fishing effort amounted to 122 effort days in ICES rectangle 44F1 in 2018, and 201 days in 2017 as shown in Table 3-4. This represents a reduction in effort compared to the three preceding years, particularly compared to the 357 days spent fishing in 2016. Effort within ICES rectangle 44F1 has been recorded as disclosive or no data for several months (predominantly January, February, March, April, May, June, July and December) each year between 2014 and 2018, indicating low levels of fishing activity during those times. Fishing effort is generally highest between October and November. Trawls were most utilised gear type used in the ICES rectangle 44F1 over all the years, other gear types used include seine nets (Scottish Government, 2019a; Table 3-5).

Table 3-3 Live Weight and Value of Fish and Shellfish from ICES Rectangles 44F1 Between 2014-2018 (Scottish Government, 2019a)

Species type	2018		2017		2016		2015		2014	
	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)	Live weight (Te)	Value (£)
Demersal	370	511,381	449	673,359	554	842,202	739	962,021	717	1,025,453
Pelagic	1	834	662	259,409	-	-	201	65,103	403	141,130
Shellfish	34	112,610	104	372,014	145	678,098	63	240,844	84	346,050
Total	**405**	**624,825**	**1,215**	**1,304,782**	**699**	**1,520,300**	**1,003**	**1,267,968**	**1,204**	**1,512,633**
UK Landings Total	**552,564**	**751,777,445**	**564,152**	**715,187,693**	**564,677**	**729,366,238**	**547,426**	**574,430,034**	**604,344**	**665,509,833**

Notes:

1. All values are rounded to the nearest whole number. For purposes of identifying totals within the UK, disclosive data has not been included to limit the effects of zero-inflation on the results.

Table 3-4 Annual Fishing Effort by UK Vessels and Landings by UK and Non-UK Vessels Landing in UK Within the Huntington Field area and Across the Wider UK (Scottish Government, 2019a)

Year	Within ICES Rectangle 44F1			Average Across the UK		
	Fishing Effort (days)	Landings Value (£)	Live weight (Te)	Fishing Effort (days)	Landings Value (£)	Live weight (Te)
2014	233	1,512,633	1,204	660	3,261,196	2,963
2015	253	1,267,968	1,003	700	3,001,940	2,841
2016	357	1,502,300	699	693	3,599,692	2,785
2017	201	1,304,782	1,215	638	3,553,440	2,809
2018	122	624,825	404	620	3,768,936	2,779
Annual average	**233**	**1,242,501**	**905**	**662**	**3,439,711**	**2,835**

Notes:

1. All values are rounded to the nearest whole number. For purposes of identifying averages across the UK, disclosive data has not been included to limit the effects of zero-inflation on the results.

Table 3-5 Number of Fishing Days per Month (all gear) in ICES Rectangles 44F1 in 2014-2018 (Scottish Government, 2018)

ICES rectangle	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
44F1	2014	D	D	-	D	D	D	11	56	49	12	70	10	233
	2015	6	66	-	D	D	9	6	34	24	34	52	20	253
	2016	30	23	D	49	-	D	D	9	10	83	113	36	357
	2017	5	D	46	5	D	9	11	62	3	35	18	D	201
	2018	20	-	D	D	D	D	D	24	20	17	24	D	122

Notes:

1. Monthly fishing effort by UK vessels landing into Scotland: "-" = no data, D = Disclosive data (indicating very low effort). Green = 0 – 100 days fished, yellow = 101 – 200, orange =201-300, red = ≥301. Disclosive data has not been considered in the totals.

AIS recordings of fishing vessel movements from 2015 indicate vessel use is dominated by transiting vessels and trawling activity, based on the long 'legs' of vessel movement (Figure 3-3). Fishing vessel activity was generally low within the Huntington Field area compared to the surrounding waters and mostly comprised of transiting fishing vessels (Figure 3-3). There is increased fishing vessel movement to the north west and south west of the Huntington Field which appears to be predominantly associated with *Nephrops* trawling, with smaller areas of pelagic fishing activity such as pelagic seines and trawls. Additionally, there is increased fishing vessel movement to the north-east of the Huntington Field which appears to be associated with demersal fishing activity, such as seines and trawls (Figure 3-3).

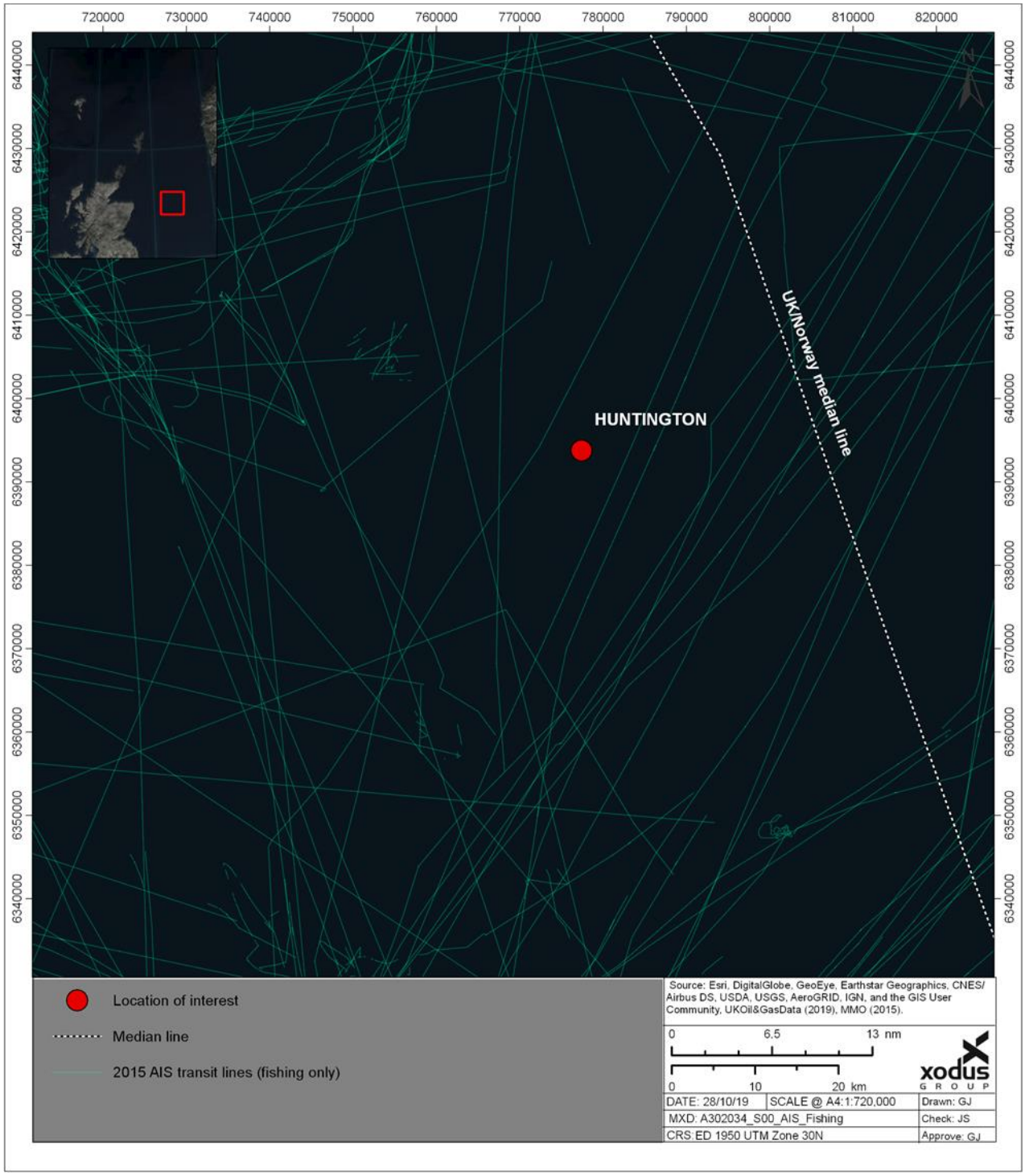

Figure 3-3 AIS data for commercial fishing vessels during the year 2015 (MMO, 2015)

Amalgamated VMS data from 2007 – 2015 shows demersal trawling activity associated with oil and gas pipelines in this region from *Nephrops* and demersal trawling Figure 3-4. The fishing intensity is generally low for mobile *Nephrops* trawling with high intensity occurring north west of Huntington. In addition, amalgamated VMS data for pelagic herring trawling showed fishing intensity in the Huntington Field area classed as Low to Medium with high intensity pelagic herring trawling found north-west of Huntington. ICES rectangle 44F1 experiences low/low-moderate levels of trawling activity (i.e. between 5 – 20 VMS tracks) over pipeline, when compared to the rest of the UKCS (Scottish Government, 2017b). Figure 3-4 suggests demersal trawling activity is highest to the north-east of Huntington along the associated pipelines and at its lowest levels the closer to the FPSO, associated anchor lines and close to the Huntington Gas Lift pipeline. Furthermore, amalgamated VMS data from 2009-2013 which has been analysed to generate 'hotpots' of fishing density (i.e. through kernel density estimates) shows generally low levels of fishing by registered UK vessels (> 15 m) using *Nephrops* mobile gears and pelagic gear for herring (Figure 3-5). Levels of fishing intensity for *Nephrops* mobile gears was low in the project area between 2009-2013 in comparison to other areas in the North Sea (Figure 3-5). In comparison, pelagic fishing intensity for herring was slightly higher but still classed as low across the region between 2009-2013 (Scottish Government, 2017a; Figure 3-5). Haddock is the key commercial species landed from ICES rectangle 44F1 for both value (53%) and weight (69%). Landings of this species from ICES rectangle 44F1 comprised 1.5% of the total value (£) of landings into Scotland in 2018 (Scottish Government, 2019a).

Figure 3-4 shows the relative demersal trawling activity associated with pipelines within the Huntington Field between 2007-2015. This analysis supports the results of the landings values by species in ICES rectangle 44F1, with *Nephrops* trawling activity comprising the majority of the demersal trawling activity, based on total trawls, associated with the project's pipelines (Figure 3-4). Of the pipelines and subsea infrastructure present in the Huntington Field, the Huntington Gas to FPSO pipeline experienced the lowest levels of demersal trawling, with between 0 – 5 trawls over the majority of the length of the pipeline (with 6 – 15 trawls witnessed at the north-east end of pipeline, Figure 3-4).

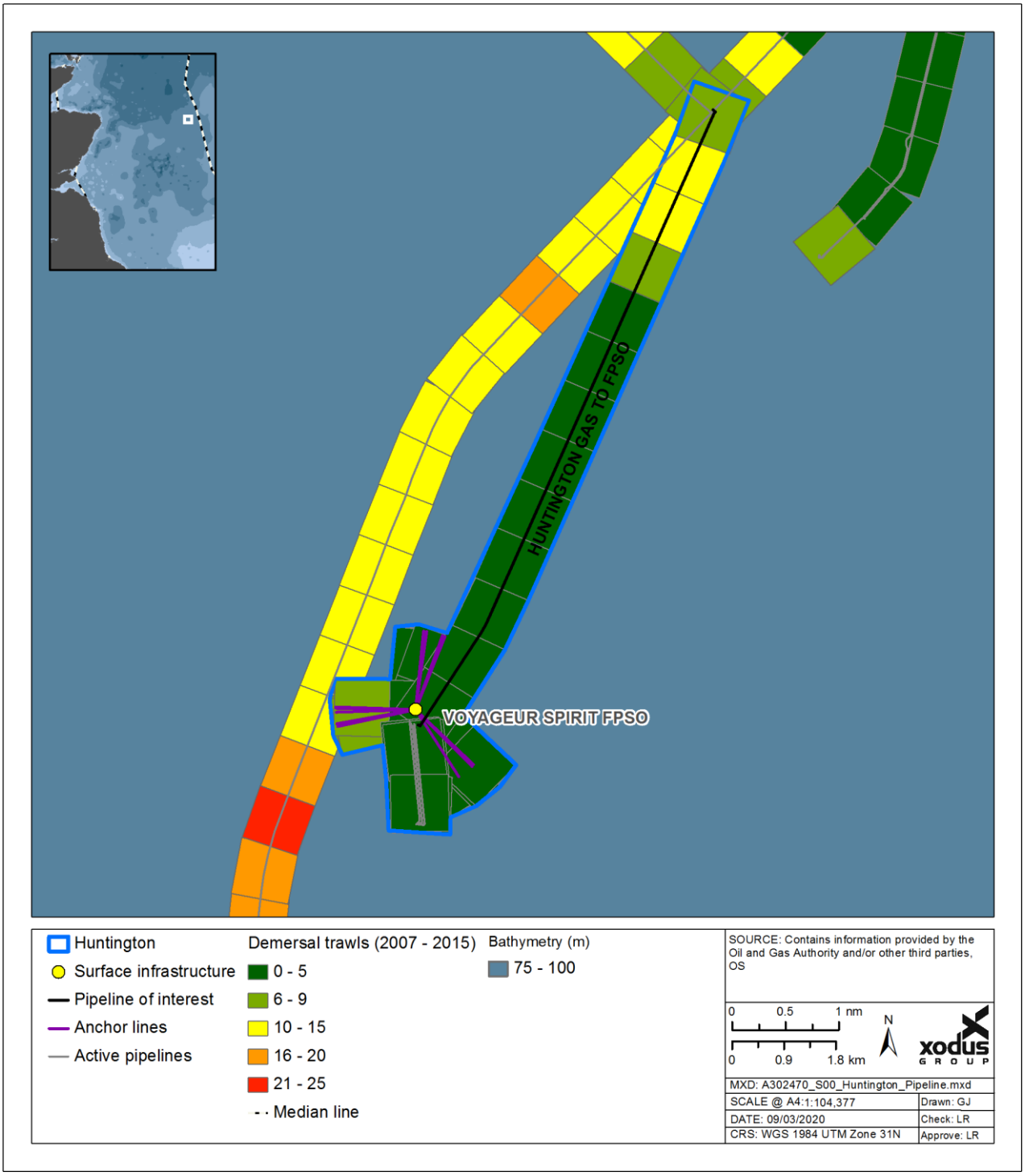

Figure 3-4 Relative trawling activity associated with the pipelines within the Huntington Field (Marine Scotland, 2017)

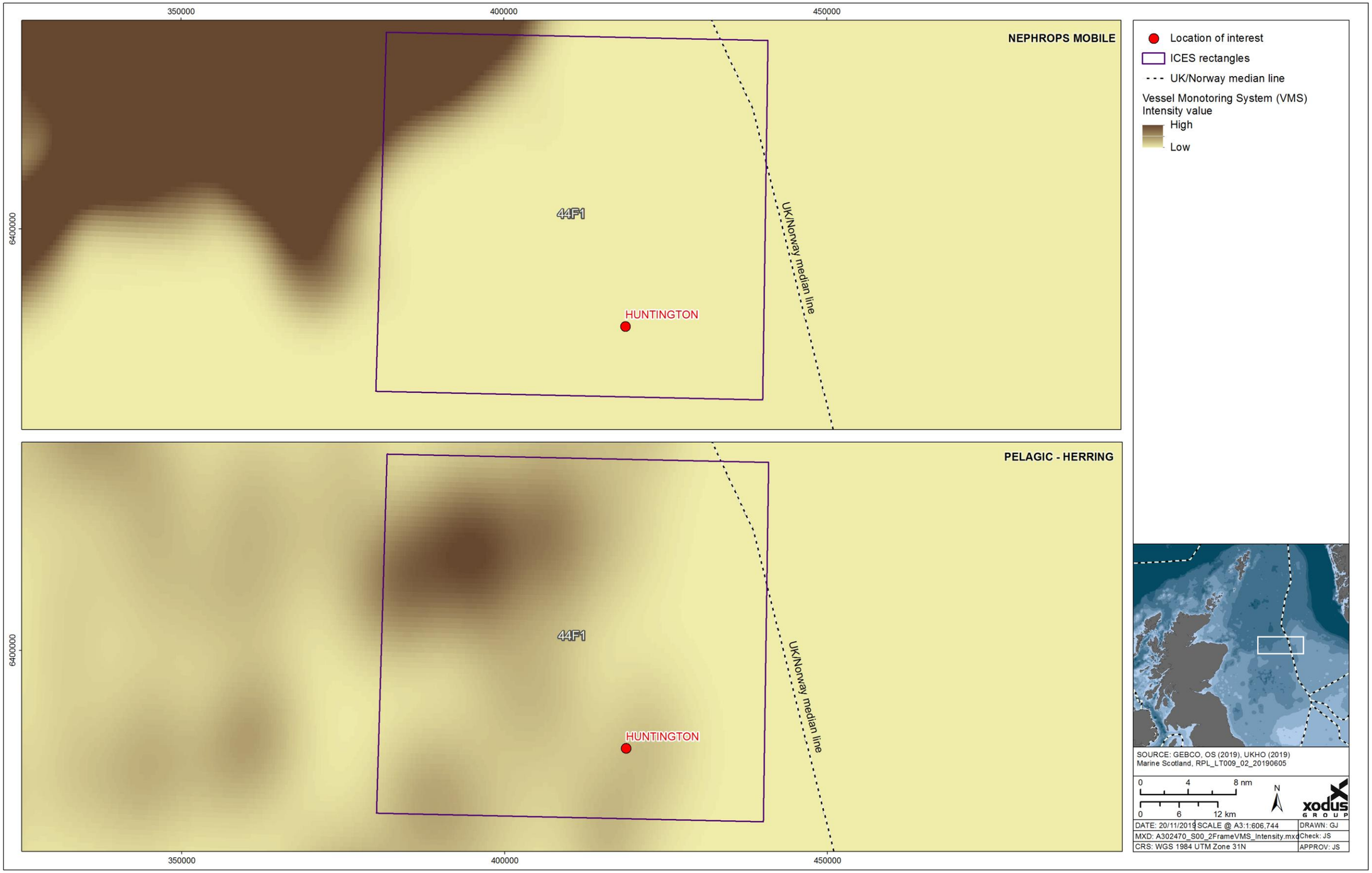

Figure 3-5 Vessel monitoring intensity for *Nephrops* (mobile gear) and pelagic (herring) fisheries in ICES Rectangles 44F1 (2009 - 2013) (Marine Scotland, 2015)

3.6 Conservation Sites and Species

3.6.1 Offshore Conservation

There is one protected area within 40 km of the Huntington Field; the closest of which is the East of Gannet and Montrose Fields NCMPA located 14 km south west of the project area (Figure 3-6). The East of Gannet and Montrose Fields NCMPA lies within a shallow sediment plain to the south-east of Scotland. The sandy seabed in the region provides an ideal home of the ocean quahog (JNCC, 2018a).

Ocean quahog were not directly observed in any survey sampling. However, this species is widely distributed in the wider area of the North Sea. No living specimens of *A. islandica* or infaunal siphons were observed during the site-specific surveys (Gardline, 2010). The closest known *A. islandica* aggregation is located approximately 73 km to the north west of the project area (SNH, 2019c). The Huntington Field is not located on any large-scale features of functional significance (Gardline, 2009a&b; SNH, 2019d).

3.6.2 Onshore Conservation

The Huntington Field is located approximately 204 km from the northeast coast of Scotland. The closest onshore conservation site is the Buchan Ness to Colliston Coast SPA the located approximately 176 km to the south west (Scottish Government, 2019c). Due to this distance, there will not be any interactions with onshore conservation sites from routine operations at the Huntington Field in the UKCS Block 22/09 and 22/14a.

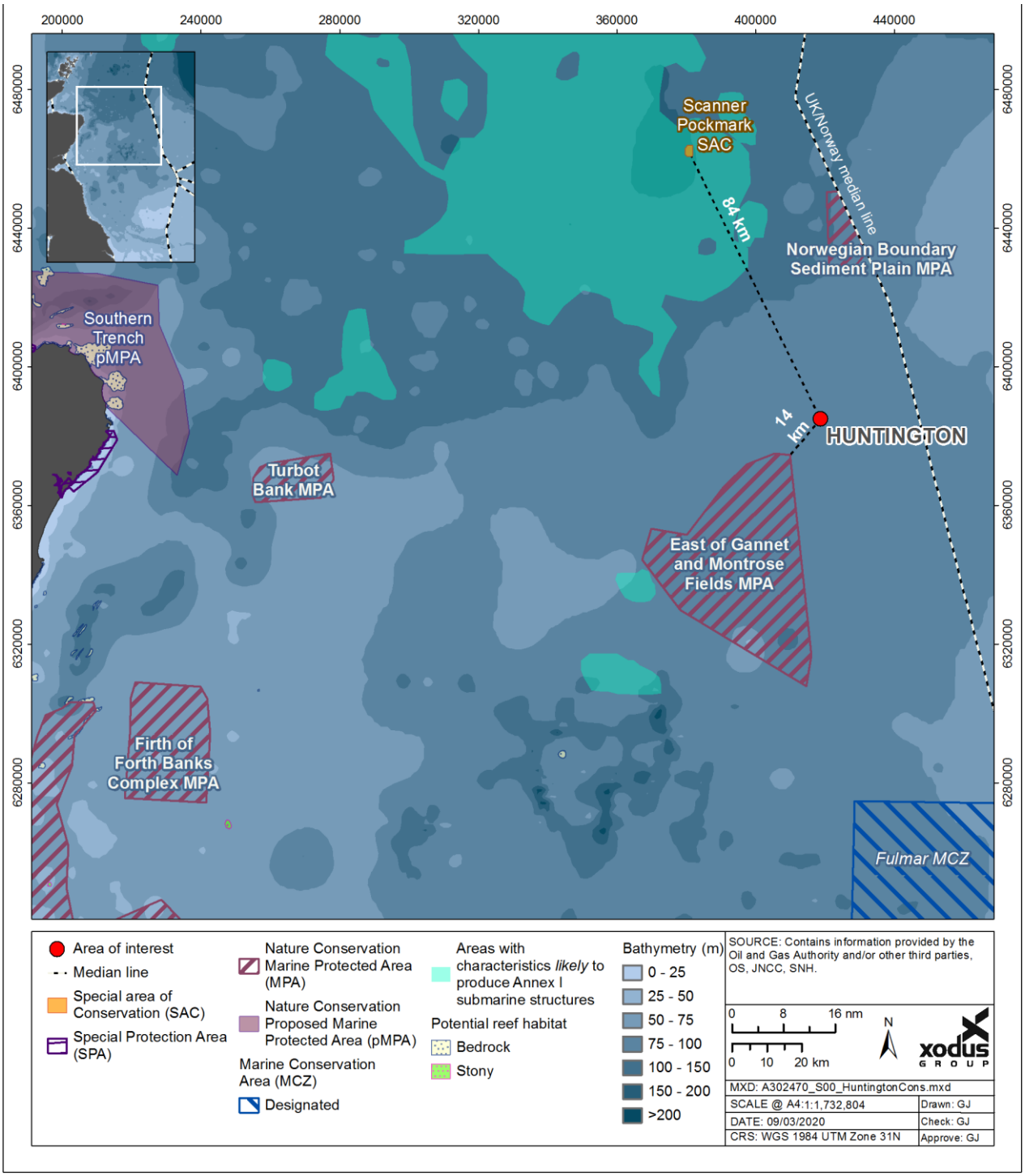

Figure 3-6 Protected sites proximal to the Huntington Field

3.6.3 Protected Species

Four species listed under Annex II of the EU Habitats Directive are found in UK waters; harbour porpoise, bottlenose dolphin, grey seal and harbour seal. Grey seals, harbour seals and bottlenose dolphins are unlikely to be observed near the Huntington Field area, as these species have very low densities far offshore (see Section 3.3). Harbour porpoise is the only Annex II species which has the potential to regularly occupy the Huntington decommissioning area.

All species of cetacean recorded within the proposed operations area are listed as EPSs. Other marine species listed as EPSs include turtles and sturgeon (*Acipenser sturio*), which are unikely to be present within the CNS.

The habitat within the Huntington Field area is reported as a suitable habitat for ocean quahog (*Arctica islandica)*, which is commonly found in sandy or gravelly sediments, such as those occurring within the nearby East of Gannet and Montrose Fields NCMPA (14 km). *A. islandica* may present in some form in the vicinity of the Huntington development area. This species is listed as PMF in Scottish waters (Tyler-Walters, 2016) and is on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2008). Although the project area is located outside the area of distribution of ocean quahog defined by Defra (2010a), the distribution of *A. islandica* is relatively wide in the North Sea (OSPAR, 2009) and individuals may be found across the wider seabed habitat, even if such examples do not form 'aggregations' as such. However, this species has not been directly observed in any survey sampling at Huntington (Gardline 2008a&b; 2009a&b; 2010).

3.6.4 National Marine Plan

The National Marine Plan (NMP) covers the management of both Scottish inshore waters (≤ 12 nm) and offshore waters (12 - 200 nm). The NMP aims to ensure sustainable development of the marine environment by guiding regulation, management, use and protection of Marine Plan areas. Proposed activities have been assessed against relevant NMP Objectives: GEN 1, 4, 5, 9, 12, 14 & 21; Oil & Gas 1, 2, 3, 5 & 6.

The proposed operations do not contradict any of the marine plan objectives and policies. Premier will ensure they comply with all the new policies that have been introduced; with particular attention being made to the policies listed above. The following Sections describe the aims of each policy and how Premier's commitments will achieve them. Additional information on the policies is detailed below.

3.6.4.1 GEN 1 – General planning and principle

Development and use of the marine area should be consistent with the Marine Plan, ensuring activities are undertaken in a sustainable manner that protects and enhances Scotland's natural and historic marine environment. Premier will ensure that any potential impacts associated with the Huntington decommissioning operations will be kept to a minimum.

3.6.4.2 GEN 4 – Co-existence

Where conflict over space or resource exists or arises, marine planning should encourage initiatives between sectors to resolve conflict and take account of agreements where this is applicable. Premier will ensure that any potential impacts on other sea users associated with the proposed Huntington decommissioning operations will be kept to a minimum.

3.6.4.3 GEN 5 – Climate change

Marine planners and decision makers should seek to facilitate a transition to a low carbon economy. They should consider ways to reduce emissions of carbon and other greenhouse gasses. Premier will ensure that any potential impacts associated with Huntington decommissioning operations will be kept to a minimum.

3.6.4.4 GEN 9 – Natural heritage

Development and use of the marine environment must:

- Comply with legal requirements for protected areas and protected species.

- Not result in significant impact on the national status of PMF.
- Protect and, where appropriate, enhance the health of the marine area.

Premier will ensure that any potential impacts to protected species and sites associated with Huntington decommissioning activities will be kept to a minimum.

3.6.4.5 GEN 12 – Water quality and resource

Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives that apply. Premier will ensure that any potential impacts to water quality associated with Huntington decommissioning operations will be kept to a minimum.

3.6.4.6 GEN 14 – Air quality

Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits. Some development and use may result in increased emissions to air, including particulate matter and gases. Impacts on relevant statutory air quality limits must be taken into account and mitigation measures adopted, if necessary, to allow an activity to proceed within these limits. Premier will ensure that any potential impacts to air quality with Huntington decommissioning operations will be kept to a minimum.

3.6.4.7 GEN 21 – Cumulative impacts

Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation. Premier will ensure that any potential impacts to air and water quality and biological communities with Huntington decommissioning operations will be kept to a minimum.

3.6.4.8 Oil & Gas 1

The Scottish Government will work with DECC, the new Oil and Gas Authority and the industry to maximise and prolong oil and gas exploration and production whilst ensuring that the level of environmental risks associated with these activities are regulated. Activity should be carried out using the principles of Best Available Technology (BAT) and Best Environmental Practice. Consideration will be given to key environmental risks including the impacts of noise, oil and chemical contamination and habitat change.

3.6.4.9 Oil and Gas 2

Where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. Re-use or removal of decommissioned assets from the seabed will be fully supported where practicable and adhering to relevant regulatory process.

3.6.4.10 Oil and Gas 3

Marine and coastal infrastructure for oil and gas developments and storage should: utilise the minimum space needed for each activity and take into account environmental and socio-economic constraints.

3.6.4.11 Oil and Gas 5

Consenting and licensing authorities should have regard to the potential risks, both now and under future climates, to oil and gas operations in Scottish waters, and be satisfied that installations are appropriately sited and designed to take account of current and future conditions.

3.6.4.12 Oil and Gas 6

Consenting and licensing authorities should be satisfied that adequate risk reduction measures are in place, and that operators should have sufficient emergency response and contingency strategies in place that are compatible with the National Contingency Plan and the Offshore Safety Directive.

4 EA METHODOLOGY

The Impact assessment is designed to: (1) identify potential impacts to environmental and societal receptors from the proposed decommissioning activities; (2) evaluate the potential significance of any identified impacts in terms of the threat that they pose to these receptors; and (3) assign measures to manage the risks in line with industry best practice; and address concerns or issues raised by stakeholders through consolation.

The impact assessment was undertaken using the following approach:

1. The potential environmental issues arising from decommissioning activities were identified through a combination of the expert judgement of project engineers and marine environmental specialists in a screening workshop, and consultation with key stakeholders (Section 4.1). The potential environmental issues were grouped under the following key receptor risk groups:
    - Atmospheric emissions;
    - Disturbance to the seabed;
    - Physical presence;
    - Discharges to sea;
    - Underwater noise;
    - Resource use;
    - Onshore activities;
    - Waste; and
    - Unplanned events.
2. Undertake initial screening based on a high-level consideration of these aspects against the evaluation criteria. Screening aspects in or out of further detailed assessment. Justification statements will be compiled detailing the rationale for screening out any aspects from further assessment (Section 5.1).
    - For aspects which are considered potentially significant, evaluate significance of potential impacts against impact criteria definitions (Section 6); and
    - For any potentially significant impact, capture any potential mitigation and/or control measures to be used to further reduce any impact to 'as low as reasonably practicable' (ALARP).

4.1 Stakeholder Engagement

The consultation for the decommissioning of Huntington has been largely based on sharing project expectations, approach and specific considerations with key stakeholders including:

- Scottish Fishermen's Federation (SFF)
- Joint Nature Conservation Committee (JNCC)
- Marine Scotland
- Oil & Gas UK (OGUK)
- OPRED Environmental Management Team (EMT)
- OPRED Offshore Decommissioning Unit (ODU) (observers)
- Scottish Environmental Protection Agency (SEPA)
- Premier Oil E&P UK Limited

This is summarised in Table 4-1 and full details of the consultation to date are provided in Section 5 of the DP (Premier Oil E&P UK Limited, 2020a).

Table 4-1 Stakeholder Issues and Concerns Raised Through Consultation

Relevant Party	Comments/Concerns Raised	Response & EA Section where addressed
Informal Consultations		
SFF, JNCC, Marine Scotland, OGUK, OPRED EMT, OPRED ODU (observers)	Premier Oil has engaged with interested parties and stakeholders who participated in CA workshops. No objections have been raised to date.	N/A
Statutory Consultations		
SFF	No objections have been raised to date.	N/A
SEPA	No objections have been raised to date.	N/A
JNCC	Scoping Letter has been issued and comments received. In addition to minor comments, the following important comments have been considered: Survey data should at least include the area of proposed operations, unless justification is provided as to why wider area surveys are sufficiently representative of conditions at the site of proposed operations. Survey data should provide adequate evidence that habitats and species of nature conservation concern (including Annex I habitats) are or are not present. It is good practice to include a diagram indicating the surveyed area in the context of the proposed activity and to identify any sample points or the location of photographic evidence. Data provided should also include high resolution acoustic data, video and / or still images. The figures 4-1, 4-2 and 4-3 are excellent starting points for this. Any gaps or limitations in environmental information should be acknowledged with, where appropriate, strategies to address these gaps or limitations. We would highlight that when using the SOSI for assessment that blocks surrounding the operations should also be reviewed and not just the “central” block. We look forward to seeing this fuller assessment within the DPs.	Section 3.2 - Summary of Environmental Surveys Section 3.3 - Summary of Receptors

4.2 EA Process

4.2.1 Overview

The decision process related to defining whether or not a project is likely to significantly impact on the environment is the core principle of the environmental impact assessment process; the methods used for identifying and assessing potential impacts should be transparent and verifiable.

The method presented here has been developed by reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for marine impact assessment (CIEEM, 2018), the Marine Life Information Network (MarLIN) species and ecosystem sensitivities guidelines (Tyler-Walters *et al*., 2004) and guidance provided by Scottish Natural Heritage (SNH) in their handbook on environmental impact assessment (SNH, 2013) and by The Institute of Environmental Management and Assessment (IEMA) in their guidelines for environmental impact assessment (IEMA, 2015; 2016).

Environmental impact assessment provides an assessment of the environmental and societal effects that may result from a project's impact on the receiving environment. The terms impact and effect have different definitions in environmental impact assessment, and one drives the other. Impacts are defined as the changes resulting from an action, and effects are defined as the consequences of those impacts.

In general, impacts are specific, measurable changes in the receiving environment (volume, time and/or area); for example, were a number of marine mammals to be disturbed following exposure to vessel noise emissions. Effects (the consequences of those impacts) consider the response of a receptor to an impact; for example, the effect of the marine mammal/noise impact example given above might be exclusion from an area caused by disturbance, leading to a population decline. The relationship between impacts and effects is not always so straightforward; for example, a secondary effect may result in both a direct and indirect impact on a single receptor. There may also be circumstances where a receptor is not sensitive to a particular impact and thus there will be no significant effects/consequences.

For each impact, the assessment identifies a receptor's sensitivity and vulnerability to that effect and implements a systematic approach to understand the level of impact. The process considers the following:

- Assessment of the consequence/extent of the impact, defined by the nature and type of impact, and the spatial extent of the impact on the receptor;
- Identification of the duration and frequency of the effect of the receptor;
- Definition of magnitude of impact, based on the magnitude of the shift from the environmental baseline conditions;
- Definition of the probability of impacts; and
- Ranking of impact significance, considering the probability that it will occur, the spatial and temporal extent and the magnitude of the impact and any residual effects after mitigations are applied.

Each of these variables are expanded upon in the following Sections to provide consistent definitions across all EA topics. In each impact assessment, these terms are used in the assessment summary table to summarise the impact and are enlarged upon as necessary in any supporting text. It should be noted that all impacts discussed in this EA report are adverse unless explicitly stated otherwise.

Once the consequence of a potential impact has been assessed it is possible to identify measures that can be taken to mitigate impacts through engineering decisions or execution of the project. This process also identifies aspects of the project that may require monitoring, such as a post-decommissioning survey at the completion of the works to inform inspection reports.

For some impacts significance criteria are standard or numerically based. For others, for which no applicable limits, standards or guideline values exist, a more qualitative approach is required. This involves assessing significance using professional judgement.

Despite the assessment of impact significance being a subjective process, a defined methodology has been used to make the assessment as objective as possible and consistent across different topics. The assessment process is summarised below. The terms and criteria associated with the impact assessment process are described and defined; details on how these are combined to assess consequence and impact significance are then provided.

4.2.2 Baseline Characterisation

In order to make an assessment of potential impacts on the environment it was necessary to firstly characterise the different aspects of the environment that could potentially be affected (the baseline environment). The baseline environment has been described in Section 2.8 and is based on desk studies combined with additional site-specific studies such as surveys and modelling where required. Information obtained through consultation with key stakeholders was also used to help characterise specific aspects of the environment in more detail.

The EA process requires identification of potential receptors which could be affected by the Huntington Decommissioning Project (e.g. commercial fisheries, water quality, and seabed impacts). Important receptors are identified within the impact assessments (Section 6).

4.2.3 Impact Definition

4.2.3.1 Impact Consequence/Extent

The impact consequence is based on the geographical extent, as described in Table 4-2.

Table 4-2 Impact Consequence Criteria

Ranking	Consequence	Criteria
High	**Major**	Extent of change: Impact occurs over a large scale or spatial geographical extent and/or has a permanent duration.
Medium	**Moderate**	Extent of change: Impact occurs over a local to medium scale/spatial extent and/or has a prolonged duration.
Medium	**Minor**	Extent of change: Impact occurs on-site or is localised in scale/spatial extent.
Low	**Negligible**	Extent of change: Impact is highly localised.

4.2.3.2 Duration/Frequency of Effect

The duration of effect is key to determining the final ranking of impact significance. This criterion takes account of:

- Duration over which the impact is likely to occur e.g. days, weeks; and
- Frequency and/or intensity of impact, i.e. how often the impact is expected to occur.

These variables are defined in Table 4-3 and Table 4-4, and the overall ranking methodology of duration of effects is provided in Table 4-5.

Table 4-3 Definition of Duration Criteria

Duration	Definition
Short-term	Impacts that are predicted to last for a short duration (e.g. less than one year).
Temporary	Impacts that are predicted to last a limited period (e.g. a few years). For example, impacts that occur during the decommissioning activities and which do not extend beyond the main activity period for the works or which, due to the timescale for mitigation, reinstatement or natural recovery, continue for only a limited time beyond completion of the anticipated activity.
Prolonged	Impacts that may, although not necessarily, commence during the main phase of the decommissioning activity and which continue through the monitoring and maintenance, but which will eventually cease.
Permanent	Impacts that are predicted to cause a permanent, irreversible change.

Table 4-4 Definition of Frequency Criteria

Frequency	Description
Continuous	Impacts that occur continuously or frequently.
Intermittent	Impacts that are occasional or occur only under a specific set of circumstances that occurs several times during the course of the Huntington Decommissioning Project. This definition also covers such impacts that occur on a planned or unplanned basis and those that may be described as 'periodic' impacts.

Table 4-5 Overall Duration/Frequency Ranking Criteria

Ranking	Duration	Criteria
High	**Major**	Frequency/intensity of impact: high frequency (occurring repeatedly or continuously for a long period of time) and/or at high intensity.
Medium	**Moderate**	Frequency/intensity of impact: medium to high frequency (occurring repeatedly or continuously for a moderate length of time) and/or at moderate intensity or occurring occasionally/intermittently for short periods of time but at a moderate to high intensity.
Medium	**Minor**	Frequency/intensity of impact: low frequency (occurring occasionally/intermittently for short periods of time) and/or at low intensity.
Low	**Negligible**	Impact is very short-term in nature (e.g. days/few weeks).

4.2.3.3 Impact Magnitude

The impact magnitude requires an understanding of how far the receptor will deviate from its baseline condition as a result of the impact. The resulting effect on the receptor is considered under vulnerability and is an evaluation based on scientific judgement. Table 4-6 defines the criteria for impact magnitude.

Table 4-6 Impact Magnitude Criteria

Ranking	Magnitude	Criteria
High	**Major**	Total loss or major alteration to key elements/features of the baseline conditions.
Medium	**Moderate**	Partial loss or alteration to one or more key elements/features of the baseline conditions.
Medium	**Minor**	Minor shift from the baseline conditions. Impact is localised and temporary/short-term with minor detectable change to site characteristics or a minor change to a small proportion of the receptor population. Low frequency impact occurring occasionally or intermittently.
Low	**Negligible**	Very slight change from baseline conditions. Impact is highly localised and short-term resulting in very slight or imperceptible changes to site characteristics.

4.2.3.4 Impact Probability

The probability of an impact is another factor that is considered in this impact assessment. This captures the probability that the impact will occur and also the probability that the receptor will be present and is based on knowledge of the receptor and experienced professional judgement. Table 4-7 provides definitions of the different levels of probability of impact that are used in the Huntington Decommissioning Project impact assessment.

Table 4-7 Impact Probability Criteria

Ranking	Probability	Criteria
High	**Major**	The impact is likely to occur.
Medium	**Moderate**	The impact is moderately likely to occur.
Medium	**Minor**	The impact is possible.
Low	**Negligible**	The impact is unlikely to highly unlikely.

4.2.4 Receptor Definition

As part of the assessment of impact significance it is necessary to differentiate between receptor sensitivity, vulnerability and value. The sensitivity of a receptor is defined as 'the degree to which a receptor is affected by an impact' and is a generic assessment based on factual information whereas an assessment of vulnerability, which is defined as 'the degree to which a receptor can or cannot cope with an adverse impact' is based on professional judgement taking into account an number of factors, including the previously assigned receptor sensitivity and impact magnitude, as well as other factors such as known population status or condition, distribution and abundance.

4.2.4.1 Receptor Sensitivity

Receptor sensitivity to potential impact activities ranges from negligible to very high. Definitions for assessing the sensitivity of a receptor are provided in Table 4-8.

Table 4-8 Criteria for Assessment of Sensitivity of Receptor

Receptor Sensitivity	Definition
Very high	Receptor with no capacity to accommodate a particular effect and no ability to recover or adapt.
High	Receptor with very low capacity to accommodate a particular effect with low ability to recover or adapt.
Medium	Receptor with low capacity to accommodate a particular effect with low ability to recover or adapt.
Low	Receptor has some tolerance to accommodate a particular effect or will be able to recover or adapt.
Negligible	Receptor is generally tolerant and can accommodate a particular effect without the need to recover or adapt.

4.2.4.2 Receptor Vulnerability

Information on both impact magnitude and receptor sensitivity is required to determine receptor vulnerability. These criteria, described in Table 4-6 and Table 4-8 are used to define receptor vulnerability as per Table 4-9.

Table 4-9 Criteria for Assessment of Vulnerability of Receptor

Receptor Vulnerability	Definition
Very high	The impact will have a permanent effect on the behaviour or condition on a receptor such that the character, composition or attributes of the baseline, receptor population or functioning of a system will be permanently changed.
High	The impact will have a prolonged or extensive temporary effect on the behaviour or condition on a receptor resulting in long term or prolonged alteration in the character, composition or attributes of the baseline, receptor population or functioning of a system.
Medium	The impact will have a short-term effect on the behaviour or condition on a receptor such that the character, composition, or attributes of the baseline, receptor population or functioning of a system will either be partially changed post development or experience extensive temporary change.
Low	Impact is not likely to affect long term function of system or status of population. There will be no noticeable long-term effects above the level of natural variation experience in the area.
Negligible	Changes to baseline conditions or receptor population of functioning of a system will be imperceptible.

It is important to note that the above approach to assessing sensitivity/vulnerability is not appropriate in all circumstances and in some instances professional judgement has been used to determine receptor sensitivity. In some instances, it has also been necessary to take a precautionary approach where stakeholder concern exists regarding a particular receptor. Where this is the case, this is detailed in the relevant impact assessment in Section 6.

4.2.4.3 Receptor Value

The value, or importance, of a receptor is based on a pre-defined judgement established in legislative requirements, guidance or policy. Where these may be absent, it is necessary to make an informed judgement on receptor value based on perceived views of key stakeholders and specialists. Examples of receptor value definitions are provided in Table 4-10.

Table 4-10 Criteria for Assessment of Value of Receptor

Receptor Value	Definition
Very high	Receptor of international importance (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site). Receptor of very high importance or rarity, such as those designated under international legislation (e.g. EU Habitats Directive) or those that are internationally recognised as globally threatened (e.g. International Union for Conservation of Nature (IUCN) red list). Receptor has little flexibility or capability to utilise alternative area. Best known or only example and/or significant potential to contribute to knowledge and understanding and/or outreach.
High	Receptor of national importance (e.g. Nature Conservation Marine Protected Area (NCMPA), Marine Conservation Zone (MCZ)). Receptor of high importance or rarity, such as those which are designated under national legislation, and/or ecological receptors such as United Kingdom Biodiversity Action Plan (UKBAP) priority species with nationally important populations in the study area, and species that are near-threatened or vulnerable on the IUCN red list. Receptor provides the majority of income from the Huntington Field. Above average example and/or high potential to contribute to knowledge and understanding and/or outreach.
Medium	Receptor of regional importance. Receptor of moderate value or regional importance, and/or ecological receptors listed as of least concern on the IUCN red list, but which form qualifying interests on internationally designated sites, or which are present in internationally important numbers. Any receptor which is active in the Huntington Field and utilises it for up to half of its annual income/activities. Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach.

Receptor Value	Definition
Low	Receptor of local importance. Receptor of low local importance and/or ecological receptors such as species which contribute to a national site, are present in regionally. Any receptor which is active in the Huntington Field and reliant upon it for some income/activities. Below average example and/or low potential to contribute to knowledge and understanding and/or outreach.
Negligible	Receptor of very low importance, no specific value or concern. Receptor of very low importance, such as those which are generally abundant around the UK with no specific value or conservation concern. Receptor of very low importance and activity generally abundant in other areas/ not typically present in the Huntington installation area. Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach.

4.2.5 Impact Significance Ranking

The initial ranking of impact significance is based on the criteria described in Sections 4.2.3 and 0. It involves:

- Determination of the extent of impact, the duration/frequency, the impact magnitude and its probability;
- Consideration of sensitivity, vulnerability and value of the receptor; and
- Existing controls which can be industry standards, legislation requirements or prescriptive.

The sensitivity, vulnerability and value of receptor are combined with the impact magnitude (and probability, where appropriate) using informed judgement to arrive at a significance assessment for each impact, as described in Table 4-11. The assessment of significance considers mitigation measures that are embedded within the proposed activities.

Table 4-11 Criteria for Assessment of Significance

Ranking	Significance	Criteria
High	**Major**	Impacts are likely to be highly noticeable and have long term effects, or permanently alter the character of the baseline, and are likely to disrupt the function and status/value of the receptor population. They may have broader systemic consequences (e.g. to the wider ecosystem/industry). These impacts are a mitigation priority to avoid or reduce the anticipated effects of the impact.
Medium	**Moderate**	Impacts are likely to be noticeable and result in prolonged changes to the character of the baseline and may cause hardship to, or degradation of, the receptor population, although the overall function and value of the baseline/ receptor population is not disrupted. Such impacts are a priority for mitigation in order to avoid or reduce the anticipated effects of the impact.
Medium	**Minor**	Impacts are expected to comprise noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause long term degradation, hardship, or impair the function and value of the receptor. However, such impacts may be of interest to stakeholders and/or represent a contentious issue during the decision-making process and should therefore be avoided or mitigated as far as reasonably practicable.
Low	**Negligible**	Impacts are expected to be either indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not anticipated to be a stakeholder concern and/or a potentially contentious issue in the decision-making process.

4.2.6 Cumulative Impact Assessment

While the scope of this impact assessment is restricted to the decommissioning of the Huntington Field, there will be other marine activities which have the potential to interact with the activities completed under the decommissioning work scope. The impact assessments presented in the following Sections consider the potential for significant cumulative impacts to occur as a result of overlapping activities.

4.2.7 Transboundary Impact Assessment

For most potential impacts from decommissioning, the likelihood of transboundary impact is low. However, where impacts on mobile receptors are of concern, the likelihood of a transboundary impact is higher. The impact assessments presented in the following Sections have identified the potential for transboundary impacts is considered within the definition of significance.

4.2.8 Mitigation

Where potentially significant impacts (i.e. those ranked as 'moderate' or 'major' in Table 4-11) are identified, mitigation measures must be considered. The intention is that mitigations should remove, reduce or manage potential impacts to a point where the resulting residual significance is at an acceptable or insignificant level. Mitigation is also proposed in some instances to maintain the significance levels of impacts defined as 'not significant'. The impact assessment conclusions define the residual impact significance after mitigations are applied.

5 INITIAL ASSESSMENT SCREENING AND JUSTIFICATION

An impact assessment screening workshop was undertaken to discuss the proposed decommissioning activities and any potential impacts these may pose. This discussion identified ten potential impacts based on the proposed removal methods identified in Section 2. Two of these potential impacts could not be screened out of further assessment based on the significance or likelihood of the impact occurring. The ten potential impacts and their screening rationales are detailed in Section 5.1, and those impacts carried forward for further assessment are defined in Section 5.2.

5.1 Assessment of Potential Impacts

The screening of potential environmental impacts from the decommissioning of Huntington for further assessment is provided in Table 5-1, including summarised rationales for the screening outcomes.

Table 5-1 Environmental Impact Screening Summary for Huntington Decommissioning

Potential impact	Further assessment?	Rationale
Emissions to air	No	Emissions during decommissioning activities, (largely comprising fuel combustion gases) will occur in the context of the CoP. As such, emissions generated by infrastructure, equipment and vessels associated with operation of the Huntington asset will be replaced by those from vessels and equipment required for decommissioning activities, as well as the recycling of decommissioned materials. Reviewing historical EU Emissions Trading Scheme data and comparison with the likely emissions from the proposed workscope suggests that emissions relating to decommissioning will be minor relative to those generated during production. Review of available decommissioning EAs shows conclusively that atmospheric emissions in highly dispersive offshore environments do not present significant impacts and are extremely small in the context of UKCS and global emissions. Most submissions also note that emissions from short-term decommissioning activities are small compared to those previously arising from the asset over its operational life. The majority of atmospheric emissions for the Huntington Decommissioning Project relate to vessel time or are associated with the recycling of material returned to shore. As the decommissioning activities proposed are of short duration, this aspect is not anticipated to result in significant impacts. The estimated CO_2 emissions to be generated by the selected decommissioning options are 14,850 Te, this equates to 0.19% of the total UKCS vessel emissions (excluding fishing vessels) in 2017 (7,800,000 Te; BEIS, 2019). In addition to emissions associated with production of new required materials and recycling of recovered materials, this CO_2 total has been calculated assuming an anticipated 50 days of vessel activity for the duration of the project. This is split across three likely vessel types, including, but not limited to: a DSV/CSV, trawler and survey vessel. This is a worst-case estimate of vessel days is also based on extensive overtrawling (which, as determined in Section 2.4.7, will not be required).

Potential impact	Further assessment?	Rationale
		Considering the above, atmospheric emissions do not warrant further assessment.
Seabed impacts	Yes	There is potential for decommissioning activities to generate disturbance to the seabed, including activities associated with the removal of Huntington's subsea installations, the reverse-reeling of flexible flowlines and umbilicals, and any remediation required post-decommissioning, including overtrawling. Seabed impacts may range in duration from short-term impacts, such as temporary sediment suspension or smothering, to permanent impacts, such as the introduction of new substrate or any consequential habitat or community level changes which may transpire. Additionally, seabed disturbance from the removal of infrastructure has the potential to modify the habitat in a way which might impact upon other sea users which utilise the seabed. The reverse reeling of trenched and buried flexible flowlines has the potential to generate clay berms in the muddy benthic habitat which defines the Huntington Field area (Section 3.4). Clay berms may pose a potential snagging hazard to commercial fishing gears which make contact with the seabed. The removal and relocation of the Voyageur Spirit FPSO and its associated mooring system and dynamic risers and dynamic umbilical falls under the jurisdiction of the Huntington FPSO (Voyageur Spirit) Float Off DP and its associated licences and consents. However, Premier is committed to leaving a clear seabed following decommissioning and will include the fourteen anchor points and temporary riser holding locations on the seabed in its Clear Seabed Verification Survey, following the decommissioning of the infrastructure listed above. The clear seabed will be validated by an independent verification survey over the installation sites and pipeline corridors. The methods used will be discussed and finalised with OPRED. Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the SFF, seabed clearance is likely to require conventional overtrawl survey methods. Impacts to the seabed from project activities have been assessed further in Section 6.1, whilst impacts to commercial fisheries generated by seabed disturbance are assessed in Section 0 below.
Physical presence of vessels in relation to other sea users	Yes	The presence of a small number of vessels for decommissioning activities will be short-term in the context of the life of the Huntington Field. A collective 50 days of total vessel time is anticipated for the project area, split across three vessel types. Activity will occur using similar vessels to those currently deployed

Potential impact	Further assessment?	Rationale
		for oil and gas installation, operation and decommissioning activities. The small number of vessels required will also generally be within the existing 500 m safety zone and the decommissioning of the Huntington FPSO will reduce the number of vessels in the area on the long-term. Other sea users will be notified in advance of planned activities through the appropriate mechanisms, meaning those stakeholders will have time to make any necessary alternative arrangements during the finite period of operations. Although the Huntington decommissioning project is estimated to require various vessels depending on the selected method of removal, these would not all be on location at the same time. Despite these management measures and the short-term nature of the proposed decommissioning activities, there exists the potential for residual impacts to commercial fisheries to result from the temporary limitation on access to fishing grounds. Assessment of potential impacts to commercial fisheries associated with changes in access to fishing grounds during decommissioning activities is addressed in Section 6.2 below.
Physical presence of infrastructure decommissioned in situ in relation to other sea users	No	The physical presence of infrastructure decommissioned *in situ* has limited potential of impacting other sea users and is limited to potential snagging risks to commercial fisheries. All subsea installations and surface-laid pipelines will be fully removed. Trenched and/or buried flexible flowlines will be reverse-reeled without prior deburial and the seabed will be subsequently surveyed and remediated as required. All jumpers, spool pieces and risers will be fully removed. The only infrastructure to be decommissioned *in situ* is the trenched and buried rigid flowline. The pipeline ends of the trenched and buried rigid flowline will be removed and recovered, with the cut ends remediated. Depth of Burial (DoB) surveys have confirmed the burial status of these flowlines and they are not expected to pose any risk of interaction with other sea users (see Appendix C). Future monitoring work will monitor the DoB of this pipeline. Mattresses and grout bags will be fully removed and be cleaned of marine growth if required, and either reused, recovered as aggregate for infrastructure projects or disposed of in landfill sites. In the instance that some mattresses are unable to be recovered OPRED will be consulted. The clear seabed will be validated by an independent verification survey over the installation sites and pipeline corridors. The methods used will be discussed and finalised with OPRED. Non-intrusive verification techniques will be considered in the first

Potential impact	Further assessment?	Rationale
		instance, but where these are deemed inconclusive by the SFF, seabed clearance is likely to require conventional overtrawl survey methods. Assessment of potential snagging risks associated with the decommissioning of infrastructure *in situ*, as well as the condition of the seabed following the decommissioning of infrastructure via full removal, is provided in Section 6 below.
Water quality	No	All Huntington subsea infrastructure will be Drained, Flushed, Purged and Vented (DFPV) at CoP. This activity will be permitted. Vessel discharges are managed through existing, International Convention for the Prevention of Pollution from Ships (MARPOL) compliant controls, including bilge management procedures and good operating practices. Post-flushing and/or water jetting, residual liquids present during the decommissioning of pipelines and subsea infrastructure will be treated before being discharged to sea, such that the discharge will comprise treated water. Any residual remaining material will be in trace levels/volumes following the DFPV regime and will not pose any significant risk to water quality. All residual solids will be shipped to shore for disposal.
Underwater noise emissions	No	Vessel presence will be limited in scale (i.e. the size and number of vessels) and duration and, therefore, does not constitute a significant or prolonged increase in noise emissions across the project area. To remove the subsea installations, the cutting of flowlines will likely be done with shears, thereby minimising produced underwater noise during this activity. There is potential that external cuttings using diamond wire may be required; however, noise associated with this activity will be temporary and generated very close to the seabed, where absorption rates are highest. All other noise generating activities associated with the decommissioning of the Huntington Field are considered negligible in the context of ambient noise levels and are likely to be masked by project related vessel activities. Geophysical surveys undertaken for post-decommissioned infrastructure left *in situ* will be assessed in future, through the process of permit application. Multibeam echosounder survey equipment is likely to be used for imaging and identification of pipeline exposures. The JNCC (2017) Guidelines will be employed for mitigation of noise impacts to marine mammals for future survey work involving seismic survey equipment. None of the activities associated with the decommissioning of the Huntington Field are considered to generate significant noise levels

Potential impact	Further assessment?	Rationale
		which may cause injury or significant disturbance to marine species or other users. The project is not located within a marine mammal protection area and EAs for offshore oil and gas decommissioning projects generally show no potential injury or significant disturbance associated with the non-survey decommissioning activities covered within the project scope. On this basis, underwater noise does not require further assessment.
Resource use	No	Generally, resource use from the proposed activities will require limited raw materials and be largely restricted to fuel use. Any opportunities for increasing fuel efficiency and reducing use of resources will be identified and implemented. The estimated total energy usage for the project is 234,412.1 GJ. This is considered very low, compared to the resources generated during the production phase of the project. Considering the above, resource use does not warrant further assessment.
Onshore activities	No	The OPRED Guidance states that onshore activities are not in scope of Decommissioning EAs, and this topic does not require further assessment. It should be noted that, only licenced contractors which can demonstrate they are capable of handling and processing the material to be brought ashore will be considered for onshore activities and this will form an integral part of the commercial tendering process.
Waste	No	The recycling and disposal of wastes are covered by Premier Oil's Waste Management Strategy, which is compliant with relevant regulations relating to the handling of waste offshore, transfer of controlled, hazardous and special waste, and TFSW. The Waste Management Strategy is guided by Premier's HSES Policy and commitments to best practice in waste management. This includes the mapping and documenting of waste management arrangements for each phase of the HLLP in individual Active Waste Management Plans (AWMPs) and ongoing monitoring of waste procedures and performance review against target Key Performance Indicators (KPIs). Wastes will be treated using the principles of the waste hierarchy, focusing on the reuse and recycling of wastes where possible. Raw materials will be returned to shore with the expectation to recycle the majority of the returned material. There may be instances where infrastructure returned to shore is contaminated (e.g. by Naturally Occurring Radioactive Material (NORM), hazardous, and/or special

Potential impact	Further assessment?	Rationale
		wastes) and cannot be recycled. In these instances, the materials will require disposal. However, the weight and/or volume of such material is not expected to result in substantial landfill use. On this basis, no further assessment of waste is necessary.
Unplanned events	No	As the decommissioning activities will be taking place after well P&A, well blowout scenarios have been ruled out as a possibility and unplanned events have been limited to unplanned instantaneous diesel release from the largest vessel. This is expected to be a CSV or DSV type vessel, and the Seven Falcon is considered a relevant example of such a vessel to be used during decommissioning. It has a fuel capacity of 1,335 m^3. An instantaneous loss of vessel diesel inventory will be less than the worst-case loss of containment of crude oil aboard the Voyageur Spirit FPSO which was modelled as a part of Altera's Huntington Offshore Oil Pollution Emergency Plan (OPEP). The OPEP considers an instantaneous loss of 43,000 m^3 of crude from the FPSO and the corresponding dispersion modelling indicates a high probability of transboundary landfall to the Norwegian coastline (approximately 95% after 30 days during the summer months) and a very low probability of surface oiling landfall within the UK (< 5% after 30 days, limited to spring). The maximum beached emulsion volume would be up to approximately 44 Te (limited to the spring). A diesel inventory release during decommissioning would not result in such a scenario, as the modelled crude volumes far exceed the anticipated fuel inventory volume (1,335 m^3) and the specific gravity of diesel fuel makes it disperse at a much faster rate. Nonetheless, the scenario modelled in the existing OPEP serves as a worst-case assessment of potential unplanned release associated with the Huntington Field which have been carefully mitigated against. The fuel inventory of the CSV / DSV is likely to be split between a number of separate fuel tanks, significantly reducing the likelihood of an instantaneous release of the full inventory. Any spills from vessels in transit and outside the 500 m safety zone are covered by separate Shipboard Oil Pollution Emergency Plans (SOPEPs). Premier will support response of any vessel-based loss of fuel containment through the vessel owner's SOPEP. In addition to the mitigation measures outlined in the individual vessel SOPEPs, Premier maintains manned bridges, navigational aids and monitoring of safety zones (e.g. with Navaids, PowerBuoys, or other technology). As any impact from vessel-based fuel inventory release will be less than that already assessed and mitigated against within the OPEP for the operational phase of the Huntington Field, the potential impacts from accidental chemical/ hydrocarbon

Potential impact	Further assessment?	Rationale
		releases during decommissioning activities do not warrant further assessment. As the methodology for the post-removal subsea installation and flowline return to shore has not been defined in detail, there exists the remote possibility that during transport of those materials, elements may dislodge and drop from the transport vessel. Premier will cut and lift the short section of exposed pipeline at the ends; however, these sections are short and will be relatively easy to manoeuvre. Therefore, the likelihood of accidental loss of pipeline materials to the seabed during lift operations is low. Moreover, all subsea installations are considered sound and no issues regarding their integrity have been identified, therefore methods of removal are not anticipated to generate issues which result in material losses to sea. Premier's dropped object procedures are industry-standard. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. The post-decommissioning Clear Seabed Verification Survey will aid in the identification of in-field dropped objects. In line with the mitigation measures in place, unplanned loss of materials to the sea do not require further assessment.

5.2 Aspects Taken Forward for Further Assessment

Based on the initial screening provided in Section 5.1, the following potential environmental and societal impacts have been identified as requiring further assessment within the EA:

- Seabed impacts; and
- Commercial fisheries.

These potential impacts are addressed in detail within Section 6.

5.3 Proposed Mitigations and Existing Controls

To ensure that impacts remain as described above, Premier will follow routine environmental management activities, for example appropriate project planning, contractor management, vessel audits, activity permitting and legal requirements to report discharges and emissions, such that the environmental and societal impact of the decommissioning activities will be minimised. The activities associated with the decommissioning Huntington assets are not likely to result in significant impacts to the environment or other sea users, including fishing or seabed communities, if appropriate mitigation and control measures are effectively applied.

A summary of the proposed control and mitigation measures is provided in Table 5-2.

Table 5-2 Proposed Mitigation and Control Measures

General and Existing

• Lessons learnt from previous decommissioning scopes will be reviewed and implemented as appropriate;
• Vessels will be managed in accordance with Premier's existing marine procedures, including:
  ○ The vessels' work programme will be optimised to minimise vessel use where possible;
  ○ The 500 m safety exclusion zone will remain in operation during the decommissioning activities reducing risk of non-project related vessels entering the area where decommissioning activities are taking place;
  ○ All infrastructure will be subject to a drain, flush, purge and vent philosophy that will be assessed and permitted under existing operational permits prior to decommissioning, to ensure minimal residual contaminants are present in the infrastructure before removal operations commence;
  ○ The OPEP is one of the controls included in a comprehensive management and operational control plan developed to minimise the likelihood of large hydrocarbon releases and to mitigate their impacts should they occur;
  ○ All vessels undertaking decommissioning activities will have a MARPOL-approved SOPEP;
  ○ Existing processes will be used for contractor management to assure and manage environmental and social impacts and risks;
  ○ Premier's management of change process will be followed should changes of scope be required; and
  ○ Careful planning, selection of equipment, management and implementation of activities.
• A post-decommissioning environmental seabed survey, centred around the well locations, will be carried out. The survey will focus on chemical, physical and biological changes, disturbances and will be compared with the pre- decommissioning survey. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED.
• All pipeline routes and installation sites will be the subject of oilfield debris clearance and as-left verification surveys when decommissioning activity has concluded.
• The main risk from infrastructure remaining *in situ* is the potential for interaction with other users of the sea, specifically from fishing related activities. Where the infrastructure is trenched below seabed level or trenched & buried below, the effect of interaction with other users of the sea is considered to be negligible.
• The infrastructure is currently shown on Admiralty Charts and the FishSafe system. When decommissioning activity has been competed, updated information will be made available to update Admiralty Charts and FishSafe system.
• When decommissioning activities have been completed, and where applicable, the safety zones around offshore infrastructure will be removed.
• Once the FPSO vessel leaves the field, the safety zone will be removed. This will leave the DUTA/SSIV unprotected. A guard vessel or buoy will put in place.
• The licence holders recognise their commitment to undertake post-decommissioning monitoring of infrastructure left *in situ*. After the post-decommissioning survey reports have been submitted to OPRED and reviewed, a post-decommissioning monitoring survey regime, scope and frequency, will be agreed with OPRED.
• Any snagging risk to other sea users will be minimised by continual monitoring of degrading installations or free spans.

Large-scale Releases to Sea
• Post-flushing water will be cleaned before it is discharged to sea and will be in accordance with Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 controls, including MARPOL-compliant bilge management procedures and good operating practices. • All solid waste will be skipped and shipped to shore for disposal and not discharged at sea. • Risk of full inventory loss from a vessel is very low given that the majority of vessels have multiple, separated fuel tanks, making full contaminant loss highly unlikely and the distance from shore would prevent any significant volume of diesel reaching any shoreline. Any potential diesel fuel spillages resulting from unplanned collisions will be minimised by approved OPEP/ SOPEP, in which risks associated with the decommissioning activities have been appropriately assessed and planned for.
Waste Management
• All waste will be managed in accordance with the Waste Management Plan, including any marine growth waste, or NORM identified during flushing and cleaning of subsea infrastructure. • The Waste Management Plan will involve the use of a waste inventory, and all residual wastes being shipped to shore for processing.

6 IMPACT ASSESSMENT

The following receptors have been identified as requiring further assessment against potential impacts from the proposed decommissioning activities:

- Seabed impacts; and
- Commercial fisheries.

Potential sources and consequences of impacts to these receptors are detailed in the Sections below.

6.1 Seabed Impacts

The impact of the Huntington Field decommissioning activities on seabed receptors is discussed in this Section, along with measures proposed to minimise the scale and duration of any potential impact.

6.1.1 Approach

The two seabed impact pathways associated with the proposed activities are direct and indirect disturbance.

Direct disturbance is considered the physical disturbance of seabed sediments and habitats. Direct disturbance has the potential to cause temporary or permanent changes to the marine environment, depending upon the nature of the associated activity. Activities which contribute to the direct disturbance impact pathway include the removal of infrastructure and remediation of snagging hazards, either from overtrawling or placement of material (rock armour) on the seabed. The total area of seabed expected to be impacted by direct physical disturbance has been calculated by adding together the individual areas of physical disturbance estimated for each activity. The duration of the direct disturbance has then been provided. Dimensions used to calculate the disturbance area for each activity are available in Appendix A.

The second impact mechanism, indirect disturbance, is that which occurs outside of the direct disturbance footprint. It may be caused by the suspension and re-settlement of natural seabed sediments and cuttings pile materials disturbed during activities. This secondary impact pathway is considered temporary in all instances, based on the definitions provided in Section 4. The scale of indirect disturbance due to re-suspension and re-settlement of natural sediment has been estimated based on the expected area of direct disturbance from any activity. The estimated indirect disturbance area is assumed to be double the direct disturbance area for all installations and activities taking place.

6.1.2 Sources of Potential Impact

6.1.2.1 Overview

The following activities have been identified as potential sources of direct or indirect seabed disturbance:

- Pipeline, flowline and umbilical decommissioning:
  - Cutting and removal surface-laid ends of the main gas export pipeline;
  - Full removal of trenched and buried flexible flowlines and umbilicals;
  - Spool and jumper full removal and recovery.
- Additional subsea infrastructure decommissioning:
  - Full removal of subsea infrastructure, including manifold, tether bases, etc.
- Stabilisation materials:
  - Removal of grout bags and concrete mattresses; and
  - Deposition of new rock armour to protect ends and cut exposures of the pipeline decommissioned *in situ*.
- Clear seabed verification – potential remediation requiring direct intervention (overtrawling):
  - Deburial of flexible flowlines to be removed via reverse reeling;
  - Footprint associated with the dynamic risers and the dynamic umbilical which will be temporarily lowered to the seabed before being recovered during Phase 1; and

- Footprints created by the suction anchors following their recovery during Phase 1.

The decommissioning activities associated with the removal of the suction anchors, dynamic risers and dynamic umbilical are associated with Phase 1 of the decommissioning programme for the Huntington Field. These activities are therefore covered in the Huntington FPSO Float Off DP (Premier Oil E&P UK Limited, 2020b) and are, therefore, covered by relevant environmental permits and are outwith the scope of this EA (Section 2.3). However, the footprints of seabed disturbance left behind by their removal have been incorporated into estimates of the potential overtrawl area required for seabed clearance verification, which is covered by the Huntington Field DP (Premier Oil E&P UK Limited, 2020a) and this EA.

Seabed disturbance may be classified in the following sections as short-term, temporary or permanent; these terms are defined in Table 4-3.

6.1.2.2 Pipelines, Flowlines and Umbilicals Decommissioning

As in Section 2.4.3 all jumpers and spools will be removed. The main gas export rigid flowline will be partly removed, remaining trenched and buried sections will be decommissioned *in situ*. All other flexible flowlines will be fully removed.

The area of seabed disturbed by recovery of each individual line to the surface has been estimated by multiplying the length of each individual line section which will be removed, by the outer diameter. The areas disturbed by recovery of each individual line have then been summed to give an overall area of disturbance affected. As the flexible flowlines will be removed by reverse reeling, this is expected to have an impact beyond the area of the flowline alone. The direct disturbance area therefore has a 10 m buffer added (5 m either side of the lines). This buffer allows for instances in which reverse reeling may not occur in a straight line.

Buried sections of rigid flowline that are decommissioned *in situ* are not expected to cause any seabed disturbance and are excluded from the table.

The direct and indirect disturbance areas associated with these proposed operations are summarised in Table 6-1. A full inventory of infrastructure dimensions is available in Appendix A. Both of these disturbance levels are temporary and will only last as long as activities are occurring. Disturbance due to placement of rock armour to protect exposed ends of flowlines decommissioned *in situ* is assessed separately in Section 6.1.2.4.

Table 6-1 Seabed Disturbance Associated with Pipeline, Flowline and Umbilical Decommissioning

Activity	Quantity and dimensions	Expected duration of disturbance	Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Removal of surface laid end sections of trenched and buried rigid flowlines	One rigid gas export pipeline of which 144 m will be removed from the ends	Temporary	0.00003	0.00006
Removal of trenched and buried flexible flowlines (by reverse reeling)	Three flexible flowlines and a static umbilical of varying lengths and diameters + 10 m buffer	Temporary	0.075	0.1508
Removal of spools and jumpers	Nine spools and nine jumpers of varying dimensions	Temporary	0.0002	0.00038
		Total	**0.075**	**0.15**

6.1.2.3 Additional Subsea Infrastructure Decommissioning

As described in Section 2.4.5, all seabed infrastructure will be recovered to the surface.

The area of seabed disturbed by recovery of each individual item has been estimated by multiplying the item length by the width. The areas disturbed by each individual item have then been summed to give the overall area of seabed disturbed. As described in Section 2.4.5, some of the seabed installations are gravity based. In a worst-case scenario, should extraction from the seabed prove difficult, liquification of the seabed around the installation may be required. This has been accounted for when calculating the area of disturbance by adding a 1 m buffer around the installation. The direct and indirect disturbance areas associated with the proposed operations are summarised in Table 6-2 (for full inventory, refer to Table 2-8 or Appendix A).

Table 6-2 Seabed Disturbance Associated with Decommissioning of Other Seabed Infrastructure

Activity	Quantity and dimensions	Expected duration of disturbance	Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Removal of subsea infrastructure	Comprised of 14 individual items, ranging in size from the production manifold structure (27.42 m x 10 m) to 5 tether bases (5 m x 5 m)	Temporary	0.0013	0.0026
		Total	**0.0013**	**0.0026**

6.1.2.4 Stabilisation Materials

Concrete mattresses and grout bags have previously been deployed across the Huntington Field to stabilise and protect seabed infrastructure.

As noted in Section 2.4.6, the intention is that all concrete mattresses and grout bags will be recovered, this will cause temporary direct and indirect disturbance. Any protection/stabilisation associated with the 36" CATS Pipeline crossover will be left undisturbed. New deposits of rock armour will also be required in order to protect the newly cut ends of trenched and buried rigid pipelines due to be decommissioned *in situ.* An estimated 30 m^2 (6 m width by 5 m length along the pipeline) will be deposited at each cut end based on the assumption that "a 36" pipeline would need to covered by 0.5 metres of rocks, which would require a pile 3 metres either side" (AURIS Environmental, 1995). With two cut ends, the total rock placement is expected to cover an area of approximately 60 m^2. This is considered a source of permanent disturbance. Rock placement also has an associated indirect disturbance area due to the sediment suspension that rock placement will cause. As previously, this has been assumed to be double the direct impact area.

In the case of grout bags, there are an estimated 1,000 in the Huntington Field. Grout bags are used in conjunction with different subsurface installations to provide protection or stability. As such, they are usually stacked or piled on top of one another or on top of other installations/mattresses. The exact location and layout of the bags is unknown. Although unlikely, the worst-case scenario has been defined as all 1,000 bags spread in a single layer on the seabed. A standard grout bag size has been used to estimate the area cover by grout bags in the Huntington Field. The direct and indirect seabed disturbance areas associated with the stabilisation materials are summarised in Table 6-3.

Table 6-3 Seabed Disturbance Associated with Stabilisation Materials (Including Existing Materials Decommissioned *in situ* and New Materials Deposited to Protect Pipeline Ends)

Activity	Quantity and dimensions	Expected duration of disturbance	Direct disturbance area (km^2)	Indirect disturbance area (km^2)	Permanent disturbance area (km^2)
Removal of existing concrete mattresses	Estimated 305 mattresses [Note 1] of 2 different sizes: 69 mattresses (6 m x 2 m) and 236 mattresses (6 m x 3 m)	Temporary	0.00512	0.01025	0
Removal of grout bags	Estimated 1,000 grout bags of standard dimensions (0.6 m x 0.3 m)	Temporary	0.00007	0.00014	0
Deposition of new rock armour to protect other infrastructure decommissioned *in situ*	Rock armour covering an area of approximately 30 m^2 at each cut end of PL2805	Permanent	0	0	0.00006
		Total	**0.0052**	**0.0104**	**0.00006**

Notes:

1. 236 mattresses are associated with the Surface and Subsea Infrastructure DP with the remaining 69 associated with the FPSO Float Off DP.

6.1.2.5 Clear Seabed Verification

As detailed in Section 2.4.7, a seabed clearance verification is required following all decommissioning projects to ensure there is no residual risk to other sea users, particularly those which make contact with the seabed, such as trawl fisheries.

Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the Scottish Fishermen's Federation (SFF), seabed clearance is likely to require conventional overtrawl survey methods. Where there is evidence of residual snagging hazards (e.g. any spans, berms, dropped objects, etc.), then intervention in the form of overtrawling to re-level the seabed or the addition of rock placement will be implemented.

Although an important activity for limiting the potential for safety hazards, the use of overtrawling constitutes the greatest potential temporary impact to the benthic environment from decommissioning activities. Proposed overtrawling remediation has therefore been limited to infrastructure where intervention is considered to be required.

As a worst-case, it is assumed that overtrawling will be required for the following:

- Trenched and buried flexible flowlines which have been removed via reverse reeling;
- Footprint of dynamic risers and dynamic umbilical post-recovery; and
- Footprint of suction anchor points post-recovery.

The area of direct impact around the above infrastructure is assumed to fall within a worst-case 100 m buffer centred on the flowlines, and a 200 m buffer surrounding each of the anchor points. These buffers have been

selected to represent the lack of precision involved in overtrawling, most considerably for circular or complex geometries. The area predicted to be directly disturbed in the worst-case scenario is presented in Table 6-4.

The 500 m zone at Huntington is associated with the FPSO. Once the FPSO is removed, a seabed survey will identify if any debris remains in the area. However, the area as a whole will not require overtrawling therefore has not been included in these calculations. Furthermore, no debris is expected to be found in the Huntington Field therefore there is no associated overtrawl. The only anticipated overtrawling activity within the Huntington Field will occur over the anchor footprint.

In addition to the calculated direct disturbance which may arise through the need for overtrawling, an estimate has been made of the possible indirect disturbance due to re-suspension and settlement of sediment. It has been assumed that this indirect disturbance will affect twice the area of the direct activity. The seabed disturbance associated with overtrawling is presented in Table 6-4. Indirect disturbance is addressed in detail in Section 6.1.3.2.

Table 6-4 Seabed Disturbance Associated with Overtrawling

Activity	Quantity and dimensions	Expected duration of disturbance	Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Overtrawling of flexible flowlines removed by reverse reeling	Three flexible flowlines and a static umbilical of varying lengths and diameters + 100 m buffer (50 m either side)	Temporary	0.811	1.622
Overtrawling of dynamic risers and dynamic umbilical footprints	One dynamic umbilical and four dynamic risers of varying lengths and diameters + 100 m buffer (50 m either side)	Temporary	0.0004	0.17
Overtrawling of suction anchor footprints	Fourteen anchors of varying dimensions + 200 m buffer	Temporary	0.6106	1.22
		Total	**1.42**	**3.0**

6.1.2.6 Summary of Seabed Impacts

Total seabed disturbance from the proposed decommissioning activities is summarised in Table 6-5. This illustrates a worst-case scenario in which the majority of the area of seabed disturbance comes from overtrawling following the decommissioning of buried flexible flowlines and other infrastructure. In all instances, it has been assumed that the area of indirect disturbance (i.e. from sediment resettlement) will affect twice the area of direct disturbance. The placement of stabilisation materials also occurs within the potential overtrawl area; however, it is considered independently as an area of permanent disturbance.

Table 6-5 Total Potential Seabed Disturbance from Greater Huntington Field Area Decommissioning Activities

Infrastructure being decommissioned	Temporary direct disturbance (km^2)	Temporary indirect disturbance (km^2)	Permanent disturbance (km^2)
Pipelines, flowlines & umbilicals	0.075	0.15	0
Subsea infrastructure	0.0013	0.0026	0
Stabilisation materials	0.0052	0.0104	0.00006
Total without overtrawling	**0.083**	**0.17**	**0.00006**
Clear Seabed Verification	1.42	3.0	0
Total with overtrawling	**1.5**	**3.0**	**0.00006**

6.1.3 Effects on Sensitive Receptors

6.1.3.1 Direct Disturbance

Decommissioning activities are expected to lead to two types of direct physical disturbance. The first is temporary disturbance, which will result from the removal of infrastructure from the seabed, and from overtrawling. The sediment will be disturbed by the action of retrieving equipment from the seabed and by the trawl running over the seabed, but once decommissioning is complete, the affected areas will be free of anthropogenic material. This should allow recovery in line with natural processes such as sediment re-suspension and deposition, movement of animals into the disturbed area from the surrounding habitat, and recruitment of new individuals from the plankton.

The second type of direct disturbance will be permanent disturbance caused by the deposition of additional rock armour on the seabed to protect infrastructure decommissioned *in situ*. This type of disturbance will effectively change the seabed type in the affected areas from the naturally occurring silty shelly sand (as described in Section 2.8) to a hard substrate. As these materials will be permanently left on the seabed, the duration of the disturbance will last until the deposited materials are fully buried by the deposition of new natural sediment. This is thought to take sufficient time for the disturbance to be classified as permanent.

The two types of direct disturbance are discussed in the subsections below. The areas of anticipated direct and indirect disturbance are captured in Figure 6-1 and Figure 6-2 and related to the existing environmental survey data (detailed in Section 3.2 and Appendix D). Areas of temporary direct and indirect disturbance are provided in light grey, whilst areas of permanent disturbance from rock placement are in dark grey. Finally, the areas where overtrawling may potentially be required are in a medium grey shade.

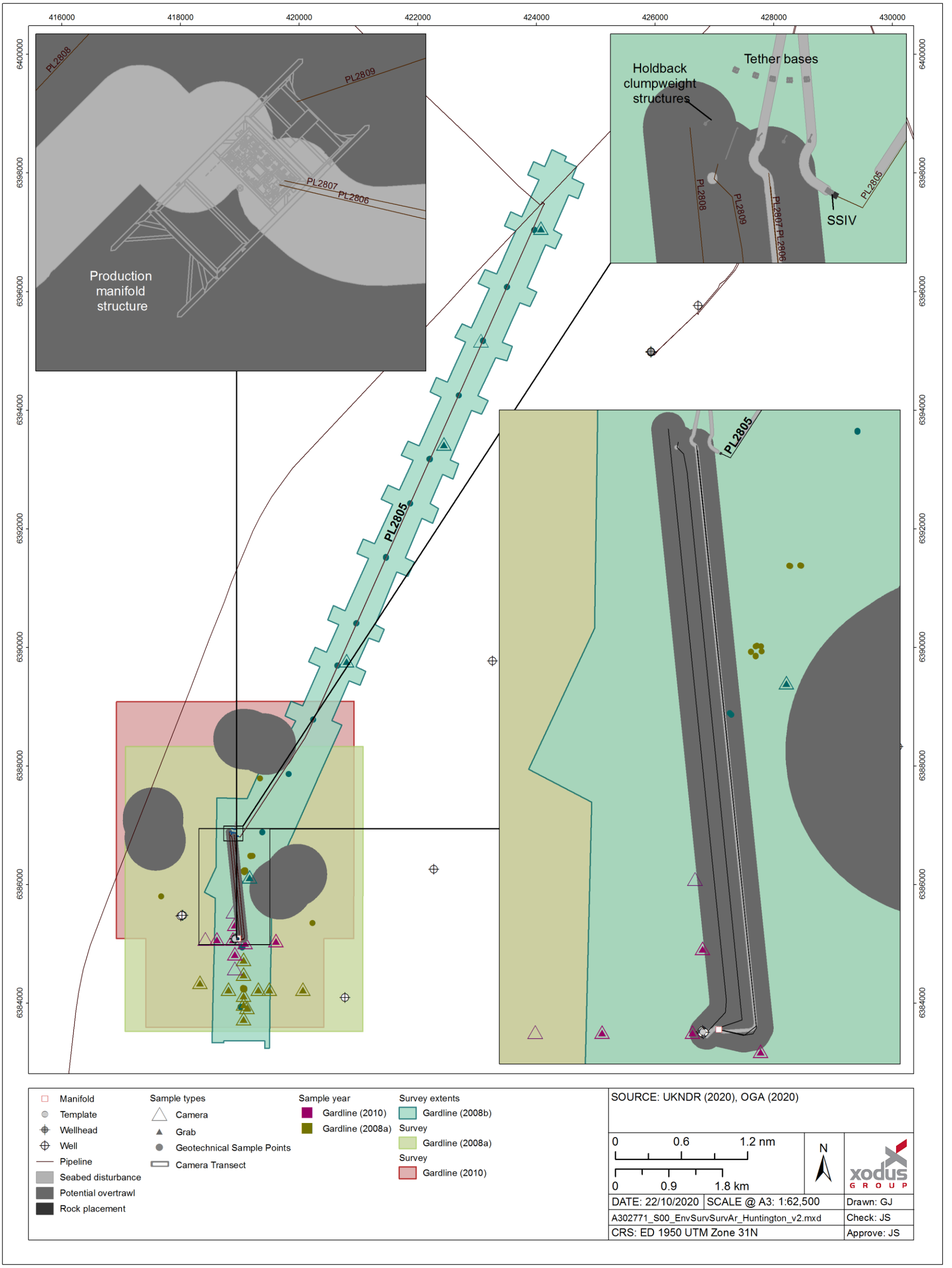

Figure 6-1 Extents of Potential Seabed Impacts against Existing Environmental Data

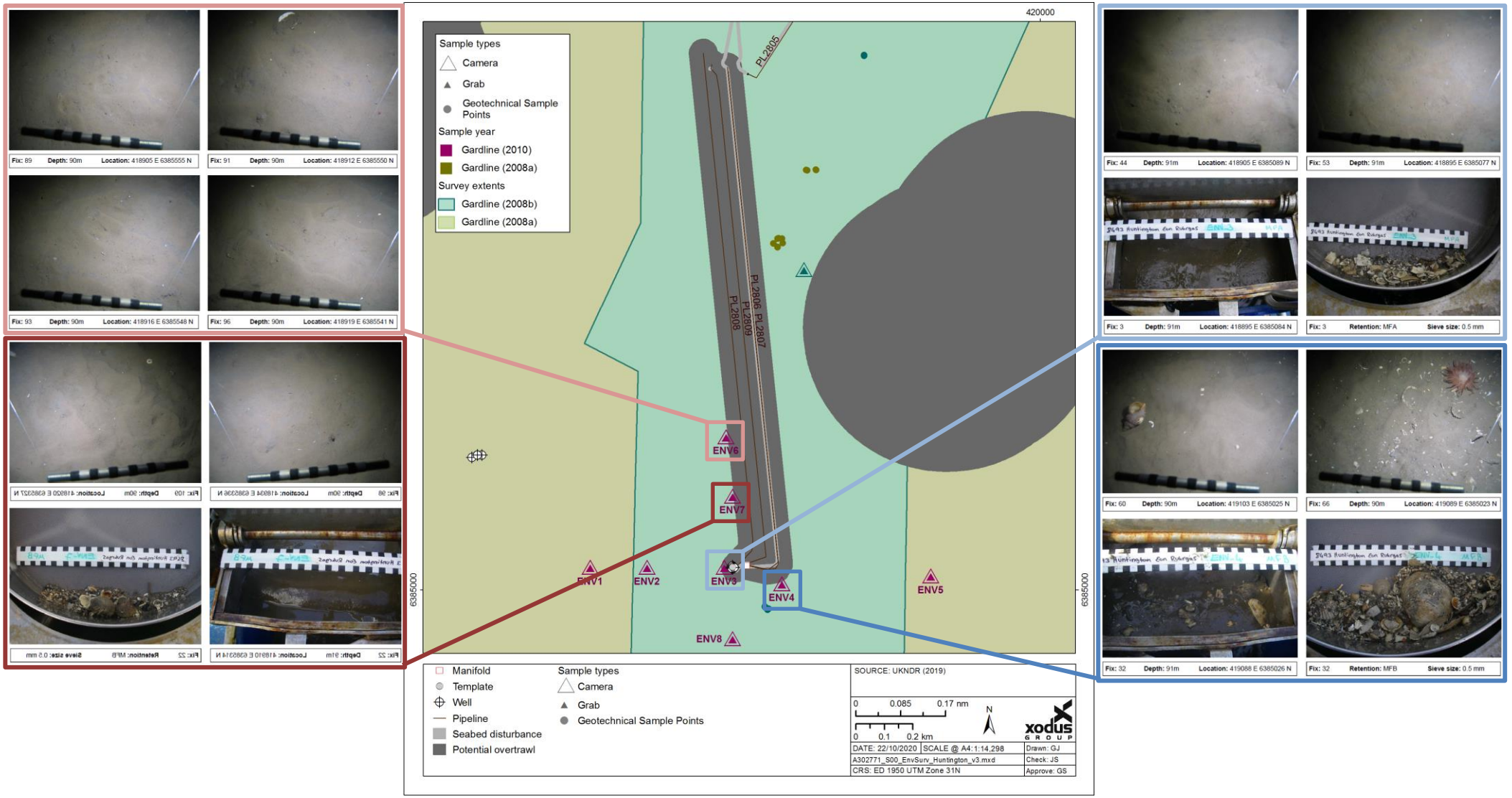

Figure 6-2 Areas of Potential Seabed Impacts with Environmental Sampling Data

6.1.3.1.1 Temporary Direct Disturbance

The sediment structure, including the burrows of any animals present, are likely to be affected by direct disturbance. Direct disturbance has the potential to cause mortality or injury to benthic and epibenthic fauna which are sessile or unable to move out of the way quickly. More mobile benthic fauna will likely also be disturbed, but this will likely be limited to a short period beyond the duration of the decommissioning activity in question.

Areas of temporary direct disturbance are centred within the production end of the Huntington Field infrastructure, where the majority of small structures and flexible flowlines are located. This also corresponds to the area with the most substantial environmental survey data (Figure 6-1 and Figure 6-2). Past surveys of benthic fauna in the Huntington Field area have identified communities typical of the CNS, comprising hermit crabs, starfish, molluscs, anemones, hydroids, soft coral and fish (as described in Section 3.2.2). However, no species of conservation concern have been identified within the Huntington Field area. Therefore, temporary decommissioning activities are not likely to have a substantial impact on benthic communities.

In addition to fauna, the benthic habitats around the area are not protected for their conservation value. EUNIS habitats A5.15 'Deep circalittoral coarse sediment' and A5.27 'Deep circalittoral sand', which are representative of the Huntington Field (BGS, 2019), form the predominant substrate types within the CNS (BGS, 2019). The predicted occurrence of habitats A5.15 and A5.27 also indicates the potential presence of PMF 'offshore subtidal sand and gravels' (JNCC, 2014b).

As noted in Table 6-5, without overtrawling, approximately 0.08 km^2 of seabed would be affected by temporary direct disturbance. However, if overtrawling remediation is required, this would nearly double the total potential area disturbed by the proposed decommissioning operations (i.e. 1.5 km^2). However, given that the temporary holding of the dynamic risers and dynamic umbilical on the sea floor will form a minimal interaction with the seabed, it is unlikely that their respective footprints will require the levels of overtrawling remediation described here. Nonetheless, it has been calculated as a part of the worst-case estimation of potential seabed impacts.

The scale of direct disturbance associated with the proposed decommissioning activities is still small when compared to other forms of disturbance that occur in the area, such as commercial *Nephrops* trawling (Section 3.5.2). A commercial trawler with a 12 m wide trawl beam trawling at its slowest rate of approximately 4.7 km/h would cover an area of roughly 0.06 km^2 per hour and would therefore take less than 90 minutes to cover the anticipated direct disturbance area (FAO, 2019). For the area of direct disturbance including overtrawling, this would equate to approximately 26.5 hours of trawling by commercial fisheries.

Fishing effort in ICES rectangle 44F1 (within which the Huntington Field is located) amounted to 122 days (2,928 hours) in 2018 (Section 3.5.2). In this context, the potential temporary disturbance associated with the possible full remediation of the relevant infrastructure will be a very small fraction of the disturbance already taking place by commercial fisheries trawling activities in this area of low benthic conservation value. As such, temporary disturbance of a relatively small area of seabed is expected to have a negligible effect on the benthic receptors across the broad regional habitat which is characteristic of the Huntington Field.

6.1.3.1.2 Permanent Direct Disturbance

Permanent direct disturbance will occur due to leaving hard substrate on the seabed in perpetuity. This encompasses both the leaving *in situ* of existing material that has previously been introduced (rock armour), and the introduction of new rock armour to protect the trenched and buried rigid flowline, PL2805, which will be decommissioned *in situ* (Figure 6-1). Approximately 60 m^2 of seabed will be subject to permanent direct disturbance due to the introduction of hard substrate.

The immediate effect of the introduction of new hard substrate will be mortality and injury of benthic and epibenthic fauna that cannot move away from the activities, as well as disturbance of motile fauna. Following the introduction of the material, the ongoing effect will be the change of an area of softer habitat to a hard substrate, and a related change in the types of organisms that can use the habitat. Organisms such as sea pens and burrowing bivalves, anemones and crustaceans will no longer be able to use the area affected, while new habitat will be created for other groups such as encrusting sponges and other species of anemone. Surveys revealed that the hard substrate community was comprised of molluscs, anemones, sponges, starfish (*A. rubens*), sea urchins, soft coral and crabs. However, environmental sampling at the production end of the PL2805 pipeline has shown limited faunal abundance, with the sampling area characterised by sands with shell fragments.

While the introduction of hard substrate clearly results in a change in the habitat type and associated fauna present, the scale of the impact (60 m^2) is negligible considering the very large extent of sandy seabed available in the CNS and the limited sensitivity of the habitat in the Huntington Field area. Recovery of any affected areas to the baseline substrate of sands is expected to take many years but will eventually occur as the deposited rock material is gradually buried by natural sediment deposition. Therefore, the community is expected to recover and revert to pre-disturbance composition with time. However, the duration over which this will occur is thought to constitute a permanent impact within this context.

6.1.3.2 Indirect Disturbance

Direct disturbance of the seabed during decommissioning operations (Section 6.1.3.1) will cause sediment re-suspension. Sediments that are re-suspended will travel in the water column before settling. Most sediment is expected to settle within the direct disturbance area, but some may settle in adjacent areas not directly affected by decommissioning operations.

6.1.3.2.1 Suspended Sediment in the Water Column

Increased suspended sediment load in the water column, and the subsequent settling can negatively affect seabed habitats and species. The effect mechanisms are interference with feeding due to individuals' inability to keep their feeding apparatus clear of sediment, and physical burial of individuals that are unable to recover to the surface through layers of newly deposited sediment (Gubbay, 2003; Rogers, 1990). The potential area of direct seabed disturbance is from all operations (including overtrawling) is 1.5 km^2 (Table 6-5 and Figure 6-1). The area of indirect impact from sediment resettlement is thus expected to be up to 3.0 km^2.

The East of Gannet and Montrose Fields NCMPA lies approximately 14 km south south-west of Huntington. This area has been designated due to the presence of ocean quahog aggregations (JNCC, 2018a). This species is listed as PMF in Scottish waters (Tyler-Walters, 2016) and is on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2008). The Huntington Field is located outside the immediate area of distribution of ocean quahog and no ocean quahog have been sighted during any of the environmental surveys (Section 3.2). Whilst some individuals may be found within 20 km of the decommissioning activities, they are unlikely to be found in any aggregations (Defra, 2010a). The distance from the Huntington Field to the NCMPA is sufficient to determine that decommissioning activities will not impact this species. Furthermore, ocean quahogs are assessed as having a low sensitivity to changes in water clarity. They typically occur in fine sediments where the surface is regularly mobilised and where accretion rates are moderate to high. Ocean quahog can also avoid sudden sedimentation changes by burrowing for several days (Tyler-Walters and Sabatini, 2017). As such, it is unlikely that increased suspended sediment caused by the Huntington decommissioning activities would reach or impact any ocean quahog.

Defra's Charting Progress for UK Seas report (Defra, 2010b) considers that impacts arising from sediment re-suspension are short-term (usually over a period of a few days to a few weeks). Generally, as with ocean quahog, infaunal communities are naturally habituated to sediment transport processes and are therefore less susceptible to the direct impact of temporarily increased sedimentation rates. As detailed in Section 3.2,

past surveys of the Huntington Field area showed no habitats or species of concern, nor any species which may be considered particularly vulnerable to increased levels of suspended sediment.

6.1.4 Cumulative and Transboundary Impacts

The closest installations are the CATS riser platform (Operator: Shell) and North Everest platform (Operator: Chrysaor), both located 19 km north-north east of the Huntington Field. It is not expected that impacts from the Huntington decommissioning activities will overlap or interact with potential seabed impacts from operations at these installations. The Huntington Field is also located 27 km west south west of the UK/Norway median line, which is outwith the potential area of disturbance; therefore, no transboundary impacts are expected from the proposed decommissioning activities.

6.1.5 Mitigation Measures

Mitigation measures to minimise seabed disturbance relate to the placement of rock armour and the Seabed Clearance Verification. Rock armour will be placed by a fall pipe vessel equipped with an underwater camera on the fall pipe to ensure accurate placement of the rock armour, a minimised footprint, and that the minimum safe quantity of rock is used.

The Seabed Clearance Verification survey will endeavour to implement survey techniques which do not make contact with the seabed, such as Side Scan Sonar (SSS) and Remotely Operated Vehicle (ROV), to verify the condition of the seabed during the post-decommissioning survey. The survey methods will be discussed and finalised with OPRED prior to survey commencement to ensure the survey meets the requirements for clear seabed verification. Where these non-intrusive survey techniques are deemed inconclusive by the SFF, seabed clearance is likely to require conventional overtrawl survey methods, as described in this chapter. Should overtrawling be required, it will be conducted by fishing vessel(s) using appropriate trawl gear.

6.1.6 Conclusion

Receptor	Impact Magnitude	Receptor Sensitivity	Receptor Vulnerability	Receptor Value
Seabed	**Minor**	**Medium**	**Low**	**Low**
Validation				
Decommissioning activities in the Huntington Field will result in temporary direct disturbance to the seabed amounting to 0.083 km^2, or 1.5 km^2 when accounting for overtrawling. When accounting for temporary indirect disturbance caused by overtrawling, the total area is doubled to 3.0 km^2. Permanent disturbance caused by long term rock armour placement will affect 60 m^2. These are considered gross over-estimations of the likely impact of the proposed decommissioning activities, particularly when considering the conservative application of overtrawling activities during seabed clearance verification (see Section 2.4.7). Due to the likely small area which will experience a minor shift in baseline conditions, the magnitude has been determined as **minor**. Temporary direct seabed disturbance may cause injury and mortality to the benthos within the disturbance footprint, whilst indirect temporary disturbance may interfere with feeding and smother individuals that are unable to burrow back to the surface through settled sediment. Due to the nature of the seabed disturbance and the potential presence of some species which may be sensitive to smothering, such as soft corals or cnidarians, the receptor sensitivity was found to be **medium**. Permanent direct disturbance will result in the loss of a small area of soft-sediment habitat, which will be replaced with an equivalent area of hard substrate. However, as the impact is so limited in scale spatially				

and temporally, the receptor is likely to fully adapt and recover, and the community as a whole is unlikely to be considerably affected by activities. Therefore, the vulnerability of the receptor is **low**. The EUNIS habitat types predicted to categorise much of the Huntington Field area are A5.15 'Deep circalittoral coarse sediment' and A5.27 'Deep circalittoral sand'. The occurrence of habitats A5.15 and A5.27 also indicates the potential presence of PMF 'offshore subtidal sand and gravels' (JNCC, 2014b). These habitats are very widely distributed across the CNS and are already included within the UK MPA Network outwith the project area. The scale of direct and indirect disturbance associated with the decommissioning activities is small relative to the area of similar habitat available. Furthermore, no habitats or species of conservation concern were identified within the decommissioning footprint or its immediate vicinity therefore receptor value is **low**. Based on the localised and mostly temporary nature of the disturbance, the impact of Huntington decommissioning activities on seabed receptors is expected to be **negligible**.	
Residual Impact Significance	**Negligible**

6.2 Commercial Fisheries

The impact of Huntington decommissioning activities on commercial fisheries is discussed in this Section, along with measures proposed to minimise the scale and duration of potential impacts.

6.2.1 Approach

Potential impacts to commercial fisheries from decommissioning of infrastructure are limited to:

- The introduction of possible snagging risks to commercial trawl fisheries and other fisheries which utilise the seabed; and
- The presence of decommissioning vessels temporarily modifying access to fishing grounds.

6.2.2 Sources of Potential Impacts

Free-spans associated with infrastructure decommissioned *in situ* during their initial decommissioning and long-term degradation have the potential to snag demersal fishing gears. Snagging may lead to the loss or damage of catch or commercial fishing gears may result in vessel capsize in extreme circumstances (MAIB, 2019). The greatest identified risk to commercial fisheries is the potential snagging of fishing gears on exposed infrastructure (e.g. deburied infrastructure or spans along rigid pipelines) or seabed modified by removal of infrastructure (e.g. clay berms generated by the removal of flexible umbilicals).

Data from the Marine Accident Investigation Branch (MAIB, 2019) shows that 15 fishing vessels were recorded to have sunk due to snagged fishing gear between 1989 and 2014, resulting in 26 fatalities. As discussed in section 3.5.2 according to the 2018 fisheries statistics, demersal mobile gear used in these Blocks (Block 22/09 and 22/14a) includes trawls and demersal seine nets which may be impacted by snagging (Scottish Government, 2019a).

Infrastructure in the Huntington Field which has the potential to pose a snagging risk include: a trenched and buried rigid pipeline to be decommissioned *in situ*; trenched and buried flexible flowlines to be fully removed via reverse-reeling without de-burial; the removal of subsea installations; and the footprint left behind following removal of the Voyageur Spirit FPSO's suction anchors and the dynamic risers and dynamic umbilical connecting the subsea flowlines to the FPSO.

As discussed in Section 3.2, a seabed survey of the Huntington Field area described the seabed as being slightly silty shelly sand with occasional minor clay outcrops, coarse sediment accumulations and boulders and debris (Gardline, 2008a, 2009a and 2010). The removal of infrastructure or the reverse reeling of flexible pipelines through such clay outcrops could potentially result in the formation of clay berms, which are a snagging hazard for fishing vessels. Similarly, removal of suction anchors may generate clay berms.

Whilst pipeline degradation has the potential to introduce snagging risk in certain circumstances, the PL2805 pipeline to be decommissioned *in situ* is known to be stable and has remained buried throughout the lifetime of the Huntington Field. Information on the DoB of the existing pipeline infrastructure indicates it is suitably buried along its length with an average depth of burial of 1.8 m (Appendix C), which is three times deeper than the 0.6 m standard for 'stable burial' (BEIS, 2018). Any potential changes in burial status of PL2805 resulting in legacy impacts to commercial fisheries due to its degradation over time will be managed through continued monitoring and communication with relevant users of the sea, as detailed in Section 6.2.5 below. Consequently, residual risk of snagging is not considered further in this assessment.

Potential residual impacts to commercial fisheries from the temporary loss of access to fishing grounds during decommissioning activities remains, however. This impact pathway has been addressed in the Sections below.

6.2.3 Effects on Sensitive Receptors

Considering the negligible likelihood of residual snagging risk to fisheries following decommissioning activities and the continued monitoring of infrastructure decommissioned *in situ*, effects on commercial fisheries will be limited to temporary loss of access to commercial fishing grounds. Various data sources indicate that use of the decommissioning area by commercial fisheries is considered low compared to the surrounding region (see Section 3.5.2). Collective fishing effort has remained low in every month of the year for the past five fishing years except in November 2016, when it was considered moderate.

Demersal species comprised the majority (63%) of live weight landings over the last five years, with the exception of 2017, when pelagic species comprised the highest proportion of live weight landings. However, there is some variability in the value, weight and composition of landings over the recent five-year period. Landings weight decreased and landings value increased when shellfish landings made up a larger portion of catches. However, this appeared to be opportunistic and not indicative of a shift in fishing style towards or away from static gear fishing. Whilst data suggests that the wider region constitutes important fishing grounds for demersal *Nephrops* trawl fisheries, the Huntington Field area experiences limited trawling activity, particularly along its pipelines (Figure 3-4 and Figure 3-5).

On review of demersal trawling activity in the North Sea, Rouse *et al* (2017) found that a low percentage (0.93%) of demersal trawling trips specifically targeted Oil and Gas pipelines compared with surrounding areas. The available VMS data for trawling activity along pipelines indicates that trawling activity across the Huntington Field is predominantly very low, likely because the pipeline is buried to an average depth of 1.8 m, which is considerable and therefore offers limited potential to act as an artificial aggregate for commercially fished species as other, unburied or superficially buried infrastructure might.

Given the relatively low fishing activity across the Huntington Field relative to the wider UKCS and surrounding region in the North Sea, the temporary loss of access to fishing grounds during decommissioning activities are not likely to have significant impacts on economic value of commercial fisheries operating within this region. Moreover, following the sail away of the Voyageur Spirit FPSO (Section 2.4.1), access to fishing grounds previously lost to the 500 m exclusion zone associated with the Huntington Field's surface infrastructure will be restored. Existing controls on decommissioning vessel movements across the project area and the promulgation of Notices to Mariners (NtMs) assist with reducing the severity of such impacts to a minor disturbance of localised fishing operations. For these reasons, potential impacts associated with decommissioning vessel presence are considered negligible.

6.2.4 Cumulative and Transboundary Impacts

The Huntington Field is located approximately 27 km from the UK-Norway border (Figure 1-1). As such, this region experiences higher levels of fishing by foreign vessels compared to other regions of the UKCS (Scottish Government, 2019a; Marine Scotland, 2012). Activity by fishing fleets of several non-UK nationalities may be recorded throughout the waters surrounding the Huntington Field; the most common of which being Norwegian, French, Faroese and Dutch vessels which predominantly operate demersal gears (MMO, 2015).

As all infrastructure will either be removed or decommissioned *in situ* to an overtrawlable condition, no cumulative impacts to any UK and/or foreign fishing fleets, demersal or otherwise, are expected to result from the Huntington decommissioning project. Moreover, a positive outcome of the decommissioning of the Huntington Field will be the removal of the fishing exclusion zone (500 m safety zone) surrounding the Voyageur Spirit FPSO. This will increase the available fishing grounds for commercial fishing fleets of all nationalities which have been granted access to fishing in the UKCS.

6.2.5 Mitigation Measures

The existing controls of seabed clearance verification with independent review by SFF, continued monitoring for an agreed period, remediation where required, and accurate mapping of the locations and state of infrastructure which has been decommissioned *in situ* reduces the probability of impacts to commercial fisheries.

The physical presence of vessels during decommissioning operations can cause disturbance to commercial fishing vessels. There are a number of existing controls which Premier is utilising for the impact of vessel presence on commercial fisheries. Stakeholder engagement will be continued prior to commencement of operations, including the promulgation of NtMs detailing any decommissioning activities. Appropriate navigation aids will be used in accordance with the Consent to Locate conditions to ensure that sea users are made aware of the presence of vessels undergoing decommissioning activities. In addition, there will be continual use of Automatic Identification System satellite vessel tracking and all decommissioning vessel activities will be in accordance with national and international regulations.

In addition, Premier keeps manned bridges to ensure that other sea users adhere to any safety zones which are in place, including temporary safety zones around decommissioning vessels.

Pipelines will be remediated should any pre-decommissioning or DoB/monitoring surveys indicate the integrity of the pipelines or DoB has been compromised or a free span has emerged. Given the stability of buried pipelines (see Appendix C), no such remediation is expected. However, should such an instance arise in future, other sea users would be notified via the appropriate communications channels (as described in Section 5).

The decommissioning operations will be designed and executed to minimise the area of seabed that is disturbed, therefore reducing the potential for these operations to generate clay berms in the process of reverse reeling (which will only take place where safe and technically practicable to do so). Furthermore, a seabed survey following completion of decommissioning will be carried out and on review of the results of this survey, an overtrawl survey will be considered.

In spite of the above, Premier has a responsibility to ensure all potential residual impacts to fisheries from snagging risk are minimised, given the magnitude of this impact factor. A post-decommissioning survey using geophysical survey methods to provide a collective profile of the buried flowline/seabed interface to identify potential free spans, as well as identify any remaining field debris will be carried out. Where necessary, overtrawl surveys will be undertaken to further verify that reverse reeling did not generate clay berms (in clay outcrop areas) or other snagging risks. Any identified snagging hazards will be remediated with rock placement or other stabilisation materials, as required. Following this, continued monitoring and remediation will take place to ensure that all buried infrastructure remains stable and without exposures.

6.2.6 Conclusion

Receptor	Impact Magnitude	Receptor Sensitivity	Receptor Vulnerability	Receptor Value
Commercial Fisheries	**Low**	**Low**	**Negligible**	**Low**
Validation				
Considering the negligible likelihood of potential snagging risks predicted from the proposed decommissioning activities, alongside the management and control measures that are in place to ensure no such risks arise, residual impacts associated with snagging of commercial fisheries are considered **negligible.** Long-term impacts of the proposed decommissioning of the Huntington Field will see increased access to fishing grounds in the area through the full removal of the Voyageur Spirit FPSO. The 500 m exclusion zone surrounding the FPSO will be removed, reopening this area to commercial fishing. During decommissioning activities, impacts to fisheries will be **low** and limited to the short-term loss of a very small relative area of unexceptional fishing grounds. Due to the very limited reduction in catches which may arise from the temporary loss of access to fishing grounds during decommissioning, receptor sensitivity has been defined as **low** and receptor vulnerability is considered **negligible**. This scoring reflects the fishing industry's ability to accommodate short-term loss of access to average quality fishing grounds, particularly when followed by regaining access to previously-closed grounds. The value of the receptor has been deemed **low** as the area in which Huntington is located and where the decommissioning activities will take place is not considered of particular commercial importance when compared to the surrounding regions of the North Sea. For these reasons, the overall residual impact significance of the proposed decommissioning activities on commercial fisheries is considered **negligible**.				
Residual Impact Significance	**Negligible**			

7 CONCLUSIONS

Following detailed review of the proposed decommissioning activities, the environmental sensitivities characteristic of the Huntington Field area, industry experience with decommissioning activities, and consideration of stakeholder concerns, it was determined that potential project-related impacts to the seabed and commercial fisheries required further consideration. As the approach for the decommissioning of the Huntington Field and associated infrastructure varies, the worst-case aspects from each method were considered and assessed in line with a tried and tested EA Methodology described in Section 4 and the results are detailed in Section 6.

The Huntington Field is located well offshore in the CNS, remote from coastal sensitivities and approximately 176 km away from the nearest offshore conservation site, the Buchan Ness to Collieston Coast SPA. The potential to impact upon the integrity of this site was reviewed in the assessment of Seabed impacts (Section 6.1). The scale of direct and indirect disturbance associated with the decommissioning activities is small relative to the area of similar habitat available. Furthermore, no habitats or species of conservation concern were identified within the decommissioning footprint or its immediate vicinity. The overtrawling scenario considered herein is considered worst-case and it is likely that minimal remediation employing intrusive techniques will be required. Any overtrawling will be carried out at specific locations determined by independent review of the non-intrusive Clear Seabed Verification Survey. All the infrastructure being decommissioned *in situ* is considered stably buried and should not require further intervention. Based on the localised and mostly temporary nature of the disturbance, and the nature of the habitat and associated benthic community being of low value and vulnerability, the impact of Huntington decommissioning activities on seabed receptors is considered **negligible**.

Potential impacts to commercial fisheries were limited to the temporary loss of access to fishing grounds, as the potential for legacy impacts such as the snagging of fishing gears was determined to be **negligible** when Seabed Clearance Verification and continued monitoring of the infrastructure decommissioned *in situ* were considered. The waters comprising the Huntington infrastructure experience varying levels of commercial fishing between years and whilst data suggests that the wider region constitutes important fishing grounds for demersal *Nephrops* trawl fisheries, the Huntington Field area experiences limited fishing activity, particularly along its pipelines which are often targeted by North Sea trawlers, compared to other regions of the UKCS (see Section 0). Existing mitigations and controls ensure that the temporary decommissioning activities are limited to a spatially and temporally limited disturbance. Based on these observations, the temporary loss of fishing grounds during decommissioning activities are not likely to have any important impacts on the economic value of commercial fisheries operating in the area and are therefore deemed **negligible**.

Finally, this EA has considered the objectives and marine planning policies of the NMP across the range of policy topics including biodiversity, natural heritage, cumulative impacts and the oil and gas sector. Premier considers that the proposed decommissioning activities are in alignment with such objectives and policies.

Based on the findings of this EA, including the identification and subsequent application of appropriate mitigation measures and Project management according to Premier's HSES Policy and EMS, it is considered that the proposed Huntington decommissioning activities do not pose any threat of significant impact to environmental or societal receptors within the UKCS or internationally.

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APPENDICES

Appendix A: Huntington Inventory

Infrastructure Details

Table A-1 Huntington Infrastructure – Pipelines, Flowlines, Spool, Jumpers, Umbilicals & Risers

Description	Group no	Diameter (inches)	Diameter (m)	Length (m)	Length to be removed (m)
Subsea infrastructure					
Gas export pipeline, trenched and buried	1	8.6	0.2	1180.0	144.0
Control jumper	4	2.8	0.1	100.0	100.0
Control jumper	4	2.8	0.1	100.0	100.0
Gas export SSIV control jumper	4	2.0	0.1	130.0	130.0
Control jumper	4	3.7	0.1	100.0	100.0
Control jumper	4	3.7	0.1	100.0	100.0
Control jumper	4	3.7	0.1	100.0	100.0
Control jumper	4	3.7	0.1	100.0	100.0
Gas lift spools	2	67.0	1.7	67.0	67.0
Gas lift spools	2	67.0	1.7	67.0	67.0
Production flexible flowline	3	15.5	0.4	1860.0	1860.0
Gas lift flexible flowline	3	6.5	0.2	1870.0	1870.0
Water injection flexible flowline	3	11.0	0.3	1830.0	1830.0
Gas lift spools	2	66.0	1.7	66.0	66.0
Gas lift spools	2	64.0	1.6	64.0	64.0
Production spools	2	63.5	1.6	63.5	63.5
Production spools	2	63.5	1.6	63.5	63.5
Production spools	2	63.5	1.6	63.5	63.5
Production spools	2	63.5	1.6	63.5	63.5
Gas Export Tee jumper	4	10.6	0.3	85.0	85.0
Gas Export SSIV jumper	4	10.6	0.3	84.0	84.0
Gas Export Spool	2	38.0	1.0	38.0	38.0

Description	Group no	Diameter (inches)	Diameter (m)	Length (m)	Length to be removed (m)
Static umbilical	5	6.0	0.2	1800.0	1800.0
Surface infrastructure [Note 1]					
Dynamic umbilical	5	7.3	0.2	325.0	325.0
Gas export riser	6	11.6	0.3	375.0	375.0
Production riser	6	18.8	0.5	325.0	325.0
Gas lift riser	6	7.0	0.2	325.0	325.0
Water injection riser	6	11.0	0.3	325.0	325.0

Notes:

1. The decommissioning via full removal of the inventory items under 'Surface infrastructure' fall under the Huntington FPSO (Voyageur Spirit) DP (Premier Oil E&P UK Limited, 2020b) and are considered outwith the scope of this EA. However, information about the dimensions of these items has been used to estimate the potential overtrawl area required for seabed clearance verification, which forms a part of the Phase 3 remit covered by the Huntington Field DP (Premier Oil E&P UK Limited, 2020a).

Table A-2 Huntington Infrastructure – Deposits and Installations

Description	Quantity	Length (m)	Width (m)
Drill Template	1	15.3	13.4
Production Manifold Structure	1	27.42	10
SSIV Structure	1	9	4.5
UTA-DUTA	1	7	6
Holdback Clumpweight Structures	4	6	6
Tether Bases	5	5	5
Huntington Tee [Note 1]	1	15.74	11.94

Notes:

1. This installation may be decommissioned with the CATS pipeline, however as a worst-case scenario has been included in the preparation of this EA.

Protection and Stabilisation

There are an estimated 305 concrete mattresses in the Huntington Field. These can be divided into two categories. Type 1, of which there are 69, have dimensions of 6 m x 2 m x 0.15 m and weigh 3.144 Te in air. Type 2, of which there are 236, have dimensions of 6 m x 3 m x 0.15 m and weigh 4.716 Te in air. There are approximately 1,000 grout bags in the Huntington Field each weighting an estimated 25 kg.

Mooring lines and suction anchors

The following infrastructure provided in Tables A-3 and A-4 are associated with the Voyageur Spirit FPSO and its decommissioning is the responsibility of Altera. The decommissioning activities associated with the Voyageur Spirit FPSO and all other surface infrastructure and are considered outwith the scope of this EA. However, information about the dimensions of the mooring lines and suction anchors has been used to estimate the potential overtrawl area required for seabed clearance verification, which forms a part of the Phase 3 remit covered by the Huntington Field DP (Premier Oil E&P UK Limited, 2020a) and this EA.

Mooring lines 1 to 10 are of the same dimensions, and therefore have been represented once in the Table.

Table A-3 Huntington Infrastructure – Mooring lines Associated with the Voyageur Spirit FPSO

Mooring lines							
ID	Quantity	Lower chain		Rope		Upper chain	
		Length (m)	Diameter (m)	Length (m)	Diameter (m)	Length (m)	Diameter (m)
1-10	10	313	0.147	915	0.241	125	0.142
11a	1	302	0.147	915	0.241	125	0.142
11b	1	306	0.147	---	---	---	---
X-12	1	213	0.147	915	0.241	125	0.142

Table A-4 Huntington Infrastructure – Suction Anchors Associated with the Voyageur Spirit FPSO

Suction anchors			
ID	**Quantity**	**Length (m)**	**Diameter (m)**
1	1	9	9
2	1	9	8
3	1	9	12.5
4	1	9	8.5
5	1	9	10.5
6	1	9	13
7	1	6	10
8	1	6	9.5
9	1	9	8.5
10	1	7	5.5
11a	1	7	10
11b	1	7	10
12	1	6	15
X-12	1	7	8.5

Appendix B: ENVID Summary

The ENVID workshop was held to review environmental sensitivities and potential impact pathways for all of Premier's assets which are under consideration for decommissioning (i.e. Balmoral, Caledonia, Huntington, Hunter & Rita, and Johnston Fields). As such, infrastructure and sensitivities associated with all of these assets are included in the ENVID Summary Table below.

Premier Oil UK Ltd. Decommissioning Project: Environmental Management Worksheet **06/08/2019**

Environmental Impact Review					Controls, Mitigations, Review and Ranking												Identified Actions		
						Initial Ranking						Residual Ranking							
Operational Phase	Project Element	Operation / Aspect	Activity	Summary of Environmental Impact	Existing Controls (Standards, Legislative, or Prescriptive)	Consequence/Extent	Duration of Effect	Impact	Probability	Rank	Premier Specific / Best Practice Standards	Consequence/Extent	Duration of Effect	Impact	Probability	Rank	Description	Comment	Status
General	Vessels	Physical presence	Vessels	Disturbance to vessel operations offshore (e.g. fisheries and other maritime users); disturbance to marine species	Stakeholder engagement. Existing controls through DP Vessels and the usual notifications (key stakeholders).	L	M	L	M	M	In addition to existing controls, Premier keeps manned bridges.	L	M	L	M	M		Screened out	
			Discharges	Vessel discharge of grey water, bilge water, etc.	MARPOL compliant, bilge management procedures, good operating practices.	L	L	L	H	L		L	L	L	H	L		Screened out	
			Vessel engine noise	Underwater noise - behavioural modifications to marine mammals, turtles and potentially fish.	Vessel noise will not have significant sound levels - unlikely to be far above ambient noise levels.	L	M	L	M	L		L	M	L	M	L		Screened out	
		Power generation	Emissions	Gaseous emissions to atmosphere cause increased degradation of local/regional air quality (NOx and particulates). Transboundary air pollution. Contributing to global warming (CO2).	Lift vessel likely to dominate gaseous emissions.												Not assessed at this stage due to global scale. This would be a very small amount of CO2 emissions.	Screened out	
			Energy Use	Impact on climate change and reduction of resources of hydrocarbons. Products used for recycling.	Lift vessel and onshore smelting processes will dominate energy usage.												Not assessed at this stage due to global scale. This would be a very small amount of fuel usage.	Screened out	
	Waste	Waste management	Onshore	Use of landfill and landfill resource take (non-hazardous); special disposal (hazardous)	All waste will be handled and disposed of in line with regulations as detailed in the Waste Management Plan. Inventory of waste - tracking materials to final place. There are potential positive impacts from recycling of steel.	L					All wastes, including normal, hazardous and special wastes, will be shipped to shore for processing. Any transfrontier shipments of waste, including those for landfill, will be non-hazardous and will be managed under the Waste Management Plan and will comply with relevant legislation.	L						Screened out under Waste Management Strategies	
Preparation	Substructures	Template, wellheads, etc.	Flushing and cleaning	Liquid discharge to sea - Water quality in immediate vicinity of discharge will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts from sediment.	Treated water discharged to sea after cleaning.	L	L	L	M	L	Any NORM identified during flushing and cleaning of substructures are covered under the appropriate Waste Management Plan. This includes NORM from all subsea and topsides sources and from Non-Destructive Testing (NDT).	L	L	L	L	L	There is a higher risk of NORM at Balmoral and around the Voyageur FPSO. It is not significant at the moment, but likely to get worse. Brenda will undergo NDT, but this is covered by the handling of radioactive waste outlined in the Waste Management Strategy for Balmoral.	Screened out under Waste Management Strategies	
			Marine growth removal	Disposal to landfill. As a worst case assume landfill, but look for alternative route.	Waste management strategy.	L	H	L	H	M	All wastes, including special wastes, such as marine growth, will be shipped to shore for processing. Any transfrontier shipments of waste, including those for landfill, will be non-hazardous and will be managed under the Waste Management Plan and will comply with relevant legislation.	L	H	L	H	M	Soft growth will be jetted off the deck, *Lophelia* or other hard substrates/species would not be jetted off (it's a hard coral), may remain stuck on the structure when it's shipped to shore, but can't go to normal landfill because it's classed as biological waste.	Screened out under Waste Management Strategies	
	Pipelines & Umbilicals	Pipelines	Disconnect ends	Liquid / solid discharge to sea - Water quality in immediate vicinity of discharge will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts? Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Treated water discharged to sea after cleaning. Solids will be shipped to shore for disposal.	L	L	L	M	L		L	L	L	L	L	Residuals at cut ends released into the marine environment (post-flushing - should be low). Flooding into the pipeline only up to a certain level (pressure dependent), so displacement is not complete pipeline.	Screened out	
				Liquid /solid discharge to sea - Water quality in immediate vicinity of discharge will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Agate discharge as solid . Potential NORM impacts? Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Treated water discharged to sea after cleaning. Solids will be shipped to shore for disposal.	L	L	L	M	L		L	L	L	L	L	Low risk of substructures emitting fluids/solids - everything cut post-flushing. Residuals released in minute amounts.	Screened out	

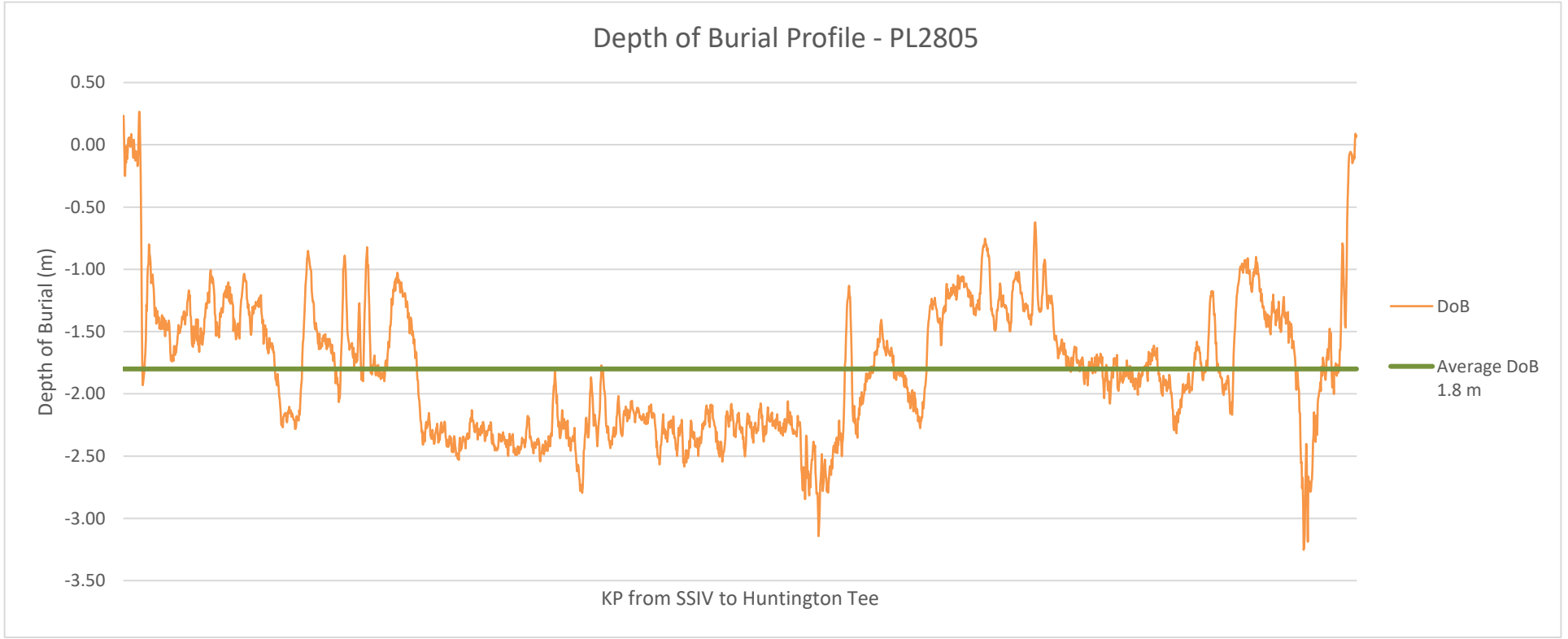
		Template, wellheads, etc.	Internal cutting (water jetting)	Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	M	L	L	M	L		M	L	L	M	L	Impacts include localised deposition and localised smothering, leading to localised seabed disturbance.	Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	M	L	L	M	L		M	L	L	M	L	Impacts include localised deposition and localised smothering., leading to localised seabed disturbance. Wellheads around Brenda includes clean cuttings deposits (not classed as piles under OSPAR assessments). Assumes some level of residuals present in deposits, but all below OSPAR thresholds, given they're not classed as piles.	Screened in	
			External cutting with diamond wire (as fallback option)	Underwater noise - behavioural modifications to marine mammals, turtles and potentially fish. Population impacts due to cumulative impact or impacting a reproductively significant number of individuals or location.	Diamond wire cutting noise will not have significant sound levels.	L	L	L	L	L		L	L	L	L	L	Ambient noise levels in the SNS are already very high due to vessel traffic, and any noise impacts from cutting will be negligible and limited in duration.	Screened out	
				Liquid / solid discharge to sea - Water quality in immediate vicinity of discharge will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts? Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Treated water discharged to sea after cleaning. Solids will be shipped to shore for disposal.	L	L	L	L	L	Transfer of controlled, hazardous and special wastes to UK ports for disposal will be governed by waste management plans.	L	L	L	L	L		Screened out under Waste Management Strategies	
				Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	M	L	L	M	L		M	L	L	M	L	Perhaps there are old piles at Johnston (old), but cuttings will have dissipated in the currents of the SNS which run closer to the coastline.	Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	M	L	L	M	L		M	L	L	M	L		Screened in	
	Substructure			Water quality in immediate vicinity of the jetted cuttings will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts?	Approximately 2 Te of cuttings jetted to surrounding environment - dynamic environment means dispersal and resettlement anticipated to be rapid.	H	M	H	M	H	MFE will direct the majority of the cuttings pile to the seabed immediate to the template (i.e. within hundreds of metres).	M	M	L	L	M	The MFE plume will only carry approximately 0.001 ppm of particulates from the cuttings pile within the water column. Whilst the plume will travel quite far in the water currents, this level of contamination is highly diluted and anticipated to have negligible impacts on marine species within the water column.	Screened in	
				Underwater noise - behavioural modifications to marine mammals, turtles and potentially fish. Population impacts due to cumulative impact or impacting a reproductively significant number of individuals or location.	MFE will not generate sound levels which will generate injury or significant disturbance to any marine species.	L	M	M	L	L	Premier will undertake MFE outwith periods of concern for drilling activities, as this activity is considered greater than a worst-case analogue for underwater noise generated by MFE.	L	L	L	L	L	Noise emissions from MFE are likely to be lower than drilling sounds and will be masked to a certain degree by the excavation vessel. MFE will be limited in duration and unlikely to exceed emissions for any of the operational equipment assessed for noise impacts. It is noted that the JNCC's period of concern for drilling activities, which are anticipated to generate noise levels slightly above those produced during MFE, is October to December.	Screened out	

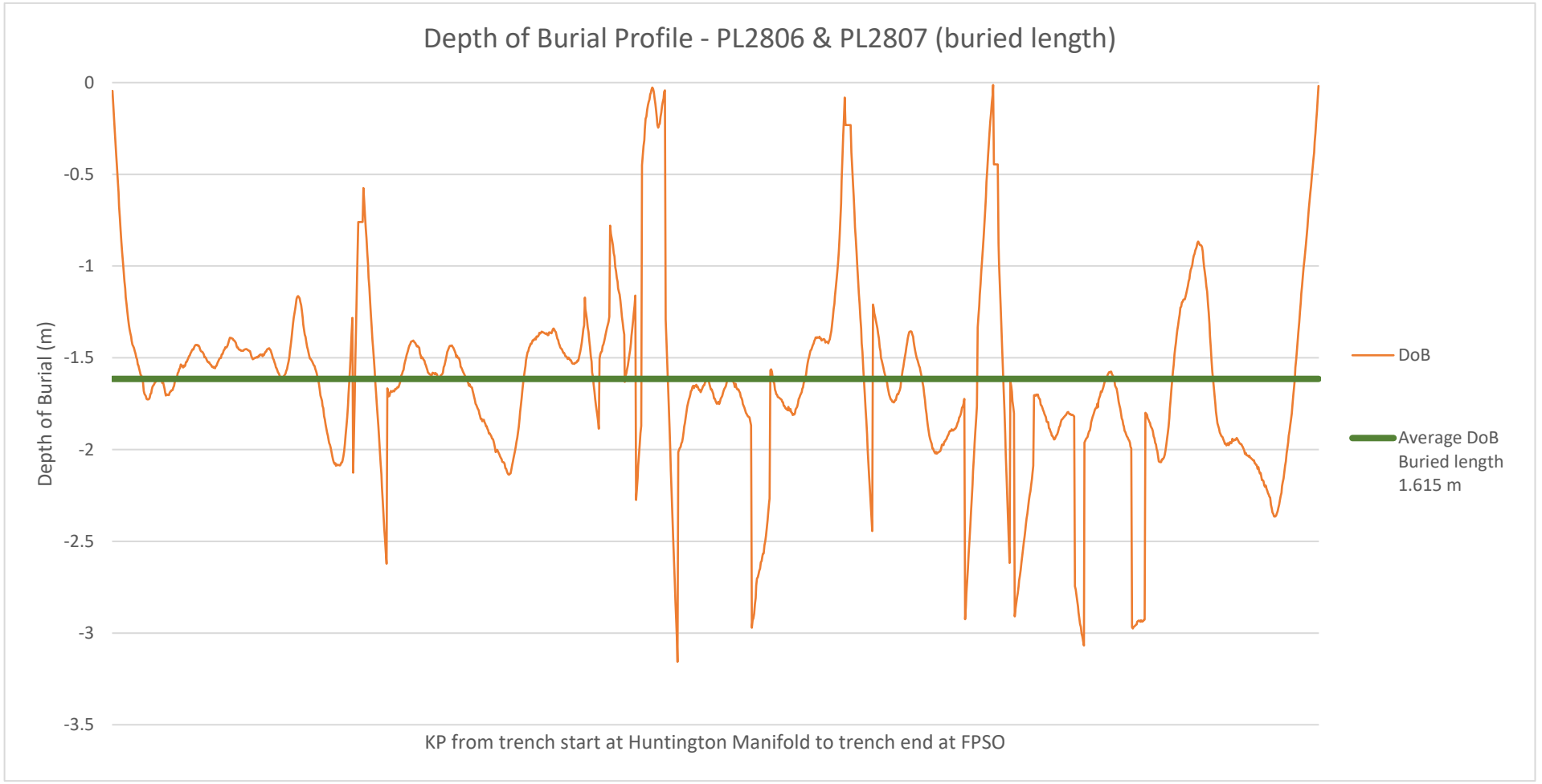
Decommissioning		Template (and potentially old wellheads)	MFE of cuttings	Seabed disturbance - Template is 9 km outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles. Cuttings deposits - in and around template, jetting deposit (2K tonnes) into water column - modelling report	Volume of sediment/ cutting mobilised - Large quantities of material excavated and introduced into a dynamic environment - region of impact will be large, but dispersal and resettlement anticipated to be rapid.	H	M	H	H	H	MFE will direct the majority of the cuttings pile to the seabed immediate to the template (i.e. within hundreds of metres).	M	M	M	M	M	The area is characterised by benthic fauna which includes species sensitive to smothering, particularly seapens. Seabed impacts will be most marked within several hundred metres of the Balmoral template, though beyond this the template cuttings deposition rates fall below 1 mm . There will be some movement of cuttings material towards the Scannar Pockmarks SAC, located approx. 9 km NW of the template. However, the majority of sediment deposition will occur to the south and southeast of the template. Any sediment deposition which reaches the SAC is likely to fall below 0.01 mm, based on available modelling, which is indiscernible against background sedimentation levels. Moreover, the template structure needs to be removed to be legally compliant. For these reasons no significant impacts to the SAC anticipated.	Screened in	
			Lifting and removal	Underwater noise - behavioural modifications to marine mammals, turtles and potentially fish. Population impacts due to cumulative impact or impacting a reproductively significant number of individuals or location.	Lifting and removal will not generate significant sound levels.	L	L	L	L	L		L	L	L	L	L		Screened out	
				Seabed disturbance - Template is 9 km outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles. Cuttings deposits - in and around template, jetting deposit (2K tonnes) into water column - modelling report	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation.	M	M	M	M	M		M	M	M	M	M		Screened in	
		Decommissioned *in situ*	Residuals	Liquid / solid discharge to sea - Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Treated water discharged to sea after cleaning. Solids will be shipped to shore for disposal.	L	L	L	L	L		L	L	L	L	L	There may be some residuals from when cuts take place, but small volumes to shoot out at end, but these will be permitted with flushing of pipelines.	Screened out	
			Free spans	Snagging risk to trawl and other demersal fisheries	Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned in situ location and state	H	M	H	M	H	Almost all pipelines are stable and have remained buried. However, pipelines will be remediated regardless.	H	M	H	L	M	Majority of pipelines don't have free spans - except potentially around 'dog kennels' which protect locations where umbilicals have popped out. These protections cover the free spans, and would only expose free spans if they are removed.	Screened in	
			Rock dump	Introduction of new substrate which may alter habitat architecture, influencing water movement, sediment accumulation and light conditions.	Minimise introduction of material where possible	L	H	L	L	L		L	H	L	L	L		Screened in	
				Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	L	H	L	L	L		L	H	L	L	L	Relatively small footprint compared to volume of fishing taking place in surrounding edges.	Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	L	H	L	L	L		L	H	L	L	L		Screened in	

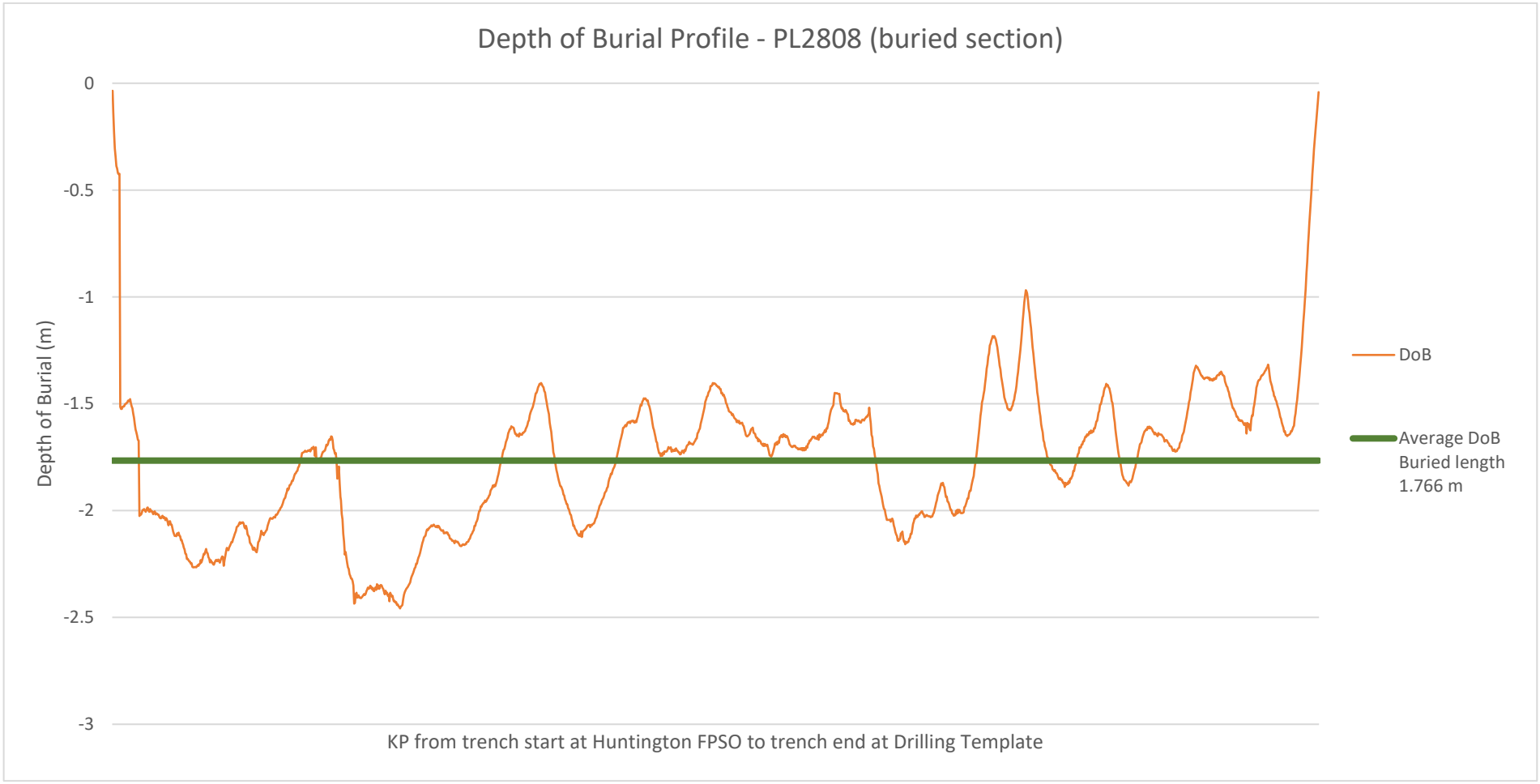
	Pipelines & Umbilicals	Full removal	Reverse reeling and cut & lift	Liquid / solid discharge to sea - Water quality in immediate vicinity of discharge will be reduced, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts. Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Treated water discharged to sea after cleaning. Solids will be shipped to shore for disposal.	L	L	L	L	L	Transfer of controlled, hazardous and special wastes to UK ports for disposal will be governed by waste management plans.	L	L	L	L	L		Screened out under Waste Management Strategies	
				Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	H	M	M	H	H	Remediation will be undertaken where required.	H	L	M	H	M	Clay berms may require remediation (overtrawl) so that lumps of clay exposed during reverse reeling do not pose a snagging risk.	Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	H	M	M	H	H	Remediation will be undertaken where required.	H	L	M	H	M	Clay berms may require remediation (overtrawl) so that lumps of clay exposed during reverse reeling do not pose a snagging risk.	Screened in	
			Rock dump	Introduction of new substrate which may alter habitat architecture, influencing water movement, sediment accumulation and light conditions.	Minimise introduction of new material where possible	L	H	L	L	L		L	H	L	L	L		Screened in	
				Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	L	H	L	L	L		L	H	L	L	L		Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	L	H	L	L	L		L	H	L	L	L		Screened in	
	Surveys	Surveys for post-decommissioned infrastructure left in-situ	Geotechnical survey activities - may include grab sampling	Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	L	L	L	L	L		L	L	L	L	L	Seabed disturbance from benthic surveys will be minute and limited to the immediate vicinity of the installations, with the odd grab sample along the pipelines, though this is unlikely. Only relevant to Rita/Hunter installations.	Screened out as no significant impacts identified	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	L	L	L	L	L		L	L	L	L	L	Seabed disturbance from benthic surveys will be minute and limited to the immediate vicinity of the installations, with the odd grab sample along the pipelines, though this is unlikely.	Screened out as no significant impacts identified	

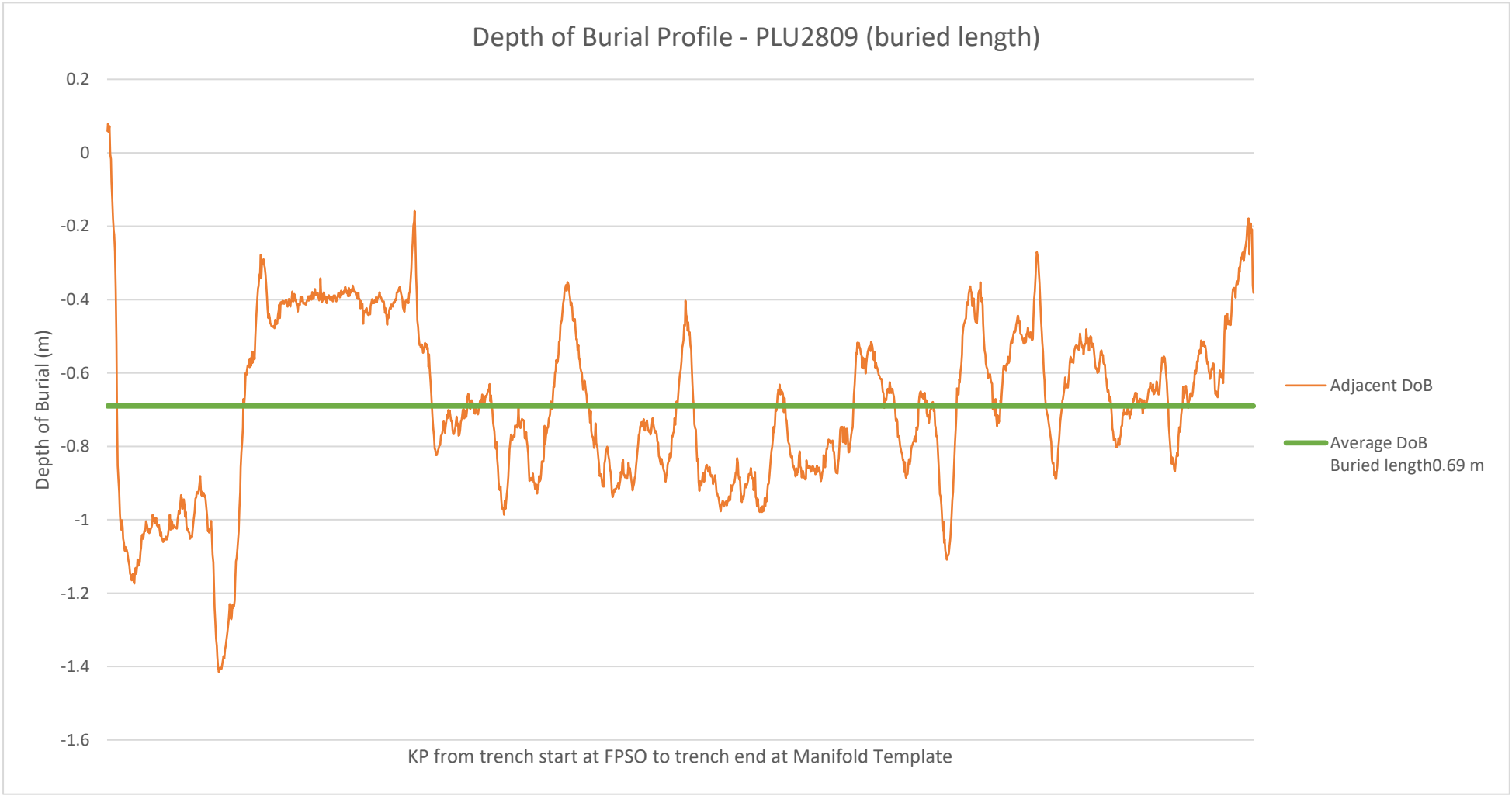
Legacy			Geophysical survey activities	Underwater noise - Physiological harm, behavioural modifications to marine mammals, turtles and potentially fish. Population impacts due to cumulative impact or impacting a reproductively significant number of individuals or location.	Noise impacts to marine species from use of seismic, sub-bottom profiler, and other survey equipment. JNCC (2017) Guidelines will be employed for mitigation of noise impacts to marine mammals for future survey work involving seismic survey equipment.	H	L	H	M	H	Future permitting will cover post-decommissioning geophysical surveys. Multibeam will likely be used for imaging and identification of any exposures.	H	L	H	M	H		Screened out as covered by future permitting	
	Remediation	Remediation of spans	Rock dump/ reburial	Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	L	H	L	L	L	Exposures remediated primarily with rockdump rather than reburial, but with additional discussion inside SAC. However, the use of rockdump will be minimised where possible.	L	H	L	L	L		Screened in	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	L	H	L	L	L	Exposures remediated primarily with rockdump, rather than reburial. However, the use of rockdump will be minimised where possible.	L	H	L	L	L		Screened in	
	Degradation	Degradation of substructure	Free spans	Snagging risk to trawl and other demersal fisheries	Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned in situ location and state.	H	L	H	L	M	Eventual corrosion and collapse of structures pose a potential snagging risk. Continued monitoring and remediation will be undertaken where required. This includes deployment of a PowerBuoy at Balmoral.	H	L	H	L	M	This is primarily an issue at Balmoral, where additional monitoring will take place via a PowerBuoy.	Screened in	
Unplanned events	Vessels	Significant Hydrocarbon release	Unplanned collision	Catastrophic loss of containment Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	Unplanned - Project will introduce new diesel inventory to the site with additional inherent spill / pollution risk e.g. from heavy lift vessel. OPEP MAS Navaids SOPEP	H	M	H	L	H	This will be covered in future Navigational Risk Assessment work.	H	M	H	L	M	SNS higher risk of collision, but manned wheelhouses, notifications, AIS, etc. No modelling required.	Screened Out; *Johnston may need assessment b/c seabirds, seals, etc.*	
		Dropped Objects	Unplanned loss of material to sea	Seabed disturbance - **inside Dogger Bank SAC** - edges mostly clay/not replaceable (CMS assets). Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - Dogger Bank is an extensive sublittoral sandbank which is characterised by moderately mobile, clean sediments. Impacts to fauna will be minor, due to community-level change from bottom-trawling. Impacts to the gross physical nature of the site are not expected.	L	H	L	L	L	Everything will be endeavoured to be retrieved. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Debris clearance surveys will aid in the identification of any dropped objects.	L	M	L	L	L	Not undertaking any cutting or lifting of pipelines, just reverse reel, and the integrity of all subsea structures is considered sound. No issues have been identified.	Screened out as no significant impacts identified	
				Seabed disturbance - outside SAC Localised physical seabed disturbance resulting in community change. Recovery time and extent dependent on type of seabed and species present and location specific estimate within EA. Lethal/sub-lethal effects on benthic and epibenthic fauna from physical abrasion; Smothering of organisms following settlement of resuspended particles.	Volume of sediment mobilised proportional to area of sediment disturbed - expected to be minor and in dynamic environment with frequent natural sediment mobilisation	L	H	L	L	L	Everything will be endeavoured to be retrieved. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. Debris clearance surveys will aid in the identification of any dropped objects.	L	M	L	L	L	Not undertaking any cutting or lifting of pipelines, just reverse reel, and the integrity of all subsea structures is considered sound. No issues have been identified.	Screened out as no significant impacts identified	

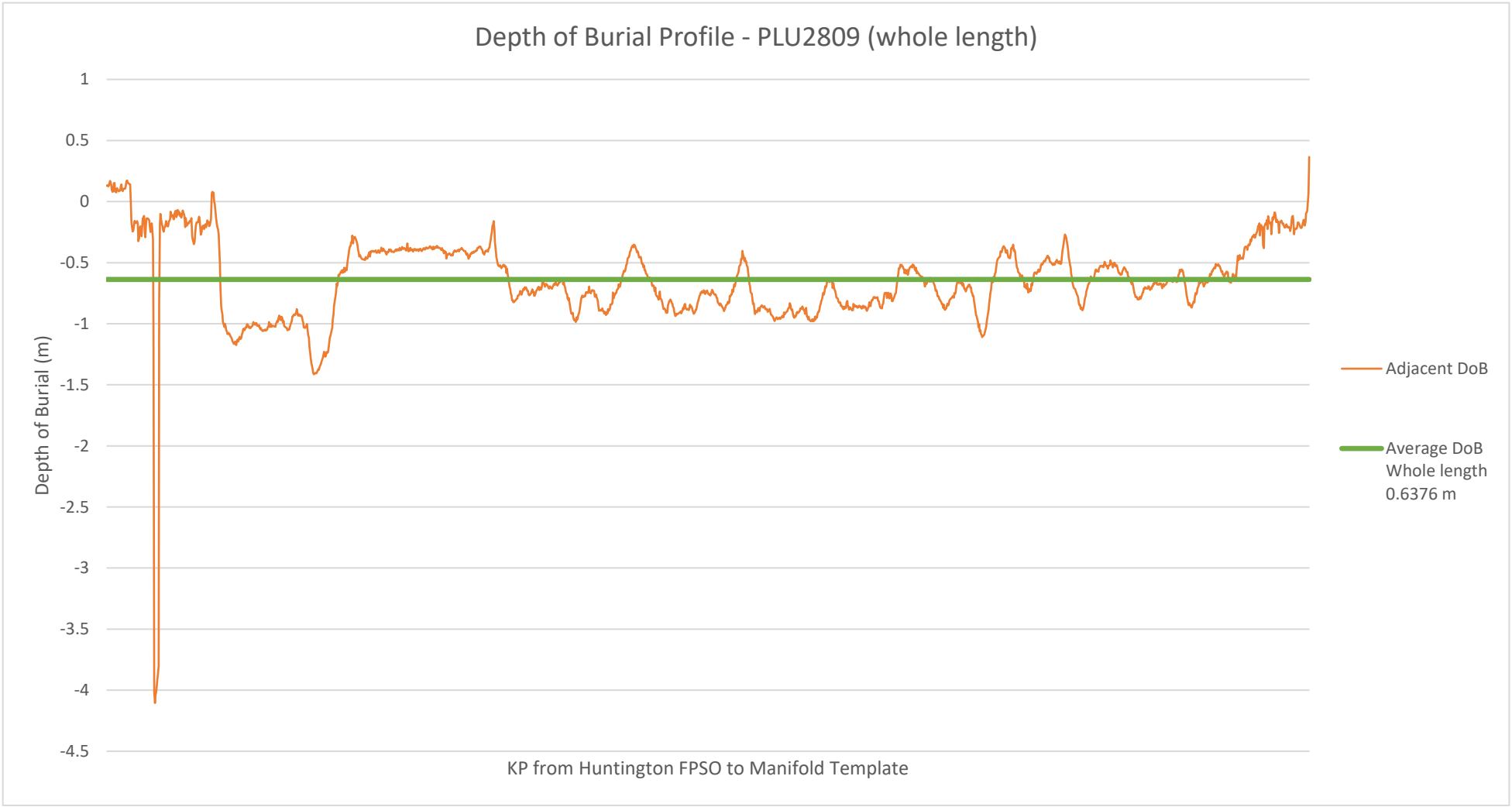
Appendix C: Depth of Burial Profiles




Depth of Burial Profile - PL2806 & PL2807 (buried length)
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Depth of Burial (m)
KP from trench start at Huntington Manifold to trench end at FPSO
DoB
Average DoB
Buried length
1.615 m


Depth of Burial Profile - PL2808 (buried section)
0
-0.5
-1
-1.5
-2
-2.5
-3
Depth of Burial (m)
KP from trench start at Huntington FPSO to trench end at Drilling Template
DoB
Average DoB
Buried length
1.766 m


Depth of Burial Profile - PLU2809 (buried length)
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
Depth of Burial (m)
KP from trench start at FPSO to trench end at Manifold Template
Adjacent DoB
Average DoB
Buried length0.69 m


Depth of Burial Profile - PLU2809 (whole length)
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
-4.5
Depth of Burial (m)
KP from Huntington FPSO to Manifold Template
Adjacent DoB
Average DoB
Whole length
0.6376 m

Appendix D: Summary of Huntington Surveys

Reference	Locations surveyed	Geophysical data	Geotechnical data	Environmental data	Water depth (m)	Environment summary	Potential protected habitat presence
Gardline (2008a, 2009a)	Huntington drill centre	Single- and multi-beam echo sounder, side-scan sonar, pinger, sparker,	Vibrocore, CPT	Camera stations and grab sampling	88.2 – 90.2	Across the survey area, the seabed undulated gently, with a series of north-south trending broad shoals and depressions expected to be related to the underlying geology. Seabed sediments were interpreted as predominantly slightly silty shelly sand with occasional minor clay outcrops, coarse sediment accumulations and boulders and debris. Sampling confirmed the geophysical sediment interpretation, with most samples comprising poorly sorted muddy fine sand, with varying proportions of shell fragments. Epifauna was sparse, comprising hermit crabs (*Pagarus berhardus*), starfish (possible juvenile *A. rubens*), annelid worm tubes, molluscs (possible *Antalis vulgaris*), anemones (*Sagartia elegans*, possible *Calliactis* sp.), hydroids (*Tubularia indivisa*), soft coral (*Alcyonium digitatum*) and fish (*Agonus cataphractus*). Faunal burrows, worm casts and general bioturbation were observed. THC was consistent with background concentrations in the CNS, except at one station where THC was much higher (7,440 mg/kg). The chromatogram for this sample showed the contamination was consistent with a lubricating oil. The station was not close to any existing wells or infrastructure and the source was not obvious. The field log for this station recorded black lumps and a chemical smell from the sample. The lumps and smell were also recorded at another station, but here the THC was low, consistent with the rest of the stations. It therefore seems likely that the contamination was present in the black lumps, and one or more of these was captured in the chemical analysis sub-sample for one station but not the other. Heavy metal concentrations were generally at or below OSPAR background concentrations across the survey area. Elevated levels were observed at the two stations that exhibited black	There was no evidence of pockmarks, biogenic reefs or other Annex I features within the survey area. *S. spinulosa* was noted to be absent from camera footage.

						lumps in the samples, although concentrations remained below the levels expected to cause environmental effects. Aside from the obvious point source contamination in these two samples, heavy metals concentrations varied slightly in line with the sediment particle size distribution. The macrofauna was dominated by juvenile annelids and echinoderms. Excluding juveniles revealed a uniform community that was typical of undisturbed seabed in the area. There were a high number of taxa only found in one sample, many of which were represented by a single individual, suggesting an absence of significant community disturbance. The community structure at the two stations where contamination had been recorded was statistically indistinguishable from the community structure at the other stations sampled.	
Gardline (2010)	Proposed Huntington SL15 well site	None acquired	None acquired	Camera stations and grab sampling	88.4 – 91.4	Seabed sediment was uniform across the site, comprising sand with a small amount of shell fragments. Particle size analysis confirmed the sedimented comprised muddy sand or slightly gravelly muddy sand, with gravel sized particles primarily being shell fragments. THC ranged from 6.1 mg/kg to 8.3 mg/kg across the survey area, which is below established background concentrations for the CNS. Most heavy metals were also below background concentrations; Barium, copper, zinc and lead were slightly elevated above background but not sufficiently elevated to suggest impacts on the faunal community. The faunal community was diverse, species rich and consistent with that found in the wider area. Polychaetes were the dominant group, with *P. jeffreysii*, *G. oculata*, *Pholoe assimilis* and *Spiophanes bombyx* among the most abundant species. The faunal community was homogenous across the survey area and there was no indication of anthropogenic disturbance.	No species or habitats of conservation concern were identified.

Gardline (2008b, 2009b)	Huntington infield and export pipeline routes	Single- and multi-beam echo sounder, side-scan sonar, magnetometer, pinger, sparker,	Vibrocore, CPT	Camera stations and grab sampling	88.1 – 90.3	There is little variation in water depth along the pipeline routes; the seabed undulates gently on both routes, with a maximum slope of <1°. Geophysical, geotechnical and environmental camera investigation and grab sampling indicate the seabed on both routes is predominantly slightly silty shelly sand with occasional minor coarse sediment accumulations which sampling showed in some cases to be due to high densities of shell fragments. There were also areas of the route where numerous outcroppings of the clay bedrock were observed. Particle size analysis showed a predominance of fine sand, with fines (silt and clay) ranging from 10% to 14% and gravels (including shells and shell fragments) between zero and <1.0%. However, grab samples were not collected in the areas of numerous clay outcrops, so the particle size analysis may not reflect the conditions in these areas. THC ranged from 3.3 mg/kg to 5.2 mg/kg across the survey area, which is below established background concentrations for the CNS. Chromatograms showed a typical distribution for CNS sediments. N-alkane and polycyclic aromatic hydrocarbon analyses indicated the hydrocarbons present were from pyrogenic and diffuse sources rather than point source contamination. All other measured chemical contaminants were below background, with the exception of mercury, which was elevated at one station, although not to a sufficient degree to affect the faunal community. Once controlled for the presence of abundant juveniles from a seasonal recruitment event, the macrofauna was found to be sparse relative to previous surveys in the area, but diverse, and representative of typical uncontaminated CNS sediments. There was no evidence of anthropogenic disturbance.	There was no evidence of any protected habitat or species identified within the survey area.