Calder, Dalton & Millom Decommissioning

Environmental Appraisal

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C6	Throughout	n/a	Eighth Issue. Response to OPRED comments.

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Figures and Tables

Table of Abbreviations

Abbreviation	Description
3LPP	3-Layer Polypropylene, coating used for carbon steel pipelines and pipework
3PLE	3 Layer Polyethylene
BEIS	Department for Business, Energy, and Industrial Strategy
CA	Comparative Assessment
Calder	Surface installation, SIP
CCUS	Carbon Capture, Usage and Storage
COSHH	Control of Substances Hazardous to Health
CPP1	Central Processing Platform 1
CWC	Concrete Weight Coated
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DP	Decommissioning Programme
DP	Dynamic Positioning
DPPA	(North Morecambe) Drilling and Production Platform Alpha; export route (PL1674) for Millom and provides hydraulic power and chemical injection capability to (PL1678) Millom East and electrical power to Millom West.
EA	Environmental Assessment
EBS	Environmental Baseline Survey
EIA	Environmental Impact Assessment
EIS	Calder, Dalton and Millom Infrastructure
EMS	Environmental Management System
ENVID	Environmental Impact Identification
EPS	European Protected Species
ESAS	European Seabirds at Sea
ESDV	Emergency Shut Down Valve
EU	European Union
FBE	Fusion-bonded Epoxy
FCS	Favourable Conservation Status
FishSAFE	FishSAFE is a PC-based safety device that provides the skipper of a fishing vessel with detailed information about subsea obstruction and provides a timely warning of any

Abbreviation	Description
	nearby oil and gas related infrastructure that may pose a snagging hazard and potentially result in the damage or loss of the fishing gear or even the vessel.
GFE	Glass Flake Epoxy
HSE	The Health and Safety Executive
ICES	International Council for the Exploration of the Seas
IOM	Isle of Man
IOM Interconnector Cable	Isle of Man Interconnector Cable runs beneath the seabed between Douglas on the Isle of Man, and Bispham on the Lancashire coast and spans a distance of 104 km (56 nautical miles) linking the Isle of Man to the UK National Grid.
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometre
KP	Kilometre Point
kV	Unit of 1000 volts, measured in Kilovolts
kWh	Kilowatt-hour
LAT	Lowest Astronomical Tide
m	metre, 1000mm
MCZ	Marine Conservation Zone
MDAC	Methane-derived authigenic carbonate
MeOH	Methanol
MLWM	Mean Low Water Mark (PL1965, KP42.424)
mm	millimetre
MoD	Ministry of Defence
NFFO	National Federation of Fishermen's Organisations
nm	Nautical Mile
No.	Number (of)
NORM	Naturally Occurring Radioactive Material
NSTA	North Sea Transition Authority
NUI	Normally Unattended Installation
OD	Outside diameter (used for suction piles, umbilicals and cables)
OGA	Oil and Gas Authority (now known as the NSTA)
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic

Abbreviation	Description
PAH	Polycyclic Aromatic Hydrocarbon
PCO	Precipitated Carbonates
PL, PLU	Pipeline or Umbilical Identification number as given by the NSTA using the PWA application process
PLEM	Pipeline End Manifold
POC	Particulate Organic Carbon
PPE	Personal Protection Equipment
PWA	Pipeline Works Authorisation
Q1, Q2, Q3	Millom Well Q1, Q2, and Q3 respectively
R1, R2	Dalton Well R1 and R2 respectively
RBA	Risk Based Assessment
ROV	Remotely Operated Vehicle
SAC	Special area of Conservation
SACFOR	Super-abundant, Abundant, Common, Frequent, Occasional, Rare
SCANS	Small Cetacean Abundance in the North Sea
SEA	Strategic Environmental Assessment
SIP	Self-Installing Platform, sometimes referred to as a Multi-Purpose Platform.
SOSI	Seabird Oil Sensitivity Index
SPA	Special Protection Area
SSS	Side-Scan Sonar
SSSI	Site of Special Scientific Interest
Te	Tonne
TFSW	Transfrontier Shipment of Waste
THC	Total Hydrocarbon Content
TOC	Total Organic Carbon
TOM	Total Organic Matter
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UK BAP	UK Biodiversity Action Plan
UTDA	Umbilical Termination and Distribution Unit
WHPS	Well Head Protection Structure
WONS	Well Operations Notification System

1 Executive Summary

1.1 Introduction and background

In accordance with the Petroleum Act 1998, Harbour, is applying to the Department for Energy Security and Net Zero ('DESNZ') (formerly known as the Department for Business, Energy and Industrial Strategy ('BEIS')) to obtain approval for decommissioning the subsea infrastructure associated with the Calder, Dalton and Millom or East Irish Sea ('EIS') infrastructure.

The Calder, Dalton and Millom Fields are in the East Irish Sea to the west of Blackpool. The Calder and Dalton fields are in Blocks 110/7a and 110/2b (respectively) of the United Kingdom Continental Shelf ('UKCS') and Millom is in Blocks 113/26a, 113/27a and 113/27b (Figure 1.2.1). Chrysaor Resources (Irish Sea) Limited took on operatorship of the Millom & Dalton facilities, pipelines, and wells from the previous duty holders (Spirit Energy) in 2022.

1.2 Regulatory context

The Petroleum Act 1998 (as amended by the Energy Act 2008) governs the decommissioning of offshore oil and gas infrastructure, including pipelines, on the United Kingdom Continental Shelf ('UKCS'). The responsibility for ensuring compliance with the Petroleum Act 1998 rests with DESNZ, managed through the Offshore Petroleum Regulator for Environment and Decommissioning ('OPRED'). The Petroleum Act requires the operator of an offshore installation or pipeline to submit a draft Decommissioning Programme ('DP') for statutory and public consultation, and to obtain approval of the DP from the Secretary of State. The DP should outline in detail the infrastructure being decommissioned and the method by which the decommissioning will take place. Well decommissioning is determined under a different process to the Decommissioning Programme, called the Well Operations Notification System ('WONS').

This Environmental Appraisal ('EA') has been conducted to assess the potential environmental impacts that may result from undertaking the subsea decommissioning activities as part of the decommissioning of the Calder, Dalton and Millom installations and associated pipelines, umbilicals, cables and protective materials. This EA supports the combined DP submitted to OPRED, the offshore decommissioning regulator under DESNZ. The EA has been written considering the BEIS 2018 guidance [3] and the 2018 Decom North Sea EA guidance [14], focuses on screening out of non-significant impacts and presents a detailed assessment of potentially significant impacts.

In terms of activities in the Irish Sea, The Northwest Inshore and Northwest Offshore Marine Plans [46] have been developed by the Department for Environment, Food and Rural Affairs ('Defra') to help ensure sustainable development of the marine area. Although the Plans do not specifically address decommissioning of oil and gas, they do note the challenges that such activities can introduce. As part of the conclusions to this assessment (Section 6), Harbour has considered the broader aims of the Plans and has ensured alignment with the aims.

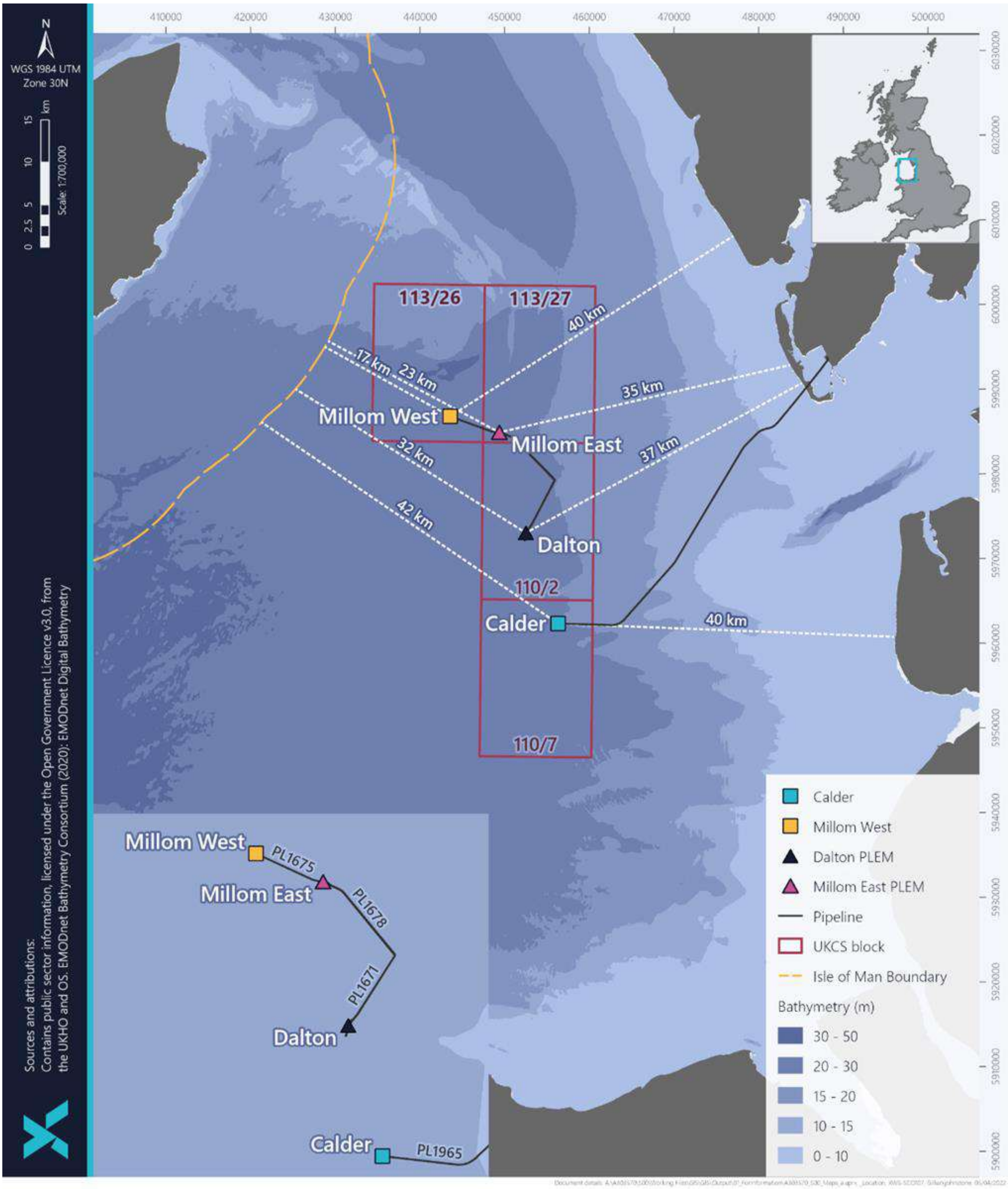


Figure 1.2.1 Location of the EIS infrastructure

1.3 Schedule

The Calder, Dalton and Millom fields are subject to differing decommissioning schedules.

Preparatory decommissioning activities for Millom West, as agreed by OPRED, commenced in 2022. Decommissioning of the Millom West wells is scheduled from 2024, followed by removal of the Millom West platform in 2026. Decommissioning of the associated installations and infrastructure are expected to be undertaken in the period 2031 to 2033.

Dalton decommissioning activities are anticipated to commence in 2027. Decommissioning of the associated installations and infrastructure are expected to be undertaken in the period 2029 to 2032.

Calder decommissioning activities are anticipated to commence in 2027. Decommissioning of the associated installations and infrastructure are expected to be undertaken in the period 2031 to 2033[1].

Ongoing monitoring surveys will extend beyond these timescales. The activity windows are subject to the acceptance of the DP and any unavoidable constraints (e.g. vessel availability) that may be encountered while executing the decommissioning activities.

1.4 Selected decommissioning options

Options to re-use the EIS infrastructure *in situ* for future hydrocarbon or alternative developments have been considered, but to date none have yielded a viable commercial opportunity. PL1965 has been identified as a potential candidate for Carbon Capture, Utilisation and Storage ('CCUS'). There is an implicit assumption that options for re-use of the pipelines have been exhausted before facilities and infrastructure move into the decommissioning phase and Comparative Assessment ('CA'). Therefore, the re-use option has been excluded from this assessment.

Given the uncertainty over the feasibility of re-use of the EIS infrastructure, there is no reason to delay decommissioning of the infrastructure in a way that is safe and environmentally and socio-economically acceptable (and the 'do nothing' approach to the infrastructure is thus rejected).

As per the guidance, all surface and subsea structures (including concrete protection structures) and surface laid pipelines, umbilicals and cables will be fully removed, and any local excavations will be left to backfill naturally.

The decommissioning methods for the associated flushed and cleaned pipeline infrastructure were assessed against each other in CA which looked at several full removal, partial removal and decommission *in situ* options. The burial status of the pipelines was confirmed by surveys conducted in 2022. The buried sections of the pipelines will be decommissioned *in situ*. On the approaches the pipeline, umbilical and cable ends will be cut at trench depth where they enter burial, and the associated surface laid sections will be removed. Existing exposed sections (total length up to ~1.3 km) of the Calder trunklines (PL1965 & PL1966) will be remediated. The preference will be for the exposed and free-span sections to be removed, minimising the number of remaining cut ends as they could re-appear as exposures. The option to bury the exposed sections under rock especially near the windfarm cable crossings remains a valid approach but has been considered in this EA as a worst-case approach. The amount of rock required to bury the exposed sections around the windfarm crossings is estimated at ~550 Te.

The CA also addressed the stabilisation materials within the EIS. The recommendation of the CA was to recover 449 of the mattresses within the EIS, out of a total 519 as a number are associated with third-party infrastructure/crossings and these will be decommissioned *in situ.* There are an estimated 1,250 grout bags within the EIS area; the intention is for all visible grout bags to be fully removed.

[1] The timing of decommissioning activities at third party owned assets (e.g. Central Processing and Production Platform ('CPP1') and North Morecambe Drilling and Production Platform Alpha ('DPPA') is subject to a number of factors and a strategy has yet to be agreed.

1.5 Environmental and societal sensitivities

The key environmental and societal sensitivities in the project area are summarised in Table 1.5.1.

Table 1.5.1 Environmental and Societal Sensitivities
Conservation Interests and Sites
The EIS project area is located within or close to a number of species and habitats of conservation importance. The Shell Flat and Lune Deep Special Area of Conservation ('SAC') features Annex I reef habitat. The reef habitat represents a good example of boulder and bedrock reef, with the largest proportions of rock found along the unique kettle hole feature known as Lune Deep [58]. According to the habitat distribution maps provided in The Convention for the Protection of the Marine Environment of the North-East Atlantic ('OSPAR') (2010), there is also a small area of 'seapens and burrowing megafauna communities' in the EIS, with a large concentration between the Isle of Man ('IOM') and the Irish Coast. The West of Walney Marine Conservation Zone ('MCZ'), located 10 km from Millom West, was designated in 2016 for the features 'A5.2 Subtidal sand', 'A5.3 Subtidal mud' and 'Sea-pen and burrowing megafauna communities' [17]. There are several designated conservation sites surrounding the project area, these are: Liverpool Bay/Bae Lerpwl (Special Protection Area ('SPA')), West of Copeland (MCZ), West of Walney (MCZ), Fylde (MCZ), Shell Flat and Lune Deep (SAC), Morecambe Bay and Duddon Estuary (SPA), Morecambe Bay (SAC), Ribble and Alt Estuaries (SPA) and Wyre-Lune (MCZ).
Conservation Species
Harbour porpoise, bottlenose dolphin, minke whale and white-beaked dolphin have all been observed within the vicinity of the project. For all species but harbour porpoise, they are found in relatively low densities within the project area or have low abundance estimates. Harbour porpoises are common in the EIS and frequent the area throughout much of the year. They are thought to be found in the area at a density of 0.086 animals/km^2 which is relatively low compared to other areas of the UKCS. Minke whales are found to the north-west of the project site at a density of 0.017 animals/km^2 and bottlenose dolphins at a density of 0.008 animals/km^2. No estimate is available for white-beaked dolphin [40]. All of the cetacean species listed are both European Protected Species ('EPS') and are covered by the UK Biodiversity Action Plan ('UK BAP'). Both grey and harbour seals are protected by the Conservation of Seals Act (1970) but are not expected to be present in significant numbers. Harbour seals are unlikely to occur in the area and grey seals may be present at low densities ranging between 5 and 10 individuals per 25 km^2 [96]. Cod (*Gadus morhua*) are an OSPAR listed species and are listed as vulnerable on the International Union for Conservation of Nature ('IUCN') red list [98]. They use the project area as a nursery and for spawning.
Benthic Environment
The seabed type around the EIS infrastructure is primarily classified under the EUNIS habitat complex MD52 (Atlantic offshore circalittoral sand) with areas of MD62 (Atlantic offshore circalittoral mud), MD42 (Atlantic offshore circalittoral mixed sediment) and MD32 (Atlantic offshore circalittoral coarse sediment) [25]. A total of 344 taxa were identified across the survey area during a pre-decommissioning environmental survey [33]. Based on photographic evidence, the most frequently observed fauna associated with the sediments were brittlestars (*Ophiuroidea*), hermit crabs (*Paguridae*), flatfish (*Pleuronectiformes*), and starfish (*Asteroidea* including *Asteropecten irregularis*). Although epifauna and mobile fauna across the survey area were sparse, bioturbation was evident, with burrows (3cm to 15cm) observed at all stations, indicating a thriving infaunal

Table 1.5.1 Environmental and Societal Sensitivities
community. Sea pens were absent across all survey sites; however burrows were considered to be 'frequent' or 'abundant', therefore indicating 'Sea pens and burrowing megafauna community' is potentially present in all survey areas [33].
Fish
The EIS area is located within an area of high intensity spawning for plaice and sole. The following species are also known to use the area for spawning: ling (*Molva molva)*, lemon sole (*Microstomus kitt*), mackerel (*Scomber scombrus),* nephrops (*Nephrops norvegicus),* plaice (*Pleuronectes platessa*), sandeels (*Ammodytes marinus*), sprat (*Sprattus sprattus*), sole (*Solea solea*) and Whiting (*Merlangius merlangus).* Additionally, the following species use the area as a nursery ground: anglerfish (*Lophius piscatorius*), cod, haddock (*Melanogrammus aeglefinus*), herring (*Clupea harengus*), lemon sole, mackerel, nephrops, plaice, sandeels, sole, spotted ray (*Raja montagui*), spurdog (*Squalus acanthias*), thornback ray (*Raja clavata*), tope shark (*Galeorhinus galeus*) and whiting. The area is an area of High nursery intensity for cod, herring, spurdog and whiting. Cod (*Gadus morhua)* use the area for both high intensity nursery and spawning grounds [10][24]. The probability of juvenile fish aggregations occurring is the area is low for anglerfish, blue whiting, European hake, haddock, herring, mackerel, horse mackerel, Norway pout, plaice, sprat, and whiting. Horse mackerel and sprat have a medium probability [1].
Seabirds
The Irish Sea provides important breeding and over-wintering areas for a wide variety of seabirds and coastal water birds. During the spring and summer months, almost half a million pairs of seabirds breed at locations (primarily on cliffs and islands) throughout the region. Coastal and offshore waters are also important for feeding and overwintering seabirds. The following species are present in the EIS area across the majority of the year: Black-headed gull (*Chroicocephalus ridibundus*), Black legged kittiwake (*Rissa tridactyla*), Common Guillemot (*Uria aalge*), Common gull (*Larus canus*), Common tern (*Sterna hirundo*), Cormorant (*Carbo carbo*), Gannet (*Morus*), Great black-backed gull (*Larus marinus*), Great skua (*Stercorarius skua*), Herring gull (*Larus smithsonianus*), Lesser black-backed gull (*Larus fuscus*), Little gull (*Hydrocoloeus minutus*), Manx Shearwater (*Puffinus Puffinus*), Northern fulmar (*Fulmarus glacialis*), Razorbill (*Alca torda*), Sandwich tern (*Thalasseus sandvicensis*) and Sooty shearwater (*Ardenna grisea*). UK breeding seabird population censuses dating back to the 1960s indicate a change in population trends over time. Black-legged kittiwake populations declined by 29% between 2000 and 2019. Northern fulmar and common tern populations have also declined by 33% and 3% respectively, in the same time frame. Conversely, razorbill, northern gannet, and black-headed gulls have seen populations increases over the same time [56]. Black-legged kittiwake, having a maximum foraging range of 120 km have been recorded nesting on offshore platforms before, as have herring gulls. Seabird sensitivity to oil within the area of the EIS infrastructure (Blocks 113/26, 113/27, 110/2 & 110/7) varies considerably throughout the year with it being highest in the months of October to December and January to March. Along the PL1965 and PL1966 (113/29, 110/3, 110/4, 110/7 & 110/8) sensitivity is variable and generally higher throughout the year compared to the area of installations. SOSI is highest approximately halfway along the pipelines to shore. In the Blocks nearest to the coast (113/29) sensitivity is highest between October and December, January to March and May.

Commercial Fishing
The EIS infrastructure (including PL1965 & PL1966) is located in International Council for the Exploration of the Seas ('ICES') statistical rectangle 37E6 and 37E6. Fisheries landings vary throughout the project area. Within the EIS area, in 2021 the catch was mostly shellfish, with shellfish fisheries landing 83% of the total value and 70% of the total weight of fish landed in ICES 37E6, and 82% of the total value and 94% of the total weight of fish landed in ICES 36E6 within 2020. Throughout 2016 – 2019, ICES rectangle 36E6 recorded a higher catch value than 37E6 with >£2,000,000 every year [74]. Fishing activity is predominantly concentrated to the south, west and north of the installations with >100,000 kWh being recorded in several areas. However, to the east and in the immediate vicinity of the both the installations and along PL1965 and PL1966, fishing activity is low with some areas having no data recorded. Trawls were the most utilised gear in both ICES, with otter and beam trawling being the favoured method. Other gear types utilised include traps and dredges [74].
Other Users
The EIS infrastructure is located within an area of extensive oil and gas development. There are twelve oil and gas surface structures within 40 km of the project area, the closest being 7km away. Shipping activity within Blocks 110/2, 110/3, 110/4, 110/7, 113/26 and 113/27 and 113/29 is high with Block 110/8 considered to be moderate. No data is present for Block 113/29 [81]. There are several cables running within close proximity to the EIS project area. The closest being the HIBERNIA ATLANTIC telecommunication cable (active) running <1 km from the Calder Installation. The LANIS 1 telecommunications cable (active) also runs within close proximity to the Calder installation (3 km). Finally, the IOM/UK INTERCONNECTOR power cable (active) runs 2 km SE of the Millom West installation. The following windfarm areas (closest edge) are located close to the EIS area: Walney Wind Farm (active) 7 km north of Millom West; Ormonde Wind Farm (active) 26 km northeast of Millom West; Barrow Wind Farm (active) 27 km northeast of Dalton; Gwynt y Môr Wind Farm (active) 36 km south of Calder and Burbo Bank Wind Farm (active) 39 km southeast of Calder. There are also 3 sites located within close proximity of the EIS area that are currently registered as 'Preferred Projects' within Round 4 of the 'Offshore Wind Leasing Round'. Blocks 110/2, 110/3, 110/4, 110/7, 110/8, 113/26, 113/27 and 113/29 are of concern to the Ministry of Defence ('MoD') as they lie within training ranges [78]. There are seven non-dangerous wrecks within 20 km of the EIS infrastructure. There is a single dangerous wreck (Ben Rein) 2 km E from Millom West and there are 3 dangerous wrecks south of the Calder: Ben Cruachan (9 km), Residu (10 km) and Kilcoan (15 km).

1.6 Impact assessment

This EA Report has been prepared in line with the OPRED Decommissioning Guidelines and with Decom North Sea's EA Guidelines for Offshore Oil and Gas Decommissioning. The OPRED 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 EA has been informed by several different processes, including the identification of potential environmental issues through project engineer and marine environmental specialist review in an Environmental Identification ('ENVID') screening workshop and consultation with key stakeholders.

The impact assessment screening identified ten potential impact areas based on the proposed EIS decommissioning activities:

- Atmospheric emissions;
- Seabed disturbance;
- Physical presence of infrastructure decommissioned *in situ*;
- Physical presence of vessels in relation to other sea users;
- Underwater noise;
- Discharges to sea;
- Resource use;
- Waste;
- Disturbance to nesting seabirds; and,
- Accidental events

Of these, the following three were screened in and taken forward for assessment based on the potential severity and/or likelihood of their respective environmental impact: seabed disturbance; physical presence of infrastructure decommissioned *in situ* and disturbance to nesting seabirds.

Disturbance to seabed was investigated further for potential impacts due to the nature of the proposed activities and the location of the EIS within proximity to conservation areas. The proposed decommissioning activities may impact a temporary (direct and indirect) area of 0.14 km^2 of EIS seabed habitat, with an additional area of 0.01 km^2 of permanent impact associated with the relocation of existing rock used as scour prevention and the additional rock remediation on pipeline ends and exposures. As a worst-case, should overtrawl trials be required, the temporary (direct) disturbance would be in the region of 3.14 km^2. While the activities may result in the mortality of some individuals, many of the taxa within the EIS area are relatively resilient; sandy communities are comparatively quick to recover from disturbance. In the scenario that an overtrawl survey is required, consultations with OPRED and relevant stakeholders (i.e., National Federation of Fishermen's Organisations ('NFFO') and Joint Nature Conservation Committee ('JNCC')) would be held to discuss the best approach to ensure the survey meets the requirements for clear seabed verification. This will take the environmental sensitivities of the area into account as it is recognised that some of the decommissioning activities will be occurring in the Morecambe Bay and Duddon Estuary SPA. With regards to the sediment and benthic features within area, the EIS activities are unlikely to affect the natural physical processes of the area. Pipelines being decommissioned *in situ* are also unlikely to have an impact on these processes and their gradual degradation over time will have a negligible impact on the surrounding sediments. Overall, when considering the spatial and temporal scale of the disturbance, and accounting for the following mitigation measures, the impact of the decommissioning on the seabed was considered **not significant**.

- Cutting and lifting operations will be controlled by a remotely operated vehicle ('ROV') to ensure accurate placement of cutting and lifting equipment and minimise any impact on seabed sediment;
- The requirements for further excavation will be assessed on a case-by-case basis and will be minimised to provide access only where necessary. Internal cutting will be used preferentially where access is available;
- Heavy lift vessels are most likely to be equipped with dynamic positioning ('DP') rather than relying on anchors to remain in position which interact with the seabed.
- Rock mass will be carefully placed over the designated areas of the pipelines and seabed by the use of an ROV. This will control the profile of the rock covering and accurate placement of rock over the pipeline and on the seabed to ensure rock is only placed within the planned footprint with minimal spread over adjacent sediment, minimising seabed disturbance;

- The profile of the rock-placement over the pipeline ends will enable fishing nets to trawl over the rock unobstructed. Suitably graded rock will be used to minimise the risk of snagging fishing gear;
- Survey data collected in the area will be reviewed for potential sensitive seabed habitats prior to the commencement of operations; and
- Post decommissioning debris clearance, surveys and monitoring will be undertaken for the area. The method of verification of which will be agreed with the regulator and relevant stakeholders in due course.
- In the event that scour and/or seabed indentations formatiokn has occurred as a result of the decommissioning operations, Harbour will

Physical presence of infrastructure decommissioned *in situ* was investigated as a potential impact on commercial fisheries. Of key importance was understanding the use of the EIS areas by commercial fisheries and the risk that infrastructure decommissioned *in situ* may pose as a gear snagging risk. Also addressed was the snag risk posed by seabed depressions.

The CA outcome has determined that any surface laid infrastructure and associated stabilisation material will be fully removed, and any buried pipeline/cable will be decommissioned *in situ* in order to minimise the snag risk their exposures present. There are only reportable exposures associated with the PL1965/PL1966 trunklines. These areas do not coincide with areas of high intensity trawling activity. Furthermore, due to the nature of the highly mobile surface sediments of the EIS, it is likely that seabed depressions will be naturally back-filled over time. Owing to the improbability of a snagging event occurring, and in consideration with the following mitigation measures, it has been concluded that the impact of the physical presence of infrastructure decommissioned *in situ* on commercial fisheries is **not significant**.

- The EIS subsea infrastructure is currently shown on Admiralty Charts and the FishSafe system. Once decommissioning activities are complete, updated information on the EIS subsea area (i.e. which infrastructure remains *in situ* and which has been removed) will be made available to allow the Admiralty Charts and the FishSafe system to be updated;
- All surface laid pipelines and associated stabilisation material will be removed. All buried pipelines will be decommissioned *in situ*;
- Additional burial surveys will need to be carried to inform the current burial status of the pipelines. Th 2022 survey data was deemed incomplete, and the burial status of the pipeline(s) will be confirmed via future surveys. At present, the total length to be remediated is ~1.3 km which has been determined using 2017 data as a recommendation;
- Any exposed/cut pipeline/umbilical ends will undergo remediation, as appropriate, to ensure they are overtrawlable to fishing gear. Remediation may entail rock placement or burial of ends using sediment;
- Post-decommissioning surveys will identify the requirement for remediation of depressions generated through dredging around piles. It is anticipated that metocean conditions and sediment composition are likely to be sufficient to naturally backfill any such depressions. However, if depressions are not able to naturally backfill; Harbour will consider using existing rock around the excavations as remediation;
- Any objects dropped during decommissioning activities, or any existing oilfield debris identified will be removed from the seabed;
- An appropriate vessel will be engaged to carry out survey work within the 500 m safety exclusion zones to evaluate any potential snagging risks. Decommissioning activities will be considered to be complete subject to certification of seabed clearance and acceptance of the Decommissioning Close-out Report by OPRED. The existing 500 m safety exclusion zones will then be removed; and
- Harbour recognises its commitment to monitor any infrastructure decommissioned *in situ* and therefore intends to set up arrangements to undertake post-decommissioning monitoring on behalf of the Licence

Owners. The frequency of the monitoring will be agreed with OPRED, and future monitoring will be determined through a risk-based approach based on the findings from each subsequent survey. A monitoring strategy will be proposed in the decommissioning close out report. During the period over which monitoring is required, the status of the infrastructure decommissioned *in situ* would be reviewed and any necessary remedial action undertaken to ensure it does not pose a risk to other sea users.

Disturbance to nesting seabirds was scoped in owing to current stakeholder and regulatory interest. Legislative expectations and requirements determine the protection of wild birds, their eggs and nests in the offshore marine area, including offshore marine installations. Future surveys are proposed by Harbour and will be conducted prior to the commencement of decommissioning activities early in the breeding season (during Q2), the results of which will indicate bird presence/absence thereby informing subsequent mitigations and discussions with OPRED. Harbour will, in their bird management strategy, outline any proposed methods of deterrence. Disturbance of nesting seabirds is only anticipated if the deterrence methods should fail. The overall impact of decommissioning activities on nesting seabirds is currently considered **not significant** and any change in the wake of future survey effort will be communicated to OPRED.

1.7 Conclusions

This EA has considered the relevant Marine Plans, adopted by the UK ('United Kingdom') Government to help ensure sustainable development of the marine area. Harbour considers that the proposed decommissioning activities are in alignment with its objectives and policies.

Having reviewed the project activities within the wider regional context and taking into consideration the mitigation measures to limit any potential impacts, the findings of this EA conclude that the activities do not pose any significant threat to environmental or societal receptors within the UKCS.

2 Introduction

2.1 Background

The Calder, Dalton and Millom Fields are situated in the East Irish Sea to the west of Blackpool and south-west of Barrow-in Furness. The Calder and Dalton Fields are in Blocks 110/7a and 110/2b respectively of the United Kingdom Continental Shelf ('UKCS') and Millom is in Blocks 113/26a, 113/27a and 113/27b. Chrysaor Resources (Irish Sea) Limited took on operatorship of the Millom & Dalton facilities, pipelines, and wells from the previous duty holders (Spirit Energy) in 2022.

In accordance with the Petroleum Act 1998, Harbour, is applying to the Department for Energy Security and Net Zero ('DESNZ') (formerly known as the Department for Business, Energy and Industrial Strategy ('BEIS')) to obtain approval for decommissioning the subsea infrastructure associated with the Calder, Dalton and Millom infrastructure.

This Environmental Appraisal ('EA') has been conducted to assess the potential environmental impacts that may result from undertaking the subsea decommissioning activities as part of the decommissioning of the Calder, Dalton and Millom installations and associated pipelines, umbilicals, cables and protective materials. This EA supports the combined Decommissioning Programme ('DP') submitted to the Offshore Petroleum Regulator for Environment and Decommissioning ('OPRED'), the offshore decommissioning regulator under DESNZ.

2.2 Overview of the infrastructure

The following sections provide an overview of the infrastructure relevant to the Calder (Section 2.2.1), Dalton (Section 2.2.2) and Millom (Section 2.2.3) infrastructure (collectively referred to as the East Irish Sea ('EIS') infrastructure as shown in Figure 2.2.1).

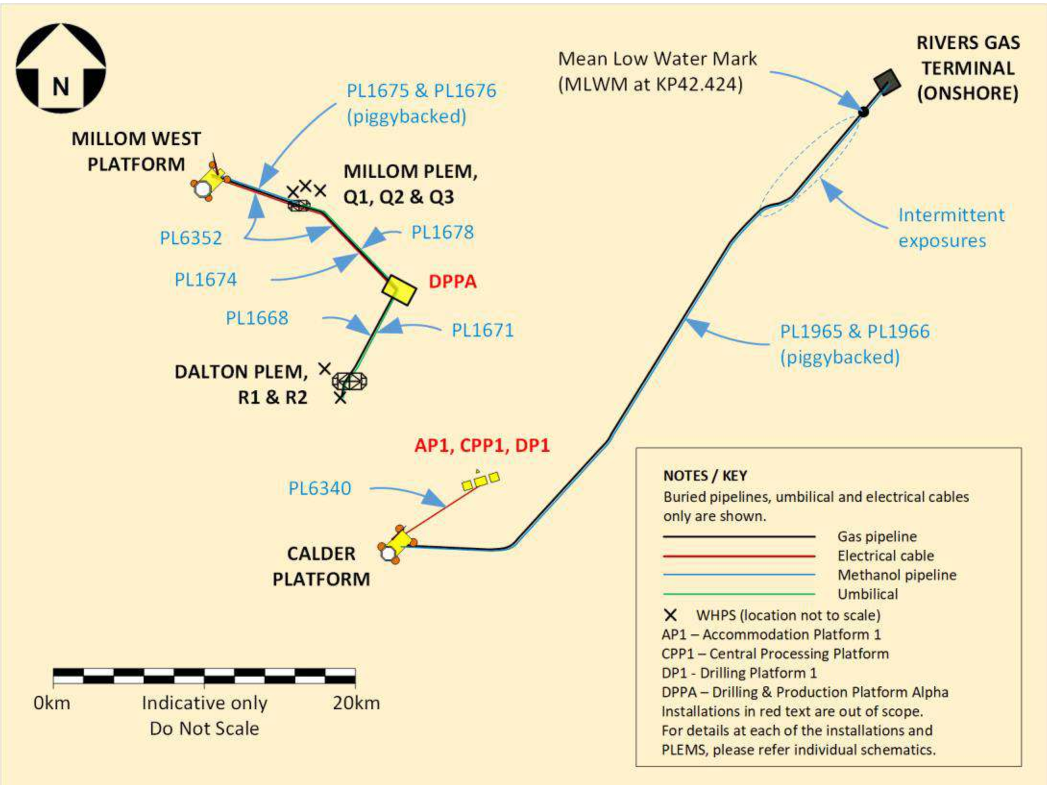


Figure 2.2.1 The EIS infrastructure (schematic)

2.2.1 Calder

The Calder platform is a Normally Unattended Installation ('NUI') that was installed in 2002, with first production occurring in October 2004. It is provided with power via an electrical cable from the South Morecambe Central Processing Platform ('CPP1') while the piggybacked trunklines PL1965 and PL1966 extend from the Calder platform to the Rivers gas terminal near Barrow. The Petroleum Act only applies to pipelines routed up to Mean Low Water Mark ('MLWM') and therefore this EA considers the presence of PL1965 and PL1966 up to MLWM. The water depths at Calder and CPP1 are ~28 m and ~31.7 m relative to Lowest Astronomical Tide ('LAT') respectively.

Short lengths of the Calder trunklines pass through the Liverpool Bay / Bae Lerpwl SPA, the Morecambe Bay and Duddon Estuary SPA and the Morecambe Bay SAC on their way to shore (Figure 2.2.2).

2.2.2 Dalton

The Dalton installations were installed in 1999, with first production being achieved in August 1999. The Dalton infrastructure is supported by and connected to the North Morecambe Drilling and Processing Platform Alpha ('DPPA'). The water depths at Dalton and DPPA are ~37.5 m and ~29 m respectively, relative to LAT.

Gas is exported from the Dalton Pipeline End Manifold ('PLEM') to the North Morecambe DPPA via PL1668 while the North Morecambe DPPA provides the Dalton PLEM with chemicals, hydraulic fluids, power, and control signals via PL1671, the main umbilical. The two Dalton wells (R1 and R2; both covered by wellhead protection structures ('WHPS')) export gas to the Dalton PLEM via PL1670 and PL1669 respectively. The R1 and R2 wellheads are provided with chemicals, hydraulic fluids, power and control signals via PL1673 and PL1672 respectively. The infrastructure in the short distance between Dalton Well R1 and Dalton PLEM is surface laid. The pipelines connecting R2 to the Dalton PLEM are buried. All surface laid pipelines and umbilicals are protected and stabilised with concrete mattresses, including the pipeline ends as they emerge from burial in the trenches.

The Dalton PLEM is 6 km from the nearest protected area (Liverpool Bay / Bae Lerpwl SPA) at its closest point (Figure 2.2.2).

2.2.3 Millom

The Millom West NUI was installed in 1999 with first production from the field occurring in August 1999. The Millom East PLEM, Q1 & Q2 WHPS were installed in the same campaign as Dalton, while Q3 WHPS was installed a few years later in 2006. The water depths at Millom and DPPA are ~41.8 m and ~29 m respectively, relative to LAT.

The Millom West NUI and the Millom East PLEM are supported by and connected to the North Morecambe DPPA via an electrical cable and umbilical PL1678. The Millom West NUI exports gas to DPPA via the Millom PLEM. Q1, Q2 and Q3 export gas to the Millom PLEM via PL1677, PL1873 and PL1980. The Millom PLEM provides Millom West with Methanol via PL1676 and provides Q1, Q2 and Q3 with chemicals, hydraulic fluids, power, and control signals using umbilicals PL1679, PLU1874, and PLU1678JQ3. The infrastructure in the short distance between Millom Well Q1, Q2 and Q3 and the Millom PLEM is all surface laid. All pipelines, umbilicals and electrical cables longer than 300m were buried in the seabed to depth of at least 1 m below seabed. All surface laid pipelines, umbilical and cables are protected and stabilised with concrete mattresses, including the pipeline ends as they emerge from burial in the trenches.

The Millom West NUI is 7km from the nearest protected area (West of Copeland Marine Conservation Zone ('MCZ')) at its closest point and the Millom East PLEM is 6km from the nearest protected area (West of Walney MCZ) at its closest point (Figure 2.2.2).

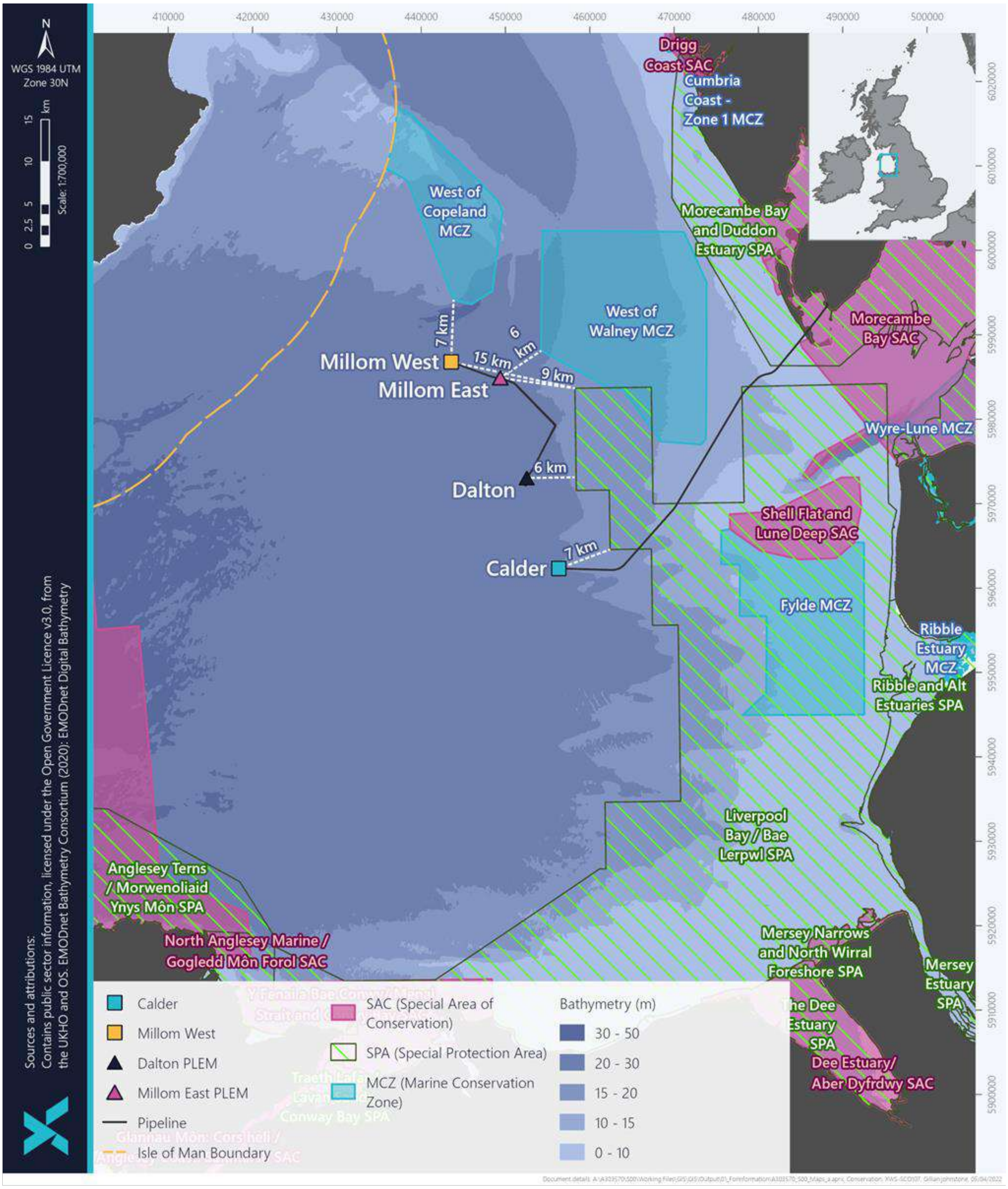


Figure 2.2.2 Location of the EIS infrastructure and designated conservation areas

2.3 Regulatory context

The Petroleum Act 1998 (as amended by the Energy Act 2008) governs the decommissioning of offshore oil and gas infrastructure, including pipelines, on the UKCS. The responsibility for ensuring compliance with the Petroleum Act 1998 rests with DESNZ and is managed through its regulatory body OPRED. OPRED is also the Competent Authority on decommissioning in the United Kingdom ('UK') for OSPAR purposes and relevant legislation. The Petroleum Act requires the operator of an offshore installation or pipeline to submit a draft DP for statutory and public consultation, and to obtain approval of the DPs from the Secretary of State, deferring to OPRED before initiating decommissioning work. The DPs outline in detail the infrastructure being decommissioned and the method by which the decommissioning will take place. Well decommissioning is determined under a different process to the DPs, called WONS.

Formal Environmental Impact Assessment ('EIA') to support the DPs is not explicitly required under existing UK legislation. However, the primary guidance for offshore decommissioning that was updated and published by BEIS in 2018 [3], detailed the need for an EA to be submitted in support of the DPs. The Guidance describes a proportionate EA process that culminates in a streamlined EA Report, which focuses on screening out of non-significant impacts and presents a detailed assessment of potentially significant impacts. This EA has been written considering the BEIS 2018 guidance [3] and the 2018 Decom North Sea EA guidance [14].

In terms of activities in the Irish Sea, The Northwest Inshore and Northwest Offshore Marine Plans [46] have been developed by Defra to help ensure sustainable development of the marine area. Although the Plans do not specifically address decommissioning of oil and gas, they do note the challenges that such activities can introduce. As part of the conclusions to this assessment (Section 6), Harbour has considered the broader aims of the Plans and made a statement on alignment with the aims.

2.4 Scope of the Environmental Appraisal

This EA assesses the potential environmental impacts associated with the proposed EIS infrastructure decommissioning activities. The impact identification and assessment process accounts for stakeholder engagement, comparison of similar decommissioning projects undertaken on the UKCS, expert judgement and the results of supporting studies which aim to refine the scope of the DP. This EA documents this process and details, in proportionate terms, the extent of any potential impacts and any necessary mitigation/control measures proposed.

2.5 Stakeholder Engagement

Engagement with stakeholders is an important part of the decommissioning process as it enables the issues and concerns of stakeholders to be incorporated into the EA and presented within the DPs, where applicable, and acted upon during the subsequent planning and implementation stages of the project.

Formal stakeholder consultation will begin with the submission of the draft DPs, supported by this EA report, to OPRED.

2.6 Environmental Appraisal process

To evaluate the potential environmental impact of the proposed DPs on the environment, an EIA process is conducted in accordance with the Offshore Oil and Gas Exploration, Production, Unloading and Storage (EIA) Regulations 2020. This EA documents the results of the EIA process and is used to communicate the process. An overview of the EIA process is provided in Figure 2.6.1. A detailed methodology is provided in Appendix A: EA Method.

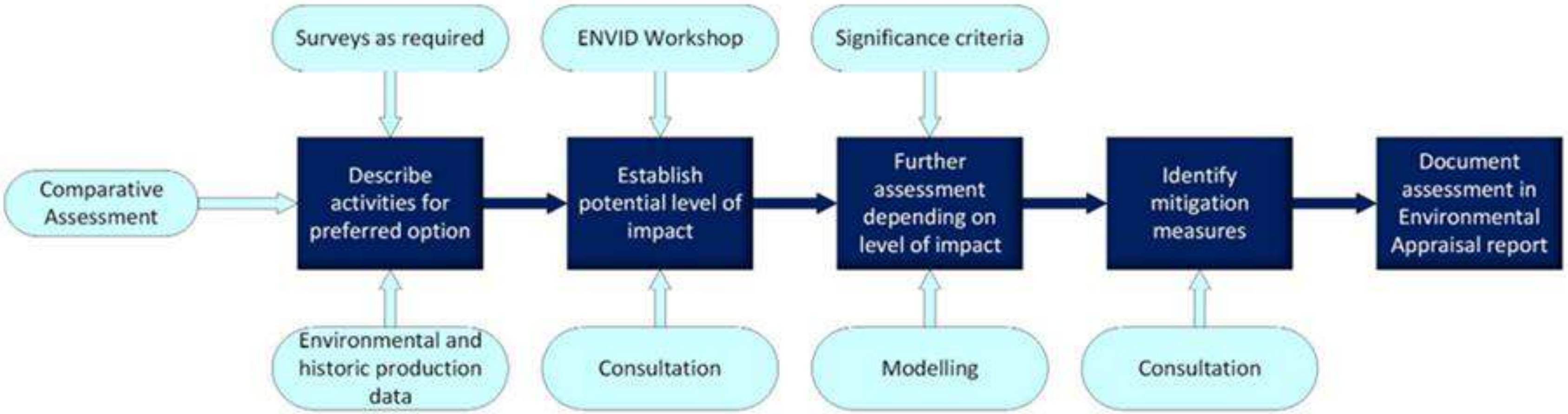


Figure 2.6.1 EA Process

3 Project Description

This section outlines the infrastructure being decommissioned as part of the EIS project (covered by this EA) and describes the way the assets will be removed and/ or be decommissioned in situ. Details on both Pipeline crossings and Well information can be found within Appendix B: Item inventory.

3.1 Surface installations & stabilisation

The EIS infrastructure consists of the Calder and Millom West self-installing platforms ('SIPs'), both NUIs. Both installations are four leg vertical structures, fixed to the seabed using suctions piles. Above the jackets, vertical structural members support the topside modules and decking. Millom West has six producing well slots and Calder has three. Both fronded (and anchored) mattresses and deposited rock have been installed on the seabed around the base of both platforms in order to support the suction piles and to mitigate against seabed scouring (Table 3.1.1; Figure 3.1.1 and Figure 3.1.2). Location information for this infrastructure is provided in Appendix B: Item inventory.

Table 3.1.1 Surface installations & stabilisation

Description	Mass (Te)	Comments / status
Calder SIP	1,908.7	Topsides mass 625 Te, 1x module. Anchored to the seabed using 4x 9.25m OD suction piles. Mass 1,283.7 Te. 23x anchored fronded mattresses may be present in and around the suction piles (total mass ~1.3Te).
Fronded mattresses	1.28	Estimated number – 23. Refer Figure 3.1.1.
Deposited rock	5,866	Dimensions 68 x 60 x 1.75m. Around perimeter of legs and bulldozed to some extent underneath the platform to prevent to prevent scour. Refer Figure 3.1.1.
Millom West, SIP	1,600	Topsides mass 400 Te, 1x module. Anchored to the seabed using 4x 7.0m OD (estimated) suction piles. Mass 1,200 Te. 18x anchored fronded mattresses may be present in and around the suction piles (total mass ~0.8Te). Deposited rock is present underneath the structure as anti-scour mitigation (approx. 70m x 70m x 2m high).
Fronded mattresses	0.81	Estimated number – 18. Refer Figure 3.1.2.
Deposited rock	12,728	Dimensions 70 x 70 x 2m. Around perimeter of legs to prevent scour and bulldozed to some extent underneath the platform. Refer Figure 3.1.2.

NOTES:
1. Fronded mattresses have not been found on 'as-built' drawings so they may or may not be present. This is to be determined at the time of decommissioning operations.

Table 3.1.1 Surface installations & stabilisation
2. The dimensions of the deposited rock are based on an interpretation of survey information. The estimated mass is calculated by volume multiplied by a density of 1.85Te/m^3 in air. 3. If protection and stabilisation features are not listed in this table, according to the documentation reviewed they were not installed.

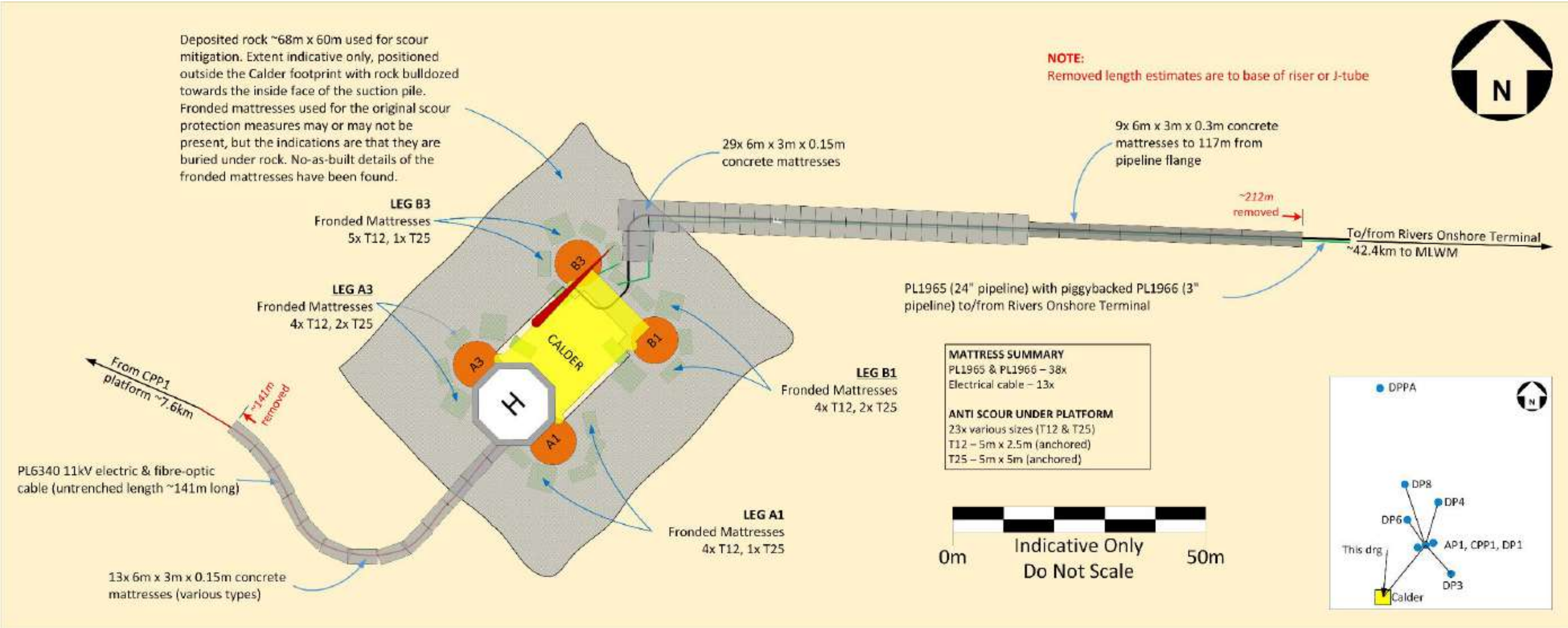


Figure 3.1.1 Calder approach schematic

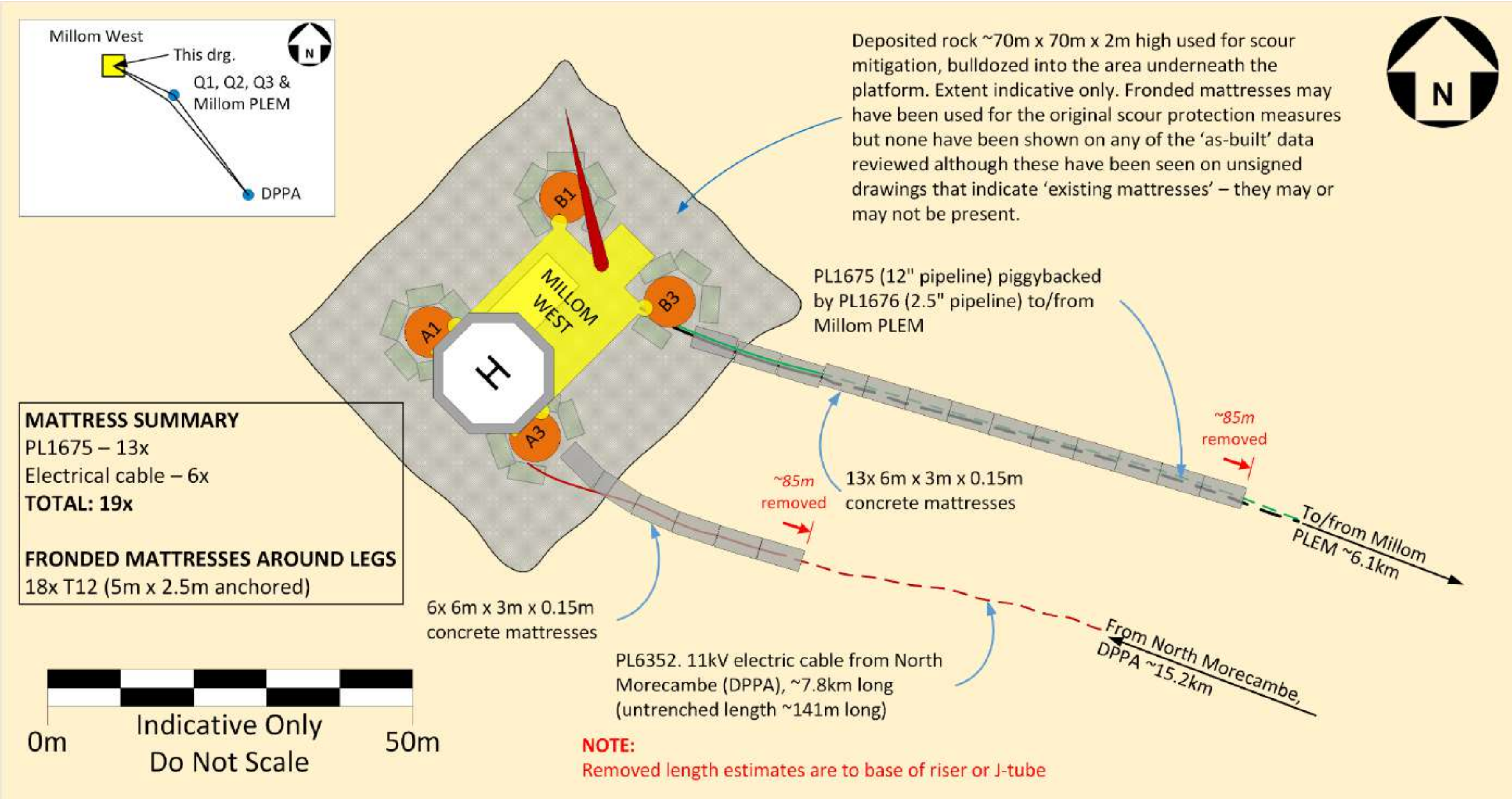


Figure 3.1.2 Millom West approach schematic

3.2 Subsea Infrastructure

The EIS subsea installations comprise of Dalton PLEM and R1 & R2 WHPS (Figure 3.2.1 and Figure 3.2.2) and Millom PLEM, Q1 & Q2 WHPS (Figure 3.2.3). A summary of the subsea installations and stabilisation features can be seen in Table 3.2.1 and Table 3.2.2. Location details are available in Appendix B: Item inventory.

Table 3.2.1 Dalton subsea installation information

Subsea installations incl. stabilisation features	No.	Mass (Te) / Size (m)	Comments / status
Dalton R1 WHPS			
Dalton R1 WHPS	1	92.4 11.9x11.9x5.9	4x 610OD25mm piles, 23.5m long.
Concrete mattresses (6m x 3m x 0.15m)	7	34.3	Refer Figure 3.2.1 and note 1.
Dalton R2 WHPS			
Dalton R2 Dual WHPS	1	98.4 15.9x11.9x5.1	4x 660OD25mm piles, 23.5m long. Refer Note 1.
Concrete mattresses (6m x 3m x 0.15m)	8	39.2	Refer Figure 3.2.2 and note 1.
Dalton PLEM			
Dalton PLEM	1	106 24.4x8x3.8	2x 1219OD25mm piles, 20m long.
NOTE: 1. All concrete mattresses are believed to be exposed, but their status will be confirmed at the time decommissioning works are executed.			

Table 3.2.2 Millom subsea installation information

Subsea installations incl. stabilisation features	No.	Mass (Te) / Size (m)	Comments / status
Millom Q1 WHPS			
Millom Q1 WHPS	1	64.3 11.9x11.9x5.9	4x 610OD25mm piles, 23.5m long.
Concrete mattresses (6m x 3m x 0.15m)	8	39.2	Refer Figure 3.2.3 and note 2.
Millom Q2 WHPS			
Millom Q2 WHPS	1	46.6 8.9x8.9x5.1	2x 1219OD25mm retrofitted pin piles, 24m long.
Millom Q3 WHPS			
Millom Q3 WHPS	1	44.3 8x8x5.1	Refer Figure 3.2.3 and note 2.
Fronded concrete mattresses (6m x 3m x 0.15m)	9	44.1	Status unknown but seabed sediment is likely to be at least partially trapped within the fronds.
Millom PLEM			
Millom East PLEM	1	112.6 24.4x8x3.8	2x 1219OD25mm piles, 24.4m long.

Table 3.2.2 Millom subsea installation information			
Shaped and fronded grout bags (1.4 m x 1.2 m x 0.9m)	27	40.5	Status unknown but seabed sediment is likely to be at least partially trapped within the fronds. Refer Figure 3.1.2.

NOTES:

1. No details have been found for the 2x 'pin piles' retrofitted to anchor the WHPS at Q2.
2. All concrete mattresses are believed to be exposed, but their status will be confirmed at the time decommissioning works are executed.

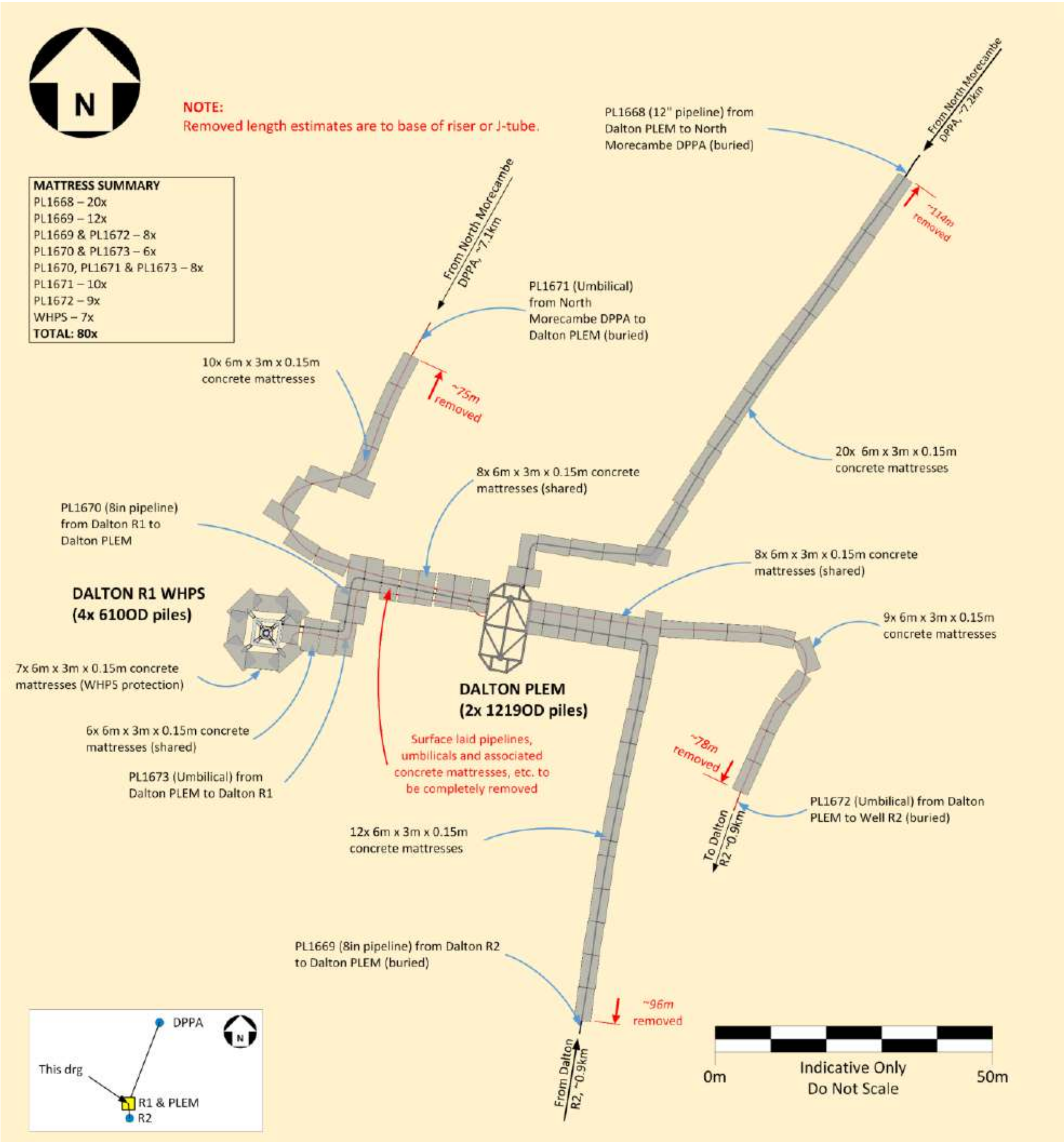


Figure 3.2.1 Dalton PLEM & Well R1 approach schematic

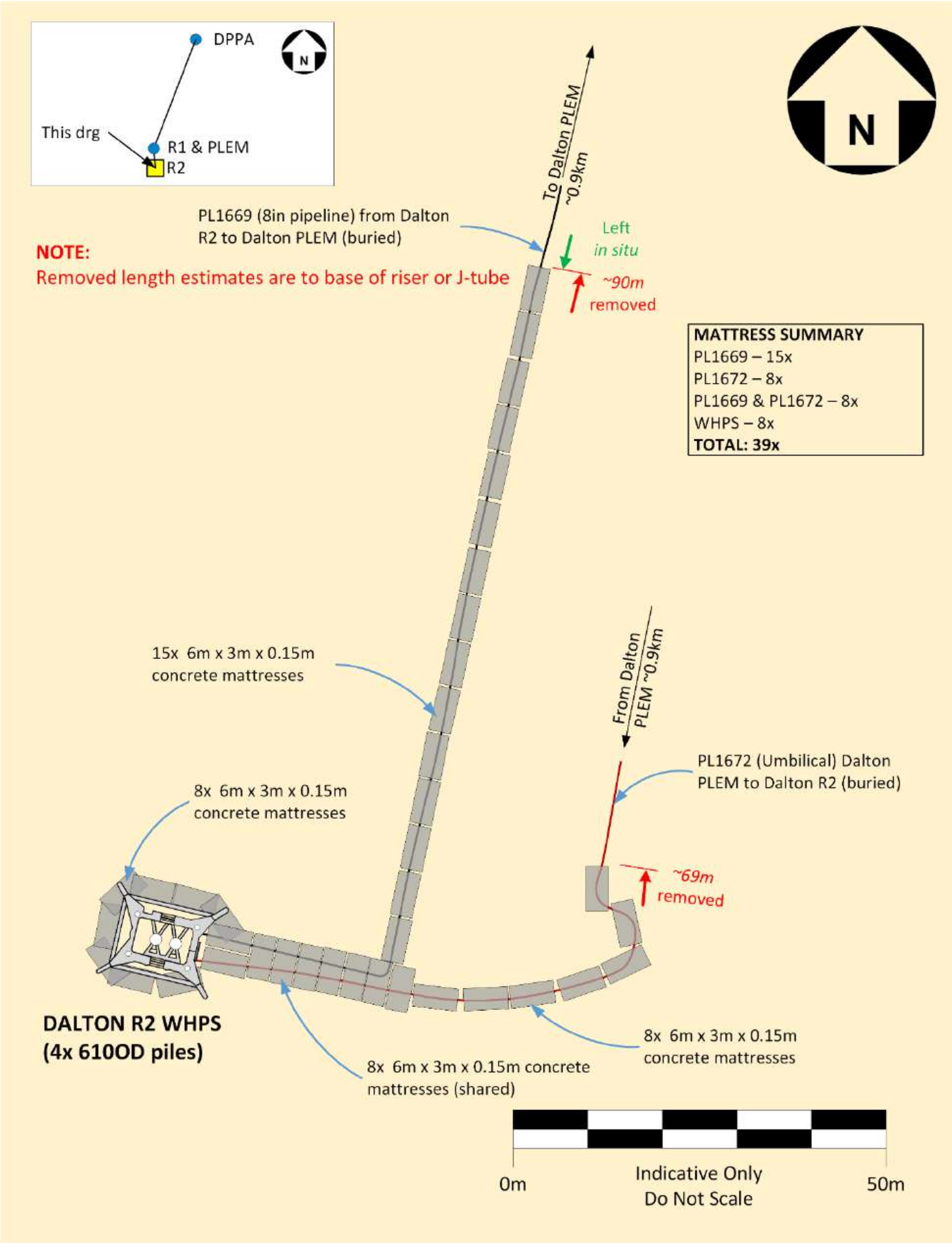


Figure 3.2.2 Dalton Well R2 approach schematic

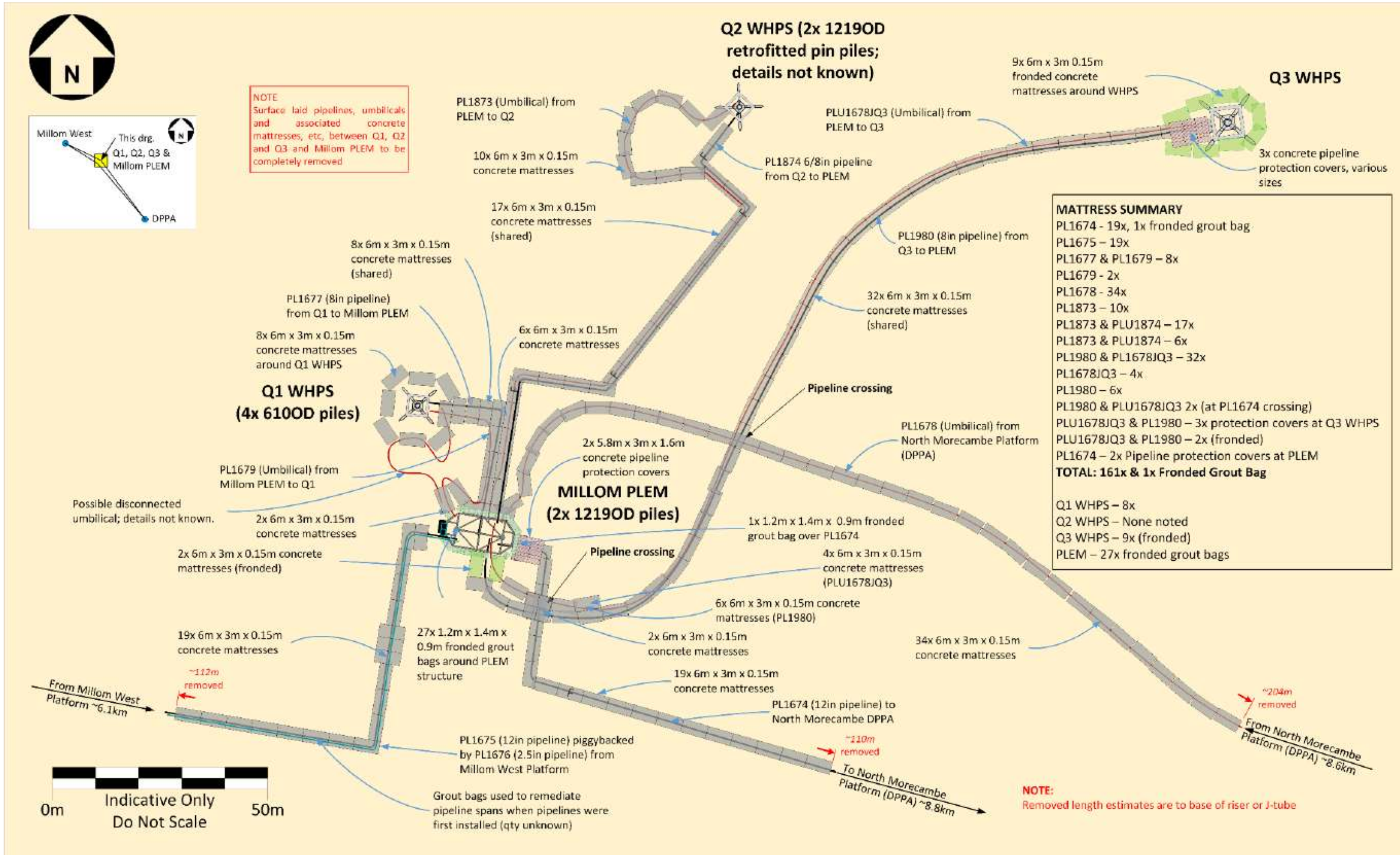


Figure 3.2.3 Millom PLEM, Well Q1 & Q3 approach schematic

3.3 Pipelines, umbilicals and cables

The pipelines, umbilicals and cables included within the scope of this EA are listed below in Table 3.3.1, Table 3.3.2 and Table 3.3.3. Further details on the EIS pipelines, are provided in Appendix B: Item inventory.

Table 3.3.1 Calder pipeline/flowline/umbilical/cable information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[2]	Burial Status	Pipeline Status	Current Content
Hydrocarbon pipeline	PL1965	24in	42.660	Coated steel pipeline with 2.3mm 3LPP and concrete weight coated ('CWC')	Unprocessed production gas	Calder platform pig launcher to MLWM	Buried with exposures	Operating	As product conveyed
Methanol pipeline	PL1966	3in	42.630	Coated steel pipeline with 2.1mm 3LPP	H,S&CI	MLWM to MeOH Emergency Shut Down Valve ('ESDV') on Calder platform	Buried with exposures	Operating	As product conveyed
Electrical & fibre optic cable	PL6340	62mm	7.597	11kV Electric power cable	N/A	CPP1 to Calder	Buried	Operating	n/a

NOTES:
1. If diameter is expressed in mm it refers to outside diameter of umbilical.
2. For brevity, the description of the end-to-end points may differ slightly from those consented.
3. Reference Pipeline Works Authorisation (PWA) 22/W/02 (PL1965, PL1966) and 123-V-23 (PL6340).

Table 3.3.2 Dalton pipeline/flowline/umbilical/cable information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[3]	Burial Status	Pipeline Status	Current Content
Hydrocarbon pipeline	PL1668	12in	7.165	Steel pipeline coated with 2.5mm 3LPP; a short length near the PLEM coated in 0.45mm GFE	Wet sweet gas	Dalton PLEM up to (but not including) cut point B at DPPA. A 3m long section has been removed from cut points A and B at DPPA.	Buried	Out of use	Filled with seawater
Hydrocarbon pipeline	PL1669	6in/8in	0.979	Steel pipeline coated with 2.5mm 3LPP; short lengths near WHPS and the PLEM coated in 0.45mm GFE	Wet sweet gas	Well R2 Xmas tree to Dalton PLEM Header. A 3m long section has been removed from cut points A and B at R2.	Buried	Out of use	Filled with seawater
Hydrocarbon pipeline	PL1670	6in/8in	0.083	Steel pipeline coated with 2.5mm 3LPP; short lengths near WHPS and the PLEM coated in 0.45mm GFE	Wet sweet gas	Well R1 Xmas tree to Dalton PLEM Header. A 3m long section has been removed from cut points A and B at R1.	Surface laid	Out of use	Filled with seawater
Chemical injection umbilical	PL1671.1 thru PL1671.5	5x19.1mm (Note 2)	7.170	Umbilical line c/w 5x19.1mm flexible hoses	H,S&CI	North Morecambe TUTU to Dalton PLEM.	Buried	Out of use	Filled with seawater
Chemical injection umbilical	PL1672.1 thru PL1672.2	2x19.1mm (Note 2)	1.007	Umbilical line c/w 2x19.1mm flexible hoses	H,S&CI	UTDA at Dalton PLEM to Well R2 Xmas Tree, disconnected from R2.	Buried	Out of use	Filled with seawater

Table 3.3.2 Dalton pipeline/flowline/umbilical/cable information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[3]	Burial Status	Pipeline Status	Current Content
Chemical injection umbilical	PL1673.1 thru PL1673.2	2x19.1mm (Note 2)	0.078	Umbilical line c/w 2x19.1mm flexible hoses	H,S&CI	UTDA at Dalton PLEM to Well R1 Xmas Tree, disconnected from R1.	Buried	Out of use	Filled with seawater

NOTES

1. If diameter is expressed in mm it refers to outside diameter of umbilical.
2. Outside diameters of umbilicals for Dalton and Millom are as follows: main umbilical - 113mm, umbilical jumpers - 100mm.
3. For brevity, the description of the end-to-end points may differ slightly from those consented.
4. The riser section of PL1668 at DPPA are out of scope.
5. Reference PWA 1/W/99 and 324/V/22.

Table 3.3.3 Millom pipeline/flowline/umbilical/cable information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[3]	Burial Status	Pipeline Status	Current Content
Hydrocarbon pipeline	PL1674	12in	8.779	Steel pipeline coated with 2.5mm 3LPP; a short length near the PLEM coated in 0.45mm Glass Flake Epoxy ('GFE')	Wet sweet gas	Millom East PLEM to (but not including) cut point B at DPPA. A 3m long section has been removed between cut points A and B at DPPA.	Buried	Out of use	Filled with seawater
Hydrocarbon pipeline	PL1675	12in	6.26	Steel pipeline coated with 2.5mm 3LPP; a	Wet sweet gas	Millom West platform to Millom East PLEM.	Buried	Out of use	Filled with seawater

Table 3.3.3 Millom pipeline/flowline/umbilical/cable information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[3]	Burial Status	Pipeline Status	Current Content
				short length near the PLEM coated in 0.45mm GFE					
Methanol pipeline	PL1676	2.5in	6.260	Steel pipeline coated with 2.5mm 3LPP; a short length near the PLEM coated in 0.45mm GFE	H,S&CI	Millom East PLEM UTDA to MeOH ESDV on Millom West Platform.	Buried	Out of use	Filled with seawater
Hydrocarbon pipeline	PL1677	6in/8in	0.110	Steel pipeline coated with 2.5mm 3LPP; a short length near the PLEM coated in 0.45mm GFE	Wet sweet gas	Disconnected at both ends. Ends left adjacent to Q1 Xmas tree exit flange and Millom East PLEM Header.	Surface laid	Out of use	Inhibited water c/w 2% DCA-22001
Chemical injection umbilical	PL1678.1 thru PL1678.5	5x19.1mm (Note 2)	8.800	Umbilical line c/w 2x12.7mm flexible hoses	H,S&CI	DPPA ('TUTU') to Umbilical Termination. Distribution Assembly ('UTDA') at Millom East PLEM	Buried	Out of use	As product conveyed
Umbilical jumper	PLU1678JQ3	111mm	0.247	Umbilical	H,S&CI	Millom East PLEM UTDA to Q3 Tree stab plate.	Surface laid	Out of use	As product conveyed
Chemical injection umbilical	PL1679.1 thru PL1679.2	2x19.1mm (Note 2)	0.074	Umbilical line c/w 2x19.1mm flexible hoses	H,S&CI	Disconnected at both ends. Left *in situ* with ends left adjacent to	Surface laid	Out of use	Inhibited water c/w

Table 3.3.3 Millom pipeline/flowline/umbilical/cable information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)[1]	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points[3]	Burial Status	Pipeline Status	Current Content
						Millom East PLEM and Q1 stab plate.			2% DCA-22001
Electric Cable	PL6352	58mm	15.327	11kV Electric power cable	n/a	DPPA to Millom West	Buried	Operating	n/a
Hydrocarbon pipeline	PL1873	6in/8in	0.142	Steel pipeline coated in 0.45mm GFE	Wet sweet gas	Disconnected at both ends. Left in situ with ends left adjacent to Q2 tree exit flange and Millom East PLEM Header.	Surface laid	Out of use	Inhibited water c/w 2% DCA-22001
Chemical injection umbilical	PLU1874	100mm	0.164	Umbilical	H,S&CI	Disconnected at both ends. Left *in situ* with ends adjacent to Millom East PLEM and Q2 stab plate.	Surface laid	Out of use	Inhibited water c/w 2% DCA-22001
Hydrocarbon flowline	PL1980	8in/6in	0.248	Flexible flowline; composite materials, mostly steel	Wet sweet gas	Q3 to Millom East PLEM Header.	Surface laid	Out of use	Filled with seawater

NOTES

1. If diameter is expressed in mm it refers to outside diameter of umbilical.
2. Outside diameters of the main umbilicals are 113mm nominal diameter; the umbilical jumpers are 100mm nominal diameter.
3. For brevity, the description of the end-to-end points may differ slightly from those consented.
4. Reference PWA 1/W/99; 35/V/03 (PLU1678JQ3, PL1980), 324/V/22, 384/V/22 and 165/V/23 (PL6352).
5. PL1677, PL1679.1, PL1679.2, PL1873 and PLU1874 are out of use and subject to Disused Pipeline Notifications under the Interim Pipeline Regime. Also refer PWA variation 220/V/18.
6. The riser section of PL1674 at DPPA is out of scope.

3.4 Pipeline protection and stabilisation features

This section presents all protection and stabilisation features that are being decommissioned. It should be noted that not all mattresses will be removed as some relate to third-party infrastructure/crossings.

Table 3.4.1 Calder pipeline protection & stabilisation features

Stabilisation Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition
CALDER PIPELINE & CABLE MATTRESSES & GROUT BAGS (AT CALDER)				
Concrete mattresses, 6m x 3m x 0.15m and 6m x 3m x 0.3m	51	287.7	On PL1965, PL1966 & PL6340 on approaches. Refer Figure 3.1.1.	Assume exposed, resting on the seabed.
Grout bags (25kg), nominal quantity	125	3.1	As above.	As above.
PL1965 & PL1966 - ISLE OF MAN INTERCONNECTOR CROSSING				
Concrete mattresses, mostly 6m x 3m x 0.15m	29	146.06	At pipeline crossing over Isle of Man Interconnector cable. Refer Figure 3.4.1.	Assume exposed, resting on the seabed
Grout bags (25kg), nominal quantity	125	3.1	As above.	As above.
CALDER PIPELINE & CABLE MATTRESSES & GROUT BAGS AT CPP1				
Concrete mattresses, 6m x 3m x 0.15m	5	24.5	On approach to scour protection ramp at CPP1. Refer Figure 3.4.3.	Assume exposed, resting on the seabed.
Grout bags (25kg), nominal quantity	125	3.1	As above.	As above.
NOTES: 1. According to the documentation review no grout bags were installed. However, that some grout bags may have been used cannot be ruled out, so a nominal quantity has been included to allow for this possibility. No other protection and stabilisation feature have been used apart from those noted in this table.				

Table 3.4.1 Calder pipeline protection & stabilisation features				
Stabilisation Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition
2. Burial status will be determined when decommissioning activities are being carried out.				

Table 3.4.2 Dalton pipeline protection & stabilisation features				
Stabilisation Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition
DALTON PIPELINE & UMBILICAL PROTECTION AT NORTH MORECAMBE DPPA				
Concrete mattresses, 6m x 3m x 0.15m	27	140	On PL1668 & PL1671 on approach to DPPA. Refer Figure 3.4.2.	Assume exposed, resting on the seabed.
Grout bags (25kg)	125	3.125	As above.	As above.
DALTON WELL R1 & PLEM PIPELINE & CABLE MATTRESSES & GROUT BAGS				
Concrete mattresses, 6m x 3m x 0.15m	73	368.2	On various Dalton pipelines on approach to R1 and PLEM. Refer Figure 3.2.1.	Assume exposed, resting on the seabed.
Grout bags (25kg), nominal quantity	125	3.1	As above.	As above.
DALTON WELL R2 PIPELINE & CABLE MATTRESSES & GROUT BAGS				
Concrete mattresses, 6m x 3m x 0.15m	31	151.9	On various Dalton pipelines on approach to R2 and PLEM. Refer Figure 3.2.2.	Assume exposed, resting on the seabed.
Grout bags (25kg), nominal quantity	125	3.1	As above.	As above.
NOTES: 1. According to the documentation review no grout bags were installed. However, that some grout bags may have been used cannot be ruled out, so a nominal quantity has been included to allow for this possibility. No other protection and stabilisation feature have been used apart from those noted in this table.				

Table 3.4.2 Dalton pipeline protection & stabilisation features				
Stabilisation Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition
2. Burial status of the concrete mattresses and pipeline protection covers will be determined when decommissioning activities are being carried out.				

Table 3.4.3 Millom pipeline protection & stabilisation features				
Stabilisation Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition
MILLOM PIPELINE PROTECTION AT NORTH MORECAMBE DPPA				
Concrete mattresses, 6m x 3m x 0.15m	50	260.4	On various Millom pipelines on approach to DPPA. Refer Figure 3.4.2.	Assume exposed, resting on the seabed.
Grout bags (25kg)	125	3.125	As above.	As above.
PIPELINE & CABLE MATTRESSES & GROUT BAGS NEAR MILLOM PLEM				
Concrete mattresses and fronded concrete mattresses, 6m x 3m x 0.15m	161	800.8	On various pipelines, etc. near Millom PLEM. Refer Figure 3.2.3.	Assume exposed, resting on the seabed.
Fronded grout bag (1.4 x 1.2 x 0.9m)	1	1.5	On PL1674 at Millom PLEM. Refer Figure 3.2.3	Assume exposed, resting on the seabed.
Grout bags (25kg), nominal quantity	250	6.3	As above, & PL1675.	As above.
MILLOM EAST Q3 PIPELINE PROTECTION AT Q3 WHPS				
Concrete pipeline protection covers, each 6.4m x 3m x 3m, 7.9m x 3m x 3m, and 7.9m x 3m x 1m respectively	3	3	On Q3 approaches at WHPS. Refer Figure 3.2.3.	Assume exposed, resting on the seabed.

Table 3.4.3 Millom pipeline protection & stabilisation features				
MILLOM EAST Q3 PIPELINE PROTECTION NEAR MILLOM PLEM				
Concrete pipeline protection covers, each 5.8m x 3m x 1.6m	2	2	On Q3 approaches at PLEM. Refer Figure 3.2.3	Assume exposed, resting on the seabed.
MILLOM PIPELINE PROTECTION AT MILLOM WEST				
Concrete mattresses, 6m x 3m x 0.15m	19	93.1	On approaches to Millom West.	Assume exposed, resting on the seabed
Grout bags (25kg)	125	3.125	As above.	As above.

NOTES:

1. According to the documentation review no grout bags were installed. However, that some grout bags may have been used cannot be ruled out, so a nominal quantity has been included to allow for this possibility. No other protection and stabilisation feature have been used apart from those noted in this table.
2. Burial status of the concrete mattresses and pipeline protection covers will be determined when decommissioning activities are being carried out.

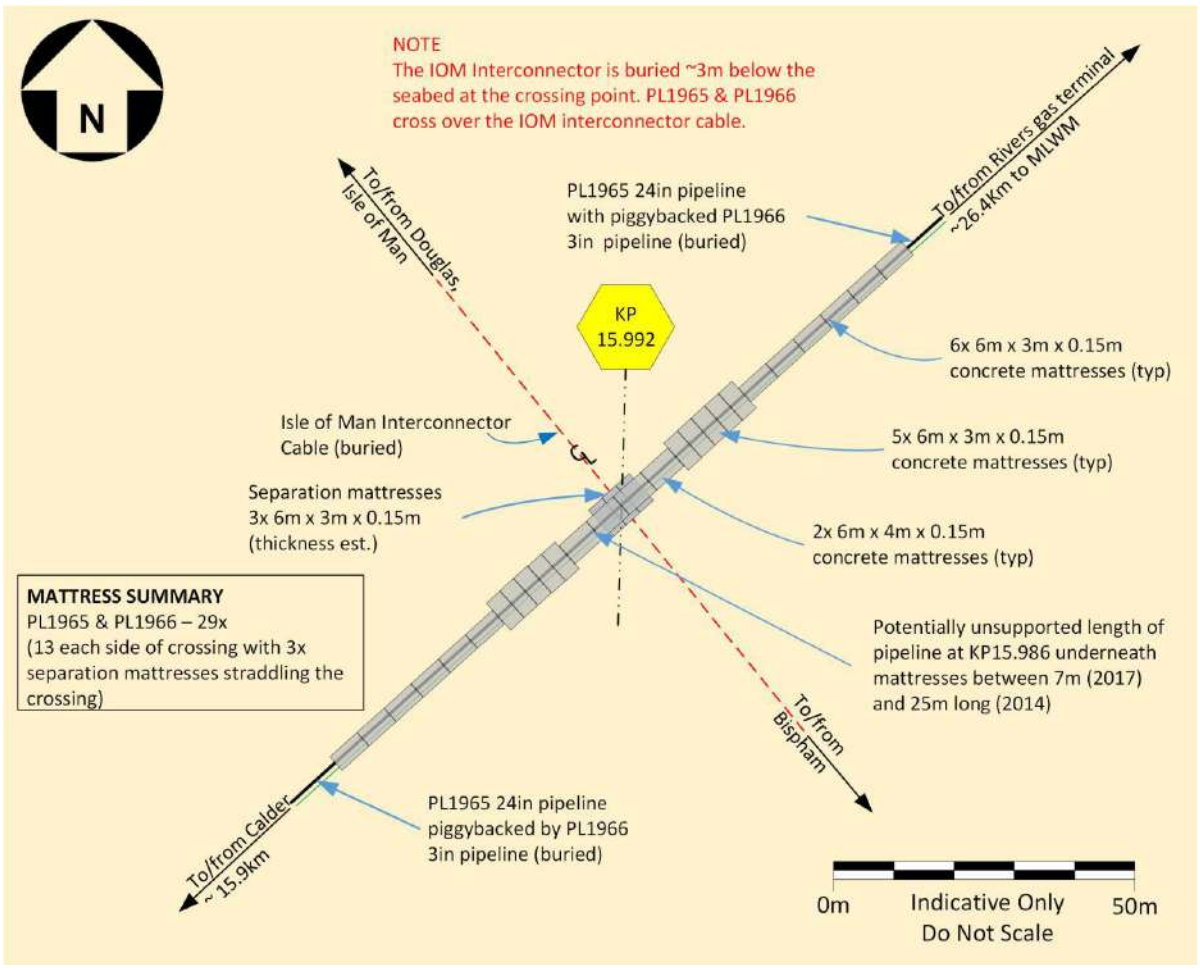


Figure 3.4.1 IOM Interconnector crossing schematic

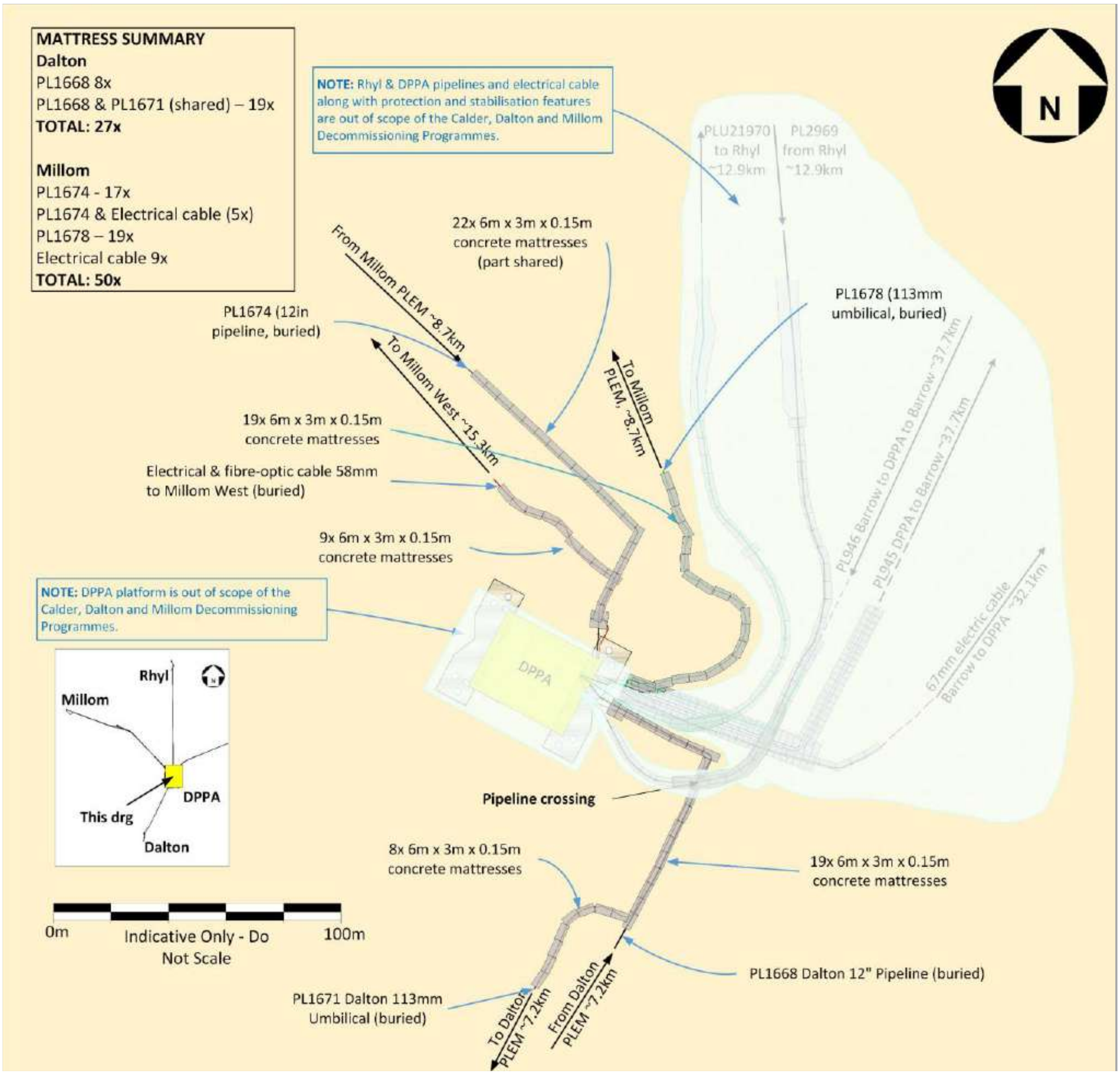


Figure 3.4.2 North Morecambe DPPA approach schematic

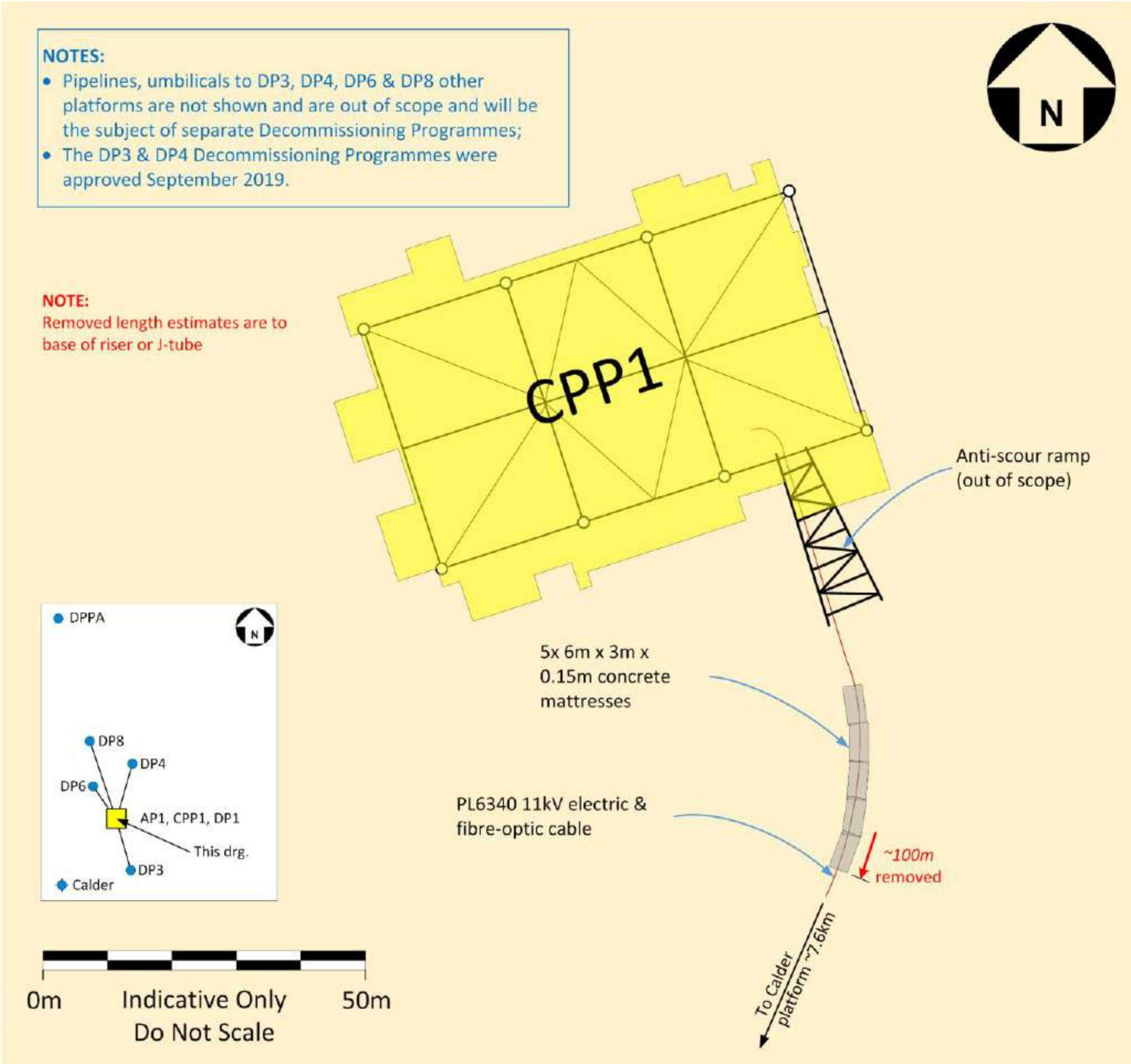


Figure 3.4.3 South Morecambe CPP1 approach schematic

3.5 Consideration of alternatives and selected approach

3.5.1 Decision-making approach

3.5.1.1 Platforms

As a Contracting Party of OSPAR, the UK has agreed to implement OSPAR Decision 98/3, which prohibits leaving offshore installations wholly or partly in place. The legal requirement for Operators to comply with the OSPAR Convention is affected through the Petroleum Act 1998 (as amended by the Energy Act 2008), the Guidance Notes for which outline the expectations of the UK regulator in terms of complying with the relevant OSPAR decisions. OSPAR Decision 98/3 states that the topsides of all installations should be returned to shore and that all jackets with a weight of less than 10,000 tonnes are completely removed for reuse, recycling or final disposal on land. In the Calder, and Millom West jackets weigh less than 10,000 Te, therefore in compliance with OSPAR, the topsides and jackets of these installations will be fully removed and disposed of appropriately onshore.

3.5.1.2 Subsea infrastructure

The latest BEIS guidance (2018) states that subsea installations (e.g., drilling templates, wellheads and their protective structures, production manifolds and risers) must, where practicable, be completely removed for reuse or recycling or final disposal on land [3]. Any piles used to secure such structures in place should be cut below natural seabed level at such a depth to ensure that any remains are unlikely to become uncovered.

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. Where an Operator is considering decommissioning pipelines *in situ*, the decision-making process must be informed by Comparative Assessment (‘CA’) of the feasible decommissioning options. This CA 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 CA of the options.

3.5.2 Alternatives to decommissioning

Options to re-use the Calder, Dalton and Millom infrastructure *in situ* for future hydrocarbon or alternative developments have been considered, but to date none have yielded a viable commercial opportunity. PL1965 has been identified as a potential candidate for CCUS. There is an implicit assumption that options for re-use of the pipelines have been exhausted before facilities and infrastructure move into the decommissioning phase and CA. Therefore, the re-use option has been excluded from this assessment.

Given the uncertainty over the feasibility of re-use of the Calder, Dalton and Millom infrastructure, there is no reason to delay decommissioning of the infrastructure in a way that is safe and environmentally and socio-economically acceptable (and the ‘do nothing’ approach to the infrastructure is thus rejected).

3.6 Comparative Assessment

3.6.1 Pipeline and umbilicals

In line with the guidance summarised above, Harbour has committed to fully removing all surface laid subsea structures and all surface laid infrastructure within the EIS area that are not buried under deposited rock. The pipelines within and associated with the EIS have been considered within a CA to arrive at an optimal decommissioning method. The methodology is described fully within the CA for pipelines in the EIS, which has been submitted along with this EA [42].

A summary of the infrastructure for which a CA of options was made and the selected option (based on consideration of safety, environmental, technical, societal and economic factors) is given in Table 3.6.1. The CA used a non-weighted process to eliminate any subjectivity. Actual environmental data was considered when comparing options including seabed disturbance, habitat loss and underwater noise in line with the conservation objectives and sensitivities of protected sites in the vicinity.

Note that PL1965 will remain in a state available for re-use as a CCUS transport pipeline until such time as a decision has been agreed with NSTA. If re-use of PL1965 is not feasible the recommended decommissioning option for the pipeline will proceed. Liaison will continue until the fate of PL1965 and its potential for reuse has been determined and agreed with NSTA.

Table 3.6.1 CA pipeline, umbilical and cable decommissioning summary

Description	Route	Burial	Length (km)	Removal option
PL6340 62mm electrical cable	CPP1 to Calder	Buried	~7.6	Ends only
PL1965 24in pipeline	Calder to MLWM	Buried	~42.7	Ends & rock/partial
PL1966 3in pipeline	MLWM to Calder	Buried	~42.6	Ends & rock/partial
PL1668 12in pipeline	Dalton PLEM to DPPA	Buried	~7.3	Ends only
PL1669 8in pipeline	Dalton R2 to Dalton PLEM	Buried	~1.0	Ends only
PL1670 8in pipeline	Dalton R1 to Dalton PLEM	Surface laid	~0.1	Complete
PL1671 113mm umbilical	DPPA to Dalton PLEM	Buried	~7.2	Ends only
PL1672 100mm umbilical	Dalton PLEM to Dalton R2	Buried	~1.0	Ends only
PL1673 100mm umbilical	Dalton PLEM to Dalton R1	Surface laid	~0.1	Complete
PL6352 58mm electrical cable	DPPA to Millom West	Buried	~15.3	Ends only
PL1674 12in pipeline	Millom PLEM to DPPA	Buried	~8.8	Ends only
PL1675 12in pipeline	Millom West to Millom PLEM	Buried	~6.3	Ends only
PL1676 2.5in pipeline	Millom PLEM to Millom West	Buried	~6.3	Ends only
PL1677 8in pipeline	Millom Q1 to Millom PLEM	Surface laid	~0.1	Complete
PL1678 113mm umbilical	DPPA to Millom PLEM	Buried	~8.8	Ends only
PLU1678JQ3 111mm umbilical	Millom PLEM to Millom Q3	Surface laid	~0.3	Complete
PL1679 100mm umbilical	Millom PLEM to Millom Q1	Surface laid	~0.1	Complete
PL1873 8in pipeline	Millom Q2 to Millom PLEM	Surface laid	~0.1	Complete

Table 3.6.1 CA pipeline, umbilical and cable decommissioning summary				
Description	Route	Burial	Length (km)	Removal option
PLU1874 100mm umbilical	Millom PLEM to Millom Q2	Surface laid	~0.2	Complete
PL1980 6in flexible flowline	Millom Q3 to Millom PLEM	Surface laid	~0.3	Complete

3.6.2 Stabilisation and protection features

Mattresses, grout bags and deposited rock associated with EIS infrastructure were also included within the CA.

Some mattresses were installed to protect and stabilise the subsea installations, WHPS and PLEMs and any surface laid infrastructure, and some were installed at the IOM Interconnector Crossing. Some fronded mattresses may have been installed around the base of the Calder and Millom West installations. Within the CA it was assumed that all concrete mattresses will be removed as part of the decommissioning options.

Any mattresses partly or fully buried under the deposited rock at the Calder and Millom West platforms may need to be decommissioned *in situ*. Any such approach will be discussed with OPRED in the first instance.

3.6.2.1 Mattress decommissioning options

Two decommissioning options were considered for the removal of fronded and concrete mattresses. These are:

- Complete removal – This would involve the complete removal of the mattresses by whatever means would be most practicable and acceptable from a technical perspective;
- Decommission *in situ* – This would involve leaving the mattresses *in situ* with no remedial works but verifying their status via future surveys.

Most of the mattresses are associated with the approaches, and if removed it is assumed that any pipelines or umbilicals beneath them would also be removed. Mattresses associated with any third-party installations or pipeline crossings will remain undisturbed. A small number may be buried under deposited rock and an implicit assumption of this assessment is that mattresses buried under rock will be decommissioned *in situ*. Any such approach will be discussed with OPRED in the first instance.

3.6.2.2 Grout bags

Ordinarily, the intention would be to leave all fully buried grout bags *in situ* when decommissioning the pipelines, but should they be disturbed as part of decommissioning operations they will be removed. Although several different methods could theoretically be used to remove the grout bags, from a practical perspective it is not known whether the bag material has remained intact. Any such approach will be discussed with OPRED in the first instance.

3.6.2.3 Deposited Rock

An examination of the Calder, Dalton and Millom related documentation suggests that deposited rock was only installed around the Calder and Millom West NUI jacket legs, and this was to mitigate scour.

Methods considered to remove the rock included:

- Dredging the rock and disposing of the material at an approved offshore location;
- Dredging the rock and transporting the material to shore to be disposed of in an approved manner;
- Lifting the rock using a grab vessel, depositing in a hopper barge, and transporting it to shore for appropriate disposal.

All these proposed methods would impact on the seabed and associated communities, create sediment plumes, and require additional vessel use with the associated environmental impacts, safety risks, impacts on other users of the sea and additional costs. While it is considered physically possible to remove deposited rock, the decommissioning philosophy in this document is consistent with the Guidance [3], with all deposited rock being decommissioned *in situ.*

3.7 Proposed schedules

Proposed decommissioning schedules for Calder, Dalton and Millom are provided in Figure 3.7.1, Figure 3.7.2 and Figure 3.7.3. The activities are subject to the acceptance of the DP and any unavoidable constraints (e.g., vessel availability) that may be encountered while executing the decommissioning activities. Therefore, activity schedule windows have been included to account for this uncertainty. The commencement of offshore decommissioning activities will depend on commercial agreements and commitments.

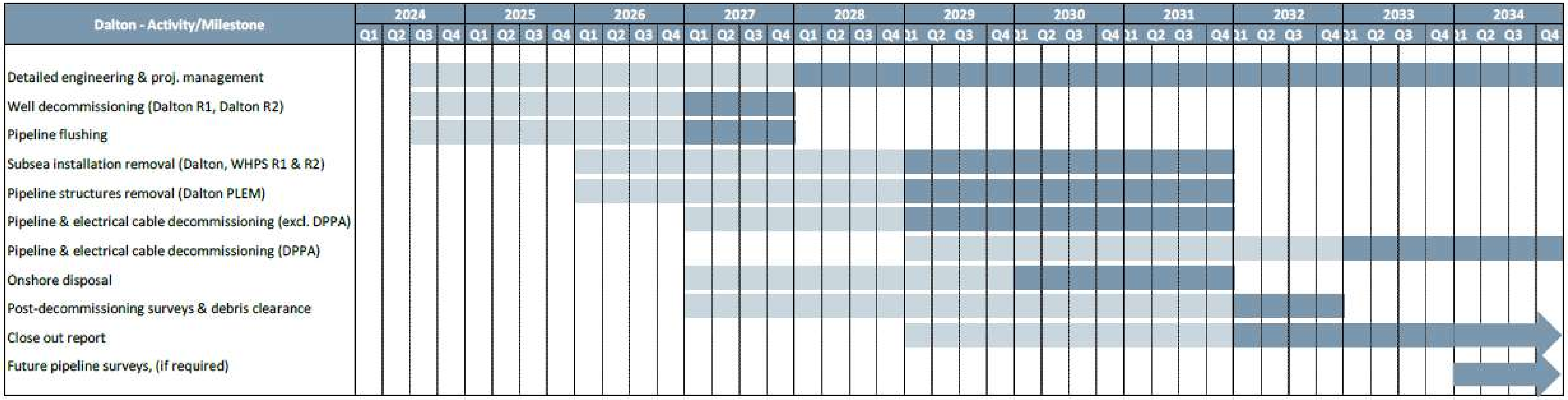
Notes / Key

Earliest potential activity

Activity window to allow commercial flexibility associated with decommissioning activities

1. If possible and subject to timing and commercial agreements, decommissioning activities will be carried out as part of a wider decommissioning campaign in the area;
2. Decommissioning of PL1640 at CPP1. This work will likely be scheduled to coincide with the decommissioning of CPP1;
3. The close out report will be prepared on completion of offshore activities. However, as decommissioning works at CPP1 will likely be timed to coincide with the decommissioning of these assets, timing and strategy for the close out report is to be agreed with OPRED as details become known;
4. The close out report will contain results of environmental surveys, debris survey (identification/removal) and clear seabed verification survey;
5. The close out report will explain the strategy based on risk assessments and results of post decommissioning surveys.
6. The program of work has been extended to cater for the uncertainty in the timing of decommissioning works of infrastructure tied into 3rd party owned installations.

Figure 3.7.1 Gantt chart of project plan for Calder



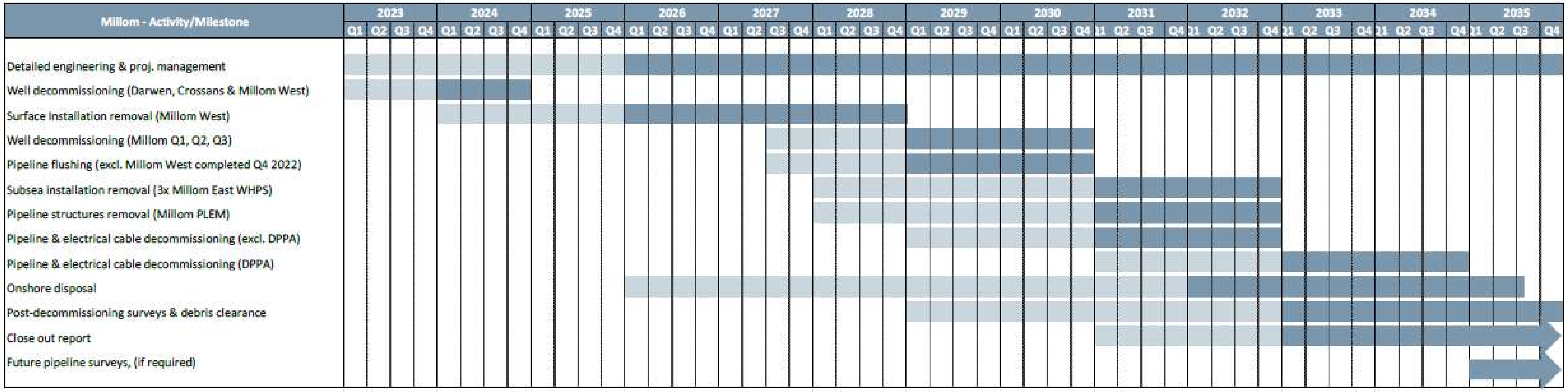
Notes / Key

Earliest potential activity

Activity window to allow commercial flexibility associated with decommissioning activities

1. If possible and subject to timing and commercial agreements, decommissioning activities will be carried out as part of a wider decommissioning campaign in the area;
2. The close out report will be prepared on completion of offshore activities. However, as decommissioning works at DPPA will likely be timed to coincide with the decommissioning of these assets, timing and strategy for the close out report is to be agreed with OPRED as details become known;
3. The close out report will contain results of environmental surveys, debris survey (identification/removal) and clear seabed verification survey;
4. The close out report will explain the strategy based on risk assessments and results of post decommissioning surveys.
5. The program of work has been extended to cater for the uncertainty in the timing of decommissioning works of infrastructure tied into 3[rd] party owned installations.

Figure 3.7.2 Gantt chart of project plan for Dalton



Notes / Key

Earliest potential activity

Activity window to allow commercial flexibility associated with decommissioning activities

1. If possible and subject to timing and commercial agreements, decommissioning activities will be carried out as part of a wider decommissioning campaign in the area;
2. The close out report will be prepared on completion of offshore activities. However, as decommissioning works at DPPA will likely be timed to coincide with the decommissioning of these assets, timing and strategy for the close out report is to be agreed with OPRED as details become known;
3. The close out report will contain results of environmental sueveys, debris survey (identification/removal) and clear seabed verification survey;
4. The close out report will explain the strategy based on risk assessments and results of post decommissioning surveys.
5. The program of work has been extended to cater for the uncertainty in the timing of decommissioning works of infrastructure tied into 3rd party owned installations.

Figure 3.7.3 Gantt chart of project plan for Millom

3.8 Decommissioning activities

This section outlines the proposed decommissioning activities for the EIS infrastructure. Some activities described here are out with the scope of this EA, however they are included within this section to provide an overview of all decommissioning activities.

3.8.1 Preparation for decommissioning

3.8.1.1 Well decommissioning

Well decommissioning is not within the scope of this EA, and it has been or will be assessed as part of well intervention and marine licence applications. A description is included here to describe the activities leading up to the point that the decommissioning activities that are assessed here begin.

All wells will be decommissioned to current industry standard, this means that each well will be systematically and permanently closed in accordance with well decommissioning best practice; these activities will be carried out using a jack up rig.

3.8.1.2 Flushing and cleaning operations

Flushing and cleaning operations are not within the scope of this EA as they have been assessed as part of the ongoing operations of the facilities and are subject to permitting application via the PETS. A description is included here to describe the activities which have occurred leading up to the point that the decommissioning activities begin.

Harbour will flush all the infield production pipelines with seawater, followed by plugs of gel or foam called ‘pigs’ propelled through the lines. This activity is designed to remove mobile hydrocarbons and achieve a cleanliness of less than 30mg/l oil in pipeline flush fluids back to the topsides. Chemical pipelines will be subjected to a turbulent seawater flush to displace all contents prior to shipping to shore for treatment and disposal.

Following isolation from the wells, gas (nitrogen) will be passed through the platform processing systems to ensure that minimal hydrocarbons remained in the system prior to the final cleaning and disconnect. During the final cleaning and disconnect activities, all the processing systems on the platform will be progressively depressurised, purged with gas (nitrogen) and rendered safe for removal operations. All bulk chemicals surplus to requirement will be backloaded onshore for disposal. The pipework and tanks will be visually inspected where possible and may be further treated should any sources of potential spills of oils and other fluids be identified.

3.8.2 Platform decommissioning

The Calder and Millom West NUIs will be completely removed, transported to shore and recycled.

3.8.2.1 Cold suspension

Specialist engineering contractors will prepare the infrastructure for removal. It is assumed that for both installations the topsides will require removal separately from the removal of the legs and suction piles.

Once hydrocarbon free, isolated from hydrocarbon sources and without a routine power source (all diesel fuel will have been drained and backloaded to shore), the platforms will enter a phase called ‘cold suspension’. During this time, the platforms will be equipped with solar powered aids to navigation and an automatic identification system (‘AIS’) to mark the structures until such time they are fully removed. During cold suspension, it is assumed that:

- The assets will be marked accordingly in line with a Consent to Locate (‘CtL’) licence. Dispensation from the standard marking schedule is to be requested owing to the solar powered aids to navigation consisting of primary lights and foghorn, without subsidiary lighting. A contingency plan has been prepared in the event of a failure with the executive action being dependent on the remaining duration of the period of cold suspension;

- No further activities are to be undertaken at the assets during cold suspension ahead of the removals phase apart from subsea surveys and bird surveys; and
- There is the potential for helicopters to land on some NUIs pre-cold suspension. However, once the installations are light housed, no personnel will re-board the topsides.

3.8.2.2 Topsides removal

It is assumed that Harbour will remove the topsides using the single lift method. A heavy lift vessel capable of lifting the entire topsides in one lift will be used. The topsides will be prepared for this by a combination of making sure modules are secured for transport and structural strengthening of the topsides.

3.8.2.3 Leg removal

Each installation is secured to the seabed by suction piles. It is possible that the piles securing the jackets may be removed via reverse installation using overpressure, where this is not possible alternative approaches, such as the addition of buoyancy modules, application of a prescribed tension from a lift wire, and excavation techniques to reduce external skin friction, may require consideration.

The removal process for of each of the two installations is expected to be:

- Cutting of risers;
- Removal of the mattresses and relocation of the rock cover surrounding the suction piles;
- Release of the suction piles that secure the jacket to the seabed; and
- Removal of jackets (including risers).

Any local excavations will be left to either naturally backfill or the existing rock material surrounding the piles will be used as remediation.

3.8.3 Subsea infrastructure decommissioning

3.8.3.1 Overview

A subsea contractor will mobilise a fleet comprising vessels with a range of crane capabilities for lifting objects of different sizes and weights off the seabed, vessels that can support underwater operations including ROV deployment, diving, cutting, and backfilling, excavation and rock placement, survey vessels and guard vessels. The vessels will deploy ROVs (or divers when necessary) to disconnect the subsea installations and tie-in spools and to cut the spools and ends of flowlines. The vessel's cranes will lift the subsea structures to the vessel.

3.8.3.2 Pipelines, umbilicals and cables

Pipelines, umbilicals and cables will be physically disconnected subsea from all subsea and surface structures and any mattresses and grout bags that cover the disconnection points will be recovered back to the vessel. Following this, the lines will be prepared for decommissioning.

The recommendation from the CA is to fully remove all surface laid pipelines, umbilicals and cables, any items buried are to be decommissioned *in situ,* with cut ends cut and remediated.

A suitable vessel will be used to undertake the subsea intervention scopes associated with pipeline disconnection and remediation, removal of infrastructure and stabilisation materials and clearance activities. The pipelines will be cut at trench depth where they enter burial, and the associated surface laid sections will be removed. Pipeline ends will either be backfilled, or rock placement will be used as remediation. Up to 10 pipelines will require remediation at each end, meaning rock may be required in 20 locations. Rock will be placed in an overtrawlable (1:3) slope covering a seabed area of approximately 50m^2 per pipeline end.

Any exposures or spans will also be remediated along the length. Remediation of the exposures and spans near the cable crossing on PL1965 and PL1966 will also be required and is estimated to require approximately 2,500Te of rock to cover a length of 250m.

3.8.3.3 Subsea infrastructure

Subsea infrastructure, including 5 WHPSs and 2 PLEMs, will be disconnected by either ROV or divers, fully removed and recovered to a vessel for transfer onshore for recycling or disposal. All piled subsea infrastructure will have their piles cut internally (where possible) and will be fully recovered. Should internal cutting not prove possible, excavation and external cutting at -3 m will be the alternative method of removal. For the purposes of this assessment, it has been assumed that one in three piles would be externally excavated to achieve a sufficient cut depth, the success rate was 100% for internal excavation for the LOGGS DP.

3.8.3.4 Protection and support materials

As per the OPRED guidance, the base case for mattresses is full removal, with the exception of any protection structures associated with crossing points and any third-party infrastructure. If any mattresses are found to have insufficient integrity to be removed, then Harbour will engage with the regulator regarding decommissioning these mattresses *in situ*.

There are a total of 446 mattresses of varying types, an estimated 1,250 grout bags, one fronded grout bag and four concrete protection structures supporting pipeline infrastructure within the EIS decommissioning area. The burial status of the concrete mattresses and pipeline protection covers will be determined when decommissioning activities are being carried out, however, it is currently proposed that the majority (316) mattresses and all the concrete protection structures are removed. Those remaining *in situ* are mostly associated with third party infrastructure and pipeline crossings. According to the documentation review no grout bags were installed. However, the possibility that some grout bags may have been used cannot be ruled out, so a nominal quantity has been included to allow for this possibility. All grout bags are to be removed.

3.8.4 Post-decommissioning activity

Following decommissioning activities, a seabed clearance survey will identify any debris on the seabed within a 500 m radius of the platforms (Calder and Millom West) and subsea wells (Millom East and Dalton); and within the corridor of any pipelines and umbilicals decommissioned *in situ* which will be recovered for onshore disposal. In the scenario that an overtrawl survey is required, consultations with OPRED and relevant stakeholders (i.e., National Federation of Fishermen's Organisations ('NFFO') and Joint Nature Conservation Committee ('JNCC;)) would be held to discuss the best approach to ensure the survey meets the requirements for clear seabed verification. This will take the environmental sensitivities of the area into account as it is recognised that some of the decommissioning activities will be occurring in the Morecambe Bay and Duddon Estuary SPA.

Post-decommissioning surveys will also be used to identify any seabed depressions/indentations formed as a result of the decommissioning of piled infrastructure. Harbour is confident that any local depressions will naturally backfill given the moderately dynamic nature of the environment and seabed type in the vicinity of the EIS. However, if depressions are not able to naturally backfill; Harbour will consider using existing rock material surround the piles as remediation. This will be discussed with OPRED and other relevant stakeholders (i.e. fisheries/JNCC etc) at the time.

Subject to acceptance of the close-out report by OPRED, the existing safety zones will be lifted. A post-decommissioning monitoring programme covering the pipelines and associated stabilisation features remaining *in situ* is also to be agreed with OPRED.

3.9 Waste management

The onshore treatment of waste from the EIS decommissioning activities will be undertaken according to the principles of the waste hierarchy, a conceptual framework which ranks the options for dealing with waste in terms of sustainability (Figure 3.9.1). The waste hierarchy is a key element in OSPAR Decision 98/3 and BEIS 2018 guidance notes [3].

Non-hazardous waste material, such as scrap metal, concrete and plastic not contaminated with hazardous waste, will, where possible, be reused or recycled. Other non-hazardous waste which cannot be reused or recycled will be disposed of to a landfill site. Hazardous waste resulting from the dismantling of the EIS facilities will be pre-treated to reduce hazardous properties or render it non-hazardous prior to recycling or disposing of it to a suitable landfill site. Under the Landfill Directive, pre-treatment is necessary for most hazardous wastes destined to be disposed of to a landfill site.

The management of waste generated from operations and drilling activities has been addressed by Harbour through an ISO14001 certified Environmental Management System ('EMS'). The EMS initially comprised a procedure for waste management designed to ensure that all waste generated during the Harbour offshore production and drilling operations are managed according to Harbour Energy's Health, Safety and Environment policy (Appendix C) and relevant legislation. Procedures and processes for waste management are now embedded in the EMS. A Waste Management Plan ('WMP') will record how handling, storage, transfer and treatment of waste will be conducted by contractors/sub-contractors on behalf of Harbour using their own waste management system. The WMP will also detail how the reporting of waste for internal and external recording and reporting will be managed. An overview of the removal, disposal and handling procedures for additional and incidental wastes not outlined previously is presented in Table 3.9.1 Total weights of the EIS infrastructure are provided in Table 3.9.2, Table 3.9.3 and Table 3.9.4.

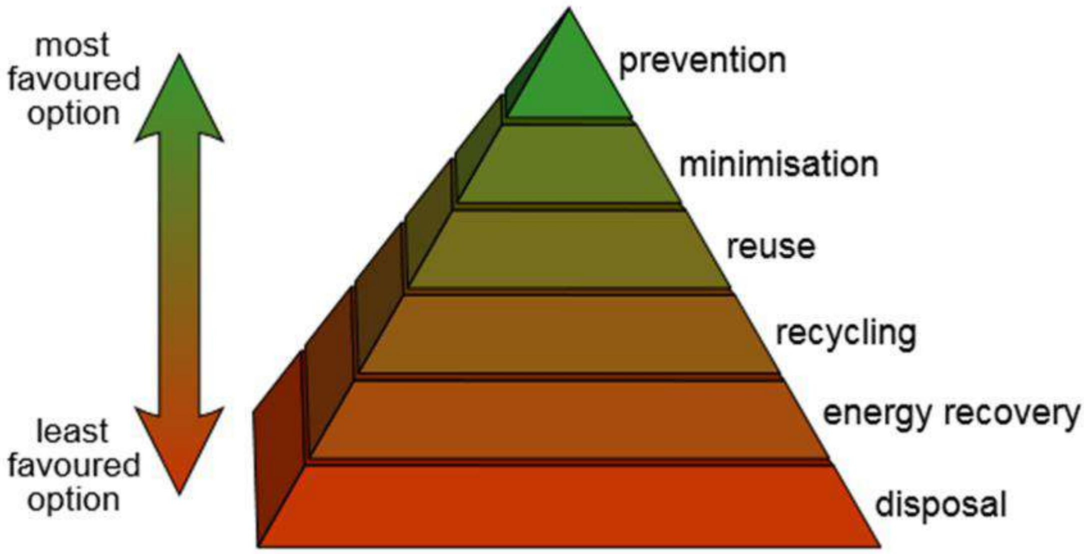


Figure 3.9.1 Waste management hierarchy

Table 3.9.1 Waste steam removal and disposal methods	
Waste Stream	Removal and disposal method
Bulk liquids	It unlikely that any bulk liquids will be present in the section of jacket structure that is being recovered to shore, however, should any be found, these will be dealt with and disposed of in accordance with guidelines and company policies. Further cleaning and decontamination of materials recovered to shore will take place onshore prior to recycling / re-use or disposal.
Marine growth	Where necessary and practicable to allow access, some marine growth will be removed offshore. The remainder will be brought to shore and disposed of according to guidelines and company policies.
Naturally Occurring Radioactive Material ('NORM')	Tests for NORM will be undertaken offshore, and any NORM encountered will be dealt with and disposed of in accordance with guidelines and company policies.
Asbestos	It unlikely that asbestos will be present in the section of jacket structure that is being recovered to shore. However, should any such material be found it will be dealt with and disposed of in accordance with guidelines and company policies.
Chromium VI	Given the age of the platforms Chromium VI paints may have been used for corrosion protection. Checks will be done to confirm whether Chromium VI is present on the platform using the correct Personal Protection Equipment ('PPE') taking account of Control of Substances Hazardous to Health ('COSHH') Regulations 2002. The material will be disposed of according to guidelines and company policies and under appropriate permit.
Other hazardous wastes	Hazardous wastes will be recovered to shore and disposed of according to guidelines and company policies and will also take place under appropriate permits.
Onshore Dismantling sites	Appropriately licensed sites will be selected for dealing with materials recovered to shore. The dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver re-use and recycling options.

Table 3.9.2 Breakdown of EIS infrastructure				
Asset	Inventory	Total Inventory (Te)	Planned mass to shore (Te)	Planned mass decommissioned *in situ* (Te)
Calder	Installations	1,910	1,910	0
	Pipelines	29,859	402	29,457
	Deposited Rock	5,866	0	5,866
Dalton	Installations	370	293	77
	Pipelines	1,865	730	1,135
	Deposited Rock	0	0	0
Millom	Installations	2,023	1,909	113

Table 3.9.2 Breakdown of EIS infrastructure				
Asset	Inventory	Total Inventory (Te)	Planned mass to shore (Te)	Planned mass decommissioned *in situ* (Te)
	Pipelines	4,078	1,149	2,929
	Deposited Rock	12,728	0	12,728
Sub-total:	**Excl. Rock**	**40,105**	**6,393**	**33,711**
Sub-total:	**Incl. Rock**	**58,699**	**6,393**	**52,305**

NOTES:

1. Totals - Installations: 4,303 Te, Pipelines: 35,802 Te.
2. There may be slight discrepancies due to rounding. The figures have not been adjusted to allow for this.

Table 3.9.3 Material Inventory for EIS Installations (Excl. Rock)	
Material	Tonnage
Steel	4,034.5
Plastic/Rubber	99.6
Non-ferrous (Aluminium assumed for worst-case E&E calcs	128.2
Concrete	40.5
Total	**4,302.8**

Table 3.9.4 Material Inventory for EIS Pipelines (Excl. Rock)	
Material	Tonnage
Steel	13,174.5
Plastic/Rubber	1,304.5
Non-ferrous (Aluminium assumed for worst-case E&E calcs	166.3
Concrete	20,712.5
Misc (non-hazardous)	444
Total	**35,801.8**

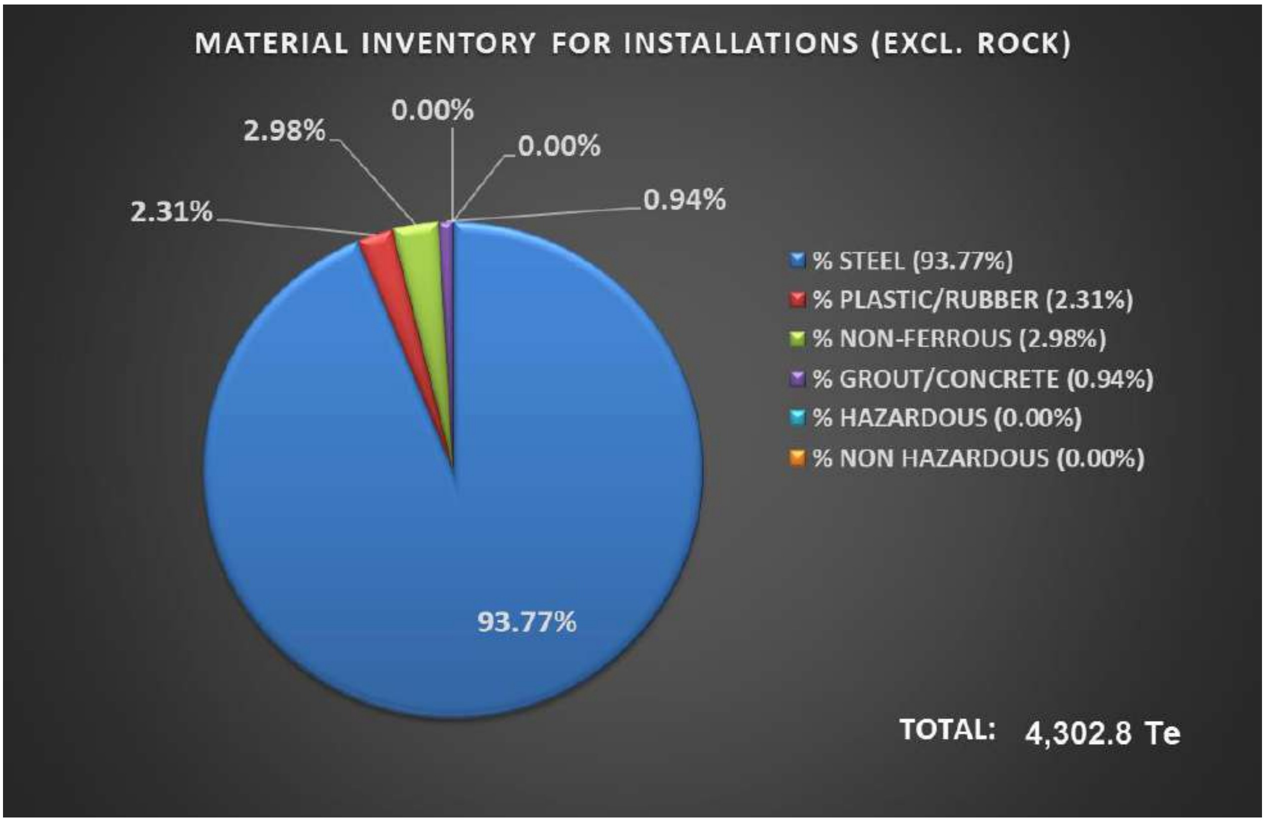


Figure 3.9.2 Pie-chart of material inventory for Calder, Dalton & Millom installations[2]

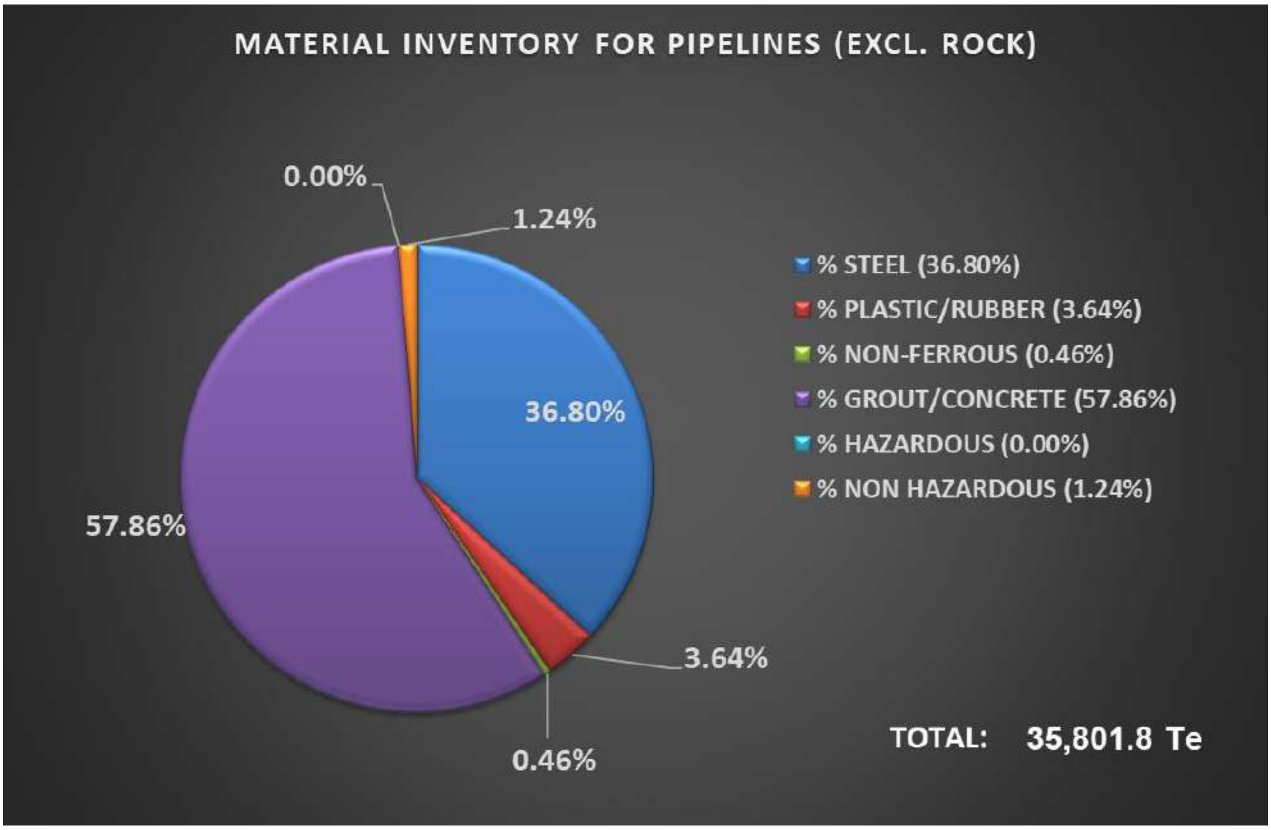


Figure 3.9.3 Pie-chart of material inventory for Calder, Dalton & Millom Pipelines

[2] Quantity excludes deposited rock used as scour protection around the Calder & Millom West installations.

4 Environmental Baseline

The baseline environment of the project area is summarised this section. Focus is placed on the sensitive environmental receptors identified during the ENVID and those deemed to be of particular interest to stakeholders. This information is considered sufficient to inform the environmental assessment of potential impacts within this EA.

4.1 Physical Environment

4.1.1 Weather and Sea Conditions

Winds in the Irish region are generally from the west and southwest for most of the year, though in spring there is an increased incidence of winds from all directions. In winter, there is a 20% chance of winds exceeding force 7 (14 m/s) to the east of the Isle of Man, increasing by 25% to the west, north and south of the island. In summer, this figure is reduced to 2% [15].

The main flow of water to the Irish Sea is from the Atlantic, flowing south to north. The main flow may veer towards the Welsh coast as it moves north, with a weaker flow, generally northward, to the west of the Isle of Man. A minor component of the flow enters the EIS to the north of Anglesey and moves anti-clockwise round the Isle of Man before re-joining the main flow to exit through the North Channel. The mean or residual flow is weak, generally less than 0.1m/s and approximately 0.01m/s in most locations [15].

Throughout much of the Irish Sea region, tidal mixing is sufficiently intense to ensure that the water column remains well mixed throughout the year, although there are regions where temperature and/or salinity differences between water masses results in seasonal stratification. Differences between saline oceanic inflows and freshwater input close to the coastlines can cause haline stratification. During the summer where haline stratification is apparent, it is reinforced by thermal stratification [15].

There is considerable variation in the tidal range experienced around the Irish Sea. For example, Liverpool Bay experiences a very large tidal range (>10m on the largest spring tides and the second largest in the British Isles) whilst areas of very small tidal range (amphidromic points) are found in the vicinity of Arklow on the Irish coast of St George’s Channel and between Islay and the Mull of Kintyre in the North Channel [15].

Winds in the Irish region are generally from the west and southwest for most of the year, though in spring there is an increased incidence of winds from all directions. In winter, there is a 20% chance of wind exceeding force 7 (14m/s) to the east of the Isle of Man, increasing by 25% to the west, north and south of the island. In summer, this figure is reduced to 2% [15].

Wave heights across the EIS region range from 0.26-1.20 m nearshore to 1.21 to 1.50 m further offshore [77]. McBreen *et al.* (2011) indicate that wave energy at the seabed is ‘moderate’ (0.21-1.2N/m^2) to ‘low’ (<0.21N/m^2) for most of the EIS region, increasing to ‘high’ (more than 1.2N/m^2) towards the west English Coast [72]. The wave height within the proposed area of operations ranges between 0.91m to 1.5m. The annual mean wave power within the area is 0.1 - 12kW/m [77].

4.1.2 Bathymetry

The water depths at Calder, Dalton and Millom are relatively shallow in the context of the EIS, sitting at 28m, 37.5m and 41.8m LAT, respectively and indicating a gentle shallowing towards the English coastline. A prominent north-south trough extends from the North Channel (where the Northern Irish coastline is closest to the Scottish coastline), reaching 275m depth in the Manx Depression, to the west of the Isle of Man [15].

4.1.3 Seabed environment

4.1.3.1 Regional Context

A variety of seabed sediments are present in the Irish Sea including areas of mud to the east and west of the Isle of Man where currents are weak, with coarser material such as sand and gravel in areas of stronger tidal and wave-driven currents, and rock and boulders in the most exposed areas. Sand waves and sandbanks can also be found within the area. Seabed surveys carried out as part of the Strategic Environmental Assessment ('SEA') 6, identified and described several seabed features of potential geomorphological and ecological conservation interest, including extensive reef areas [20]. The coastal area from the Mull of Galloway and the Solway Firth to Morecambe Bay, the Ribble Estuary, Liverpool Bay, the Dee Estuary, Colwyn Bay and the northern entrance to the Menai Strait encompasses a range of habitats but is predominantly sedimentary in nature and includes some of the UK's most extensive sand/mud flats [79].

Under OESEA3 (2016), regional area 6 (covering covers the eastern Irish Sea, Cardigan Bay, and the St George's Channel) is reported to have a complex sea-bed topography with many static, relict, bedforms indicative of glacial and peri-glacial activity (e.g., rôche moutonnées, pingos). The bathymetry of the wider area varies from shallow near shore to deeper waters in the Firth of Clyde (80m), with several active bedforms including sandbanks and smaller sandwaves and ripples. A prominent north-south trough extends from the North Channel (120m), reaching 275m depth in the Beaufort's Dyke passing the Manx Depression, St George's Channel (120m), and towards the Celtic Deep. The areas of Cardigan Bay and Caernarfon Bay are relatively shallow with depths typically ranging between 40 and 80m [79].

In the EIS there is a general transition to the southeast and east of the Isle of Man, towards the western English coast, from coarser-grained gravel and sand to mud, known as the Eastern Irish Sea Mud Belt [4].To the east and south of Arran, muddy sediments range down to around 55°N in the Firth of Clyde. These muddy areas coincide with areas of weak bed stress, representing depositional environments. These areas were identified by [63] as potentially providing Holocene-based sources of methane which is a key gas involved in the creation of methane-derived authigenic carbonate ('MDAC') habitats.

Thin sandy, gravelly sediments generally less than 0.3m thick overly a layer of gravelly lag deposits comprising sandy, shelly and poorly sorted gravel, which makes up the floors of the St. George's Channel and North Channel [52], the sand only thickening in areas of raised bedforms. Sand thickness increases towards the area of extensive mud to the west and east, varying in thickness from 0.5 to 40m, with surface variations accounted for by the development of sand waves and tidal sand ridges [52].

4.1.3.2 EIS Seabed Environment

4.1.3.2.1 Physical Composition

Sediment surrounding the EIS infrastructure consists of mainly sands, muds and gravel and is classed as a mixture of sand (sand, gravelly sand, slightly gravelly sand, sandy gravel) and as circalittoral sandy mud [77]. PL1965 and PL1966 are situated within sand and muddy sand around the approach to the Calder installation, as it moves further in shore the sediment transitions through slightly gravelly muddy sand, gravelly muddy sand and muddy sandy gravel [77].

A large broadscale offshore seabed survey east of the Isle of Man was carried out in 1997 by the University of Liverpool [47]. The survey found the area to be relatively uniform, consisting of fine and medium sands, with various amounts of stones and shell. Side scan sonar and video survey identified widespread areas of fine scale sand waves or ripples.

The most recent survey was undertaken between 17th July 2022 and 1st August 2022 by Fugro Ltd. A pre-decommissioning environmental survey comprising a geophysical seabed survey, a habitat assessment and an environmental baseline survey ('EBS') was competed across Harbour asset locations, covering the Calder and Millom West platforms and five subsea wells (Dalton R1 well, Dalton R2 well and Millom East Q1, Q2 and Q3 wells) [32]. The seabed across the EIS survey areas comprised mostly rippled muddy sand/sandy mud with a varying proportion of shell fragments [32]. Megaripples were observed at all stations throughout the areas surveyed, except for sediments in the Millom East Wells survey area, which was expected to comprise clayey sandy silt based on environmental camera visuals and grab samples. Sand was the dominant fraction, with sediments classed as fine sand or medium sand at all stations, according to the Wentworth classification scale [104]. All stations except two (C-W1 and ME-W2) were described as 'sand' in the Folk classification, with the remaining two stations classified as 'muddy sand' (Folk, 1954).

A separate inshore survey was conducted for the Calder hydrocarbon pipeline (PL1965) and methanol pipeline (PL1966) [31]. Three sediment substrates were encountered along the pipeline route: fine sand, coarse sand and glacial till. Most of the route was dominated by fine sand and glacial till, whereas only one discrete area comprised coarse sand.

The sediment descriptions from the 2022 survey areas are in accordance with those reported from previous surveys in the region, which described sediments as sand to muddy sand [28][29], sandy mud [30] or sand to slightly gravelly sand [34].

4.1.3.2.2 Chemical Composition

The 2022 pre-decommissioning survey analysed the chemistry of sediments at five stations across the EIS infrastructure. The mean Total Organic Matter ('TOM') varied across the survey sites, with the lowest reported in the Dalton R2 Well survey area (0.93%) and the highest mean value reported in the Millom East Wells and PLEM survey area (1.77%) [32]. The mean TOM content across the survey areas was lower than or comparable to previous values reported in the vicinity of the area in 2011 and 2019 [28][29][34]. Total Organic Carbon ('TOC') content reflected the TOM patterns observed. The lowest mean TOC value was recorded at the Dalton R2 Well survey area (0.06%) and the Millom East Wells and PLEM survey area reported the highest mean value (0.13%) [32]. Compared to previous years, the mean TOC content across the survey areas was lower than those recorded in the vicinity of the area in 2011 and 2019 and also lower than the mean values reported for the SEA6 area [28][29][34][26] indicating a reduction in contamination over time.

The total hydrocarbon content ('THC') levels at all survey sites were generally typical of background marine sediments in this region of the Irish Sea. The highest THC levels were observed in the Calder platform and Millom East Wells and PLEM survey areas, consistent with the highest mean fines content observed in these areas. No areas exceeded the concentrations reported for the SEA6 area or the OSPAR ecological effects threshold ('EET') value [32].

Polycyclic aromatic hydrocarbon ('PAH') concentrations were generally low and comparable to historic data in the wider EIS region and were below their respective effects range low ('ERL') values. Like THC, the highest concentrations were reported in the Calder platform survey area. Correlation analysis showed a positive correlation between PAH concentrations and fines content in the sediment, suggesting that the variation observed from the survey was influenced by the variation in sediment composition [32]. When compared to data from previous surveys, PAH concentrations at most stations were found to be lower than previous values reported at the DP3 and DP4 Platforms, Bains Well and at the Ventnor Field and Whitehaven to Rhyl Pipeline [28][29][34] indicating a reduction in contamination over time.

The total metals concentrations in the sediments displayed low to moderate variability for all metals. Across all survey sites, chromium concentrations exceeded their ERL at six station stations and mercury concentrations exceeded their ERL at one station. Historic data from the wider Irish Sea reported similar elevated levels of chromium and mercury, suggesting that the values observed were typical of the Irish Sea. All other metal concentrations (cadmium, lead, nickel, arsenic, zinc and barium) were below their respective ERL values. No evidence of any impacts originating from elevated metals concentrations were observed when macrofaunal communities across the survey area were considered [32].

4.1.3.3 Cuttings Piles

No cuttings piles exist at Calder, Dalton, or Millom. Cuttings are widely dispersed and fall below OSPAR 2006/5 thresholds [86].

4.2 Biological Environment

4.2.1 Habitats and Benthos

The seabed type around the EIS infrastructure is primarily classified under the habitat complex MC52 (Atlantic offshore circalittoral sand). Other habitats that may be found in the area include EUNIS habitat complex MD62 (Atlantic offshore circalittoral mud), MD42 (Atlantic offshore circalittoral mixed sediment) and EUNIS habitat complex MD32 (Atlantic offshore circalittoral coarse sediment) [25].

Based on the sediment types considered in the survey areas, the UK BAP (JNCC, 2019a) Priority Habitat ‘Mud habitats in deep water’, which includes the OSPAR Annex I habitat 'Sea pen and burrowing megafauna communities', and the UK BAP Priority Habitat ‘Subtidal Sand and Gravels’ have the potential to occur in the EIS area. Both habitats are protected within MCZs, as discussed in Section 4.3. A full habitat assessment was carried out across the survey areas to determine whether the OSPAR 'Sea pen and burrowing megafauna communities' habitat was present. The survey identified megafauna burrows throughout the survey areas, whilst mounds were primarily observed in the vicinity of the Calder Platform. No sea pens were observed. Burrows (ranging from 3cm to 15 cm) were recorded along all transects in the survey areas and were ‘frequent’ or ‘abundant’ (based on the; ‘Super-abundant, Abundant, Common, Frequent, Occasional, Rare’ (SACFOR) scale) across the majority of the survey areas. Burrow density was lower in areas where sediment appeared to be sandier (i.e. Dalton R1 Well, Dalton R2 Well and Millom West Platform survey areas) and Norway lobster (*Nephrops norvegicus)* burrows were only observed at two stations within the Millom East Well survey area, which appeared to comprise muddier sediments [33].

The JNCC (2014) habitat guidelines state that the seabed must be ‘heavily bioturbated by burrowing megafauna with burrows and mounds forming a prominent feature of the sediment surface’, while sea pens may or may not be present, for it to be classified as the OSPAR designated habitat ‘Sea pen and burrowing megafauna communities’ [87]. Guidelines also state that the burrows should at least be ‘frequent’ on the SACFOR scale for an area to be classified as a ‘Sea pens and burrowing megafauna community’. Therefore, the densities of burrows and mounds observed suggest that the OSPAR (2010) habitat ‘Sea pens and burrowing megafauna community’ is potentially present in all five EIS survey areas. No other designated or priority habitats of conservation interest were observed [30].

Photographic data analysis as part of the geophysical and habitat assessment survey suggests the EUNIS habitat biotope complex MC521 (Faunal communities of Atlantic circalittoral sand) and EUNIS habitat biotope complex MC621 (Faunal communities of Atlantic circalittoral mud) were observed within the survey areas [33]. The habitat type ‘Faunal communities of Atlantic circalittoral mud’ (MC621) typically occurs in water depths >10 m and in less disturbed areas and are typically characterised by sea pens and/or brittlestars, as well as polychaetes and bivalves. Whereas the habitat type ‘Faunal communities of Atlantic circalittoral sand’ (MC521) comprises sand communities in depths of over 15 -20 m and tends to be more stable than their infralittoral equivalents, supporting more diverse infaunal communities. Areas dominated by sand (< 5% silt/clay) are characterised by a wide range of echinoderms, polychaetes and bivalves. Muddier sands (5% – 20% silt content), are supportive of animal-dominated communities characterised by a wide variety of polychaetes, along with bivalves and echinoderms [22]. Figure 4.2.1 and Figure 4.2.2 presents example photographs of areas that potentially represent the habitat types ‘Faunal communities of Atlantic circalittoral sand’ and ‘Faunal communities of Atlantic circalittoral mud’.

Benthic epifauna and mobile megafauna were generally sparse across the survey areas, however bioturbation was evident across most of the survey areas, indicating a thriving infaunal community. Dominant fauna observed included brittlestars (*Ophiuroidea including Ophiura sp*.), starfish (*Astropecten irregularis* and *Asterias rubens*), anemones (*Anthozoa* including *Metridium senile*, *Hormathiidae*, *Ceriantharia* and *Sagartiidae*) and hermit crabs (*Paguridae*) with associated hydrozoans (*Hydractinia sp.)* and anemones (*Adamsia palliata*). Faunal burrows, mounds and tracks were prominent at the Calder platform and Millom East Wells and PLEM as well as faunal tubes (including Polychaeta) observed along transects at most survey areas [33].

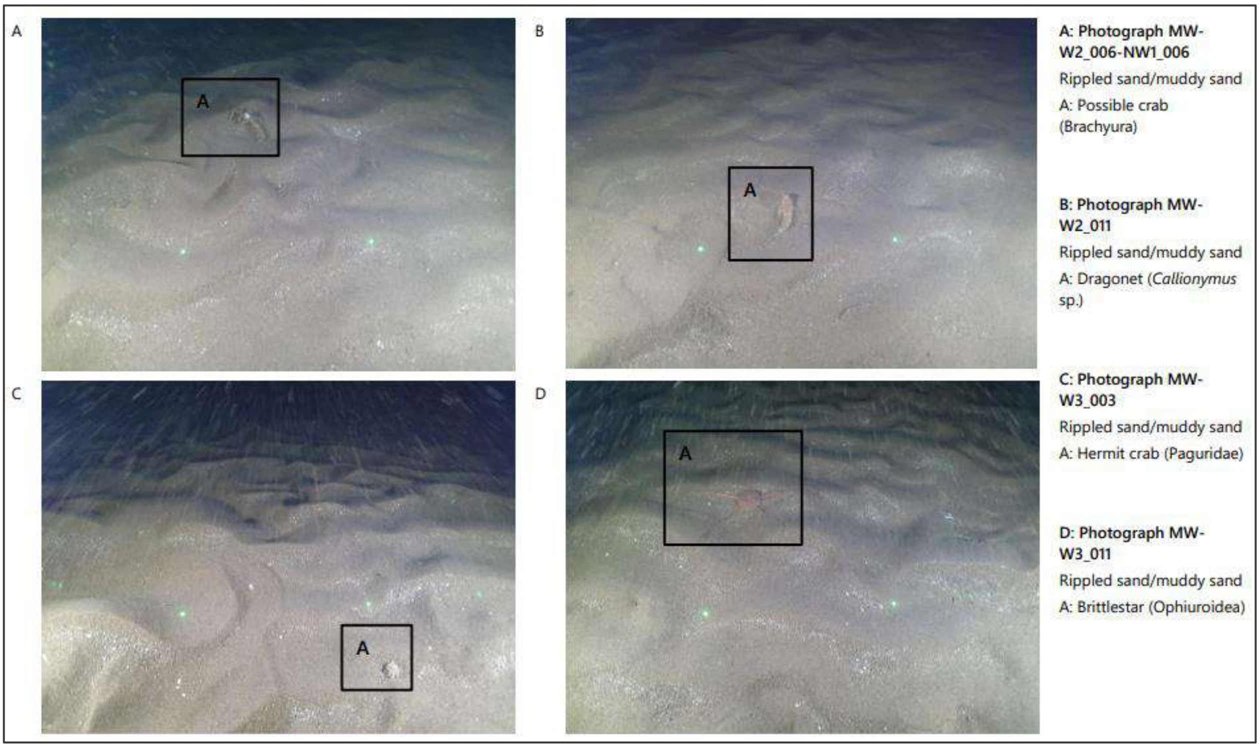


Figure 4.2.1 Faunal communities of Atlantic circalittoral sand (MC521) [33]

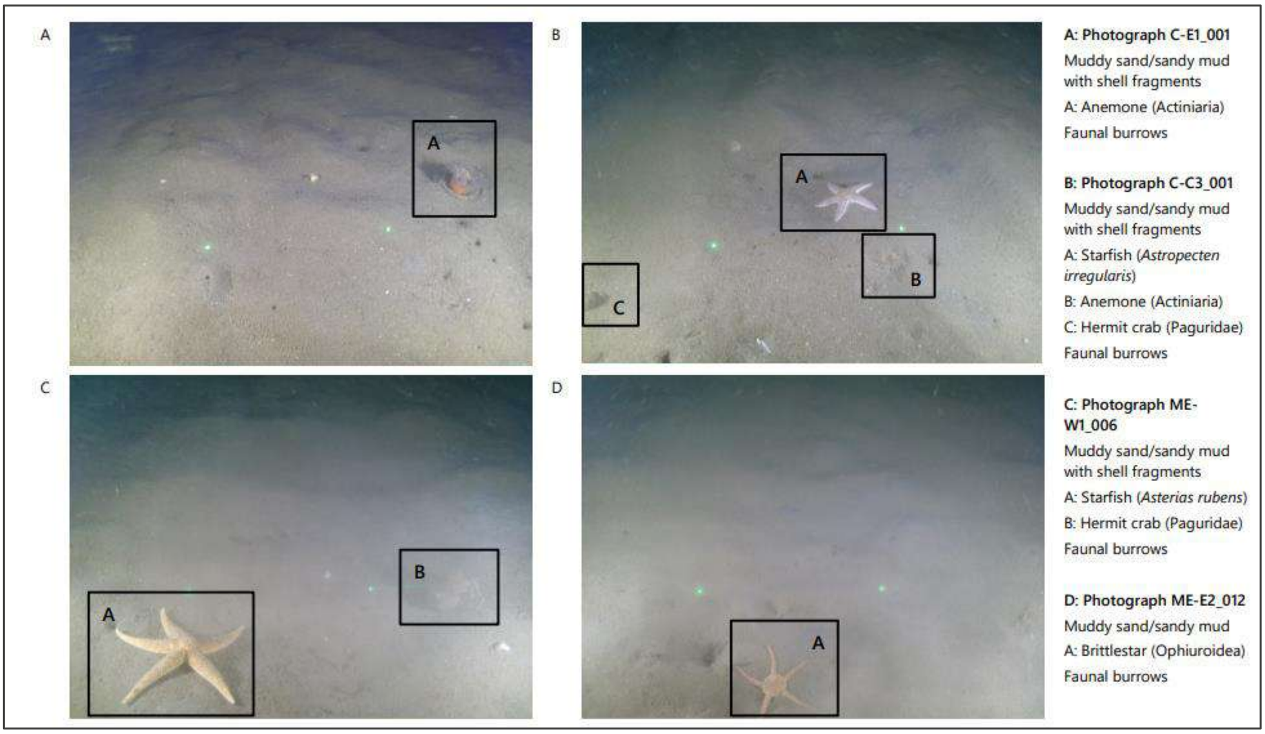


Figure 4.2.2 Faunal communities of Atlantic circalittoral mud (MC621) [33]

A total of 344 taxa and 30,093 individuals were identified from the survey area. Across the Calder Platform survey area, rationalised data comprised 117 benthic taxa, of which 55 (47.0%) were annelids, 28 (23.9%) were arthropods, 24 (20.5%) were molluscs, 4 (3.4%) were echinoderms, and 6 (5.1%) were other phyla (specifically cnidarians, platyhelminths, nemerteans, phoronids, and enteropneusta). A total of 6344 individuals were identified in the rationalised data, of which 2002 (31.6%) were annelids, 420 (6.6%) were arthropods, 2443 (38.5%) were molluscs, 68 (1.1%) were echinoderms, and 1411 (22.2%) were other phyla [32].

The composition of taxa and individuals across all other survey areas indicated a high degree of similarity in macrofaunal community, with annelids being the most diverse taxa followed by arthropods or molluscs. The polychaete *Lagis kpreni* and bivalve *Phaxas pellucidus* dominated the macrofaunal communities across Calder Platform, Dalton R1, Dalton R2, Millom West and Millom East survey areas [32]. The taxa observed across the assets were considered typical for the survey area and like those recorded previously in the surrounding areas.

Benthic biodiversity of the southern Irish Sea from Anglesey to the Celtic Deep was surveyed in 1989 and 1991 [69]. An abundant and diverse polychaete dominated fauna, comparable to that of other deep-water communities, was found at depths below 80m, which included several new species and species previously unrecorded in UK waters. Much of the benthos in the central and southern deeper parts of the Irish Sea is characterised by urchins and bivalves in depths of 40-100m.

To the east of Tremadog Bay (an inlet of Cardigan Bay), the seabed is varied but dominated by current swept coarse cobbles sustaining, in places, minimal epifauna [90]. However, in areas with micro-relief (formed by the presence of cobbles protruding into the current) bivalves were common. Descriptions by [13] in the vicinity of the UK/Irish median line at 53°N include a sand wave field in depths <90m transitioning northwards to coarse sandy sediments at 90m depth. Shell debris, mostly comprising dead horse mussels and tough-shelled bivalves, was apparent in troughs between sand waves [79].

4.2.2 Fish and Shellfish

The EIS infrastructure (including PL1965 and PL1966) is in ICES rectangles 37E6 and 36E6, in an area of spawning and nursery grounds for several commercially important species. Information on spawning and nursery periods for these different species, including peak spawning times (where applicable) are detailed in Table 4.2.1.

Table 4.2.1 Fish sensitivities within ICES rectangles 37E6 and 36E6

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anglerfish	N	N	N	N	N	N	N	N	N	N	N	N
Cod	SN	S*N	S*N	SN	N	N	N	N	N	N	N	N
Haddock	N	N	N	N	N	N	N	N	N	N	N	N
Herring	N	N	N	N	N	N	N	N	N	N	N	N
Lemon Sole	N	N	N	SN	SN	SN	SN	SN	SN	N	N	N
Ling		S	S	S	S							
Mackerel	N	N	N	N	S*N	S*N	S*N	SN	N	N	N	N
Nephrops	SN	SN	SN	S*N	S*N	S*N	SN	SN	SN	SN	SN	SN
Plaice	S*N	S*N	SN	N	N	N	N	N	N	N	N	SN
Sandeels	SN	SN	N	N	N	N	N	N	N	N	SN	SN
Sole	N	SN	S*N	SN	N	N	N	N	N	N	N	N
Spotted ray	N	N	N	N	N	N	N	N	N	N	N	N
Sprat					S*	S*	S	S				
Spurdog	N	N	N	N	N	N	N	N	N	N	N	N
Thornback ray	N	N	N	N	N	N	N	N	N	N	N	N
Tope shark	N	N	N	N	N	N	N	N	N	N	N	N

Table 4.2.1 Fish sensitivities within ICES rectangles 37E6 and 36E6												
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Whiting	N	SN	SN	SN	SN	SN	N	N	N	N	N	N
S = Spawning, N = Nursery, SN = Spawning and Nursery; * = peak spawning; Species = High nursery intensity as per Ellis *et al.*, 2012; Species = High intensity spawning as per Ellis *et al.* (2012); Species = High nursery intensity and high intensity spawning as per Ellis et al., (2012)												

The EIS infrastructure lies within spawning grounds for cod (January to April), ling (Molva molva) (February to May), lemon sole (*Microstomus kitt*) (April to September), mackerel (*Scomber scombrus)* (May to August), nephrops (*Nephrops norvegicus*) (all year), plaice (*Pleuronectes platessa*) (December to March), sandeels (*Ammodytes marinus*) (November to February), sprat (*Sprattus sprattus*) (May to August), sole (*Solea solea)* (March to May) and Whiting (*Merlangius merlangus*) (February to June). The area is an area of high spawning intensity for cod, plaice and sole [11][25].

This area also lies within the nursery grounds for anglerfish (*Lophius piscatorius*), cod, haddock (Melanogrammus aeglefinus), herring (*Clupea harengus),* lemon sole, mackerel, nephrops, plaice, sandeels, sole, spotted ray (*Raja montagui*), spurdog (*Squalus acanthias*), thornback ray (*Raja clavata*), tope shark (*Galeorhinus galeus)* and whiting. The area is an area of high nursery intensity for cod, herring, spurdog and whiting [11][25].

Modelling of predicted spatial distribution of 0-year group fish indicates the presence of juvenile fish for multiple species: anglerfish, blue whiting, European hake, haddock, herring, mackerel, horse mackerel, Norway pout, plaice, sprat, and whiting. Across the project area the probability of juvenile fish aggregations occurring is very low for most species (<0.2), except for sprat and horse mackerel for which the probability is medium [1].

4.2.3 Seabirds

During spring and summer, almost half a million pairs of seabirds including Manx shearwater, gannet, lesser black-backed gull and guillemot breed at locations throughout the Irish Sea region. Coastal and offshore waters are also important for feeding and overwintering seabirds. The estuaries of the region hold internationally important numbers of breeding, wintering and migratory water birds, with the shallow waters of Liverpool and Cardigan Bays supporting large numbers of protected wintering common scoter and red-throated divers.

Seabirds are generally not at risk from routine offshore operations. However, they may be vulnerable to pollution from accidental events, for example from accidental hydrocarbon releases. Of the species commonly present in the Irish Sea area (Manx shearwater, gannet, auk species and sea ducks), the common scoter and divers are the most vulnerable to oil pollution due to a combination of heavy reliance on the marine environment, low breeding output with a long period of immaturity before breeding, the regional presence of a large percentage of the biogeographic population and the fact that they congregate in large concentrations on the sea surface and are flightless due to annual moults [38].

The Seabird Oil Sensitivity Index ('SOSI') [55] [103] identifies regions where seabirds are likely to be most sensitive to oil pollution. It is an updated version of the Oil Vulnerability Index [53] which uses survey data collected between 1995 and 2015 and covers the UKCS and beyond. The SOSI also includes an improved method to calculate a single measure of seabird sensitivity to oil pollution. These data were combined with individual species sensitivity index values and summed at each location to create a single measure of seabird sensitivity to oil pollution [103]. Seabird sensitivity to oil within the area of the EIS infrastructure (Blocks 113/26, 113/27, 110/2 & 110/7) varies considerably throughout the year with it being highest in the months of October to December and January to March, as shown in Table 4.2.2. Along the PL1965 and PL1966 (113/29, 110/3, 110/4, 110/7 & 110/8) sensitivity is variable and generally higher throughout the year compared to the area of installations. SOSI is highest approximately halfway along the pipelines to shore. In the Blocks nearest to the coast (113/29) sensitivity is highest between October and December, January to March and May.

The Liverpool Bay/Bae Lerpwl SPA is 7km to the east of the Calder installation at its the nearest point (Figure 2.2.2) following an extension of the site boundary to incorporate important areas for non-breeding little gull (*Hydrocoloeus minutus*) over the winter period (October to March).

Table 4.2.2 Seabird Oil Sensitivity in EIS Blocks and Surrounding Vicinity

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
113/21	5	4	3	3	5	5	3	3	5	2	2	5
113/22	5	3	3	2	5	5	2	2	4	1	2	3
113/23	5	3	3	1	3	5	2	3	4	1	2	2
113/24	4	2	3	4	2	4	3	4	5	2	2	2
113/25	3	2	3	5	2	3	3	5	4	3	2	2
113/26	5	4	3	5	5	5	5	4	5	2	4	5
113/27	5	3	3	2	5	5	3	3	5	1	2	3
113/28	4	2	3	4	3	5	4	3	5	2	2	2
113/29	1	1	1	5	2	4	4	3	5	2	2	2
113/30	1	1	1	5	2	4	5	4	4	3	1	1
110/1	5	5	4	5	5	5	5	5	3	3	5	5
110/2	4	3	3	4	4	5	4	3	4	2	3	3
110/3	2	2	2	4	3	5	4	3	4	2	2	2
110/4	1	1	1	4	3	4	4	3	4	2	1	2
110/6	5	4	4	5	5	5	5	5	3	4	5	5
110/7	2	3	2	3	5	5	5	4	3	2	3	2
110/8	1	2	2	3	4	4	5	4	4	2	2	2
110/9	1	1	1	3	4	4	5	3	4	3	1	1
110/11	2	2	3	1	5	4	4	5	2	2	2	2
110/12	1	1	1	1	5	4	5	4	4	3	1	2
110/13	1	1	1	1	5	4	5	4	2*	2	1	2
110/14	1	1	1	2	4	4	5	3	4	2	1	1
Key	1 = Extremely high		2 = Very high		3 = High		4 = Medium		5 = Low		N = No data	

4.2.4 Marine Mammals

4.2.4.1 Cetaceans

The distribution of cetacean species in UK waters has been compiled in the Atlas of Cetacean Distribution on North-West European Waters [92]. The data suggest that harbour porpoise, bottlenose dolphin, minke whale and white-beaked dolphin occur in the EIS at relatively low densities, with harbour porpoise being the most common species.

A series of Small Cetacean Abundance in the North Sea ('SCANS') surveys have been conducted to obtain an estimate of cetacean abundance in North Sea and adjacent waters, the most recent of which is SCANS-IV. Aerial and shipboard surveys were carried out during the summer of 2022 [41]. The Joint Nature Conservation Committee ('JNCC') have published the 'regional' population estimates for the most common species of cetacean occurring in UK waters [51]. Divided into local management units ('MUs'), these provide an indication of the spatial scale and the relevant populations at which potential impacts should be assessed.

The harbour porpoise (*Phocoena phocoena*) is a small, highly mobile species of cetacean that is the most commonly occurring cetacean in UK waters. They are listed as PMFs (Scotland), EPS are covered by OSPAR and the UKBAP and are listed on the IUCN Global Red List as species of lower risk. Harbour porpoise are frequently found throughout UK waters. They are common throughout the year within the vicinity of the EIS in low densities [92]. The density of harbour porpoise in the project area is estimated to be 0.5153 animals/km^2 [41].

Bottlenose dolphins (*Tursiops truncatus*) are social animals, commonly forming groups of 2-25, but occasionally numbering several tens or low hundreds of animals. Larger schools tend to occur in deeper waters, where in some parts of the world distinct offshore forms have been recognised. Bottlenose dolphins have been recorded within UK waters between July and October (with a secondary peak in some localities in March-April), although some animals are present near-shore in every month of the year. Bottlenose dolphins are found within the EIS in relatively low densities of 0.0104 animals/km2 [41].

White-beaked dolphins (*Lagenorhynchus albirostris)* are usually found in water depths of between 50 and 100m in groups of around 10 individuals, though groups of up to 500 animals have been seen. They are present in the UK waters throughout the year, however more sightings have been made between June and October. White-beaked dolphins are found within the EIS in relatively low densities [92].

Minke whale (*Balaenoptera acutorostrata*) were observed to the north-west of the project area during the SCANS-IV surveys at a density of 0.0088 animals/km^2[41]. Minke whale is also an EPS and is covered by the UK BAP.

All cetacean species in UK waters are classified as EPS. As such it is an offence to deliberately kill, capture, or disturb an EPS, or to damage or destroy the breeding site or resting place of such an animal.

4.2.4.2 Pinnipeds

Two species of pinnipeds are found within UK waters, grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*). Both species are listed under Annex II of the EU Habitats Directive and are listed as PMFs and EPS. Seals are protected in the UK under the Conservation of Seals Act 1970 and in Scotland under the Marine (Scotland) Act 2010 and are listed on the IUCN Global Red List as species of lower risk.

Grey seals and harbour seals are not expected to be present in significant numbers within the project area. Harbour seals are unlikely to occur in the area. Given the proximity to grey seal haul-out sites at South Walney Nature Reserve (Barrow in Furness) at Hilbre Island in the Dee Estuary and at sites within the Solway Firth, grey seals be present in the project area at low densities ranging between 5 and 10 individuals per 25 km (Figure 4.2.3) [97]. Haul-out sites can be particularly large during the Autumn and Winter (September to December) during the pupping season.

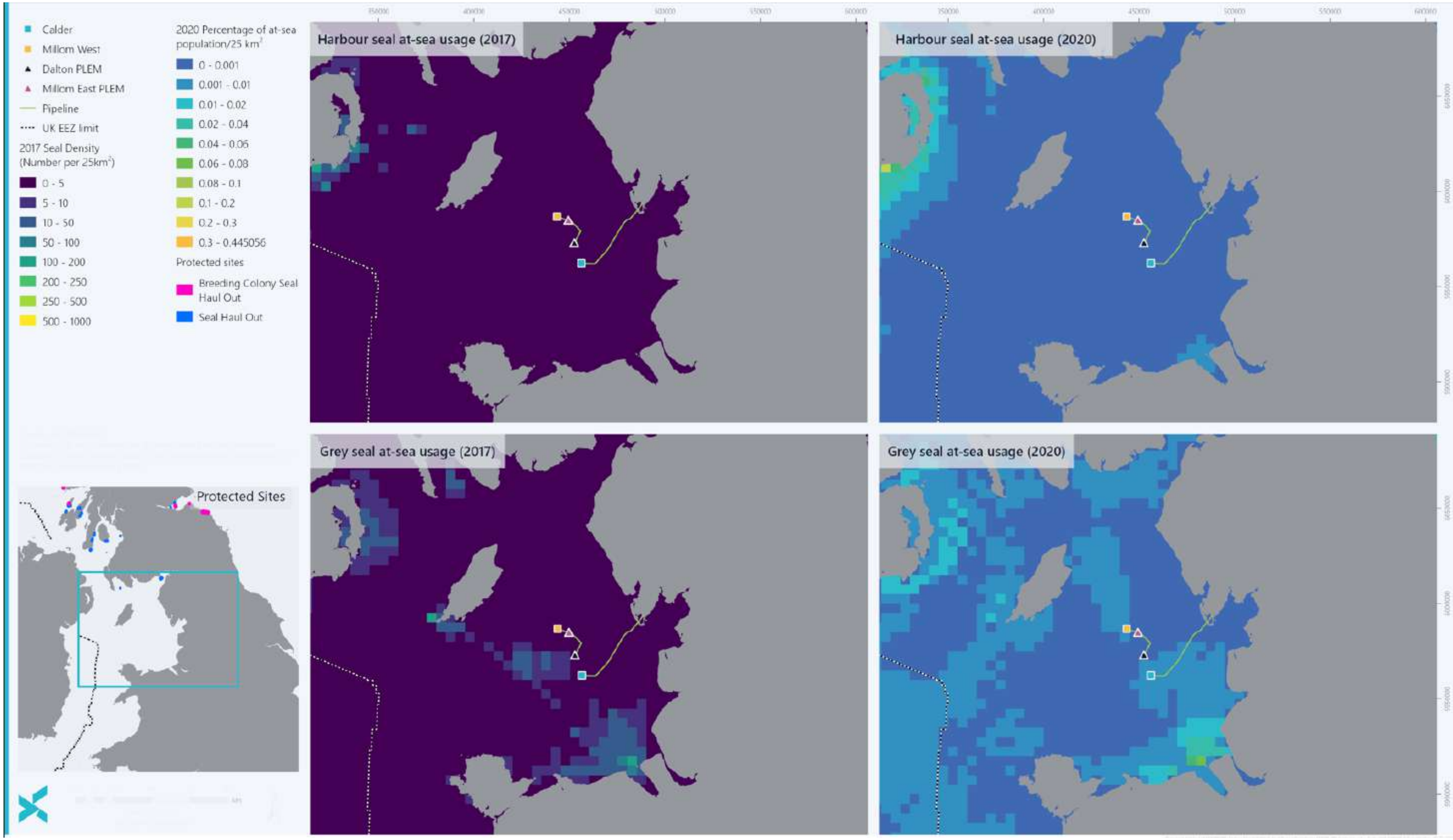


Figure 4.2.3 At sea usage data for Harbour and Grey Seal within the project area

4.3 Conservation

Sites of conservation importance located within the vicinity of the EIS infrastructure and associated pipelines are shown in Figure 2.2.2. Sites for which potential interaction (within 40 km of the infrastructure) have been identified are described in Table 4.3.1, along with those within 40 km of the infrastructure. The Qualifying Features and the Conservation Objectives for each site are also outlined in Table 4.3.1.

Table 4.3.1 Conservation sites within 40 km of the EIS infrastructure

Offshore protected area	Closest to (Calder/Dalton/Millom)	Approximate distance (km)	Features of concern and Conservation Objectives
Liverpool Bay/Bae Lerpwl (SPA)	Calder	7	Liverpool Bay / Bae Lerpwl SPA is in the east of the Irish Sea, bordering the coastlines of north-west England and north Wales. The boundary of Liverpool Bay / Bae Lerpwl SPA extends beyond 12 nm and therefore lies partly in Welsh and English territorial waters and partly in offshore waters; hence it is a site for which Natural England, Natural Resources Wales, and JNCC have responsibility to provide statutory advice. It is classified for the protection of red-throated diver (*Gavia stellata*), common scoter (*Melanitta nigra*), and little gull (*Hydrocoloeus minutus*) in the non-breeding season; common tern (*Sterna hirundo*) and little tern (*Sterna albifrons*) in the breeding season, and an internationally important waterbird assemblage The Conservation Objectives for the protected features of the SPA are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and, • The distribution of the qualifying features within the site [60].
West of Copeland (MCZ)	Millom West	7	The West of Copeland MCZ is in the eastern region of the Irish Sea and covers an area of 158 km^2. The protected features include *Subtidal sand* and *Subtidal coarse sediment*, with areas of *Subtidal mixed sediments* in the north-eastern section of the MCZ, which support an array of species. The Conservation Objectives for the West of Copeland MCZ are in place to ensure that:

			• The protected features already in favourable condition, remain in such condition; and • The protected features not already in favourable condition, be brought into such condition, and remain in such condition. With respect to *Subtidal coarse sediment, Subtidal sand* and *Subtidal mixed sediments* within the Zone, favourable condition means that: • Its extent is stable or increasing; and • Its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating [61].
West of Walney (MCZ)	Millom West	10	West of Walney is a site in the Irish Sea, off the coast of Cumbria and to the west of Walney Island. The site covers around 388 km^2, most of which is in inshore waters, but with a small section crossing the 12nm boundary into offshore waters. The Qualifying Features include *subtidal sand*, *subtidal mud* and *sea-pen and burrowing megafauna communities* [17]. The Conservation Objectives for the West of Walney MCZ are in place to ensure that: • The protected features already in favourable condition, remain in such condition; and • The protected features not already in favourable condition, be brought into such condition, and remain in such condition. With respect to *subtidal sand*, *subtidal mud* and *sea-pen and burrowing megafauna communities* within the Zone, favourable condition means that: • Its extent is stable or increasing; and • Its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating [61].
Fylde (MCZ)	Calder	20	Fylde MCZ is in Liverpool Bay, lying between 3 and 20 km off the Fylde coast and Ribble estuary. The MCZ protects an area of approximately 260 km^2. Fylde MCZ is located next to Shell Flat sandbank, part of the Shell Flat and Lune Deep SAC and offers protection to other rich areas of seabed outside of the SAC. Qualifying Features include S*ubtidal sands* and *subtidal muds*.

			The Conservation Objectives for the Flyde MCZ are in place to ensure that: • The protected features already in favourable condition, remain in such condition; and • The protected features not already in favourable condition, be brought into such condition, and remain in such condition. With respect to Subtidal sand and Subtidal muds within the Zone, favourable condition means that: • Its extent is stable or increasing; and • Its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating [37].
Shell Flat and Lune Deep (SAC)	Calder	21	Shell Flat and Lune Deep SAC is located between 3 and 20 km off the Lancashire Coast, at the mouth of Morecambe Bay. Qualifying Features include *Sandbanks which are slightly covered by sea water all the time* and *Reefs* [58]. The Shell Flat and Lune Deep SAC also features Annex I reef habitat. Annex I reef habitats are defined as 'submarine, or exposed at low tide, rocky substrates and biogenic concretions'. These reefs generally support a zonation of benthic communities of algae and animal species including concretions, encrustations and corallogenic concretions [24]. The UK has interpreted this habitat further to include bedrock, boulders and cobbles (generally >64 mm in diameter), including those composed of soft rock, e.g. chalk. The reef habitat present in the Lune Deep component area represents a good example of boulder and bedrock reef, with the largest proportions of rock found along the unique kettle hole feature known as Lune Deep [58] [62]. The northern edges of Lune Deep are characterised by heavily silted cobble and boulder slopes, subject to strong tidal currents with a dense hydroid and bryozoan turf. Data from a 2004 survey showed that the northern flanks of Lune Deep are composed of exposed bedrock with a rugged seabed physiography [58] [56]. With regard to the SAC and the natural habitats and/or species for which the site has been designated and subject to natural change the Conservation Objectives are to; • Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status ('FCS') of its Qualifying Features, by maintaining or restoring; ○ The extent and distribution of qualifying natural habitats; ○ The structure and function (including typical species) of qualifying natural habitats; and,

			○ The supporting processes on which the qualifying natural habitats rely [58].
Morecambe Bay and Duddon Estuary (SPA)	Dalton	28	Spanning almost 669 km^2, the SPA extends between Rossall Point in Lancashire and Drigg Dunes in Cumbria. The site is designated due to its importance in supporting both a number of non-breeding and breeding bird species as well as supporting an internationally important waterbird assemblage and seabird assemblages [36]. The Conservation Objectives for the protected features of the SPA are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and, • The distribution of the qualifying features within the site [36].
Morecambe Bay (SAC)	Dalton	37	Morecambe Bay is a large, very shallow, predominantly sandy bay at the confluence of four principal estuaries, the Leven, Kent, Lune and Wyre. The Qualifying Features include Estuaries, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, perennial vegetation of stony banks, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows, shifting dunes along the shoreline with *Ammophila arenaria,* fixed dunes with herbaceous vegetation, humid dune slacks. The SAC is also home to a number of Annex I habitats including sandbanks which are slightly covered by sea water all the time, coastal lagoons, reefs, embryonic shifting dunes, Atlantic decalcified fixed dunes and dunes with Salix repens ssp. Argentea. The site also supports the Annex II protected species, the great crested newt (*Triturus cristatus*)[59]. With regard to the SAC and the natural habitats and/or species for which the site has been designated and subject to natural change the Conservation Objectives are to; • Ensure the integrity of the site is maintained or restored as appropriate, and ensure the site contributes to achieving the FCS of its Qualifying Features, by maintaining or restoring; ○ The extent and distribution of qualifying natural habitats; ○ The structure and function (including typical species) of qualifying natural habitats; and, ○ The supporting processes on which the qualifying natural habitats rely.

Ribble and Alt Estuaries (SPA)	Calder	39	The Ribble and Alt Estuaries SPA lies on the coast of Lancashire and Sefton in northwest England. The SPA overlaps the Ribble Estuary site of special scientific interest ('SSSI') and Sefton Coast SSSI. The site consists of extensive areas of sandflats and mudflats, as well as large areas of saltmarsh, particularly in the Ribble. There are also areas of coastal grazing marsh. The site supports many species of breeding, wintering and passaging bird. The site also the site supports waterbird assemblages and seabird assemblages. The Conservation Objectives for the protected features of the SPA are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and, • The distribution of the qualifying features within the site [76].
Wyre-Lune (MCZ)	Calder	40	Wyre-Lune MCZ is an inshore site that covers an area of approximately 92 km². It is in the south of Morecambe Bay. Estuaries such as the Wyre and Lune therefore provide critical habitats required to complete smelt (Qualifying Objective) lifecycles, including for feeding and post-larval development The Conservation Objectives for the Wyre-Lune MCZ, in relation to smelt are in place to ensure that: • The protected features already in favourable condition, remain in such condition; and • The protected features not already in favourable condition, be brought into such condition, and remain in such condition. With respect to smelt within the Zone, favourable condition means that: • with respect to a spawning habitat within the Zone, means that the habitat is of sufficient quality and quantity to enable members of the species using the habitat to survive, aggregate, nest, lay or fertilise eggs during breeding; and; and • with respect to the population of that species within the Zone, means that the composition of that population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive [39].

4.4 Socio-economic Environment

4.4.1 Commercial Fisheries

The EIS infrastructure (including PL1965 and PL1966) is in ICES rectangles 37E6 and 36E6. These ICES rectangles are predominantly targeted for demersal and shellfish species. However, the value of landed shellfish far exceeds that of demersal species, with shellfish fisheries landing 83% of the total value and 70% of the total weight of fish landed in ICES 37E6, and 82% of the total value and 94% of the total weight of fish landed in ICES 36E6 within 2020 (Table 4.4.1). Pelagic species values are negligible, accounting for <0.01% of the average landings value for each year from 2016 to 2020 [74].

The five top landed species in ICES 37E6 in 2020 in terms of weight included Norway lobster, razor clam, crabs, whelks and plaice, and within ICES 36E6 the top five were queen scallops, whelks, scallops, sole and thornback ray. However, the contribution of both rectangles to total UK landings is relatively low, with 37E6 averaging 0.08% of the total UK value and 0.19% of the total weight, and 36E6 averaging 0.24% of the total UK value and 0.22% of the total weight in 2020 [74].

Fishing activity is predominantly concentrated to the south, west and north of the installations with >100,000kWh being recorded in several areas. However, to the east and in the immediate vicinity of both the installations and along PL1965 and PL1966, fishing activity is low with some areas having no data recorded (Figure 4.4.1, Figure 4.4.2 and Figure 4.4.3).

Trawls were the most utilised gear in both ICES rectangles, with otter and beam being the favoured trawling methods. Other gear types utilised include traps and dredges. In coastal areas such as Morecambe Bay, benthos including cockles are harvested from intertidal mud and sandflats. Mussels are also cultivated in Morecambe Bay and along the North Wales coast [2], and designated shellfish waters are in place in key areas to manage water quality.

Both ICES rectangles cover large areas including coastal waters and therefore summary statistics for the rectangles may not accurately represent fishing activity around the EIS infrastructure. The distribution of fishing effort within the area for all gear types is illustrated in Figure 4.4.4. The maps show fishing vessels of 15m or more in length, which must carry an Automatic Identification System (AIS).

Table 4.4.1 Commercial fisheries landings in ICES Rectangles 37E6 and 36E6 in 2016 – 2020 [74]

ICES Rectangle	Fisheries type	2016		2017		2018		2019		2020	
		Landed weight (Te)	Value (£)	Landed weight (Te)	Value (£)	Landed weight (Te)	Value (£)	Landed weight (Te)	Value (£)	Landed weight (Te)	Value (£)
37E6	Demersal	126.68	138,148.13	119.58	195,016.21	149.46	197,192.75	147.75	192,568.12	114.80	190,013.46
	Pelagic	0.04	5.00	0.04	47.54	0.00	3.23	0.01	0.00	0.05	52.25
	Shellfish	408.65	924,701.32	478.13	1,586,437.90	321.23	1,373,303.94	330.31	1,657,564.54	266.15	923,714.48
	Total	**535.37**	**1,062,854.5**	**597.75**	**1,781,501.7**	**470.69**	**1,570,499.9**	**478.07**	**1,850,132.7**	**381**	**1,113,780.2**
36E6	Demersal	61.93	69,369.53	38.03	62,392.86	25.60	65,669.70	24.30	82,591.90	66.13	299,751.74
	Pelagic	0.02	35.40	0.02	44.63	0.16	196.72	-	-	0.08	18.33
	Shellfish	4,020.70	3,286,809.90	1,517.71	2,009,287.55	1,269.18	1,965,754.30	1,490.09	2,209,012.61	1,012.40	1,381,290.75
	Total	**4,082.65**	**3,356,214.83**	**1,555.76**	**2,071,725.04**	**1,294.94**	**2,031,620.72**	**1,514.39**	**2,291,604.51**	**1,078.61**	**1,681,060.82**

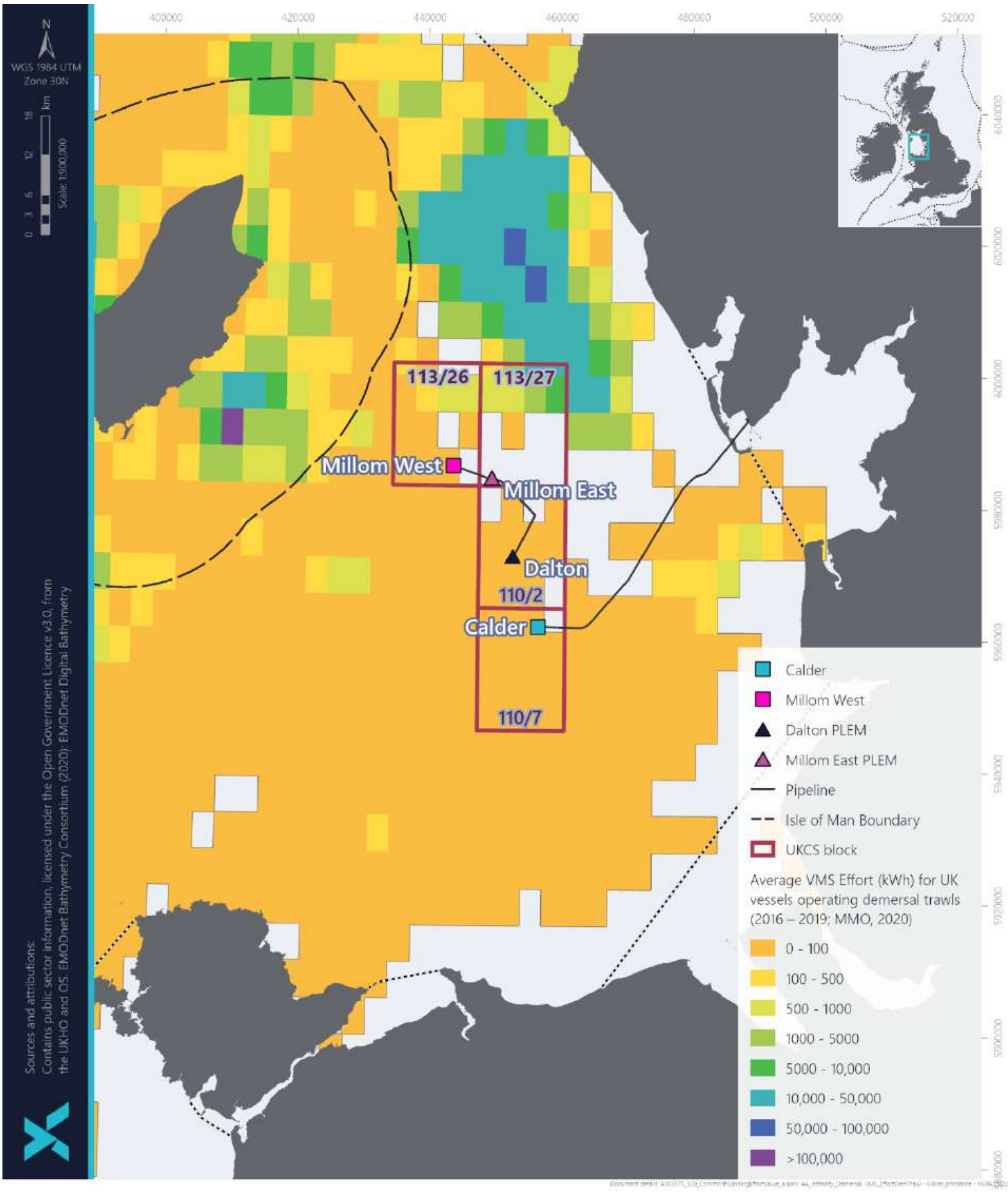


Figure 4.4.1 Average demersal fishing effort for UK Vessels within Project Area

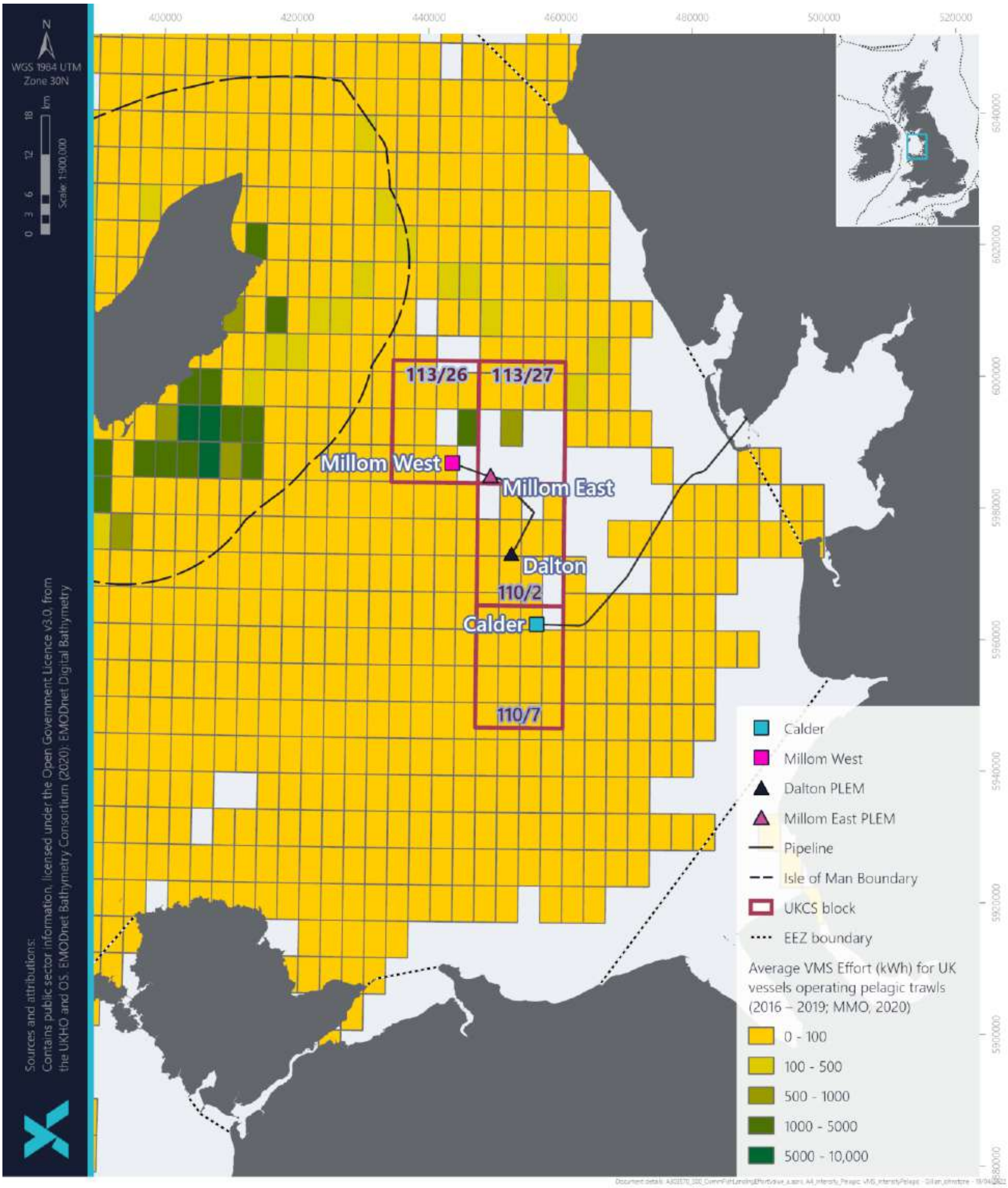


Figure 4.4.2 Average pelagic fishing effort for UK Vessels within Project Area

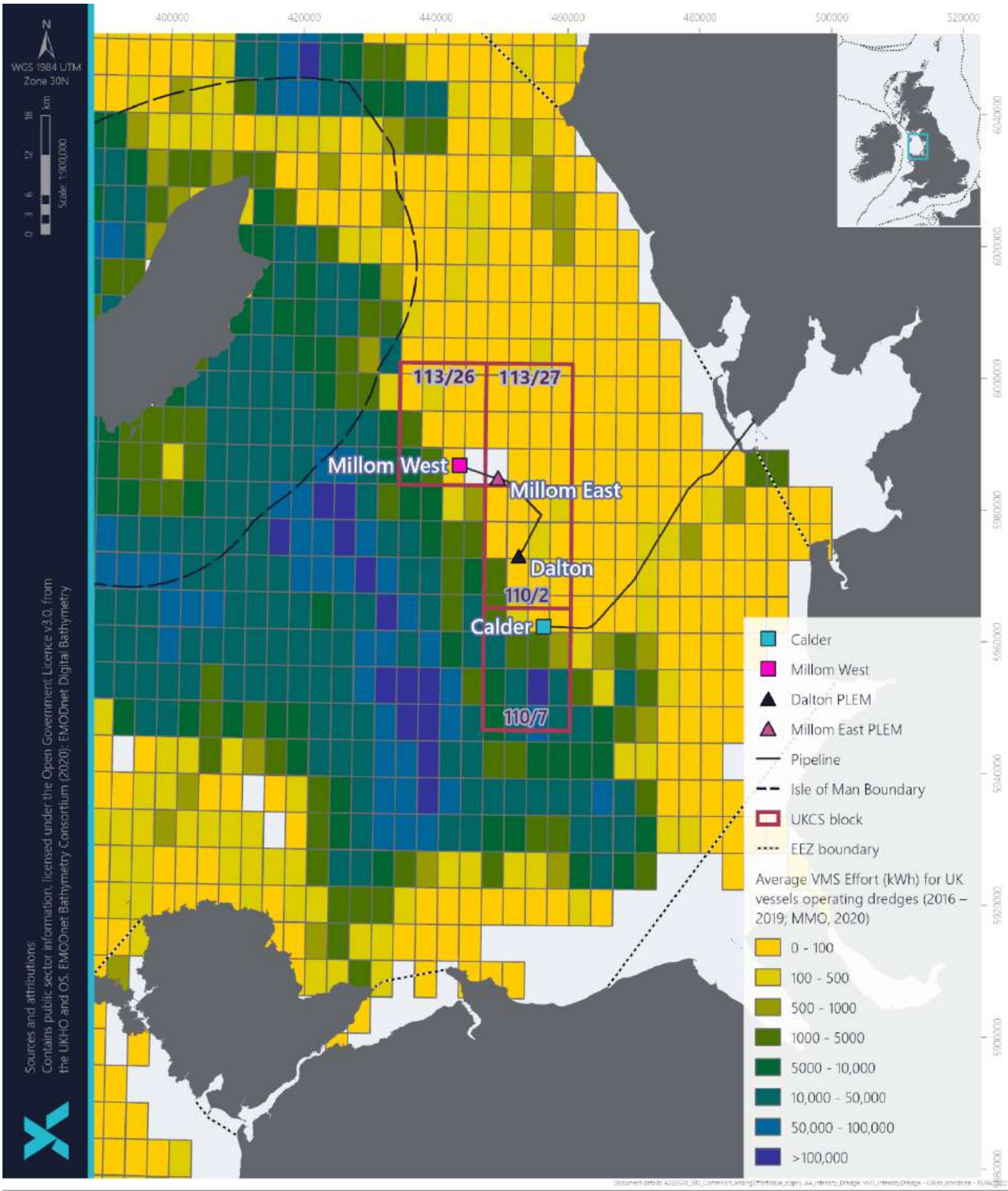


Figure 4.4.3 Average vessels operating dredges within the project area

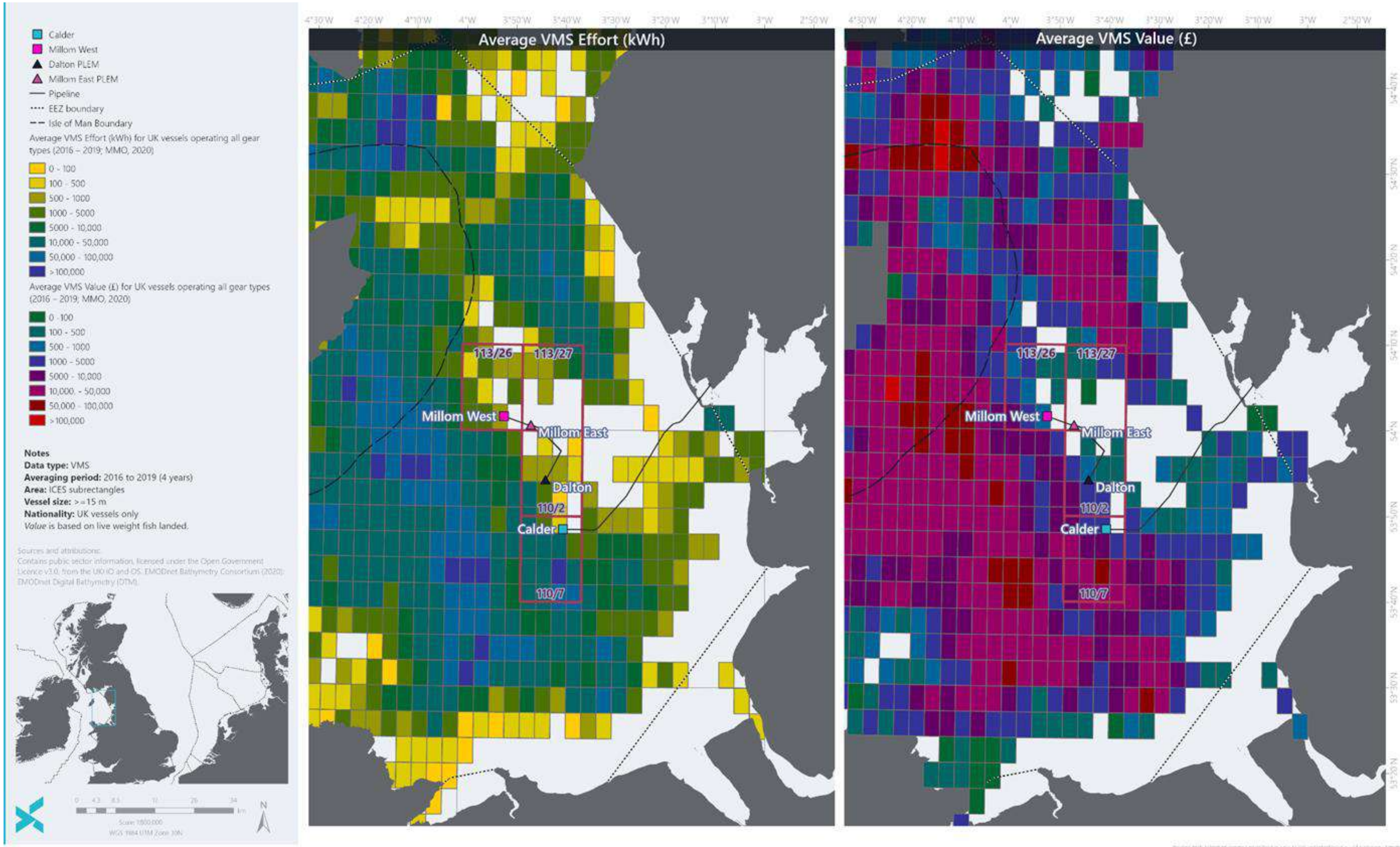


Figure 4.4.4 Average effort and value (all gear types) within the project area

4.4.2 Shipping

The density of shipping traffic in the EIA area is assessed as moderate (1,000 – 5,000 vessels per annum) with more nearshore areas being assessed as low density (<1,000 vessels per annum). due to the presence of fishing vessels, ferries between the UK and the Isle of Man and Ireland and cargo and offshore support vessels [15]. Shipping activity within Blocks 110/2, 110/3, 110/4, 110/7, 113/26 and 113/27 and 113/29 is high with Block 110/8 moderate. No data is available for Block 113/29 [80].

4.4.3 Other Sea Users

The EIS infrastructure is located within an area of extensive oil and gas development. Oil and gas installations located within 40 km of the EIS infrastructure are provided in Table 4.4.2.

Table 4.4.2 Oil and gas installations within the vicinity of the EIS infrastructure

Name	Operator	Distance / direction
South Morecambe DP3	Spirit Energy	7 km NEE (Calder)
DP6 Platform	Harbour	7 km NNE (Calder)
Central Production Platform CPP1	Harbour	7 km NE (Calder)
DP8 Platform	Harbour	10 km NNE (Calder)
DP 4 Platform	Harbour	10 km NE (Calder)
North Morecambe Platform	Spirit Energy	15 km SEE (Millom)
OSI FPSO	ENI	16 km SE (Calder)
Conwy Platform	Tailwind	20 km S (Calder)
Hamilton North	ENI	22 km SEE (Calder)
Hamilton	ENI	30 km SE (Calder)
Douglas DP	ENI	31 km SSE (Calder)
Lennox	ENI	37 km SEE (Calder)

In addition to fishing, oil and gas production, and shipping, the EIS is host to several other marine industries and activities. These include offshore wind farm development; marine aggregate extraction; submarine power and communication cables; and military exercise areas. The locations of these activities and related infrastructure within the EIS are illustrated in Figure 4.4.5.

There are several cables running close to the EIS project area. The closest being the HIBERNIA ATLANTIC telecommunication cable (active) running <1 km from the Calder Installation. The LANIS 1 telecommunications (active) also runs close to the Calder installation (3km) and the IOM/UK INTERCONNECTOR power cable (active) runs 2 km southeast of the Millom West installation [77]. PL1965 and PL1966 do not cross any third-party telecom cables, however, they do cross the IOM/UK INTERCONNECTOR power cable (active).

Blocks 110/2, 110/3, 110/4, 110/7, 110/8, 113/26, 113/27 and 113/29 are of concern to the MoD as they lie within training ranges [78]. Army exercises occur throughout the southern part of SEA 6, which includes the Blocks of Interest.

There are seven non-dangerous wrecks within 20 km of the EIS infrastructure. There is a single dangerous wreck (Ben Rein) 2 km east of Millom West and there are 3 dangerous wrecks south of the Calder: Ben Cruachan (9 km), Residu (10 km) and Kilcoan (15 km). There are no designated historical wrecks recorded in the area [102].

The following windfarm areas (closest edge) also 3 sites located near the EIS area that are currently registered as ‘Preferred Projects’ within Round 4 of the ‘Offshore Wind Leasing Round’, these are Project 4, 5 and 6. Calder lies within the proposed site of Project 5 and Millom West is situated <1 km north of the proposed site for Project 6.

The PL1965 and PL1966 pipelines pass 1 km to the east of the West of Duddon Sands wind farm, directly adjacent to the Barrow wind farm and are also located within the proposed Project 5 site location for approximately 10 km of their length.

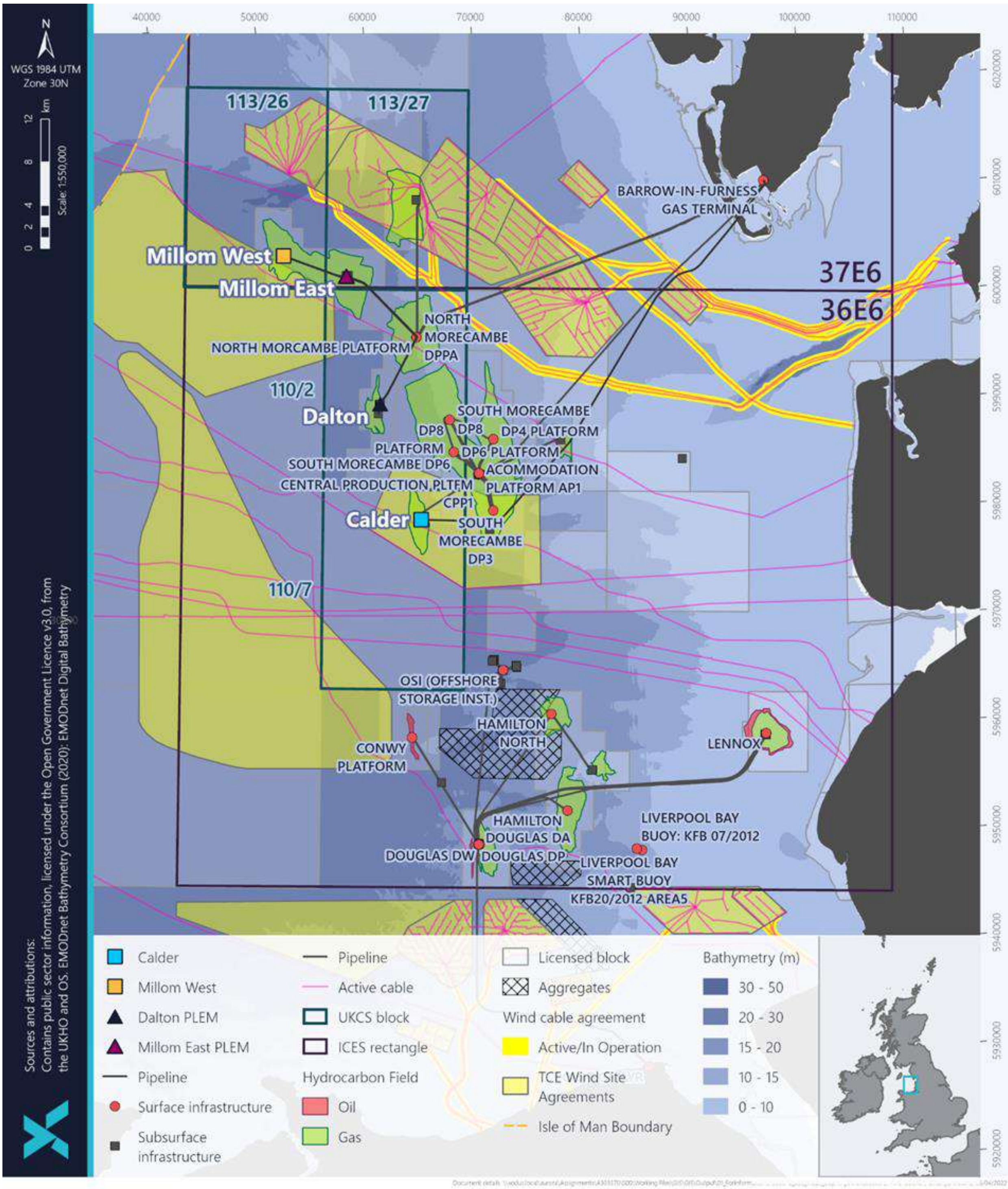


Figure 4.4.5 Map of other sea users around the EIS project area

4.5 National Marine Plan

In addition to adhering to the suite of marine policies, regulations, and guidance for the offshore oil and gas industry, this project considers the objectives set by the National Marine Plan ('NMP'). The NMP has been developed for inshore and offshore waters around the UK. The NMP was also introduced to help ensure the sustainable development of marine area through informing and guiding regulation, management, use and protection of the Marine Plan areas.

The EIS area is located within the Northwest Offshore Marine Plan area and close to the Northwest Inshore Marine Plan area [46]. The Marine Plan associated with these areas aims to provide a clear spatial approach to the Northwest areas, as well as the Southeast, Southwest and Northeast. The North West Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan areas.

The proposed operations described in this EA have been assessed against the Marine Plan's policies and objectives (as detailed below). Assessment of compliance against relevant policies has already been achieved through the ENVID process. The proposed operations do not contradict any of the marine plan objectives and policies. Harbour will ensure they comply with any new policies that have been introduced, with particular attention being made to the following existing policies.

NW-AIR-1 Air Quality and Emissions

Proposals must assess their direct and indirect impacts upon local air quality and emissions of greenhouse gases. Proposals that are likely to result in increased air pollution or increased emissions of greenhouse gases must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - air pollution and/or greenhouse gas emissions in line with current national and local air quality objectives and legal requirements.

Harbour will ensure that the minimal number of vessels will be deployed and the streamlining of activities through planning to reduce the time required for vessels to undertake these activities and, in doing so, will support the drive to reduce emissions. Each vessel will have a SEEMP which contains information on minimising fuel consumptions.

NW-BIO-1 Biodiversity protection

Proposals that enhance the distribution of priority habitats and priority species will be supported. Proposals that may have significant adverse impacts on the distribution of priority habitats and priority species must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant d) compensate for significant adverse impacts that cannot be mitigated.

Legal requirements will be adhered to throughout the duration of the project, including those relating to the protected species which may be present within the project area. There are a number of PMFs expected within the project area however the proposed operations will not result in significant impact on their national status. As previously mentioned, decommissioning of the EIS area will result in the removal of infrastructure, the recovery of debris and the cessation of produced water discharges, all of which will enhance the local marine environment in the longer term.

NW-CC-3 Climate change

Proposals in the northwest marine plan areas, and adjacent marine plan areas, that are likely to have significant adverse impact on coastal change, or on climate change adaptation measures inside and outside of the project areas, should only be supported if they can demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant.

Harbour will ensure that the minimal number of vessels will be deployed and the streamlining of activities through planning to reduce the time required for vessels to undertake these activities and, in doing so, will support the drive to reduce emissions. Each vessel will have a Shipboard Energy Efficiency Management Plan ('SEEMP') which contains information on minimising fuel consumptions.

NW-CE-1 Cumulative impacts

Proposals must consider cross-border impacts throughout the lifetime of the platform. Proposals that impact upon one or more marine plan areas or terrestrial environments must show evidence of the relevant public authorities (including other countries) being consulted and responses considered.

In terms of air and water quality, Harbour's approach and project-specific mitigation measures will minimise the potential negative aspects contributing towards cumulative impacts as detailed in the responses to NW-AIR-1 and NW-WQ-1. In terms of seabed disturbance, it is reasonable to presume that the proposed operations are not of significant magnitude to have any discernible contribution to cumulative impacts in the broader context though this presumption is qualified in Section 5.2.3.

NW-CO-1 Co-existence

Proposals that optimise the use of space and incorporate opportunities for co-existence and co-operation with existing activities will be supported. Co-existence NW-CO-1 Proposals that may have significant adverse impacts on, or displace, existing activities must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant.

Potential impacts to other users of the sea during execution will be managed through existing safety zones, UK Hydrographic Office ('UKHO') standard communication channels (including Kingfisher, Notice to Mariners and radio navigation warnings) and the use of AIS as well as other navigational controls. Upon completion of the operations, the area of sea from which other users of the sea have been excluded throughout the operational phase of the project area will be made available for them once again.

NW-DIST-1 Disturbance

Proposals that may have significant adverse impacts on highly mobile species through disturbance or displacement must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant.

Harbour will ensure that any potential impacts associated with the decommissioning of the EIS area on highly mobile species through disturbance or displacement are kept to a minimum. Mobile epifauna was sparse across the survey areas and no ocean quahog (*Arctica Islandica)* was identified during the most recent environmental survey of the EIS area [32][33].

NW-FISH-2 Fishing

Proposals that enhance access for fishing activities should be supported. Proposals that may have significant adverse impacts on access for fishing activities must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant. If it is not possible to mitigate significant adverse impacts, proposals should state the case for proceeding.

Decommissioning of the EIS area will result in a positive impact by opening up new fishing grounds previously unavailable due to the 500 m safety exclusion zones currently imposed around the Calder and Millom West installations, therefore enhancing access for fishing activities.

NW-INF-1 Infrastructure

Proposals for appropriate marine infrastructure which facilitates land-based activities, or land-based infrastructure which facilitates marine activities (including the diversification or regeneration of sustainable marine industries), should be supported.

Harbour intend to maximise the reuse and recycling of materials that are returned to shore. Harbour will identify an appropriately authorised disposal company and fit for purpose yard through a selection process that will ensure that the chosen facility demonstrates a proven track record of waste stream management throughout the deconstruction process, the ability to deliver innovative reuse / recycling options.

NW-MPA-1 Marine Protected Areas

Proposals that support the objectives of marine protected areas and the ecological coherence of the marine protected area network will be supported. Proposals that may have adverse impacts on the objectives of marine protected areas must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts, with due regard given to statutory advice on an ecologically coherent network.

Legal requirements will be adhered to throughout the duration of the project, including those relating to the protected species which may be present within the project area. As some of the decommissioning activities will be carried out in the Morecambe Bay and Duddon Estuary SPA, which is designated for the protection of a number of non-breeding and breeding bird species as well as supporting an internationally important waterbird assemblage and seabird assemblages. Harbour have implemented an internal team to discuss all aspects of bird management applicable to decommissioning operations to minimise impacts where possible as outlined by the mitigation measures in Section 5.4.4. As previously mentioned, decommissioning of the EIS area will result in the removal of infrastructure, the recovery of debris and the cessation of produced water discharges, all of which will enhance the local marine environment in the longer term.

NW-UN-2 Underwater Noise

Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts on highly mobile species so they are no longer significant. If it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding.

Harbour will minimise any potential noise associated with the EIS decommissioning activities. Vessel noise and cutting activities will be the only noise generating activities, which will be minimised and carried out in isolation where possible. Therefore, the decommissioning of the EIS infrastructure should not contribute any adverse impacts on highly mobile species.

NW-WQ-1 Water Quality

Proposals that protect, enhance and restore water quality will be supported. Proposals that cause deterioration of water quality must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - deterioration of water quality in the marine environment.

Harbour Therefore, any residual discharges during decommissioning activities will be negligible and managed/risk assessed under the existing permitting regime. Discharges from vessels are typically well-controlled activities that are regulated through vessel and machinery design, management and operation procedures. Controls will be in place, as required, through compliance with the Offshore Chemical Regulations and the Oil Pollution Prevention and Control Regulations.

5 Impact Assessment

5.1 Impact identification outcome

Table 5.1.1 summarises the findings of the impact identification workshop, providing justification for the inclusion and exclusion of impact mechanisms. More information regarding industry standard and project-specific mitigation and controls can be found in the ENVID tables in Appendix D: ENVID[3].

Table 5.1.1 Impact identification

Impact	Further assessment	Justification	Mitigation
Atmospheric emissions	No	Emissions during decommissioning activities, (largely comprising fuel combustion gases) will occur following CoP. Emissions generated by infrastructure, equipment and vessels associated with operation of the assets will be replaced by those from vessel use as well as the recycling of decommissioned materials. The atmospheric emissions from the EIS decommissioning activities will be temporary and limited in nature. It is not expected that atmospheric emissions will negatively impact local air quality or result in significant local cumulative impacts. The estimated CO_2 emissions to be generated by the selected decommissioning options are 43,453 Te. the decommissioning activities will add a very small (0.3%) contribution to the overall 14.63 MtCO2e of offshore emissions generated offshore on the UKCS in 2018 [84]. The contribution to global warming will be negligible in relation to those from the wider offshore industry and outputs at a national or international level. These emissions present a total value for the overall project; the figure has been calculated assuming approximately 225 days of vessel emissions across the duration of the project and includes any theoretical emissions associated with the recovery of items, as well as the emissions relating to manufacture for replacement of items decommissioned *in situ*. The project vessel time is split across six types of vessels which	• Vessel management • Minimal vessel use/movement • Vessel sharing where possible • Engine maintenance

[3] It should be noted that the ENVID was undertaken prior to some decommissioning activity decision making. Therefore, the ENVID conclusions regarding physical presence of vessels in relation to other sea users and underwater noise have been amended to align with proposed decommissioning operations.

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
		will participate in a variety of activities including: flowline removal, rock placement and a post-decommissioning survey. The total emissions estimate also includes any emissions associated with the recycling of infrastructure being removed and the new manufacture to replace otherwise recyclable materials decommissioned *in situ*. The CCC concluded in their 2019 report, that it is achievable for the UK to implement a new target of net-zero GHG emissions by 2050 in England and Wales, and by 2045 in Scotland. To achieve the net-zero goal, the CCC report calls for concerted effort and action by all to reduce emissions and for any remaining emissions in 2050 to be offset. As part of this, the offshore oil and gas industry is focussed on the continued management and reduction of its operational emissions and the recently announced North Sea Transition Deal (BEIS, 2021) further commits the sector to early targets for the reduction of greenhouse gas emissions from production, against a 2018 baseline. See Appendix E for a summary of the emissions associated with the project vessels, operational activity and recovery of remaining materials. In line with the NSTA Stewardship Expectation 11 (2021) Harbour is committed to reduce, as far as is reasonably practicable, GHG emissions from all aspects of our operated assets and to collaborate with and facilitate the supply chain to do the same for our non-operated portfolio. This includes: the development of new hydrocarbon projects; existing producing assets; the abandonment and decommissioning of fields; and the progression of potential energy integration/net zero solutions to assist the governments in our areas of active operations in meeting Net Zero targets. Considering the above, atmospheric emissions do not warrant further assessment.	
Seabed disturbance	Yes	There is potential for decommissioning activities to generate disturbance to the seabed; including the removal of the NUIs, subsea structures and stabilisation materials and the	• Mitigation addressed in Section 5.2.4.

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
		partial decommissioning of pipelines *in situ*. This aspect has therefore been assessed further in Section 5.2.	
Physical presence of infrastructure decommissioned *in situ*	Yes	Harbour will leave the seabed in an overtrawlable state following decommissioning activities, however, stakeholder concern in this case warrants it to be considered further. As such, these two impact pathways have been fully assessed in Section 5.3.	• Mitigation addressed in Section 5.3.4.
Physical presence of vessels in relation to other sea users	No	The presence of a small number of vessels for decommissioning activities will be short-term in the context of the life of the EIS fields. Activity will occur using similar vessels to those currently deployed for oil and gas installation, operation and decommissioning activities across the EIS. Furthermore, most decommissioning works will be carried out within the 500 m zones (with the exception of some pipeline remediation activities), thereby using the area around existing infrastructure and not occupying 'new' areas. Vessel presence will be spatially and temporally restricted so exclusion will only be short-term. Other sea users will be excluded from the 500 m safety zone during active operations. The 500 m safety zones will remain until such time the installations are fully removed. Thereafter applied safety zones will remain until such time debris clearance and seabed remediation has been completed. The decommissioning of the EIS area will result in a positive impact by opening up new fishing grounds previously unavailable due to the 500 m safety exclusion zones currently imposed around the Harbour installations. The proposed decommissioning of the EIS area is estimated to require six different vessel types. These would not all be on location at the same time. Vessel activities are expected to cover approximately 225 days. Overall levels of vessel activity attributed to the decommissioning are likely to be similar to those experienced under typical	• Minimal vessel use/movement • Notification to Mariners • Opening up of 500 m safety exclusion zones following seabed-clearance

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
		conditions. The nearshore activities associated with this project are very likely to be limited in duration (i.e., limited to passing survey vessels). While the offshore EIS area experiences moderate shipping, with standard mitigation measures in place, and the short-term nature of these operations, the risk of collision is not expected to be significant. Such measures include Notice to Mariners, the maintained presence of 500 m safety exclusion zone around the platforms and use of navigation aids and safety standby vessels. 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. Considering the above, the physical presence of vessels does not warrant further assessment.	
Underwater noise	No	There is potential for localised injury and disturbance to marine mammals and fish through noise from cutting operations and vessels across the project area, however, recent research findings regarding noise levels emitted during diamond wire cutting procedures determined they were not easily discernible above the background noise levels (mostly attributed to vessel activity) [88]. In the absence of recorded field measurements, it seems likely that this form of cutting would not generate a great deal of noise and may not be detectable above other sources operating simultaneously (i.e. vessels) within the EIS. The need for geophysical surveys undertaken for post-decommissioned infrastructure left *in situ* will be determined in the future and assessed through the process of permit applications as appropriate. Multibeam echosounder survey equipment is likely to be used for imaging and identification of pipeline exposures. The JNCC (2017) Guidelines	• Vessel management; • Minimal vessel use/movement; • Vessel sharing where possible; and • Cutting activities will be minimised and carried out in isolation where possible.

Table 5.1.1 Impact identification

Impact	Further assessment	Justification	Mitigation
		will be employed for mitigation of noise impacts to marine mammals for future survey work involving seismic survey equipment [54]. As presented in the ENVID exercise, the activities associated with the decommissioning of the EIS are likely to be minor and are unlikely to generate significant noise levels. As 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. Further assessment of the impact of the decommissioning on this receptor is therefore not required.	
Discharges to sea	No	Discharges from vessels are regulated activities that are managed on an ongoing basis through existing legislation and compliance controls. All subsea infrastructure in the EIS area will have been drained and flushed at CoP. This is a pre-decommissioning activity which has been permitted as appropriate, and therefore, falls outside the scope of this EA. Any discharges from infrastructure occurring during decommissioning activities will similarly be assessed in more detail as part of the environmental permitting process (e.g., through Master Application Templates/Subsidiary Application Templates). Controls will be in place, as relevant, through the Offshore Chemical Regulations and the Oil Pollution Prevention and Control regulations. 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. Pipelines will be flushed to achieve a hydrocarbon concentration in flush fluids of less than 30 mg/l and filled with seawater. All residual solids will be shipped to shore for disposal.	• MARPOL compliance • Bilge management procedures • Vessel audit procedures • Contractor management procedures

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
		Considering the above, discharges to sea during decommissioning activities are not assessed further herein.	
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 by Harbour where possible. The estimated total energy usage for the project is 788,456 GJ. This number accounts for all operations, material recycling, and the resource loss associated with decommissioning items *in situ*. This is considered very low, compared to the resources generated during the production phase of the project. A summary breakdown of energy use associated with the project is available in Appendix E. Considering the above, resource use does not warrant further assessment.	• Adherence to the Waste Hierarchy • Vessel management • Minimal vessel use/movement • Vessel sharing where possible • Engine maintenance
Waste	No	The onshore treatment of waste from the EIS decommissioning activities will be undertaken according to the principles of the waste hierarchy, a conceptual framework which ranks the options for dealing with waste in terms of sustainability. The waste hierarchy is a key element in OSPAR Decision 98/3 and DECC 2011 Guidance Notes [3]. Waste material 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 non-hazardous material. Other non-hazardous waste which cannot be reused or recycled will be disposed of to a landfill site. Facilities requiring removal as part of the EIS DPs will be transferred to shore by a heavy lift vessel for decontamination, dismantlement, disposal, recycling or reuse. Typically, around 95% of the materials from decommissioning projects can be recycled [83].	• Overall 'Duty of Care' • Waste Management Strategy • Active waste tracking (cradle to grave) • Adherence to the Waste Hierarchy • Transfrontier Shipment of

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
		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. Hazardous waste resulting from the dismantling of the EIS facilities will be pre-treated to reduce hazardous properties or render it non-hazardous prior to recycling or disposing of it to a suitable landfill site. Under the Landfill Directive, pre-treatment is necessary for most hazardous wastes destined to be disposed of to a landfill site. However, the weight and/or volume of such material is not expected to result in substantial landfill use. The recycling and disposal of wastes are covered by Harbour's Waste Management Strategy, which is compliant with relevant regulations relating to the handling of waste offshore, transfer of controlled, hazardous (special) waste, and TFSW ('Trans-Frontier Shipment of Waste'). The Waste Management Strategy is guided by Harbour Energy's HSE Policy (Appendix C: HSE Policy) and commitments to best practice in waste management. This includes the mapping and documenting of waste management arrangements for ongoing monitoring of waste procedures and performance review against target Key Performance Indicators ('KPIs'). 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. Due diligence audits will take place of waste contractors/sub-contractors to ensure that all necessary handling and reporting measures (including tracking of wastes, accounting and identification of wastes, wastes generated per asset and waste segregation) are taking place. Specific audit/monitoring schedules will be set up as part of the disposal yard contract award. No further assessment of waste is necessary.	Waste (if applicable) • Permitting for hazardous wastes • Communication with relevant Regulator(s) • EEMS tracking • Close-out reporting • Contractor management

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
Disturbance to nesting seabirds	Yes	In recent years, there has been an increase in the number of seabirds utilising offshore installations for nesting. Opportunistic species such as kittiwake and herring gull are utilising artificial nest locations and successfully rearing chicks. In some instances, colonies of several hundred birds have established and return each year. Although for most offshore platforms, the number of breeding birds remains very low. All nesting birds and nesting activities are protected from damage by conservation legislation. under the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2017, it is an offence to: • Take, damage or destroy the nest of any wild bird while that nest is in use or being built; or • Take or destroy an egg of any wild bird. This legislation is relevant to installations more than 12nm from the coast, applies to all species of bird and applies irrespective of the number of nests found. i.e., there is no *de-minimus*. The preferred practice is to avoid disturbance by undertaking works out with the breeding season, however, this is not always practicable. Where required, Harbour are committed to deterring birds from their installations out with the breeding season to mitigate against nesting birds on the platform. Harbour will engage with OPRED to agree any further licensing requirements, as appropriate and will also engage in the appropriate monitoring and surveys prior to decommissioning. Due to both stakeholder and regulatory interest, potential disturbance to seabird nests has been scoped in for further assessment in Section 5.4.	• Mitigation addressed in Section 5.4.4
Accidental events (Vessel inventory loss	No	Well decommissioning is outside of the scope of this specific impact assessment since it not dependent on approval of the DP. The possibility of a well blowout therefore does not require consideration in this assessment (it is assessed as part of separate well intervention and marine licence applications). Pipelines and umbilicals will have been	• OPEP and SOPEP in place for operations

Table 5.1.1 Impact identification			
Impact	Further assessment	Justification	Mitigation
and dropped objects)		flushed and cleaned prior to the decommissioning activities described herein being carried out. Release of a hydrocarbon and chemical inventory is therefore also out of scope of this assessment. Therefore, the most likely origin of an accidental event would be from an unplanned instantaneous diesel release from the largest vessel employed in the decommissioning activities. This is expected to be an HLV with a maximum fuel capacity of approximately 1,569 m^3. The fuel inventory of the HLV vessel is likely to be split between a few separate fuel tanks, significantly reducing the likelihood of an instantaneous release of the full inventory. Any spills from vessels in transit or participating in decommissioning activities are covered by a Communication and Interface Plan of the Southern North Sea Offshore Oil Pollution Emergency Plan, and by separate Shipboard Oil Pollution Emergency Plans (SOPEPs). Harbour will support response of any vessel-based loss of fuel containment through the vessel owner's SOPEP. There is a very low likelihood of vessel-to-vessel collision occurrence with an estimated collision rate of one in 685 years. Considering this, and in line with the mitigation measures in place, a vessel collision scenario does not require further assessment here. Vessel collision with any of the surface installations is in some cases an order of magnitude less likely. In addition to the mitigation measures outlined in the individual vessel SOPEPs, Harbour maintains manned bridges, navigational aids and monitoring of safety zones. Only project vessels will be present when activity is taking place within 500 m safety exclusion zones. Other vessels will not be present within the 500 m zone at any time prior to well decommissioning, therefore the likelihood of fishing vessels trawling in the vicinity of the wellheads is negligible. Dropped object procedures are industry-standard and will be employed. All unplanned losses in the marine environment will be attempted to be remediated, and notifications	• Navaids (Cardinal Buoys) in place • 500 m zones operational until seabed clearance certified • SOPEP on all vessels • Spill response procedures • Bunkering procedures in place (if necessary) • Contractor management and communication • Lifting operations management of risk • Dropped object recovery and debris clearance surveys • PON2 submission

Table 5.1.1 Impact identification

Impact	Further assessment	Justification	Mitigation
		to other mariners will be sent out. The post-decommissioning Clear Seabed Verification Survey will aid in the identification of in-field dropped objects. All lift operations will happen within platform safety zones or at the dockside therefore there is minimal risk from dropped objects on live third-party infrastructure from these activities. Infrastructure will either be transported on deck with suitable sea fastening or held 'in the hook' securely for transport as per safe vessel operating procedures. As a result, there will be minimal risk from significant dropped objects during transport. Should such an event occur, the likely destination ports would mean transport over gas or condensate lines only which would result in a low-risk hydrocarbon release which could be managed by offshore spill procedures with minimal environmental impact. As the methodology for platform removal to shore has not been defined, there exists the possibility that the platforms could be transported by a vessel using a crane. Where these would be suspended over the side of the vessel for the transfer, the possibility of dropping onto a live pipeline cannot be ruled out. However, dropped object procedures are industry standard and there is only a very remote probability of any interaction with any live infrastructure, when planning for such transport efforts will be made to minimise the transit over live infrastructure. In line with the mitigation measures in place, accidental events are not assessed further herein.	

5.2 Seabed disturbance

5.2.1 Introduction

This section discusses the potential environmental impacts associated with seabed interaction resulting from the proposed EIS infrastructure decommissioning activities. The measures planned by Harbour to minimise these impacts are detailed in Section 5.2.4.

The decommissioning activities have the potential to impact the seabed in the following main ways:

- Direct impact through:
  - Removal of subsea infrastructure including jackets, subsea structures and stabilisation materials;
  - Removal of pipeline ends;
  - Rock-placement for pipeline ends and exposures; and
  - Footprint of existing rock used as scour protection left *in situ*.
- Indirect impact through:
  - Re-suspension and re-settling of sediment; and
  - Footprint of remaining infrastructure.

These activities all represent the 'base-case' for seabed impact. As a 'worst-case' scenario, overtrawl surveys would be undertaken in the EIS area to demonstrate that no snagging risks remain on the seabed. However, Harbour will finalise survey methods with OPRED and relevant stakeholders as it is recognised that some of the decommissioning activities will be occurring in the Morecambe Bay and Duddon Estuary SPA. Therefore, different methods of determining debris clearance and snag risk may be required giving due consideration to the seabed habitats and species.

Direct disturbance the physical disturbance of seabed sediments and habitats and has the potential to cause temporary or permanent changes to the marine environment, depending upon the nature of the associated activity. Indirect disturbance occurs outside of the direct disturbance footprint and may be caused by the suspension and re-settlement of natural seabed sediments and cuttings pile materials disturbed during activities. Indirect disturbance is considered temporary in all instances.

Vessels utilising DP will be deployed to carry out the decommissioning activities and there will be no additional seabed impacts associated with anchors and mooring lines. A jack-up rig may be utilised to complete well decommissioning activities; however, these activities fall outside of the scope of this EA and the appropriate permits will be applied for in support of works carried out via the BEIS Portal Environmental Tracking System (PETS). An application to decommission the wells will be made via the online WONS on the North Sea Transition Authority (NSTA) online portal.

5.2.2 Description and quantification of impact

5.2.2.1 Jackets and stabilisation features

As the mass of the Calder and Millom West SIPs are <10,000 tonnes, they fall within the OSPAR 98/3 category of steel structures for which derogation cannot be sought. Therefore, the only option available for these jackets is full removal, as presented in Section 3.5.

Both Jackets are anchored to the seabed using 4 suction piles of varying dimensions. Removal of subsea structures founded on suction caissons can theoretically be achieved by reverse installation techniques. For instance, the application of overpressure (in place of suction) between the underside of the mud mat plate and the top of the soil plug (seabed inside the caisson). Where suction caissons cannot be removed by overpressure alone, alternative approaches, such as the addition of buoyancy modules, application of a prescribed tension from a lift wire, and excavation techniques to reduce external skin friction, may require consideration.

As a worst-case scenario, excavation of the seabed, including the removal of the fronded mattresses and relocation of the rock placed around the legs to prevent scour, will likely be required to release the piles from the seabed. The dimensions of deposited rock around the legs of the Calder and Millom West platforms have been used to account for the temporary indirect footprint associated with the relocation of rock and the permanent direct disturbance associated with the rock remaining *in situ*. As the removal of the frond mattresses is required to release the piles, the direct impact has been based on the total footprint of suction piles and the mattresses removal activities. This may impact any benthos living on or around the mattresses. Indirect impacts are considered to cover twice the area of the direct impact as a worst-case scenario, to account for any sediment disturbance and resettlement (Table 5.2.1).

Table 5.2.1 Seabed footprint related to the removal of jackets

Field	Activity	Quantity and dimensions	Expected duration of disturbance	Total		
				Temporary Direct disturbance area (km^2)	Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Calder	Excavation and removal of Calder suction piles	4 x 9.25 m diameter suction piles	Temporary	0.00027	0.00054	
	Removal of frond mattresses around Calder	17 matts with dimensions 5 x 2.5 m (T12) 6 matts with dimensions 5 x 5 m (T25)	Temporary	0.00036	0.00073	
	Relocation of deposited rock around platform legs (Refer Figure 3.1.1)	Deposited rock with dimensions 68 x 60 m	Long-term		0.00816	0.00408
Millom West	Excavation and removal of Millom West suction piles	4 x 7.0 m diameter suction piles	Temporary	0.00015	0.00031	
	Removal of frond mattresses around Millom West	18 matts with dimensions 5 x 2.5 m (T12)	Temporary	0.00023	0.00045	
	Relocation of deposited rock around platform legs (Refer Figure 3.1.2)	Deposited rock with dimensions 70 x 70 m	Long-term		0.00980	0.00490
			Total	**0.0010**	**0.0020**	**0.0090**

5.2.2.2 Subsea structures

As discussed in Section 3.5, the recommended option for decommissioning subsea structures is full removal. The subsea structures (including the Dalton R1 WHPS, the Dalton R2 dual WHPS and the Dalton PLEM) are all piled. The piles on the structures will be removed to approximately 3m below the seabed and may be suitable for removal via internal cutting methods, however access to cut the pile will only be confirmed when internal inspections are completed, at which point OPRED will be consulted. It is possible that some degree of excavation will be required. For excavation, sediment will likely be removed by using MFE and will be deposited down current of the piles, where it will quickly undergo natural dispersal and settling. It is expected that any displaced sediment will be rapidly incorporated into the local sediment transport regime. However, in the interest of providing conservative estimates, the use of MFE has been accounted for in the area calculations by including a buffer of 15m (Table 5.2.2).

Seven concrete mattresses are also present as protection around the Dalton R1 WHPS. These will also be completely removed to shore for removal and as such, the impact footprint of their removal is also accounted for in Table 5.2.2. The area of indirect disturbance is assumed to be twice the direct disturbance area, as a worst case.

Table 5.2.2 Seabed footprint related to the removal of subsea structures

Activity	Quantity and dimensions	Expected duration of disturbance	Total	
			Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Excavation and removal of Dalton R1 WHPS piles	4 piles x 25mm	Temporary	0.0007	0.0014
Removal of mattresses around Dalton R1 WHPS	7 matts with dimensions 6 x 3m	Temporary	0.00013	0.00025
Excavation and removal of Dalton R2 dual WHPS piles	4 piles x 25mm	Temporary	0.0007	0.0014
Removal of mattresses around R2 dual WHPS	8 matts with dimensions 6 x 3m	Temporary	0.00014	0.00029
Excavation and removal of Dalton PLEM piles	2 piles x 25mm	Temporary	0.00035	0.0007
Excavation and removal of Millom Q1 WHPS piles	4 piles x 25mm	Temporary	0.0007	0.0014
Removal of mattresses around Q1 WHPS	8 matts with dimensions 6 x 3m	Temporary	0.00014	0.00029
Excavation and removal of Millom Q2 WHPS piles	2 piles x 25mm	Temporary	0.00035	0.0007
Excavation and removal of Millom Q3 WHPS piles	2 piles x 25mm	Temporary	0.00035	0.0007
Removal of mattresses around Q3 WHPS	9 matts with dimensions 6 x 3m	Temporary	0.00016	0.00032
Excavation and removal of Millom PLEM piles	2 piles x 25mm	Temporary	0.00035	0.0007

Table 5.2.2 Seabed footprint related to the removal of subsea structures				
Activity	Quantity and dimensions	Expected duration of disturbance	Total	
			Direct disturbance area (km^2)	Indirect disturbance area (km^2)
Total			**0.0041**	**0.0082**

5.2.2.3 Pipelines

Following the removal of the pipeline ends, the remaining pipelines, umbilicals, cables and stabilisation materials will either be partially removed/decommissioned *in situ* or fully removed. Table 5.2.3 presents the approximate footprint of seabed affected by decommissioning the pipelines, umbilicals and cables (or components of) to be removed or decommissioned *in situ* or due to partial removal. The length of the ends to be cut from each pipeline/umbilical varies according to the length of each trench transition (Table 5.2.3) here the pipeline will be partially removed, a 10m corridor centred (5m each side) around each pipeline/umbilical has been assumed. Any associated rock placement at the cut ends or for remediation of exposures is also calculated separately as a source of permanent impact (Table 5.2.4).

Table 5.2.3 Seabed footprint related to the decommissioning of pipelines, umbilicals and cables

Field	Item	Total length (m)	Decommissioning Approach/ length (m)		Expected duration of disturbance	Total		
						Temporary Direct disturbance area (km^2)	Temporary Indirect disturbance area (km^2)	Long-term disturbance area (km^2)
Calder	PL1965	42,660	Remove ends	212	Temporary	0.0021	0.0042	
			Decommission *in situ*	42,448	Long-term			0.424
	PL1966	42,630	Remove ends	212	Temporary	0.0021	0.0042	
			Decommission *in situ*	42,418	Long-term			0.424
	Electrical & fibre optic cable	7,597	Remove ends	241	Temporary	0.0024	0.0048	
			Decommission *in situ*	7,356	Long-term			0.074
Dalton	PL1668	7,268	Remove ends	180	Temporary	0.0018	0.0036	
			Decommission *in situ*	7,088	Long-term			0.071
	PL1669	979	Remove ends	166	Temporary	0.0017	0.0033	
			Decommission *in situ*	813	Long-term			0.008

Table 5.2.3 Seabed footprint related to the decommissioning of pipelines, umbilicals and cables

Field	Item	Total length (m)	Decommissioning Approach/ length (m)		Expected duration of disturbance	Total		
						Temporary Direct disturbance area (km^2)	Temporary Indirect disturbance area (km^2)	Long-term disturbance area (km^2)
	PL1670	83	Remove	86	Temporary	0.0008	0.0017	
	PL1671	7,170	Remove ends	63	Temporary	0.0006	0.0013	
	PL1671	7,170	Decommission *in situ*	7,107	Long-term			0.071
	PL1672	1,007	Remove ends	188	Temporary	0.0019	0.0038	
	PL1672	1,007	Decommission *in situ*	819	Long-term			0.008
	PL1673	78	Remove	78	Temporary	0.0008	0.0016	
Millom	PL1674	8,825	Remove ends	102	Temporary	0.0010	0.0020	
Millom	PL1674	8,825	Decommission *in situ*	8,723	Long-term			0.087
Millom	PL1675 & PL1676	6,260	Remove ends	203	Temporary	0.0020	0.0041	
Millom	PL1675 & PL1676	6,260	Decommission *in situ*	6,057	Long-term			0.061
Millom	PL1677	110	Remove	110	Temporary	0.0011	0.0022	
Millom	PL1678	8,800	Remove ends	63	Temporary	0.0006	0.0013	
Millom	PL1678	8,800	Decommission *in situ*	8,737	Long-term			0.087
Millom	PLU1678JQ3	247	Remove	247	Temporary	0.0025	0.0049	
Millom	PL1679	74	Remove	74	Temporary	0.0007	0.0015	
Millom		15,327	Remove ends	200	Temporary	0.0020	0.0040	

Table 5.2.3 Seabed footprint related to the decommissioning of pipelines, umbilicals and cables

Field	Item	Total length (m)	Decommissioning Approach/ length (m)		Expected duration of disturbance	Total		
						Temporary Direct disturbance area (km²)	Temporary Indirect disturbance area (km²)	Long-term disturbance area (km²)
	Electrical & fibre optic cable		Decommission *in situ*	15,127	Long-term			0.151
	PL1873	142	Remove	142	Temporary	0.0014	0.0028	
	PLU1874	164	Remove	164	Temporary	0.0016	0.0033	
	PL1980	248	Remove	248	Temporary	0.0025	0.0050	
					Total	**0.0298**	**0.0595**	**1.4669**

An estimated 25 Te (covering an area of 50m^2) of rock is thought to be required per cut end. It is assumed that rock placement will be required at all pipeline ends. Remediation of the exposures near the cable crossing on PL1965 and PL1966 has also been accounted for. As before, the indirect impact area is double the direct impact area (Table 5.2.4).

Table 5.2.4 Seabed footprint related to the requirement for remedial rock placement

Field	Pipeline(s)	Rock Location	Rock Dimensions	Quantity of rock (Te)*	Total	
					Permanent direct disturbance area (km^2)	Temporary indirect disturbance area (km^2)
Calder	PL1965 and PL1966	Exposures	250 m for exposures between KP35.5 and KP36.4 x 10 m corridor (total 2,500 m^2)	550	0.0025	0.005
		Pipeline end	50m^2 x 2 (pipeline ends)	50	0.0001	0.0002
	Electrical & fibre optic cable	Pipeline end	50m^2 x 2	50	0.0001	0.0002
Dalton	PL1668	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	PL1669	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	PL1671	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	PL1672	Pipeline end	50m^2 x 2	50	0.0001	0.0002
Millom	PL1674	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	PL1675 & PL1676	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	PL1678	Pipeline end	50m^2 x 2	50	0.0001	0.0002
	Electrical & fibre optic cable	Pipeline end	50m^2 x 2	50	0.0001	0.0002
				Total	**0.0035**	**0.007**

*Worst-case assumes 2.2 Te per metre length.

5.2.2.4 Pipeline stabilisation materials

There are a total of 446 mattresses of varying types, an estimated 1,250 grout bags, one fronded grout bag and four concrete protection structures supporting pipeline infrastructure within the EIS decommissioning area. The burial status of the concrete mattresses and pipeline protection covers will be determined when decommissioning activities are being carried out, however, it is currently proposed that the majority (316) mattresses and all the concrete protection structures are removed. Those remaining *in situ* are mostly associated with third party infrastructure and pipeline crossings. According to the documentation review no grout bags were installed. However, that some grout bags may have been used cannot be ruled out, so a nominal quantity has been included to allow for this possibility. All grout bags are to be removed.

The dimensions have been used to calculate an area for all stabilisation materials which is shown in Table 5.2.5. The method of calculation assumes that all mattresses and grout bags will be laid on the seabed in a single layer, however it is important to note that this is highly unrealistic. Mattresses and grout bags are used to stabilise and support infrastructure therefore they are more likely to be piled on top of one another, or even on top of certain items/structures. As such the numbers presented are highly conservative estimates (Table 5.2.5).

Table 5.2.5 Seabed footprint related to the pipeline stabilisation materials

Field	Location	Stabilisation type	No.	Dimensions (m)	Disposal route	Total		
						Temporary direct disturbance area (km^2)	Temporary indirect disturbance area (km^2)	Long-term disturbance area (km^2)
Calder	Calder platform (PL1965, PL1966 & PL6340 approaches.)	Concrete Mattresses	51	6 x 3	Remove	0.00092	0.0018	
		Grout bags	125	0.5 x 0.5	Remove	0.000031	0.000063	
	PL1965, PL1966 interconnector crossing	Concrete Mattresses	29	6 x 3	Decom *in situ*		0.00104	0.00052
		Grout bags	125	0.5 x 0.5	Decom *in situ*		0.00063	0.00031
	CPP1 (Remaining from Morecambe DP3 and DP4)	Concrete Mattresses	5	6 x 3	Decom *in situ*		0.00018	0.00009
		Grout bags	125	0.5 x 0.5	Decom *in situ*		0.00063	0.00031
Dalton	North Morecambe DPPA	Concrete Mattresses	27	6 x 3	Decom *in situ*		0.00097	0.00049
		Grout bags	125	0.5 x 0.5	Decom *in situ*		0.00063	0.00031
	Dalton R1 well and PLEM pipelines	Concrete Mattresses	73	6 x 3	Remove	0.0013	0.0026	
		Grout bags	125	0.5 x 0.5	Remove	0.00031	0.00063	
	Dalton well R2 pipeline	Concrete Mattresses	31	6 x 3	Remove	0.00056	0.0011	
		Grout bags	125	0.5 x 0.5	Remove	0.00031	0.00063	
Millom	North Morecambe DPPA	Concrete Mattresses	50	6 x 3	Decom *in situ*		0.0018	0.0009

		Grout bags	125	0.5 x 0.5	Decom *in situ*		0.000063	0.000031
	Millom PLEM	Concrete Mattresses	161	6 x 3	Remove	0.0029	0.0058	
		Fronded grout bags	1	1.4 x 1.2	Remove	0.000002	0.000003	
		Grout bags	250	0.5 x 0.5	Remove	0.00031	0.00063	
	Millom East Q3 WHPS	Concrete pipeline protection covers	3	6.4 x 3 7.9 x 3 7.9 x 3	Remove	0.000067	0.00013	
	Millom East Q3 PLEM	Concrete pipeline protection covers	2	5.8 x 3	Remove	0.000035	0.00007	
	Millom West	Concrete Mattresses	19	6 x 3	Decom *in situ*		0.0068	0.0034
		Grout bags	125	0.5 x 0.5	Decom *in situ*		0.00063	0.00031
					Total	**0.0068**	**0.027**	**0.0067**

5.2.2.5 Overtrawl trial

If non-intrusive methods are not deemed sufficient then overtrawl trials may be required to demonstrate a 'safe seabed'. The area covered will overlap the footprint of activities captured within Table 5.2.1, Table 5.2.2, Table 5.2.3, Table 5.2.4 and Table 5.2.5; therefore assuming a worst-case scenario. The area impacted by the overtrawl trial is estimated to be 3.14 km^2 of temporary direct impact. This is based on the four 500 m safety zones at the Calder, Dalton, Millom East and Millom West, with no consideration to overlap to account for a worst-case scenario.

The overtrawl will be supported by a Certificate of Clearance. Evidence of a clear seabed will also be included in the Close Out Report and sent to the Seabed Data Centre (Offshore Installations) at the Hydrographic office. Whilst the worst-case seabed disturbance from overtrawl has been assessed, it is recognised that some of the decommissioning activities will be occurring in the Morecambe Bay and Duddon Estuary SPA, therefore different methods of determining debris clearance and snag risk may be required.

5.2.2.6 Summary

Table 5.2.6 provides a summary of the estimated potential seabed disturbance associated with the various decommissioning activities outlined in Section 3.8.

The overall expected temporary area of disturbance associated with all the decommissioning activities is 0.14 km^2. A further 0.01 km^2 of permanent impact, exclusively attributed to the relocation of existing rock for scour protection and additional rock placement on pipeline ends and exposures is also expected. The long-term impact associated with decommissioning infrastructure *in situ* accounts for 1.47 km^2, however, some of this infrastructure is associated with the crossings which will be decommissioned later, and no additional impact is expected from this infrastructure until that date. As a worst-case, should overtrawl trials be required, the temporary (direct) disturbance would be in the region of 3.14 km^2.

Table 5.2.6 Seabed footprint summary (base-case)

Activity	Temporary direct disturbance (km^2)	Temporary indirect disturbance (km^2)	Permanent direct disturbance (rock) (km^2)	Long-term disturbance (decommission *in situ*) (km^2)
Jacket and stabilisation removal	0.0010	0.0020	0.0090	
Subsea structure removal	0.0041	0.0082		
Pipeline decommissioning	0.0298	0.0595		1.4669
Rock placement		0.007	0.0035	
Pipeline stabilisation decommissioning	0.0068	0.027		0.0067
Total	**0.04**	**0.1**	**0.01**	**1.47**
Temporary total	**0.14**			

5.2.3 Effects on sensitive receptors

Decommissioning activities are expected to lead to two types of physical disturbance. The first is temporary disturbance, which will result from the removal of the jackets, subsea structures, pipelines, umbilicals, cables and stabilisation materials from the seabed. The sediment will be disturbed by the action of retrieving equipment from the seabed and rock placement, but once decommissioning is complete, the affected areas will be free of anthropogenic material. Temporary disturbance 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 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 sand to a hard substrate. These materials will be permanently left on the seabed and potentially become fully buried by the deposition of new natural sediment. While the seabed will eventually recover and the substrate will return to pre-disturbance conditions, the time frame over which this occurs is so long-term that the disturbance is considered permanent. The temporary and permanent seabed effects associated with direct disturbance are discussed in the subsections below.

5.2.3.1 Temporary disturbance

As noted in Table 5.2.6, approximately 0.14 km^2 of seabed would be affected by temporary disturbance as the base-case. The worst-case is expected to be in the region of 3.14 km^2.

Two main factors minimise the impacts of seabed disturbance:

- Biological communities are in a continual state of flux and can either adjust to disturbed conditions or rapidly re-colonise areas that have been disturbed.
- The moderate dynamic nature of much of the seabed environment will aid the recovery of disturbed areas.

The seabed is inhabited by numerous organisms, including mobile fauna (e.g., crustaceans) which may be able to vacate an area following a disturbance and less mobile, or sessile fauna. Past surveys of this area of the East Irish Sea indicate that it is typical of the wider area; characterised by various sessile benthic species associated with specific sediment types. For instance, finer areas are colonised by the heart urchin, common starfish, hermit crab and sea star, and coarser areas are inhabited by common brittlestars. Direct mortality of such limited mobility seabed organisms and direct loss of habitat would be expected.

seabed type around the EIS infrastructure is primarily classified under the habitat complex MC52 (Atlantic offshore circalittoral sand). Other habitats that may be found in the area include EUNIS habitat complex MD62 (Atlantic offshore circalittoral mud), MD42 (Atlantic offshore circalittoral mixed sediment) and EUNIS habitat complex MD32 (Atlantic offshore circalittoral coarse sediment) and the seabed energy is described as ‘moderate’ [25]. Spawn is usually deposited demersally, on marine vegetation or on a substrate with a high percentage of gravel and a low fine sediment component [71]. This habitat would therefore support the high intensity plaice, sole and cod spawning grounds and high intensity cod nursery grounds which [24] identified in this area of the East Irish Sea. Seabed disturbance could therefore also present a risk to fish and shellfish species which use the seabed for spawning and/or nursery grounds.

Given the very localised area of decommissioning activities and the transient nature of the disturbance to benthic sediments in this moderately energetic area with good recovery potential, disturbance to fish and shellfish is not expected to be significant. Fish are highly mobile organisms and are likely to avoid areas of re-suspended sediments and turbulence during the activities and these spawning and nursery grounds will be ‘recolonised’ over time [9]. Therefore, the proposed activities are unlikely to have an impact on fish and shellfish species populations or their long-term survival.

Post-disturbance recovery of the seabed is dependent both on the strength of the seabed soils and the ability of the hydrological regime to rework disrupted sediments and return the seabed to its original contours. It has been reported that offshore circalittoral mixed sediments have a high recoverability following disturbance [101][5].

Indirect disturbance (being twice the area of direct disturbance) is projected to have an area of temporary impact of 0.1 km^2 with no permanent impacts anticipated and very quick recovery expected. Sediments that are redistributed and mobilised because of the proposed decommissioning activities will be transported by the seabed currents before settling out over adjacent seabed areas. The natural settling of the suspended sediments is such that the coarser material (sands) will quickly fall out of suspension with the finer material being the last to settle. This natural process will ensure that all the suspended sediment is not deposited in one location. With most of the area being classified as EUNIS biotope complex MC52 (Atlantic offshore circalittoral sand), it is likely that much of this sediment will fall out of suspension in a matter of minutes.

There is the potential for a number of depressions and berms to be left on the seabed following removal of the subsea structures and NUIs. As a worst-case scenario (presented in Section 5.2.2) it is assumed that excavation will be required to remove the subsea structures in order to facilitate removal. Based on the moderately dynamic nature of the environment in the vicinity of the EIS, it is anticipated that these depressions will backfill naturally over time. It is estimated that it can take between 1 and 5 years for natural recovery of similar depressions [99][68][44].

The re-settlement of sediments may result in the smothering of epifaunal species [40] with the degree of impact related to their ability to clear particles from their feeding and respiratory surfaces [93]. Infaunal communities are naturally habituated to sediment transport processes and are therefore less susceptible to the direct impact of temporarily increased sedimentation rates. Depending on the sedimentation rates, infaunal species and communities can also work their way back to the seabed surface through blanket smothering. Defra (2010) states that impacts arising from sediment re-suspension are short-term (generally over a period of a few days to a few weeks) [16].

Following completion of the proposed activities, the natural physical processes of sediment transportation and natural backfilling are therefore expected to restore the seabed habitat to its equilibrium state within a year. This will be qualified by post-decommissioning surveys.

5.2.3.2 Permanent disturbance

Permanent direct disturbance will occur due to placing further rock cover on the seabed in perpetuity. Approximately 0.01 km^2 of seabed will be subject to permanent (yet localised) direct disturbance due to the introduction of rock protection material and relocation of existing rock used for scour protection, as detailed in Table 5.2.6.

The proposed decommissioning activities will cause a direct impact to fauna living on and in the sediments. Mortality is more likely in non-mobile benthic organisms, whereas mobile benthic organisms are more sparsely distributed and may be able to move away from the area of disturbance. Whilst the introduction of a new substratum into the area may be influenced by scour from tides and mobile sediments and it may even become partially buried in places from time to time, it is likely that parts of it will eventually support a low diversity epifaunal community like that present on naturally occurring stones and boulders in the area. This will occur because of natural settlement by larvae and plankton and through the migration of animals from adjacent undisturbed benthic communities.

While the introduction of rock cover clearly results in a change in the habitat type and associated fauna present, the scale of the impact is negligible considering the very large extent of seabed of a similar composition available in the East Irish Sea. Rock remediation will be targeted and localised.

5.2.3.3 Impact on protected habitats

The Calder trunklines PL1965 and PL1966 to shore pass through the Liverpool Bay/Bae Lerpwl SPA, the Morecambe Bay and Duddon Estuary SPA and the Morecambe Bay SAC. Of those protected areas, only the Morecambe Bay SAC is designated for seabed features. Harbour's liability for these trunklines extends the end of the pipeline at MLWM at KP42.424. However, no decommissioning activities are expected to occur within this protected site as the section of the pipeline within the SPA will be decommissioned *in situ*.

The nearby West of Walney MCZ (approximately 6 km from Millom East; Figure 2.2.2) is located in an area of sandy mud which is protected for sea-pen and burrowing megafauna communities, which are listed as OSPAR (2008) threatened and/or declining habitat'. Seapens demonstrate high resistance and resilience to smothering and heavy changes in the siltation rates and are not sensitive to these pressures [44] as they can withdraw rapidly into the sediment. The 'Seapens and burrowing megafauna in circalittoral fine mud' habitat has no resistance to physical loss or change of substrate as where the soft sediment is no longer available, the community ceases to exist. Seapens themselves show poor recovery when physically damaged [45]. However, given the distance to the West of Walney MCZ, it is very unlikely that any impacts will be felt. Similarly, the West of Copeland (MCZ) is 7 km from the Millom West platform the seabed habitats are home to species including worms, sea urchins, anemones, crabs, sea mats and bivalve molluscs (such as venus clams and razor clams, however, is far enough away from the location of the decommissioning activities for there not to be an impact on the site's Qualifying Features and the relevant Conservation Objectives (Figure 2.2.2).

The closest protected site with a seabed habitat as a qualifying feature is the Shell Flat and Lune Deep SAC located approximately 21 km from Calder. Due to the distance, the Qualifying Features of this site and its Conservation Objectives (which is protected for "sandbanks which are slightly covered by seawater all the time") are not expected to be impacted by the proposed operations (Figure 2.2.2).

5.2.3.4 Long-term presence of infrastructure decommissioned *in situ*

Structural degradation of the pipelines, umbilicals and cables in the East Irish Sea areas will be a long-term process caused by corrosion and the eventual collapse of the pipelines under their own weight and that of the overlying mattresses, pipeline coating material, scale and sediment. During this process, degradation products derived from the exterior and interior of the pipe will breakdown and potentially become bioavailable to benthic fauna in the immediate vicinity.

The primary degradation products will originate from the following pipeline components:

- Pipeline scale;
- Steel;
- Sacrificial anodes;
- Coal tar enamel coating;
- Concrete coating; and
- Plastic coating.

Note: The pipelines will be flushed clean of hydrocarbons and toxic materials, then disconnected and sealed. As such they are not discussed further herein.

5.2.3.4.1 Heavy metals

Metals with a relatively high density or a high relative atomic weight are referred to as heavy metals. It is expected that these metals will be released into the sediments and water column during the breakdown of the components of the pipeline scale, steel, and sacrificial anodes.

The toxicity of a given metal varies between marine organisms for several reasons, including their ability to take up, store, remove or detoxify these metals [64]. Concentrations of the metals are not expected to exceed acute toxicity levels at any time. However, chronic toxicity levels may be reached for short periods within the interstitial spaces of the sediments or near the pipelines. At these levels, heavy metals act as enzyme inhibitors, adversely affect cell membranes, and can damage reproductive and nervous systems. Changes in feeding behaviour, digestive efficiency and respiratory metabolism can also occur. Growth inhibition may also occur in crustaceans, molluscs, echinoderms, hydroids, protozoans and algae [64]. It is expected that any toxic impacts will be short lived and localised with minimal potential to impact populations of marine species. The potential for uptake and concentration of metals would also be limited to the local fauna and due to the slow release of these chemicals not likely to result in a significant transfer of metals into the food chain.

The slow release of the metals associated with the pipeline steel and steel associated with the concrete coating and mattress protection is expected to have a negligible impact on the local environment. It is anticipated that failure of the pipelines due to through-wall degradation would only begin to occur after many decades (of the order of 60 to 100 years [49].

Along buried pipeline corridors there may be accumulations of heavy metals in the sediments. Where present, the finer fraction of these sediments (silts and clays) is likely to form bonds with these metals, making them less bioavailable to marine organisms. The sandy (coarser fraction) of the sediments surrounding the pipelines are less likely to retain metals [75]. Much of the surrounding seabed is composed of sand and will therefore release any metals to the surrounding seawater, making them bioavailable, but also diluting them into the wider environment.

Due to the highly localised nature of any degradation products and the low concentrations of contaminants being released over an elongated period it is highly unlikely that these products will be detectable above current background conditions in the area. As a result, no likelihood of significant effect is expected to any of the designated sites within which a pipeline will be decommissioned *in situ*.

5.2.3.4.2 Naturally Occurring Radioactive Material (NORM)

Marine organisms can potentially bioaccumulate radium from solution in seawater, from ingested seabed sediments or from their food. Studies of the impacts of ^{226}Ra released into the North Sea via produced water and natural processes indicate that it is unlikely that observed levels of radioactive substances entrained in sediments or found in seawater will cause effects on marine organisms [50]. NORM scale discharged from offshore installations is known to be insoluble in seawater and when produced water rich in barium and radium is discharged to sulphate rich seawater, the radium precipitates rapidly as a complex of barium, radium and sulphate which is also insoluble. ^{226}Ra therefore has a very low concentration in solution in seawater and has a low bioavailability to marine organisms. Dissolved cations in seawater, particularly calcium and magnesium, also inhibit the bioaccumulation of NORM [12].

Due to the highly localised nature of any degradation products and the potentially very low concentrations of NORM being released over an elongated period it is highly unlikely that these will be detectable above current background conditions in the area. As a result, no likelihood of significant effect is expected on the environment generally or to any designated site.

5.2.3.4.3 Polycyclic Aromatic Hydrocarbons

The likely base material of some of the concrete coated pipelines is coal tar. There is no standardised formula for the composition of coal tar, but it is thought that its constituents are over 60% inert and may comprise up to 15% of PAHs [75].

The coal tar coating degrades when the internal pipeline steel corrodes or if the concrete coat is damaged. There are no known records of concrete durability, but it is expected that the concrete will decay at a very slow rate. It is presumed that PAH will be released once the coal tar layer is open to the seawater, and over time will be released into the surrounding environment. PAHs in marine sediments will have a low biodegradation potential due to low oxygen and low temperatures [8]. PAHs are almost insoluble and only become available to marine organisms through ingestion of particulate matter [75][11].

Two factors, lipid and organic carbon, control to a large extent the partitioning behaviour of PAHs between sediment, water, and tissue. Accumulation of PAHs occurs in all marine organisms; however, there is a wide range in tissue concentrations from variable environmental concentrations, level and time of exposure, and a species' ability to metabolize these compounds. There are many variables, such as chemical hydrophobicity, uptake efficiency, feeding rate, and ventilatory volume, which may affect the outcome. The route of uptake may be an important issue for short-term events; however, under long-term exposure and equilibrium conditions between water, prey, and sediment, the route of uptake may be immaterial because the same tissue burdens will be achieved regardless of uptake routes [73]. Due to their poor solubility in water these substances will partition in organic material including plankton and marine snow (cell water release) and marine sediments (cell water and sediment release). All substances in this group are persistent with a half-time in the marine environment ranging from weeks (water column) to several years (sediments). Evidence of carcinogenicity, mutagenicity or teratogenicity attributable to PAHs in the marine environment is very limited and the amounts concerned are not thought to pose a threat to marine organisms [75]. Given that PAHs are expected to be released in very low concentrations during the deterioration of the coating over time, it is unlikely that marine organisms will accumulate them to a significant extent.

Due to the highly localised nature of any degradation products and the low concentrations of contaminants being released over an elongated period it is highly unlikely that these products will be detectable above current background conditions in the area and no likelihood of significant effect is expected to any designated sites.

5.2.3.4.4 Plastics

Methanol and gas pipelines in the are generally coated with 3 Layer Polyethylene ('3PLE') and Fusion-bonded Epoxy ('FBE'). 3PLE and FBE are considered non-toxic in the marine environment [21]. However, as no micro-organisms have evolved to utilise the chemically resistant polymer chains as a carbon source, these plastics can be expected to persist in the environment for centuries [82]. As biodegradability in the marine environment (in particular when buried within sediment) is also low, it can be assumed that the environmental effect of leaving these plastics in place is negligible [75].

Due to the highly localised nature of any degradation products and the low concentrations of contaminants being released over an elongated period it is highly unlikely that these products will be detectable above current background conditions in the area and no likelihood of significant effect is expected to any designated sites.

5.2.3.5 Blue Carbon

Marine sediments are the primary store of biologically derived carbon (mostly inorganic carbon). Biogenic marine habitats are highly productive places, with a very high rate of assimilation of carbon into plant material (662 gC/m^2/yr), mostly in coastal areas. However, their overall contribution to the carbon budget is relatively small compared to sediments [6][7]. Carbon stored in organisms can be broadly defined as either 'transient', such as the carbon stored in seagrass beds, kelp and macroalgae; or 'long term', such as biogenic structures (e.g. coral reefs, serpulid reefs, mussel beds).

Carbon may be sequestrated in marine sediments as precipitated carbonates ('PCO') or as particulate organic carbon ('POC'). While it is known that sediment accumulation rates tend to be faster nearer to land (e.g. in sea lochs), it is unclear what processes maintain the accumulation basins on the shelf, or whether any of the rich supply of organic material from phytoplankton in productive shelf waters becomes refractory and remains there [6]. The principal threat to long term carbon burial in sediments is any process that stirs up the sediment, particularly the top few millimetres of sediment. Resuspension of sediment allows rapid consumption of buried carbon by organisms and its subsequent release as carbon dioxide. This effectively reduces the carbon burial rate significantly and reduces the blue carbon inventory.

Patterns of standing stocks and sequestration capacity of organic carbon follow the distribution of mud and mud-sand-gravel combinations. Most organic carbon and the largest capacity for sequestration of organic carbon appears to be in deep mud off the continental shelf [6]. A review of sediment accumulation rates in the North Sea showed that the burial rates for organic carbon are strongly dependent on sediment type. The seabed type within the East Irish Sea is primarily classified under the EUNIS habitat complex MC52 (Atlantic offshore circalittoral sand) [25].

The average percentage carbonate in the top 10 cm of superficial sediments in the offshore East Irish Sea area (BGS, 2022), is <10% (and <20% close to the Cumbrian and Lancashire coastlines) which is below average for the UKCS more generally [6][77]. The impact on any blue carbon stores is therefore expected to be negligible.

5.2.4 Mitigation measures

Mitigation measures to minimise seabed impacts within the Calder, Dalton and Millom areas are detailed below:

- Cutting and lifting operations will be controlled by ROV to ensure accurate placement of cutting and lifting equipment and minimise any impact on seabed sediment;
- Lifting operations will be conducted around high tide and slack water to minimise the distribution of mobilised sediments;
- The requirements for further excavation will be assessed on a case-by-case basis and will be minimised to provide access only where necessary. Internal cutting will be used preferentially where access is available;
- Vessels are most likely to be equipped with dynamic positioning ('DP') rather than relying on anchors to remain in position which interact with the seabed.
- The rock mass will be carefully placed over the designated areas of the pipelines and seabed in order to ensure rock is only placed within the planned footprint with minimal spread over adjacent sediment, minimising seabed disturbance;
- Data collected in the area will be reviewed for potential sensitive seabed habitats prior to the commencement of operations; and
- Post decommissioning debris clearance, surveys and monitoring will be undertaken for the area. The method of verification of which will be agreed with the regulator and relevant stakeholders in due course.

5.2.5 Cumulative assessment

The worst-case cumulative area of directly disturbed seabed, due to planned and ongoing activities (excluding fishing), within a 40 km radius of Calder, Dalton and Millom is shown in Table 5.2.7. The nearest planned activity that will result in seabed disturbance is the decommissioning of the South Morecambe DP3 and DP4 and the Bains infrastructure, which is planned to be undertaken in parallel.

Approximately 17 km to the south of the Calder platform, marine aggregates are extracted from Licence Area 457 (Liverpool Bay) and 36 km south of the Calder platform, from Licence Area 392 (Hilbre Swash). Within the Liverpool Bay licence area, there are four active dredge zones with a total seabed footprint of 9.938 km^2 and Hilbre Swash licence area impacts a total area of 21.813 km^2 (Table 5.2.7).

Another major source of seabed disturbance in the local area is fishing activity, however, it is difficult to quantify the area impacted by fishing gear. Information presented in Section 4.4.1 , suggests that fishing activity is relatively low near Calder, Dalton and Millom and moderate to high in the wider area.

Other activities that may introduce a cumulative aspect in the vicinity include activities around the windfarms, including Barrow, Ormonde, Walney 1, Walney 2, Walney extension and Duddon Sands. These windfarms all became operational between 2006 and 2018 and are therefore unlikely to create any seabed impact prior to decommissioning. Several areas in very close vicinity are also in the process of consent under the recent Crown Estate Leasing Round 4, however, activity at these sites is unlikely to coincide with any decommissioning activity as the projects are subject to licensing and consenting processes at the time of writing (February, 2024).

Table 5.2.7 Cumulative impacts		
Activity	Distance (km) at closest point	Area impacted (km^2)
Oil and gas		
Bains subsea decommissioning	15 from Calder	1.88
DP 3 platform decommissioning	6.8 from Calder	3.64
DP4 platform decommissioning	10 from Calder	
Marine Aggregates		
Licence Area 457 (Liverpool Bay)	17 from Calder	9.94
Licence Area 392 (Hilbre Swash)	36 from Calder	21.81
	Total	**37.27**

The timing of some of these impacts may overlap, but they will not occur in proximity. Due to the short duration and localised nature of seabed disturbance from the Calder, Dalton and Millom decommissioning activities, no significant cumulative impacts associated with temporary seabed disturbance are anticipated. Similarly, given the small area permanently disturbed by Calder, Dalton and Millom infrastructure decommissioned *in situ*, no significant cumulative impacts associated with permanent seabed disturbance are anticipated.

Dalton (closest point) is located approximately 105 km east of the UK/Ireland jurisdictional median line and 32 km south-east of Isle of Man territorial waters. Given these distances and the relatively localised impacts, no transboundary impacts associated with seabed disturbance are anticipated.

5.2.6 Residual Impact

Receptor	Consequence	Likelihood
Seabed habitats and benthos	Low	Frequent
Protected areas	Negligible	Rare
Rationale		
Decommissioning of the EIS infrastructure will cause physical disturbance to the local seabed environment. Activities will result in an expected area of temporary direct disturbance equalling 0.04 km^2. When accounting for temporary indirect disturbance, which arises secondarily due to sediment suspension and resettlement, the total area of impact is approximately 0.1 km^2. Permanent disturbance due to the relocation of existing rock used for scour protection and additional rock placement on pipeline ends and exposures will affect approximately 0.01 km^2. In a worst-case (overtrawl) scenario, this would increase to approximately 3.14 km^2. An evaluation of threats and impacts to circalittoral muddy sand and slightly mixed sediment (in line with that in the East Irish Sea area), suggested that the threat from infrastructure installation offshore is low. Direct loss of habitat and direct mortality of sessile seabed organisms that cannot move away from the contact area would be expected. Impacts arising from sediment re-suspension are expected to be short-term and mobile species will be able to avoid the area during activities and 'recolonise' it in the future. Although substratum loss may cause a decline of species in the direct footprint, species that inhabit this type of benthic habitat are deemed to be highly recoverable.		

While demersal fish species using the area as a nursery or spawning grounds may coincide with the decommissioning activities, given the very localised nature of decommissioning activities and the transient nature of the disturbance to benthic sediments, disturbance to fish and shellfish nursery and spawning grounds is not expected to be significant.

The long-term decommissioning of the pipelines, umbilicals and cables *in situ* is expected to represent a footprint of approximately 1.05 km^2. As this infrastructure will remain buried, the release of primary degraded products such as plastics, NORM, PAHs and heavy metals are predicted to cause negligible impacts on the surrounding sediments.

The addition of rock is also unlikely to disturb the natural physical processes of the area. While the addition of 0.004 km^2 of rock will change the substrate, this covers such a small area in proportion to the area of available sandy habitat. There is potential that the colonisation of hard substrate may result in a habitat moderately comparable to that of a typical rocky reef. For these reasons, the impact consequence is considered low across all receptors.

Owing to the nature of the proposed decommissioning impacts on the seabed are unavoidable and, for the duration of the activities, the likelihood of disturbance to the seabed is considered frequent the general seabed habitats and benthos and the likelihood of an impact on nearby protected areas, rare. Combining the consequence and likelihood rankings (Appendix A), the risk significance is low seabed and benthos and negligible for any nearby protected areas. Overall, the impact of seabed disturbance due to the proposed decommissioning activities, in combination with consideration of mitigation measures, is not significant.

Risk significance	**Impact significance**
Minor	Not significant

5.3 Physical presence of infrastructure decommissioned *in situ*

5.3.1 Introduction

The proposed EIS decommissioning activities have the potential to impact upon other users of the sea, namely commercial fisheries. This may happen during the decommissioning activities themselves or after decommissioning should any infrastructure decommissioned *in situ* interact with fishing gear. Sea users, other than commercial fisheries, are unlikely to be affected by the proposed decommissioning. The following issues were considered as potentially having a significant impact on commercial fisheries:

- Physical presence of subsea infrastructure decommissioned *in situ* posing a potential snagging risk.
- Snagging risk arising from seabed depressions.

This is anticipated to be the only impact to fisheries due to decommissioning and is assessed against the receptor throughout the rest of this Section.

5.3.2 Fisheries in the EIS

The long-term presence of subsea infrastructure decommissioned *in situ* has the potential to interfere with other sea users that may use the area. In particular, exposures or even free spans associated with infrastructure decommissioned *in situ* which may arise during initial decommissioning and long-term degradation, introduce a snagging risk to some fisheries. In addition to the physical presence of the pipelines decommissioned *in situ*, seabed depressions, local rock placement, mattresses and grout bags also increase the potential for interaction with fishing gear.

Demersal fishing gears which interact with the seabed are vulnerable to snagging. Snagging may lead to the loss or damage of catch or fishing gear and may result in vessel destabilisation in extreme circumstances. There have been reports of 15 fishing vessels sinking due to snagged gear in the UK between 1989 and 2014 which resulted in 26 fatalities [70]. Generally, the pattern of interactions between oil and gas infrastructure and fishing gear are spatially concentrated in the muddy Northern North Sea (NNS) where demersal fisheries are generally concentrated [95] as opposed to the Southern North Sea or the EIS. On review of demersal trawling activity on the UKCS, it was determined that a low percentage (0.93%) of demersal trawling trips specifically targeted oil and gas pipelines compared with surrounding areas [94].

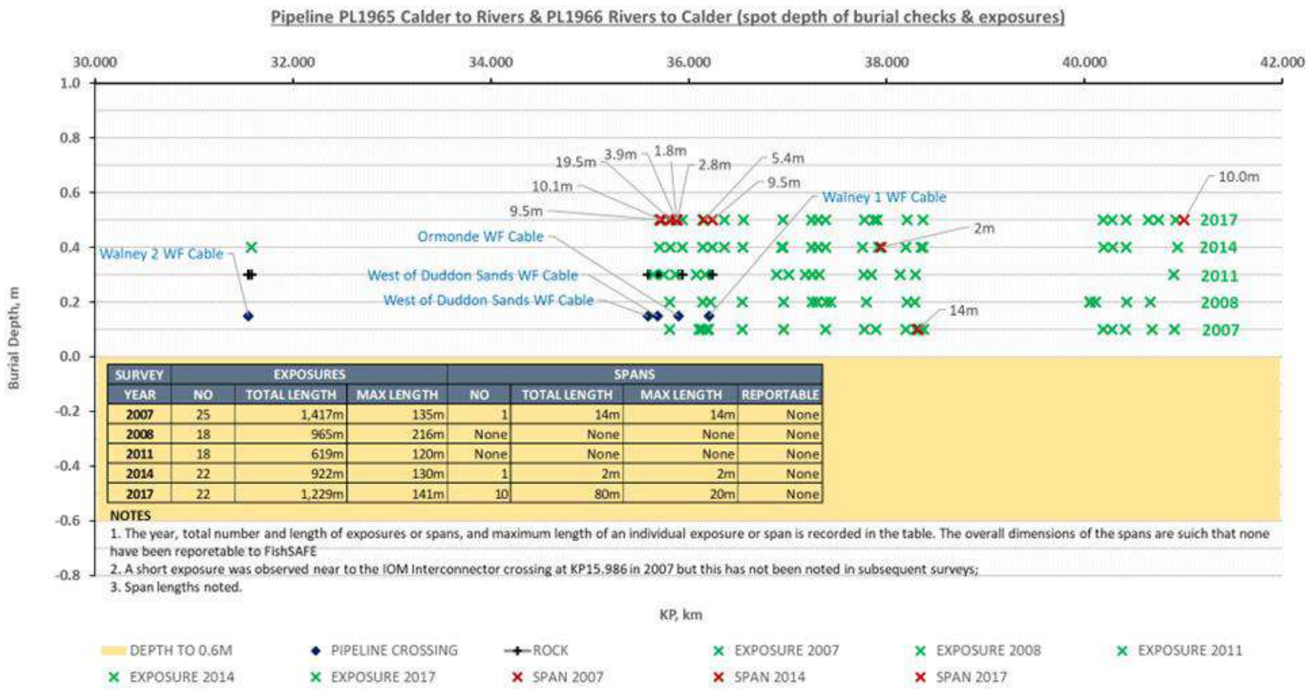
Annual fishing statistics in the EIS infrastructure area (ICES rectangles 37E6 and 36E6) was variable. Both Demersal and shellfish are targeted, however, shellfish value far exceeds that of demersal, with shellfish fisheries landing >70% of the total value and >70% of the total weight for both rectangles. Fishing activity is predominantly concentrated to the south, west and north of the EIS infrastructure. To the east and in the immediate vicinity of the both the installations and along PL1965 and PL1966, fishing activity is low with some areas having no data recorded (Section 4.4.1). Shellfish fisheries are associated with a more passive gear effort. Therefore, with regards to snagging risk, the incidence of interaction between demersal fishing gear and infrastructure decommissioned *in situ* is greatly reduced in the EIS area.

5.3.3 Physical presence of subsea infrastructure decommissioned *in situ* posing a potential snagging risk

Except for the Calder trunklines that were (mostly) trenched to approximately 0.6m below seabed, all pipelines, umbilicals and electrical cables longer than 300 m were designed to be buried in the seabed to depth of at least 1m below seabed. On the approaches, the pipelines are protected and stabilised concrete mattresses as they emerge from burial in the trenches. The pipelines and umbilical jumpers for Dalton R1, and Millom Q1, Q2 and Q3 to and from the Dalton and Millom PLEMS were all surface laid and provided with protection and stabilisation features in the form of concrete mattresses. At the time of installation, the infrastructure crossed over few third-party pipelines and infrastructure with such crossings being limited to the two Calder pipelines crossing over the Isle of Man Interconnector. However, since their original installation in 2002 several windfarms have been installed, and this has resulted in the Calder pipelines being crossed by several power cables that service these wind farms.

The results of acoustic monitoring surveys conducted on several occasions since 2007, have shown that none of the pipelines have been found to be exposed along their length except for the two Calder pipelines PL1965 and PL1966, where they cross the IOM Interconnector cable, and where they themselves are crossed by the various wind farm cables. In 2014 and 2017, near the IOM Interconnector, there were also observations of unsupported sections of the pipeline of 25 m long and 7.2 m long (albeit covered with mattresses), and this was thought to be attributed to local scour. In 2022, 18 m long unsupported section of the pipelines was observed. Several short exposures between the mattresses were also observed in 2022. However, it has been noted that the 2022 survey data is incomplete as it only extends as far as KP36.4, no data are available between KP36.4 and MLWM. The burial status of the pipeline(s) will be confirmed via future surveys. Therefore, 2017 data has been used for recommendation.

The exposures that have been observed over the years would appear to be occurring because of the pipelines being installed at a shallower depth to top of pipe in these areas. As detailed, over the years several exposures have been found near the windfarm power cable crossings, however, exposures have also been located within the area that was difficult to trench during installation. The lengths of exposures that were found over all surveys, including 2017, are shown in Figure 5.3.1 and the spot depth of burial recorded data can be seen within Figure 5.3.2. All other pipelines addressed within the CA do not have any exposures or reportable spans.



SURVEY	EXPOSURES			SPANS			
YEAR	NO	TOTAL LENGTH	MAX LENGTH	NO	TOTAL LENGTH	MAX LENGTH	REPORTABLE
2007	25	1,417m	135m	1	14m	14m	None
2008	18	965m	216m	None	None	None	None
2011	18	619m	120m	None	None	None	None
2014	22	922m	130m	1	2m	2m	None
2017	22	1,229m	141m	10	80m	20m	None

NOTES
1. The year, total number and length of exposures or spans, and maximum length of an individual exposure or span is recorded in the table. The overall dimensions of the spans are suich that none have been reporetable to FishSAFE
2. A short exposure was observed near to the IOM Interconnector crossing at KP15.986 in 2007 but this has not been noted in subsequent surveys;
3. Span lengths noted.

Figure 5.3.1 PL1965 & PL1966 summary of exposures and spans KP30.0 onwards

Currently, approximately <3% of the PL1965/PL1926 is exposed with the remainder of the pipeline achieving burial depth below 0.6 m. The exposure total length measured between KP36.55 and KP41.02 has been estimated to have a minimum length of approximately 1,023 m. At present, the proposed approach for PL1965 and PL1966 is to decommission most of the pipeline length *in situ*. The surface-laid section (approximately 212 m) near the Calder installation will be removed and the exposed sections between KP36.55 and KP41.02 will be remediated by either removal or rock cover. The unsupported sections of pipelines observed in both 2014 and 2017, may be sufficiently protected by mattresses with no further remediation action required, however if needed, the short sections of pipeline will be removed.

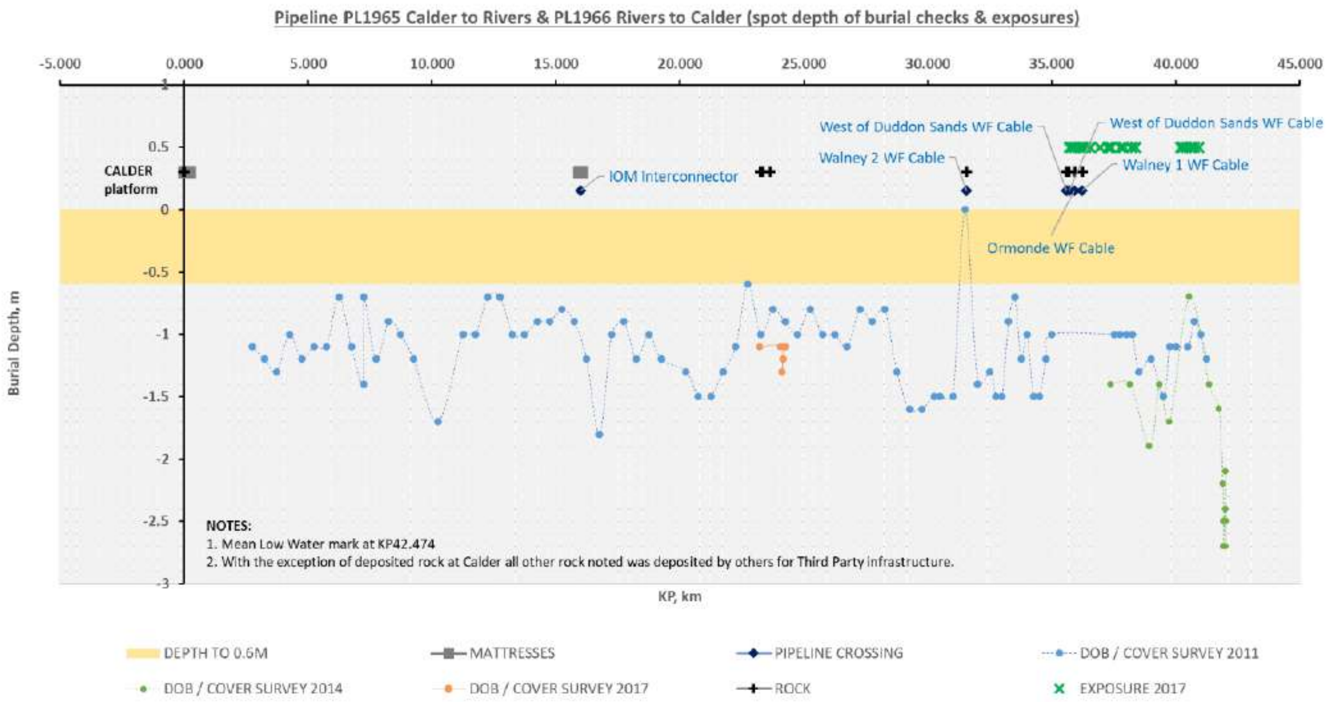


Figure 5.3.2 PL1965 & PL1966 spot depth of burial & 2017

For the subsea infrastructure decommissioned *in situ* on the seabed, Harbour will ensure all EIS areas are left overtrawlable without snagging risks and that any rock placement required will be appropriately graded with a 1:3 slope which allows fishing gear to trawl across it without snagging. The method of determining snag risk removal will be determined with OPRED and relevant stakeholders.

Following decommissioning, a post decommissioning survey campaign will be arranged and agreed in accordance with OPRED that will monitor any change in burial status and any spans or exposures that may arise. If any remediation is required, this will be discussed and agreed with OPRED.

5.3.3.1 Snagging risk arising from seabed depressions

In addition to pipelines to be decommissioned *in situ*, seabed depressions, local rock placement, mattresses and grout bags increase the potential for interaction with fishing gear. There is the potential for depressions and/or berms to be left on the seabed following removal of the subsea structures and NUIs. This may arise from excavation at cut location and at the pile locations to enable these to be severed at 3m below the seabed if internal cutting is not possible. As a worst-case scenario (presented in Section 5.2) it is assumed that excavation will be required to remove the subsea structures to facilitate removal. Based on the moderately dynamic nature of the environment in the vicinity of the EIS, it is anticipated that these depressions will backfill naturally over time. It is estimated that it can take between 1 and 5 years for natural recovery of similar depressions [99][68][44].

The sediment within the EIS infrastructure area is primarily classified under the EUNIS habitat complex MD52 (Atlantic offshore circalittoral sand) with areas of MD62 (Atlantic offshore circalittoral mud), MD42 (Atlantic offshore circalittoral mixed sediment) and MD32 (Atlantic offshore circalittoral coarse sediment) [25]. Coarse and sandy sediments are less likely to form a berm and fishing gears are better able to pass through coarse and sandy sediments compared to clay. Depressions being backfilled over time and the ability of fishing gears to penetrate and pull through a sandy seabed means the snagging risk from such seabed features, should they arise, is minimal.

Post-decommissioning surveys will be undertaken to ensure there are no berms or snagging issues associated with these depressions. As above, if remediation will be required to address any snag risk, discussion with OPRED will be undertaken.

5.3.4 Mitigation measures

A number of mitigation measures will be employed to reduce the impact of the decommissioning on other sea users:

- The EIS subsea infrastructure is currently shown on Admiralty Charts and the FishSafe system. Once decommissioning activities are complete, updated information on the EIS subsea area (i.e. which infrastructure remains *in situ* and which has been removed) will be made available to allow the Admiralty Charts and the FishSafe system to be updated;
- All surface laid pipelines and associated stabilisation material will be removed. All buried pipelines will be decommissioned *in situ*;
- Additional burial surveys will need to be carried to inform the current burial status of the pipelines. The 2022 survey data was deemed incomplete. The burial status of the pipeline(s) will be confirmed via future surveys. At present, the total length to be remediated is ~1.3 km which has been determined using 2017 data as a recommendation;
- Any exposed/cut pipeline/umbilical ends will undergo remediation, as appropriate, to ensure they are overtrawlable to fishing gear. Remediation may entail rock placement or burial of ends using sediment;
- Post-decommissioning surveys will identify the requirement for remediation of depressions generated through dredging around piles. It is anticipated that metocean conditions and sediment composition are likely to be sufficient to naturally backfill any such depressions. However, if depressions are not able to naturally backfill; Harbour will consider using existing rock around the excavations as remediation;
- Any objects dropped during decommissioning activities, or any existing oilfield debris identified will be removed from the seabed;
- An appropriate vessel will be engaged to carry out survey work within the 500 m safety exclusion zones, at locations where installations have been removed, where cutting or remediation has occurred along the pipeline to evaluate any potential snagging risks. Decommissioning activities will be considered to be complete subject to acceptance of the Decommissioning Close-out Report by OPRED. The existing 500 m safety exclusion zones will then be removed; and
- Harbour recognises its commitment to monitor any infrastructure decommissioned *in situ* and therefore intends to set up arrangements to undertake post-decommissioning monitoring on behalf of the Licence Owners. The frequency of the monitoring will be agreed with OPRED, and future monitoring will be determined through a risk-based approach based on the findings from each subsequent survey. A monitoring strategy will be proposed in the decommissioning close out report. During the period over which monitoring is required, the status of the infrastructure decommissioned *in situ* would be reviewed and any necessary remedial action undertaken to ensure it does not pose a risk to other sea users.

5.3.5 Cumulative assessment

When considering the EIS decommissioning within the wider regional context, the proposed decommissioning activities may coincide with other projects in the vicinity. As discussed, the main impact to associated with the decommissioning is the potential snagging risk to commercial fisheries. As this is the only perceived risk to other sea users, it is the only impact to be assessed in a cumulative context.

In the EIS area, landings were dominated by shellfish species. Trawls were the most utilised gear in both ICES, with Otter and Beam being the favoured method. Other gear types utilised include traps and dredges. The effort in the EIS area is generally low in terms of fishing effort and landing values.

It is not possible to quantify the cumulative snag risk associated with additional decommissioning activities in the region such as the DP3 & DP4 platform decommissioning and the Bains subsea decommissioning activities, however, due to the projected schedule of these operations and the requirement to leave an overtrawlable seabed it is deemed that there will be no cumulative impact.

As the decommissioning activities proceed, new areas of sea/seabed will become available to fisheries and other sea users, reducing the overall cumulative impact, and resulting in a positive impact to these users. These include removal of safety zones within the EIS area. In terms of the scale of the decommissioning activities with regards to other sea users, there are an estimated 651 safety zones in the within the UKCS, as of 2015 [81]. Since the decommissioning of the EIS area will see the removal of safety zones resulting in approximately 0.785 km^2 of occupied sea area being returned to navigable water. This will assist in reducing the areas of the currently unavailable to commercial fisheries and thus in reducing the potential for cumulative impact from decommissioning of structures.

There are no negative cumulative impacts expected as a result of the decommissioning. The decommissioning of the EIS area will result in a positive impact by opening new fishing grounds previously unavailable due to the 500m safety exclusion zones currently imposed around the Harbour installations.

5.3.6 Transboundary impacts

As the EIS area is beyond the UK's 12 nm limit, foreign national vessels are also permitted to fish in the area. However, Global Fishing Watch reports low fishing presence by international vessels in the area [35]. Overall. the intensity of fishing activity with the EIS area is low with principal fishing grounds located outside of the project area. Combined with the removal of infrastructure, the intention to monitor pipeline exposures over time, and the intention to leave the seabed in an over trawlable state, there is no mechanism by which significant transboundary impacts could occur.

5.3.7 Residual impact

Receptor	Consequence	Likelihood
Commercial fisheries	High	Improbable
Rationale		
Of all sea users, commercial fisheries are most likely to be affected by the proposed decommissioning activities. Impacts to fisheries mainly arise from the potential for snagging generated by the decommissioning *in situ* of pipelines, and the potential creation of depressions or berms during decommissioning activities. Survey data within the EIS area has shown that exposures and changes in burial have been minimal in location and extent. There was only reported exposures located along PL1965 and PL1966 pipelines running from the Calder installation to shore. The total exposure length in-between KP36.55 and KP41.02 has been estimated		

to be ~1,023 m (minimum). There were also observations of unsupported sections of the pipeline of 25 m long and 7.2 m long (albeit covered with mattresses), and this was thought to be attributed to local scour

. There are no other reportable spans or exposures within the EIS area.

Annual fishing statistics in the Project area (ICES rectangles 37E6 and 36E6) were variable. Both demersal and shellfish species are targeted, however, shellfish value far exceeds that of demersal, indicating a focus on more passive fishing techniques. To the east and in the immediate vicinity of the both the EIS infrastructure and along PL1965 and PL1966, fishing activity is low with some areas having no data recorded. Therefore, the opportunity of a snagging event occurring is negligible. While the consequence of a snagging event may be high, Harbours commitment to leaving the seabed in an overtrawlable condition, and to conduct pipeline monitoring, will ensure that the likelihood of snagging impacts on fisheries is minimised.

Although there will be localised exclusion during decommissioning itself, the removal of the safety zones within the EIS will eventually return sea area to the fishing community, which is considered a positive outcome of the activities. Combining the above, the risk significance is defined as low and thus not significant.

Risk significance	Impact significance
Low	Not significant

5.4 Disturbance to nesting seabirds

As oil and gas infrastructure in the North Sea ages, the role these structures occupy in seabird ecology, and the subsequent impact of their decommissioning on seabirds, is coming under increasing scrutiny. In recent years, there has been an increase in the number of seabirds utilising offshore installations for nesting. Opportunistic species such as kittiwake and herring gull are utilising artificial nest locations and successfully rearing chicks. In some instances, colonies of several hundred birds have established and return each year. Although for most offshore platforms, the number of breeding birds remains very low.

Prior to the commencement of decommissioning activities, assurances must be made that any potential adverse impacts associated with the activities will be minimised with respect to protected species such as seabirds.

5.4.1 Legislative Context

Harbour is fully aware of their responsibilities under the following legislative expectations and requirements. The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) transpose the European Union ('EU') Wild Birds Directive and secure protection of wild birds, their eggs and nests in the offshore marine area, including offshore marine installations. It is an offence under Regulation 40 to deliberately injure, kill or disturb any wild bird or take, damage or destroy the nest whilst in use or being built or take or destroy an egg.

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 amend the 2017 Regulations to ensure that the transposition of the Wild Birds Directive (and Habitats Directive) continues to be operable upon the UK's exit from the EU. The transposition note for the 2017 Regulations indicates that it was intended that Regulation 40 would transpose Article 5 of the Wild Birds Directive so despite deliberate disturbance not being specified it is intended it should be included [57].

5.4.2 Guidance Recommendations

Recent decommissioning operations in the UKCS have reported significant numbers of kittiwake nests on the cardinal faces and undersides of certain platforms. They are colonial nesters and readily utilise offshore platforms as an artificial cliff habitat.

Current advice from JNCC requests that all platforms that will have significant decommissioning operations planned within the following years breeding period, should have a survey undertaken to assess the extent of kittiwakes nesting on the platform. The survey methodology however is applicable to all potential nesting seabirds offshore.

An awareness of the birds utilising the platform will allow the operator the opportunity to implement a deterrence strategy, and/or apply for a licence to disturb if operations will lead to disturbance of nests that cannot be mitigated against. The survey data can be used to inform the planning and scheduling of works to avoid the risk of an offence and/or to determine whether a disturbance licence needs to be sought from OPRED.

5.4.3 Description and quantification of impact

The EIS is an important foraging ground for several seabird species. Table 5.4.1 shows a list of more common species typically recorded in the EIS. Of these species only three have been recorded nesting on offshore platforms on the UKCS: kittiwake, lesser black-backed gull, and herring gull.

Table 5.4.1 List of common seabird species recorded in the EIS	
Species common name	Scientific name
Black-headed gull	*Chroicocephalus ridibundus*
Black-legged kittiwake	*Rissa tridactyla*
Common Guillemot	*Uria aalge*
Common Gull	*Larus canus*
Common tern	*Sterna hirundo*
Cormorant	*Carbo carbo*
Gannet	*Morus bassanus*
Great black-backed gull	*Larus marinus*
Great skua	*Stercorarius skua*
Herring gull	*Larus smithsonianus*
Lesser black-backed gull	*Larus fuscus*
Little gull	*Hydrocoloeus minutus*
Manx shearwater	*Puffinus Puffinus*
Northern fulmar	*Fulmarus glacialis*
Razorbill	*Alca torda*
Sandwich tern	*Thalasseus sandvicensis*
Sooty shearwater	*Ardenna grisea*

5.4.4 Mitigation measures

Harbour have implemented an internal team to discuss all aspects of bird management applicable to decommissioning operations. The remit of this team's work is to:

- Plan and arrange seasonal surveys until removal;
- Explore technological opportunities for evidence gathering; and
- Develop bird management plans.

Harbour will liaise with OPRED and JNCC to confirm expectations and licensing requirements based on the nest status and scheduling, as appropriate.

5.4.5 Cumulative impact

There are no clear cumulative impacts associated with the disturbance or abandonment of nests on platforms in the EIS.

5.4.6 Transboundary impact

There are no transboundary impacts associated with the disturbance or abandonment of nests on platforms in the EIS.

5.4.7 Residual impact

Receptor	Consequence	Likelihood
Seabirds nesting on EIS platforms	Medium	Improbable
Rationale		
Decommissioning activities within the EIS will result in the disturbance/abandonment of nests if works or removal operations coincide with breeding periods of seabird species in UK waters. The main receptor for this disturbance will most likely be kittiwakes, lesser black-backed gull and herring gulls, although other species cannot be discounted. The risk of either loss of nesting habitat or abandonment of eggs / fledglings is sufficiently low and localised that the impact to the local population is considered temporary, highly localised and largely undetectable against natural variation. The consequence on seabird populations is ranked as medium. However, with Harbour's mitigation measures in place as outlined in Section 5.4.4 will ensure that the consequence on seabird populations is minimised. The results of future nesting surveys will also be taken into consideration. Following considered remedial strategies and scheduling to avoid bird breeding periods where possible, the likelihood of occurrence is improbable. This impact can only happen should any potential deterrence strategies fail. Therefore, combining the above, the risk significance is defined as low and thus not significant.		

Risk significance	Impact significance
Low	Not significant

6 Conclusions

The Calder, Dalton and Millom infrastructure is located in the East Irish Sea and consists of a number of fields and facilities. This EA addresses the environmental impacts associated with the decommissioning of the EIS infrastructure, which consists of the Calder, Dalton and Millom Fields and their associated infrastructure.

A CA was completed to determine the appropriate decommissioning methods for all items associated with the asset. Full removal of all surface installations, subsea installations and surface-laid pipelines and cables within the EIS will be undertaken, in line with the Guidance [3]. With regards to pipelines, umbilicals and cables, the preferred option is to decommission buried pipelines and cables be decommissioned *in situ*, with ends cut and remediated, and any exposures or spans remediated.

Following detailed review of the proposed project activities, the environmental sensitivities characteristic of the project area, industry experience with decommissioning activities and of stakeholder concerns, it was determined that assessment of the following issues was required to properly define the potential impacts associated with the EIS decommissioning activities:

- Seabed disturbance (Section 5.2);
- Physical presence of subsea infrastructure decommissioned *in situ* (Section 5.3); and
- Disturbance to nesting seabirds (Section 5.4).

A review of each of these potentially significant environmental interactions has been completed and the results have been summarised below.

Seabed disturbance was assessed due to the nature of the proposed activities and the location of the EIS to multiple designated sites of conservational importance. The proposed decommissioning activities may impact a temporary (direct and indirect) area of 0.14 km^2 of EIS seabed habitat, with an additional area of 0.004 km^2 of permanent impact associated with rock remediation. As a worst-case, should overtrawl trials be required, the temporary (direct) disturbance would be in the region of 3.14 km^2. While the activities may result in the mortality of some individuals, many of the taxa within the EIS area are relatively resilient; sandy communities are comparatively quick to recover from disturbance. In the scenario that an overtrawl survey is required, consultations with OPRED and relevant stakeholders (i.e., NFFO and JNCC) would be held to discuss the best approach to ensure the survey meets the requirements for clear seabed verification. This will take the environmental sensitivities of the area into account as it is recognised that some of the decommissioning activities will be occurring in the Morecambe Bay and Duddon Estuary SPA. With regards to the sediment and benthic features within area, the EIS activities are unlikely to affect the natural physical processes of the area. Pipelines being decommissioned *in situ* are also unlikely to have an impact on these processes and their gradual degradation over time will have a negligible impact on the surrounding sediments. Overall, due to the duration and highly localised spatial scale on which the impacts will be occurring in the context of the wider available sandy habitat, the impact is considered **not significant**.

The potential impacts identified to commercial fisheries were limited to the potential for legacy impacts such as the snagging of fishing gears due to the **physical presence of infrastructure decommissioned *in situ***, and any snagging risk due to existing seabed depressions. Most pipelines within the EIS are stably buried to a suitable depth. The results of acoustic monitoring surveys conducted on several occasions since 2007, have shown that none of the pipelines have been found to be exposed along their length except for the two Calder pipelines PL1965 and PL1966, where they cross the IOM Interconnector cable, and where they themselves are crossed by the various wind farm cables. In 2014 and 2017, near the IOM Interconnector, there were also observations of unsupported sections of the pipeline of 25 m long and 7.2 m long. Neither PL1965 and PL1966 nor the other infrastructure are located near areas of high intensity trawling. Owing to the nature of the seabed and physical processes in the EIS, depressions are likely to become backfilled over time and the incidence of a snagging event is highly unlikely. In 2022, unsupported sections of the pipelines 18 m long was observed. However, the 2022 survey was considered incomplete as the survey did not cover the full length of the pipelines. The burial status of the pipeline(s) will be confirmed via future surveys. Overall, due to the improbability of such a snagging event occurring, the impact is considered **not significant**.

Decommissioning activities within the EIS may result in **disturbance to nesting seabirds** if works or removal operations coincide with breeding periods of seabird species in UK waters. However, following Harbour's bird management plan, disturbance or forced nest abandonment will be reduced to ALARP. The consequence on seabird populations will be highly localised and generate a low impact to the local population through the relatively low predicted loss of nesting habitat. Furthermore, impacts may only occur any potential deterrence strategies are unsuccessful. The overall impact of decommissioning activities on nesting seabirds is currently considered **not significant** and should this outcome change in the wake of future survey effort, this will be communicated to OPRED.

Finally, this EA has considered the objectives and marine planning policies of the Northwest Inshore and Northwest Offshore Marine Plans across the range of policy topics including biodiversity, natural heritage, cumulative impacts and oil and gas. It has also considered the Qualifying Features and Conservation objectives of the protected areas in context with proximity to the activities. Harbour considers that the proposed decommissioning activities are in broad alignment with such objectives and policies.

In summary, the proposed operations have been rigorously assessed through the CA and EA, resulting in a set of selected decommissioning options which are thought to present the least risk of environmental impact whilst satisfying safety risk, technical feasibility, societal impacts and economic requirements. Based on the findings of this EA and the identification and subsequent application of the mitigation measures identified for each potentially significant environmental impact (which will be managed through Harbour's EMS), it is concluded that the proposed activities will result in no significant environmental impact.

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8 Appendix A: EA Method

Appendix A.1 Impact identification

An EA in support of a Decommissioning Programme should be focused on the key issues related to the specific activities proposed; the impact assessment write-up should be proportionate to the scale of the project and to the environmental sensitivities of the project area. This does not mean, however, that the impact assessment process should be any less robust than for a statutory EIA or consider any fewer impact mechanisms. To this end, an environmental impact identification (ENVID) exercise (Appendix D: ENVID) was undertaken early in the EA process. This exercise identified the key environmental sensitivities, discussed the sources of potential impact and identified those aspects which required further assessment and those which could be scoped out. The decision on which issues required further assessment was based on:

- Specific proposed activities and sensitive environmental receptors;
- A review of industry experience of decommissioning impact assessment; and
- An assessment of wider stakeholder interest

Appendix A.2 Environmental significance

For the potential sources of impact that were assessed in this EA, it is important that a conclusion is reached regarding whether the impact is likely to result in a substantive change to environmental and societal conditions. During EA, there are many ways this can be done; a common approach is to define ‘significance’, and this approach is taken here. However, it is equally appropriate to employ some other method; the key is that the methods used for identifying and assessing significance are transparent and verifiable.

The first step is to assign a prediction of likelihood is assigned as per Table A.3.1, this indicates the frequency of the impact mechanism occurring during the project activities (as opposed to the likelihood of a subsequent impact occurring). The next step is to assign a prediction of consequence of environmental and societal impact, based on the criteria presented in Table A.3.2. These criteria recognise the likely effectiveness of planned mitigation measures to minimise or eliminate potential impact; as such, they represent an impact where mitigation has been taken into account. The consequence and likelihood criteria are then combined as per Table A.3.3 to give an overall risk score. This risk score is compared against the criteria presented in Table A.3.4 to give a conclusion regarding significance. In cases where the impact is considered significant, further measures to remove, reduce or manage the impact to a point where the resulting residual significance is at an acceptable level must be adopted and the steps above repeated.

Appendix A.3 Significance determination method

Table A.3.1 Definition of likelihood			
Category	One-word descriptor	Description	Quantitative range per year
5	Frequent	• - Likely to occur several times a year; • - Very high likelihood or level of uncertainty	<10^{-1}
4	Probable	• - Expected to occur at least once in 10 years; • - High likelihood or level of uncertainty	10^{-3} to 10^{-1}
3	Rare	• - Occurrence considered rare; • - Moderate likelihood or level of uncertainty.	10^{-4} to 10^{-3}
2	Remote	• - Not expected nor anticipated to occur; • - Low likelihood or level of uncertainty.	10^{-6} to 10^{-4}
1	Improbable	• - Virtually impossible and unrealistic; • - Very low likelihood or level of uncertainty	<10^{-6}

Table A.3.2 Definition of Consequence				
Category	Socio-cultural economic impact	Biodiversity impact	Remediation cost	Negative public image exposure
5	- Permanent loss of access or use of area with permanent reduction in associated community; - Major economic impact to surrounding community; Irrevocable loss of culture resources; - Irrevocable loss of culture resources; - Scale typically widespread (national or greater level).	Very High: - Catastrophic loss of natural resources or biodiversity typically over a widespread area, with permanent or long-term consequences; and/or - Irrevocable loss of regionally unique habitat, legally designated conservation site or intact ecosystems; - No mitigation possible	>$10,000,000	International Coverage
4	- Permanent partial restriction on access or use, or total restriction >10 years in duration; - Temporary reduction in quality of life >10 years durations; -Harm to cultural resources requiring major mitigation; -Scale typically regional to national level.	High: - Persistent environmental degradation within and beyond the project area, typically with prospects of short-to-medium term recovery if the cause of the impact is removed or by natural abatement process and/or; - Serious loss (>50%) of unique habitat or legally designated conservation site or intact ecosystems within area of study;	$1,000,000 to $10,000,000	National Coverage

Table A.3.2 Definition of Consequence				
Category	Socio-cultural economic impact	Biodiversity impact	Remediation cost	Negative public image exposure
		- Mitigation only possible through prolonged and resource intensive effort (>50 years).		
3	- Temporary restriction <10 years in duration with a moderate reduction in usage levels or quality of life; - Harm to cultural resources recoverable through moderate mitigation efforts; - Scale typically local to regional level.	Medium: - Persistent environmental degradation within and close to the project area, localised within defined areas, typically with prospects of rapid recovery if cause of the impact is removed or by natural abatement processes and/or; - Temporary, but reversible loss (>25% to 50%) of unique habitat or legally designated conservation site or intact ecosystems within area of study; - Moderate mitigation efforts required (>1 to 50 years).	$100,000 to $10,000,000	Regional Coverage
2	- Best restriction <5 years in duration with a minor reduction in usage levels or quality of life; - Minor harm to cultural resources that is recoverable through minor mitigation efforts; - Scale typically localised.	Low: - Temporary environmental degradation, typically within and close to project area, with good prospects of short-term recovery; and/or - Brief, but reversible loss (>10% to 25%) of unique habitat or legally designated conservation site or intact ecosystems within area of study; - Minor mitigation efforts required (<1 year).	$10,000 to $100,000	Local Coverage
1	- Restrictions on access without loss of resources; Temporary but fully reversible impacts on quality of life; - Minor impact on cultural resources; - Typically transient and highly localised.	Negligible: - Highly transitory or highly localised environmental degradation typically contained within the project area and noticeable/measurable against background only within or in very close proximity to the project area; and/or - Some minor loss (<10%) of unique habitat or legally designated conservation site or intact ecosystems within area of study;	$0 to $10,000	No Outside Coverage

Table A.3.2 Definition of Consequence				
Category	Socio-cultural economic impact	Biodiversity impact	Remediation cost	Negative public image exposure
		- Naturally and completely reversible.		

Table A.3.3 Risk Matrix						
Likelihood	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Consequence Category Note: Biodiversity and/or socioeconomic considerations take precedence: for all other factors, worst-case score is assumed from severity descriptions				

Table A.3.4 Definition of significance		
Score	Risk category	Significance
IV: 17-25	High Risk. Manage risk utilising prevention and/or mitigation with highest priority. Promote issues to appropriate management level with commensurate risk assessment detail.	Significant
III: 12-16	Medium Risk. Manage risk utilising prevention and/or mitigation with priority. Promote issue to appropriate management level with commensurate risk assessment detail.	Significant
II: 5-10	Minor Risk with controls verified. No mitigation required where controls can be verified as functional.	Not significant
I: 1-4	Low Risk. No mitigation required.	Not significant

Appendix A.4 Impact identification outcome

Having used the method outlined throughout Appendix A: EA Method, each possible impact associated with the decommissioning is considered against the understanding of the environmental and societal baseline conditions for the area (Section 4). Each impact is scoped in or out of further assessment. A justification is provided for each impact scoped out. Section 5 of this EA contains the Impact Assessment for the EIS decommissioning, with Section 5.1 providing a justification for aspects scoped out.

9 Appendix B: Item inventory

Surface installations & stabilisation	
Description	Location
	WGS84 Decimal
	WGS84 Decimal Minute
Calder platform SIP	53.809464° N 03.661811° W
	53°48.5678' N 03°39.7087' W
Fronded mattresses	As above.
Deposited rock	As above.
Millom West, SIP	54.028217° N 03.860114° W
	54°1.6930' N 03°51.6068' W
Fronded mattresses	As above.
Deposited rock	As above.

NOTES
1. Fronded mattresses have not been found on 'as-built' drawings so they may or may not be present. This is to be determined at the time of decommissioning operations;
2. The dimensions of the deposited rock are based on an interpretation of survey information. The estimated mass is calculated by volume multiplied by a density of 1.85Te/m^3 in air;
3. If protection and stabilisation features are not listed in this table, according to the documentation reviewed they were not installed.

Dalton subsea installation information			
Subsea installations incl. stabilisation features	No.	Location	
		WGS84 Decimal	WGS84 Decimal Minute
Dalton R1 WHPS			
Dalton R1 WHPS	1	53.905465° N 03.721955° W	53°54.3279' N 03°43.3173' W
Concrete mattresses (6m x 3m x 0.15m)	7	As above	As above
Dalton R2 WHPS			
Dalton R2 Dual WHPS	1	53.897520° N 03.723521° W	53°53.8512' N 03°43.4113' W
Concrete mattresses (6m x 3m x 0.15m)	8	As R2	As R2
Dalton PLEM			
Dalton PLEM	1	54.028217° N 03.860114° W	54°1.6930' N 03°51.6068' W

NOTES
1. According to the documentation reviewed no grout bags were installed, and no deposited rock was used.
2. According to the documentation reviewed there are no protection or stabilisation features associated with the Dalton PLEM.

Millom subsea installation information			
Subsea installations incl. stabilisation features	No.	Location	
		WGS84 Decimal	WGS84 Decimal Minute
Millom Q1 WHPS			
Millom Q1 WHPS	1	54.012045° N 03.771144° W	54°0.7227' N 03°46.2687' W
Concrete mattresses (6m x 3m x 0.15m)	8	As above	As above
Millom Q2 WHPS			
Millom Q2 WHPS	1	54.012651° N 03.769991° W	54°0.7590' N 03°46.1995' W
Millom Q3 WHPS			
Millom Q3 WHPS	1	54.012678° N 03.768192° W	54°0.7607' N 03°46.0915' W
Fronded concrete mattresses (6m x 3m x 0.15m)	9	As above	As above
Millom PLEM			
Millom East PLEM	1	54.011795° N 03.770970° W	54°0.7077' N 03°46.2582' W
Shaped and fronded grout bags (1.4m x 1.2 x 0.9m)	27	As above	As above
NOTES 1. According to the documentation reviewed no concrete mattresses were installed around Q2, no grout bags were installed at any of the WHPS, and no deposited rock was used. 2. No details have been found for the 2x 'pin piles' retrofitted to anchor the WHPS at Q2.			

Calder pipeline crossings		
Pipeline description	Location	Protection / comment
ISLE OF MAN INTERCONNECTOR CABLE		
PL1965 & PL1966 cross over the Isle of Man Interconnector Cable	KP15.992 469549.78 E 5968680.71 N	Concrete mattresses. Refer Table 3.4.1 and Figure 3.4.1.
WINDFARM CABLE CROSSINGS		
Walney 3 windfarm cable crossing	KP23.2	Deposited rock between KP23.229 - KP23.202
Walney 3 windfarm cable crossing	KP23.3	Deposited rock between KP23.322 - KP23.347
Walney 3 windfarm cable crossing	KP23.6	Deposited rock between KP23.616 - KP23.646
Walney windfarm cable crossing	KP27.6	Deposited rock between KP31.551 - KP31.578
West of Duddon Sands windfarm cable crossing	KP35.6	Deposited rock between KP35.586 - KP35.608
West of Duddon sands windfarm cable crossing	KP35.7	Deposited rock between KP35.683 - KP35.707
Ormonde offshore windfarm cable crossing	KP35.9	Deposited rock between KP35.898 - KP35.937
NOTES: 1. All windfarm cables cross over PL1965 & PL1966. 2. KP measured from the start of the pipeline at Calder platform. 3. The KP for windfarm crossings are estimates, based on acoustic survey data.		

Dalton pipeline crossings		
Pipeline description	Location	Protection / comment
NORTH MORECAMBE DPPA 500M ZONE		
PL1668 & PL1671 are crossed over by Rhyl PL2969	~KP7.2	Concrete mattresses and probably grout bags. Refer Figure 3.4.2.
OUTSIDE NORTH MORECAMBE 500M ZONE		
IOM Interconnector Cable crosses over PL1668 (Note)	~KP7.47 455654.62 E 5978710.60 N	3x 5m x 2.5m x 0.15m concrete mattresses
IOM Interconnector Cable crosses over PL1671 (Note)	~KP0.8 455663.31 E 5978716.60 N	5x 5m x 2.5m x 0.15m concrete mattresses (3x inside trench, buried,2x on seabed)

Dalton pipeline crossings
NOTE: The Isle of Man Interconnector was installed after the Dalton infrastructure. According to the documentation reviewed the seabed was excavated to the top of the pipeline and umbilical and 3x mattresses were installed inside the trench to provide a minimum 300mm separation between the IOM Interconnector Cable and the 12in pipeline and umbilical. For the umbilical 2x concrete mattresses were installed on the seabed as 'gateway' markers. The KP locations are approximate and based on the UTM Coordinates of North Morecambe relative to the 12in pipeline and umbilical.

Millom pipeline crossings		
Pipeline description	Location	Protection / comment
MILLOM EAST 500M ZONE		
PL1873 & PLU1874 cross over PL1678 near Millom PLEM.	Millom East 500m zone	Refer Figure 3.2.3. Both sets of pipelines are dealt with in the DP [43].
PL1873 & PLU1874 cross over PL1674 near Millom PLEM.	Millom East 500m zone	Refer Figure 3.2.3. Both sets of pipelines are dealt with in the DP [43].
PL1980 and PLU1678JQ3 over PL1674 near Millom East PLEM	Millom East 500m zone	Refer Figure 3.2.3. Both sets of pipelines are dealt with in the DP [43].
PL1980 and PLU1678JQ3 over PL1678 near Millom East PLEM	Millom East 500m zone	Refer Figure 3.2.3. Both sets of pipelines are dealt with in the DP [43].

Crossans well information			
Well ID	Designation	Status	Category of Well
110/02b-10	Exploration	Decommissioned, AB1	SS-3-4-2
Darwen well information			
Well ID	Designation	Status	Category of Well
110/08a-4	Exploration	Decommissioned, AB1	SS-4-0-2
110/08c-6	Appraisal	Decommissioned, AB3	n/a
110/08c-6Z	Appraisal	Decommissioned, AB3	n/a
NOTES: For details of well categorisation please refer the latest version of the Oil and Gas UK Guidelines for the Decommissioning of wells.			

Calder well information			
Well ID	Designation	Status	Category of Well
110/07a-T1	Production	Decommissioned, AB1	PL-0-0-2
110/07a-T1Z	Production	Operating	PL-3-0-2
110/07a-T2	Production	Operating	PL-3-0-2
110/07a-T3	Production	Operating	PL-3-0-2

Dalton well information			
Well ID	Designation	Status	Category of Well
110/02b-R1	Production	Completed, Shut-in	SS-3-0-2
110/02b-9 (R2)	Production	Completed, Shut-in	SS-3-0-2
110/02b-R3	Production	Decommissioned, AB3	n/a
110/02b-R3Y	Production	Decommissioned, AB3	n/a
110/02b-R3Z	Production	Decommissioned, AB3	n/a

Millom well information			
Well ID	Designation	Status	Category of Well
113/26a-2	Appraisal	Decommissioned, AB3	n/a
113/26a-P1	Production	Completed, Shut-in	PL-3-0-2
113/26a-P2	Production	Completed, Shut-in	PL-3-0-2
113/26a-P2Y	Production	Completed, Shut-in	PL-3-0-2
113/26a-P2Z	Production	Decommissioned, AB1	PL-3-0-2
113/26a-P3	Production	Completed, Shut-in	PL-3-0-2
113/26a-P3Z	Production	Completed, Shut-in	PL-3-0-2
113/26a-P4	Production	Completed, Shut-in	PL-4-0-2
113/26a-P4X	Production	Completed, Shut-in	PL-4-0-2
113/26a-P4Y	Production	Decommissioned, AB1	PL-4-0-2
113/26a-P4Z	Production	Completed, Shut-in	PL-4-0-2
113/27a-4	Production	Decommissioned, AB1	SS-0-0-2
113/27a-5	Appraisal	Decommissioned, AB3	n/a
113/27a-4Z (Q1)	Production	Completed, Shut-in	SS-3-0-2
113/27a-Q2	Production	Completed, Shut-in	SS-3-0-2
113/27a-Q2Y	Production	Completed, Shut-in	SS-3-0-2
113/27a-Q2Z	Production	Completed, Shut-in	SS-3-0-2
113/27a-Q3	Production	Completed, Shut-in	SS-3-0-2

Other well information			
Well ID	Designation	Status	Category of Well
110/02b-11	Exploration	Decommissioned, AB3	n/a
110/07-1	Exploration	Decommissioned, AB3	n/a
110/07-2	Exploration	Decommissioned, AB3	n/a
110/07-3	Exploration	Decommissioned, AB3	n/a
110/07a-4	Appraisal	Decommissioned, AB3	n/a
110/07a-5	Exploration	Decommissioned, AB3	n/a
110/07a-7	Exploration	Decommissioned, AB3	n/a
110/07a-8	Appraisal	Decommissioned, AB3	n/a
110-07b-6	Exploration	Decommissioned, AB3	n/a
110/08-3	Exploration	Decommissioned, AB3	n/a
110/08a-5	Exploration	Decommissioned, AB3	n/a
110/09-1	Exploration	Decommissioned, AB3	n/a
110/09a-3	Exploration	Decommissioned, AB3	n/a
110/11-1	Exploration	Decommissioned, AB3	n/a
110/11-2	Exploration	Decommissioned, AB3	n/a
110/12a-1	Exploration	Decommissioned, AB3	n/a
110/14-2	Exploration	Decommissioned, AB3	n/a
110/14-4	Exploration	Decommissioned, AB3	n/a
110/14-5	Exploration	Decommissioned, AB3	n/a
113/22-1	Exploration	Decommissioned, AB3	n/a
113/22-1Z	Exploration	Decommissioned, AB3	n/a
113/26-1	Exploration	Decommissioned, AB3	n/a
113/27-1	Exploration	Decommissioned, AB3	n/a
113/27-2	Exploration	Decommissioned, AB3	n/a
113/27-3	Exploration	Decommissioned, AB3	n/a

Harbour Energy

10 Appendix C: HSE Policy

Harbour Energy

Health, Safety, Environment and Security

Policy

Harbour Energy is committed to operating responsibly and securely, never compromising our Health, Safety, Environmental or Security (HSES) standards. Harbour Energy will do all that is reasonably practicable to reduce HSES risks, ensure the safety and security of everyone affected by our operations, protect the environment by minimising our environmental impacts, and protect our assets and business data.

To achieve this Harbour Energy will:

- Provide strong, visible leadership and commitment at all levels of the business
- Effectively identify hazards, threats and vulnerabilities to assess and manage risks
- Meet or surpass our legal and other requirements (e.g., compliance obligations)
- Set objectives and targets to drive improvement
- Support and train our people and assure their competence
- Provide appropriate resources
- Encourage open and honest communication
- Effectively manage the HSES risks associated with contracted work
- Maintain safe, clean, healthy and secure workplaces to protect our people, environment, assets and data
- Maintain protected high quality documented systems and processes
- Plan and prepare for potential emergencies
- Report, investigate and learn from any incidents and near misses
- Routinely inspect the workplace and audit systems and processes
- Seek opportunities to continually improve our performance

It is the responsibility of everyone in Harbour Energy to conform to our Policies and Standards and to assist the business in their implementation.

Linda Z Cook
CEO Harbour Energy plc
01 April 2021

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11 Appendix D: ENVID

Project Activity	Detailed Activity	Summary of Environmental Impact/ Location-Specific Sensitive Habitats and Species	Controls, Mitigations and Ranking								Actions	
			Existing controls - Industry Standard, Legislative or Prescriptive	Initial Ranking taking into account existing controls and mitigation			Project Specific and Harbour Best Practice	Final Ranking taking into account project-specific controls and mitigation			Comments	Taken Forward for Further Assessment?
				Consequence	Likelihood	Initial Risk / Impact Ranking		Consequence	Likelihood	Final Risk / Impact Ranking		
Preparatory activities	**Engineering down and cleaning**	**Discharges to Sea** Flushing/ cleaning operations for topsides, installations and pipelines- discharge targeted 30ppm Liquid discharge to sea - Water quality in immediate vicinity of discharge will be reduced slightly, but effects are usually minimised by rapid dilution in massive receiving body of water; planktonic organisms most vulnerable receptor. Potential NORM impacts.	- Controls will be in place, as relevant, through the Offshore Chemical Regulations and the Oil Pollution Prevention and Control regulations. - Work will be undertaken within permit consent agreement limits. - Any chemical and solids would be collected, skipped and shipped to shore for treatment and disposal.	1	5	5	- Procedural cleaning and/or containment process. - Maintenance procedures. - Bulk handling procedures and personnel training. - Vessels will be selected which comply with IMO/MCA codes for prevention of oil pollution. - Preferred operational procedures to be in place onboard vessels including use of drip trays under valves, use of pumps to decant lubricating oils, use of lockable valves on storage tanks and drums. - Chemical storage areas contained to prevent accidental release of chemicals. - Pre-mobilisation audits will be carried out including a comprehensive review of spill prevention procedures - Arrangements in place to track spills. -Residuals at cut ends released into the marine environment (post-flushing - should be low).	1	4	4	- These are routine operations and will be conducted within the agreed permit conditions and using Harbours procedural cleaning and containment processes. - Any residual material will be in trace levels/volumes following the DFPV regime and will not pose any significant risk to water quality. - Well cleaning is out with the scope of this EA and will be covered by its own permitting regime.	**No**
Power Generation	**Project Emissions**	**Gaseous emissions to atmosphere and energy use** Increased degradation of local/regional air quality (NOx and particulates). Transboundary air pollution. Contributing to global warming (CO2).	Emissions during decommissioning activities will occur in the context of the cessation of production. As such, almost all future emissions (from Project operations and vessels) will cease. - MARPOL compliance. - UKAPP compliance for vessels.	1	5	5	- Low sulphur diesel. - Contractor selection - maintenance programmes and audits. - Campaign, logistics, sharing vessels optimising vessels to minimise use where possible.	1	4	4	Emissions values will be included but will very likely represent a negligible proportion of all operational O&G UKCS emissions over the year.	**No**

	Project Energy Use	**Resource Use** Impact on climate change and reduction of resources of hydrocarbons. Some materials decommissioned *in situ* and some materials available for recycling.	- Energy use during decommissioning activities will occur in the context of the cessation of production. As such, almost all resource use (from Project operations, vessels and materials) will cease.	1	5	5	- Campaign, logistics, sharing vessels, optimising vessels to minimise use where possible. - Observing the Waste Hierarchy	1	4	4	Energy value likely to be small. Replacement of materials decommissioned *in situ* is a theoretical value to replace the amount which would otherwise be recycled.	**No**
Vessel Use	**Vessel Engine Noise**	**Underwater Noise** Physiological harm, behavioural modifications to marine mammals and potentially fish. Population impacts due to cumulative impact or impacting a reproductively significant number of individuals or location. Heavy lift vessels are most likely to be equipped with dynamic positioning.	- Comparable with operational background vessel noise.	2	5	10	- Campaign, logistics, sharing vessels optimising vessels to minimise use where possible - Main potential impact likely to be from disturbance rather than injury - Contractor selection - Minimising the duration, disturbance and risk of requiring the activity to be repeated.	1	5	5	Not deemed to be significant in relation to current vessel activity already being moderate, activities are far from shore and not in the vicinity of key areas for receptors and that the planned activities will be short in duration. Anglesey Marine SAC is > 100 km from EIS infrastructure, which is for this not to be affected detrimentally. Low density (0.086 animals/km^2) of harbour porpoise occur in the project area, which is relatively low compared to other areas of the UKCS.	**No**
	Vessel Discharges	**Discharges to Sea** (e.g. grey water, blackwater, ballast)	Routine discharges from vessels are typically well-controlled activities that are managed on an ongoing basis under MARPOL Annex IV.	1	5	5	- Procedural cleaning and/or containment process. - Maintenance procedures - Bulk handling procedures and personnel training	1	4	4	These are routine operations and will be conducted within the agreed permit conditions and using the vessel procedural cleaning and containment processes.	**No**
	Vessel Physical Presence	**Other Users** e.g. Fisheries, Recreational users	- Limited duration. - Stakeholder engagement. - Existing controls through the Consent to Locate process. - UKHO standard communication channels including Kingfisher, Notice to Mariners and radio navigation warnings.	1	5	5	Campaign logistics and sharing vessels where possible - Collision risk assessment. - Stakeholder consultation. - Logistics plan.	1	3	3	Not expected to be significant over normal vessel traffic and implementation of notifications etc.	**No**
Topside, Jacket and Subsea Infrastructure Decommissioning	**Cutting and Removal**	**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.	- Intermittent and single source noise that is limited in duration	2	5	10	- Main potential impact likely to be from disturbance rather than injury. - Suitable technology for cutting will be selected to ensure the effectiveness of the cutting (likely to use diamond wire or similar mechanical form of cutting). - Minimising the duration, disturbance and risk of requiring the activity to be repeated.	1	5	5	Planned activities will be short in duration and carried out in isolation. External cutting represents a worst-case scenario. Low density (0.086 animals/km^2) of harbour porpoise occur in the project area, which is relatively low compared to other areas of the UKCS.	**No**

							- Use of internal cutting where possible and external cutting methods as a contingency.					
		Seabed disturbance Disturbance to the seabed, including to features of conservation importance during removal 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.	- Pre-decommissioning seabed surveys - Stakeholder consultation	3	5	15	- Review of survey data for potential sensitive habitats of seabed. - Cutting and lifting operations controlled by ROV. - Internal cutting will be used preferentially where access is available. - Heavy lift vessels are likely to be equipped with dynamic positioning (DP) rather than relying on anchors to remain in position.	3	5	15	No evidence of *S. spinulosa* or *A. islandica* aggregations within the EIS, but there are confirmed widespread presence of 'seapens and burrowing megafauna communities' Deemed to be a minor risk and therefore insignificant. Potential stakeholder concern due to proximity to designated areas of conservational importance and impact on features of conservation importance including sessile and mobile organisms, therefore scoped in for further assessment.	**Yes**
		Blue Carbon (linked to seabed disturbance) Disturbance to top layers of sediment during removal activities, leading to the release of a potential carbon store	- Pre-decommissioning seabed surveys - Stakeholder consultation	1	5	5	- Review of survey data for potential sensitive habitats of seabed. - Cutting and lifting operations controlled by ROV. - Internal cutting will be used preferentially where access is available. - Heavy lift vessels are likely to be equipped with dynamic positioning (DP) rather than relying on anchors to remain in position.	1	3	3	Area of disturbance will be minimal – but due to emerging stakeholder and regulatory interest it will be cumulatively assessed under seabed disturbance.	**Yes (Cumulative)**
		Bird Disturbance All nesting birds and nesting activities are protected from damage by conservation legislation. Under the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2017 – (OMR 17), it is an offence to: 1. Take, damage or destroy the nest of any wild bird while that nest is in use or being built, or 2. Take or destroy an egg of any wild bird**.**	- Preferred approach is to avoid activity during breeding season which is not always practicable - Licensing requirements	3	5	15	- Harbour are committed to deterring birds from their installations out with the breeding season to mitigate against nesting birds on the platform. Harbour are in the process of surveying their installations to identify the presence of any wild birds and if discovered, may employ a range of non-invasive/ non-lethal deterrents to prevent birds nesting. These methods will continue throughout the duration of decommissioning until removal. - Harbour will have a bird management plan in place as agreed with OPRED and JNCC. -Should these measures not prove successful, Harbour will engage with OPRED to agree any further licensing requirements, as appropriate.	3	1	3	Opportunistic species such as Kittiwake and Herring Gull are utilising artificial nest locations and successfully rearing chicks. In some instances, colonies of several hundred birds have established and return each year. SPA proximity designated for high bird presence	**Yes**

Subsea Infrastructure	**Physical presence of free spans/ exposures**	**Other Users** Snagging risk to trawl and other demersal fisheries from pipelines and any sediment berms or depressions. Risk over time due to sediment movement and exposure.	- Seabed clearance certificate required before the 500 m safety zone is opened up for use. - Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned *in situ* location and state - Following seabed clearance, the opening of the subsea 500m zones to other sea users will also have a positive impact.	5	2	10	-Remediation on free spans and exposures - The profile of the rock-placement allow fishing nets to trawl over the rock unobstructed. Suitably graded rock will be used to minimise the risk of snagging fishing gear. - Final visual and/ or overtrawl seabed survey will be undertaken of the 500 m safety zone to ensure that the seabed is cleared for use following decommissioning.	5	1	5	Deemed to be a minor risk and therefore insignificant. Potential Stakeholder concern due to demersal fishery snagging risk, therefore scoped in for further assessment.	**Yes**
	Long term degradation of pipeline decommissioned *in-situ* (offshore)	**Seabed disturbance** Gradual breakdown of pipeline and release of contaminants. Pollution of the marine ecosystem. Organic enrichment and chemical contaminant effects in water column and seabed sediments.	- Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned *in situ* location and state. - The pipelines will be flushed clean of hydrocarbons and toxic materials, then disconnected and sealed.	2	5	10	Same as existing controls	2	5	10	-Not an acute impact as breakdown of components will occur over decades, 100s of years -Effects are usually minimised by rapid dilution in massive receiving body of water - Deemed to be a minor risk and therefore insignificant. Potential stakeholder concern due to proximity to protected areas and impact on features of conservation importance including sessile and mobile organisms, therefore scoped in for further assessment.	**Yes**
	Physical presence of buried pipeline	**Other Users** Risk over time due to nearshore users as pipeline degrades. Safety risk to near shore users.	- Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned *in situ* location and state. - The pipelines will be flushed clean of hydrocarbons and toxic materials, then disconnected and sealed.	5	2	10	Same as existing controls with additional subsidence monitoring where access allows.	5	1	5	Scoped in due to Stakeholder concern.	**Yes**
	Long term degradation of pipeline decommissioned *in-situ* (nearshore/ onshore)	**Seabed disturbance** Gradual breakdown of pipeline and release of contaminants. Pollution of the coastal marine and terrestrial ecosystem. Organic enrichment and chemical contaminant effects in water column and sediments.	- Continued monitoring for an agreed period and remediation if required, accurate mapping of decommissioned *in situ* location and state. - The pipelines will be flushed clean of hydrocarbons and toxic materials, then disconnected and sealed.	2	5	10	Same as existing controls	2	5	10	-Not an acute impact as breakdown of components will occur over decades, 100s of years -Effects are usually minimised by rapid dilution in massive receiving body of water Deemed to be a minor risk and therefore insignificant. Potential stakeholder concern due to proximity to protected areas and impact on features of conservation importance including SPA's (designated for presence of bird feeding grounds)	**Yes**

Pipeline Remediation	**Remediation - Introduction of new substrate**	**Seabed Disturbance** Introduction of new substrate which may alter habitat architecture, influencing water movement, sediment accumulation and light conditions.	- Minimise introduction of material where possible	4	5	20	- A rock-placement vessel or ROV support vessel will be used. The rock mass will be carefully placed over the pipeline end by the use of an ROV-controlled fall pipe equipped with cameras, profilers, pipe tracker and other sensors as required. - Implementation of Harbours Environmental Management Strategy. - Visual surveys of the seabed where possible to locate obstructions and to localise (and minimise) any post-decommissioning overtrawl surveys that may be required.	3	5	15	Deemed to be a medium risk and therefore potentially significant. Potential stakeholder concern due to proximity to multiple designated areas of conservation significance and impact on features of conservation importance including sessile and mobile organisms, therefore scoped in for further assessment.	**Yes**
Drill Cuttings Decommissioning	**Drill cutting disturbance during cutting/ removal activities**	**Discharges to Sea** Planktonic organisms most vulnerable receptor.	- Minimise disturbance to the seabed during decommissioning activities	1	4	4	Overall, environmental baseline surveys indicated that there was no evidence of drilling related hydrocarbon contamination within the EIS	1	4	4	- Effects are usually minimised by rapid dilution in massive receiving body of water. No evidence of drilling related hydrocarbon contamination within the EIS due to dispersal over time in a highly dynamic seabed environment.	**No**
Waste Management		**Waste** Resource use Energy consumption Use of landfill space	- In accordance with the BEIS guidance notes under the Petroleum Act 1998, the disposal of such installations should be governed by the precautionary principle. - Waste Hierarchy				- All waste will be handled and disposed of in line with the Harbour Waste Management Strategy as part of the project Active Waste Management Plan. - Approximately 97% of material recovered will be recycled. A target of less than 3% to go to landfill. - Potential positive impact from recycling of steel. - Selected contractor will be assessed for competence.				Not scored as all will be managed through Harbour's waste management strategy and recorded through the project materials inventory. All waste will be managed in line with current legislation.	**No**
		Waste Waste, including non-hazardous, hazardous, radioactive and marine growth.	- In accordance with the BEIS guidance notes under the Petroleum Act 1998, the disposal of such installations should be governed by the precautionary principle. - Waste Hierarchy - As per the Landfill Directive, pre-treatment will be necessary for most hazardous wastes which are destined to be disposed of to landfill site.				- All waste will be handled and disposed of in line with the Harbour Waste Management Strategy as part of the project Active Waste Management Plan. - There will be an inventory of hazardous waste compiled (including asbestos) to aid the segregation and recycling of waste. - NORM and any other hazardous waste will be dealt with by specialist contractors who will be selected for competence. Quantity of hazardous waste is not expected to be significant. - Inventory of waste - tracking materials to final place				Not scored as all will be managed through Harbour's waste management strategy and recorded through the project materials inventory. All waste will be managed in line with current legislation.	**No**

		Waste Onshore dismantling yard activities including airborne noise, odour, light, dust and aesthetics	- In accordance with the BEIS guidance notes under the Petroleum Act 1998, the disposal of such installations should be governed by the precautionary principle. - Waste Hierarchy - Onshore yards already deal with potential environmental issues as part of their existing site management plans.				- Based on Harbour's contracting strategy, multiple disposal facilities are likely. Whilst the yards are yet to be selected, they will be in the UK or Europe. Harbour's procedures require suitably approved facilities, including site visits, review of permits and consideration of how new facility and construction and design has been developed to minimise impact.				Not scored as all will be managed through Harbour's waste management strategy and recorded through the project materials inventory. All waste will be managed in line with current legislation.	**No**
Unplanned Events	**Loss of containment**	**Accidental Events** Pollution of the marine ecosystem with hydrocarbons Project will introduce new diesel inventory to the site with additional inherent spill / pollution risk e.g. from heavy lift vessel.	- OPEP/SOPEP, including modelling and appropriate response planning - Collision risk assessment - Communication Interface Plan - Navaids used where appropriate	5	2	10	- Vessel diesel inventory expected to be within quantity modelled in OPEP - Maintenance procedures - Bulk handling procedures and personnel training - Vessels will be selected which comply with IMO/MCA codes for prevention of oil pollution - Maintenance procedures - Pre-mobilisation audits will be carried out including a comprehensive review of spill prevention procedures - Arrangements in place to track spills - Adverse weather working procedures - Use of existing 500 m safety exclusion zone at platforms during lifting operations. -Navigation aids, lighting in line with HSE and MCA requirements -500 m safety exclusion zone to remain in operation.	5	1	5	- Well P&A is outside of the scope of this specific impact assessment since it not dependent on approval of the DP. The possibility of a well blowout therefore does not require consideration here. - Reduced to 'as low as reasonably practicable'	**No**
	Dropped objects	**Seabed Disturbance** 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.	- Industry-standard procedures in place to make sure that the location of any lost material is recorded and that significant objects are recovered where practicable.	1	3	3	- Harbour's Environmental Management System. - Procedures will be in place to reduce the potential for dropped objects. - Training and awareness of contractors will be required. - Lift planning will be undertaken to manage risks during lifting activities, including the consideration of prevailing environmental conditions and the use of specialist equipment where appropriate. - All lifting equipment will be tested and certified. - Dropped objects would be recovered where practicable.	1	3	3	Harbour procedures will reduce the potential for dropped objects.	**No**

Appendix E: Energy and Emissions Summary

Appendix E.1 Project Activity

Table E.1.1 Energy and emissions by project activity

Planned activity	Operations energy (GJ)	Operations CO_2 (Te)
Offshore transportation	147,618	10,960
Onshore deconstruction	3,369	ND
Onshore transportation	35	2.5
Recycling of materials	47,145	4,884
New manufacture to replace recyclable materials	590,289	27,607
Total	**788,456**	**43,453**

ND: No conversion factor available

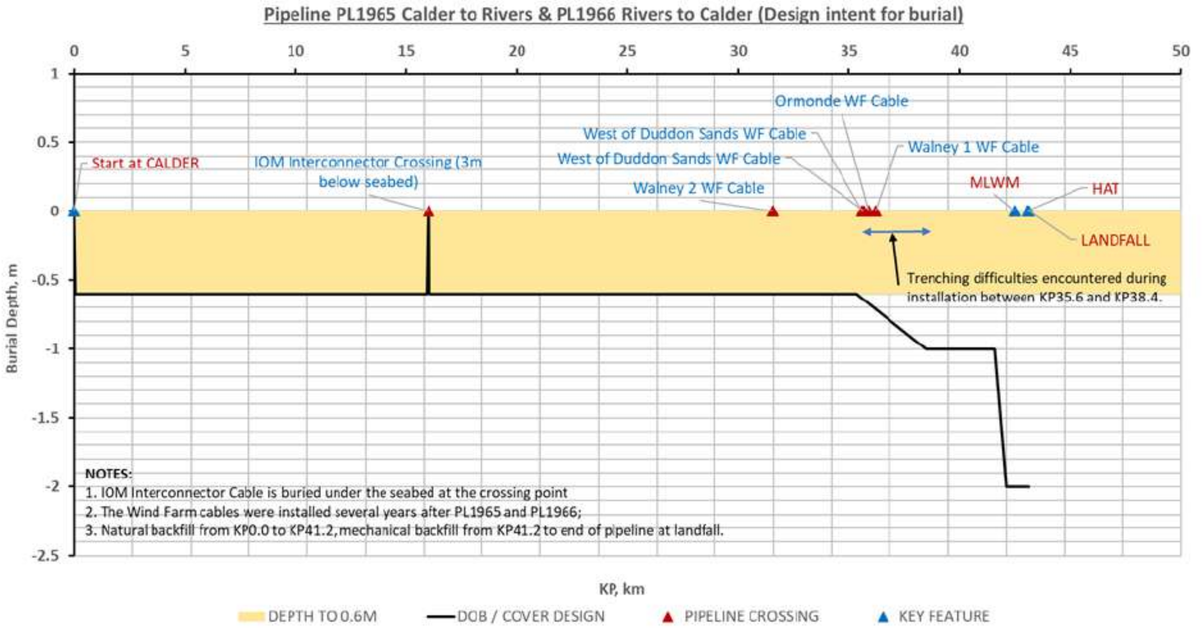
Appendix E.2 Offshore Transport

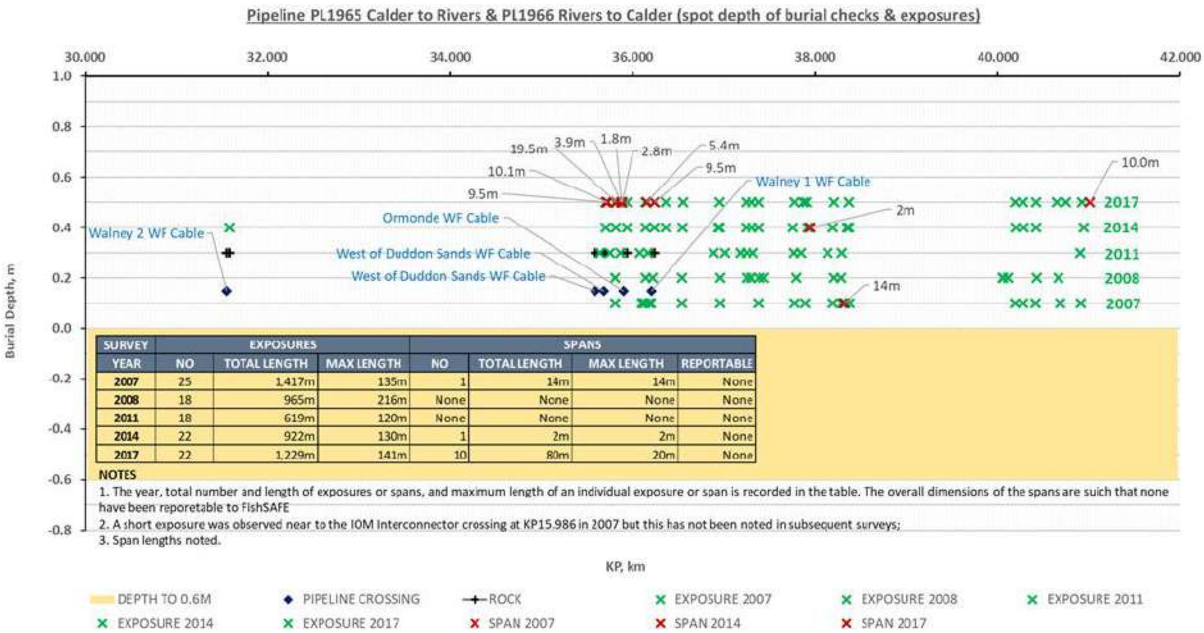
Table E.2.1 Offshore transport energy and emissions

Vessel type	Total duration (days)	Operations energy (GJ)	Operational CO_2 (Te)
HLV	56	**147,618**	**10,960**
CSV	21		
DSV	68		
Supply Vessel	10		
Guard Vessel	44		
Survey Vessel	26		

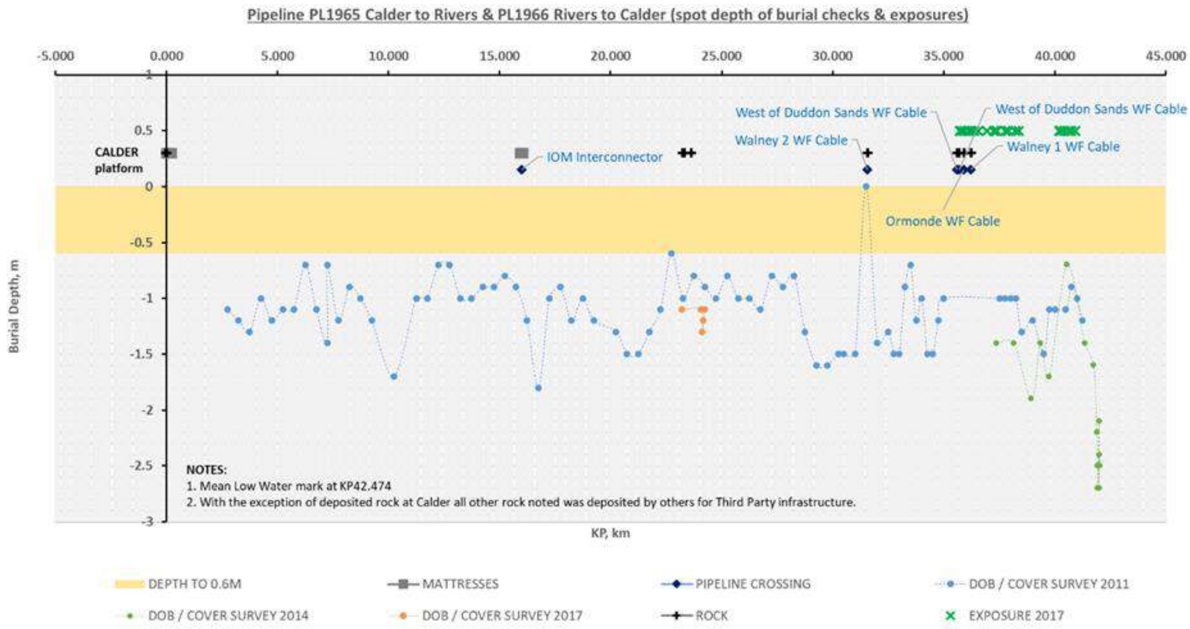
12 Appendix F: Depth of Burial

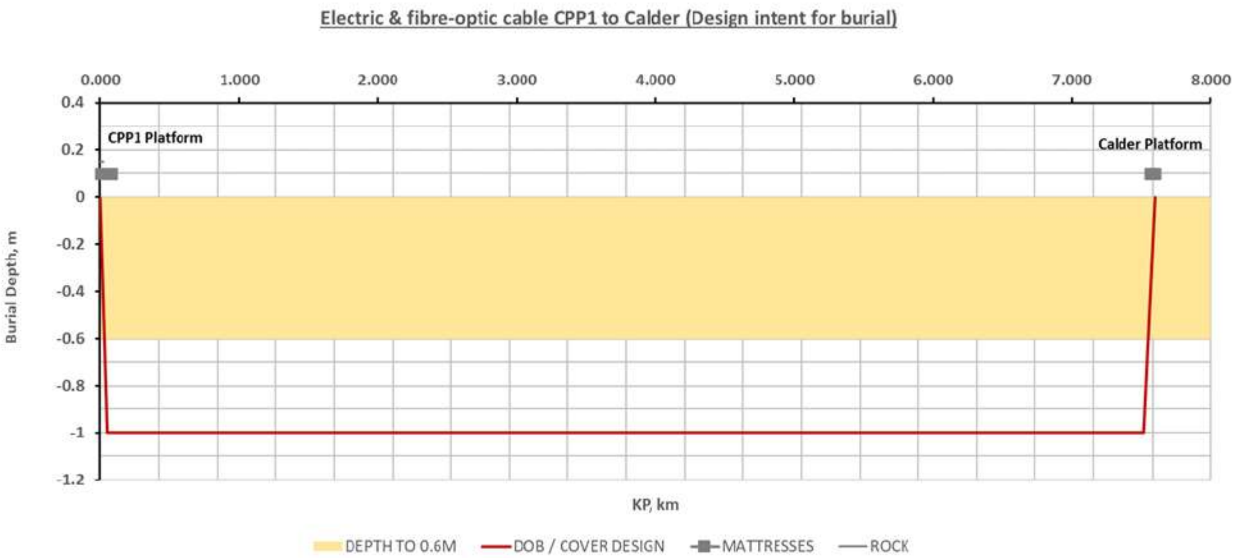
Appendix F.1 Calder Pipelines and Cables



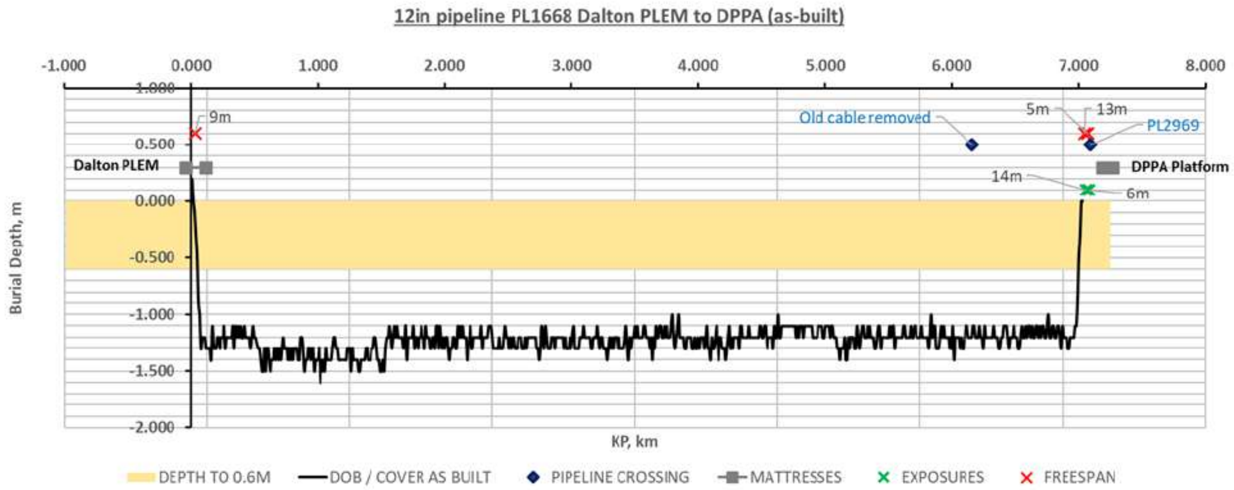


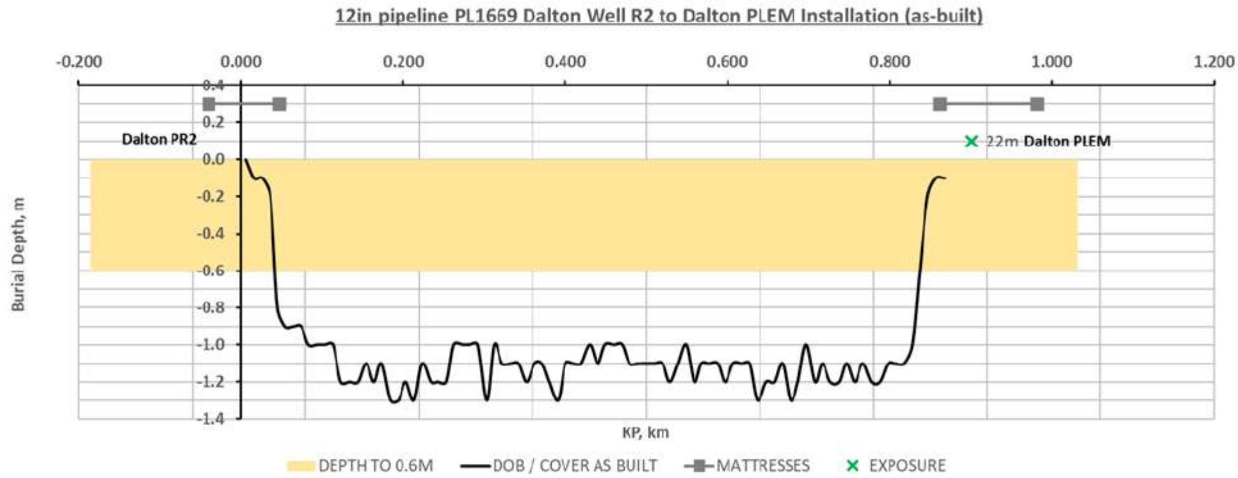
SURVEY	EXPOSURES			SPANS			
YEAR	NO	TOTAL LENGTH	MAX LENGTH	NO	TOTAL LENGTH	MAX LENGTH	REPORTABLE
2007	25	1,417m	135m	1	14m	14m	None
2008	18	965m	216m	None	None	None	None
2011	18	619m	120m	None	None	None	None
2014	22	922m	130m	1	2m	2m	None
2017	22	1,229m	141m	10	80m	20m	None

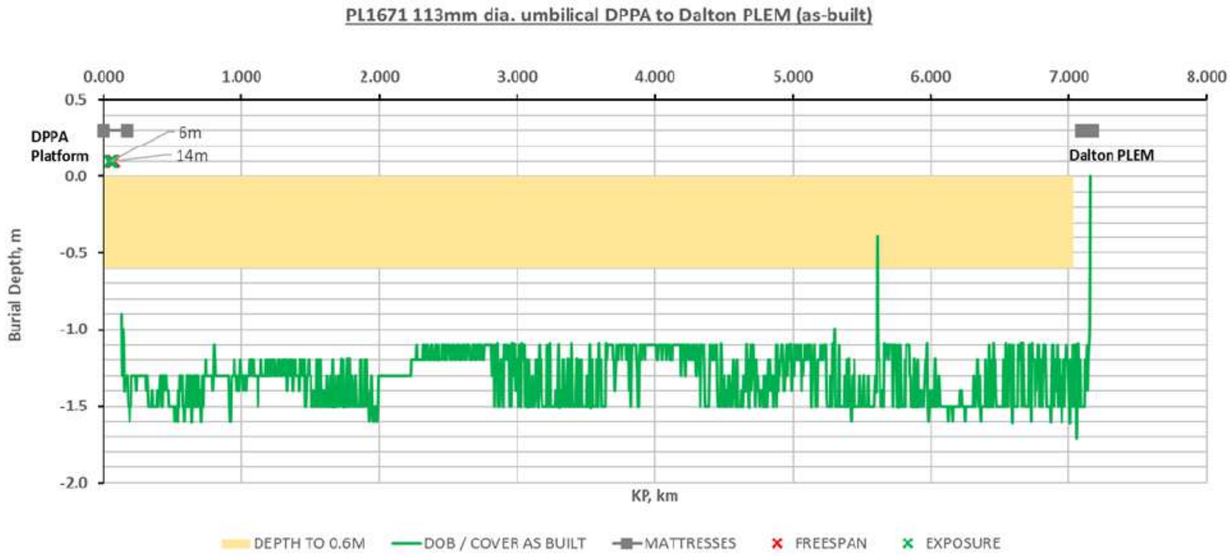

Pipeline PL1965 Calder to Rivers & PL1966 Rivers to Calder (spot depth of burial checks & exposures)
CALDER platform
IOM Interconnector
West of Duddon Sands WF Cable
Walney 2 WF Cable
West of Duddon Sands WF Cable
Walney 1 WF Cable
Ormonde WF Cable
Burial Depth, m
KP, km
NOTES:
1. Mean Low Water mark at KP42.474
2. With the exception of deposited rock at Calder all other rock noted was deposited by others for Third Party infrastructure.
DEPTH TO 0.6M
MATTRESSES
PIPELINE CROSSING
DOB / COVER SURVEY 2011
DOB / COVER SURVEY 2014
DOB / COVER SURVEY 2017
ROCK
EXPOSURE 2017

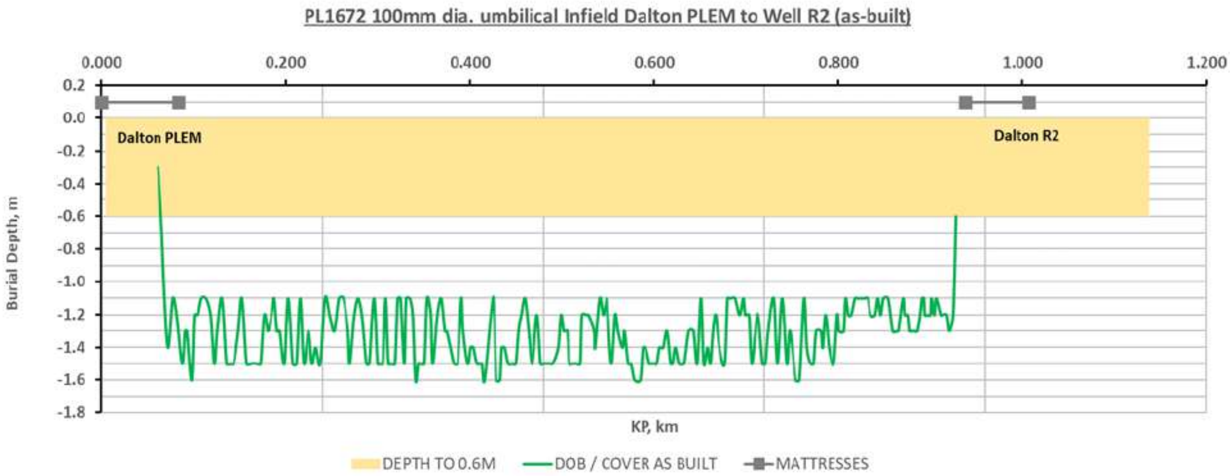

Electric & fibre-optic cable CPP1 to Calder (Design intent for burial)
CPP1 Platform
Calder Platform
Burial Depth, m
KP, km
DEPTH TO 0.6M
DOB / COVER DESIGN
MATTRESSES
ROCK

Appendix F.2 Dalton Pipelines and Umbilical's

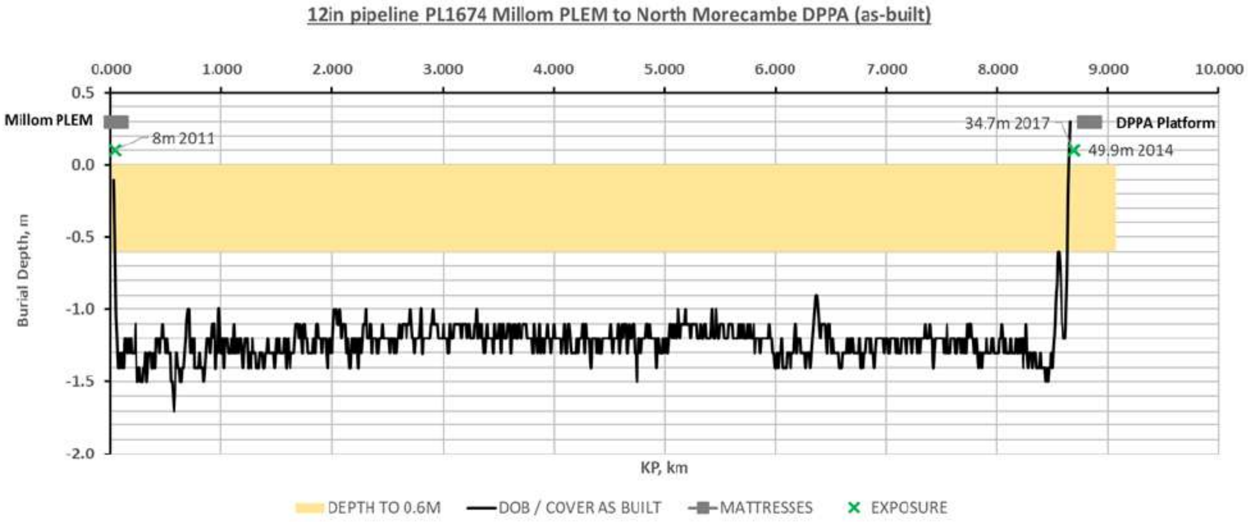


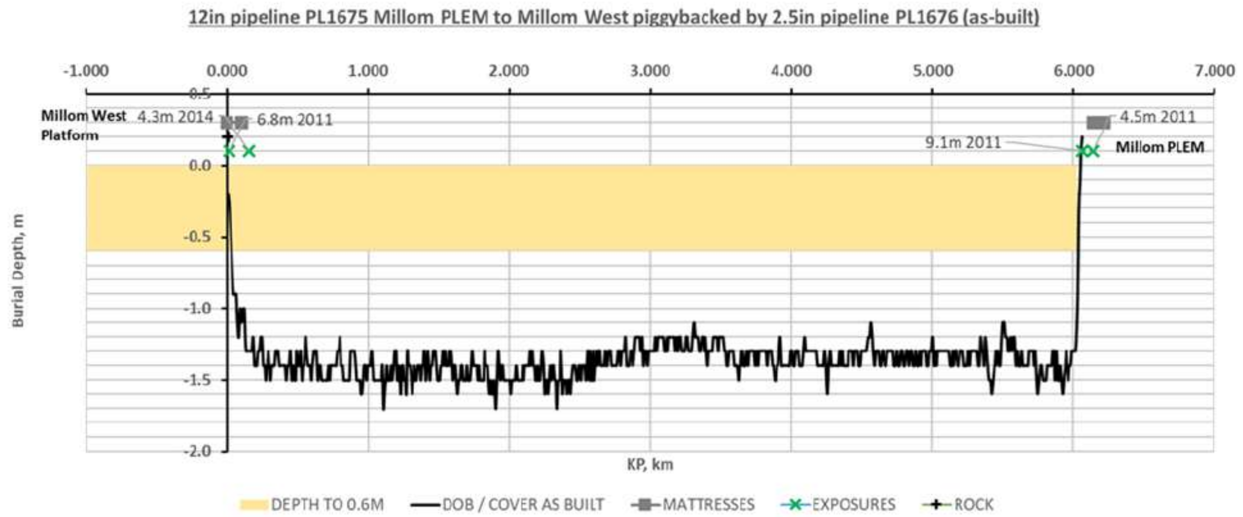


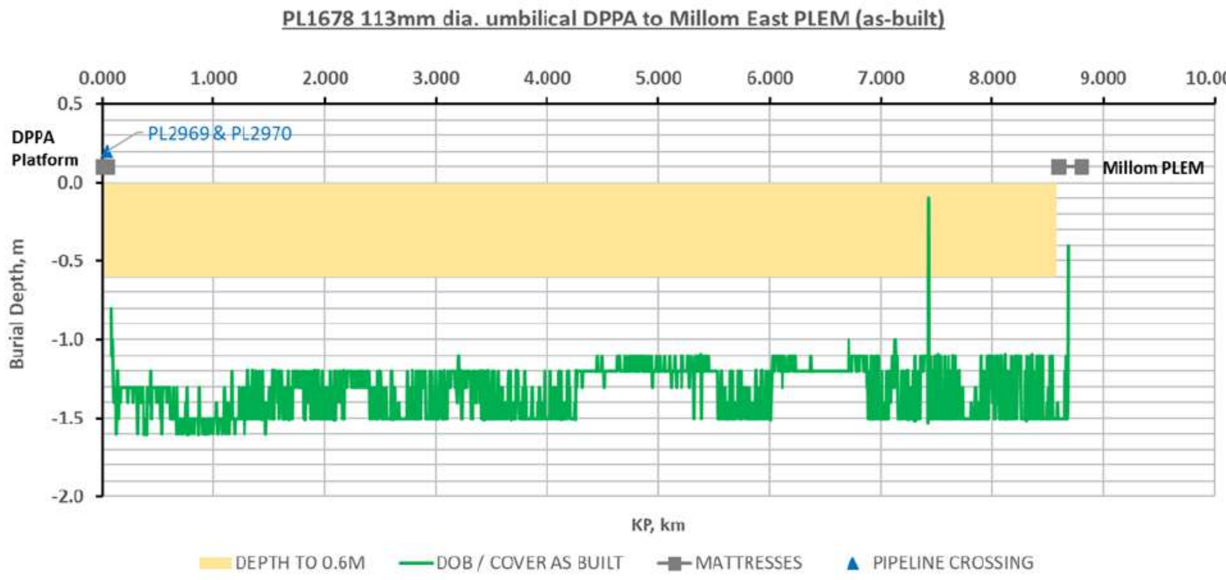

PL1671 113mm dia. umbilical DPPA to Dalton PLEM (as-built)
0.000
1.000
2.000
3.000
4.000
5.000
6.000
7.000
8.000
0.5
0.0
-0.5
-1.0
-1.5
-2.0
DPPA Platform
6m
14m
Dalton PLEM
Burial Depth, m
KP, km
DEPTH TO 0.6M
DOB / COVER AS BUILT
MATTRESSES
FREESPAN
EXPOSURE

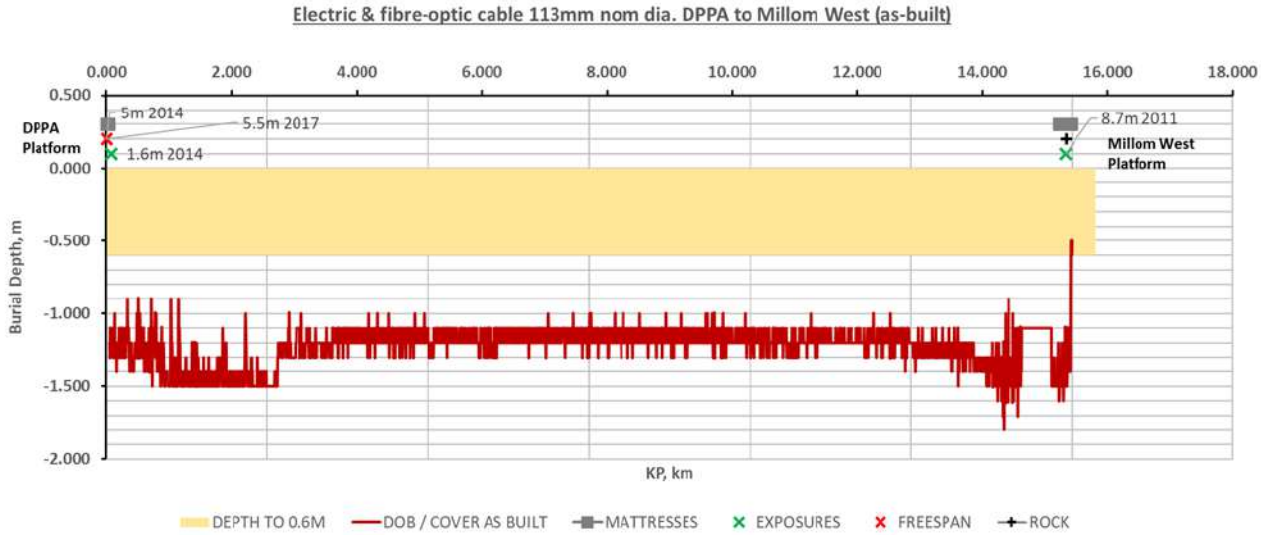

PL1672 100mm dia. umbilical Infield Dalton PLEM to Well R2 (as-built)
0.000
0.200
0.400
0.600
0.800
1.000
1.200
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
-1.8
Dalton PLEM
Dalton R2
Burial Depth, m
KP, km
DEPTH TO 0.6M
DOB / COVER AS BUILT
MATTRESSES

Appendix F.3 Millom East & Millom West Pipelines, Umbilical's and Electrical Cables






PL1678 113mm dia. umbilical DPPA to Millom East PLEM (as-built)
DPPA Platform
PL2969 & PL2970
Millom PLEM
Burial Depth, m
KP, km
DEPTH TO 0.6M
DOB / COVER AS BUILT
MATTRESSES
PIPELINE CROSSING


Electric & fibre-optic cable 113mm nom dia. DPPA to Millom West (as-built)
DPPA Platform
5m 2014
5.5m 2017
1.6m 2014
8.7m 2011
Millom West Platform
Burial Depth, m
KP, km
DEPTH TO 0.6M
DOB / COVER AS BUILT
MATTRESSES
EXPOSURES
FREESPAN
ROCK