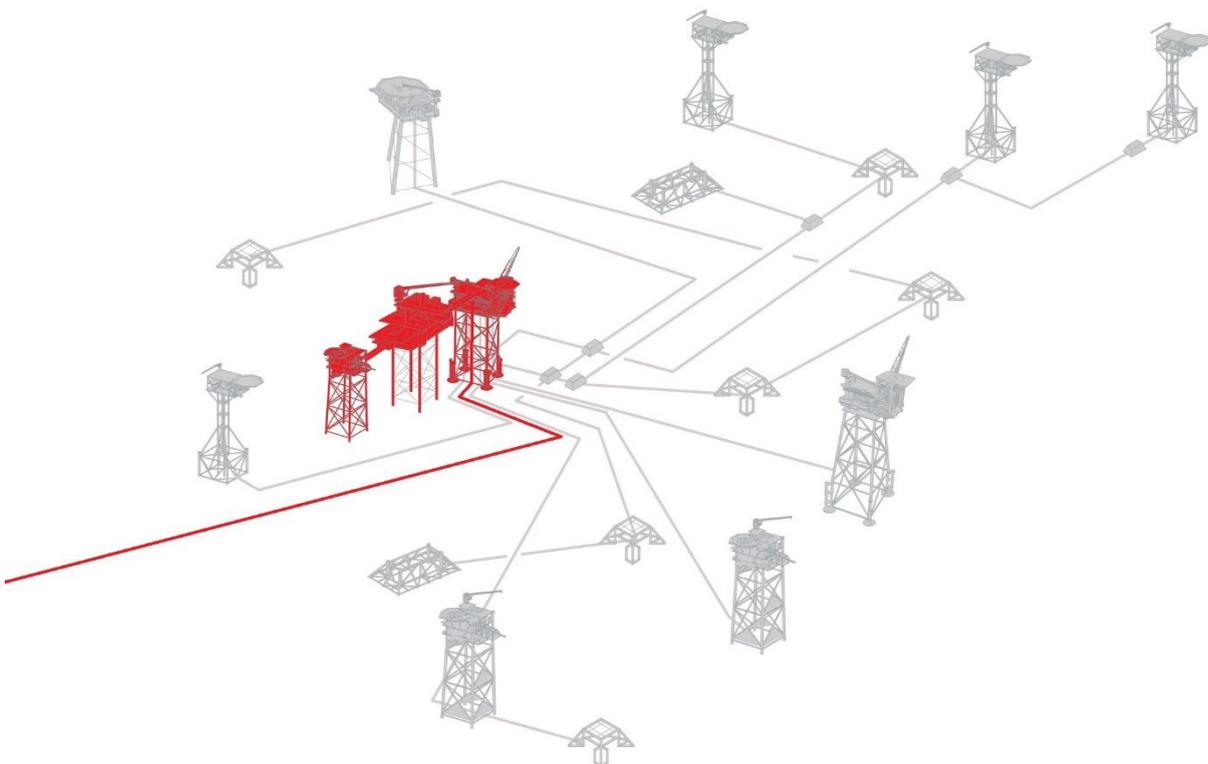




CHRYSAOR



CDP3 Decommissioning Programmes for Murdoch Installations and Trunk Pipelines, CDP3

Murdoch MA, Murdoch MC, Murdoch MD, & Associated
Trunk Pipelines

FINAL
30 June 2022

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TABLE OF CONTENTS

<i>INST = Installations; P/L = Pipelines</i>		INST	P/L
1	EXECUTIVE SUMMARY 9		
1.1	COMBINED DECOMMISSIONING PROGRAMMES 9	✓	✓
1.2	REQUIREMENT FOR DECOMMISSIONING PROGRAMMES 9	✓	✓
1.3	INTRODUCTION..... 9	✓	✓
1.4	DECOMMISSIONING OVERVIEW 13	✓	✓
1.5	SUMMARY OF PROPOSED DECOMMISSIONING PROGRAMMES..... 15	✓	✓
1.6	FIELD LOCATION INCL. FIELD LAYOUT AND ADJACENT FACILITIES..... 17	✓	✓
1.7	INDUSTRIAL IMPLICATIONS 23	✓	✓
2	DESCRIPTION OF ITEMS TO BE DECOMMISSIONED..... 24	✓	
2.1	SURFACE FACILITIES (TOPSIDES AND JACKETS) 24	✓	
2.2	SUBSEA INSTALLATIONS..... 25		✓
2.3	PIPELINES..... 27		✓
2.4	RISERS..... 28		✓
2.5	PIPELINE CROSSINGS 29		✓
2.6	PIPELINE STABILISATION FEATURES 31	✓	✓
2.7	WELLS..... 35	✓	✓
2.8	INVENTORY ESTIMATES..... 35	✓	✓
3	REMOVAL AND DISPOSAL METHODS..... 37	✓	
3.1	TOPSIDES DECOMMISSIONING 37		
3.2	JACKET DECOMMISSIONING..... 40		✓
3.3	SUBSEA INSTALLATIONS..... 44		✓
3.4	PIPELINES AND STABILISATION FEATURES 44	✓	✓
3.5	WELLS..... 47	✓	✓
3.6	WASTE STREAMS 47	✓	✓
4	ENVIRONMENTAL APPRAISAL OVERVIEW 49	✓	✓
4.1	ENVIRONMENTAL SENSITIVITIES (SUMMARY) 49	✓	✓
4.2	POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MANAGEMENT 53	✓	✓
5	INTERESTED PARTY CONSULTATION 59	✓	✓
5.1	CONSULTATION SUMMARY 59	✓	✓
6	PROGRAMME MANAGEMENT..... 60	✓	✓
6.1	PROJECT MANAGEMENT AND VERIFICATION..... 60	✓	✓
6.2	POST-DECOMMISSIONING DEBRIS CLEARANCE AND VERIFICATION 60	✓	✓
6.3	SCHEDULE 60	✓	✓
6.4	COSTS..... 62	✓	✓
6.5	CLOSE OUT..... 62		✓
6.6	POST DECOMMISSIONING MONITORING AND EVALUATION 62	✓	✓
7	SUPPORTING DOCUMENTS 63	✓	✓
APPENDIX 1	PIPELINE CROSSING SCHEMATICS 64		✓
APPENDIX 1.1	PIPELINE CROSSINGS OUTSIDE MURDOCH 500M ZONE 64		✓
APPENDIX 2	DECOMMISSIONING ONSHORE PIPELINES 65		✓
APPENDIX 2.1	OUTLINE APPROACH..... 65		✓
APPENDIX 3	PRE-WORKS APPROVAL COMMUNICATIONS 67	✓	✓
APPENDIX 3.1	CHRYSOR TO OPRED (6-PAGES) 67	✓	✓
APPENDIX 3.2	OPRED TO CHRYSOR (2-PAGES) 73	✓	✓
APPENDIX 4	PUBLIC & CONSULTEE CORRESPONDENCE 75	✓	✓
APPENDIX 4.1	PUBLIC NOTICES..... 75	✓	✓
APPENDIX 4.2	EMAIL FROM GMG 76	✓	✓
APPENDIX 4.3	LETTER FROM NFFO 77	✓	✓
APPENDIX 4.4	LETTER FROM SFF 78	✓	✓
APPENDIX 5	LETTERS OF SUPPORT..... 79	✓	✓

FIGURES AND TABLES

Figure 1.1.1: The difference between pipeline burial, exposures, and spans	8
Figure 1.3.1: Murdoch and CMS Area Installations and Pipelines	10
Figure 1.6.1: Murdoch installation location in UKCS (indicated in red)	17
Figure 1.6.2: Murdoch installation layout	18
Figure 1.6.3: Location, adjacent facilities, and environmentally sensitive areas	21
Figure 1.6.4: Location and environmentally sensitive areas	22
Figure 2.1.1: Photograph of the Murdoch installation (left to right, MA, MC & MD)	24
Figure 2.1.2: Photograph of the Murdoch installation (left to right, MD, MC & MA)	25
Figure 2.2.1: Photograph of the Murdoch MD Template	26
Figure 2.5.1: Murdoch installation 500m zone	30
Figure 2.6.1: Separation of PL929 & PL930 at KP180.409 (NTS)	31
Figure 2.6.2: PL253 Esmond pipeline crossing PL929 & PL930 at ~KP129 (NTS)	31
Figure 2.6.3: PL930 crosses over PL929 at ~KP20.0 from MLWM (NTS)	32
Figure 2.6.4: Separation of PL930 & PL929 ~4.8km from MLWM (NTS)	32
Figure 2.8.1: Pie-chart of estimated installation inventory	35
Figure 2.8.2: Pie-chart of estimated pipeline inventory, excl. deposited rock	36
Figure 3.1.1: View on Murdoch MA topsides looking north	37
Figure 3.1.2: View on Murdoch MC topsides looking north	38
Figure 3.1.3: View on Murdoch MD topsides looking south	39
Figure 3.2.1: Murdoch MA jacket 3D view	41
Figure 3.2.2: Murdoch MC jacket typical side view	42
Figure 3.2.3: Murdoch MD jacket typical side view	43
Figure 6.3.1: Gantt chart of project plan	61
Figure A1.1.1: Schematic of pipeline crossings outside Murdoch 500m zone	64
Figure A2.1.1: PL929 Theddlethorpe approach (indicative only)	65
Figure A4.1.1: Public Notice - The London Gazette, 07 March 2022	75
Figure A4.1.2: Public Notice - The Daily Telegraph & The Hull Daily Mail, 07 March 2022	75
Table 1.4.1 Installations being decommissioned	13
Table 1.4.2: Installation Section 29 Notice Holder details – CMS Joint Facilities	14
Table 1.4.3: Installation Section 29 Notice Holder details – Murdoch MD (incl. template)	14
Table 1.4.4: Pipelines being decommissioned	14
Table 1.4.5: Pipeline Section 29 Notice Holder details – CMS trunklines	14
Table 1.4.6: Pipeline Section 29 Notice Holder details – Boulton BM (PL1311 & PL1312) risers	14
Table 1.4.7: Pipeline Section 29 Notice Holder details – Ketch (PL1612 & PL1613) risers	15
Table 1.4.8: Pipeline Section 29 Notice Holder details – Schooner (PL1222 & PL1223) risers	15
Table 1.5.1: Summary of Decommissioning Programmes	15
Table 1.6.1: List of adjacent facilities	19
Table 2.1.1: Surface facilities information	24
Table 2.2.1: Subsea installation and stabilisation features	25
Table 2.3.1: Pipeline / flowline / umbilical information	27
Table 2.4.1: Riser information	28
Table 2.5.1: Pipeline crossing information	29
Table 2.6.1: Pipeline stabilisation features (PL1311 & PL1312)	33
Table 2.6.2: Pipeline stabilisation features (PL929 & PL930)	33
Table 2.7.1: Well information	35
Table 3.1.1: Cleaning of Topsides for Removal	39
Table 3.1.2: Topsides removal methods	40
Table 3.2.1: Jacket removal methods	43
Table 3.3.1: Subsea installations & stabilisation features	44
Table 3.4.1: Pipeline or pipeline groups / decommissioning options	44
Table 3.4.2: Outcomes of Comparative Assessment	45
Table 3.4.3: Pipeline protection & stabilisation features (PL929 & PL930)	46
Table 3.5.1: Well decommissioning	47
Table 3.6.1: Waste stream management method	48
Table 3.6.2: Inventory disposition	48
Table 4.1.1: Environmental sensitivities	49

Table 4.2.1: Environmental Impact Management

53

Table 5.1.1: Summary of stakeholder comments

59

TABLE OF TERMS AND ABBREVIATIONS

Abbreviation	Explanation
~	Approximately
AB	Deprecated term 'Abandoned' but included in Table 2.7.1 to indicate extent to which wells have been decommissioned (Phase 1, Phase 2, etc.)
approaches	Refer to pipelines as they come nearer to the risers on the installations
CA	Comparative Assessment (Report)
CCUS	Carbon Capture Usage and Storage
Chrysaor	Chrysaor Production (UK) Limited
CMS	Caister Murdoch System
CO ₂	Carbon Dioxide
CSV	Construction Support Vessel
Cut and lift	The 'cut and lift' method of removing trenched and buried pipelines would involve excavating the pipelines from within the seabed and thereafter cutting the pipeline into recoverable and transportable lengths.
CWC	Concrete Weight Coated
Dia. / dia.	Diameter
DNO	DNO North Sea (ROGB) Limited
DOC	The blue line on the burial profiles shows the profile of cover. The area between the blue line and maroon line (DOL) shows the depth of sediment above the top of the pipeline.
DOL	Pipeline trench profile; depth of lowering to top of pipe.
DP	Decommissioning Programme
EA	Environmental Appraisal
EMS	Environmental Management System
EPS	European Protected Species
ESDV	Emergency Shutdown Valve
EU	European Union
EUNIS	European Nature information System
FBE	Fusion Bonded Epoxy
FishSAFE	The FishSAFE database contains a host of oil & gas structures, pipelines, and potential fishing hazards. This includes information and changes as the data are reported for pipelines and cables, suspended wellheads pipeline spans, surface & subsurface structures, safety zones & pipeline gates (www.fishsafe.eu)
FOCI	Feature of Conservation Importance
FPAL	First Point Assessment Limited (UK)
Freespan	Sometimes referred to as a 'span'. Similar to an exposure except that the whole of the section of pipeline is visible above the seabed rather than just part of it. Once the height and length dimensions meet or exceed certain criteria it becomes a potential snagging hazard, and the span becomes reportable to FishSAFE and is called a 'reportable span'
Full removal	The full removal options for decommissioning the pipelines would involve using the 'cut and lift' method of removal especially for the larger pipeline and the presence of concrete weight coating and piggyback clamps on the platform approaches
GJ	Giga Joules (unit of energy in the International System of Units)
GMG	Global Marine Group
HAT	Highest Astronomical Tide
HLV	Heavy Lift (Crane) Vessel
HSE	Health & Safety Executive
HVAC	Heating Ventilation and Air Conditioning
ID	Inside Diameter
in	Inch (1in = 25,4mm)
Ineos	INEOS UK SNS Limited
Ithaca	Ithaca Energy (UK) Limited
JUWB	Jack Up Work Barge
kg	kilogram

Abbreviation	Explanation
km	kilometre
KP	Kilometre Point, usually measured from point of origin, the start of the pipeline
LAT	Lowest Astronomical Tide
Leave <i>in situ</i>	Leave <i>in situ</i> for pipelines would involve leaving trenched and buried pipelines <i>in situ</i> and risk assessing any exposures and spans
LOD	Limit of Detection
m, μ m	metres, micrometre (1m = 1,000,000 μ m)
MCV	Multipurpose Construction Vessel
MCZ	Marine Conservation Zone
MeOH	Methanol
mg/l	milligrams per litre
MLWM	Mean Low Water Mark (1.341km to 'Gas Line Termination' at TGT)
mm	Millimetre (1m = 1000mm)
MoD	Ministry of Defence
Murdoch Installation	The Murdoch Installation comprises Murdoch MA, Murdoch MC, and Murdoch MD. All installations are bridge linked.
n/a	Not Applicable
N,S,E,W	North, South, East & West
Neptune	Neptune E&P UKCS Limited
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NORM	Naturally Occurring Radioactive Material
NUI	Normally Unattended Installation
\varnothing	Diameter, usually outside diameter
OD	Outside Diameter
OGA	Oil and Gas Authority
OGUK	Oil and Gas United Kingdom
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo-Paris Convention
PAH	Polycyclic aromatic hydrocarbon
Partial removal	The partial removal decommissioning option for pipelines would involve excavating trenched and buried pipelines local to the exposed ends of the pipeline and thereafter effecting removal of the section of pipeline using the 'cut and lift' method. Typically, the excavated locations and cut pipeline ends in the seabed may need to be remediated in some way, either by back-filling the excavated material or by depositing rock
Perenco	Perenco UK Limited
PMA	Pigging Manifold Assembly (Kelvin)
Pipeline crossing	A pipeline with a higher identification number crosses over the top of a pipeline with a lower identification number. Typically, pipeline crossings might be protected with concrete mattresses and overlain with deposited rock
PL	Pipeline identification numbers
Platform	Installation, typically comprising topsides and jacket
Premier	Premier Oil E&P UK Limited
PSNL	Pigging Skid Northern Lobe (PL1922 & PL1925, PL1923 & PL1926) inside Murdoch 500m zone
PSSL	Pigging Skid Southern Lobe or Cavendish Subsea Pigging Skid (PL2430 & PLU2431, PL1924 & PL1927) inside Murdoch 500m zone
PWA	Pipeline Works Authorisation
Reportable span	A reportable span is a significant span which meets set criteria (FishSAFE criteria) of height above the seabed and span length (10m long x 0.8m high)
Riser	Pipe that connects the pipeline to the topsides' pipework
SAC	Special Area of Conservation
SACFOR	The semi-quantitative SACFOR abundance scale (super-abundant, abundant, common, frequent, occasional, rare) was developed to support the observation of marine habitats, communities and species and is widely used in the UK
SDV	Shutdown Valve

Abbreviation	Explanation
SEI	Significant Environmental Impact
SFF	Scottish Fishermen's Federation
Shell	Shell U.K. Limited
SNS	Southern North Sea
SOPEP	Shipboard Oil Pollution Emergency Plans
SPA	Special Protection Area
Span	Sometimes referred to as a 'free-span'. Similar to an exposure except that the whole of the section of pipeline is visible above the seabed rather than just part of it. Once the height and length dimensions meet or exceed certain criteria it becomes a potential snagging hazard, and the span becomes reportable to FishSAFE and is called a 'reportable span'
SSCV	Semi-Submersible Crane Vessel
SPS	Subsea Pigging Skid (Kelvin-Murdoch) inside Murdoch 500m zone
STA	Subsea Tee Assembly (Kelvin)
Tampnet AS	Owners of the 36km long MCCA fibre-optic cable between two platforms in the Southern North Sea, and the NorSea Com 1 fibre-optic cable, connecting Draupner, Ula, Ekofosk, Valhal and Murdoch platforms to Lowestoft in Suffolk, UK and Kårstø, Rogaland, Norway. https://www.tampnet.com/about
Te	Tonne(s)
Tee	Section of pipeline furnished with additional valves and pipework to allow for future expansion. It is also provided with a protection structure with its own protection and stabilisation features such as mattresses and deposited rock
TGT	Theedlethorpe Gas Terminal (WGS84 Degrees: 53.362438° N .237783° E)
THC	Total Hydrocarbon Content
Trenched and buried	Pipeline installed into a trench and covered in seabed sediment. Refer Figure 1.1.1
UK	United Kingdom
UK BAP	UK Biodiversity Action Plan
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
UTM	Universal Transverse Mercator (Coordinate System)
WGS84	World Geodetic System 84 is the reference coordinate system used by the Global Positioning System
Wintershall	Wintershall Noordzee B.V.
x	Number of (e.g. 16x = 16 in Number)

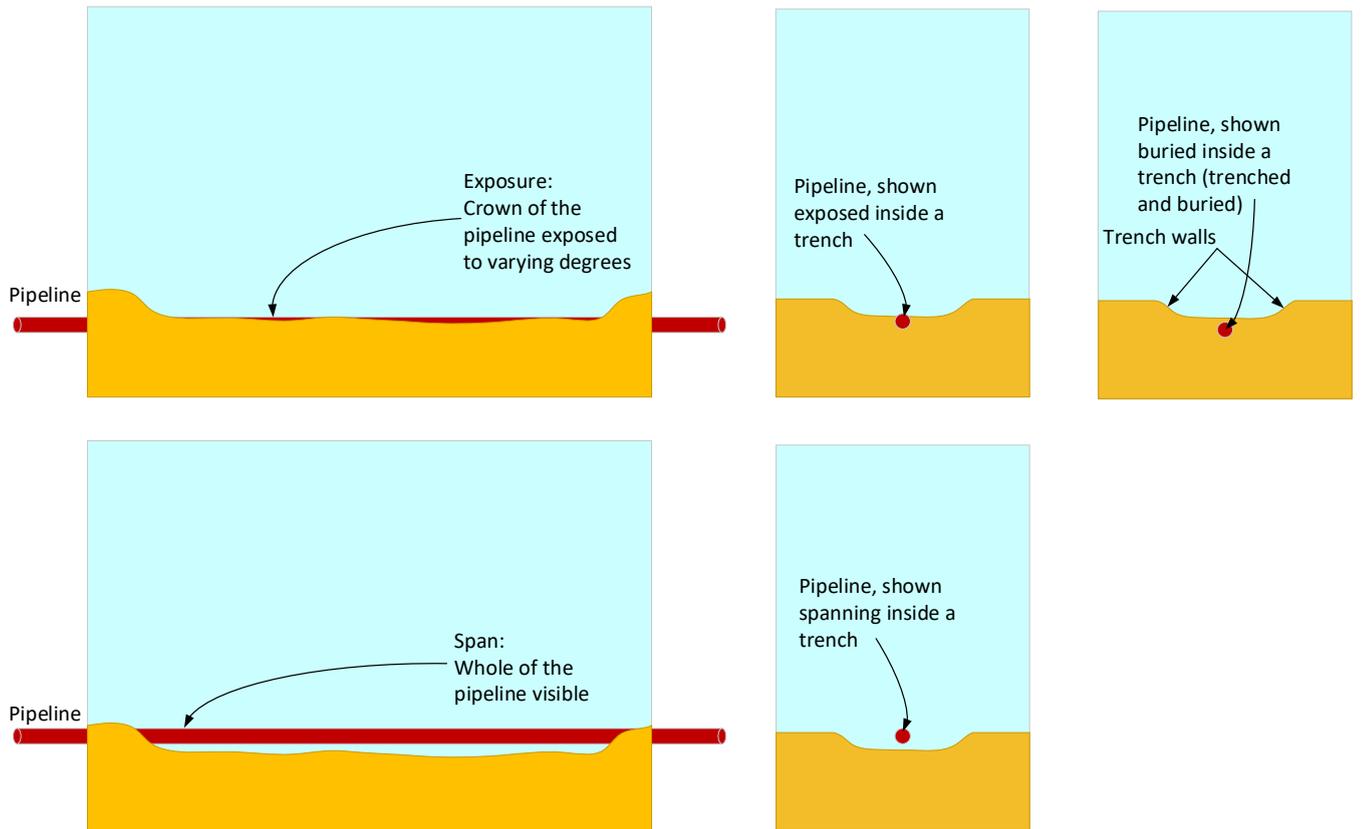


Figure 1.1.1: The difference between pipeline burial, exposures, and spans¹

¹ Trench walls may or may not be prominent

1 Executive summary

1.1 Combined Decommissioning Programmes

This document contains three Decommissioning Programmes, one for each set of notices under Section 29 of the Petroleum Act 1998. The Decommissioning Programmes are:

- Caister-Murdoch System (CMS) joint facilities installations, including Murdoch MA, and Murdoch MC;
- The Murdoch MD installation & template;
- The pipelines associated with the Murdoch MD installation, PL929 and PL930.

Collectively the Murdoch MA, Murdoch MC, and Murdoch MD installations are known as the Murdoch Installation. Although decommissioning of these installations and pipelines is being treated in this document as a standalone project, the operational phase is being carried out as part of a wider decommissioning campaign in the CMS area. Chrysaor Production (U.K.) Limited (Chrysaor) shall also continue to explore cost saving synergies with other projects.

1.2 Requirement for Decommissioning Programmes

Installations: In accordance with the Petroleum Act 1998, Chrysaor, as operator of the CMS Joint Facilities Installations and Murdoch MD installation, and on behalf of the Section 29 notice holders listed in Table 1.4.2, and Table 1.4.3, is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installations detailed in Section 2 of this document. Following Statutory Consultation, the partner letters of support are included in Appendix 4.

Pipelines: In accordance with the Petroleum Act 1998, Chrysaor, as operator of the CMS trunklines, and on behalf of the Section 29 notice holders listed in Table 1.4.5 is applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. Following Statutory Consultation, the partner letters of support are included in Appendix 4.

Risers: In accordance with the Petroleum Act 1998, Chrysaor, as operator of the Boulton BM, Ketch and Schooner risers, and on behalf of the Section 29 notice holders listed in Table 1.4.6, Table 1.4.7 and Table 1.4.8 is applying to OPRED to obtain approval for decommissioning the risers detailed in Section 2 of this document. Partner letters of support will be provided separately to OPRED following statutory consultation.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and OPRED decommissioning guidance notes [13]. The schedule outlined in this document is for a decommissioning project with the well decommissioning and platform removal preparation commencing in 2021. Decommissioning of the facilities will continue for a further 8 years until completion in 2029.

1.3 Introduction

1.3.1 Overview of Murdoch Installation and CMS

Chrysaor's Caister-Murdoch System joint facilities installations, including Murdoch MA and Murdoch MD are collectively referred to as the Murdoch installation. The development consists of a single 'gas gathering' and controls complex which collected gas from a total of 8 'satellite' platforms and 8 subsea centres up to ~45km from the main Murdoch installation. Some of the platforms and subsea centres are operated and owned by companies other than Chrysaor.

The Murdoch installation is located in UKCS block 44/22a and consists of three bridge-linked platforms for accommodation, compression and wellheads creating three independent platforms designated MA, MC, and MD. The MC platform is linked to the MD platform by a 37m bridge at main deck level. MA platform is linked to the MC platform by a 45m bridge, connecting the mezzanine deck on MC to Level 1 of MA. The Murdoch Installation is based on three separate four leg vertical structures with horizontal bracing systems. The jackets are fixed to the seabed using piles. Above the jackets, vertical structural members support the topside modules and decking. The major decking on MD and MC consists of an under-deck, Cellar Deck, Main Deck and

Helideck, some areas have mezzanine or intermediate deck levels. There are four levels and a helideck on MA.

MA and MD support the pipeline and umbilical infrastructure. MA provided the electrohydraulic power for the umbilicals, while Murdoch MD received gas and exported it to TGT. Murdoch MD also imported methanol from TGT and distributed it to the various satellites and beyond. MD was built and installed in 1993, MC was built and installed in 1996 and MA was built and installed in 2002. First production was achieved in 1993. Production ceased in 2018. It is located ~160km North East-East of Easington on the East Riding of Yorkshire Coast, England.

The surface installation wells that are tied back to Murdoch MD (44/22a) include Boulton BM (44/21a), Caister CM (44/23a), Katy KT (44/19b), Kelvin TM (44/18 & 44/23b), Munro MH (44/17b). The subsea wells that are tied back to Murdoch include Murdoch K (KM) (44/22a), McAdam (MM) (44/17c), Hawksley (EM) (44/17a), Boulton H (HM) (44/22b) and Watt (QM) (44/22b). Collectively this is called the CMS.

The pipelines are all now shutdown, but gas used to be exported from CMS via Murdoch MD to TGT using the 26in trunk gas pipeline PL929. PL930 is a 4in methanol pipeline originating from TGT and tied into Murdoch MD which used to supply to the various satellite installations using 3in pipelines. It lies in a separate trench to PL929 although it crosses over PL929 about 20km from mean low water mark (MLWM). Most of the smaller 3in pipelines are piggybacked to the larger gas pipeline for each facility. The exception to this is the 3in Caister pipeline PL936 that was buried in a separate trench to its sister 16in gas pipeline PL935.

There are pipelines from other installations (e.g. Cavendish RM, Hunter HK, Rita RH, Ketch KA, Schooner SA) that also tied into Murdoch, but these are subject to decommissioning programmes being prepared by others and are therefore out of scope. Decommissioning Programmes for all these third party assets are available on the regulator’s website (<https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines>).

The Decommissioning Programmes for the Caister platform, pipelines and the Caister-Murdoch System installations and infrastructure are addressed in Decommissioning Programmes submitted separately [1], [2] and [3].

The Murdoch installation acts as host to several third-party pipelines. These are presented in Figure 1.3.1.

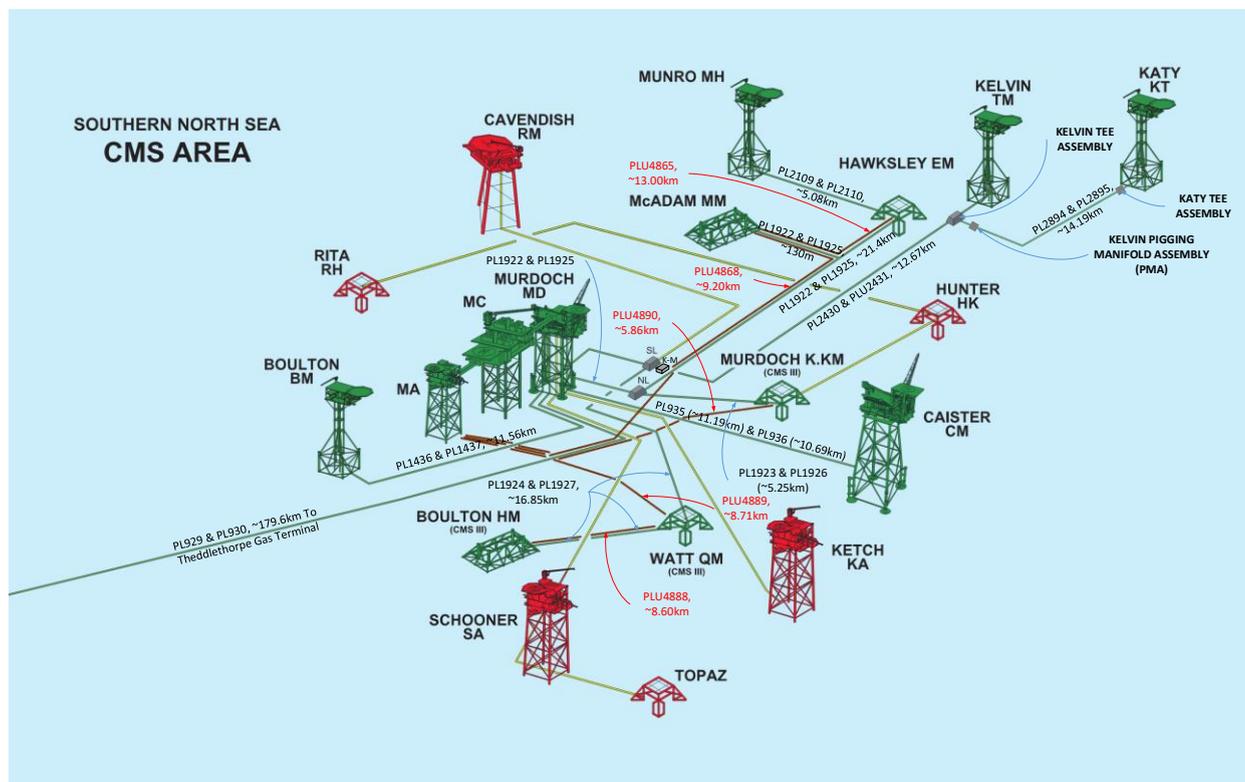


Figure 1.3.1: Murdoch and CMS Area Installations and Pipelines

The application for Cessation of Production of the Murdoch and CMS fields (including Boulton, Munro, McAdam, Kelvin, and Katy) was accepted by OGA on 10 May 2018. For Caister the CoP application was

accepted by OGA on 04 May 2016, for Hawksley, the CoP application was accepted by OGA on 10 February 2011 and for Watt the CoP application was accepted by OGA on 11 November 2009. Production and export from Murdoch MD ceased in 2018.

Chrysaor is aware that pipeline PL929 has been flagged as having potential for reuse/repurposing for CCUS projects or otherwise and have undertaken discussions with the NSTA. No decommissioning activity will take place on PL929 that would preclude potential reuse/repurposing for CCUS projects or otherwise until reuse/repurposing opportunities have been exhausted. Chrysaor will advise OPRED as soon as reuse/repurposing opportunities are determined to have been exhausted. Once reuse/repurposing options for PL929 are exhausted, the recommended option for decommissioning the pipeline will be triggered and this will involve removal of surface laid sections of the pipeline and remediation of the pipeline ends as described in section 3.4.2 and as per the schedule presented in Figure 6.3.1. The Decommissioning Programme progress reports will detail the timeframes associated with the reuse/repurposing considerations and any decisions made on reuse/repurposing.

1.3.2 Murdoch MA

Murdoch MA acts as origin for three umbilicals. The decommissioning of these is outside the scope of the CDP3 Decommissioning Programmes. Where available, the relevant Decommissioning Programmes are italicised in parentheses, together with the date if they have already been approved by the Secretary of State:

- PLU4686 96mm dia. electrohydraulic umbilical to McAdam MM ~9.2km long (*CDP2*, [3]);
- PLU4889 88mm dia. electrohydraulic umbilical to Watt QM ~8.7km long (*CDP2*, [3]);
- PLU4890 82mm dia. electrohydraulic umbilical to Murdoch K.KM ~5.9km long (*CDP2*, [3]).

All these umbilicals are out of use. The chemical cores have been flushed and filled with seawater. The hydraulic cores have been left filled with water-based hydraulic fluids.

1.3.3 Murdoch MC

Murdoch MC has no subsea infrastructure associated with the installation.

1.3.4 Murdoch MD

As well as being the hub for PL929 and PL930, Murdoch MD acts as host to several pipelines. All these pipelines are out of use and have been flushed, cleaned, and filled with seawater but they may remain connected to their respective risers.

The decommissioning of following pipelines is being addressed herein:

- PL929 26in Murdoch MD to TGT pipeline ~179.64km;
- PL930 4in TGT to Murdoch MD pipeline ~179.58km.

The decommissioning of the following pipelines is addressed in the CDP1b Decommissioning Programmes for Caister Pipelines [2].

- PL935 16in Caister CM to Murdoch MD ~11.2km long;
- PL936 3in MeOH Murdoch MD to Caister CM ~10.7km long.

The decommissioning of the risers for the following pipelines is addressed in the CDP2 Decommissioning Programmes for Caister-Murdoch System Installations and Associated Pipelines [3]:

- PL1922 10in Hawksley EM to Murdoch MD pipeline ~21.62km long;
- PL1925 3in Murdoch MD to Hawksley EM pipeline ~21.53km long;
- PL1924 10in Boulton HM to Murdoch MD riser ~76m long;
- PL1927 3in Murdoch MD to Boulton HM riser ~49m long.

The decommissioning of following risers is being addressed herein:

- PL1222 16in Schooner pipeline riser, ~56.5m long;
- PL1223 3in Schooner pipeline riser, 109.3m long;

- PL1311² 10in Murdoch MD riser tie-in flange to ESD valve, riser ~75m long;
- PL1312² 3in ESDV Murdoch MD to subsea tie-in flange, riser ~72m long;
- PL1612 18in Ketch pipeline riser, ~66.3m long;
- PL1613 3in Ketch pipeline riser, ~59.3m long;

The decommissioning of the following pipelines is addressed in the Decommissioning Programmes for Cavendish which were approved in June 2020.

- PL4612 Cavendish umbilical.

1.3.5 Murdoch installation 500m zone

The decommissioning of the following third-party pipelines and associated protection structures inside the 500m zone is also outside the scope of the CDP3 Decommissioning Programmes but for completeness they are listed here. Where available, the relevant Decommissioning Programmes are italicised in parentheses, together with the date if they have been approved by the Secretary of State.

- PL1222 16in Schooner pipeline, ~28.5km long (*Schooner*, August 2019);
- PL1223 3in Schooner pipeline, ~28.5km long, (*Schooner*, August 2019);
- PL1612 18in Ketch pipeline, ~26.9km long (*Ketch*, August 2019);
- PL1613 3in Ketch pipeline, ~26.9km long (*Ketch*, August 2019),
- PL2284 10in Cavendish pipeline, ~47.4km long (*Cavendish*, June 2020);
- PL2285 2in Cavendish pipeline, ~47.4km long (*Cavendish*, June 2020);
- PL4612 1.25in Cavendish fibre-optic cable, ~47.3km long (*Cavendish*, June 2020);

- PL935 16in Caister CM to Murdoch MD pipeline, ~11.2km long (*CDP1b*, [2]);
- PL936 3in Murdoch MD to Caister CM pipeline, ~10.7km long (*CDP1b*, [2]);
- PL1436 10in Boulton BM to Murdoch MD pipeline, ~11.6km long (*CDP2*, [3]);
- PL1437 3in Murdoch MD to Boulton BM pipeline, ~11.6km long (*CDP2*, [3]);
- PL1922 10in Hawksley EM to Murdoch MD pipeline, ~21.6km long (*CDP2*, [3]);
- PL1925 3in Murdoch MD to Hawksley EM pipeline, ~21.5km long (*CDP2*, [3]);
- PL1923 10in Murdoch K.KM to PSSL pipeline, 5.25km long (*CDP2*, [3]);
- PL1926 3in PSSL to Murdoch K.KM pipeline, ~5.25km long (*CDP2*, [3]);
- PL1924 10in Boulton HM to Murdoch MD pipeline, ~16.8km long (*CDP2*, [3]);
- PL1927 3in Murdoch MD to Boulton HM pipeline, ~16.9km long (*CDP2*, [3]);
- PL2430 12in Kelvin TM to PSSL pipeline, ~12.67km long (*CDP2*, [3]);
- PLU2431 3in PSSL to Kelvin TM pipeline, ~12.67km long (*CDP2*, [3]).

The Tampnet cable referenced in this document used to be connected to Murdoch MD but it has now been disconnected and rerouted. It remains operational.

1.3.6 Submission of Decommissioning Programmes

Following public, stakeholder and regulatory consultation, the Decommissioning Programmes will be submitted without derogation and in full compliance with the OPRED decommissioning guidance notes [13]. The Decommissioning Programmes explain the principles of the removal activities and are supported by an Environmental Appraisal [4] and a Comparative Assessment [5].

² PL1311 is the riser for PL1436 at Murdoch MD and PL1312 is the riser for PL1437 at Murdoch MD.

1.4 Decommissioning overview

1.4.1 Installations

Table 1.4.1 Installations being decommissioned

Field names		Quad / Block		Surface installations					Distances	
Fields	Water depth (LAT)	Type of production	UKCS block(s)	Number	Function	Type	Topsides mass (Te)	Jacket mass (Te) ³	Distance to median (Netherlands)	Distance from nearest UK coastline
Murdoch MA	~29.8m	n/a	44/22a	1	Accommodation Platform	Steel Jacket (4-Legs)	835.3	1,012.9	~30km	~160km
Murdoch MC	~29.8m	Gas, condensate	44/22a	1	Compression Platform	Steel Jacket (4-Legs)	4,393.3	1,692.0	~30km	~160km
Murdoch MD	~29.8m	Gas, condensate	44/22a	1	Wellhead Platform	Steel Jacket (4-Legs)	2,256.5	2,907.3	~30km	~160km
Drill cuttings			Subsea installations					Number of wells		
Field	Drill cuttings pile(s)	Total estimated volume (m ³)	Number		Type		Platform	Subsea		
Murdoch MA	n/a	n/a	n/a		n/a		n/a	n/a		
Murdoch MC	n/a	n/a	n/a		n/a		n/a	n/a		
Murdoch MD	n/a	n/a	1		Drilling template		8	n/a		

³ Includes mass of piles.

Table 1.4.2: Installation Section 29 Notice Holder details – CMS Joint Facilities

Section 29 Notice Holders	Registration number	Equity interest
Chrysaor Production (U.K.) Limited (Operator)	00524868	31.75%
Chrysaor (U.K.) Beta Limited	02316577	15.00%
Neptune E&P UKCS Limited	03386464	16.25%
Premier Oil E&P UK Limited	02761032	20.00%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	17.00%

Table 1.4.3: Installation Section 29 Notice Holder details – Murdoch MD (incl. template)

Section 29 Notice Holders	Registration number	Equity interest
Chrysaor Production (U.K.) Limited	00524868	54.50%
Neptune E&P UKCS Limited	03386464	11.50%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	34.00%

1.4.2 Pipelines

Table 1.4.4: Pipelines being decommissioned

Field	Number of pipelines	
Murdoch	2	Refer Table 2.3.1

Table 1.4.5: Pipeline Section 29 Notice Holder details – CMS trunklines

Section 29 Notice Holders	Registration number	Equity interest
Chrysaor (U.K.) Beta Limited	02316577	15.00%
Chrysaor Production (U.K.) Limited	00524868	31.75%
Neptune E&P UKCS Limited	03386464	16.25%
Premier Oil E&P UK Limited	02761032	20.00%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	17.00%

1.4.3 Risers

Decommissioning of the following risers remains the responsibility of the owners of the CMS joint facilities installations. This section has been added to document this.

Table 1.4.6: Pipeline Section 29 Notice Holder details – Boulton BM (PL1311 & PL1312) risers

Section 29 Notice Holders	Registration Number	Equity Interest
Chrysaor Production (U.K.) Limited (Operator)	00524868	31.75%
Chrysaor (U.K.) Beta Limited	02316577	15.00%
Neptune E&P UKCS Limited	03386464	16.25%
Premier Oil E&P UK Limited	02761032	20.00%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	17.00%

Table 1.4.7: Pipeline Section 29 Notice Holder details – Ketch (PL1612 & PL1613) risers

Section 29 Notice Holders	Registration number	Equity interest
Chrysaor Production (U.K.) Limited (Operator)	00524868	31.75%
Chrysaor (U.K.) Beta Limited	02316577	15.00%
Neptune E&P UKCS Limited	03386464	16.25%
Premier Oil E&P UK Limited	02761032	20.00%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	17.00%

Table 1.4.8: Pipeline Section 29 Notice Holder details – Schooner (PL1222 & PL1223) risers

Section 29 Notice Holders	Registration number	Equity interest
Chrysaor Production (U.K.) Limited (Operator)	00524868	31.75%
Chrysaor (U.K.) Beta Limited	02316577	15.00%
Neptune E&P UKCS Limited	03386464	16.25%
Premier Oil E&P UK Limited	02761032	20.00%
Tullow Oil PLC	03919249	-
Tullow Oil SK Limited	05287330	17.00%

1.5 Summary of proposed Decommissioning Programmes

Table 1.5.1: Summary of Decommissioning Programmes

Proposed decommissioning solution	Reason for selection
1. Topsides (Murdoch MA, MC & MD)	
Complete removal and recycling. The topsides will be removed and recovered to shore and recycled. Environmental permit applications required for work associated with removal of the topsides will be applied for.	Allows jacket to be removed and maximises recycling of materials.
2. Jackets (Murdoch MA, MC & MD)	
Complete removal and recycling. The leg piles will be cut 3.0m below seabed and the jacket, along with all the risers will be removed and recovered to shore for recycling. Environmental permit applications required for work associated with removal of the jacket will be applied for.	To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials.
3. Pipelines (Murdoch MD only)	
PL929 & PL930 (each ~179.6km long between end of 525m long deposited rock and MLWM) have been flushed and will be left buried <i>in situ</i> along with the pipeline stabilisation features at KP4.8 and KP20.0 (refer Figure 2.6.3 and Figure 2.6.4 respectively). PL929 & PL930, on approach to Murdoch MD remove all the associated mattresses and underlying piggybacked pipelines ~147m long up to point of burial at the deposited rock. If the mattresses where PL930 separates from PL929 at KP4.8 (Figure 2.6.4) KP180.409 (Figure 2.6.1) or where PL930 crosses over PL929 at KP20 (Figure 2.6.3) are covered in sediment and barely distinguishable from the surrounding seabed they will be left <i>in situ</i> . Otherwise, if the perimeter edge of any one mattress at the location is more than 50% exposed, they will all be completely removed at the location along with	Outside the 500m safety zones the pipelines will already have been exposed to fishing activity and the situation would be no different to what it is now. The comparative assessment recommends that the pipelines be left <i>in situ</i> . Potentially leaves PL929 available for reuse. From the survey data reviewed, PL929 exhibits good burial depth and good depth of cover, although the expectation is that the pipeline suffers from exposures for ~7km. Regrettably no recent survey data were available for PL930 but given the bathymetry of the seabed it is assumed that PL930 would exhibit the same burial characteristics as PL929, but this will need to be confirmed by survey, noting that while PL929 was originally

Table 1.5.1: Summary of Decommissioning Programmes

Proposed decommissioning solution	Reason for selection
<p>the underlying surface laid flexible pipespools (~40m, ~80m, and 40m long respectively). Should the point of burial of the cut pipeline end be in the seabed, it will be excavated locally with small quantities of rock potentially used to ensure that the remaining pipeline end(s) are buried. Each cut pipeline or umbilical end at point of burial at or within deposited rock will be dealt with by the deposition of a small quantity of rock on top of or adjacent to existing rock. The amount used will be kept to a practical minimum but is estimated to be up to 25Te. The deposition of such rock will be covered by a deposit consent. Where identified it is intended that mattresses be fully recovered to shore. However, should practical difficulties ensue OPRED will be consulted; All materials that are identified for removal will be recovered to shore for reuse, recycling, or disposal as appropriate. Any permit applications required for work associated with cutting and removal will be submitted.</p>	<p>trenched to a minimum between 0.5m and 0.7m below seabed, PL930 was trenched to a minimum 1.0m to top of pipe below seabed throughout its length. PL930 will be surveyed in 2022. Minimal seabed disturbance, lower energy usage, reduced risk to personnel engaged in the activity. Reduces the requirement for the introduction of new material such as deposited rock to the Dogger Bank Special Area of Conservation (SAC). Monitoring to confirm the pipelines remain buried will be completed to a schedule agreed with OPRED. Given the mobile nature of the seabed the exposures will meantime be monitored but not remediated.</p>
4. Risers	
<p>All risers will be completely removed to shore for recycling along with the Murdoch MD jacket. Environmental permit applications required for work associated with decommissioning of the risers will be applied for.</p>	<p>To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials.</p>
5. Well decommissioning (Murdoch MD only)	
<p>Some of the wells have been partially decommissioned with conductor removal activities remaining. All the well decommissioning will be completed in accordance with the version of Oil & Gas UK Well Decommissioning Guidelines relevant at the time and to comply with HSE "Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996". Environmental permit applications required for work associated with decommissioning the wells will be applied for.</p>	<p>Meets the OGA and HSE regulatory requirements.</p>
6. Drill cuttings (Murdoch MD only)	
<p>None found.</p>	<p>No drill cuttings piles have been identified by seabed survey.</p>
7. Interdependencies	
<p>The whole of the three installations will be removed. The piles will be cut with seabed sediment potentially being displaced to allow access for cutting. No third-party pipeline crossings will be disturbed as a result of the decommissioning proposals, although three umbilicals cross over the pipelines near Murdoch MD. This crossing is to be removed as explained in the CDP2 Decommissioning Programmes [3]. Any concrete mattresses and exposed grout bags that are removed to gain access to infrastructure will be fully recovered to shore for re-use, recycling, or disposal as appropriate. Grout bags that are exposed will also be removed to shore for re-use, recycling or disposal as appropriate. Deposited rock will remain <i>in situ</i>.</p>	

1.6 Field location incl. field layout and adjacent facilities



Figure 1.6.1: Murdoch installation location in UKCS (indicated in red)

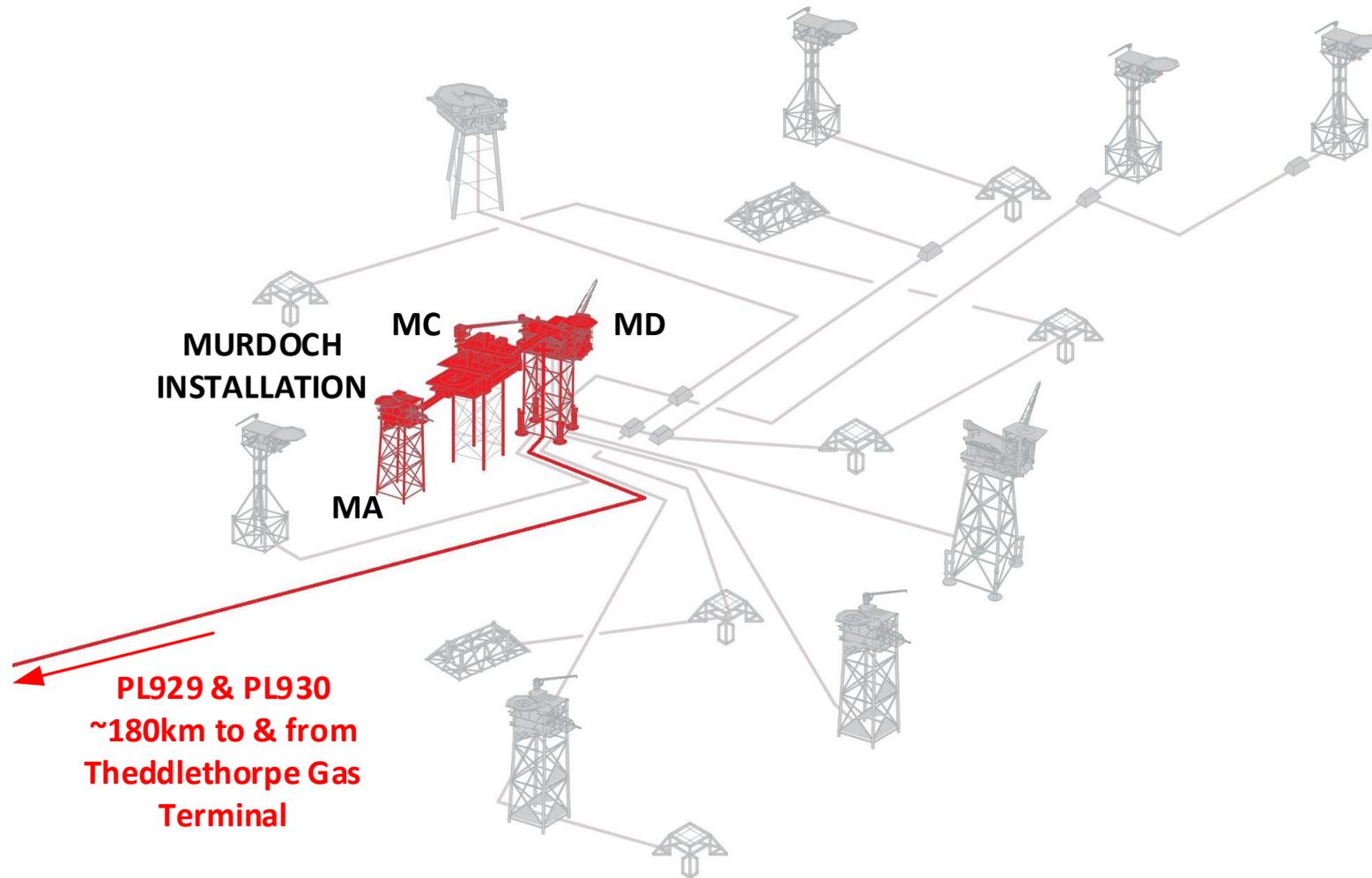


Figure 1.6.2: Murdoch installation layout

Table 1.6.1: List of adjacent facilities

Owner	Name	Type	Murdoch MA	Murdoch MC	Murdoch MD	Information	Status
Chrysaor	Murdoch MA	Accommodation Platform	n/a	SW, 0.09km	SW, 0.16km	Subject of this DP	Out of use
Chrysaor	Murdoch MC	Compression Platform	NE, 0.09km	n/a	SW, 0.07km	Subject of this DP	Out of use
Chrysaor	Murdoch MD	Drilling Platform	NE, 0.2km	NE, 0.1km	n/a	Subject of this DP	Out of use
Chrysaor	Murdoch K.KM	Subsea Template (1-Slot)	ESE, 5.6km	ESE, 5.5km	ESE, 5.5km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Boulton BM	Wellhead Platform	WSW, 11.4km	WSW, 11.4km	WSW, 11.5km	Refer DP for CDP2 [3]	Out of use
Chrysaor	McAdam MM	Subsea Template (2-Slot)	N, 8.7km	N, 8.6km	N, 8.6km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Munro MH	Wellhead Platform	NNW, 18.4km	NNW, 18.4km	NNW, 18.3km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Hawksley EM	WHPS (1-Slot)	N, 21.3km	N, 21.2km	N, 21.2km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Kelvin TM	Wellhead Platform	NE, 12.5km	NE, 12.4km	NE, 12.3km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Katy KT	Wellhead Platform	NE, 26.5km	NE, 26.4km	NE, 26.3km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Watt QM	WHPS (1-Slot)	SSE, 8.4km	SSE, 8.4km	SSE, 8.5km	Refer DP for CDP2 [3]	Out of use
Chrysaor	Boulton HM	WHPS (1-Slot)	SSW, 11.5km	SSW, 11.6km	SSW, 11.7km	Refer DP for CDP2 [3]	Out of use
Ineos	Cavendish RM	Fixed Platform (NUI)	NWW, 44.3km	NWW, 44.3km	NWW, 44.3km	DP approved May 2020	Out of use
Chrysaor	PSSL	Pigging skid & protection structure	NE, 0.23km	NNE, 0.14km	NNE, 0.07km	Inside Murdoch 500m zone; Refer DP for CDP2 [3]	Out of use
Chrysaor	PSNL	Pigging skid & protection structure	NE, 0.23km	NE, 0.15km	NE, 0.07km	Inside Murdoch 500m zone; Refer DP for CDP2 [3]	Out of use
Chrysaor	Kelvin/Murdoch SPS	Pigging skid & protection structure	NE, 0.28km	NNE, 0.2km	NNE, 0.12km	Inside Murdoch 500m zone; Refer DP for CDP2 [3]	Out of use
Premier	Hunter HK	WHPS	NE, 7.9km	NE, 7.8km	NE, 7.8km	Export via Murdoch K.KM DP approved in April 2021	Out of use
Premier	Rita	WHPS	W, 7.4km	W, 7.4km	W, 7.5km	Export via Hunter HK and Murdoch K.KM. DP approved April 2021	Out of use
DNO	Ketch KA	Piled steel jacket	SE, 26.7km	SE, 26.7km	SE, 26.7km	DP approved Aug 2019	Out of use
DNO	Schooner SA	Piled steel jacket	SSW, 28.2km	SSW, 28.3km	SSW, 28.4km	DP approved Aug 2019	Out of use
Ineos	Topaz	WHPS	S, 36.1km	S, 36.2km	S, 36.3km	DP approved Feb 2021	Out of use
Chrysaor	Kelvin TM STA	Pipeline Tee Piece	NE, 12.4km	NE, 12.4km	NE, 12.3km	Refer DP for CDP2 [3]	Out of use

Table 1.6.1: List of adjacent facilities

Owner	Name	Type	Murdoch MA	Murdoch MC	Murdoch MD	Information	Status
Chrysaor	Kelvin PMA	PMA	NE, 12.5km	NE, 12.4km	NE, 12.3km	Refer DP for CDP2 [3]	Out of use
Wintershall	Wingate	Satellite Platform	NEE, 19.9km	NEE, 19.8km	NEE, 19.8km		Operational
Chrysaor	Katy Tee	Pipeline Tee Piece	NE, 26.5km	NE, 26.4km	NE, 26.3km	Refer DP for CDP2 [3]	Out of use
Perenco	Tyne	Wellhead Platform	NNE, 22.5km	NNE, 22.4km	NNE, 22.3km	DP approved Jan 2019	Out of use
Neptune	Minke	Wellhead Platform	E, 27.3km	E, 27.2km	E, 27.2km	DP approved Sept 2019	Out of use
National Grid	Viking Interconnector	Cable crossing	SW, 44.2km	SW, 44.2km	SW, 44.3km	Installed Q4 2021, due to be commissioned in 2023	Installation in progress
Various	Various	Umbilical crossings	Within Murdoch 500m zone			Refer Table 2.5.1	Out of use
Tampnet	Tampnet fibre-optic cables	Cable crossings	Refer Figure 2.5.1 and Figure A1.1.1 in Appendix 1 for general routing of the Tampnet cables, and the crossing over PL929 & PL930 at KP19.097.			Refer Table 2.5.1 for Tampnet cable crossing	Operational
Impacts of decommissioning proposals							
No impact is expected although the pipeline crossings associated with PLU4686, PLU4888, and PLU4890 will be affected by the decommissioning proposals and will need to be dealt with in a coordinated effort. Refer Table 2.5.1 and the Decommissioning Programmes for CDP2 [2].							

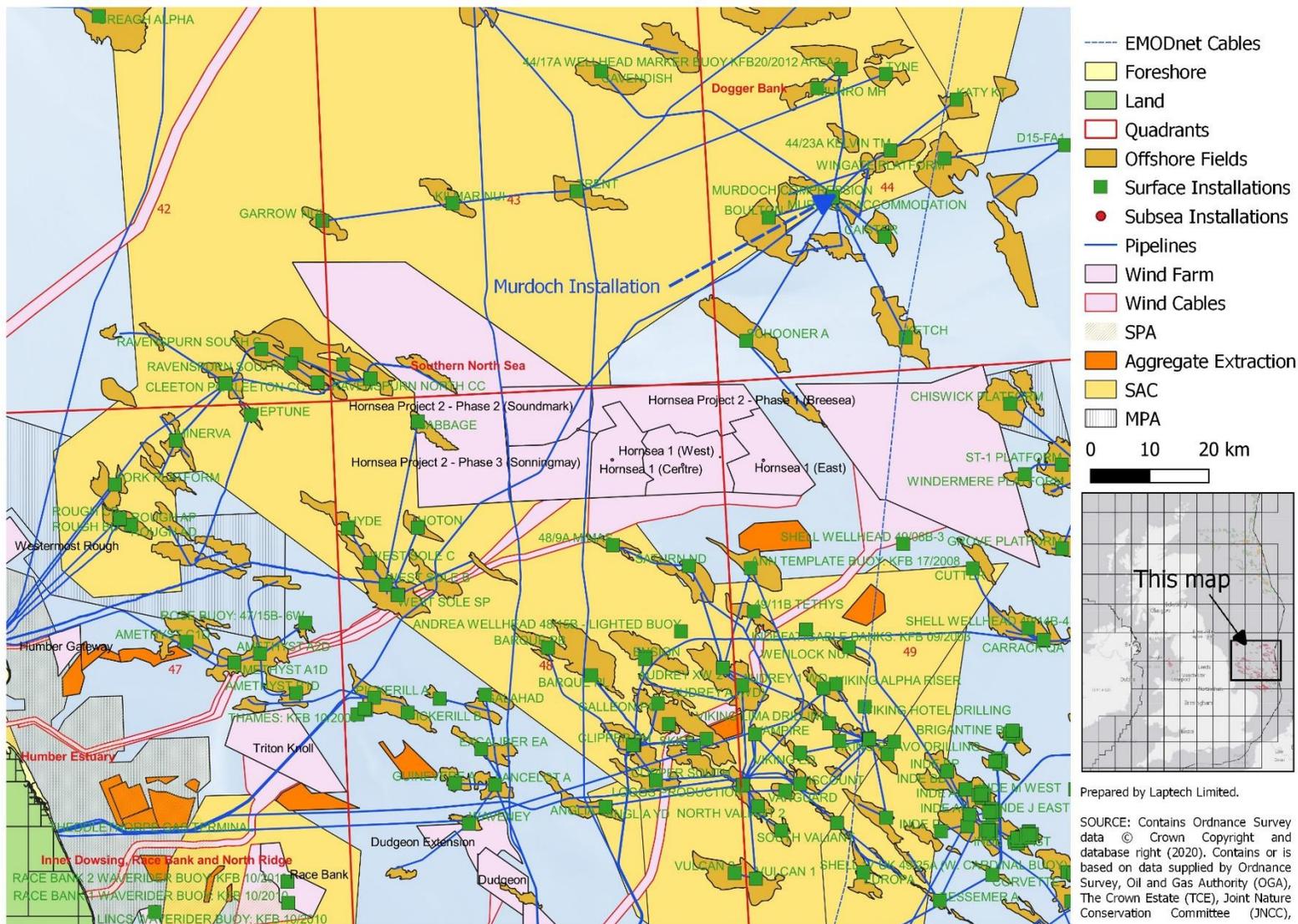


Figure 1.6.3: Location, adjacent facilities, and environmentally sensitive areas

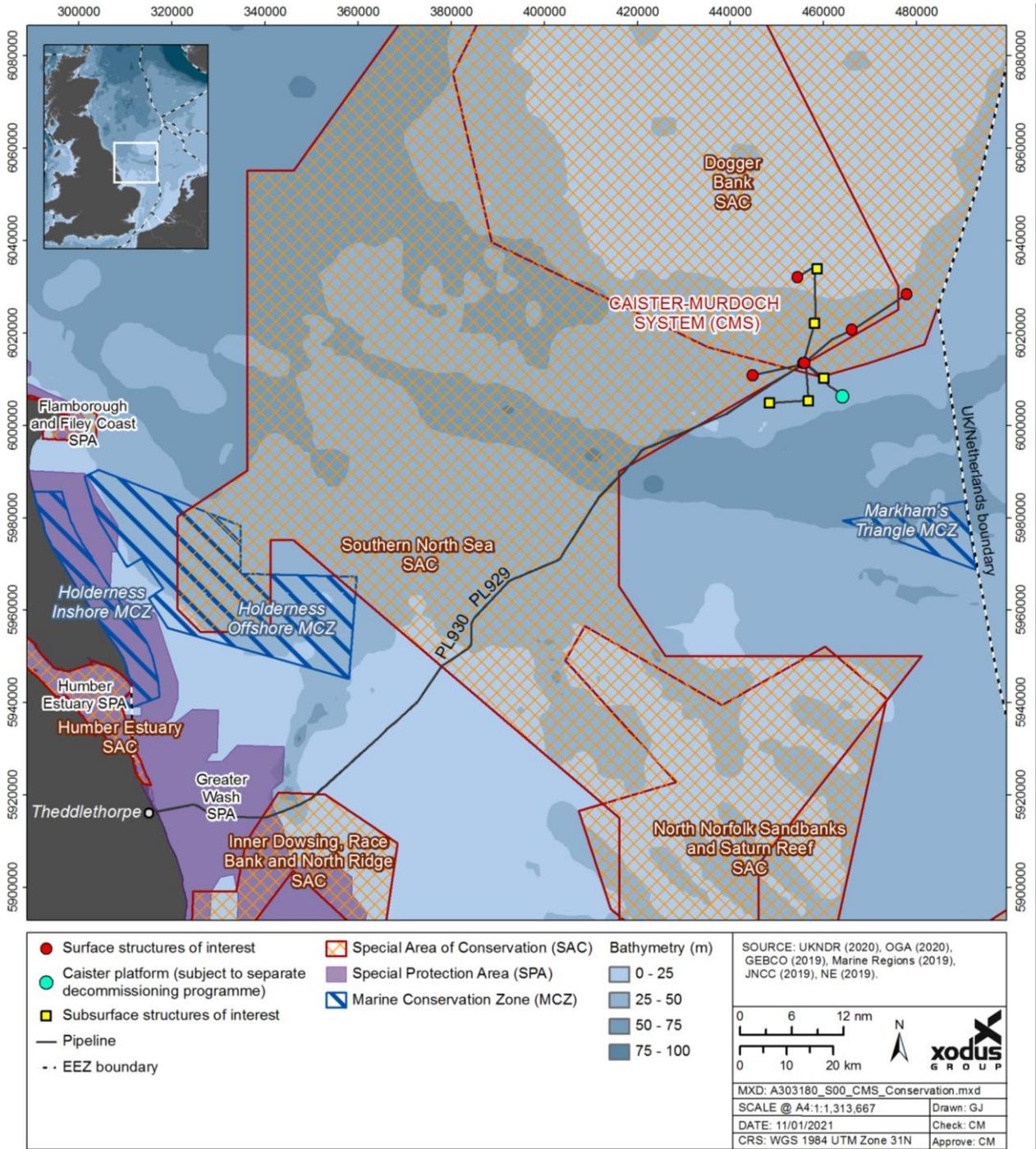


Figure 1.6.4: Location and environmentally sensitive areas

1.7 Industrial implications

It is Chrysaor's intention to develop a contract strategy and Supply Chain Action Plan that will result in an efficient and cost-effective execution of the decommissioning works. Principles of the contracting and procurement strategies to be used by Chrysaor as operator and on behalf of the other Section 29 notice holders, for the decommissioning of the Murdoch Installation (Murdoch MA, Murdoch MC, and Murdoch MD) and associated pipelines are listed below:

- 1) Chrysaor participates in the PILOT Share Fair events providing one-to-one sessions with the UK supply chain on the SNS decommissioning programmes and timeline.
- 2) The First Point Assessment (FPAL) database is the primary source for establishing tender lists for contracts or purchases valued at US\$ 100,000 and above, although it is also used under this limit.
- 3) Chrysaor is committed to competitively bidding all its major contracts where possible and practicable. We are supporters of the UK Supply Chain Code of Practice and our performance in this regard has been acknowledged through Excellence Awards from Oil & Gas UK.
- 4) Chrysaor are active participants in various industry initiatives including:
 - a. Oil & Gas UK Supply Chain Forum;
 - b. Inventory sharing initiative (Ampelius);
 - c. OGA Decommissioning & Supply Chain Task Forces.

2 Description of items to be decommissioned

2.1 Surface facilities (Topsides and Jackets)

Table 2.1.1: Surface facilities information								
Name	Facility type	Location		Topsides / facilities		Jacket		
		WGS84 Decimal		Mass (Te)	No of modules	Mass (Te) ⁴	No of legs, piles	Mass of piles (Te)
		WGS84 Decimal minute						
Murdoch MA	Fixed Steel Jacket	54.269009° N 2.321724° E		835.3	1	672.9	4, 4	340.0
		54°16.1405' N 02°19.3034' E						
Murdoch MC	Fixed Steel Jacket	54.269407° N 2.322904° N		4,393.3	1	1,217.6	4, 4	474.4
		54°16.1644' N 02°19.3742' E						
Murdoch MD	Fixed Steel Jacket	54.269861° N 2.323702° E		2,256.5	1	2,089.6	4, 4	817.7
		54°16.1916' N 02°19.4221' E						



Figure 2.1.1: Photograph of the Murdoch installation (left to right, MA, MC & MD)

⁴ Jacket mass excluding piles.

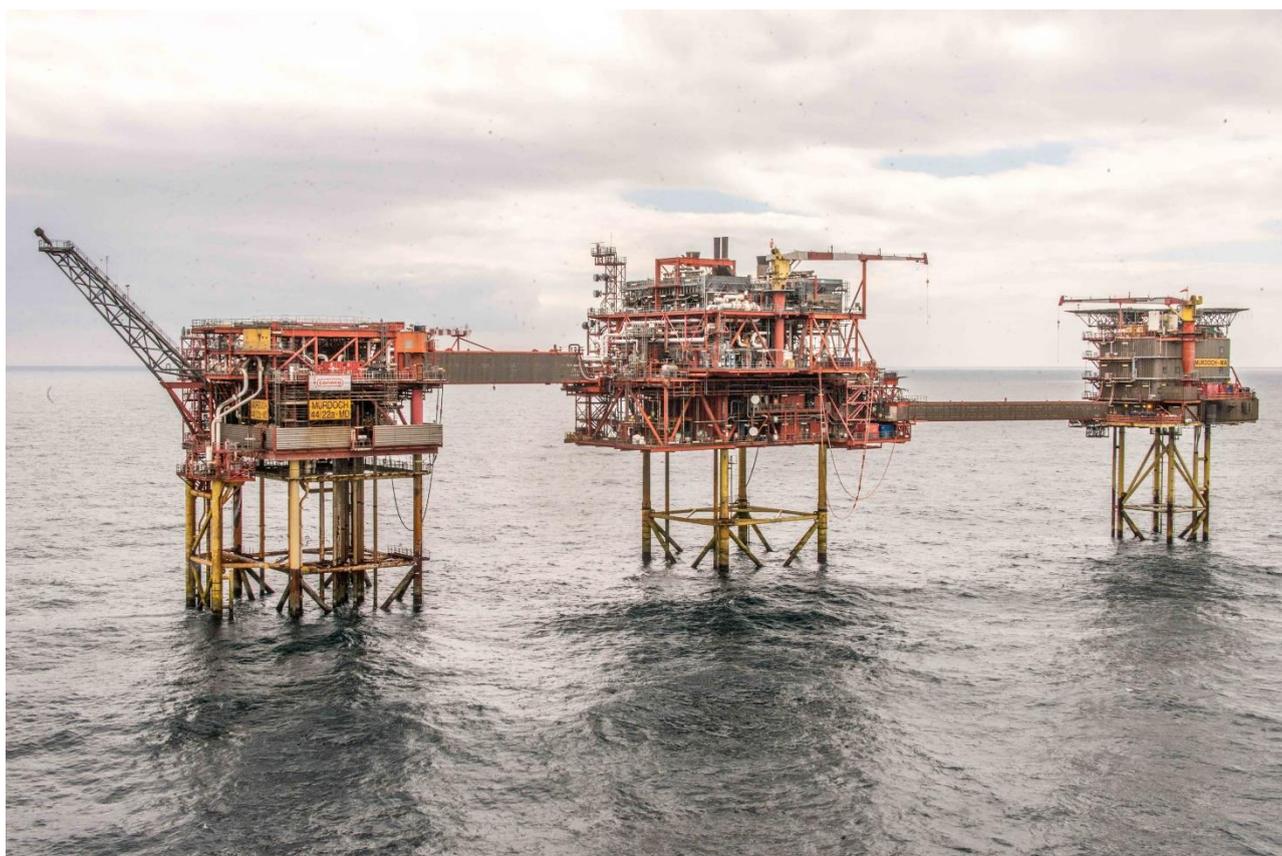


Figure 2.1.2: Photograph of the Murdoch installation (left to right, MD, MC & MA)

2.2 Subsea installations

Table 2.2.1: Subsea installation and stabilisation features

Total Number	Size/Mass (Te)	Location(s) WGS84 Decimal	Locations(s) WGS84 Decimal Minute	Comments / Status
1	7.7m x 8m x 3.75m 418	54.269861° N 2.323702° E	54°16.1916' N 02°19.4221' E	3x 30inOD piles

NOTE:
The Murdoch template is installed within the footprint of the Murdoch MD jacket. Refer Figure 2.2.1.

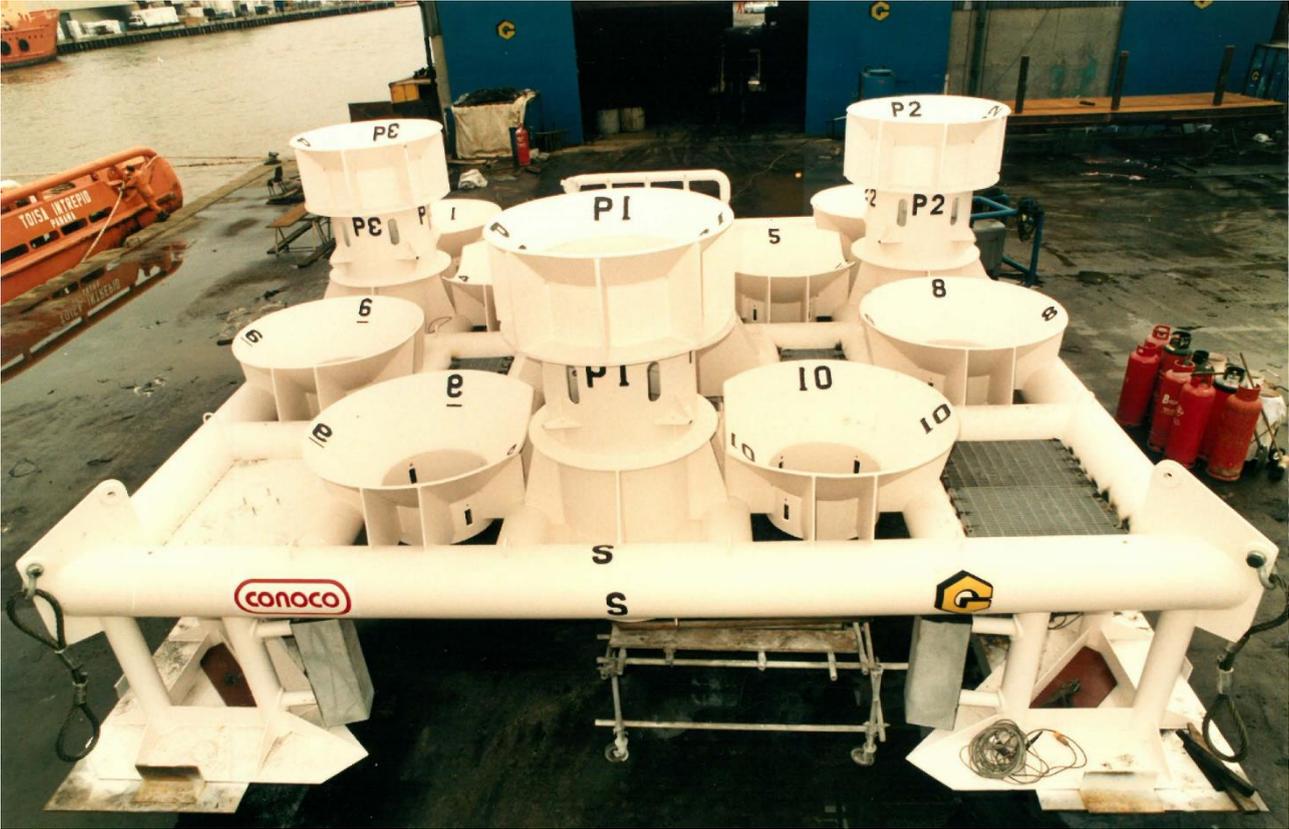


Figure 2.2.1: Photograph of the Murdoch MD Template

2.3 Pipelines

Table 2.3.1: Pipeline / flowline / umbilical information

Description	Pipeline No (as per PWA)	Diameter (inches)	Length (km) ^{2,3}	Description of component parts	Product conveyed	From – to end points ⁶	Burial status ¹	Pipeline status	Current content
26in gas export pipeline	PL929	26in	179.64	FBE coated steel pipeline coated with CWC for most of its length	Natural gas, condensate, water	Sphere launcher on ESDV Murdoch MD to MLWM	Trenched and buried. Exhibits good burial depth but with the total length of exposures and spans <5% of the overall length of the pipeline.	Out of use	Inhibited seawater
4in methanol import pipeline	PL930	4in	179.58	FBE resin coated steel pipeline with 3x polyethylene flexible tie-in spools ⁵	Methanol and corrosion inhibitor	MLWM to ESDV at Murdoch MD	Trenched and buried. Trenched to ≥1.0m to top of pipe.	Out of use	Inhibited seawater

NOTES:

- For further information refer the Comparative Assessment report [5]. The total number and length of exposures and spans is difficult to quantify as the survey data are not directly comparable. Historically in 2006 one reportable span 61m long was recorded at ~KP57.432, but it has not been observed since. For pipeline crossings refer Table 2.5.1;
- PWA variation (354/V/18) quotes 179.643km for PL929. This *excludes* the distance between MLWM and termination of the pipeline at TGT (1.341km);
- PWA variation (354/V/18) quotes 179.577km for PL930. This *excludes* the distance between MLWM and the ESDV at TGT (1.097km);
- PL930 is piggybacked on PL929 for the first ~500m from Murdoch MD and for ~4.6km up to MLWM;
- The length of PL930 is interspersed with three flexible transition spool pieces between 40m (3x) and 80m (1x) long. The first flexible spool piece is 40m long and is located ~4.8km from mean low water mark (MLWM), the next, 80m long, is located ~20km from MLWM, the third is located at ~KP180.409 on approach to the 500m zone is 40m long, while a fourth and last flexible spool piece ~100m long, connects the end of the pipeline to the 4in riser at the platform. The 'as-built' lengths and number of flexible flowlines may differ from the PWA details;
- Note that decommissioning of the onshore section of pipelines beyond MLWM is not addressed in this Decommissioning Programme as OPRED has a regulatory remit that only extends as far as MLWM. Regulatory responsibility of the onshore section of pipeline beyond MLWM lies with the Local Planning Authority under the Town and Country Planning Act. At the time of writing, the decommissioning plan for the onshore sections of the pipelines out to the MLWM has not been fully defined, but please refer Appendix 1.

2.4 Risers

Table 2.4.1: Riser information

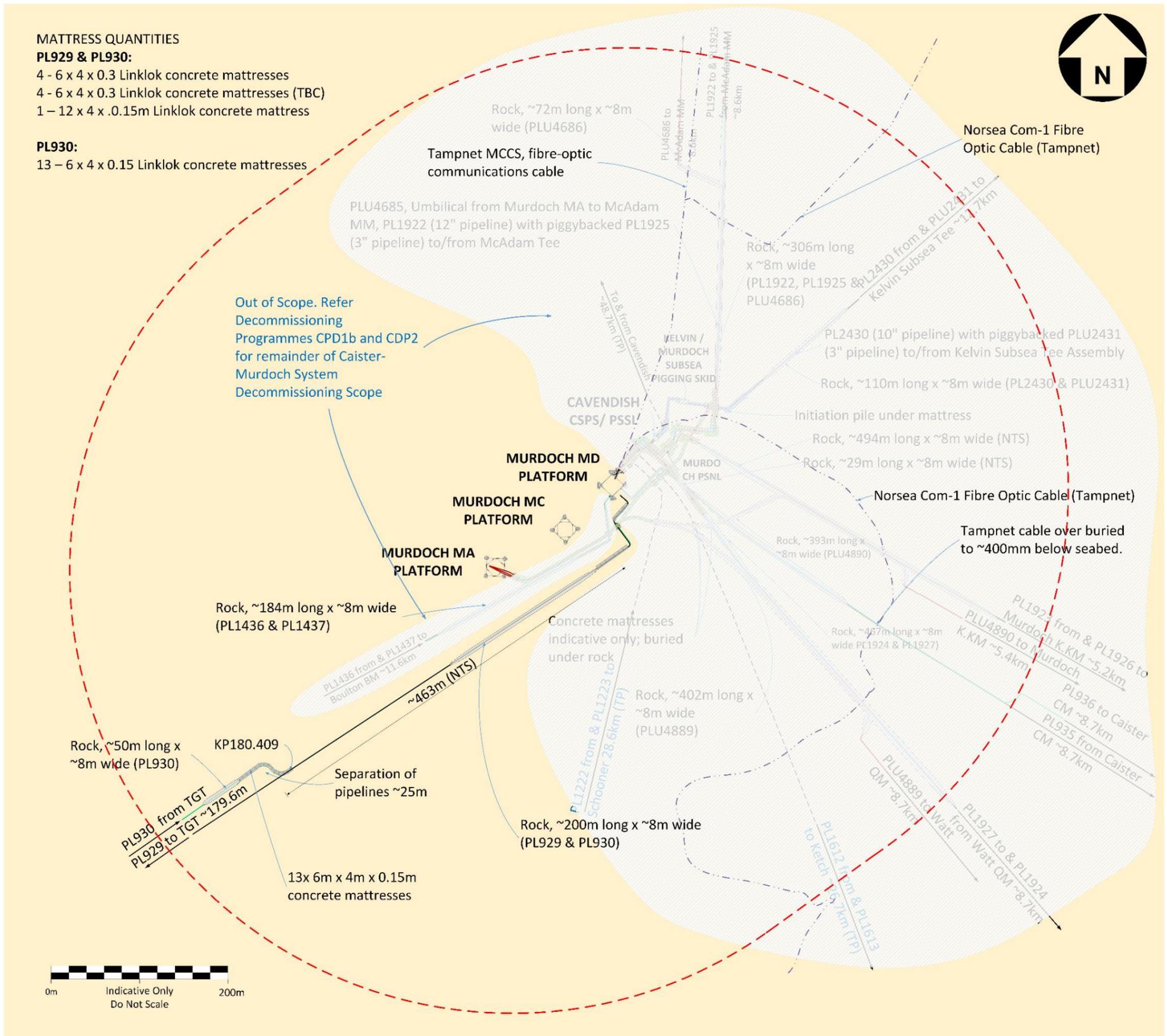
Description	Pipeline No (as per PWA)	Diameter (inches)	Length (m)	Description of component parts	Product conveyed	From – to end points	Burial status	Pipeline status	Current content
10in gas import riser	PL1311	10	75	Coated carbon steel. Neoprene / Thermal Sprayed Aluminium (TSA)	Gas	Riser tie-in flange (Murdoch MD platform) to ESD Valve (Murdoch MD)	Exposed (mounted on jacket)	Out of use	Seawater
3in MeOH riser	PL1312	3	72	Coated carbon steel. Neoprene / Thermal Sprayed Aluminium (TSA)	Methanol and corrosion inhibitor	ESDV (Murdoch MD platform) to Subsea Tie-in Flange (Murdoch MD)	Exposed (mounted on jacket)	Out of use	Seawater
18in Gas export pipeline riser	PL1612	18	66.3	Coated carbon steel	Gas	From Murdoch riser flange to pipeline end closure at end of primary pig receiver on Murdoch platform	Exposed (mounted on jacket)	Out of use	Seawater
3" Gas MeOH pipeline riser	PL1613	3	59.3	Coated carbon steel	Methanol and corrosion inhibitor	From Murdoch riser flange to Murdoch platform ESDV	Exposed (mounted on jacket)	Out of use	Seawater
16in Gas export pipeline riser	PL1222	16	56.5	Coated carbon steel	Gas	From Murdoch riser flange to pipeline end closure at end of primary pig receiver on Murdoch platform	Exposed (mounted on jacket)	Out of use	Seawater
3in MeOH export riser	PL1223	3	109.3	Coated carbon steel	Methanol and corrosion inhibitor	From Murdoch riser flange to Murdoch platform SDV	Exposed (mounted on jacket)	Out of use	Seawater

NOTES:

1. PL1612 & PL1613 are the Ketch pipeline risers; the associated pipelines are dealt with in the Ketch Decommissioning Programmes [7];
2. PL1222 and PL1223 are the Schooner pipeline risers; the associated pipelines are dealt with in the Schooner Decommissioning Programmes [8].

2.5 Pipeline crossings

Table 2.5.1: Pipeline crossing information		
OUTSIDE MURDOCH 500M ZONE	KP	Protection
Tampnet fibre-optic cable (over PL929 & PL930), indicative only, to be confirmed.	KP19.097	Picked up in survey as cable bridge over PL929 & PL930, no details available. Refer Figure A1.1.1 in Appendix 1. Out of scope.
PL3121 Juliet to Pickerill A gas pipeline & PLU3122 Juliet to Pickerill umbilical.	KP65.7	Unknown. Expectation is that the crossing will be protected with concrete mattresses overlain with deposited rock. Out of scope.
PL2641 8in Seven Seas Newsham gas export & PLU2642 Seven Seas control umbilical.	KP90.8	Unknown. Expectation is that the crossing will be protected with concrete mattresses overlain with deposited rock. Out of scope.
PL1570 Shearwater to Bacton 34in gas pipeline (SEAL).	KP112.1	Unknown. Expectation is that the crossing will be protected with concrete mattresses overlain with deposited rock. Out of scope.
PL253 Esmond to Bacton 24in gas export pipeline (over).	KP129.1	Concrete mattresses buried under deposited rock. Refer Figure 2.6.2 and Table 2.6.2.
Viking Interconnector Link (cable laid and buried Q4 2021) crosses over PL929. Refer Notice to Mariners [9].	417898 E 5990847 N	Unknown. The expectation is that the Viking Interconnector will be furnished with cable protection overlain with deposited rock. This is the responsibility of National Grid. Refer Figure A1.1.1 in Appendix 1
Viking Interconnector Link (cable laid and buried Q4 2021) crosses over PL930. Refer Notice to Mariners [9].	417881 E 5990859 N	Unknown. As above.
INSIDE MURDOCH 500M ZONE		
PLU4686 Murdoch MA to McAdam umbilical.	KP180.915	Shared. 2x concrete mattresses. Refer Figure 2.5.1.
PLU4888 Watt QM to Boulton HM umbilical.	KP180.915	
PLU4890 Murdoch MA to Murdoch K.KM umbilical.	KP180.915	
NOTES:		
1. A higher PL number will cross over the top of a pipeline with a lower PL number. For example, PL929 & PL930 would cross over PL253.		
2. KP measured from Theddlethorpe.		



⁵ Mattress quantities only include those in the Murdoch 500m Zone. For example, they exclude those used for the PL253 Esmond crossing.

2.6 Pipeline stabilisation features

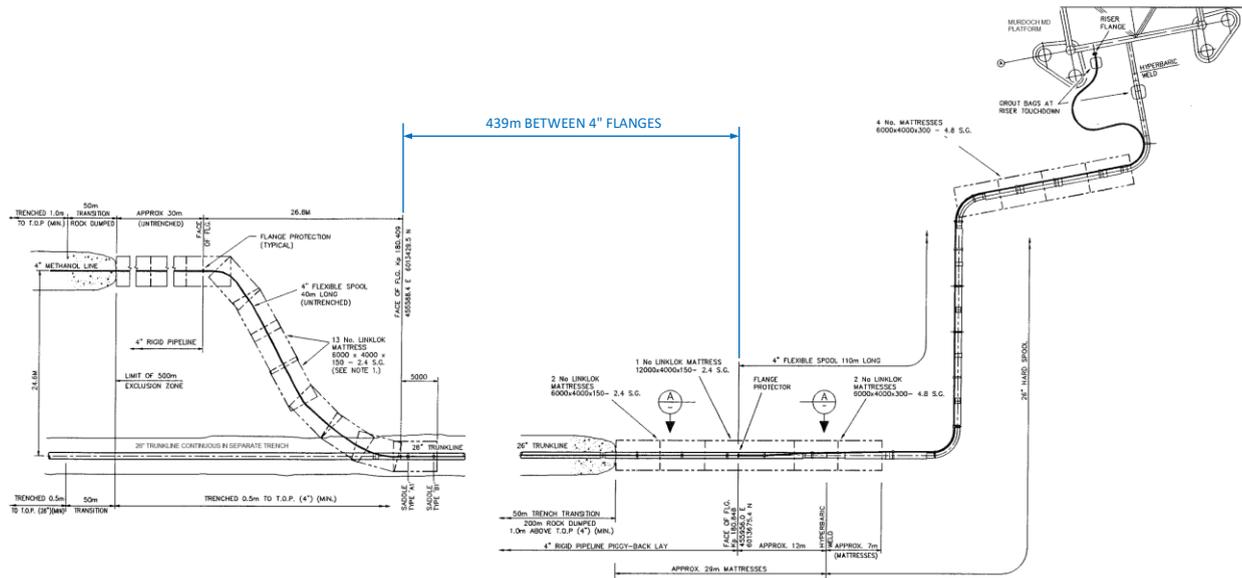


Figure 2.6.1: Separation of PL929 & PL930 at KP180.409 (NTS)

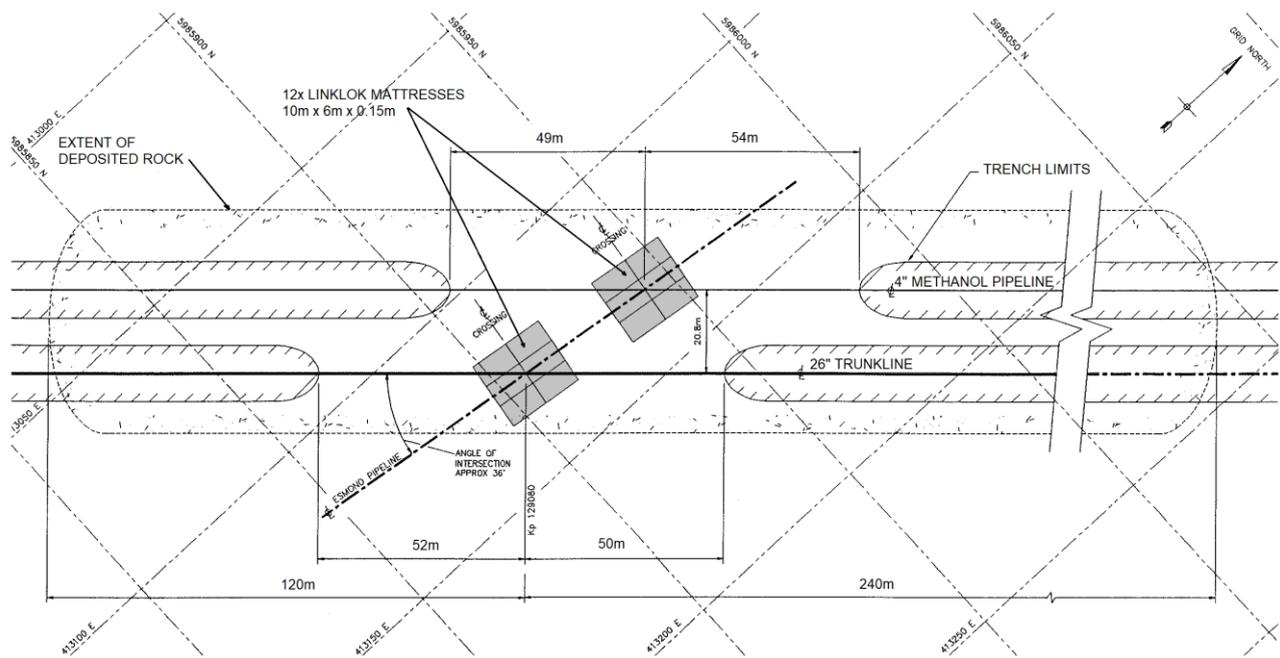


Figure 2.6.2: PL253 Esmond pipeline crossing PL929 & PL930 at ~KP129 (NTS)

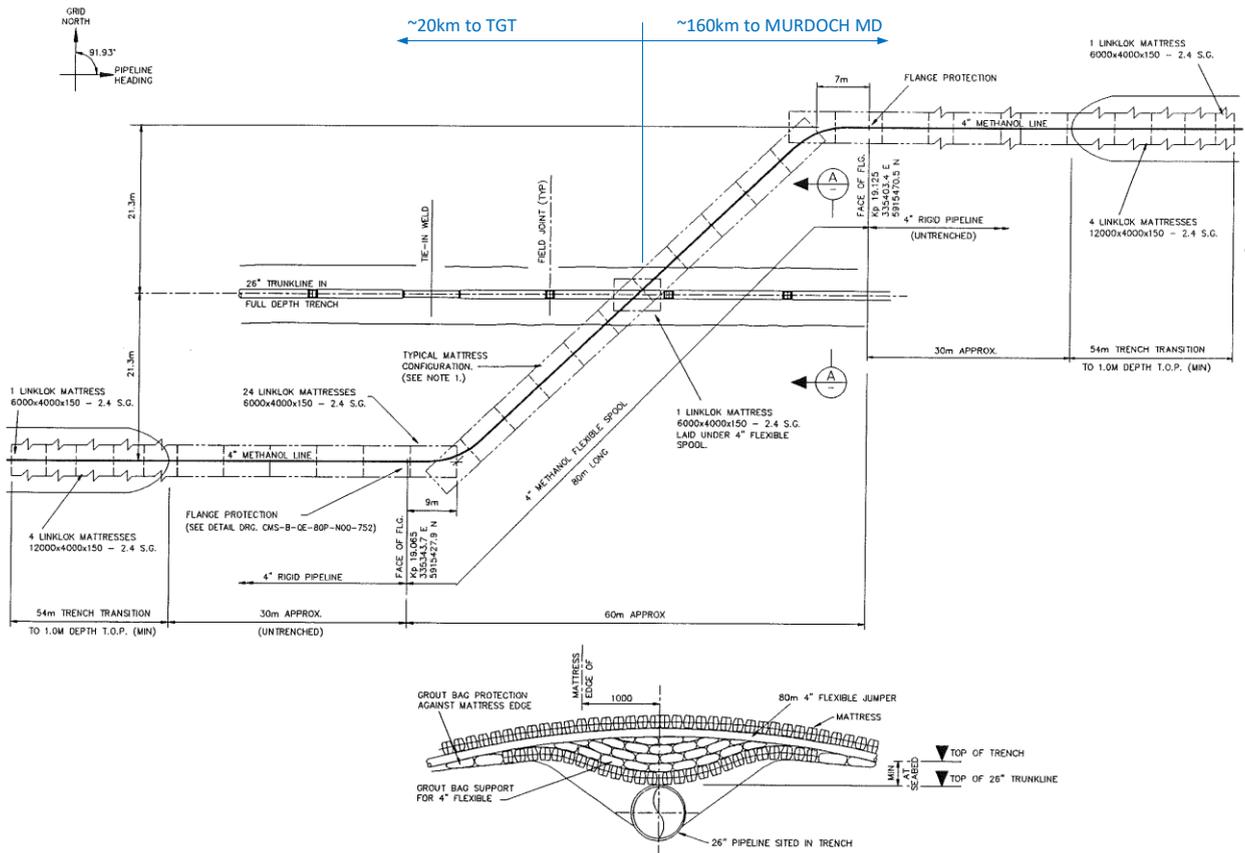


Figure 2.6.3: PL930 crosses over PL929 at ~KP20.0 from MLWM (NTS)⁶

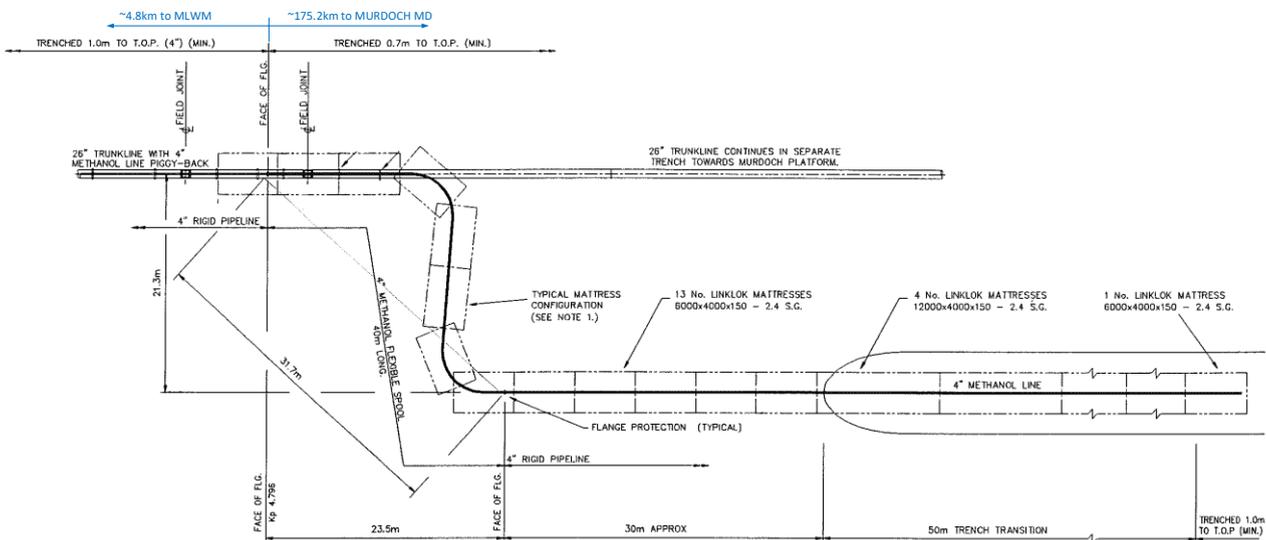


Figure 2.6.4: Separation of PL930 & PL929 ~4.8km from MLWM (NTS)

⁶ The UTM coordinates of KP20 have been calculated to be: 335 732 E, 5 915 355 N.

Table 2.6.1: Pipeline stabilisation features (PL1311 & PL1312)

Stabilisation feature	Total number	Total mass (Te)	Location(s)	Exposed / buried / condition
INSIDE MURDOCH 500M ZONE				
NOTE:				
1. No stabilisation features as associated with PL1311 & PL1312.				

Table 2.6.2: Pipeline stabilisation features (PL929 & PL930)

Stabilisation feature	Total number	Total mass (Te)	Location(s)	Exposed / buried / condition
INSIDE MURDOCH 500M ZONE				
Concrete mattresses	4	36.8	Murdoch MD approach (PL929 & PL930), 6m x 4m x 0.15m Linklok concrete mattresses. Refer Figure 2.6.1.	Expected to be buried. Current status unknown.
	4	36.8	Murdoch MD approach (PL929 & PL930), 6m x 4m x 0.15m. Linklok concrete mattresses. Refer Figure 2.6.1.	Expected to be buried. Current status unknown.
	1	9.2	Murdoch MD approach (PL929 & PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.1.	Expected to be buried. Current status unknown.
	13	59.9	KP180.409 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.1.	Expected to be buried. Current status unknown.
Grout bags (25kg)	n/a	n/a	n/a	No mention of grout bags on drawings or survey reports.
Deposited rock ^{2,4}	50m	1,855	Between KP180.302 and KP180.352 over PL930 at separation. Refer Figure 2.5.1 and Figure 2.6.1.	Likely exposed with dusting of sediment but to be confirmed.
Deposited rock ^{2,4}	200m	3,180	Between KP180.631 and KP180.831. Refer Figure 2.5.1 and Figure 2.6.1.	Likely exposed with dusting of sediment but to be confirmed.
OUTSIDE MURDOCH 500M ZONE				
Concrete mattresses	12	138.2	Esmond pipeline PL253 crossing (PL929, PL930) at ~KP129.1 10m x 6m x 0.15m Linklok mattresses. Refer Figure 2.6.2.	Buried under deposited rock.
Concrete mattresses	4	36.8	~KP20 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.	Expected to be buried. Status unknown.
	1	4.6	~KP20 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.	Expected to be buried. Status unknown.
	24	110.5	~KP20 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.	Expected to be buried. Status unknown.

Table 2.6.2: Pipeline stabilisation features (PL929 & PL930)

Stabilisation feature	Total number	Total mass (Te)	Location(s)	Exposed / buried / condition
	1	4.6	~KP20 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.	Expected to be buried. Status unknown.
	4	36.8	~KP20 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.	Expected to be buried. Status unknown.
	1	4.6	~KP4.8 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	Expected to be buried. Status unknown.
	4	36.8	~KP4.8 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	Expected to be buried. Status unknown.
	4	18.4	~KP4.8 (PL929 & PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	Expected to be buried. Status unknown.
	10	46.0	~KP4.8 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	Expected to be buried. Status unknown.
Grout bags (25kg)	500	12.5	At separation point at KP20. Refer Figure 2.6.3.	Expected to be buried. Status unknown.
Deposited rock ^{2,4}	360m	26,847	PL253 Esmond pipeline crossings between KP128.96 and KP129.320, ~360m long x ~55m wide (estimated). Refer Figure 2.6.2.	Likely exposed with dusting of sediment but to be confirmed.

NOTES:

- Origin of pipeline KP taken at MLWM and ends at base of PL929 riser at Murdoch MD;
- No quantities of grout bags are stated on drawings or survey reports;
- Mass of deposited rock is estimated, based on the estimated volume and profile;
- Quantity of deposited rock excludes rock used to protect and stabilise pipeline crossings installed *after* PL929 and PL930;
- Total numbers of mattresses as follows:
 - 58x 6m x 4m x 0.15m;
 - 12x 10m x 6m x 0.15m;
 - 17x 12m x 4m x 0.15m.

2.7 Wells

Table 2.7.1: Well information			
Murdoch MD platform wells	Designation	Status	Category of well
44/22a-D1	Gas production	Decommissioned, AB2	PL 4-0-3
44/22a-D3	Gas production		PL 1-0-3
44/22a-D6	Gas production	Decommissioned, AB3	PL 3-0-3
44/22a-D7	Gas production	Decommissioned, AB2	PL 4-0-3
44/22a-D8	Gas production		PL 1-0-3
44/22a-D9	Gas production	Decommissioned, AB3	PL 1-0-3
44/22a-D10	Gas production	Decommissioned, AB2	PL 4-0-3
44/22a-D11z	Gas production		PL 3-0-3

For details of well categorisation see the latest version of the Oil & Gas UK Guidelines for the Decommissioning of Wells.

2.8 Inventory estimates

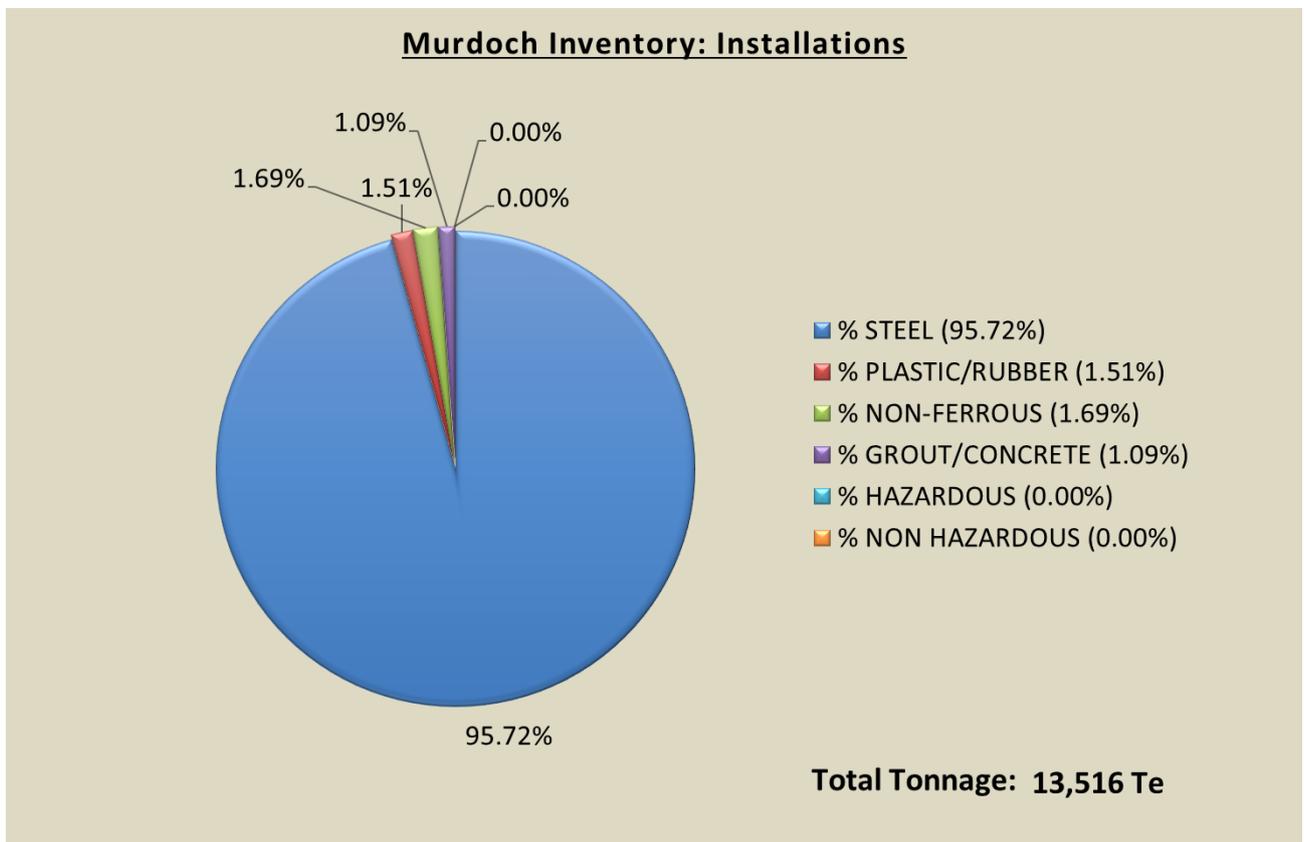


Figure 2.8.1: Pie-chart of estimated installation inventory

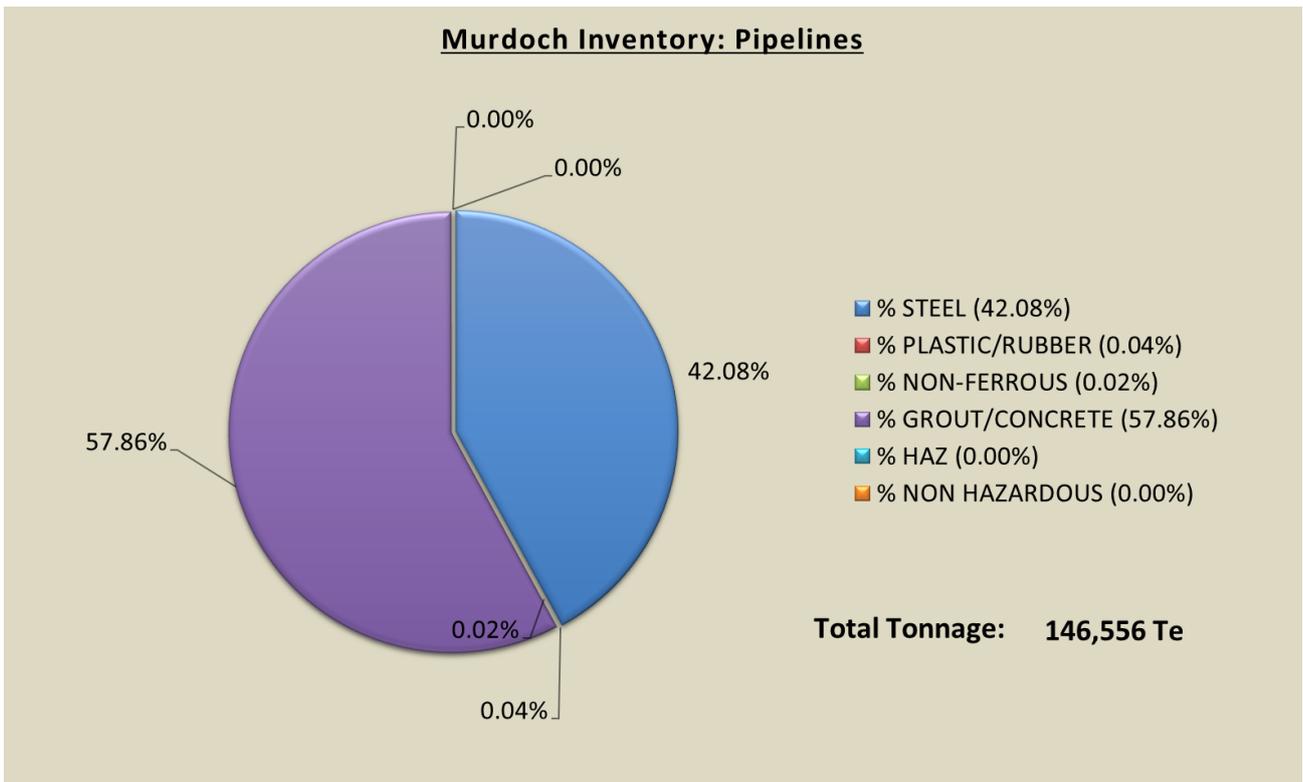


Figure 2.8.2: Pie-chart of estimated pipeline inventory, excl. deposited rock

3 Removal and disposal methods

Waste will be dealt with in accordance with the Waste Framework Directive [9]. The reuse of an installation or pipelines (or parts thereof) is first in the order of preferred decommissioning options. However, given the age of the installations and infrastructure it is unlikely that reuse opportunities will be realised. Waste generated during decommissioning will be segregated by type and periodically transported to shore in an auditable manner through licensed waste contractors. Transfrontier shipment of waste will not be required. Steel and other recyclable metal are estimated to account for the greatest proportion of the materials inventory. Refer to section 5.4 of the Environmental Appraisal [4] for further details concerning disposal of waste.

3.1 Topsides decommissioning

3.1.1 Murdoch MA

Topsides description: the Murdoch MA topside structure comprises accommodation on four levels as illustrated in Figure 3.1.1 with a mass ~835Te including the mass of the access bridge to Murdoch MC, which is ~37.2Te. The overall dimensions of the topsides at Level 1 are ~34m x 22m and the overall height between the roof level and LAT is ~39m. The bridge link between Murdoch MA and Murdoch MC is visible in Figure 2.1.1, Figure 2.1.2 and Figure 3.1.1. The bridge has a rectangular cross section 3.1m deep x 3.2m wide and is ~45m long. The helideck on MA is the only operational helideck on the Murdoch installation. The others on MC and MD are out of use.

Level 1 contains the muster area or locker room, local control room, local equipment room, battery room and HVAC plant room. A generator room is provided on the north side of the accommodation module that houses a plant air compressor and the emergency (auxiliary) generator. The hydraulic power unit for the sub-sea umbilicals is also located on the north side of Level 1. Two ladders provide emergency egress from this level to the sea.

Level 2 includes the galley and dining room, food stores and recreation areas, while outside a laydown area for food containers is provided.

Level 3 incorporates the medical room, gym and sauna, laundry, store cupboards, offices, and cabins.

Level 4 incorporates cabins and the helicopter administration area. The roof level has the potable and seawater header tanks for domestic services within the accommodation, the helicopter refuelling unit and the HVAC extract fans and ductwork.

Removal methods: the topsides along with the access bridge will be completely removed and returned to shore. Possible methods are described in Table 3.1.2.

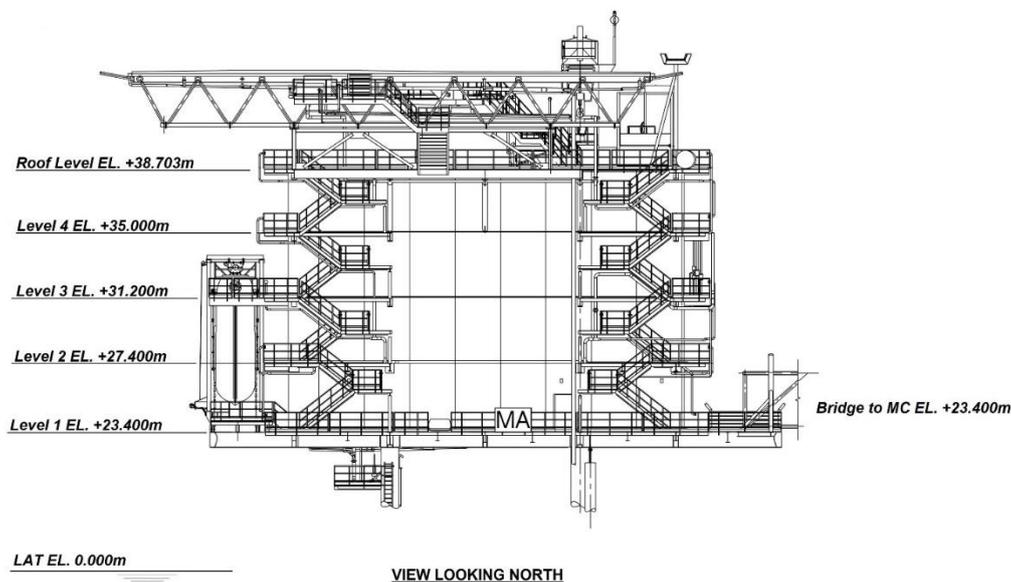


Figure 3.1.1: View on Murdoch MA topsides looking north

3.1.2 Murdoch MC

Topsides description: the Murdoch MC topsides was used as for accommodation before the Murdoch MA installation was installed. It comprises a Pigging platform, Main Deck, Mezzanine Deck and Cellar Deck as illustrated in Figure 3.1.2 with a mass ~4,393Te including the mass of the bridge to Murdoch MD, which is ~27.3Te. The overall dimensions of the Main Deck are ~56m x 39m and the overall height between Pigging Platform on the Weather Deck and LAT is ~50.7m. The bridge link to MD can be seen on the right of Figure 3.1.2. The bridge has a cross section 4.5m deep x 5m wide and is ~37m long. The bridge link to MA is not shown. The mass and dimensions for the bridge links from Murdoch MA is explained in the individual description for Murdoch MA and so shall not be repeated here.

Removal methods: the topsides and access bridges will be completely removed and returned to shore. Possible methods are described in Table 3.1.2.

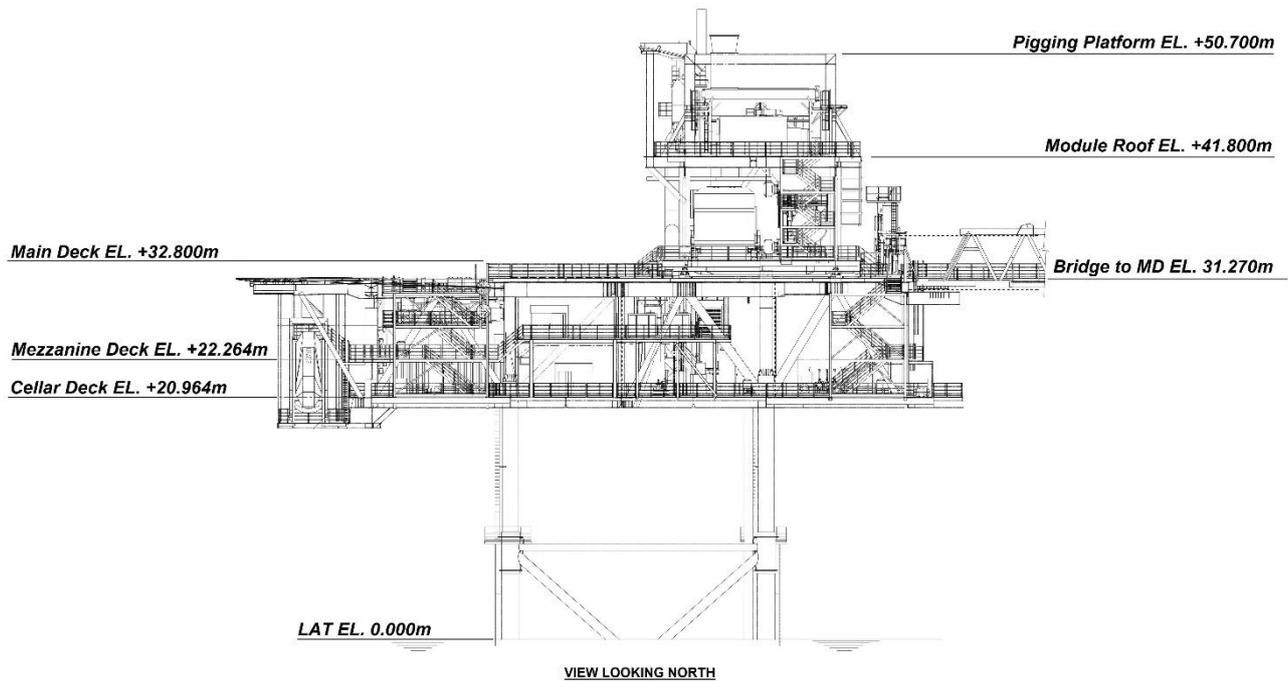


Figure 3.1.2: View on Murdoch MC topsides looking north

3.1.3 Murdoch MD

Topsides description: the Murdoch MD topside structure contains the wellheads comprises a Helideck, Main Deck and Cellar Deck as illustrated in Figure 3.1.3 and has a mass ~2,257Te. The overall dimensions of the Main Deck are ~44m x 31m and the overall height between the Helideck and LAT is ~39.6m. The bridge links between Murdoch MC and Murdoch MD are not shown here but are visible in 3.1.2. The mass and dimensions for the bridge links from Murdoch MC is explained in the individual description for Murdoch MC and so shall not be repeated here.

Removal methods: the topsides and access bridge will be completely removed and returned to shore. Possible methods are described in Table 3.1.2.

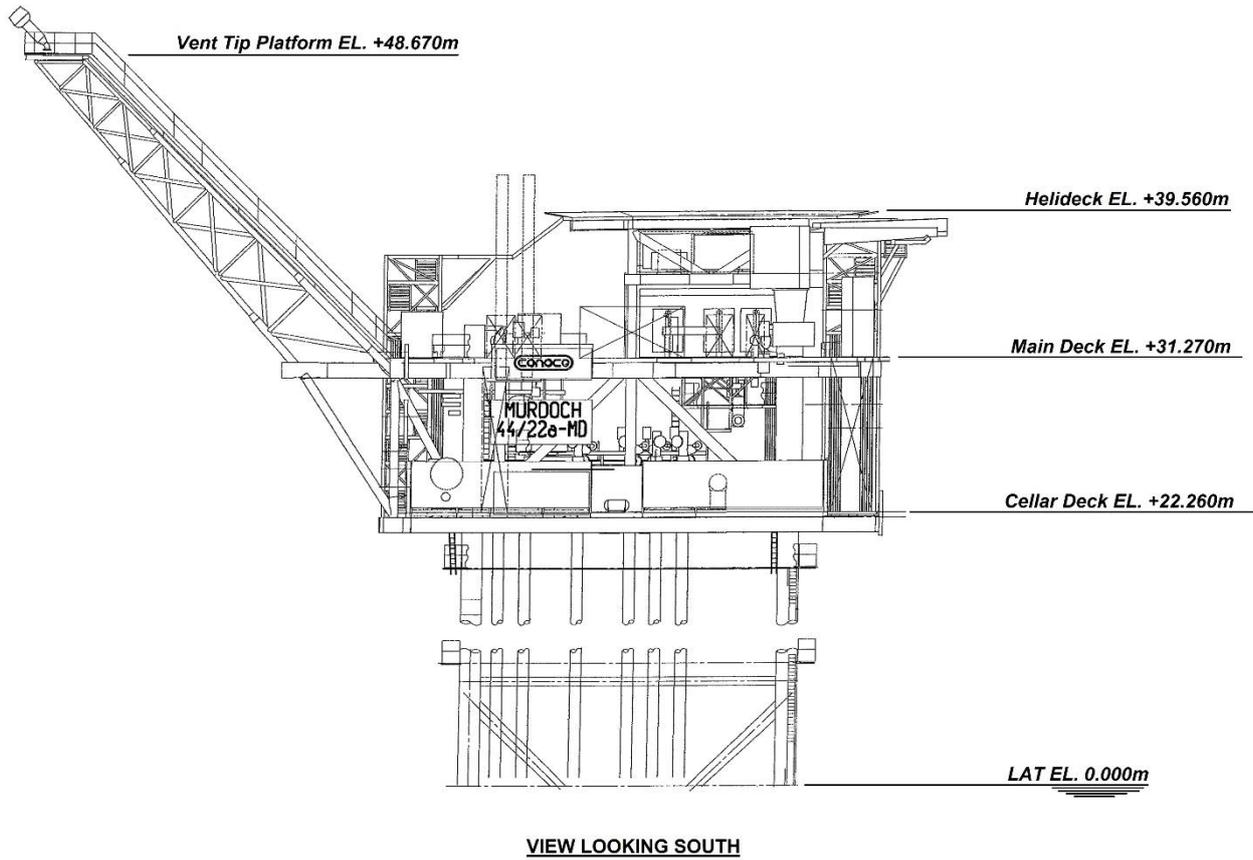


Figure 3.1.3: View on Murdoch MD topsides looking south

Preparation / Cleaning: The methods that will be used to flush, purge, and clean the topsides prior to removal to shore are summarised in Table 3.1.1.

Table 3.1.1: Cleaning of Topsides for Removal		
Waste Type	Composition of Waste	Disposal Route
Hydrocarbons	Process fluids	Vessels and pipework have already been flushed, nitrogen purged vented and made liquid free.
Produced solids	Sand, NORM	Any pipeline debris captured in filter packages, has been returned onshore for disposal. Any solids remaining in vessels will be removed and disposed of during the dismantlement of the Topsides onshore.
Diesel	Bunkered Diesel fuel	Bunkered diesel has already been drained and returned onshore for re-use or disposal.
Lubricating oils	Lubricants for equipment e.g. gearboxes, pumps, pedestal crane compressor skid	Lubricating oils have already been drained and returned onshore for re-use or disposal.

3.1.4 Topsides removal methods

Table 3.1.2: Topsides removal methods	
1) Semi-Submersible Crane Vessel <input checked="" type="checkbox"/> ; 2) Monohulled Crane Vessel <input checked="" type="checkbox"/> ; 3) Shear Leg Vessel <input checked="" type="checkbox"/> ; 4) Jack up Work barge <input checked="" type="checkbox"/> ; 5) Piece small or large <input checked="" type="checkbox"/> ; 6) Complete with jacket <input checked="" type="checkbox"/> .	
Methods considered	Description
Single lift removal by SSCV / MCV / SLV	Removal of topsides and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate
Single lift removal by SSCV / MCV / SLV	Removal of topsides as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate
Piece-small or piece large removal using attendant support vessel such as a JUWB	Removal of topsides in a series of smaller sub-units making use of the JUWB used for the well decommissioning activities, followed by recovery to shore for a programme of re-use, recycling or disposal as appropriate
Proposed removal method and disposal route	Removal of topsides, jacket and interconnecting bridges individually followed by recovery to shore for reuse, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method was made following a commercial tendering process and the removal contract has now been awarded. Removal will be carried out using an SSCV.

3.2 Jacket decommissioning

3.2.1 Murdoch MA

Jacket description: The Murdoch MA jacket is an unconventional shape. It is pinned to the seabed by four piles driven through and grouted to the four outer legs. The bottom part of the jacket, between –22m and –28.6m elevations is a conventional and square in plan with no incline. There are single pile sleeves at each corner. The top part of the jacket, above –5m elevation is also square in plan, without incline, and each face is narrower than the faces on the bottom part of the jacket. It is rotated in the horizontal plane by 45 degrees relative to the bottom part of the jacket, the middle part of the structure consists of eight vertical diagonals, which join the top and bottom sections. The jacket subsea horizontal levels are at -15m, -27m and -39.5m elevations (Figure 3.2.1).

The mass of the jacket is ~672Te excluding the section of piles penetrating more than 3m into the seabed and excluding any rigging that would be used for lifting operations. The legs will be cut at an appropriate elevation to allow the lifting aids to be installed, and the jackets will ideally each be removed in a single lift⁷. Assuming there would be no technical issues, the piles will be internally cut 3.0m below the mean seabed. Should any difficulties be encountered when accessing the piles internally such that an external excavation would be required, OPRED will be consulted prior to carrying out the external excavation. The jacket will be returned to shore for recycling.

Removal methods: the jacket along with mudmats will be completely removed and returned to shore. Possible methods are described in Table 3.2.1.

⁷ The technique adopted for removal of the jacket will be subject to engineering feasibility and any commercial agreements; they are also subject to regulatory requirements.

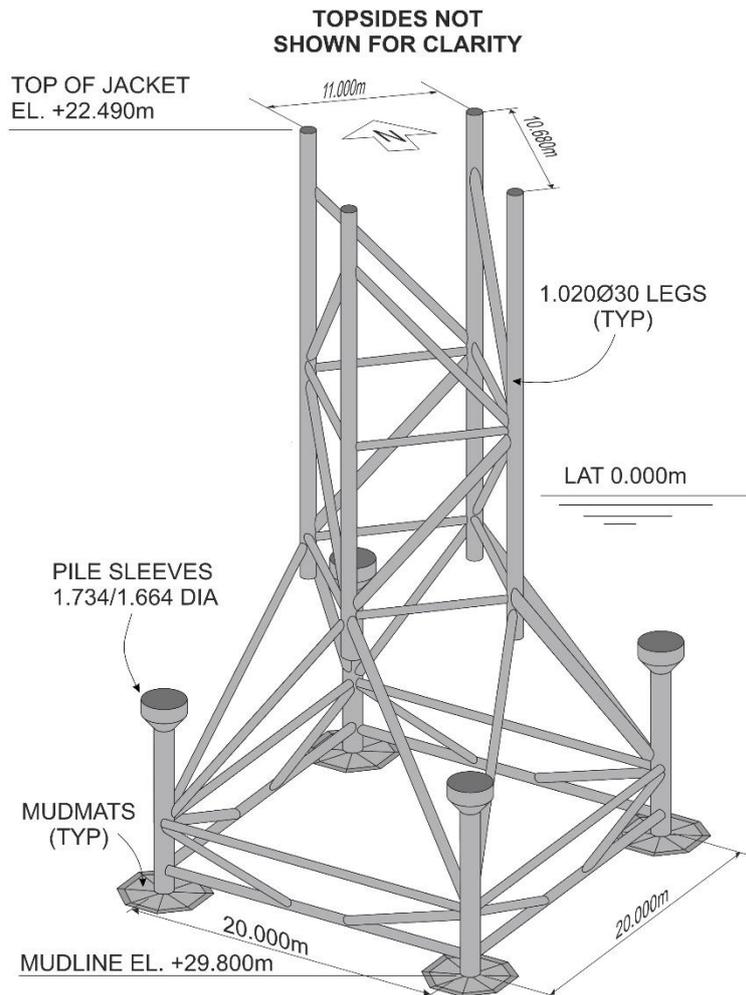


Figure 3.2.1: Murdoch MA jacket 3D view

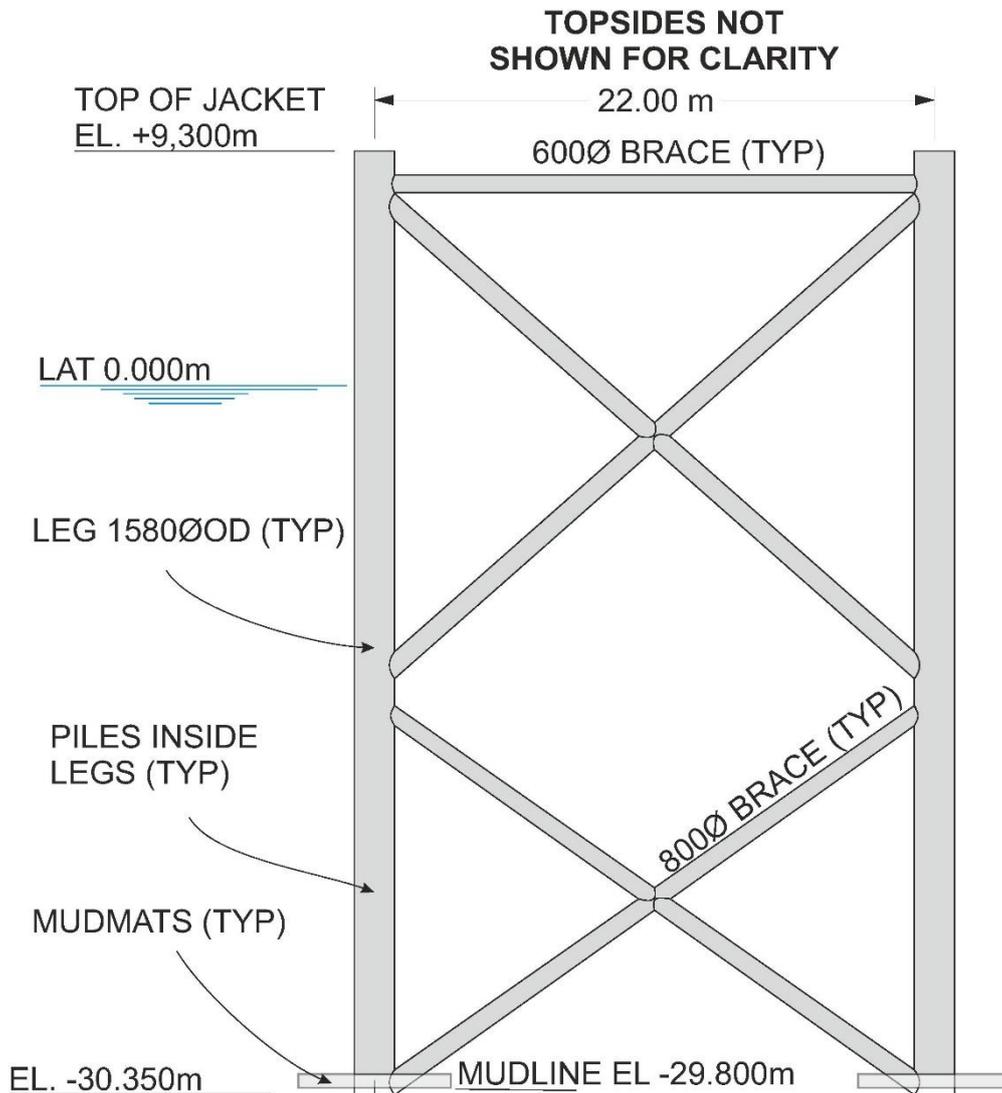
3.2.2 Murdoch MC

Jacket description: The 4-legged jacket is a conventional four leg square jacket without incline to the faces. It has a single horizontal elevation at -12m , which consists of three members forming a cruciform. The jacket does not have any external pile sleeves and is piled. The jacket is secured by four leg piles of 1372mm diameter ($54''$), which protrude through the jacket legs at elevation $+9.3\text{m}$ (relative to LAT) (Figure 3.2.2).

The mass of the jacket mass is $\sim 1,218\text{Te}$ excluding the section of piles penetrating more than 3m into the seabed and excluding any rigging that would be used for lifting operations. The legs will be cut at an appropriate elevation to allow the lifting aids to be installed, and the jackets will ideally each be removed in a single lift⁸. As the piles are located inside the legs it is expected that difficulties would be encountered when carrying out an internal excavation, so it is likely that an external excavation would be required to access the piles for cutting. Should any difficulties be encountered when accessing the piles internally such that an external excavation would be required, OPRED will be consulted prior to carrying out the external excavation. The jacket will be returned to shore for recycling.

Removal methods: the jacket along with mudmats will be completely removed and returned to shore. Possible methods are described in Table 3.2.1.

⁸ The technique adopted for removal of the jacket will be subject to engineering feasibility and any commercial agreements; they are also subject to regulatory requirements.



**TYPICAL VIEW ON EACH SIDE OF JACKET
(DIMENSIONS MM UNO)**

Figure 3.2.2: Murdoch MC jacket typical side view

3.2.3 Murdoch MD

Jacket description: The 4-legged jacket is a conventional four leg square jacket without incline to the faces. It is held in position by 8 vertical skirt piles, two per leg. The jacket has two horizontal levels at -14m and -28.3m. The jacket has double external pile sleeves at the four corners, which extend from the mudline to approximately -14m. The jacket has an external riser support frame on the north-east face of the jacket between legs A2 and B2 (Figure 3.2.3).

The mass of the jacket is ~2,090Te excluding the section of piles penetrating more than 3m into the seabed and excluding any rigging that would be used for lifting operations. The legs will be cut at an appropriate elevation to allow the lifting aids to be installed, and the jacket will ideally be removed in a single lift⁹. Assuming there would be no technical issues, the piles will be internally cut 3.0m below the mean seabed. Should any difficulties be encountered when accessing the piles internally such that an external excavation would be required, OPRED will be consulted prior to carrying out the external excavation. The jacket will be returned to shore for recycling.

⁹ The technique adopted for removal of the jacket will be subject to engineering feasibility and any commercial agreements; they are also subject to regulatory requirements.

Removal methods: the jacket along with mud mats and all the risers will be completely removed and returned to shore. Possible methods are described in Table 3.2.1.

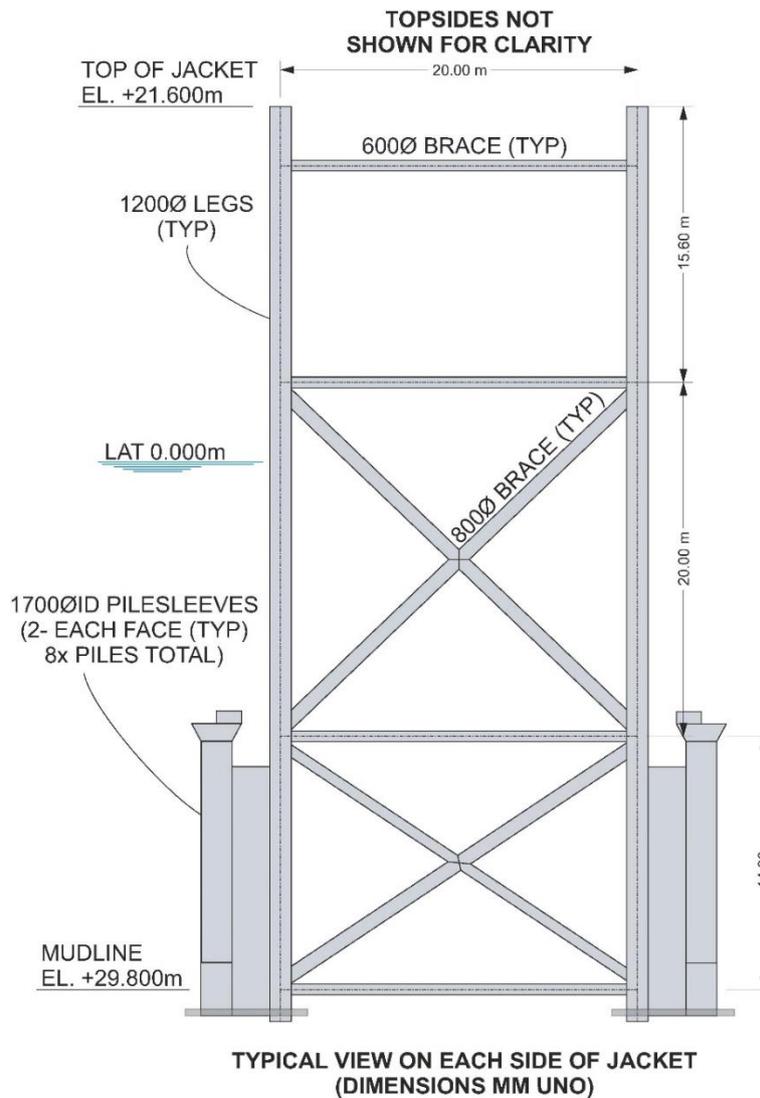


Figure 3.2.3: Murdoch MD jacket typical side view

3.2.4 Jacket removal methods

Table 3.2.1: Jacket removal methods	
1) Semi-Submersible Crane Vessel <input checked="" type="checkbox"/> ; 2) Monohulled Crane Vessel <input checked="" type="checkbox"/> ; 3) Shear Leg Vessel <input checked="" type="checkbox"/> ; 4) Jack up Work barge <input checked="" type="checkbox"/> ; 5) Piece small or large <input checked="" type="checkbox"/> ; 6) Complete with topsides <input checked="" type="checkbox"/> .	
Methods considered	Description
Single lift removal along with topsides using SSCV.	Removal of the topsides and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
Single lift removal using SSCV.	Removal of the jacket as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
Offshore removal 'piece-small' for onshore disposal	Removal of jacket and dismantlement offshore followed by transportation to shore for disposal and recycling.
Proposed removal method and disposal route	Removal of jacket as a single unit followed by recovery to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method was made following a commercial tendering process and the removal contract has now been awarded. Removal will be carried out using an SSCV.

3.3 Subsea installations

Table 3.3.1: Subsea installations & stabilisation features

Subsea installations and stabilisation features	Number	Option	Disposal route
Murdoch MD Template	1	Complete removal, piles cut to 3m below seabed	Return to shore for reuse or recycling
NOTE:			
1. Contingency measures may be required to counter any potential difficulties that may be encountered when cutting the piles at the required depth; OPRED will be consulted.			

3.4 Pipelines and stabilisation features

3.4.1 Decommissioning options

All exposed pipelines or pipespools on approach to Murdoch MD associated with the scope in this Decommissioning Programme will be completely removed up to the point of burial. That is, all pipelines buried under concrete mattresses that would otherwise be exposed will be removed.

Although PL929 is a candidate for reuse for CCUS, there is an implicit assumption that options for re-use of the pipelines have been exhausted prior to the facilities and infrastructure moving into the decommissioning phase and associated comparative assessment. Therefore, this option has been excluded. The three decommissioning options considered for the two pipelines in Table 3.4.1 are:

- 1) **Complete removal** – This would involve the complete removal of the pipelines by whatever means most practicable and acceptable from a technical perspective;
- 2) **Partial removal or remediation** – This would involve removing exposed or potentially unstable sections of pipelines. Remedial work may need to be carried out to make the remaining pipeline safe for leaving in situ. This option is relevant for those pipelines that have known exposures or spans. There will likely be a need to verify their status via future surveys;
- 3) **Leave in situ** – This would involve leaving the pipeline(s) *in situ* with no remedial works but possibly verifying their status via future surveys.

The mattresses and the underlying pipelines were also subject to a comparative assessment. The pipeline and mattress comparative assessments were combined to provide an overall recommendation. Please refer the comparative assessment [5] for PL929 burial profiles.

Table 3.4.1: Pipeline or pipeline groups / decommissioning options

Pipelines Group	Condition of line / group (surface laid/trenched/buried/spanning)	Whole or part of pipeline/group	Decommissioning options considered
PIPELINE GROUP 1			
PL929	Trenched and buried in the seabed throughout its length albeit with a number of exposures and freespans expected except on approach at Murdoch MD where the pipeline is buried under deposited rock and concrete mattresses. Historically, the first 15km of pipeline from MLWM has not been surveyed since the pipeline was first installed but using the available data there one reportable span was observed at KP57.432 ~61m long in 2006 but it was not present in 2017. No surveys are directly comparable so any changes in lengths and numbers of exposures and spans are difficult to quantify. The indications are, however, that the length of exposures and	Whole 26" pipeline, except for short-exposed lengths of welded pipespools on approach to Murdoch MD. Refer Table 2.3.1.	1, 2, 3

Table 3.4.1: Pipeline or pipeline groups / decommissioning options

Pipelines Group	Condition of line / group (surface laid/trenched/buried/spanning)	Whole or part of pipeline/group	Decommissioning options considered
	spans will likely be <5% of the total length of the pipeline.		
PL930	Trenched and buried in the seabed. The expectation is that the pipeline will exhibit a better burial profile than that for PL929 because the original as-built survey indicates a greater trench depth (≥1.0m) to top of pipe when it was first installed. This will need to be confirmed by survey.	Whole 4” pipeline except for short-exposed lengths of pipespools on approach to Murdoch MD. Refer Table 2.3.1.	1, 2, 3

3.4.2 Outcomes of comparative assessment

All risers will be completely removed along with the Murdoch MD jacket. A comparative assessment of the decommissioning options was carried out in accordance with the OPRED decommissioning guidance notes [13]. Each decommissioning option was qualitatively assessed against Safety, Environment, Technical and Societal and Cost. Refer [5] for details. Pipeline burial profiles can be found in section 3 of the Comparative Assessment report.

The chosen option is ‘leave *in situ*. The influence of existing infrastructure that had been removed could affect the mobility of the local seabed. In order to minimise the deposition of additional rock, and to minimise any potential increase in snagging hazards, for example, by removing intermediate exposures or spans, it was considered that leave *in situ* would be appropriate. The means that the pipelines would meantime remain as they are, and any reportable spans would remain recorded in FishSAFE. Use of historical pipeline survey data with future pipeline surveys would better inform the future strategy for monitoring the pipelines.

Table 3.4.2: Outcomes of Comparative Assessment

Pipeline or Group	Recommended option	Justification
PL929	<p>Leave <i>in situ</i>. PL929 ~179.6km long between end of 200m long deposited rock and MLWM has been flushed and will be left buried <i>in situ</i> along with the pipeline stabilisation features at KP4.8 and KP20.0 (refer Figure 2.6.4 and Figure 2.6.3 and respectively).</p> <p>Leave the, ~179.6km long carbon steel trunkline between end of deposited rock 200m long near the Murdoch 500m zone and MLWM <i>in situ</i>.</p> <p>On approach to Murdoch MD remove all the associated mattresses and underlying piggybacked pipelines ~147m long up to point of burial at the deposited rock.</p> <p>Therefore, except for the removal of the surface laid sections of pipeline on approach to Murdoch MD, the pipeline will be left <i>in situ</i> in its current state.</p>	<p>Albeit with several km of exposures the pipeline is stable for much of its length (refer Table 2.3.1). No recordable spans have been noted in more recent survey data although the survey data does not extend the full length of the pipeline. This will need to be confirmed by survey.</p> <p>This approach will result in minimal seabed disturbance, minimises the deposition of additional rock in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation.</p>
PL930	<p>Leave <i>in situ</i>. PL930 ~179.6km long between end of 200m long deposited rock and MLWM has been flushed and will be left buried <i>in situ</i> along with the pipeline stabilisation features at KP4.8 and KP20.0 (refer Figure 2.6.4 and Figure 2.6.3 respectively).</p> <p>Refer recommended option for PL929 for section of PL930 piggybacked onto PL929 on approach to Murdoch MD.</p> <p>If the mattresses where PL930 separates from PL929 at KP4.8 (Figure 2.6.4) KP180.409 (Figure 2.6.1) or where PL930 crosses over PL929 at KP20</p>	<p>According to the as-built alignment sheets PL930 was trenched to ≥1.0m below seabed to the top of pipe, but for the purposes of the comparative assessment and given the bathymetry of the seabed, it was assumed that PL930 would exhibit the same burial characteristics as PL929, but this will need to be confirmed by survey.</p> <p>This approach will result in minimal seabed disturbance, minimises the</p>

Table 3.4.2: Outcomes of Comparative Assessment

Pipeline or Group	Recommended option	Justification
	(Figure 2.6.3) are covered in sediment and barely distinguishable from the surrounding seabed they will be left <i>in situ</i> . Otherwise, if the perimeter edge of any one mattress at the location is more than 50% exposed, they will all be completely removed along with the underlying surface laid flexible pipespools (~40m, ~80m, and 40m long respectively). Therefore, except for the removal of the surface laid sections of pipeline on approach to Murdoch MD, the pipeline will be left <i>in situ</i> in its current state.	deposition of additional rock in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation.

NOTES

1. Each cut pipeline end at point of burial at or within deposited rock will be dealt with by the deposition of a small quantity of rock on top of or adjacent to existing rock. The amount used will be kept to a practical minimum, nominally up to ~25Te;
2. At the separation or pipeline crossover points, should the point of burial of the cut pipeline end be in the seabed, it will be excavated locally with small quantities of rock potentially used to ensure that the remaining pipeline end(s) are buried;
3. The pipeline will be subject to inspection and monitoring to a schedule agreed with OPRED;
4. The deposition of rock will be covered by a deposit consent.

3.4.3 Pipeline protection structures & stabilisation features

There are no pipeline protection structures that form part of the PL929 and PL930 pipelines and infrastructure.

3.4.4 Pipeline protection & stabilisation features

Table 3.4.3: Pipeline protection & stabilisation features (PL929 & PL930)

Protection or stabilisation features	Number (UNO)	Description	Disposal route (if applicable)
INSIDE MURDOCH 500M ZONE			
Concrete mattresses	4	Murdoch MD Approach (PL929 & PL930), 6m x 4m x 0.15m Linklok concrete mattresses. Refer Figure 2.5.1.	Remove to shore for re-use, recycling, or disposal.
	4	Murdoch MD Approach (PL929 & PL930), 6m x 4m x 0.15m. Linklok concrete mattresses. Refer Figure 2.5.1.	
	1	Murdoch MD Approach (PL929 & PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.5.1.	
	13	~KP180.409 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.1, Figure 2.5.1.	Leave buried mattresses <i>in situ</i> otherwise remove to shore for re-use, recycling, or disposal.
Deposited rock	1,855Te	Between KP180.302 and KP180.352 over PL930 at separation. Refer Figure 2.5.1 and Figure 2.6.1.	Leave <i>in situ</i> .
	3,180Te	Between KP180.631 and KP180.831. Refer Figure 2.5.1 and Figure 2.6.1.	
OUTSIDE MURDOCH 500M ZONE			
Concrete mattresses	6	~KP129.1 PL253 Esmond pipeline crossing (PL929), 10m x 6m x 0.15m Linklok mattresses. Refer Figure 2.6.2.	Leave <i>in situ</i> .

Table 3.4.3: Pipeline protection & stabilisation features (PL929 & PL930)

Protection or stabilisation features	Number (UNO)	Description	Disposal route (if applicable)	
	6	~KP129.1. PL253 Esmond pipeline crossing (PL930), 10m x 6m x 0.15m Linklok mattresses. Refer Figure 2.6.2.	Leave <i>in situ</i> .	
	4	~KP20.0 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.		
	1	~KP20.0 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.		
	24	~KP20.0 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.		
	1	~KP20.0 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.		
	4	~KP20.0 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.3.		
		1	~KP4.8 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	Leave <i>in situ</i> .
		4	~KP4.8 (PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	
		4	~KP4.8 (PL929 & PL930), 12m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	
		10	~KP4.8 (PL930), 6m x 4m x 0.15m. Linklok concrete mattress. Refer Figure 2.6.4.	
Grout bags (25kg)	500	At separation point at KP20. Refer Figure 2.6.3	Leave <i>in situ</i> .	
Deposited rock	26,847Te	Between KP128.96 and KP129.320, PL253 Esmond pipeline crossings. Refer Figure 2.6.2.	Leave <i>in situ</i> .	
NOTES:				
<ol style="list-style-type: none"> Origin of pipeline KP taken at MLWM and ends at base of PL929 riser at Murdoch MD; No quantities of grout bags are stated on drawings or survey reports; Mass of deposited rock is estimated, based on the estimated volume and profile; Quantity of deposited rock <i>excludes</i> rock potentially used to protect and stabilise pipeline crossings installed <i>after</i> PL929 and PL930. 				

3.5 Wells

Table 3.5.1: Well decommissioning

The Murdoch MD wells listed in Section 2.7, Table 2.7.1 have already been partly or fully decommissioned. The remainder – conductor removal, will be completed as part of the installation removal operations.

3.6 Waste streams

The Able UK Seaton Port in Hartlepool is the decommissioning facility that has been selected and will manage all wastes. ABLE offers speciality services in the decommissioning and recycling of end-of-life vessels and marine structures. This is part due to the unique offer to undertake the work at the large scale, specialised ABLE Seaton Port Facility in Hartlepool, North-East of England. Chrysaor have used the organisation for previous decommissioning activities including the LOGGS complex structures.

Waste stream	Removal and disposal method
Bulk liquids	Residual hydrocarbons have already been removed from topsides. Further cleaning and decontamination will take place onshore prior to re-use or recycling.
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 and under appropriate permit.
NORM	Tests for NORM have been undertaken offshore by the Radiation Protection Supervisor and recorded. Any NORM encountered onshore will be dealt with and disposed of in accordance with guidelines and company policies and under appropriate permit.
Asbestos	Given the age of the installations asbestos can be expected and 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 IV is present on the platform using the correct PPE taking account of COSHH Regulations 2002. The material will be disposed of according to guidelines and company policies and under appropriate permit.
Other hazardous wastes	Other hazardous waste will be recovered to shore and disposed of according to guidelines and company policies and under appropriate permit.
Onshore dismantling sites	Appropriate licensed sites will be selected. 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.

Asset	Inventory	Total (Te)	Planned materials to shore (Te)	Planned materials decommissioned <i>in situ</i> (Te)
Murdoch MA	Installation	1,848	1,508	340
Murdoch MC	Installation	6,085	5,611	474
Murdoch MD	Installation	5,164	4,346	818
	Template	418	142	276
	Pipelines	146,556	209	146,347
	Deposited rock	50,350	-	50,350

4 Environmental Appraisal overview

4.1 Environmental sensitivities (summary)

Table 4.1.1: Environmental sensitivities

Environmental Receptor	Main Features
Conservation interests	<p>Protected habitats:</p> <p>The majority of the CMS infrastructure is located within the Dogger Bank Special Area of Conservation (SAC) and the Southern North Sea SAC, while the export pipelines also pass-through Inner Dowsing and Race Bank SAC, Greater Wash Special Protection Area (SPA).</p> <p>The Dogger Bank SAC is the largest sandbank in UK waters and is designated for the Annex I feature '<i>Sandbanks which are slightly covered by seawater all the time</i>'. The Conservation Objectives for the site are to ensure that the features are to be in favourable condition thus ensuring site integrity in the long term and contribution to Favourable Conservation Status (FCS). This contribution would be achieved by maintaining or restoring, subject to natural change:</p> <ul style="list-style-type: none"> • The extent and distribution of the qualifying habitat in the site; • The structure and function of the qualifying habitat in the site; and • The supporting processes on which the qualifying habitat relies. <p>The Southern North Sea SAC has been identified as an area of importance for the Annex II species the harbour porpoise. This site includes key winter and summer habitat for this species. The Conservation Objectives of the site are to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining FCS for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:</p> <ul style="list-style-type: none"> • Harbour porpoise is a viable component of the site; • There is no significant disturbance of the species; and • The condition of supporting habitats and processes, and the availability of prey is maintained. <p>The Inner Dowsing, Race Bank and North Ridge SAC is designated for '<i>Sandbanks slightly covered by water at all times</i>' and for '<i>Reefs</i>'. The area encompasses a wide range of sandbank types which host a diverse variety of species, and biogenic reef formed by the Ross worm, <i>Sabellaria spinulosa</i>. Both the Humber Estuary SPA and the Greater Wash SPA are designated for a number of breeding and non-breeding bird species. The Humber Estuary SPA is additionally designated for the presence of waterbird assemblages.</p> <p>Protected species:</p> <p>Annex II species likely to be sighted within the area of the proposed decommissioning activities include harbour porpoise, grey seals and harbour seals.</p> <p>Cod <i>Gadus morhua</i> are OSPAR listed threatened and/or declining species and are known to use the CMS for spawning and</p>

Table 4.1.1: Environmental sensitivities

Environmental Receptor	Main Features
	<p>as a nursery. Survey footage identified three fish belonging to the family Gadidae, which cod are part of, however the species was not identified.</p> <p>The ocean quahog (<i>Arctica islandica</i>) is among the longest-lived and slowest growing marine bivalves and is on the OSPAR list of threatened and/or declining species and habitats in the North Sea. It is also a Feature of Conservation Importance (FOCI) for which Marine Conservation Zones can be designated. One <i>A. islandica</i> individual was identified in a 2015 survey. A single juvenile individual was identified at in 2020. Bivalve siphons were observed in the 2020 survey throughout the CMS area however it is not possible to identify the species from the siphon alone therefore this cannot confirm the presence of more <i>A. islandica</i>.</p> <p><i>S.spinulosa</i> is a small, tube-building polychaete worm and is also on the OSPAR list of threatened and/or declining species and habitats in the North Sea. 21 individuals of <i>S. spinulosa</i> were identified from samples taken at the Murdoch Hub, however none were observed in seabed imagery. A 968m stretch of <i>S. spinulosa</i> reef was observed during a 2006 survey of the PL929/PL930 between KP31.390 and KP32.358.</p> <p>Faunal burrows were observed throughout the area surveyed in 2020. However, only one site at Kelvin TM displayed burrows at a density sufficient to register on the Marine Nature Conservation Review SACFOR scale as showing a level of similarity to the OSPAR habitat 'seapens and burrowing megafauna community'. Despite this, the burrows observed cannot be confidently attributed to any of the 'megafauna' species associated with this OSPAR habitat. Instead, the burrows observed at Kelvin TM and within the CMS area more likely relate to a number of species characteristic of the Dogger Bank community, including sand eels. Therefore, this habitat is not thought to be present within the CMS area.</p>
Seabed and benthos	<p>The seabed near the CMS infrastructure is predominantly composed of EUNIS biotope A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand and A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand. The mean particle size across the CMS was consistent with the SNS UKOOA mean particle size of 243µm (fine sand). The seabed sediments remain relatively consistent along the pipelines to shore. The PL929/PL930 travelling to shore pass through a band of A5.15: Deep circalittoral coarse sediment. This is followed by an area of A5.14 Circalittoral coarse sediment, small outcrops of A5.25 or A5.26 Circalittoral fine sand or Circalittoral muddy sand may be encountered for a stretch. Finally, the pipelines pass through a thin section of A5.13 Infralittoral coarse sediment just prior to landfall.</p> <p>Total Hydrocarbon (THC) concentrations were below the Significant Environmental Impact (SEI) threshold across the CMS, and there is no evidence of drilling related hydrocarbon contamination. Reported Polycyclic Aromatic Hydrocarbon (PAH) concentrations were in line with levels typical of the wider SNS. Polychlorinated biphenyl (PCB) levels were below Limit of Detection (LOD). All detectable concentrations of heavy metals were above their respective OSPAR (2005) Background Concentrations. However, this is to be expected due to the heavily industrialised nature of the SNS. Organotin concentrations were below LOD, except at a single station at the Murdoch Hub.</p> <p><i>Spatangoida</i> (juveniles; the order of heart urchins) and <i>Spipohanes bombyx</i>, a polychaete, featured across the CMS. Juvenile <i>Spatangoida</i> dominated the benthos by number at almost every location however, when assessing the adult-only</p>

Table 4.1.1: Environmental sensitivities	
Environmental Receptor	Main Features
	populations, the dominant taxa were more variable across the CMS though generally were polychaetes. Only at Katy KT was the infaunal community dominated by molluscs.
Fish	<p>The CMS is located within an area of high intensity spawning for plaice and sandeel. The following species are also known to use the area for spawning: cod, herring, mackerel, <i>Nephrops</i>, sole, sprat, and whiting. Additionally, the following species use the area as nursery grounds: anglerfish, blue whiting, cod, European hake, herring, ling, mackerel, <i>Nephrops</i>, sandeel, spurdog, sprat, and tope shark. Whiting use the area as a high intensity nursery.</p> <p>The probability of juvenile fish aggregations occurring in the CMS is low for: plaice, sole, hake, anglerfish, blue whiting, Norway pout, mackerel, haddock, and cod. The probability of juvenile herring, horse mackerel, sprat, and whiting being present in the CMS area is low-moderate.</p>
Commercial fishing	<p>The CMS area is located in International Council for the Exploration of the Seas (ICES) statistical rectangle 37F2. The associated PL929 and PL930 pass through rectangles 37F1, 36F1, 36F0, and 35F0. Fisheries landings vary throughout the project area. At the CMS area in 2019, the catch was mostly demersal and was relatively low compared to other rectangles. Closer to shore shellfish make up the majority of landings the value of which was very high; in rectangles 36F1, 36F0 and 35F0 closest to shore the value of catch was >£1,000,000 every year from 2015 onwards.</p> <p>Commercial fishing effort was also highest in rectangle 36F0 (2,344 days in 2019). This effort is consistently high across all months excluding January, February, November, and December when effort is moderate. Effort is much lower around the CMS (rectangle 37F2). Fishing effort in other rectangles is comparatively low (<100 days per month).</p>
Marine mammals	<p>Harbour porpoise, minke whale, white-beaked dolphin, and long-finned pilot whale have all been observed within the vicinity of the project. For all species but harbour porpoise, they are found in relatively low numbers in the CMS or have low abundance estimates. Harbour porpoise are common in the SNS and frequent the area throughout much of the year. They are thought to be found in the area at a density of 0.888 animals/km² which is relatively high compared to other areas of the North Sea. All of the cetacean species are both European Protected Species (EPS) and are covered by the UK Biodiversity Action Plan (UK BAP).</p> <p>Both grey and harbour seal densities are relatively low offshore in the CMS area. However, where the PL929 and PL930 arrive at the shore seal density is much higher, particularly for grey seals. Grey seals use the Humber Estuary SAC in autumn to form large breeding colonies. Comparatively, harbour seals use the Wash and North Norfolk Coast SAC (~27 km south of the TGT) for breeding and hauling-out. Both pinniped species are Annex II listed.</p>
Seabirds	<p>The following species are present in the CMS area across the majority of the year: northern fulmar, northern gannet, great black-backed gull, black-headed gull, common gull, herring gull, Atlantic puffin, black-legged kittiwake, common guillemot, razorbill, little auk, and lesser black-backed gull.</p> <p>Seabird sensitivity to oil (according to the Seabird Oil Sensitivity Index) is low throughout the year and highest in July and between November and January (Blocks 44/21, 44/22, 44/23, 44/17, 44/18, 44/19). Block 48/2, approximately half-way along the PL929 and PL930, is high, very high, or extremely high every month of the year. In the Blocks nearest to the coast</p>

Table 4.1.1: Environmental sensitivities	
Environmental Receptor	Main Features
	(47/17, 47/18) sensitivity is highest between October and December, and in March.
Onshore communities	An onshore decontamination and dismantlement facility will be UK based and will be one that is deemed able to comply with all relevant permitting and legislative requirements.
Other users of the sea	<p>The CMS is located in a mature area of the SNS with extensive oil and gas development. There are ten oil and gas surface structures within 50 km of the project, the nearest being 20.1 km away. Shipping in the project area is variable; closest to shore Blocks 47/18, 47/19, 47/20, 47/15, experience very high shipping activity, due to their proximity to the Humber Estuary. In the CMS area shipping is moderate (in Blocks 44/22 and 44/23) to high (Blocks 44/17, 44/18 and 44/19).</p> <p>Two telecom cables come within 1km of the Murdoch platform (Tampnet cable and MCCA). The PL929 and PL930 do not cross any third-party telecom cables. However, as there is much renewable energy activity in the area, the pipelines to shore do cross the Hornsea 1 active export cable. Furthermore, the PL929 and PL930 pass through the Hornsea 2 area for ~25 km, and through the Triton Knoll windfarm area which is currently under construction. The Race Bank windfarm (and proposed extension), and the Lincs windfarm are also both located within 15 km of the PL929/PL930.</p> <p>Blocks 47/18, 47/19, 47/20, 47/15, 43/29, 43/30, and 44/26 are of concern to the Ministry of Defence (MoD) as they lie within training ranges. Additionally, Block 47/17, in which the PL929 and PL930 terminate at the shore, has been excluded from consideration of granting development licenses at the request of the MoD.</p> <p>There are seven non-dangerous wrecks within 20 km of Murdoch. There is a single dangerous wreck 18 km from Murdoch. There are no designated historical wrecks recorded in the area.</p>
Atmosphere	Energy will be used during decommissioning activities, and this will result in atmospheric emissions. Once decommissioning has been completed, pipeline surveys will likely be required in future, incurring further use of energy use and the resulting emissions.

4.2 Potential environmental impacts and their management

4.2.1 Environmental impact assessment summary

The potential environmental impacts associated with the decommissioning activities have been assessed and it is concluded that the proposed decommissioning of the infrastructure can be completed without causing significant adverse impact to the environment. The EA assesses the potential environmental impacts by identifying interactions between the proposed decommissioning activities and the associated environmental receptors. It also describes the proposed mitigation measures designed to avoid or reduce the identified potential environmental impacts and how these will be managed in accordance with Chrysaor’s Environmental Management System (EMS) while considering responses from stakeholders. It is expected that CDP1b, CDP2 and CDP3 will be addressed as a campaign of decommissioning work, so much of the following information is explained in these terms.

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
Vessel activity during installation and pipeline decommissioning activities	Atmospheric emissions	<p>The majority of atmospheric emissions for the decommissioning of CDP1b, CDP2 [3] and CDP3 [2] combined relate to vessel use or are associated with the recycling of material returned to shore. The worst-case estimated CO₂ emissions to be generated by the selected decommissioning options are 339,358 Te, this equates to 2.6% of the total UKCS emissions in 2018 (13,200,000 Te) and includes any theoretical emissions associated with the remanufacture of infrastructure remaining <i>in situ</i>. Almost all future emissions (from project operations and vessels) will cease once decommissioning has been completed.</p> <p>All combustion plant including engines and generators on the vessels will be well maintained and correctly operated to ensure that they are working efficiently to minimise energy use and gaseous emissions.</p> <p>Vessel operations will be minimised where practical.</p>
Decommissioning of installations and pipelines	Seabed disturbance	<p>There is potential for decommissioning activities to generate disturbance to the seabed; including the decommissioning of pipelines <i>in situ</i> and any associated remediation, and the removal of substructures.</p> <p>Seabed impacts may range in duration from short-term impacts, such as temporary sediment suspension or smothering, to permanent impacts, such as the introduction of new substrate or any consequential habitat or community level changes which may transpire.</p> <p>The proposed decommissioning activities associated with CDP1b, CDP2 [3] and CDP3 [2] combined may impact an area of 0.093 km² SNS habitat. Much of this activity is due to take place within the Dogger Bank SAC (0.0697 km²) which is designated for the presence of Annex I ‘Sandbanks which are slightly covered by sea water all the time’. While the activities may result in the mortality of some individuals, many of the taxa within the CMS area are relatively resilient;</p>

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
		<p>sandy communities are comparatively quick to recover from disturbance. Furthermore, <i>S. spinulosa</i>, and <i>Arctica islandica</i> individuals (albeit in low numbers) are the only sensitive species of conservation interest unlikely to be directly affected by the project activities within the CMS or associated with contingency activities along the PL929/PL930. With regards to the sediment and benthic features within the Dogger Bank SAC, the CMS activities are unlikely to affect the natural physical processes of the area. Pipelines being decommissioned <i>in situ</i> 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.</p> <p>Chrysaor are committed to leaving a clear, safe seabed in the wake of the decommissioning activities. The clear seabed will be validated by a verification survey over the installation sites and pipeline corridors. Non-intrusive verification techniques will be considered in the first instance, but where these are deemed inconclusive by the NFFO, seabed clearance is likely to require conventional overtrawl survey methods. The methods used will be discussed and finalised with OPRED.</p>
Decommissioning of pipelines <i>in situ</i>	Physical presence of infrastructure decommissioned <i>in situ</i>	<p>The preferred option from the CA is to decommission the pipelines PL929 & PL930 <i>in situ</i>, with some sections of some pipelines qualifying for partial removal. The physical presence of infrastructure decommissioned <i>in situ</i> has the potential to impact other sea users.</p> <p>The potential impacts identified to commercial fisheries were limited to the potential for legacy impacts such as the snagging of fishing gears on flowlines decommissioned <i>in situ</i>, and any snagging risk due to existing seabed depressions. Two pipelines qualified for partial removal and the sections to be removed coincide with areas which have higher levels of exposure. The PL929/PL930 to shore have the highest level of exposure and the PL929 is the only pipeline along which reportable spans are located. Of the two reportable spans, one is within 100 m of the Murdoch Hub, and neither are located near areas of high intensity trawling. Owing to the nature of the seabed and physical processes in the CMS, depressions are likely to become backfilled over time and the incidence of a snagging event is highly unlikely.</p> <p>Pipelines and stabilisation features decommissioned <i>in situ</i> will continue to be shown on Navigational charts.</p> <p>A clear seabed verification survey (using non-intrusive techniques in the first instance) will be undertaken following the decommissioning works.</p> <p>The presence of stabilisation features remaining <i>in situ</i> will not compromise the integrity of the environmental feature of the seabed in the area.</p>
Vessel activity during	Physical presence of vessels	The presence of a small number of vessels for decommissioning activities associated with CDP1b

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
installation and pipeline decommissioning operations	in relation to other sea users	<p>[2], CDP2 [3] and CDP3 will be short-term in the context of the life of the CMS fields. Activity will occur using similar vessels to those currently deployed for oil and gas installation, operation, and decommissioning activities across the SNS. Furthermore, most of the decommissioning works will be carried out within the 500 m zones, 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.</p> <p>The decommissioning of the CMS area is estimated to require eight different vessel types. They would not all be on location at the same time. For the overall campaign covering CDP1b [2], CDP2 [3] and CDP3 the vessel activities are expected to over approximately 804 days; most of these days are attributed to the removal of the surface installations. Overall levels of vessel activity attributed to the decommissioning are likely to be similar to those experienced under typical conditions. The nearshore activities associated with this project are very likely to be limited in duration and limited to passing vessels.</p> <p>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.</p>
Underwater activities during decommissioning operations	Underwater noise	<p>A noise assessment has been completed to determine the likely impact of noise generated by the proposed operations on marine mammals in the surrounding area. On the basis of the expected noise emissions, there is no requirement to adopt additional mitigation to limited potential for impact. However, there are control measures built into the project that will ensure noise emissions are not greater than would be required to execute the decommissioning activities. For example, machinery and equipment will be well-maintained and the number of vessels will be minimised as far as possible.</p> <p>Given the location of the project within the Southern North Sea SAC, the generation of underwater noise is also a concern, particularly with regards to Annex II harbour porpoise for which the site is designated. Noise emissions are expected to be sufficiently low that injury will not occur from any of the activities. With regards to disturbance, potential zones of avoidance around vessels or cutting activities are not predicted to extend beyond approximately 100m. Furthermore, the levels of noise generated by project activities are unlikely to be detectable above background levels.</p> <p>There is no intention to use underwater explosives during these activities. In the extremely unlikely event that the requirement changes, project-specific noise modelling may be undertaken to inform the risk of injury in the impact assessment and mitigation requirements. The requirement will be discussed with OPRED Environmental Management Team.</p>

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
Vessel activity during installation and pipeline decommissioning operations	Discharges to sea	<p>Discharges from vessels are regulated activities that are managed on an ongoing basis through existing legislation and compliance controls.</p> <p>All subsea infrastructure in the CMS area has 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 the 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.</p> <p>The pipelines have already been flushed and cleaned.</p>
Vessel activity during installation and pipeline decommissioning operations; manufacture of materials required to carry out the decommissioning activities	Resource Use	<p>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 Chrysaor where possible.</p> <p>The estimated total energy usage for the project is 3,635,554 GJ. This number accounts for all operations, material recycling, and the resource loss associated with decommissioning items <i>in situ</i>. This is considered low compared to the resources generated during the production phase of the project.</p>
Waste management	Waste	<p>The onshore treatment of waste from the CMS 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.</p> <p>Wastes will be treated using the principles of the waste hierarchy, focusing on the reuse and recycling of wastes where possible. Raw materials will be returned to shore with the expectation to recycle the majority of the returned 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 CMS 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. Hazardous waste resulting from the dismantling of the CMS facilities will be pre-treated to reduce hazardous properties or render it non-hazardous prior to recycling or disposing of it to a landfill site.</p> <p>The recycling and disposal of wastes are covered by Chrysaor'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 Chrysaor's HSE Policy. Only licenced contractors who can</p>

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
		<p>demonstrate they are capable of handling and processing the material to be brought ashore will be considered for onshore activities.</p>
<p>Removal of surface installations</p>	<p>Disturbance or destruction of seabird nests</p>	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>This legislation is relevant to installations more than 12 nautical miles 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.</p> <p>The preferred practice is to avoid disturbance by undertaking works out with the breeding season. However, this is not always practicable. Chrysaor has been undertaking surveys to determine the presence (and if so type) of birds nesting on our platforms. We are committed to deterring birds from their installations out with the breeding season to mitigate against nesting birds on the platform. Chrysaor may employ a range of non-lethal deterrents to prevent birds nesting if required. These methods will continue throughout the duration of decommissioning. Chrysaor carried out surveys in April / May 2021 and repeat surveys are planned for the early breeding season (during Q2).</p> <p>Should these measures not prove successful, Chrysaor will engage with OPRED to agree any further licensing requirements, as appropriate. This process will form part of future licensing applications for subsequent offshore applications and as such is not assessed here further.</p>
<p>Vessel activity during installation and pipeline decommissioning operations</p>	<p>Physical presence of vessels in the field</p>	<p>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 1,569m³. The fuel inventory of the HLV vessel is likely to be split between a number of separate fuel tanks, significantly reducing the likelihood of an instantaneous release of the full inventory. Any spills from vessels in transit or participating in decommissioning activities are covered by separate Shipboard Oil Pollution</p>

Table 4.2.1: Environmental Impact Management

Activity	Main Impacts	Management
		<p>Emergency Plans (SOPEPs). Chrysaor will support response of any vessel-based loss of fuel containment through the vessel owner’s SOPEP.</p> <p>There is a very low likelihood of vessel-to-vessel collision occurrence, an estimated one collision in 685 years which is in line with the areas’ baseline collision risk.</p> <p>Chrysaor maintains manned bridges, navigational aids and monitoring of safety zones. Only project vessels will be present when activity taking is 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.</p> <p>OPRED will be notified of any dropped objects, noting that dropped object procedures are industry-standard and will be used. All unplanned losses in the marine environment will be attempted to be remediated, and notifications to other mariners will be sent out. The post-decommissioning Clear Seabed Verification Survey will aid in the identification of in-field dropped objects.</p>

5 Interested party consultation

5.1 Consultation summary

During the public consultation period (07 March 2022 to 08 April 2022), copies of the Decommissioning Programmes and supporting documents were forwarded to the following Statutory Consultees:

- The National Federation of Fishermen's Organisations (NFFO);
- The Scottish Fishermen's Federation (SFF);
- The Northern Ireland Fish Producer's Organisation (NIFPO); and,
- Global Marine Group (GMG).

Copies of the Decommissioning Programmes and supporting documents were made available as a download from the Chrysaor website: <https://www.harbourenergy.com>.

A public notice was published in the following publications on 07 March 2022. Please refer to Appendix 4.1 for a copy of the public notices:

- The London Gazette;
- The Daily Telegraph;
- The Hull Daily Mail.

The public notice gave instructions for representations to be made in writing by Friday Thursday 08 April 2022.

Chrysaor received no comments or any written or verbal representation from the public in direct response to the public notice or during the public consultation period.

Copies were also submitted for consideration to OPRED.

Table 5.1.1: Summary of stakeholder comments

Stakeholder	Comment	Response
STATUTORY CONSULTATIONS		
NFFO	Decommissioning Programmes and supporting documentation issued by letter dated 07 March 2022.	The NFFO would request that post-decommissioning overtrawl surveys are carried out within each of the 500m safety zones to the area is safe to be opened to commercial fishing operations with no snagging hazards or debris is left <i>in situ</i> after the removal of these assets.
NIFPO	Decommissioning Programmes and supporting documentation issued by letter dated 07 March 2022.	No response received.
SFF	Decommissioning Programmes and supporting documentation issued by letter dated 07 March 2022.	Given the locality SFF would wish to defer to the advice from NFFO.
GMG	The Decommissioning Programmes and supporting documentation issued by letter dated 07 March 2022.	GMG advised that as the nearest active cables (TAMPNET Norse Sea Com 1 and MCCS) are located within 1km of the Murdoch Platforms, it would be prudent to contact the cable owners to ensure they are aware of operations. Contact details of the cable owners can be sourced from https://kis-orca.org/map/ .
Public	Public Notices were Published 07 March 2022.	No response received.

On the advice of GMG, Chrysaor also contacted the TAMPNET Norse Sea Com 1 cable owners with no issues arising.

6 Programme management

6.1 Project management and verification

Chrysaor has established a UK Decommissioning organisation as a department to manage and execute decommissioning projects. Chrysaor's existing processes for Operations, Planning, Project Management, Procurement, Health Safety and Environment, will be used and tailored to meet the specific requirements of decommissioning projects. Chrysaor will manage all permitting, licences, authorisations, notices, consents and consultations.

Any changes to this decommissioning document will be discussed and agreed with OPRED.

6.2 Post-decommissioning debris clearance and verification

A post decommissioning debris survey will be carried out within all 500m safety zones. Discussions are underway with OPRED regarding the level of appropriate coverage for pipeline corridor survey along each existing pipeline route. Oil and gas debris will be recovered for onshore disposal or recycling in line with existing disposal methods.

Verification of seabed state will be obtained. Whilst the worst-case seabed disturbance from overtrawl has been assessed, it is recognised that some of the decommissioning activities is occurring in the Dogger Bank SAC, therefore different methods of determining debris clearance and snag risk may be required. The methods used will therefore be discussed and finalised with OPRED. This will be followed by a statement of clearance to all relevant governmental departments and statutory consultees.

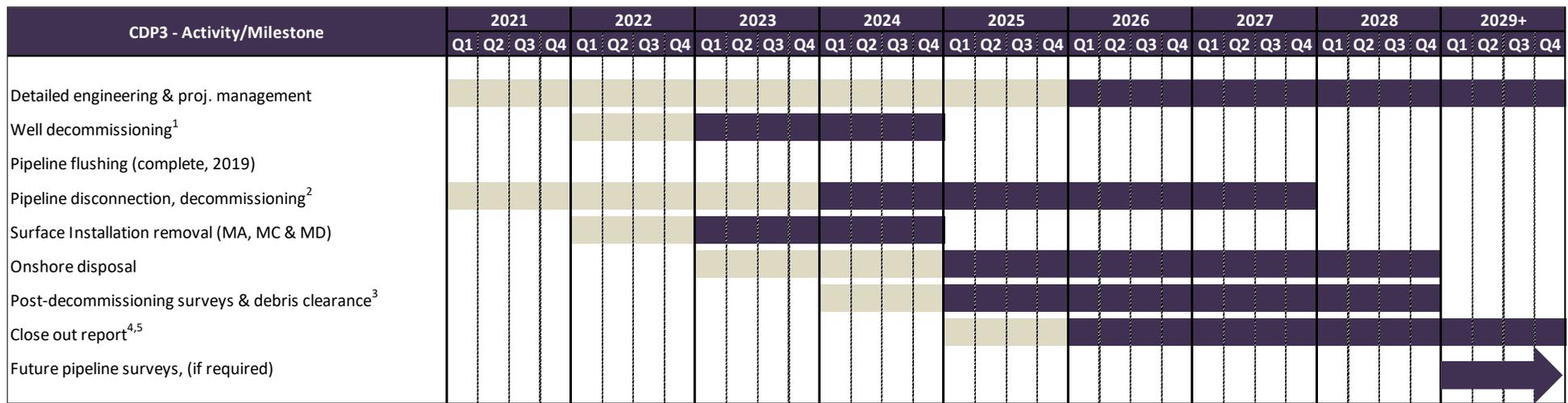
Oil and gas debris activity and verification along the remaining pipeline corridor of the infield pipeline sections not subject to actual decommissioning works will be carried out in accordance with OPRED guidance in operation at the time those activities commence. This activity will reflect the environmental setting of the Dogger Bank SAC.

The outcomes of the clear seabed verification activities in the 500m zones and the alternative survey methods of the pipelines will be reported in the Close Out Report and sent to the Seabed Data Centre (Offshore Installations) at the Hydrographic Office.

6.3 Schedule

A proposed schedule is provided in Figure 6.3.1. The activities are subject to the acceptance of the Decommissioning Programme presented in this document 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. Two wells (44/22a-D6 & 44/22a-D9) have been fully decommissioned (AB3) while the remainder have been partially decommissioned (AB2). The intention is that the conductors are removed in the same campaign as removal of the MD installation;
2. The pipelines have been disconnected at Murdoch as agreed in a Preparatory Works request to OPRED on 12 Feb 2021. Pipeline decommissioning may be carried out as part of a wider subsea decommissioning campaign associated with CDP2;
3. Post decommissioning debris clearance within Murdoch 500m zone will be timed to coincide with execution of the scope of work associated with CDP2;
4. The close out report will be prepared on completion of offshore activities. It 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.

Figure 6.3.1: Gantt chart of project plan

6.4 Costs

Decommissioning costs will be provided separately to OPRED and OGA.

6.5 Close out

In accordance with OPRED guidelines, a close out report covering the completion of the offshore decommissioning scope of these Decommissioning Programmes will be submitted at time agreed by OPRED. The close out report will contain debris removal and verification of seabed clearance, the first post decommissioning environmental survey and explanation of any variations to the approved Decommissioning Programmes.

6.6 Post decommissioning monitoring and evaluation

After decommissioning activities have been concluded, pipeline status surveys and environmental surveys will be completed with the findings being sent to OPRED in the Close Out report. The frequency and scope of future surveys will be agreed with OPRED and supported by a risk assessment. Residual liability will remain with the Section 29 holders identified in Table 1.4.5. Unless agreed otherwise in advance with OPRED, Chrysaor will remain the focal point for such matters, such as any change in ownership, for example.

A post decommissioning environmental seabed survey will be carried out once the offshore decommissioning work scope covered by this decommissioning document has been completed. The survey will include seabed sampling to monitor levels of hydrocarbons, heavy metals, and other contaminants to allow for a comparison with the results of the pre-decommissioning survey. Results of this survey will be available once the decommissioning document work scope is complete.

PIPELINE RISK BASED MONITORING PROGRAMME

All pipeline systems covered within this Decommissioning Document scope will be subject to survey. The post decommissioning pipeline (and associated stabilisation features) monitoring programme, to be agreed with OPRED, will:

- Begin with an initial baseline survey covering the full length of each pipeline;
- Be followed by a risk-based assessment for each pipeline (and associated stabilisation materials) which will inform the minimum agreed extent and frequency of future surveying. This will take account of pipeline burial, exposure and spanning data derived from the initial baseline survey, all available historical survey information and fisheries impact assessment;
- Provide a report of each required survey (with analysis of the findings, the impact on the risk-based assessment and identification of the proposed timing of the next survey in accordance with the agreed RBA approach), for discussion and agreement of OPRED;
- Include provision for remediation in the framework where such a requirement is identified. Appropriate remediation will be discussed and agreed with OPRED;
- Where remediation has been undertaken, a follow up survey of the remediated section(s) will be required;
- In the event of a reported snagging incident on any section of a pipeline, the requirement for any additional survey and/or remediation, will be discussed and agreed with OPRED;
- Will include a further fisheries impact assessment following completion of the agreed survey programme;
- Monitoring will become reactive following completion of the agreed survey programme and OPRED agreement of the analysis of the outcomes;
- Require pipeline information to be recorded on Navigation charts and FishSAFE.

The monitoring programme will also include discussion with OPRED of the long-term pipeline degradation and potential risk to other users of the sea following conclusion of the planned survey programme.

7 Supporting documents

- [1] Chrysaor (2020) CDP1a Decommissioning Programme for Caister installation CDP1a, COP-SNS-C-CM-X-PM-12-00001;
- [2] Chrysaor (2020) CDP1b Decommissioning Programmes for Caister pipelines, CYR-SNS-C-CM-X-PM-12-00001;
- [3] Chrysaor (2020) CDP2 Decommissioning Programmes for Caister-Murdoch System Installations and Associated Pipelines, CYR-SNS-C-CM-X-PM-12-00002;
- [4] Chrysaor (2020) Environmental Appraisal Caister-Murdoch System, CYR-SNS-C-XX-X-HS-02-00003;
- [5] Chrysaor (2020) Comparative Assessment for Pipelines in the Caister-Murdoch System, CYR-SNS-C-XX-X-HS-02-00001;
- [6] ConocoPhillips (2017). Commercial Fisheries Baseline Characterisation: LOGGS South, LOGGS North and CMS Areas. Report No. BMM-SNS-P-XX-S-HS-02-00001;
- [7] DNO (2019) Ketch Decommissioning Programmes, Final July 2019. Weblink last accessed 18 Oct 2020:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/826988/Ketch_Decommissioning_Programme_BEIS_Final_July_2019.pdf
- [8] DNO (2019) Schooner Decommissioning Programmes, Final July 2019. Weblink last accessed 18 Oct 2020:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/826989/Schooner_Decommissioning_Programme_BEIS_Final_July_2019.pdf
- [9] Eastern IFCA (2021) Viking Link Project HVDC Cable Laying and Burial Work, Notice to Mariners, weblink last accessed 14 April 2022: [VIKING-LINK-NTM.pdf](#)
- [10] EU (2008) Directive 2008/98/EC on waste (Waste Directive) Weblink last accessed 27 Jan 2021:
<http://data.europa.eu/eli/dir/2008/98/2018-07-05>
- [11] Gardline (2015). SNS Decommissioning Survey Caister Murdoch System (Murdoch Hub and Caister CM). Habitat Assessment Report. August 2015. Final. Report No. 10554.1, CPUK/INT/PR-258;
- [12] Gardline (2015). SNS Decommissioning Survey Caister Murdoch System (Murdoch Hub and Caister CM). Pre-decommissioning Survey Report. August 2015. Final. Report No. 10554.2, CPUK/INT/PR-258;
- [13] OPRED (2018) Offshore Oil and Gas Decommissioning Guidance Notes. Weblink last accessed 28 Oct 2020:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf

Appendix 1 Pipeline Crossing Schematics

Appendix 1.1 Pipeline crossings outside Murdoch 500m Zone

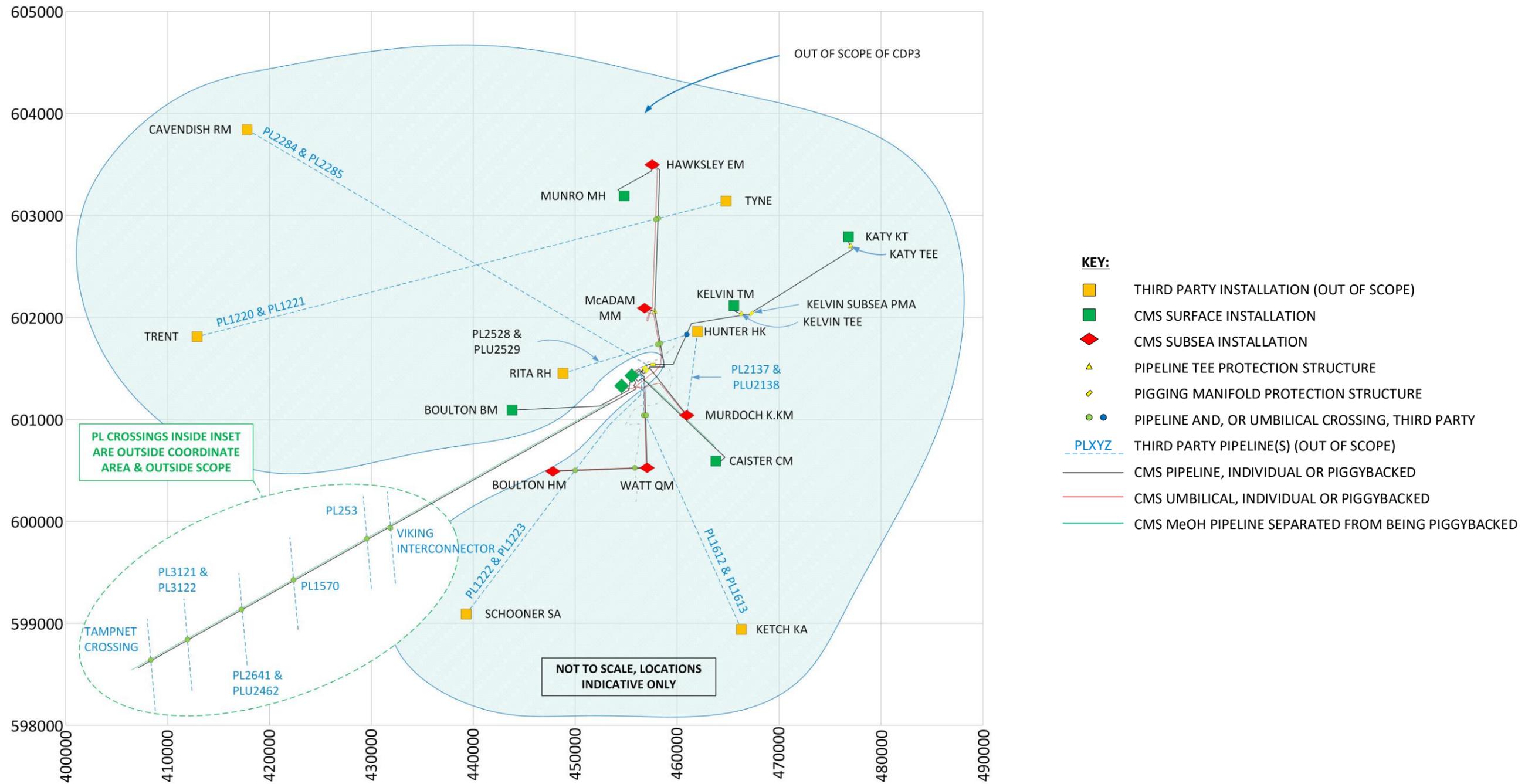


Figure A1.1.1: Schematic of pipeline crossings outside Murdoch 500m zone¹⁰

¹⁰ Murdoch MC not shown, area near Murdoch complex indicative only. Refer Figure 2.5.1.

Appendix 2 Decommissioning onshore pipelines

Appendix 2.1 Outline approach



Figure A2.1.1: PL929 Theddlethorpe approach (indicative only)

The onshore pipelines will be decommissioned in accordance with the Pipelines Act 1962, Regulations 25, the Pipelines Safety Regulations 1996, and the BSI Code of Practice for steel pipelines on land PD 8010-1:2015+A1:2016.

The pipelines will be flushed clean of hydrocarbons and toxic materials, then disconnected and sealed. The abandonment plan for the onshore sections of the pipelines out to the MLWM has not been fully defined. Where the pipelines are to be decommissioned *in situ*, they may be filled with a suitable filler and left buried. A record will be kept of all *in situ* pipelines indicating their contents, location, size, and depth of burial.

The option to use a suitable filler material for the onshore abandoned *in situ* pipeline sections would be based on an option selection assessment, as well as comprehensive stakeholder engagement.

Structural degradation of the pipelines will be a long-term process caused by corrosion and the eventual collapse of the pipelines under their own weight, the weight of the pipeline coating material and that of the overlying soil or substrate. It is anticipated that failure of the pipelines due to through-wall degradation would only begin to occur after many decades (i.e. 60 to 100 years) and is expected to take several hundred years to fully degrade.

During this process, degradation products derived from the exterior and interior of the pipe will breakdown and potentially become bioavailable in the immediate vicinity. Pathways from the pipelines to the receptors would be via the interstitial spaces in substrate.

The release of degradation products is expected to occur at a slow rate and therefore expected to have a minimal impact on the surrounding environment. The area that could be biologically impacted would likely be limited to a few metres on either side of the pipeline.

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.

Complete failure of water filled buried pipelines has a potential for subsidence of the overlying substrate.

Appendix 3 Pre-works approval communications

Appendix 3.1 Chrysaor to OPRED (6-pages)



Chrysaor Production (U.K.) Limited
Rubislaw House
Anderson Drive
Aberdeen
AB15 6FZ

Offshore Petroleum Regulator for Environment and Decommissioning (OPRED)
Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Decommissioning Unit
AB1 Building
Wing C, 3rd Floor
48 Huntly Street
Aberdeen
AB10 1SH

7th January 2021

Dear Ms Livingston

Request to undertake additional disconnection works in 2021 prior to Decommissioning Programme Approval

Chrysaor Production (U.K.) Limited requests permission to undertake certain works at the Murdoch Complex in the CMS Area of the Southern North Sea (SNS) ahead of the approval of the associated Decommissioning Programmes.

The MD platform was installed in 1992 as a manned production facility and gathering system, initially for the Caister field. A compression platform, Murdoch MC, was added in 1996 and an accommodation platform, Murdoch MA, in 2002 to complete the complex as a collection hub for the Normally Unattended Installations (NUI's) in the surrounding area. At Murdoch, received gas was compressed and exported to TGT via an 188km 26" gas pipeline. At TGT, the gas was processed, sold and exported to the National Transmission System (NTS).

The works required to be undertaken are:

1. Subsea pipeline disconnections at the base of the MD and MA jackets of the Murdoch Complex including 3rd party disconnections

These scopes will be a part of the DSV campaign to be conducted between May and October in 2021 to support the removal of the Murdoch Complex in 2022.

The Decommissioning Programmes associated with the pipeline disconnections are CDP1b, CDP2 and CDP3. These decommissioning programmes will be submitted to OPRED in Q1 2021 for review prior to consultation. Approval of CDP3 (Murdoch Complex & Associated Trunklines) is anticipated by the end of 2021 and the CDP1b (Caister CM Associated Pipelines) and CDP2 (Boulton BM, Katy KT, Kelvin TM, Munro MH platforms and Associated Pipelines including CMSIII manifolds and Associated Pipelines) are expected to be approved in 2021/ 2022.

The detailed scope of work planned at each location in support of decommissioning, for which we request OPRED approval, is as follows:

1. Murdoch Platform Disconnection

To prepare for Murdoch MD, MC, MA removal in 2022, the pipelines at Murdoch MD and umbilicals at MA are required to be disconnected to facilitate enough clearance for the removals contractor to take the platforms away. All the pipelines to Murdoch have been flushed clean and filled with inhibited seawater.

The disconnection methodology is to use a diamond-wire saw (DWS), to cut the gas and methanol spool pieces at a minimum of 5m lateral distance from the platform. Thereafter where a closing span exists at the riser base, a further length will be removed up to the point where the pipeline touches down on the seabed. Shears will be used to cut the outboard end of the pipeline at the touchdown point. The disconnection philosophy at this stage, is to minimise pipeline intervention required proximal to the platform. To achieve this the minimum length of pipeline will be disconnected to achieve sufficient clearance for platform removal. The outboard cut will terminate at a point where the pipeline is buried beneath stabilisation material. Mattress removal will only take place where they obstruct the clearance necessary for the removal criteria. Minimum excavation will be required to expose pipelines as they have been surface-laid at the approaches. Seabed mobility may however have buried the pipelines thus requiring minor unburial to expose the section to the point where it is buried beneath stabilisation material. A ROV dredger will be on board the vessel to facilitate unburial, if necessary.

The pipeline ends at Murdoch MD and MA will not be buried at this stage, as the assessment of the decommissioning of the pipeline ends will be communicated within the comparative assessment and agreed between stakeholders during the decommissioning approval process. The comparative assessment will be submitted to BEIS for initial review in early 2021. Any future remediation of the pipeline ends required to reach an agreed decommissioning as-left state will be undertaken as part of the post removal activities.

The 500m zone will be retained until there are no foreseeable snagging risks to fishermen.

13 pipelines (5 gas pipelines, 5 methanol pipelines and 3 umbilicals) are proposed to be disconnected:

Pipeline Number	Pipeline Description	Removal Length (minimum)	Removed Items*
PL1436	Boulton BM to Murdoch MD 10" Gas Line	3m (Note1)	No mattresses, several grout bags
PL1437	Murdoch MD 3" MeOH Line to Boulton BM	3m (Note1)	No mattresses, several grout bags
PL929	Murdoch MD to TGT 26" Gas Line	3m (Note2)	No mattresses, several grout bags
PL930	TGT to Murdoch MD 4" MeOH Line	3m (Note2)	No mattresses, several grout bags
PL935	Caister CM to Murdoch MD 16" Gas Line	3m (Note2)	Several mattresses, several grout bags
PL936	Murdoch MD to Caister CM 3" MeOH Line	3m (Note2)	Several mattresses, several grout bags
PL1922	Hawksley EM to Murdoch MD 12" Gas Line via McAdam MM and Northern Lobe Pigging Skid (PSNL)	11m	No mattresses, several grout bags
PL1925	Murdoch MD to Hawksley EM 3" MeOH Line via McAdam MM and Northern Lobe Pigging Skid (PSNL)	11m	No mattresses, several grout bags
PL1924	Boulton H HM to Murdoch MD 10" Gas Line via Southern Lobe Pigging Skid (PSSL) via Watt QM	12m	No mattresses, several grout bags
PL1927	Murdoch MD to Boulton H HM 3" MeOH Line via Southern Lobe Pigging Skid (PSSL) via Watt QM	12m	No mattresses, several grout bags
PLU4890 (UM8)	Murdoch MA to Murdoch K KM	8m	No mattresses, several grout bags
PLU4686 (UM7)	Murdoch MA to McAdam MM	8m	No mattresses, several grout bags
PLU4889 (UM5)	Murdoch MA to Watt QM	8m	No mattresses, several grout bags

*Removed items are approximate based on as-left information, actual conditions may differ when executing the works.
 Note 1 - Minimum separation of 3m disconnection length in 2021 for these lines due to access restrictions as they run under the MD platform which causes access issues, so it is proposed we carry out recommended disconnection to this line in 2022
 Note 2 - Minimum separation of 3m disconnection length in 2021 for these lines due to access restrictions as they run under the helideck, which causes access issues with getting the vessel in close with necessary tooling etc so it is proposed we carry out recommended disconnection to this line in 2022.

Where safe to do so, all grout bags and mattresses moved to enable access will be recovered for onshore disposal. All cut sections of the pipelines will be recovered to deck for onshore disposal.

To achieve cost efficiencies during the SNS subsea campaign, Chrysaor has invited the 3rd parties that are connected to the complex to participate in the subsea disconnection scope. The 3rd party pipelines that may also be

included in the scope are DNO operated Schooner and Ketch pipelines and Ineos operated Cavendish to Murdoch cable.

The CMS infrastructure is illustrated in Fig 1. Chrysoar-operated assets are highlighted in green and the pipeline disconnections for which approval is sought ahead of decommissioning programme approval will be performed at the base of the MD and MA jackets at the Murdoch Complex.

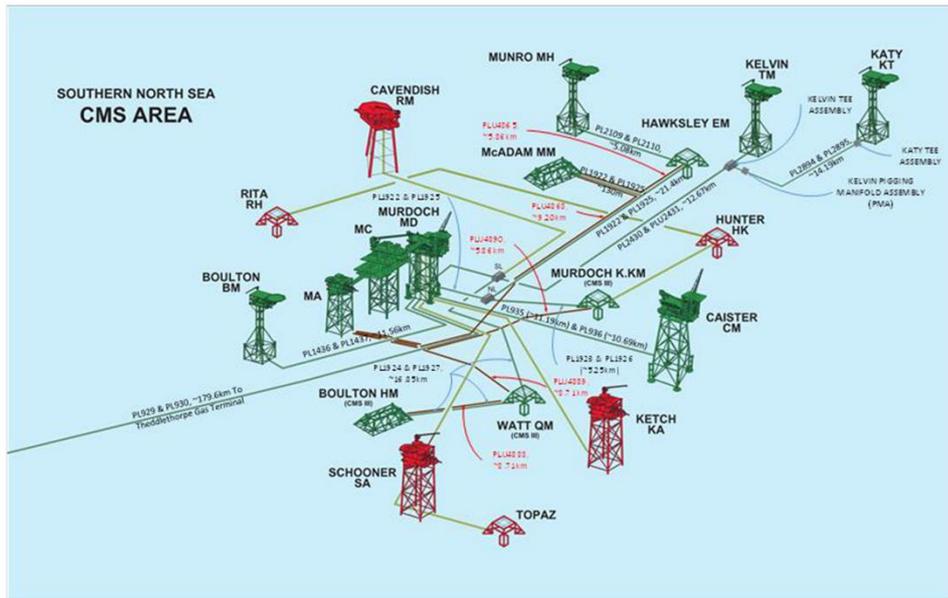


Figure 1 - CMS Gas Operation Schematic (Chrysoar operated assets coloured green)

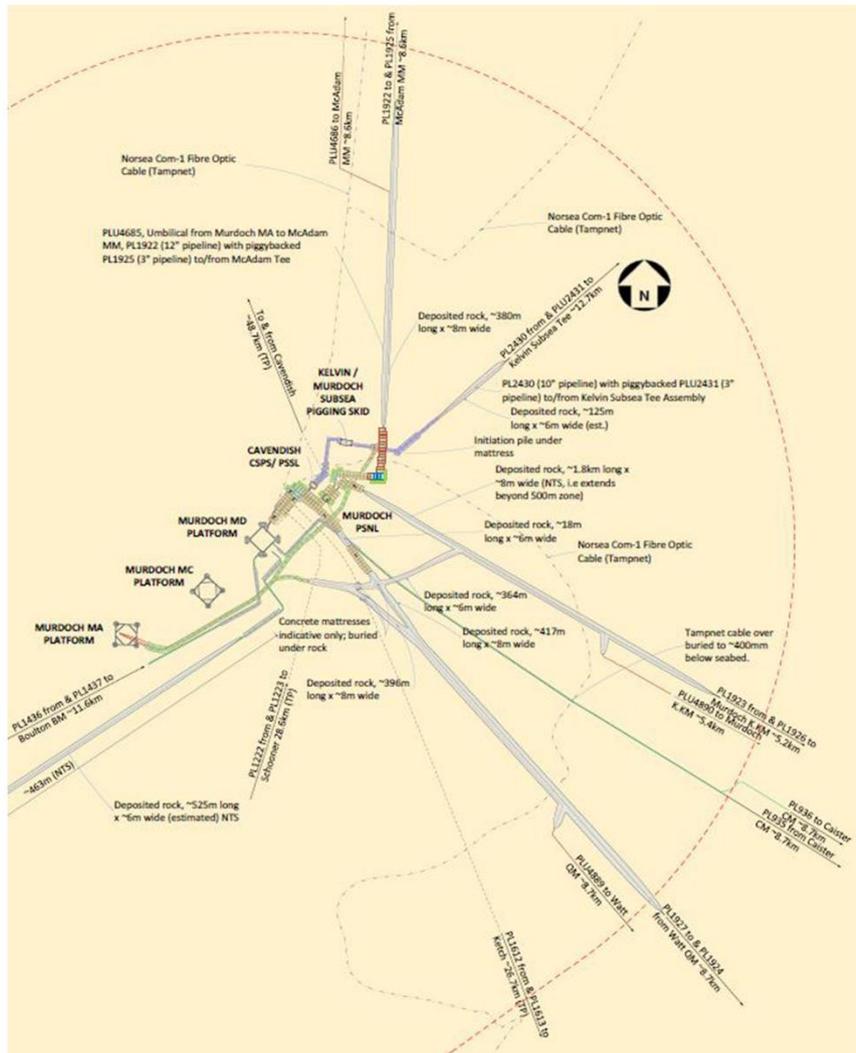


Figure 2 – Schematic of pipelines and current view of stabilization features around Murdoch based on as-left information

Environmental Permit and Consent Applications

A Decommissioning (DCA) Master Application Template (MAT) and supporting Environmental Impact Assessments (EIA) will be submitted detailing the proposed discharge of pipeline contents upon subsea pipeline disconnects and the temporary deposits, removals and seabed disturbance during the proposed subsea pipeline disconnects and spool-piece removals.

The DCA MATs will likely be supported by the following Subsidiary Application Templates (SATs):

- Oil Discharge Permits for the discharge of pipeline flush fluids containing hydrocarbons at a concentration below 30mg/l OIW;
- Marine Licence for the seabed disturbance from dredging activities and the temporary deposits of heavy duty debris baskets for recovery of mattresses/grout sacks and pipeline spool-pieces.

Pipeline Works Authorisation (PWA) variation applications will be submitted to OGA to request consent for these operations.

Chrysaor confirms that the request will not compromise or prejudice feasible decommissioning options for the remaining infrastructure. A copy of the PWR and reference of the work executed will be an appendix to the Decommissioning Programmes.

We request your permission to undertake these works ahead of the Decommissioning Programme approval to avoid the additional expenditure associated with delaying this activity.

Yours sincerely



Catharine Marston
Decommissioning Integration Lead

T: +44 (0)7809 781 392 E: cathy.marston@chrysaor.com

Appendix 3.2 OPRED to Chrysaor (2-pages)

Offshore Petroleum Regulator
for Environment & Decommissioning

Catharine Marston
Chrysaor Production (U.K.) Limited
Rubislaw House
Anderson Drive
Aberdeen
AB15 6FZ

Offshore Petroleum Regulator for
Environment & Decommissioning

Department for Business, Energy &
Industrial Strategy
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ
T: 01224 254042
E: kim.wood@beis.gov.uk
www.gov.uk/beis

12 February 2021

Dear Mrs Marston

RE: Request to undertake preparatory works in 2021 prior to the CDP1b, CDP2 and CDP3 Decommissioning Programme Approvals

I write in reply to your email of 6 January 2021, enclosing a letter dated 7 January 2021 (*sic*), containing an updated request to carry out various preparatory works prior to the approval of the CDP1b, CDP2, CDP3 decommissioning programmes.

Chrysaor proposes various subsea pipeline disconnection works at the base of the MD and MA jackets of the Murdoch complex. Thirteen pipelines (5 methanol, 5 gas and 3 umbilicals) are proposed to be disconnected by diamond-wire saw at the Murdoch MA and MD platforms. The proposed cuts will be made at a minimum lateral distance of 5m from the platforms to allow sufficient minimum clearance for the subsequent platform removals in 2022. The pipeline sections noted below will be removed; if possible, with the outboard cut terminating at a point where the pipeline is buried beneath stabilisation material.

- PL1436 - 3m section from Boulton BM to Murdoch MD
- PL1437 - 3m section from Murdoch MD to Boulton BM
- PL929 - 3m section from Murdoch MD to TGT 26" Gas Line
- PL930 - 3m section from TGT 26" Gas Line to Murdoch MD
- PL935 - 3m section from Caister CM to Murdoch MD
- PL936 - 3m section from Murdoch MD to Caister CM
- PL1922 - 11m section from Hawksley EM to Murdoch MD
- PL1925 - 11m section from Murdoch MD to Hawksley EM
- PL1924 - 12m section from Boulton H HM to Murdoch MD
- PL1927 - 12m section from Murdoch MD to Boulton H HM
- PLU4890 - 8m section from Murdoch MA to Murdoch K KM
- PLU4686 - 8m section from Murdoch K KM to Murdoch MA
- PLU4889 - 8m section from Murdoch MA to Watt QM

The proposal also notes that if any closing span exists at a riser base, a further length of pipeline may be removed up to the point where the pipeline touches down on the seabed. This specific activity may be undertaken in this disconnection campaign, or at a later phase, depending upon whether the platform is obstructing access.



Offshore Petroleum Regulator
for Environment & Decommissioning

In addition, the proposal also notes that the pipeline ends at the Murdoch MD and MA platforms will not be buried during this pipeline disconnection stage. The decommissioning of these pipeline ends will be assessed in the Comparative Assessment, accompanying the future associated Decommissioning Programmes, and agreed with OPRED as part of the decommissioning approval process.

We have considered Chrysaor's proposals, outlined in your updated letter of 7 January 2021, for the above-named pipelines, and conclude that they will not prejudice or compromise feasible decommissioning options and as such we are content to agree the proposals.

However, you are reminded that pipeline PL929, the 26" pipeline from Murdoch MD to Theddlethorpe Gas Terminal (TGT) has been identified for potential re-use and we are aware that the Oil & Gas Authority (OGA) has been discussing this aspect with Chrysaor. Agreement to the disconnection of PL929 as part of this preparatory works request is given only on the basis that PL929 is disconnected and left in such a manner that this does not preclude potential re-use options.

With regards to the PWA and MCAA applications associated with these proposals, Chrysaor must make it clear in these submissions that the only reason that some of the pipelines are being removed in two separate phases is because the platform obstructs access to some of the sections of pipelines attached to it. You are also reminded that PWA applications should be submitted well in advance of proposed work start dates, and clearly state, where applicable, whether third parties are aligned to avoid any delay in approval. Please ensure that start dates are aligned across the supporting applications.

This approval is given only in respect of the disconnections of the Chrysaor owned pipelines noted above, agreement to any associated INEOS or DNO owned pipeline disconnections will require separate approval agreed by the relevant team within OPRED-ODU.

This is the third version of this preparatory works request at the Murdoch Complex; the three iterations (1 October 2020, 1 December 2020 and 7 January 2021) have involved multiple changes to pipeline disconnection lengths, some quite considerable. Triple handling of a request is not helpful to ODU nor its internal and external consultees. This has caused unnecessary, additional workload which is time-consuming and inefficient for all involved. Chrysaor must ensure that any future preparatory works proposals are at a sufficient stage of maturity before submission to avoid this happening again.

I also draw your attention to ensuring that appropriate time is allowed for the review and approval process of decommissioning programmes. Timings for approvals are dependent on the quality and nature of information provided, but also the additional assessments that may be required due to environmental considerations.

Yours sincerely

Fiona Livingston
Senior Decommissioning Manager
Offshore Decommissioning Unit

Appendix 4 Public & consultee correspondence

Appendix 4.1 Public Notices

PUBLIC NOTICE
THE PETROLEUM ACT 1998
MURDOCH INSTALLATIONS AND TRUNK PIPELINES
DECOMMISSIONING PROGRAMMES (CDP3)
 Chrysaor Production (U.K.) Limited (a Harbour Energy company) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the Murdoch Installations and Trunk Pipelines, in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.
 The items/facilities covered by the Decommissioning Programmes are:
 The Murdoch Installations lie 160 kilometres east of the nearest UK coastline, in Block 44/22a. The facilities include three bridge-linked platforms (Caister Murdoch System (CMS) joint facilities installations, including Murdoch MA and Murdoch MC, and the Murdoch MD installation and template), each comprising a topside and a jacket structure; two trunk pipelines (one gas, one methanol).
 Harbour Energy hereby gives notice that a summary of the Murdoch Installations and Trunk Pipelines Decommissioning Programmes can be viewed at this address: www.harbourenergy.com, or alternatively a hard copy of the document may be requested by contacting Harbour Energy during office hours on 01224 205000.
 Representations regarding the Murdoch Installations and Trunk Pipelines Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to DecommissioningDCMailbox@chrysaor.com, by the consultation closing date of **8 April 2022**. Submissions should state the grounds upon which any representations are being made.
 Date: 7 March 2022
 Michael Burnett
 Decommissioning Strategy and Integration Manager
 Harbour Energy
 Rubislaw House
 Anderson Drive
 Aberdeen AB15 6FZ (4008763)

4258 | CONTAINING ALL NOTICES PUBLISHED ONLINE ON 7 MARCH 2022 | LONDON GAZETTE

Figure A4.1.1: Public Notice - The London Gazette, 07 March 2022

Monday 7 March 2022 *The Daily Telegraph*

PUBLIC NOTICE

The Petroleum Act 1998

Murdoch Installations and Trunk Pipelines Decommissioning Programmes (CDP3)

Chrysaor Production (U.K.) Limited (a Harbour Energy company) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the Murdoch Installations and Trunk Pipelines, in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

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The Murdoch Installations lie 160 kilometres east of the nearest UK coastline, in Block 44/22a. The facilities include three bridge-linked platforms (Caister Murdoch System (CMS) joint facilities installations, including Murdoch MA and Murdoch MC, and the Murdoch MD installation and template), each comprising a topside and a jacket structure; two trunk pipelines (one gas, one methanol).

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Date: 7 March 2022

Harbour Energy Rubislaw House Anderson Drive Aberdeen AB15 6FZ	Michael Burnett Decommissioning Strategy and Integration Manager
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MONDAY, MARCH 7, 2022 **HULL-LIVE.CO.UK** 37

PUBLIC NOTICE

The Petroleum Act 1998

Murdoch Installations and Trunk Pipelines Decommissioning Programmes (CDP3)

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The items/facilities covered by the Decommissioning Programmes are:

The Murdoch Installations lie 160 kilometres east of the nearest UK coastline, in Block 44/22a. The facilities include three bridge-linked platforms (Caister Murdoch System (CMS) joint facilities installations, including Murdoch MA and Murdoch MC, and the Murdoch MD installation and template), each comprising a topside and a jacket structure; two trunk pipelines (one gas, one methanol).
 Harbour Energy hereby gives notice that a summary of the Murdoch Installations and Trunk Pipelines Decommissioning Programmes can be viewed at this address: www.harbourenergy.com, or alternatively a hard copy of the document may be requested by contacting Harbour Energy during office hours on 01224 205000.
 Representations regarding the Murdoch Installations and Trunk Pipelines Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to DecommissioningDCMailbox@chrysaor.com, by the consultation closing date of **8 April 2022**. Submissions should state the grounds upon which any representations are being made.

Date: 7 March 2022

Michael Burnett
 Decommissioning Strategy and Integration Manager
 Harbour Energy
 Rubislaw House, Anderson Drive, Aberdeen AB15 6FZ

Figure A4.1.2: Public Notice - The Daily Telegraph & The Hull Daily Mail, 07 March 2022

Appendix 4.2 Email from GMG

From: Alex Riddell, GMG

To: C. Marston

Date: 13 April 2022: 13:31

Good afternoon,

Thank you for sending through the Caister CM Pipelines Decommissioning Program.

I have reviewed the content provided and as the nearest active cables (TAMPNET Norsesea Com 1 and MCCS) are located within 1km of the Murdoch Platforms, it would be prudent to contact the cable owners to ensure they are aware of operations.

Contact details of the cable owners can be sourced from <https://kis-orca.org/map/>

Kind regards,

Alex Riddell

Appendix 4.3 Letter from NFFO



The National Federation of
Fishermen's Organisations

Harbour Energy
Rubislaw House
Anderson Drive
Aberdeen
AB15 6FZ

13th April 2022.

Attention of: Catharine Marston.
Decommissioning Integration Lead, Harbour Energy.

Dear Catharine

In reference to the decommissioning program for the CDP2, Caister Murdoch system111 Installations and associated pipelines & the CDP1b Caister CM pipelines.

The National Federation Fisherman's Organisations would like to thank Harbour Energy for the detailed documentation explaining the planned methodology of the decommissioning of these assets along with the comparative assessment and environmental statements.

I can confirm The National Federation Fisherman's Organisations would like to comment and request post decommissioning trawl surveys are carried out at each 500m safety zones to ensure that the area is safe to be opened to commercial fishing operations with no snagging hazards or debris is left in situ after the removal of these assets.

NFFO Services department look forward to working closely with Harbour Energy throughout the decommissioning process.

Kind Regards

Ian Rowe

NFFO Services

General Manager.

The National Federation of Fishermen's Organisations Ltd | 30 Monkgate, York YO31 7PF

Tel: 01904 635430 | Email: nffo@nffo.org.uk | Web: www.nffo.org.uk

Appendix 4.4 Letter from SFF



Our Ref: SA/03/3/DP

Your Ref:

25th March 2022

Scottish Fishermen's Federation
24 Rubislaw Terrace
Aberdeen, AB10 1XE
Scotland UK

T: +44 (0) 1224 646944
F: +44 (0) 1224 647078
E: sff@sff.co.uk

www.sff.co.uk

Catharine Marston
Decommissioning Integration Lead
Chrysaor (U.K) Limited
Rubislaw House
Anderson Drive
Aberdeen AB15 6FZ

Dear Catharine,

CDP3: Murdoch Installations and Trunk Pipelines Decommissioning Programmes

I refer to your letter of 7th March 2022 and associated documents provided by email on 7th March 2022 regarding the draft Decommissioning Programmes for the Murdoch Installations and Trunk Pipelines.

The Scottish Fishermen's Federation (SFF) appreciates the clearly laid out and detailed explanation of Chrysaor's proposals for the decommissioning of the aforementioned infrastructure and place on record our appreciation of the information provided.

Given the locality of this particular Field, I can advise that the SFF is content to leave it with the National Federation of Fishermen's Organisations (NFFO) to respond to you on these plans.

For your information, please note that the SFF's Oil and Gas Decommissioning Policy and accompanying Key Principles document can be viewed via the SFF's website using the following link: <https://www.sff.co.uk/sff-offshore-oil-gas-decommissioning-policy/>

Yours sincerely,



Steven Alexander
Offshore Liaison

Members:

Anglo Scottish Fishermen's Association · Fife Fishermen's Association · Fishing Vessel Agents & Owners Association (Scotland) Ltd ·
Mallaig & North-West Fishermen's Association Ltd · Orkney Fisheries Association · Scottish Pelagic Fishermen's Association Ltd ·
The Scottish White Fish Producers' Association Ltd · Shetland Fishermen's Association

VAT Reg No: 605 096 748

Appendix 5 Letters of Support



Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

1st July 2022

Dear Sir or Madam

Murdoch Installations and Trunk Pipelines Decommissioning Programmes: CDP3

The Petroleum Act 1998

We acknowledge receipt of your letter dated 30th June 2022.

We, Chrysaor (U.K.) Beta Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf the abandonment programmes for Murdoch Installations and Trunk Pipelines Decommissioning Programmes, as directed by the Secretary of State on 30th June 2022.

We confirm that we support the proposals detailed in the Murdoch Installations and Trunk Pipelines Decommissioning Programmes dated 30th June 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,



Richard Tocher
SVP Decommissioning & Major Projects

For and on behalf of Chrysaor (U.K.) Beta Limited

Chrysaor Production
(U.K.) Limited
Rubislaw House
Anderson Drive
Aberdeen
AB15 6FZ
harbourenergy.com



Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

1st July 2022

Dear Sir or Madam

Murdoch Installations and Trunk Pipelines Decommissioning Programmes: CDP3

The Petroleum Act 1998

We acknowledge receipt of your letter dated 30th June 2022.

We, Premier Oil E&P UK Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf the abandonment programmes for Murdoch Installations and Trunk Pipelines Decommissioning Programmes, as directed by the Secretary of State on 30th June 2022.

We confirm that we support the proposals detailed in the Murdoch Installations and Trunk Pipelines Decommissioning Programmes dated 30th June 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,



Richard Tocher
SVP Decommissioning & Major Projects

For and on behalf of Premier Oil E&P UK Limited



To:

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 01-07-2022

Dear Sir or Madam,

Murdoch Installations and Trunk Pipelines Decommissioning Programmes: CDP3

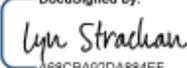
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (30th June 2022).

We, Neptune E&P UKCS Limited, confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf the abandonment programmes for Murdoch Installations and Trunk Pipelines Decommissioning Programmes, as directed by the Secretary of State on 30th June 2022.

We confirm that we support the proposals detailed in the Murdoch Installations and Trunk Pipelines Decommissioning Programmes dated 30th June 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

DocuSigned by:

A88CBA92DA884EF...

Lyn Strachan

Commercial Lead Non-Operated Assets

For and on behalf of Neptune E&P UKCS Limited

Neptune E&P UKCS Limited
Nova North, 11 Bressenden Place
London SW1E 5BY
United Kingdom
T: +44 (0)1224 281000
F: +44 (0)1224 281025
www.neptuneenergy.com

Company No. 03386464
Registered in England and Wales at:
Nova North, 11 Bressenden Place
London SW1E 5BY
United Kingdom

Tullow Oil plc

9 Chiswick Park, 566 Chiswick High Road, London, W4 5XT
Tel: +44 (0)203 249 9000 Fax: +44 (0)203 249 8801



To:
Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 1 July 2022

Dear Sir or Madam,

Murdoch Installations and Trunk Pipelines Decommissioning Programmes: CDP3

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (30th June 2022).

We, Tullow Oil plc, confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf the abandonment programmes for Murdoch Installations and Trunk Pipelines Decommissioning Programmes, as directed by the Secretary of State on 30th June 2022.

We confirm that we support the proposals detailed in the Murdoch Installations and Trunk Pipelines Decommissioning Programmes dated 30th June 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998. Yours faithfully,



Franco Uliana
Asset Manager - Decommissioning

For and on behalf of Tullow Oil plc

Tullow Oil SK Limited

9 Chiswick Park, 566 Chiswick High Road, London, W4 5XT
Tel: +44 (0)203 249 9000 Fax: +44 (0)203 249 8801



To:
Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 1 July 2022

Dear Sir or Madam,

Murdoch Installations and Trunk Pipelines Decommissioning Programmes: CDP3

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (30th June 2022).

We, Tullow Oil SK Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf the abandonment programmes for Murdoch Installations and Trunk Pipelines Decommissioning Programmes, as directed by the Secretary of State on 30th June 2022.

We confirm that we support the proposals detailed in the Murdoch Installations and Trunk Pipelines Decommissioning Programmes dated 30th June 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998. Yours faithfully,



Franco Uliana
Asset Manager - Decommissioning

For and on behalf of Tullow Oil SK Limited

Registered in England: Number 5287330
Registered Office as above