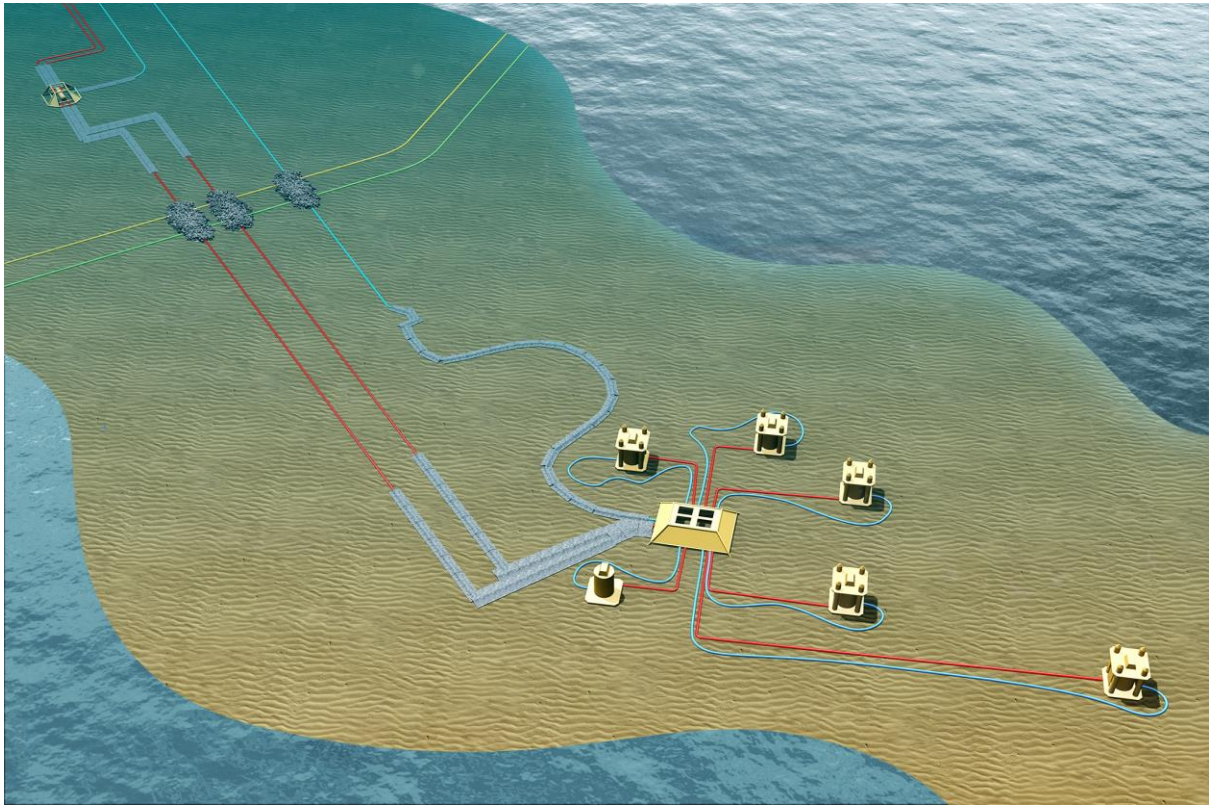


Kingfisher Field

Final Decommissioning Programmes – Part 1



Submitted to the U.K. Department for Business, Energy and Industrial Strategy

Shell Report Number KDP-PT-S-AA-8203-00001

22 June 2021



Document Control

Approvals

	Name	Signature	Date
Prepared by:	F. Whyte		22-06-2021
Reviewed by:	J. Blackburn		22/06/2021
Approved by:	J. Blackburn		22/06/2021

Revision Control

Revision No.	Reference	Changes/Comments	Issue Date
R01	Issued for Internal Review	N/A	09-Jul-2018
R02	Issued for Internal Review	Updated with comments	07-Sep-2018
R03	Issued for Internal & Partner Approval	Updated with comments	22-Oct-2018
A01	Pre-draft sent to OPRED for review	Updated with comments	23-Nov-2018
A02	Pre-consultation draft sent to OPRED for review	Updated with comments	03-Jun-2019
A03	DP split and issued for internal review	Removed all infrastructure within Brae Bravo 500m from this DP	09-Aug-2019
A04	Split DP Pre-draft		27-Sept-2019
A05	Issued for Partner Approval		23-Apr-2020
A06	Consultation draft		1-June-2020
A07	Post-consultation draft		05-Feb-2021
A08	Final Decommissioning Programmes		21-April-2021
A09	Final Decommissioning Programmes	Partner letter of support added	22-June-2021



Contents		INST	P/L
1 Executive Summary	6	✓	✓
1.1 Combined Decommissioning Programmes	6	✓	✓
1.2 Requirement for Decommissioning Programmes	6	✓	✓
1.3 Introduction	7	✓	✓
1.3.1 Asset Overview	7	✓	✓
1.4 Overview of Installations / Pipelines Being Decommissioned	9	✓	✓
1.5 Field Location Including Field Layout and Adjacent Facilities	22	✓	✓
1.6 Industrial Implications	26	✓	✓
2 Description of Items to be decommissioned	27	✓	✓
2.1 Kingfisher Field	27	✓	✓
2.1.1 Kingfisher Field Installations: Surface Facilities	27		
2.1.2 Kingfisher Field Installations: Subsea including Stabilisation Features	27	✓	
2.1.3 Kingfisher Field: Pipelines Including Stabilisation Features	29		✓
2.1.4 Kingfisher Field Wells	36	✓	
2.1.5 Kingfisher Field Drill Cuttings	36	✓	
2.1.6 Kingfisher Field Inventory Estimates	37	✓	✓
3 Removal and Disposal Methods	39	✓	✓
3.1 Topsides	39		
3.2 Jacket	40		
3.3 Subsea Installations and Stabilisation Features	40	✓	
3.4 Pipelines	41		✓
3.5 Pipeline Stabilisation Feature(s)	45		✓
3.6 Wells	45	✓	
3.7 Drill Cuttings	45	✓	
3.8 Waste Streams	48	✓	✓
4 Environmental APPRAISAL OVERVIEW	50	✓	✓
4.1 Environmental Sensitivities (Summary)	50	✓	✓
4.2 Potential Environmental Impacts and their Management	54	✓	✓
5 Interested Party Consultations	58	✓	✓
6 Programme Management	59	✓	✓
6.1 Project Management and Verification	59	✓	✓
6.2 Post-Decommissioning Debris Clearance and Verification	59	✓	✓
6.3 Schedule	60	✓	✓
6.4 Costs	61	✓	✓
6.5 Close Out	61	✓	✓
6.6 Post-Decommissioning Monitoring and Evaluation	61	✓	✓
7 Supporting Documents	63	✓	✓
8 Partner Letter of Support	64	✓	✓



Terms and Abbreviations

Term	Explanation
ALARP	As Low As Reasonably Practicable
BEIS	Department for Business, Energy and Industrial Strategy (formerly DECC)
CA	Comparative Assessment
CoP	Cessation of Production
DECC	Department of Energy and Climate Change (now BEIS)
DP	Decommissioning Programme
EA	Environmental Appraisal
EC	European Commission
EIA	Environmental Impact Assessment
ENVID	Environmental Identification
EU	European Union
EUNIS	European University Information Systems Organization
FPAL	First Point Assessment Ltd., the Achilles scheme which identifies, evaluates and pre-qualifies suppliers for major buyers in oil and gas
GMS	Global Marine Systems Ltd.
HLV	Heavy Lift Vessel
HSE	Health and Safety Executive
HSSE&SP	Health, Safety, Security, Environment and Social Performance
ICES	International Council for the Exploration of the Sea
JNCC	Joint Nature Conservation Committee
MCAA	Marine and Coastal Access Act
NIFPO	Northern Ireland Fish Producers Organisation
NORM	Naturally Occurring Radioactive Material
OBM	Oil Based Mud
OGA	Oil and Gas Authority
OGUK	Oil & Gas UK
OiW	Oil-in-Water
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo and Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)
P&A	Plug and Abandonment
PETS	Portal Environmental Tracking System



Term	Explanation
PMF	Priority Marine Feature
PMS	Power Management System
PON	Petroleum Operations Notice(s)
PWA	Pipeline Works Authorisation
ROV	Remote Operated Vehicle
SAC	Special Area of Conservation
SFF	Scottish Fishermen's Federation
SLV	Single Lift Vessel
SOPEP	Shipboard Oil Pollution Emergency Plan
SSIV	Subsea Safety Isolation Valve
Te	Metric Tonne
TUTU	Topside Umbilical Termination Unit
UKCS	United Kingdom Continental Shelf
UTA	Umbilical Termination Assembly
WBS	Work Breakdown Structure
WGS84	World Geodetic System 1984
WMP	Waste Management Plan

Figures and Tables

List of Figures	
Figure 1.1: Field Location in UKCS.....	22
Figure 1.2: Field Layout	23
Figure 2.1: Estimated Inventories (Installations)	38
Figure 2.2: Estimated Inventories (Pipelines) (excluding rock cover)	38
Figure 3.1: Comparative Assessment Groupings Schematic	42
Figure 6.1: Project Plan	60
Figure APP3-1 – Burial depth definition.....	69
Figure APP38-2 – Kingfisher Production Pipeline Survey Results Summary (N0509 / PL1488).....	71
Figure APP3-3 – Kingfisher Production Pipeline Survey Results Summary (N0510 / PL1489).....	72
Figure APP3-4 – Kingfisher Manifold Umbilical Survey Results Summary (N0889 / PLU1490)	73
Figure APP3-5 – Depth-of-Cover data for PL1488 crossing at Heimdal	74
Figure APP3-6 – Depth-of-Cover data for PL1489 crossing at Heimdal	74
Figure APP3-7 – Depth-of-Cover data for PLU1490 crossing at Heimdal.....	75



List of Tables

Table 1.1: Installations Being Decommissioned	9
Table 1.2: Installations Section 29 Notice Holders Summary.....	9
Table 1.3: Pipelines being Decommissioned.....	9
Table 1.4: Pipelines Section 29 Notice Holders Summary	10
Table 1.5: Pipeline Summary Table	11
Table 1.6: Summary of Decommissioning Programmes.....	18
Table 1.7: Adjacent Facilities	24
Table 2.1: Surface Facilities Information.....	27
Table 2.2: Subsea Installations and Stabilisation Features	27
Table 2.3: Pipeline/Flowline/Umbilical Information	29
Table 2.4: Subsea Pipeline Stabilisation Features	35
Table 2.5: Subsea Pipeline Structures	35
Table 2.6: Well Information.....	36
Table 2.7: Drill Cuttings Pile(s) Information	36
Table 2.8: Kingfisher Material Inventory	37
Table 3.1: Topsides Removal Methods	39
Table 3.2: Jacket Decommissioning Methods.....	40
Table 3.3: Subsea Installations and Stabilisation Features	40
Table 3.4: Pipeline or Pipeline Groups Decommissioning Options	41
Table 3.5: Outcomes of Comparative Assessment	44
Table 3.6: Pipeline Stabilisation Features	45
Table 3.7: Well Plug and Abandonment	45
Table 3.8: Drill Cuttings Decommissioning Options	46
Table 3.9: Waste Stream Management Methods.....	48
Table 3.10: Inventory Disposition	49
Table 4.1: Environmental Sensitivities	50
Table 4.2: Environmental Impact Management	55
Table 5.1: Summary of Stakeholder Comments	58
Table 6.1: Provisional Decommissioning Programmes - Costs.....	61
Table 7.1: Supporting Documents	63

Appendices

List of Appendices	Description	Page
1	Public Notice	65
2	Statutory Consultee Correspondence	66
3	Burial Depth Data	69



1 EXECUTIVE SUMMARY

1.1 Combined Decommissioning Programmes

This document contains two Decommissioning Programmes (DP) for the Kingfisher installations and fifteen Kingfisher infield pipelines.

These combined DPs are submitted by the co-venturers Shell U.K. Limited (Shell, operator) and Esso Exploration and Production UK Limited (Esso) being recipients of the Section 29 Notices, and throughout this document the terms ‘owners’, ‘we’, and ‘our’ refer to these co-venturers.

1.2 Requirement for Decommissioning Programmes

These DPs were submitted for statutory and public consultation in compliance with relevant legislation and guidelines [2] from the Offshore Petroleum Regulator for the Environment and Decommissioning (OPRED) part of the Department for Business, Energy and Industrial Strategy, (BEIS), formerly Department of Energy and Climate Change (DECC). They describe the principles of the decommissioning activities in compliance with national and international regulations, whilst also presenting an assessment of the environmental impacts of the proposed programme.

Installations:

In accordance with the Petroleum Act 1998 [1], Shell U.K. Limited and Esso Exploration and Production UK Limited as Section 29 notice holders of the Kingfisher installations / field (see Table 1.2) are applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installations detailed in Section 2.1.1 and 2.1.2 of these programmes. (See also Section 8 - Partner Letters of Support).

Pipelines:

In accordance with the Petroleum Act 1998 [1], Shell U.K. Limited and Esso Exploration and Production UK Limited as Section 29 notice holders of the fifteen Kingfisher pipelines (see Table 1.4) are applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2.1.3 of these programmes. (See also Section 8 – Partner Letters of Support).

The fifteen pipelines included in this Decommissioning Programme do not cover the full scope of the Kingfisher Pipelines Section 29 notice. The pipelines and pipeline sections within the 500m safety zone of the TAQA Bratani Limited operated Brae Bravo Platform have been excluded from this Programme and will be the subject of a separate Programme to be submitted at a later date.

In conjunction with public, stakeholder and regulatory consultation, the decommissioning programmes are submitted in compliance with national and international regulations and OPRED guidelines. The schedule outlined in this document is for up to a 5-year decommissioning project plan, due to begin in 2020.



1.3 Introduction

Kingfisher was operational as an oil and gas producing field since 1997. Hydrocarbons from the Kingfisher field, comprising of the Brae I, Brae II and Heather reservoirs, were produced via TAQA Bratani Limited's Brae Bravo platform. TAQA Bratani Limited's Brae Bravo platform has reached the end of economic life; the Oil and Gas Authority (OGA) gave formal Cessation of Production (CoP) approval to TAQA Bratani Limited for Brae Bravo's Brae Field production in 2016 and production ceased in July 2018. For Kingfisher, the Partners and OGA agreed with the Cessation of Production assessment made by Shell U.K. Limited and formal CoP approval was received from OGA on 5th Dec 2016. Kingfisher production was not economically viable on a standalone basis and, following a period of production on a best endeavours' basis, the Kingfisher field ceased production on the 5th July 2018. aligning with Brae Bravo's decommissioning timeline.

The phasing of the decommissioning activities is as follows:

- Phase 1 – Flushing of available chemicals cores in the Kingfisher manifold umbilical, flushing of hydrocarbons from 10" production pipelines (completed Jul 2018) and physical isolation of the pipelines from the Kingfisher manifold (completed Sep 2018).
- Phase 2 – Subsea Wells Plug & Lubricate (P&L), flushing of hydrocarbons from production jumpers and flushing of Kingfisher manifold umbilical hydraulic cores (Flushing completed Jan 2019 – April 2019)
- Phase 3 – removal and/or remediation of Kingfisher subsea infrastructure outside the Brae Bravo 500m safety zone in accordance with this approved DP, including the wellheads for the six Kingfisher wells. Well Plug and Abandonment (P&A) completion is regulated separately by the OGA and will be scheduled in a separate campaign.
- Phase 4 – removal and/or remediation of Kingfisher subsea infrastructure inside the Brae Bravo 500m safety zone in accordance with a separate approved DP to be submitted at a later date.

For clarity, these Programmes, i.e. Decommissioning Programmes Part 1, cover the decommissioning of all Kingfisher Field pipelines and installations outside the Brae Bravo 500m safety zone. This includes the Kingfisher wellheads, although the approval of the plug and abandonment activities are regulated separately.

Further information on the permitry associated with each phase can be found in the Environmental Appraisal [5] Section 1.3.

1.3.1 Asset Overview

The Kingfisher field lies in Block 16/8 of the UK Sector of the North Sea and comprises three reservoirs: Brae I (Gas/Condensate), Brae II (Volatile Oil) and Heather (Gas/Condensate). The Kingfisher field is located 280km Northeast of Aberdeen and was developed as a subsea tie-back to the TAQA Bratani Limited Brae Bravo platform. The field first produced in October 1997 and had a design life of 15 years. Produced oil was exported via the Brae Bravo Platform to the Forties pipeline system and gas was delivered to the Brae Bravo operators as part of the tariff structure.

The Kingfisher development comprises six subsea wells with rigid pipeline jumpers to a subsea manifold. The production fluids from the Brae and Heather wells were commingled in the manifold and routed to the Brae Bravo platform via the two production pipelines. The production pipelines were linked at the Kingfisher manifold to provide a pigging loop to allow round trip pigging.



A single composite control and chemical injection umbilical from the Brae Bravo platform to the Kingfisher manifold provides all the utilities required for operation of the manifold facility.

A SSIV control umbilical from the Brae Bravo platform to the SSIV structure controls the SSIV. The SSIV structure is a gravity-based, piled and overtrawlable structure located approximately 330m south-east of the Brae Bravo Platform.



1.4 Overview of Installations / Pipelines Being Decommissioned

1.4.1 Installations

Table 1.1: Installations Being Decommissioned			
Field:	Kingfisher	Production Type:	Volatile oil, gas and condensate
Water Depth (m)	114m	UKCS Block:	16/8a, 16/8d
Surface Installations			
Number	Type	Topsides Weight (Te)	Jacket Weight (Te)
0	N/A	N/A	N/A
Subsea Installations		Number of Wells	
Number	Type	Platform	Subsea
1	Production Manifold	N/A	6
Drill Cuttings pile(s)		Distance to median	Distance from nearest UK coastline
Number of Piles	Total Estimated volume (m ³)	km	km
1	1508	4.7	197 (Shetland Islands)

Table 1.2: Installations Section 29 Notice Holders Summary		
S29 Notice Holder	Registration Number	Equity Interest
Shell U.K. Limited	00140141	49.74%
Esso Exploration and Production UK Limited	00207426	49.37%
Fujairah Oil and Gas UK LLC	FC009587 (UK establishments: BR000914 and BR001797)	0.89%

1.4.2 Pipelines

Table 1.3: Pipelines being Decommissioned	
Number of Pipelines (see Table 2.3 for full details)	15
Pipelines	8
Umbilicals	7



Table 1.4: Pipelines Section 29 Notice Holders Summary		
S29 Notice Holder	Registration Number	Equity Interest
Shell U.K. Limited	00140141	49.74%
Esso Exploration and Production UK Limited	00207426	49.37%
Fujairah Oil and Gas UK LLC	FC009587 (UK establishments: BR000914 and BR001797)	0.89%

1.4.3 Summary of Recommendations

The installation (production manifold) and the wellhead structures will be fully removed during decommissioning, in line with the requirements of OSPAR Decision 98/3. The proposals for decommissioning pipelines and umbilicals, meanwhile, have been prepared in line with the OPRED Guidance Notes following comparative assessment of credible options and are as follows:

- The trenched and/or buried section of the pipelines will be decommissioned *in situ*. Applies to the production pipelines (PL1488 & PL1489) and umbilical (PLU1490). The end of the pipelines will be cut where they leave existing rock berms and an anticipated overall 30Te of rock cover (expected 10Te per pipeline / umbilical end) will be added to cut ends to reduce snagging risk. The trenched end of the umbilical at the Kingfisher Manifold will either be lowered by fluidising the soil or the surrounding soil will be excavated, and the cut made at a point where 0.6m depth of cover has been achieved and remediated with rock cover, as required (included within above estimate of 30Te total). Shell will aim to limit the volume of additional rock cover, as far as practicable.
- All surface laid sections of pipelines and umbilical will be removed and returned to shore for recycling or disposal. Applies to the production pipelines (PL1488 & PL1489), production jumpers (PL1497, PL1498, PL1499, PL1500, PL1501 & PL1502), umbilical (PLU1490) and umbilical jumpers (PLU1491, PLU1492, PLU1493, PLU1494, PLU1495 & PLU1496). All pipeline protection items (mattresses and grout bags) associated with these sections will be removed and returned to shore for recycling or disposal.

Table 1-5 below provides a summary of the Kingfisher pipelines and recommendations for decommissioning. Note that Decommissioning Programmes Part 1 refer only to the sections of pipeline outside the Brae Bravo 500m zone



Table 1.5: Pipeline Summary Table

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
Production Pipeline P1 Note – KP0 is the base of the caisson riser at Brae Bravo	PL1488	Brae Bravo 500m safety zone boundary ~KP 0.7	Start of rock berm protecting the trench transition ~KP 8.8	~8000	Decommission in situ (CA Group 6)	Trenched and buried with the exception of the crossing The Heimdal / PMS cable crossing (~KP 4.8) and the transitions from the trench to either side of the crossing are protected by mattresses and rock cover 37 areas of spot rock along length for upheaval buckling prevention Approximately 5 mattresses buried at the Heimdal crossing	Crosses the Heimdal Pipeline and PMS Cable at ~KP 4.8
		Start of rock berm protecting the trench transition ~KP 8.8	End of rock berm protecting the trench transition ~KP 8.85	~50	Decommission in situ (CA Group 5)	Rock covered	None



Table 1.5: Pipeline Summary Table

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
		End of rock berm protecting the trench transition ~KP 8.85	Tie-in flange to Kingfisher Production Manifold (disconnected) ~KP 8.9	~75	Full removal (CA Group 2)	Surface-laid with 14 concrete mattresses (of which 7 matts are shared with PL1489)	None
Production Pipeline P2 Note – KP0 is the base of the caisson riser at Brae Bravo	PL1489	Brae Bravo 500m safety zone boundary ~KP 0.7	Start of rock berm protecting the trench transition ~KP 8.8	~8000	Decommission in situ (CA Group 6)	Trenched and buried with the exception of the crossing The Heimdal / PMS cable crossing (~KP 4.8) and the transitions from the trench to either side of the crossing are protected by mattresses and rock cover 37 areas of spot rock along length for upheaval buckling prevention Approximately 5 mattresses buried at the Heimdal crossing	Crosses the Heimdal Pipeline and PMS Cable at ~KP 4.8



Table 1.5: Pipeline Summary Table

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
		Start of rock berm protecting the trench transition ~KP 8.8	End of rock berm protecting the trench transition ~KP 8.85	~50	Decommission in situ (CA Group 5)	Rock covered	None
		End of rock berm protecting the trench transition ~KP 8.85	Tie-in flange to Kingfisher Production Manifold (disconnected) ~KP 8.9	~80	Full removal (CA Group 2)	Surface-laid with 16 concrete mattresses (of which 7 matts are shared with PL1488)	None
Manifold Umbilical Note – KP0 is the base of the caisson riser at Brae Bravo	PLU1490	Brae Bravo 500m safety zone boundary ~KP 0.6	Transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6	~8000	Decommission in situ (CA Group 6)	Trenched and buried with the exception of the crossing The Heimdal / PMS cable crossing (~KP 4.8) and the transitions from the trench to either side of the crossing are protected by mattresses and rock cover	Crosses the Heimdal Pipeline and PMS Cable at ~KP 4.8



Table 1.5: Pipeline Summary Table

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
		Start of transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6	End of the transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6	~75	The umbilical will either be cut at seabed level with the end lowered by fluidising the soil, or the surrounding soil excavated with the cut made at a point where 0.6m depth of cover has been achieved. The exact location of the cut will be subject to the selected contractor's methodology (CA Group 7)	Transition from burial to surface	None
		Transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6	Kingfisher Manifold ~KP 8.8	~155	Full removal (CA Group 2)	Surface-laid with 26 concrete mattresses	None
Production Spool	PL1497	Wellhead BP1.1	Kingfisher Manifold	18	Full removal (CA Group 2)	Surface-laid with 2 mattresses (matts are shared with PLU1491)	None

**Table 1.5: Pipeline Summary Table**

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
Production Spool	PL1498	Wellhead BP1.2	Kingfisher Manifold	25	Full removal (CA Group 2)	Surface-laid with 3 mattresses (matts are shared with several other lines)	None
Production Spool	PL1499	Wellhead BP1.3	Kingfisher Manifold	17	Full removal (CA Group 2)	Surface-laid with 2 mattresses (matts are shared with several other lines)	None
Production Spool	PL1500	Wellhead BP2.1	Kingfisher Manifold	29	Full removal (CA Group 2)	Surface-laid with 5 mattresses (matts are shared with several other lines)	None
Production Spool	PL1501	Wellhead HP1	Kingfisher Manifold	145	Full removal (CA Group 2)	Surface-laid with 24 mattresses (matts are shared with several other lines)	None
Production Spool	PL1502	Wellhead HP2	Kingfisher Manifold	30	Full removal (CA Group 2)	Surface-laid with 5 mattresses (matts are shared with several other lines)	None

**Table 1.5: Pipeline Summary Table**

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
Chemical and Control Umbilical Jumper	PLU1491	Wellhead BP1.1	Kingfisher Manifold UTA	36	Full removal (CA Group 2)	Surface-laid with 2 mattresses (matts are shared with PL1497)	None
Chemical and Control Umbilical Jumper	PLU1492	Wellhead BP1.2	Kingfisher Manifold UTA	45	Full removal (CA Group 2)	Surface-laid with 4 mattresses (matts are shared with several other lines)	None
Chemical and Control Umbilical Jumper	PLU1493	Wellhead BP1.3	Kingfisher Manifold UTA	23	Full removal (CA Group 2)	Surface-laid with 3 mattresses (matts are shared with several other lines)	None
Chemical and Control Umbilical Jumper	PLU1494	Wellhead BP2.1	Kingfisher Manifold UTA	40	Full removal (CA Group 2)	Surface-laid with 6 mattresses (matts are shared with several other lines)	None
Chemical and Control Umbilical Jumper	PLU1495	Wellhead HP1	Kingfisher Manifold UTA	155	Full removal (CA Group 2)	Surface-laid with 24 mattresses (matts are shared with several other lines)	None

**Table 1.5: Pipeline Summary Table**

Description	Pipeline Number (per PWA)	From	To	Length of Section (m)	Decommissioning Solution	Protection Status	Crossings
Chemical and Control Umbilical Jumper	PLU1496	Wellhead HP2	Kingfisher Manifold UTA	40	Full removal (CA Group 2)	Surface-laid with 6 mattresses (matts are shared with several other lines)	None



1.4.4 Summary of Proposed Decommissioning Programmes

Table 1.6: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
1. Topsides		
N/A	N/A	N/A
2. Jacket/Floating Facility (FPSO etc.)		
N/A	N/A	N/A
3. Subsea Installations		
Production Manifold	To leave a clear seabed	Piles will be cut at a minimum of 3m below the seabed and the structure will be transported to a land-based facility for dismantlement and reuse / recycling, complete with any piping that they contain.
4. Pipelines, Flowlines & Umbilicals		
10" Production Pipelines PL1488 and PL1489 trenched and buried sections (Scope group 6) to be decommissioned <i>in situ</i> Pipelines have been flushed and contain seawater	The pipeline is sufficiently buried and stable for both the trenched sections and pipeline crossings; Minimal seabed and land disturbance; reduced risk to personnel.	The pipelines will be decommissioned <i>in situ</i> . Existing buried areas with covering to remain, with remediation as required. Crossings to be decommissioned <i>in situ</i> (see Table 1.7 Impact of Decommissioning Proposals, for more information).



Table 1.6: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
<p>Full removal of 10” Production Pipelines PL1488 and PL1489 surface laid sections (Scope group 2). between trench and Production Manifold</p> <p>Pipelines have been flushed and contain seawater</p>	To remove and leave a clear seabed.	Pipelines and associated support/protection to be recovered to shore for re-use / recycling / disposal.
<p>Full removal of 6” Production Jumpers PL1497, PL1498, PL1499, PL1500, PL1501 and PL1502 (Scope group 2)</p> <p>Jumpers have been flushed and contain seawater</p>	To remove and leave a clear seabed.	Pipelines and associated support/protection to be recovered to shore for re-use / recycling / disposal.



Table 1.6: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
<p>Umbilical PLU1490 trenched and/or buried sections (Scope group 6) to be decommissioned <i>in situ</i>.</p> <p>With the exception of cores that have known blockages, the umbilical has been flushed and contains seawater</p>	<p>The umbilical is buried and stable; Minimal seabed and land disturbance; reduced risk to personnel</p>	<p>The umbilical will be decommissioned <i>in situ</i>. Existing buried areas with covering to remain, with remediation as required. Crossing to be decommissioned <i>in situ</i>. (see Table 1.7 Impact of Decommissioning Proposals, for more information).</p>
<p>Full removal of umbilicals PLU1490 surface laid section (Scope group 2) at Kingfisher Production Manifold.</p> <p>With the exception of cores that have known blockages, the umbilical has been flushed and contains seawater</p>	<p>To remove and leave a clear seabed</p>	<p>To be recovered to shore for re-use / recycling / disposal.</p>
<p>Full Removal of umbilical jumpers PLU1491, PLU1492, PLU1493, PLU1494, PLU1495 and PLU1496 (Scope group 2).</p> <p>With the exception of cores that have known blockages, the umbilical jumpers have been flushed and contain seawater</p>	<p>To remove and leave a clear seabed.</p>	<p>To be recovered to shore for re-use / recycling / disposal.</p>
5. Wells		
<p>Well decommissioning in accordance with Oil & Gas UK Well Decommissioning Guidelines (issue 6, June 2018)</p>	<p>Meets HSE and OGA regulatory requirements</p>	<p>The reservoir will be fully and permanently isolated using a combination of semi-submersible drilling rig and Light Well Intervention vessel.</p> <p>Wellheads will be cut a minimum of 3m below seabed level and returned onshore for recycle or disposal.</p>



Table 1.6: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
6. Drill Cuttings		
Decommissioning <i>in situ</i> .	Cuttings pile falls well below the OSPAR 2006/5 thresholds requiring remediation.	Decommissioning <i>in situ</i> to degrade naturally with minimal disturbance, as practicable, during wider Kingfisher decommissioning.
7. Interdependencies		
The minor drill cuttings pile may be impacted by infrastructure removal but has little influence on options.		



1.5 Field Location Including Field Layout and Adjacent Facilities

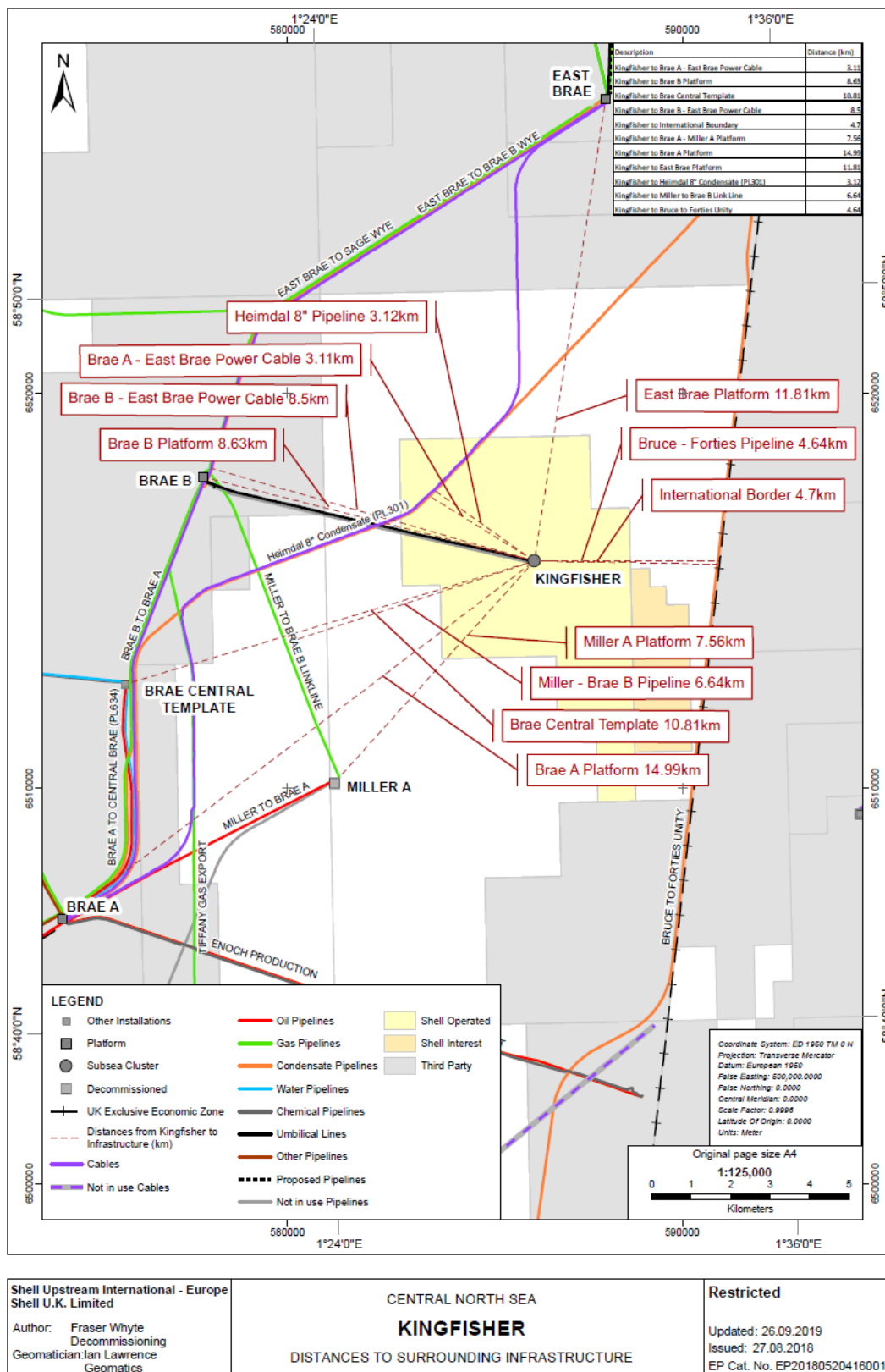


Figure 1.1: Field Location in UKCS

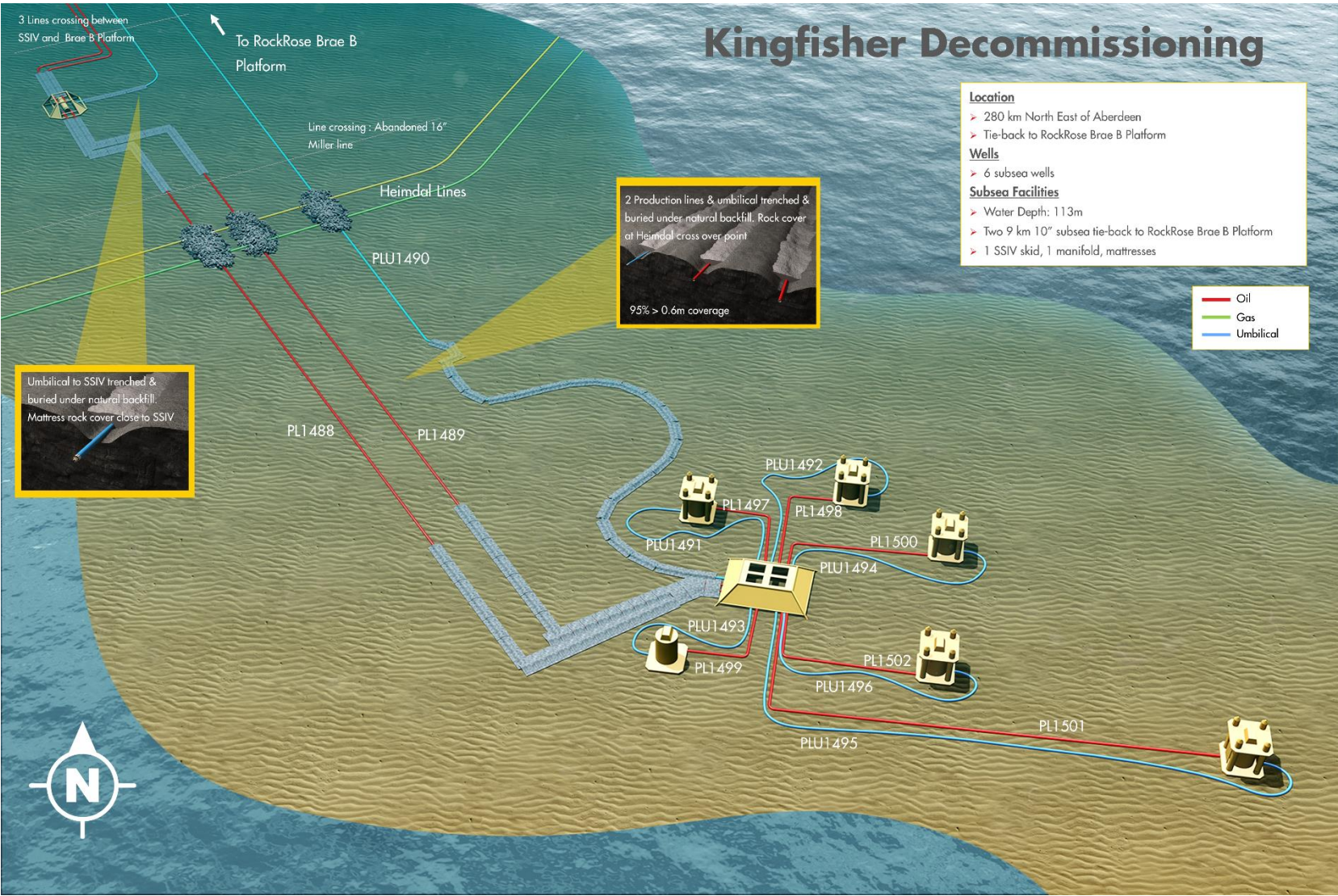


Figure 1.2: Field Layout



Table 1.7: Adjacent Facilities					
Owner	Name	Type	Distance/ Direction	Information	Status
TAQA Bratani Ltd	Brae Bravo	Platform	8.6km / W	Host platform for Kingfisher.	Inactive
TAQA Bratani Ltd	PL360	Gas Transfer	8.6km / W	Brae Bravo Bypass to Brae Alpha 18” Gas Transfer Pipeline.	Active
TAQA Bratani Ltd	PL360A	Gas Transfer	8.6km / W	Brae Bravo SSIV XXV3769 to Brae Bravo. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.445’ N, 01°20.712’ E but outside scope of this DP	Inactive
TAQA Bratani Ltd	PL361	Condensate Export	8.6km / W	Brae Bravo Condensate Wye to Brae Alpha 18” Condensate Export Pipeline.	Active
TAQA Bratani Ltd	PL361A	Condensate Export	8.6km / W	Brae Bravo to Brae Bravo Condensate Wye Condensate Export Pipeline. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.444’ N, 01°20.715’ E but outside scope of this DP	Inactive
TAQA Bratani Ltd	PMS Cable	Power Cable	8.6km / W	Brae Alpha – Brae Bravo Power Cable. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.437’ N, 01°20.740’ E but outside scope of this DP	Active
TAQA Bratani Ltd	PLU4189	Control Umbilical	8.6km / W	Brae Bravo Condensate Export SSIV Control Umbilical. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.429’ N, 01°20.775’ E but outside scope of this DP	Inactive
TAQA Bratani Ltd	PL894	Condensate Pipeline	8.5km / W	East Brae to Brae Bravo Condensate Wye Pipeline. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.420’ N, 01°20.817’ E but outside scope of this DP	Active
BP Exploration Operating Company Limited	PL1971	Gas Interlink	6.6km / SW	Brae to Miller 16” Pipeline. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°47.320’ N, 01°21.253’ E	Inactive



Table 1.7: Adjacent Facilities					
Owner	Name	Type	Distance/ Direction	Information	Status
TAQA Bratani Ltd	PMS Cable	Power Cable	3.1 km / W	Brae Alpha – East Brae Power Cable. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°46.779' N, 01°25.154' E	Active
Equinor Energy AS	PL301	Condensate Export	3.1km / NW	Heimdal to Brae Alpha 8" Pipeline. Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°46.779' N, 01°25.253' E	Active
TAQA Bratani Ltd	PMS Cable	Power Cable	8.6km / W	Brae Bravo to East Brae Power Cable.	Active
TAQA Bratani Ltd	PLU4188	Control Umbilical	8.6km / W	Brae Bravo 18" Gas Transfer SSIV Control Umbilical.	Inactive
TAQA Bratani Ltd	PL895	Gas Transfer	8.6km / W	East Brae 18" to Brae Bravo Bypass Gas Transfer Pipeline	Active
TAQA Bratani Ltd	PL895A	Gas Transfer	8.6km / W	Brae Bravo SSIV XXV3753 to Brae Bravo Gas Transfer Pipeline.	Inactive
TAQA Bratani Ltd	PL4164	Gas Transfer	8.6km / W	SSIV XXV to SSIV XXV3769 Gas Transfer Bypass Pipeline	Active
BP Exploration (Alpha) Limited	Miller	Platform	7.6km / SW	Miller Platform. Decommissioned production platform. Topsides removed	Inactive
TAQA Bratani Ltd	Central Brae	Template	10.8km / SW	Subsea Template for Central Brae Wells.	Active
TAQA Bratani Ltd	East Brae	Platform	11.8km / N	East Brae production platform.	Active
TAQA Bratani Ltd	Brae Alpha	Platform	15.0km / SW	Brae Alpha production platform.	Active
Impacts of Decommissioning Proposals					
<p>The Kingfisher main production pipelines PL1488 and PL1489 along with the control umbilical PLU1490 crosses over the Brae to Miller 16" Pipeline PL1971 (inactive), the live Brae Alpha – East Brae Power Cable and the live Heimdal to Brae Alpha 8" Pipeline PL301. The decommissioning of these crossings will be revisited when the owners of the third-party crossed lines have received approval for their decommissioning proposals from OPRED. At that time, we will discuss and agree appropriate decommissioning with OPRED.</p>					



Pipelines that are within 100m of Kingfisher Pipelines PL1488 and PL1489 are included in Table 1.7 above. Other adjacent facilities and pipelines out with 100m can be seen in Figure 1.1.

1.6 Industrial Implications

We have looked to identify safe, efficient and cost-effective methods and procedures for various aspects of decommissioning the Kingfisher Field.

Contact was initiated, in late 2016, with the supply chain to explore decommissioning execution solutions, including:

- Inviting supply chain companies to present to the decommissioning team on their capabilities;
- Decommissioning & Remediation supply chain/market engagements including:
 - Portfolio presentation at kick-off event held in March 2017;
 - Follow up engagement questionnaires and selective follow up “deep dives”;
- Participation in industry workgroups, events, seminars and conferences;
- Inclusion of trade organisations and enterprise bodies in supply chain consultations;
- Exploring multi-field and potentially multi-operator combined work scopes.

All procurement will be carried out in accordance with the company standards for contract and procurement. This includes the required utilisation of FPAL/Achilles for the identification of potential tenderers, where suitable.



2 Description of Items to be decommissioned

2.1 Kingfisher Field

2.1.1 Kingfisher Field Installations: Surface Facilities

Table 2.1: Surface Facilities Information								
Name	Facility Type*	Location	Topsides/ Facilities		Jacket (if applicable)			
			Weight (Te)	No of modules	Weight (Te)	Number of legs	Number of piles	Weight of piles (Te)
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

2.1.2 Kingfisher Field Installations: Subsea including Stabilisation Features

Table 2.2: Subsea Installations and Stabilisation Features					
Subsea installations including Stabilisation Features	No.	Size / Weight (Te)	Location		Comments / Status
Production Manifold	1	13.5m x 6.5m x 5m / 123.3Te	WGS84 Decimal Degrees	58.771115°N 1.489731°E	Piled - 4 off 610mm dia x 17m.
			WGS84 Decimal Minute	58° 46.267'N 01° 29.384'E	
Kingfisher Wellheads (inc flowbase)	6	3.4m x 4.6m x 6.2m / 18.9 Te (BP1.1 -16/08a-K1)	WGS84 Decimal Degrees	58.771153°N 1.489453°E	Plugged and Lubricated. Primary mechanical barrier verified, SXT with pressure monitoring capability installed as secondary barrier (Nov 19).
			WGS84 Decimal Minute	58° 46.269' N 01° 29.337' E	
		3.4m x 4.6m x 6.2m / 18.9 Te (BP1.2 - 16/08a-K2)	WGS84 Decimal Degrees	58.77131°N 1. 489619°E	Plugged and Lubricated, SXT installed to provide primary barrier to chemical injection line. Refurbished tree cap installed (Nov 19) to provide tree cavity pressure monitoring via ROV.
			WGS84 Decimal Minute	58° 46.280' N 01° 29.377' E	
		3.4m x 4.6m x 6.2m / 18.9 Te	WGS84 Decimal Degrees	58.770981°N 1.489683°E	Did not penetrate reservoir, no well P&A



Table 2.2: Subsea Installations and Stabilisation Features					
Subsea installations including Stabilisation Features	No.	Size / Weight (Te)	Location		Comments / Status
Kingfisher Wellheads (inc flowbase)	6	(BP1.3 - 16/08a-K3)	WGS84 Decimal Minute	58° 46.259' N 01° 29.381' E	required, only wellhead severance and recovery required
		3.4m x 4.6m x 6.2m / 18.9 Te (BP2.1s1 (16/08a-K4Z))	WGS84 Decimal Degrees	58.771342°N 1.489961°E	Plugged and Lubricated. Single verified mechanical barrier, second barrier tested but subsequently operated, now closed but not retested. SXT with pressure monitoring capability installed as additional barrier (Nov 19).
			WGS84 Decimal Minute	58° 46.281' N 01° 29.398' E	
		3.4m x 4.6m x 6.9m / 19.4 Te (HP1 - 16/08a-K6)	WGS84 Decimal Degrees	58.771547°N 1.491767°E	Plugged and Lubricated with two tested barriers. SXT with pressure monitoring capability installed as additional barrier (Nov 19).
			WGS84 Decimal Minute	58° 46.293' N 01° 29.506' E	
		3.4m x 4.6m x 6.9m / 19.4 Te (HP2) - 16/08a-K5)	WGS84 Decimal Degrees	58.771164°N 1. 490219°E	Reservoir section permanently abandoned. No tree
			WGS84 Decimal Minute	58° 46.270' N 01° 29.413' E	
Concrete mattresses	n/a	n/a	n/a	n/a	n/a
Grout bags	n/a	n/a	n/a	n/a	n/a
Formwork	n/a	n/a	n/a	n/a	n/a
FronD Mats	n/a	n/a	n/a	n/a	n/a
Rock Dump	n/a	n/a	n/a	n/a	n/a



2.1.3 Kingfisher Field: Pipelines Including Stabilisation Features

Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Pipelines									
Production Pipeline	PL1488	10	8.3*	Super Duplex steel with 4-layer polypropylene insulation	Reservoir Fluids	From Kingfisher Manifold to Brae Bravo 500m safety zone *	Trenched and buried with rock cover or natural backfill.; some surface laid sections; spools covered by concrete mattresses.	Non-operational	Seawater
Production Pipeline	PL1489	10	8.3**	Super Duplex steel with 4-layer polypropylene insulation	Reservoir Fluids	From Kingfisher Manifold to Brae Bravo 500m safety zone **	Trenched and buried with rock cover or natural backfill.; some surface laid sections; spools covered by concrete mattresses.	Non-operational	Seawater
Production Jumper	PL1497	6	0.017	Super Duplex steel with polyurethane insulation	Reservoir Fluids	From Well BP1.1 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater



Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Production Jumper	PL1498	6	0.021	Super Duplex steel with polyurethane insulation	Reservoir Fluids	From Well BP1.2 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater
Production Jumper	PL1499	6	0.017	Super Duplex steel with polyurethane insulation	Unused	From Well BP1.3 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater
Production Jumper	PL1500	6	0.030	Super Duplex steel with polyurethane insulation	Reservoir Fluids	From Well BP2.1 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater
Production Jumper	PL1501	6	0.136	Super Duplex steel with polyurethane insulation	Unused	From Well HP1 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater
Production Jumper	PL1502	6	0.027	Super Duplex steel with polyurethane insulation	Reservoir Fluids	From Well HP2 to Kingfisher Manifold	Surface laid and covered by concrete mattress.	Non-operational	Seawater



Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Umbilicals									
Manifold Chemical and Control Umbilical	PLU1490	5.23	8.1***	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Brae Bravo 500m safety zone to Kingfisher Manifold UTA ***	Trenched and/or buried with rock cover or natural backfill.; some surface laid sections covered by concrete mattresses.	Non-operational	Seawater, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid
Note the diameter shown for PLU1490 is the as-built external diameter for the full umbilical. Individual core diameters are as follows: 12 x 9.5mm diameter cores; 5 x 12.7mm diameter cores; 3 x 2.5mm signal cables; 3 x 10mm power supply cables									
Chemical and Control Umbilical Jumper	PLU1491	75mm	0.017	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well BP1.1	Surface laid and covered in concrete mattresses	Non-operational	Sea water. Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid



Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Chemical and Control Umbilical Jumper	PLU1492	75mm	0.022	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well BP1.2	Surface laid and covered in concrete mattresses	Non-operational	Seawater, Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid
Chemical and Control Umbilical Jumper	PLU1493	75mm	0.017	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well BP1.3	Surface laid and covered in concrete mattresses	Non-operational	Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid



Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Chemical and Control Umbilical Jumper	PLU1494	75mm	0.030	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well BP2.1	Surface laid and covered in concrete mattresses	Non-operational	Sea water Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid
Chemical and Control Umbilical Jumper	PLU1495	75mm	0.140	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well HP1	Surface laid and covered in concrete mattresses	Non-operational	Sea water Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid



Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (inches)	Approx. Length (km)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Chemical and Control Umbilical Jumper	PLU1496	75mm	0.027	Electro / Hydraulic / Chemical Control Umbilical	Methanol , Mineral Based Hydraulic Fluid	From Kingfisher Manifold UTA to Well HP2	Surface laid and covered in concrete mattresses	Non-operational	Sea water. Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid
<p>* Only this section of PL1488 falls within the scope of this Decommissioning Programme. The OGA PWA Table A to/from points are 'From Kingfisher Manifold to Brae Bravo topsides'. A separate Decommissioning Programme will be submitted at a later date covering the remainder of the pipeline</p> <p>** Only this section of PL1489 falls within the scope of this Decommissioning Programme. The OGA PWA Table A to/from points are 'From Kingfisher Manifold to Brae Bravo topsides'. A separate Decommissioning Programme will be submitted at a later date covering the remainder of the pipeline</p> <p>*** Only this section of PLU1490 falls within the scope of this Decommissioning Programme. The OGA PWA Table A to/from points are 'from Brae Bravo TUTU to Kingfisher Manifold'. A separate Decommissioning Programme will be submitted at a later date covering the remainder of the umbilical</p>									



Table 2.4: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	Total Number	Weight (Te)	Location(s)	Exposed/Buried/Condition
Concrete mattresses	Approx. 107	5 Te each	Multiple locations throughout the field. See CA for detail [4]	Mainly exposed on seabed surface, some partially or fully buried. Generally good condition.
Grout bags	Approx. 1,744	0.025 Te each	Multiple locations throughout the field. See CA for detail [4]	Mainly exposed on seabed surface, some partially or fully buried. Generally good condition.
Formwork	n/a	n/a	n/a	n/a
Froned Mats	n/a	n/a	n/a	n/a
Rock Cover	n/a	Approx. 7,627Te	Multiple locations throughout the field. See CA for detail [4]	Rock cover to remain <i>in situ</i>

Table 2.5: Subsea Pipeline Structures					
Pipeline Installations/structures	No.	Size/ Weight (Te)	Location		Comments/Status
N/A	N/A	N/A	N/A	N/A	N/A



2.1.4 Kingfisher Field Wells

Table 2.6: Well Information			
Subsea Wells	Designation	Status	Category of Well
BP1.1 (16/08a-K1)	Gas/Condensate Production	Plugged and Lubricated	SS-3-0-1
BP1.2 (16/08a-K2)	Gas/Condensate Production	Plugged and Lubricated	SS-4-0-1
BP1.3 (16/08a-K3)	Conductor / Surface casing only	Did not penetrate reservoir only wellhead recovery required	SS-0-0-1
BP2.1s1 (16/08a-K4Z)	Gas/Condensate/Oil Production	Plugged and Lubricated	SS-3-0-1
HP1 (16/08a-K6)	Well has never produced	Plugged and Lubricated	SS-3-0-1
HP2 (16/08a-K5)	Gas/Condensate Production	Plugged	SS-3-0-1

NB All Exploration/Appraisal wells have all been previously abandoned

2.1.5 Kingfisher Field Drill Cuttings

Only a single cuttings pile within the definition in OSPAR Recommendation 2006/5 is present in the Kingfisher field (See Section 3.7 for further information).

Table 2.7: Drill Cuttings Pile(s) Information		
Location of Pile Centre (Latitude/Longitude)	Seabed Area (m ²)	Estimated volume of cuttings (m ³)
Centre of visible drill cuttings pile near Kingfisher wells: WGS84: 58° 46.275' N 01° 29.386' E	5027	1508



2.1.6 Kingfisher Field Inventory Estimates

The total inventory of pipeline and installations materials at the Kingfisher field is 2620 tonnes; 277 tonnes of this total relates to installations and 2343 tonnes of this total relates to pipelines, umbilicals, spool pieces and pipeline support structures.

The tables and pie charts which follow present estimates for the Kingfisher inventory. Refer to Section 8 of the Environmental Appraisal [5] for further details of the waste inventory.

Table 2.8: Kingfisher Material Inventory		
Material	Weight (Te)	% of total
Installations		
Carbon Steel	136	49%
Stainless Steel	140	50%
Non-Ferrous Metal	1	<1%
Concrete	0	0%
Plastics	0	0%
Haz Mat/NORM	0	0%
Other Non-Hazardous	0	0%
Installations Total	277	100%
Pipelines		
Carbon Steel	121	5%
Stainless Steel	1493	64%
Non-Ferrous Metal	9	<1%
Concrete	622	27%
Plastics	98	4%
Haz Mat/NORM	0	0%
Other Non-Hazardous	0	0%
Pipelines Total	2343	100%

Note that figures are rounded and may not sum to exactly 100%.

Material inventory excludes rock cover

Details of wastes are given in Section 3.8 of this Decommissioning Programme.

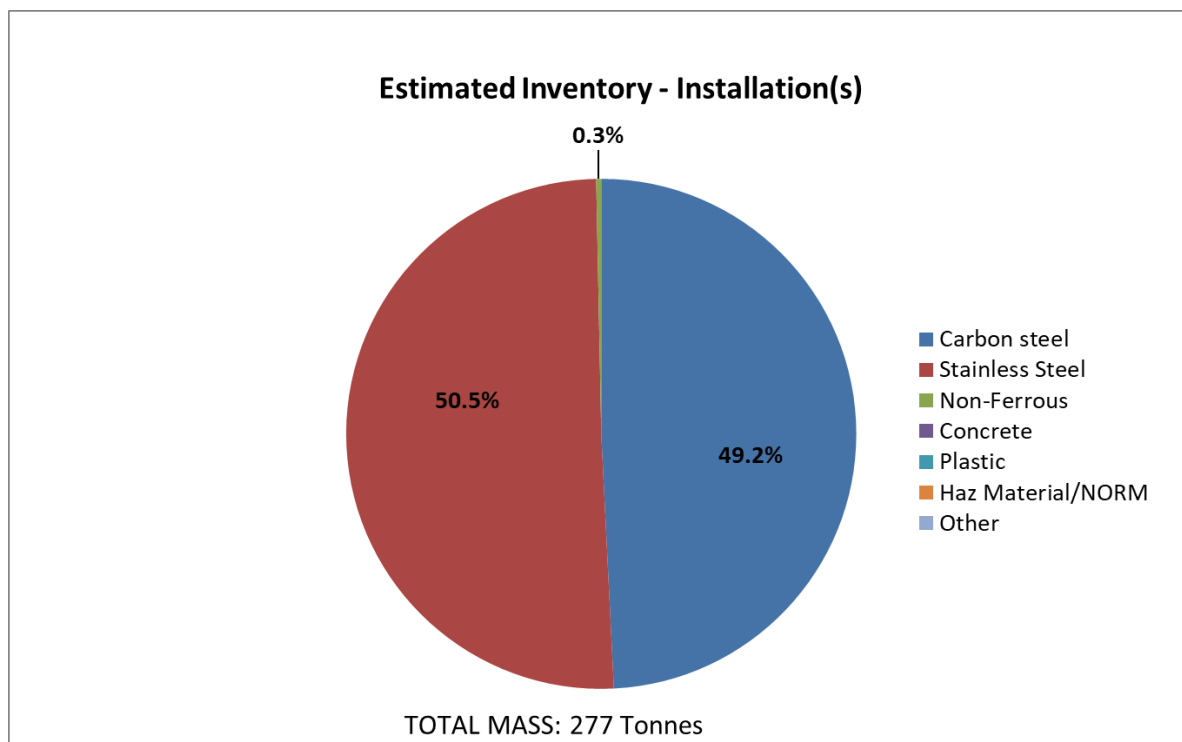


Figure 2.1: Estimated Inventories (Installations)

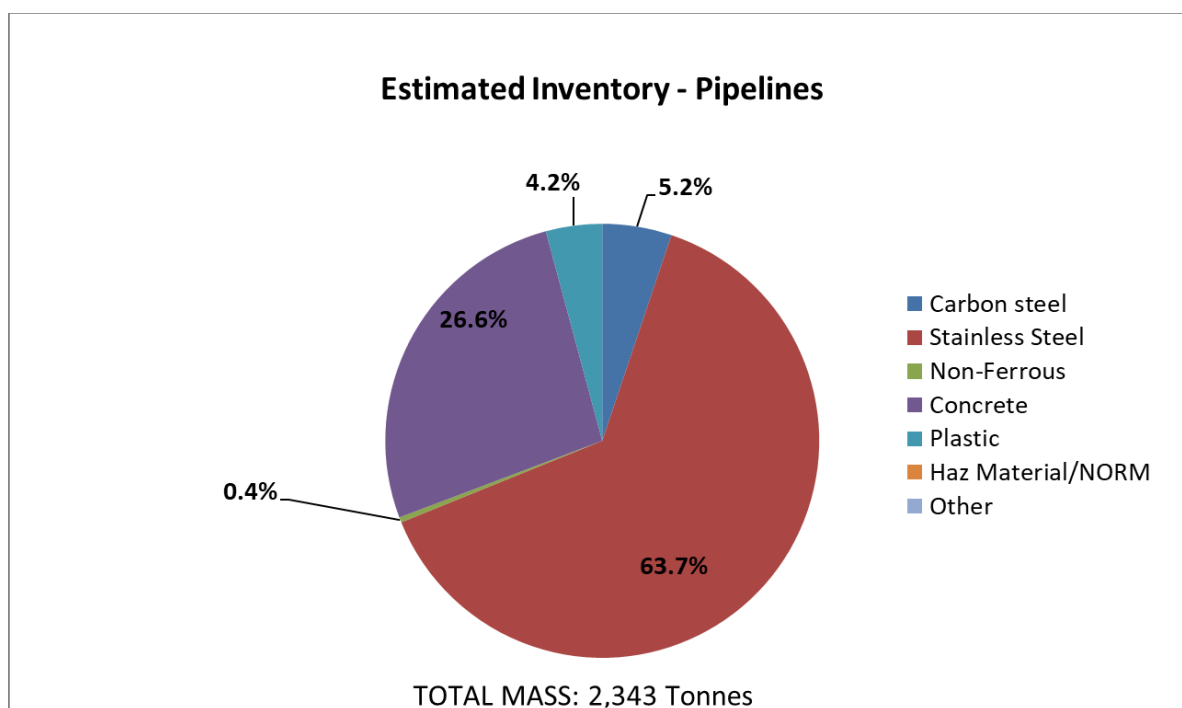


Figure 2.2: Estimated Inventories (Pipelines) (excluding rock cover)



3 REMOVAL AND DISPOSAL METHODS

The Kingfisher decommissioning project will implement Shell's HSSE & SP Control Framework, supporting a waste management hierarchy that optimises the re-use and recycling of waste and aims to minimise waste disposal in accordance with the EU Waste Framework Directive. The risks associated with waste will be assessed before removal to shore and opportunities to re-use the waste for the same or other purposes or, failing that, to recycle or recover materials will be identified. Waste will be characterised, classified, segregated, stored and transported according to appropriate regulatory requirements.

When removed from the seabed, the equipment will be transported to a decommissioning contractor's onshore yard, where different types of material will be segregated with a view to optimising re-use and recycling.

The decommissioning contractor for the subsea installations and pipelines may look for opportunities to re-use equipment or component parts, either as spares or for them to be refurbished through their normal channels. It is anticipated there may be limited commercial interest given the age of the asset.

The decommissioning contractor's established arrangements with recycling companies will facilitate optimisation of the quantity of materials that can be sent for recycling. A project Waste Management Plan (WMP) will be implemented that tracks waste materials through to the recycling endpoint. It is expected that more than 97% of recovered materials from the Kingfisher development will be re-used or recycled.

Materials for which no re-use or recycling options are available will be tracked through to disposal in landfill.

3.1 Topsides

There are no topsides associated with the Kingfisher Decommissioning Programmes.

Table 3.1: Topsides Removal Methods

1) HLV (semi-submersible crane vessel) ☐ 2) Monohull crane vessel ☐ 3) SLV ☐ 4) Piece small ☐
5) Other ☐

Method	Description
N/A	N/A



3.2 Jacket

There are no jackets associated with the Kingfisher Decommissioning Programmes.

Table 3.2: Jacket Decommissioning Methods

1) HLV (semi-submersible crane vessel) <input type="checkbox"/>		2) Monohull crane vessel <input type="checkbox"/>	
3) SLV <input type="checkbox"/>		4) Piece small <input type="checkbox"/>	
		5) Other – <input type="checkbox"/>	
Method	Description		
N/A	N/A		

3.3 Subsea Installations and Stabilisation Features

Table 3.3: Subsea Installations and Stabilisation Features

Subsea installations and stabilisation features	Number	Option	Disposal Route (if applicable)
Production Manifold	1	Full recovery	Return to shore for recycling
Wellheads	6	Full recovery	Return to shore for recycling
Concrete mattresses	n/a		
Grout bags	n/a		
Formwork	n/a		
Froned Mats	n/a		
Rock Dump	n/a		



3.4 Pipelines

A comparative assessment review of the pipeline decommissioning options was performed in accordance with the OPRED Guidance Notes, OGUK Guidelines on Comparative Assessment and Shell U.K. Guidance. At this review, the following options for decommissioning were considered (see also Table 2.3 for more information on current status):

***Key to Options:**

- | | | |
|-----------------------|-----------------------|-------------------------|
| 1) Total Removal | 2) Partial Removal | 3) Trench and bury |
| 4) Blanket Rock Cover | 5) Partial Rock Cover | 6) Decommission in situ |

Table 3.4: Pipeline or Pipeline Groups Decommissioning Options

Pipeline / group (as per PWA)	Condition of line/group	Whole or part of pipeline/group	Decommissioning options considered
2– Surface-laid lines Outside Brae Bravo 500m Zone PL1488, PL1489, PLU1490, PLU1491, PLU1492, PLU1493, PLU1494, PLU1495, PLU1496PL1497, PL1498, PL1499, PL1500, PL1501, PL1502	Surface-laid, partially mattress protected	Part	1, 4, 6
5 – Pipeline ends at manifold PL1488, PL1489	Rock-covered transitions from trench	Part	1, 4, 6
6 – Trenched and buried sections PL1488, PL1489, PLU1490	Trenched and buried	Part	1, 6
7 – Umbilical end at manifold PLU1490	Mattress protected area as umbilical exits trench	Part	1, 4, 6

The groups referenced in Table 3.4 can be seen as a simplified schematic in Figure 3.1.

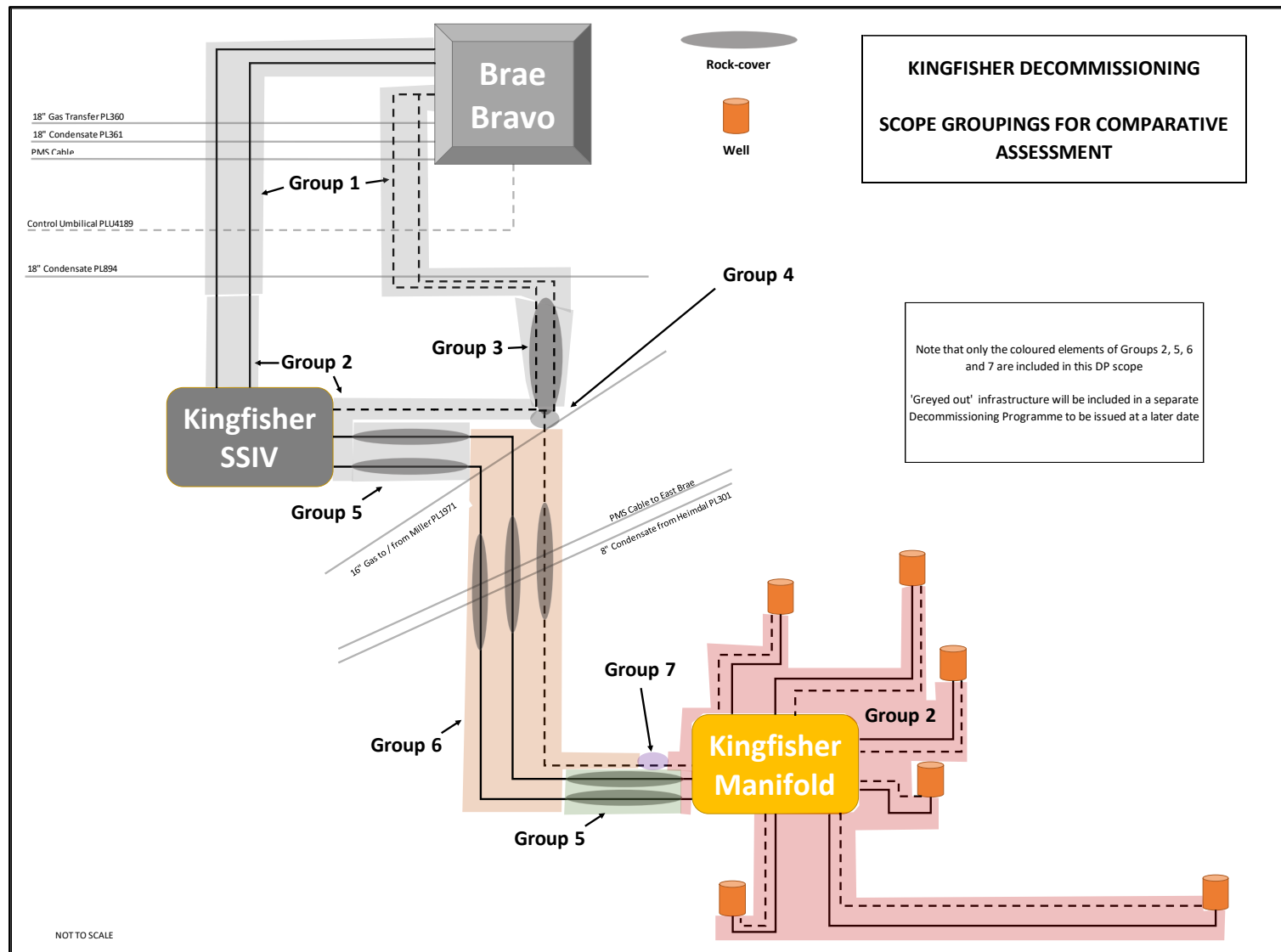


Figure 3.1: Comparative Assessment Groupings Schematic



Comparative Assessment Method:

Decommissioning options were assessed in line with the requirements of the OPRED Guidance Notes [2] and largely adopted the guidance provided in Appendix A of the Oil & Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes, Issue 1, as required. Application of the OPRED and OGUK Guidelines for Shell decommissioning projects, including adaptations of the assessment criteria, is detailed in the Shell CA Procedure [6].

Screening workshops were held to ensure the required information was available for the CA and that relevant studies were available. A CA workshop was held with relevant external stakeholders and consultants to ensure a robust assessment was completed.

The assessments were arranged by unique geographical and technical conditions. Options were scored according to pre-agreed qualitative and quantitative scales provided in the CA Procedure [6].

Outcome of Comparative Assessment:

The results of the CA workshop have been issued to stakeholders, with feedback sought prior to the final recommendations being issued as the Comparative Assessment Report in support of this document.

**Table 3.5: Outcomes of Comparative Assessment**

Pipeline or Group	Recommended Option	Justification
2– Surface-laid lines Outside Brae Bravo 500m Zone PL1488, PL1489, PLU1490; PLU1491, PLU1492, PLU1493, PLU1494, PLU1495, PLU1496; PL1497, PL1498, PL1499, PL1500, PL1501, PL1502.	Full removal (Option 1)	The CA concluded that this option has the lowest legacy risk to other users of the sea and the most acceptable for the legacy environmental impact
5 – Pipeline ends at manifold PL1488, PL1489	Decommission <i>in situ</i> (Option 6)	The CA concluded that decommissioning <i>in situ</i> achieves a clear seabed whilst minimising the environmental impact from additional rock, both in the short- and long-term.
6 – Trenched and buried sections PL1488, PL1489, PLU1490 (includes PL1488, PL1489 and PLU1490 crossings of PL301 and PMS Cable, reference Table 1.7)	Decommission <i>in situ</i> (Option 6)	The CA concluded that decommissioning the pipelines <i>in situ</i> achieves a clear seabed, thereby minimising risk to other users of the sea, whilst achieving the lowest safety risk to project personnel and reducing short-term environmental impact. (see Table 1.7 <i>Impact of Decommissioning Proposals, for more information on the pipelines crossings</i>)
7 – Umbilical end at manifold PLU1490	Either be cut at seabed level with the end lowered by fluidising the soil, or the surrounding soil excavated with the cut made at a point where 0.6m depth of cover has been achieved (Option 2 or 3). A small amount of rock to be installed over the end to seabed level. Any section of umbilical not buried to a depth-of-cover of at least 0.6m to be recovered to shore for recycling and disposal Exposed concrete mattresses associated with this section (approx. 5) will be recovered to shore for recycling / disposal	The CA concluded that this option has the lowest legacy risk to other users of the sea and the most acceptable for the legacy environmental impact



3.5 Pipeline Stabilisation Feature(s)

Table 3.6: Pipeline Stabilisation Features

Stabilisation feature(s)	Number	Option	Disposal Route (if applicable)
Exposed concrete mattresses	Approx. 97	Full recovery	To shore for recycling ^[1]
Buried concrete mattresses	Approx. 10 ^[4]	Leave in situ	n/a
Exposed grout bags	Approx. 1719 ^[2]	Full recovery	To shore for recycling
Buried grout bags	Approx. 25 ^[2,4]	Leave in situ	n/a
Rock cover (Te)	Approx. 7627 Te ^[3]	Leave in situ	n/a

Notes

1. In the event of practical difficulties (e.g. poor integrity or fully covered with rock), OPRED will be consulted.
2. The number of grout bags (both exposed and covered) is estimated.
3. This is the existing rock that is estimated as being present at time of CoP.
4. Mattresses and grout bags used at pipeline crossings for PL1488, PL1489 and PLU1490 (e.g. for protection of other pipelines, support or stability purposes). Installed under pipelines and/or covered under rock.

3.6 Wells

Table 3.7: Well Plug and Abandonment

The wells, as listed in Section 2.1.4 (Table 2.6), are in the process of being decommissioned in accordance with Oil and Gas UK (OGUK) Guidelines for the suspension and abandonment of wells. A PON5/PETS/MCAA Application will be submitted in support of any such work to be carried out.

3.7 Drill Cuttings

Cuttings with Oil Based Muds (OBM) from Kingfisher BP1.1, BP1.2, BP2.1, HP1 and HP2 that were generated when drilling the 16", 12.25" and 8.5" sections in 1997 were discharged to sea, as was permitted under the regulations at the time. No OBM was used during the drilling of Kingfisher BP1.3 as drilling was suspended at the 20" casing shoe.

Samples from the cuttings pile were taken in June 2017 as part of the Pre-decommissioning Survey scope and analysed (Fugro, 2018¹).

¹ Fugro Ltd. 2018, Environmental Monitoring Report, Kingfisher Pre-Decommissioning Survey (UKCS Blocks 16/8a and 16/8c), Shell UK Ltd.



The Stage 1 assessment requirements set out within OSPAR Recommendation 2006/5 requires all drill cuttings piles in the North Sea to be evaluated against the following threshold criteria:

- Rate of oil loss to water column: 10 tonnes per year
- Persistence as a reflection of the area of seabed where oil concentrations remain above 50 ppm and the length of time that the contamination level is expected to remain: 500 km²yr

The rate of oil loss from the Kingfisher drill cuttings pile has been calculated as 1.16 tonnes per year, which is significantly below the above listed OSPAR threshold of 10 tonnes per year.

Exceedances of the 50 ppm threshold have been observed in three of the six core samples taken from within the drill cuttings pile. Observed exceedances were not uniformly distributed across the drill cuttings pile and were seen at varying depths. Notwithstanding this, based on a linear progression an estimated worst-case distance of 215 m from the wells for THC concentrations exceeding the 50 ppm threshold was calculated. Using the (UKOOA, 2005) conversion factor, a persistence of drill cuttings contamination has been calculated at a maximum of 10.3 km²yr. This is significantly below the above listed OSPAR threshold of 500 km²yr.

Samples from within the drill cuttings pile returned concentrations of certain metals, including Mercury (Hg), Lead (Pb) and Zinc (Zn) above the OSPAR Effects Range Low (ERL) thresholds (OSPAR, 2014). Measured levels of Iron (Fe) and Nickel (Ni) within the drill cuttings pile cores were consistently above the CNS background mean. Levels of Fe in four of the five sample cores exceeded the CNS background 95th percentile.

Table 3.8: Drill Cuttings Decommissioning Options

How many drill cuttings piles are present?	1
Tick options examined: <input type="checkbox"/> Remove and re-inject <input checked="" type="checkbox"/> Leave in place <input type="checkbox"/> Cover <input type="checkbox"/> Relocate on seabed <input type="checkbox"/> Remove and treat onshore <input type="checkbox"/> Remove and treat offshore <input type="checkbox"/> Other	
Review of Pile characteristics	Pile
How has the cuttings pile been screened? Actual samples taken?	Yes
Dates of sampling	June 2017
Sampling included in pre-decommissioning survey?	Yes
Does it fall below both OSPAR thresholds?	Yes
Will the drill cuttings pile have to be displaced in order to remove the jacket?	N/A
What quantity (m ³) would have to be displaced/removed?	N/A
Will the drill cuttings pile have to be displaced in order to remove any pipelines?	Partially as the removal of the following pipelines will cause the drill cuttings to be disturbed: PL1497, PL1498, PL1499, PL1500, PL1501, PL1502, PLU1491, PLU1492,



	PLU1493, PLU1494, PLU1495, PLU1496 and the partial removal of PL1488, PL1489 and PLU1490
What quantity (m ³) would have to be displaced/removed?	1096
Have you carried out a Comparative Assessment of options for the Cuttings Pile?	No



3.8 Waste Streams

Table 3.9: Waste Stream Management Methods	
Waste Stream	Removal and Disposal Method
Bulk Liquids	The Kingfisher system has been flushed and is free of bulk liquid waste.
Marine growth	Marine growth that remains attached to the subsea equipment after load-in to the onshore dismantling site will be removed. It will be disposed of in accordance with the regulations in force at the site following the site operator's licences and procedures (e.g. decommissioning yards Waste Management Plan)
NORM/LSA Scale	No NORM was reported during operation of the Kingfisher Field, during the well P&L campaign or in the main pipeline (PL1488 & PL1489) tie-in spools recovered following the flushing scope. One isolated instance of NORM has been identified in the tree recovered from Kingfisher Well BP1.2. Whilst NORM is not expected to be found in the remaining infrastructure, all recovered material will be monitored for NORM contamination and, if encountered, managed in accordance with the Radioactive Substance Act 1993 and Environmental Authorisations (Scotland) Regulations 2018.
Asbestos	There is no asbestos within the Kingfisher subsea infrastructure or pipelines.
Other hazardous wastes	No other hazardous wastes were identified within the Kingfisher Inventory of Materials.
Onshore Dismantling sites	<p>Selection of an onshore dismantling site will be made on the basis of a commercial process, taking account of HSSE&SP criteria.</p> <p>Screening, followed by site audits, will be performed and Shell U.K. will only consider sites that are licenced to receive the types and quantities of materials identified in the Materials Inventory. Candidate sites must demonstrate the capability to manage waste streams and disposal throughout the deconstruction process. The dismantling site operator will have established arrangements with facilities that recycle steel, copper, aluminium and other materials.</p>

The Waste Management Strategy for the Kingfisher decommissioning project is based on the waste hierarchy (avoid, re-use, recycle, recover energy, dispose) underpinned by the commitment to comply with legal requirements.

The material to be removed during decommissioning activities is shown in Table 3.10.



Table 3.10: Inventory Disposition			
	Total Inventory Tonnage	Planned tonnage to shore	Planned left <i>in situ</i>
Installations			
Carbon Steel	136	121	15
Stainless Steel	140	140	0
Non-Ferrous Metal	1	1	0
Concrete	0	0	0
Plastics	0	0	0
Haz Mat/NORM	0	0	0
Other Non-Hazardous	0	0	0
Installations Total	277	262	15
Pipelines			
Carbon Steel	121	2	119
Stainless Steel	1493	35	1458
Non-Ferrous Metal	9	0	9
Concrete	622	571	51
Plastics	98	5	93
Haz Mat/NORM	0	0	0
Other Non-Hazardous	0	0	0
Pipelines Total	2343	614	1730

Note that numbers are rounded to the nearest whole and therefore the totals do not always align
Inventory tonnes excludes rock cover.

Of the total of materials in this Kingfisher Decommissioning Programme workscope, it can be seen that approximately 33% of the inventory tonnage is planned to be recovered. The remaining 67% of the inventory tonnage is proposed to be decommissioned in situ.

In addition to the above, approximately 25Te (wet) of marine growth is expected to be recovered. Most of this weight represents water. Some marine growth will dry out in transit and onshore, so a much smaller dry weight of biological waste will require disposal. It is likely that the marine growth will be disposed of by land-farming or to landfill.

Excluding the marine growth, the Waste Management Plan suggests that more than 97% of the wastes and materials arising from the decommissioning works and recovered to shore are reusable and/or recyclable.



4 ENVIRONMENTAL APPRAISAL OVERVIEW

4.1 Environmental Sensitivities (Summary)

Table 4.1: Environmental Sensitivities	
Environmental Receptor	Main Features
Conservation interests	<p>The Kingfisher field is not located within or in proximity to any designated sites. The closest designated site is the Braemar Pockmarks Special Area of Conservation (SAC) including the Annex I habitat '<i>Submarine Structures made by leaking gases</i>' located approximately 22 km to the north of the Kingfisher manifold. These structures provide a very specific reef habitat which support chemosynthetic organisms, rarely seen elsewhere within the OSPAR North East Atlantic region. Pockmarks have been observed out with the designated boundary, however no evidence of pockmarks in the seabed around the Kingfisher infrastructure has been documented during pre-decommissioning environmental survey (Fugro, 2018 – note this report refers to the pre-decommissioning survey performed in 2017).</p> <p>Mobile species of conservation importance likely to be present in the area around the Kingfisher infrastructure include the Harbour Porpoise <i>Phocoena phocoena</i> protected under Annex II of the Habitats Directive. A number of other marine mammal species, protected under Annex IV of the same directive, may also be present.</p> <p>Observations of individual seapens <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> during pre-decommissioning environmental survey (Fugro, 2018) indicate the potential for the presence of the OSPAR listed threatened and or declining habitat 'seapens and burrowing mega fauna communities'. Individuals of the Scottish Priority Marine Feature (PMF) bivalve, the Ocean quahog <i>Arctica islandica</i> were also observed as present in some samples.</p>
Seabed	<p>Seabed sediments around the Kingfisher infrastructure are of fine or very fine sand. A drill cuttings pile of approximately 1500m³ exists around the wellheads and the manifold structure. Mean particle size within the drill cuttings is generally lower than in the surrounding sediments.</p> <p>Elevated levels of some contaminant parameters exist in and immediately surrounding the drill cuttings. OSPAR Stage 1 assessment of the drill cuttings pile indicates these contaminated sediments are currently stable with calculated leaching and persistence rates well below the thresholds set out within OSPAR</p>



Table 4.1: Environmental Sensitivities

Environmental Receptor	Main Features
	<p>2006/5. Chemical analysis of samples taken out with the drill cuttings area during the pre-decommissioning environmental survey (Fugro, 2018) were observed to share a common underlying hydrocarbon distribution typical of low level, weathered petroleum residues commonly found in North Sea sediments.</p> <p>The seabed in the area around the Kingfisher infrastructure is dominated by the circalittoral muddy sand biotope (EUNIS classification A5.26) with some areas of the circalittoral mixed sediment biotope (A5.44). Polychaete worms including <i>Paraphinome jefferysii</i> were ranked as the most abundant taxa. Most frequently observed mobile species included sea urchins (<i>Brissindin</i>, <i>graclechinus acutus</i>, <i>Spatangus perpureus</i>), brittle stars, sea lilies, hermit crabs, spider crabs and gastropods.</p> <p>In areas where circalittoral mixed sediments have been observed, the variable nature of the seabed supports a wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as <i>Cerianthus lloydii</i>.</p>
Fish	<p>The Kingfisher infrastructure lies within or in close proximity to known spawning areas for Blue Whiting <i>Micromesistius poutassou</i> (January to April); Cod <i>Gadus morhua</i> (January to April), Haddock <i>Melanogrammus aeglefinus</i> (February to May); Norway Pout <i>Trisopterus esmarkii</i> (January to April); Saithe <i>Pollachinus spp.</i> (January to April); Sandeels <i>Ammodytidae spp.</i> (November to February); Norway lobster <i>Nephrops norvegicus</i> (All year); Herring and mackerel <i>Scomber scombrus</i> (May to September). The area is also used as nursery grounds for those listed above as well as Whiting <i>Merlangius merlangus</i>, Ling <i>Molva molva</i>, Hake and Angler fish <i>Lophius piscatorius</i>.</p> <p>In addition, occasional records are also available indicating the potential presence a number of elasmobranch species including species identified as Priority Marine Features (PMF) under the Marine (Scotland) Act, 2010. These include basking shark <i>Cetorhinus maximus</i> and porbeagle <i>Lamna nasus</i> as well as tope <i>Galeorhinus galeus</i> and the Spiny dogfish <i>Squalus acanthias</i>. There are also historic records of sandy ray <i>Leucoraja circularis</i> common skate <i>Raja batis</i> in the area around the Kingfisher infrastructure in low densities</p>
Fisheries	<p>The Kingfisher infrastructure is located within ICES rectangle 46F1. Total fishing effort in 46F1 for 2017 comprised 239 days. The total effort for all ICES rectangles in UK waters in 2017 was recorded at 131,871 days, with some ICES rectangles recording over 1,000 days. As such rectangle 46F1 represents 0.18% of the total UK fishing effort and can be considered low.</p>

**Table 4.1: Environmental Sensitivities**

Environmental Receptor	Main Features
	Landings in 2017 were dominated by demersal species (833 tonnes) with some shellfish (57 tonnes).
Marine Mammals	<p>Whilst a wide range of marine mammal species have been recorded in the waters around the British Isles only a small number are regularly recorded in the area around the Kingfisher infrastructure, including Harbour Porpoise <i>Phocoena phocoena</i>, White-beaked dolphin <i>Lagenorhynchus albirostris</i> and Minke whale <i>Balenoptera acutorostrata</i>. Harbour porpoise are listed under Annex II of the EU Habitats Directive and all three species are listed as Scottish PMFs.</p> <p>The potential presence of cetaceans in the area of the Kingfisher infrastructure is considered to be of medium sensitivity to disturbance particularly from underwater noise generation and propagation. Sensitivity will also be seasonal depending on the individual species. Under most circumstances it is anticipated that individual cetacean species have a certain capacity to adapt to disturbance including through avoidance behaviour moving further from the disturbance source, whilst still remaining within alternative suitable habitat.</p>
Birds	<p>The North Sea and its coastal areas support international important numbers of seabirds. Seabirds are present in the area around the Kingfisher infrastructure throughout the year, although in low numbers for the majority of species as the area is at some distance from their breeding colonies. Aggregated density of all seabirds is expected to be lowest in the area in late spring/summer when many birds are nesting and therefore are in close proximity to coastal colonies.</p> <p>Seabirds anticipated to be present in the Kingfisher area include: Northern Fulmar <i>Fulmarus glacialis</i> (All year); Northern Gannet <i>Morus bassanus</i> (All year); European Storm Petrel <i>Hydrobates pelagicus</i> (June to October); Pomerine skua <i>Stercorarius pomarinus</i> (March to June); Arctic skua <i>Stercorarius parasiticus</i> (May to August); Great skua <i>Stercorarius skua</i> (May to August); Black-legged kittiwake <i>Rissa tridactyla</i> (All year); Greater black-backed gull <i>Larus marinus</i> (Sept to March); Common gull <i>Larus canus</i> (July to February); Herring gull <i>Larus argentatus</i> (July to April); Guillemot <i>Uria aalge</i> (All year); Little auk <i>Alle alle</i> (November to February); and Atlantic Puffin <i>Fratercula arctica</i> (April to September). Of these species, the European storm petrel, and guillemot are both afforded protection under the EC Birds Directive (2009/147/EC).</p>
Onshore Communities	The location of the decommissioning contractor's onshore yard is not yet known.
Other Users of the Sea	Shipping activity in the area around the Kingfisher infrastructure is classified as low. An average weekly density of non-port service vessels is recorded in the adjacent block 16/7 which coincides with the location of TAQA Bratani Limited's Brae Alpha and Bravo

**Table 4.1: Environmental Sensitivities**

Environmental Receptor	Main Features
Other Users of the Sea	<p>platforms. This is consistent with rig supply vessel activity which would be expected. A preferred North Sea cargo vessel transit route is evident passing on an east-west orientation approximately 40 km to the south.</p> <p>The Kingfisher infrastructure forms part of an integrated and extensively developed oil and gas infrastructure network in this part of the CNS. The Kingfisher infrastructure itself ties back to TAQA Bratani Limited's Brae Bravo platform approximately 9 km to the west of the Kingfisher manifold. TAQA Bratani Limited's Brae Alpha platform is located approximate 15 km south west, with BPs Miller platform (currently being decommissioned) approximately 7.5 km south west of the Kingfisher manifold. TAQA Bratani Limited's East Brae platform is located approximately 12 km to the north.</p> <p>There are no records of telecommunication cables, defence activities, offshore windfarm locations, Scheduled Monuments or Historic Marine Protected Areas within the area of the Kingfisher infrastructure. A previously used alignment for a historic telecommunications cable is recorded running parallel to the Heimdal pipeline and crossing the Kingfisher pipeline approximately 4.5 km from the Kingfisher manifold.</p> <p>A single record of a 'wreck' is recorded however further investigation indicates the presence of an abandoned piece of pipeline/dropped object as a result of previous oil and gas activity. This length of 3.5" drill pipe dropped in 1986, reported by Shell but pre-dating the PON2 recording system, will be recovered as part of the post-decommissioning debris survey."</p>
Atmosphere	<p>Air Quality is not routinely monitored at offshore sites, although regional air quality monitoring is carried out in coastal areas. Inshore waters in certain parts of the CNS have shown increased levels of pollutants close to coastal industry but these levels decrease with distance offshore. Oil and Gas platforms are also known to represent point sources of offshore atmospheric pollution. The area around the Kingfisher infrastructure lies in close proximity to a number of oil and gas platforms, including TAQA Bratani Limited's Brae Bravo, Brae Alpha and East Brae platforms, as well as BP's Miller platform. No monitoring data is available.</p>



4.2 Potential Environmental Impacts and their Management

Environmental Impact Assessment Summary

An environmental appraisal (EA) process has been carried out providing systematic consideration of the environmental affects which may be anticipated as a result of Kingfisher decommissioning. The EA has been completed to comply with all relevant legislative, regulatory and policy requirements for environmental assessment, as well as to meet best practice requirements as set out within Shell's Health Safety, Securing Environment and Social Performance (HSSE&SP) Control Framework and specifically the Shell Control Framework Impact Assessment manual.

Environmental characteristics of the Kingfisher area are well understood and have been established through a combination of desk study and site-specific environmental survey. The development of the DPs for Kingfisher has been informed by ongoing consideration of potential environmental interactions and risks during: Comparative Assessment (CA) consideration of options; comprehensive identification of potential impacts associated with the preferred option(s); and further consideration of specific potential interactions through environmental scoping and environmental appraisal, where necessary and appropriate.

The EA confirms that the Kingfisher DPs can be executed with readily implementable controls that will result in minimal impacts to the receiving environment. Whilst the initial Environmental Identification (ENVID) process did not identify any potential activity/environment interactions of high significance, a small number of activity/environment interactions were identified as of potentially minor to moderate significance. These were further investigated and are summarised below.

Potential effects as a result of discharges to air were considered likely to be insignificant, as the emissions will constitute only a minor addition to the overall emissions from routine shipping in the area. All vessels used will be compliant with relevant international air pollution standards and emissions.

No high energy noise source activities such as blasting, piling or deep sediment penetration seismic survey are required, with noise sources limited to underwater cutting activities, limited rock placement activities and associated vessel movements, which will be of relatively short duration.

The two production pipelines (PL1488 and PL1489) have been flushed and cleaned achieving a very low oil in water (OiW) concentration of 3.8mg/l. In addition, Osborne-Adams toxicity calculations have been carried out for the small number of umbilical sections within PLU1490 for which flushing, and cleaning is not possible. These calculations concluded that any volume of residual chemicals lost to sea during umbilical cutting would be limited and not significant. Section 5.1.2 of the Environmental Appraisal Report [5] provides further details of the potential releases

Benthic community biotopes in the area around the Kingfisher infrastructure comprise predominantly 'circalittoral muddy sand' (EUNIS A5.26) supporting often rich in-faunal communities of polychaete worms, echinoderms and including Priority Marine Feature (PMF) burrowing megafauna including seapens and ocean quahog. Seabed disturbance as a result of removal of Kingfisher infrastructure (manifold etc.) and potential smothering of benthic communities as a result of decommissioning activities was considered. Both seapens and ocean quahog are considered to be tolerant of a degree of smothering from suspended sediment. Decommissioning 'in situ' of much of the trenched and buried Kingfisher pipelines also allows disturbance to seabed and the benthic communities they support to be minimised. Any resultant impacts are therefore considered likely to be of low magnitude, affecting receptors with the ability to adapt and recover from any changes which may occur. Seabed disturbance as a result of Kingfisher DP is not considered likely to give rise to significant environmental effects. In addition, a small quantity (approximately 10 tonnes for each of the two pipeline ends and one umbilical end – 30 tonnes in total, plus any requirement for spot rock identified



by the post-decommissioning depth-of-cover survey) of additional rock placement is expected as a result of Kingfisher DP. It is possible that a small number of individuals from benthic species may be lost as a result of rock placement. It is not considered that this would result in any significant effect on the population viability of any individual benthic species, or on the benthic assemblage as a whole.

Disturbance to other sea users, including Commercial fisheries has been considered throughout the EA. In most cases any potential for interaction with other sea users would be as a result of potential impacts from seabed disturbance, discharges to sea, unplanned events etc. as discussed above.

Potential for significant environmental effects as a result of the following interactions were identified and are summarised in Table 4.2: Environmental Impact Management below:

- disturbance to drill cuttings;
- the long-term degradation of plastic coatings on pipelines and umbilicals decommissioned 'in situ';
- cumulative seabed disturbance when considered along with other DP activities in the vicinity, specifically Brae Area DP activities;
- effects associated with unplanned leaks and spills from decommissioning vessels;
- Waste management

Table 4.2: Environmental Impact Management

Activity	Main Impacts	Management of the Impacts
Subsea Installation Removal and Drill Cuttings Disturbance	<p>Discharge to sea:</p> <p>Approximately 1500 m³ of drill cuttings are deposited beneath, immediately adjacent to and in some cases overlying the wellhead and manifold infrastructure and associated jumpers and stabilisation structures. Disturbance of an estimated 73% of these drill cuttings will occur as a result of the removal of Kingfisher infrastructure. This will result in some mobilisation and resuspension of contaminated sediments into the local water column.</p>	<p>Analysis of benthic survey data indicates a relatively high abundance of hydrocarbon tolerant species within the benthic assemblage. Natural bio-remediation processes which will occur as a result of the increased availability of oxygen to contaminants currently present within the drill cuttings, will result in a reduction of hydrocarbon concentration over time. Effects of disturbance of drill cuttings hydrocarbons on surrounding benthos are considered to be of minor significance. No effect on commercial fish stocks, or fishing gear as a result drill cuttings disturbance is expected.</p> <p>Chemical analysis of drill cutting samples also indicates sporadic presence of certain endocrine disrupting chemicals. Disturbance is expected to distribute and dilute these contaminants, so that whilst a larger area may be temporarily affected, the concentrations will be lower and are expected to be below the Class V: Extensive Toxic Effect threshold for background sediment levels set by the Norwegian Pollution Control Authority (2007).</p> <p>A post-decommissioning environmental survey will be undertaken. The survey will focus on any chemical and physical</p>

**Table 4.2: Environmental Impact Management**

Activity	Main Impacts	Management of the Impacts
		<p>disturbances of the decommissioning activities compared with the pre-decommissioning data. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED. After the summary of the survey has been sent to OPRED and reviewed, a post-monitoring survey regime will be agreed.</p> <p>Post -decommissioning overtrawl trials or an alternative clear seabed verification method, to be discussed and agreed with OPRED, will be completed to demonstrate that the as-left condition of the seabed does not present a hazard to fishing, and to confirm a clear seabed.</p>
	<p>Unplanned Events:</p> <p>The potential for loss of vessel fuel from a decommissioning vessel whilst undertaking activities at Kingfisher has been considered. For the purposes of this assessment it has been assumed that the largest single vessel required on site will be a Heavy Lift Vessel (HLV) with a fuel inventory of no greater than 2, 695m³ of vessel diesel.</p> <p>Modelling results show that the spill will not reach the UK coastline or any mainland European coastline, but there is up to a 70% probability of crossing the UK/Norwegian median line within <6 hours during the spring, summer and autumn, with a slightly decreased probability of up to 60% during winter.</p> <p>Refer to Section 7 of the Environmental Appraisal [5] for further details.</p>	<p>The likelihood of a diesel release is low due to operating procedures in place (e.g. vessel will be subject to audits and inspections, regular maintenance and inspection of hoses and tanks, adequate bunding in place etc.).</p> <p>All appropriate notifications to mariners will be made prior to the operations.</p> <p>All operations will be carried out within the 500 m safety zone around the Kingfisher Manifold.</p> <p>The possibility of a diesel spill during operations will be covered under the vessels' approved Shipboard Oil Pollution Emergency Plans (SOPEPs).</p> <p>As diesel is a non-persistent hydrocarbon, its residence in the marine environment is low, as such, the risk to the marine environment from accidental spills is considered to be slight or minor, if effectively managed.</p>
Decommissioning of Pipelines	<p>Discharges to Sea:</p> <p>An estimated 93 tonnes of plastic from coatings on pipelines and umbilicals, and associated with some protective mattress</p>	<p>Where pipelines are to be decommissioning <i>in situ</i> they will be trenched and buried within the seabed or covered with rock protection. Whilst plastics in the marine environment are</p>



Table 4.2: Environmental Impact Management

Activity	Main Impacts	Management of the Impacts
	structures will be decommissioned <i>in situ</i> . However, note the pipelines and umbilicals to be decommissioned <i>in situ</i> will be trenched and buried, or beneath stable rock cover, and therefore, per the mitigation text provided, there is no expectation that the plastic will be discharged to sea.	of increasing concern, the low temperatures, reduced UV light levels and decreasing oxygen levels which exist in the seabed around Kingfisher will ensure degradation of any plastic products decommissioned ' <i>in situ</i> ' will occur extremely slowly, with any degraded plastic products contained within the seabed and not available to the water column or benthic community
	<p>Seabed Disturbance:</p> <p>As discussed above, seabed disturbance associated with decommissioning of the pipelines will mostly arise from cutting sections to be recovered to shore and installation of new rock to protect the cut ends. When considered in isolation, the impact arising from the Kingfisher DPs is not expected to be significant and is expected to be limited to localised sediment disturbance resulting in temporary increases in turbidity and smothering of benthic organisms, as disturbed sediment re-settles in the immediate vicinity of the infrastructure to be lifted. Localised seabed disturbance is also anticipated as a result of TAQA Bratani Limited's Brae area decommissioning activities.</p>	The EA acknowledges that a number of other decommissioning activities associated with other nearby oil and gas infrastructure may also occur in a similar timescale. Consideration has therefore been given specifically to activities associated with TAQA Bratani Limited's adjacent Brae Area DPs. It is understood that additional rock placement associated with Brae area decommissioning will also be kept to a minimum and whilst the timing of localised seabed disturbance associated with Brae and Kingfisher DP activities may be spatially and/or temporally aligned, disturbance will be temporary in nature with short term seabed recovery expected
Decommissioning Stabilisation Features	<p>Waste Generation:</p> <p>Recovered material will be classed as waste.</p>	An inventory of materials has been compiled and the fate of all materials will be tracked through an active waste management plan using waste consignment notes, up to the point of materials re-entering the supply system following recycling or, where necessary, to the point of disposal.



5 INTERESTED PARTY CONSULTATIONS

Pre-Engagement Summary

Pre-engagement with stakeholders commenced in 2017 with discussions held with statutory advisor and regulatory bodies. These covered the emerging decommissioning plans and the scope of the pre-decommissioning environmental baseline surveys. Ongoing introductory engagements and meetings with statutory consultees were progressed. Other meetings have taken place, as required, with regulatory authorities and others (e.g. OGA, JNCC, Marine Scotland, OPRED Environmental Management Team, SFF).

A Comparative Assessment workshop was held in March 2018 to consult and engage key stakeholders through the decisions to be made. From the workshop, the emerging recommendations report was updated and the notes of minutes detailing the outcomes was circulated to all stakeholders in attendance and comments, where received, were taken account of.

Table 5.1: Summary of Stakeholder Comments		
Points raised during statutory and public consultations		
Stakeholder	Comment	Response
National Federation of Fishermen's Organisations	None	N/A
Scottish Fishermen's Federation (SFF)	See letter in Appendix 2	See letter in Appendix 2
Northern Ireland Fish Producers Organisation (NIFPO)	None	N/A
Global Marine Systems Limited (GMS)	No comments	No response required
Public	None	N/A



6 PROGRAMME MANAGEMENT

6.1 Project Management and Verification

Members of the Project Management team have been appointed to manage suitable sub-contractors for the disconnection and removal activities. Standard company procedures for operational control and hazard identification and management will be used. Where possible the work will be coordinated with other decommissioning operations in the Central North Sea to secure schedule and cost efficiencies. This may lead to Kingfisher decommissioning being executed in several phases over an extended time. There may be significant periods of inactivity following a phase of work. Regular Progress Reports, and a final Close Out Report, will be submitted to ODU.

The process of consents and the engagements required as part of this process have commenced and will be fully managed and monitored. In the event of any changes in the detail of the offshore removal programme being required, these would be discussed and agreed with OPRED in advance.

If it is determined by ODU that pipeline monitoring is required during a prolonged decommissioning execution period, the results of any such surveys will be submitted to ODU.

6.2 Post-Decommissioning Debris Clearance and Verification

A post decommissioning debris survey will be carried out within the 500m safety zone centred on the Kingfisher Production Manifold and a 100m corridor along each existing pipeline and umbilical routes (50m either side).

Any significant oil and gas related seabed debris will be recovered for onshore disposal or recycling in line with existing disposal methods.

Verification of seabed clearance will be submitted to OPRED. Confirmation of seabed clearance will also be submitted to the Seabed Data Centre (Offshore Installations) at the United Kingdom Hydrographic Office.

Areas where oil-based mud drill cuttings may exist will be surveyed by alternative non-intrusive methods to determine that the seabed is clear of debris and to avoid deliberate disturbance of the drill cuttings. Any debris removal that is required within the cuttings pile will be conducted by ROV and Shell propose to notify other users of the sea of the location of any remaining drill cuttings deposits as required.

The default OPRED policy requirement is for clear seabed verification to be undertaken using non-intrusive means, such as side scan sonar. Overtrawl surveys as a means to locate debris and/or verify clear seabed, are likely only to be approved in cases where it is deemed necessary i.e. where there are specific safety concerns such as pipeline bundle ends, extensive debris and/or extensive seabed disturbance resulting from decommissioning operations. However, for the purposes of estimating environmental impact, a worst-case position has been taken in this DP and supporting EA with the assumption that over-trawling may be required. It should be understood that this assumption has been used only for estimating worst-case environmental impact; actual methods of verification will be discussed and agreed with OPRED on a case-by-case basis with an assumption that less intrusive methods of clear seabed verification are the base case.



6.3 Schedule

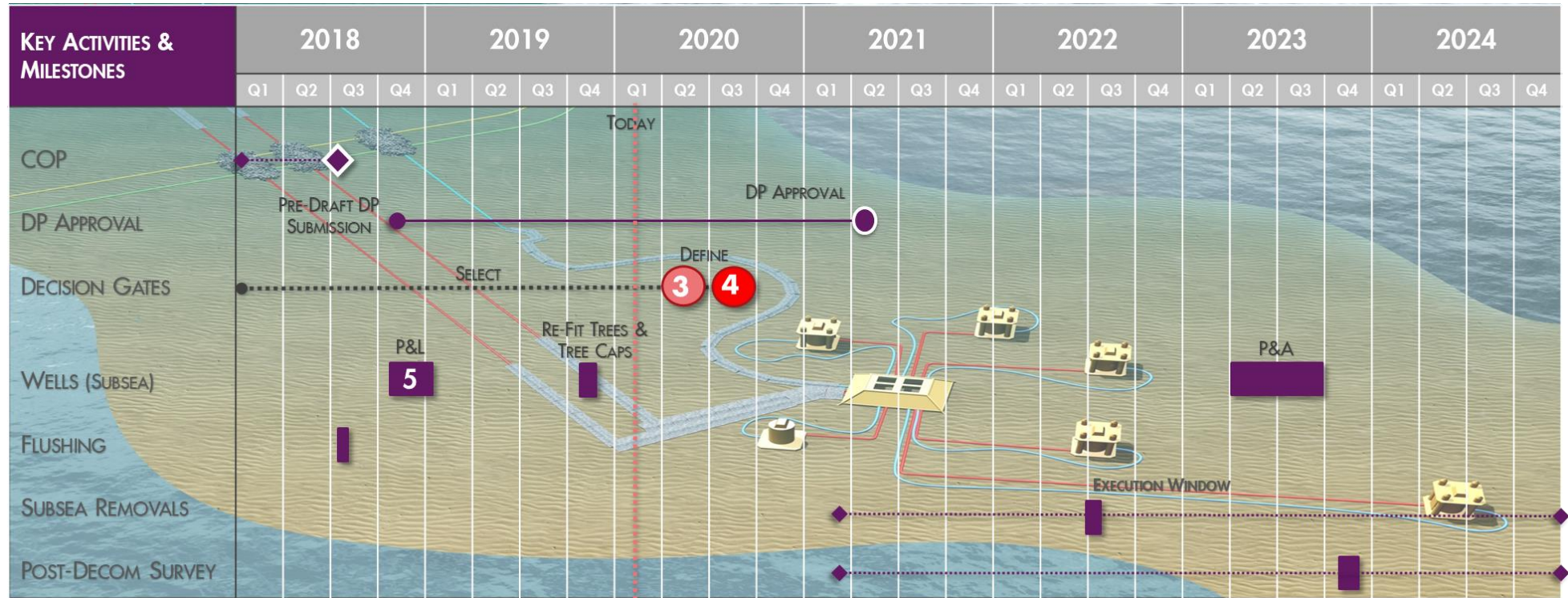


Figure 6.1: Project Plan



6.4 Costs

Separate costs letter will be provided to OPRED ‘commercial – in confidence’ at public consultation submission

An overall cost estimate is being provided to OPRED in confidence, following U.K. Oil and Gas Guidelines on Decommissioning Cost Estimation in-line with OGUK Work Breakdown Structure (WBS) Guidelines.

Table 6.1: Provisional Decommissioning Programmes - Costs		
OGUK WBS	Item	Estimated Cost (£m)
1.0	Operator PM	Provided to OPRED in confidence
2.0	Facility running/owner costs	
3.0	Wells abandonment	
4.0	Facilities/pipelines making safe	
5.0	Topsides preparation – Not Relevant for Kingfisher	
6.0	Topsides removal – Not Relevant for Kingfisher	
7.0	Substructure removal- – Not Relevant for Kingfisher	
8.0	Topsides and substructure onshore recycling – Not Relevant for Kingfisher	
9.0	Subsea Infrastructure	
10.0	Site Remediation	
11.0	Monitoring	

6.5 Close Out

In accordance with OPRED guidelines, a close out report will be submitted to OPRED within 12 months of completion of the offshore decommissioning scope including debris removal, verification of seabed clearance and the first post-decommissioning environmental and pipeline surveys. The report will detail the outcomes of surveys as well as explain any major variances from the programme

6.6 Post-Decommissioning Monitoring and Evaluation

A post-decommissioning environmental seabed survey centred on the sites of subsea installations and pipeline/umbilical corridors will be carried out. The survey will focus on any chemical and physical disturbances of the decommissioning activities compared with the pre-decommissioning data. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED. All pipeline routes and structure sites will be the subject of geo-physical surveys when decommissioning activity has concluded. After the summary of the surveys has been sent to OPRED and reviewed, a post-monitoring survey regime will be agreed.



The parties to the approved Decommissioning Programmes will be the contact points for any third-party claims arising from damage caused by any remaining infrastructure under the approved Kingfisher Decommissioning Programmes. All the pipelines which are proposed to be left in place remain the property and responsibility of the owners, even if they were to exit the UKCS.



7 SUPPORTING DOCUMENTS

Table 7.1: Supporting Documents		
Ref	Document Number	Title
[1]	Chapter 17	The Petroleum Act 1998
[2]	N/A	OPRED GUIDANCE NOTES - Decommissioning of Offshore Oil and Gas Installations and Pipelines November 2018
[3]	OSPAR Decision 98/3	OSPAR Decision on the Disposal of Disused Offshore Installations
[4]	KDP-PT-S-AA-7180-00004	Kingfisher Comparative Assessment Report
[5]	KDP-PT-D-HE-0702-00001	Environmental Appraisal
[6]	EOFL-PT-S-QA-6050-00001	Comparative Assessment Methodology

These documents are available as follows:

1. At the Shell website at
<https://www.shell.co.uk/sustainability/decommissioning/kingfisher.html>
2. By email from: SUKEP-Shell-Decommissioning-Correspondence@shell.com
3. Due to the COVID-19 pandemic, Shell UK will not provide hard copies for review at its offices in Aberdeen. Instead, electronic copies may be requested by emailing SUKEP-Shell-Decommissioning-Correspondence@shell.com or writing to Rob Jansen, Head of Projects, Decommissioning Strategy, Shell U.K. Limited, 1 Altens Farm Road, Nigg, Aberdeen, AB12 3FY.



8 PARTNER LETTER OF SUPPORT

Esso Exploration and Production UK Limited

Correspondence:
Union Plaza
1 Union Wynd
Aberdeen AB10 1SL
john.gillies@exxonmobil.com



Department for Business, Energy and Industrial Strategy
Offshore Decommissioning Unit
AB1 Building, 3rd Floor
Crimon Place
Aberdeen
AB10 1BJ

23rd June 2021

Dear Sir or Madam,

KINGFISHER DECOMMISSIONING PROGRAMMES (PART 1) PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 22 April 2021.

We, Esso Exploration and Production U.K. Limited confirm that we authorise Shell U.K. Limited to submit abandonment programmes on our behalf relating to the Kingfisher facilities as directed by the Secretary of State on 22 April 2021.

We confirm that we support the proposals detailed in the Shell U.K. Limited Decommissioning Programmes dated 22 June 2021, which are to be submitted by Shell 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

John Gillies
Projects and Technical Manager
For and on behalf of Esso Exploration and Production U.K. Limited

Yours faithfully

John Gillies
Projects and Technical Manager

For and on behalf of Esso Exploration and Production U.K. Limited



APPENDIX 1 – PUBLIC NOTICE - EXAMPLE

PUBLIC NOTICE

The Petroleum Act 1998

Kingfisher Decommissioning Programmes (Part 1)

On 8 June 2020, Shell U.K. Limited submitted, for the consideration of the Secretary of State for Business, Energy and Industrial Strategy, the draft Decommissioning Programmes for the Kingfisher Field (Part 1) 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:

- Installations and subsea infrastructure associated with the Kingfisher Field, but excluding Kingfisher infrastructure within the 500m safety zone of the Brae Bravo platform.

Shell U.K. Limited hereby gives notice that the Kingfisher Decommissioning Programmes can be viewed online at <https://www.shell.co.uk/sustainability/decommissioning/kingfisher.html>

Alternatively, a digital copy of the programmes can be requested:

Contact: Rob Jansen, Head of Projects, Decommissioning Strategy

E-Mail: SUKEP-Shell-Decommissioning-Correspondence@shell.com

Representations regarding the Kingfisher Decommissioning Programmes (Part 1) should be submitted in writing to Shell U.K. Limited marked for the attention of Rob Jansen at the above email address, where they should be received no later than the consultation closing date (8 July 2020) and should state the grounds upon which any representations are being made.

8 June 2020

Rob Jansen

Head of Projects, Decommissioning Strategy

Shell U.K. Limited

1 Altens Farm Road

Nigg

Aberdeen

AB12 3FY



APPENDIX 2 – CORRESPONDENCE WITH STATUTORY CONSULTEES

Letter Received from Scottish Fishermen's Federation, 23 June 2020, per public consultation:



Our Ref: SA/06/01

Your Ref:

23 June 2020

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

T: +44 (0) 1224 646944
F: +44 (0) 1224 647058
E: sff@sff.co.uk

www.sff.co.uk

FAO Rob Jansen
Head of Projects Decommissioning Strategy
c/o SUKEP-Shell-Decommissioning-Correspondence@shell.com

Dear Rob,

Kingfisher Decommissioning Programmes - Part 1 - Public Consultation

I refer to the Consultation on Draft Decommissioning Programmes and key supporting documentation provided by email on 8 June 2020.

The Scottish Fishermen's Federation (SFF) appreciates the clearly laid out and detailed explanation of the proposals submitted by Shell U.K. Limited for the decommissioning of the Kingfisher Field's installations and infield pipelines and place on record our appreciation of the information provided.

For your information, I can advise 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/>.

As highlighted in these documents, the concerns of fishermen are primarily that of safety and the physical impact on the fishing grounds of the long-term presence of oil industry infrastructure on the seabed. I can confirm that the SFF's preferred position regarding the decommissioning of oil and gas infrastructure is one of total removal.

We are therefore pleased to note that under the Kingfisher Decommissioning Programmes – Part 1 works, it is Shell's intention to fully remove the Kingfisher production manifold installation and the six wellhead structures in line with the requirements of OSPAR Decision 98/3.

Regarding the proposals for decommissioning pipelines (eight) and umbilicals (seven), it is noted that these have been prepared in line with OPRED Guidance Notes and following comparative assessment of credible options. We are pleased to find that all surface-laid lines outside the Brae Bravo 500 metre Safety Zone are to be removed.

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



In relation to the offshore pipelines and umbilicals that are proposed to be decommissioned in situ, we accept the reasoning behind the recommendation (based on the outcome of the comparative assessment of feasible options) of leaving these in situ with minimum intervention in order to minimise seabed disturbance. As you will be aware, any pipelines/umbilicals left on the seabed represent a legacy issue and will require on going monitoring. Where rock cover is deployed, we would look for the size and profile of the rock to follow normal industry standards and would recommend that such rock dump berms are incorporated into the post decommissioning debris clearance trawl sweeps to verify that, at the time of deposit, they did not pose a risk to fishing.

It is noted that there is one drill cutting pile associated with the Kingfisher Field and although deemed within OSPAR Recommendation 2006/5 thresholds, the fishing industry wishes to highlight that it still has concerns of the potential dangers (human consumption wise) of a fishing vessel inadvertently trawling over drill cuttings piles resulting in catch contamination and this is an area where the SFF feels that more research / clarification is required to ascertain whether and, if so, when is it deemed safe for fishermen to tow in the vicinity of drill cuttings. In this instance, it is interesting and helpful to note from the Kingfisher Environmental Appraisal Report (provided by Shell), that, "a study undertaken by the Fisheries Research Service in 2002 concluded that although (drill cuttings) contamination may be disturbed as a result of trawl disturbance, the limited quantity would be unlikely to pose serious contamination of toxicological threats to the marine environment as the act of spreading will encourage increased oxygenation of deposited material, which will enhance the rate of breakdown of contaminants, by natural processes. Ecotoxicological effects on commercial fish stocks or fishing gear as a result of the disturbance of drill cuttings at Kingfisher are not anticipated to affect commercial catch viability."

We would take this opportunity to highlight that the SFF has serious reservations and is yet to be convinced regarding the use of alternative methods of verifying to fishermen that it is safe for fishing to resume in an area following the removal of oil and gas related infrastructure, and has made its views known to OPRED. For where an area of seabed was previously bottom trawled prior to oil and gas operations taking place and where bottom trawling is permitted to take place following decommissioning works, it is our view that the best way to satisfy fishermen that the area is safe for fishing to resume is to undertake a trawl sweep, under controlled conditions, which replicates the most common method of fishing that takes place in that locality.

The Federation having stated the above position, would reaffirm its appreciation of the decommissioning plans provided and its wish to work closely and positively with the Kingfisher Field Decommissioning Team, as you work through the challenges before you.

Yours sincerely,

Steven Alexander
Offshore Liaison



Shell UK's response to Scottish Fishermen's Federation letter of 23 June 2020:



Steven Alexander
Scottish Fishermen's Federation (SFF)
24 Rubislaw Terrace
Aberdeen, AB10 1XE
Scotland, UK

Shell U.K. Limited
1 Altens Farm Road
Nigg
Aberdeen
AB12 3FY
United Kingdom
Tel +44 122488 2000
Internet <http://www.shell.co.uk>

March 2021
Kingfisher Decommissioning Programmes Part 1 – Response to Public Consultation
Your ref SA/06/01

Dear Steven,

We thank you for your letter of 23 June 2020 and note the guidance provided therein.

Specifically, with regard to the penultimate paragraph on seabed clearance verification, Shell would like to advise you of the following changes to the Kingfisher Decommissioning Programmes (Part 1). Since issuing the Programmes for public consultation, Shell has been advised by OPRED of a change to their seabed clearance verification policy.

To reflect this change in policy, the following text will be added to Section 6.2 of the Decommissioning Programmes and reflected in the Environmental Appraisal:

"The default OPRED policy requirement is for clear seabed verification to be undertaken using non-intrusive means, such as side scan sonar. Overtrawl surveys as a means to locate debris and/or verify clear seabed, are likely only to be approved in cases where it is deemed necessary, i.e. where there are specific safety concerns such as pipeline bundle ends, extensive debris and/or extensive seabed disturbance resulting from decommissioning operations. However, for the purposes of estimating environmental impact, a worst-case position has been taken in this DP and supporting EA with the assumption that over-trawling may be required. It should be understood that this assumption has been used only for estimating worst-case environmental impact; actual methods of verification will be discussed and agreed with OPRED on a case-by-case basis with an assumption that less intrusive methods of clear seabed verification are the base case."

Your contribution to the public consultation of the Kingfisher Decommissioning Programmes (Part 1) is appreciated and we will continue to work with the SFF throughout the planned execution of the works contained therein.

Yours sincerely,
Shell U.K. Limited

James Blackburn, Decommissioning Business Opportunity Manager

Shell U.K. Limited,
Registered in England number 140141,
Registered office Shell Centre London SE1 7NA,
VAT reg number GB 235 7632 55
Kingfisher - response to SFF Shell UK Letterhead

APPENDIX 3 – BURIAL DEPTH DATA

The charts below were presented to attendees at the Kingfisher Comparative Assessment Workshop and summarise the data that Shell has available regarding the burial status of each line.

Generally, there are two definitions for burial depth; depth of lowering and depth of cover, which are both illustrated in the figure below. The depth of cover is the conventional definition of burial depth, which is the depth of backfill or rock on top of the pipeline or umbilical. The depth of lowering is the depth of the top of the pipeline or umbilical below the natural mean seabed level. The natural mean seabed level is ignoring any berms to the sides of the trench.

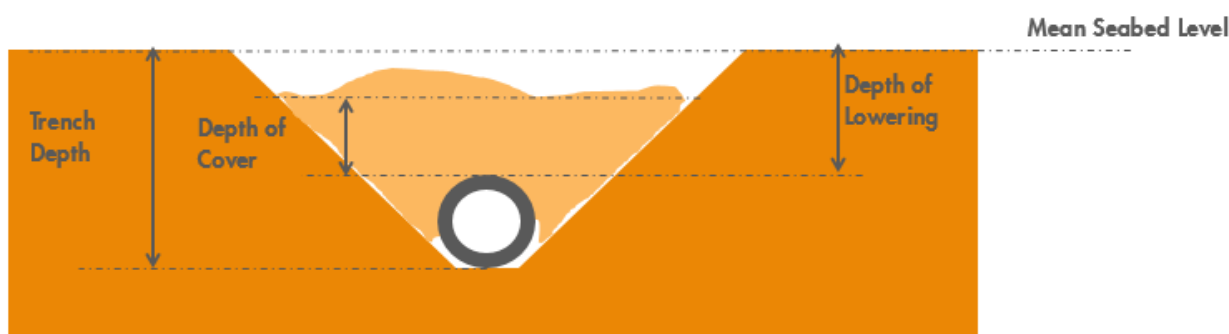


Figure APP3-1 – Burial depth definition

The graphics below, Figures APP3-2 to APP3-7, show the depth-of-cover data from the 1997 as-trenched surveys following installation of the main pipelines and umbilical. The data is presented as a subsea layout, showing the path of each line from the Kingfisher well site to the Kingfisher SSIV adjacent to the Brae Bravo Platform. Coloured dots along the path of each line indicate the depth-of-cover for every 50m of pipeline or umbilical. The colour coding for the pipelines is:

- A red dot indicates depth-of-cover less than 0.4m
- An orange dot indicates depth-of-cover between 0.4m and 0.6m
- A green dot indicates depth-of-cover greater than 0.6m

The colour coding for the umbilical is:

- A red dot indicates depth-of-cover less than 0.3m
- A yellow dot indicates depth-of-cover between 0.3m and 0.6m
- A green dot indicates depth-of-cover greater than 0.6m

The results for each pipeline / umbilical can be summarised as follows.

For PL1488 (N0509 – Kingfisher Production Pipeline 1), more than 95% of the line has a depth-of-cover greater than 0.6m and more than 70% greater than 1m depth-of-cover. Only 2% of the line had depth-of-cover had depth-of-cover between 0.4m and 0.6m, leading to these areas being covered with additional rock. The only area where depth-of-cover was less than 0.4m was the crossing at the Heimdal line which was subsequently protected by mattresses and rock cover, details of which are provided below.

For PL1489 (N0510 – Kingfisher Production Pipeline 2), more than 95% of the line has a depth-of-cover greater than 0.6m and more than 70% greater than 1m depth-of-cover. Only 2% of the line had depth-of-cover had depth-of-cover between 0.4m and 0.6m, leading to these areas being covered with additional rock. The only area where depth-of-cover was less than 0.4m was the crossing at the Heimdal line which was subsequently protected by mattresses and rock cover, details of which are provided below.



For PLU1490 (N0889 – Kingfisher Manifold Umbilical), more than 90% of the line has a depth-of-cover greater than 0.6m and more than 80% greater than 1m depth-of-cover. Less than 10% of the umbilical had depth-of-cover less than 0.6m, leading to these areas being covered with additional rock. The only area where depth-of-cover was less than 0.4m was the crossing at the Heimdal line which was subsequently protected by mattresses and rock cover, details of which are provided below.

All three Kingfisher lines exit their respective trenches to cross over the East Brae PMS Cable and Heimdal pipeline approximately 4.5km from the SSIV manifold. Each crossing consists of a combination of concrete mattresses and rock cover to protect both the crossed lines and the crossing Kingfisher lines. Figures APP3-2 to APP3-7 below provide the depth-of-cover data for these crossings and indicate that each line is protected by rock to a depth-of-cover greater than 0.6m across the entirety of the crossing.

On the completion of decommissioning activities, Shell will perform a depth-of-cover survey for the full length of each line being decommissioned *in situ*. The results of these surveys will be presented to OPRED in a linear graph format as part of regular progress reporting and/or the Close Out Report.

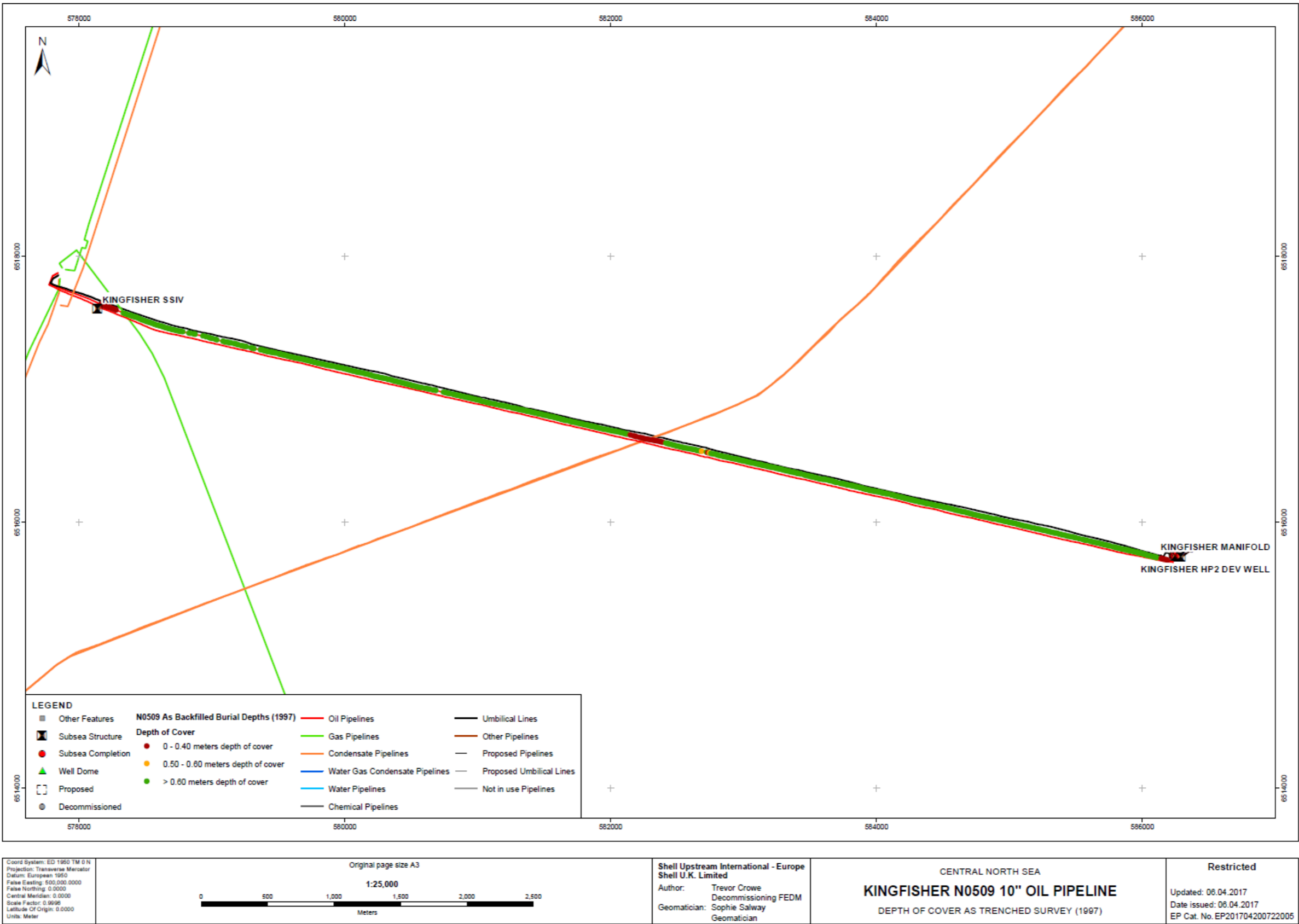


Figure APP38-2 – Kingfisher Production Pipeline Survey Results Summary (N0509 / PL1488)

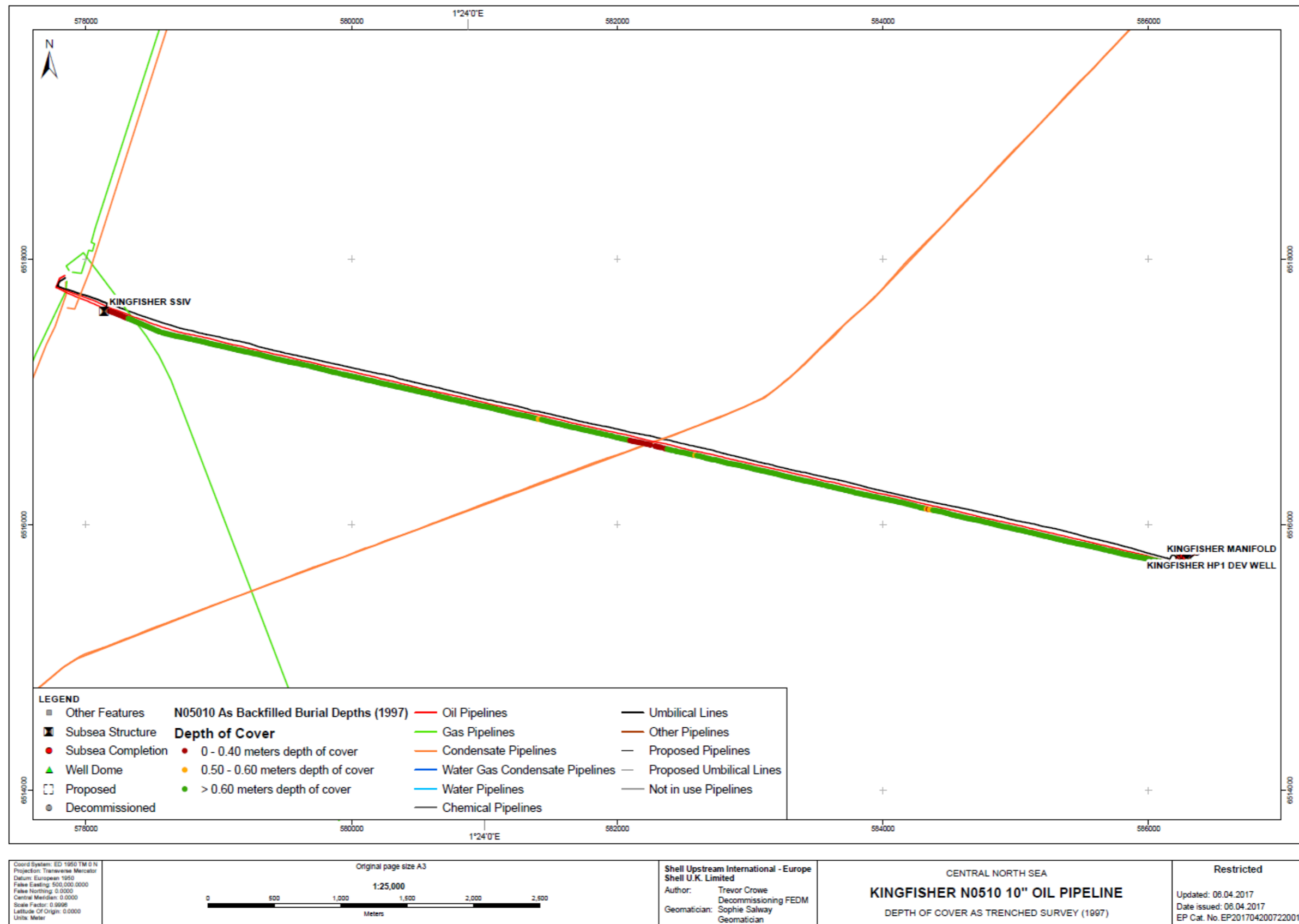


Figure APP3-3 – Kingfisher Production Pipeline Survey Results Summary (N0510 / PL1489)

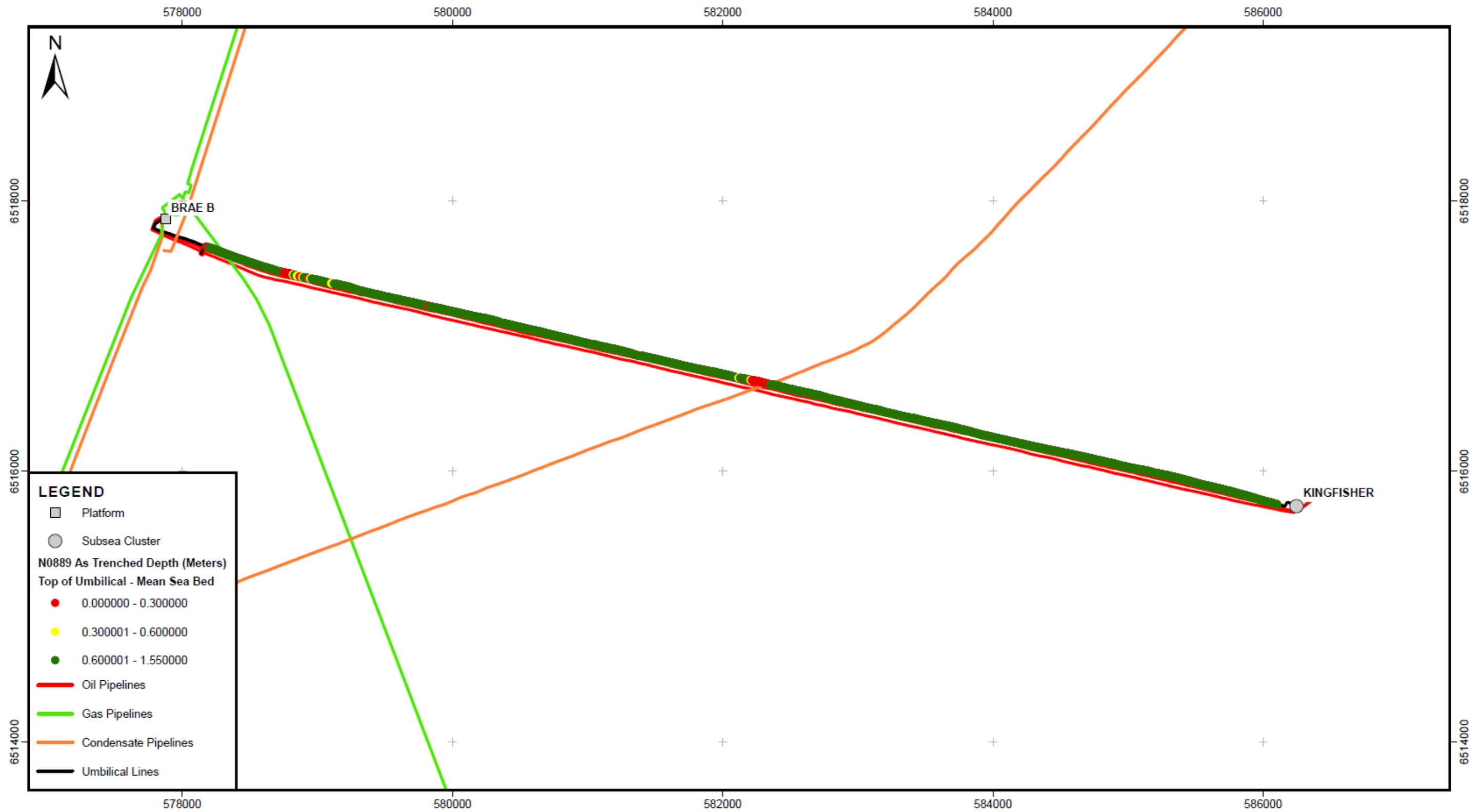


Figure APP3-4 – Kingfisher Manifold Umbilical Survey Results Summary (N0889 / PLU1490)

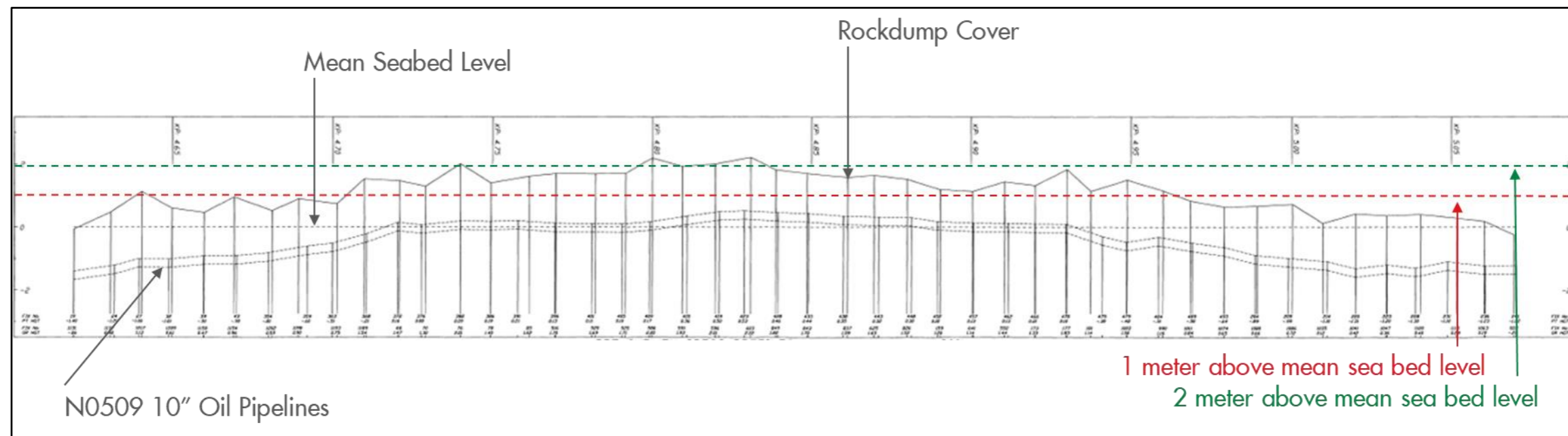


Figure APP3-5 – Depth-of-Cover data for PL1488 crossing at Heimdal

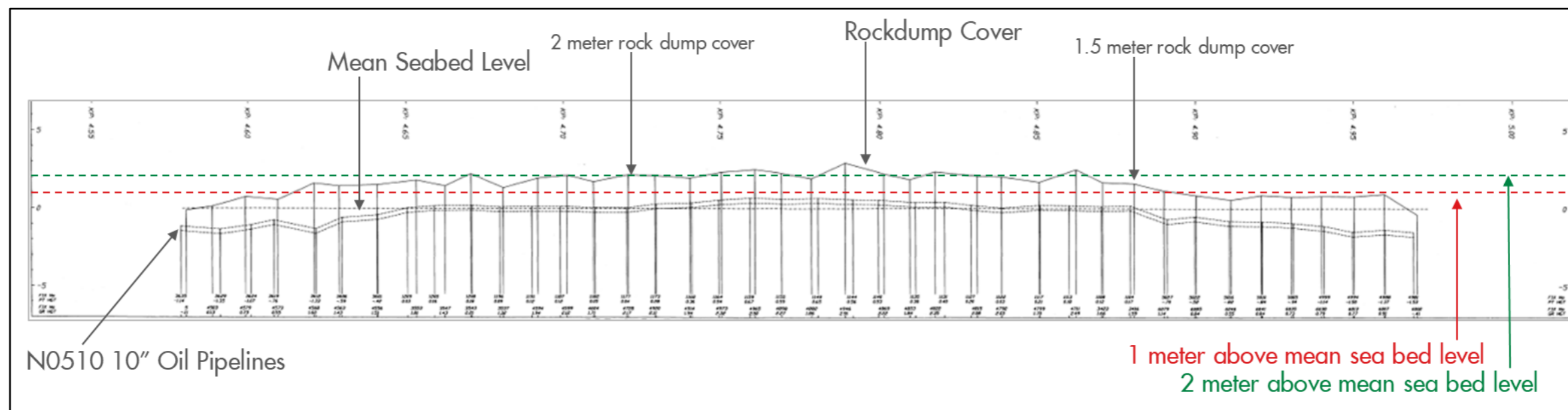


Figure APP3-6 – Depth-of-Cover data for PL1489 crossing at Heimdal

