Kingfisher Field
Final Decommissioning Programmes – Part 1

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

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22 June 2021
Document Control

Approvals

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<td>ALARP</td>
<td>As Low As Reasonably Practicable</td>
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<td>BEIS</td>
<td>Department for Business, Energy and Industrial Strategy (formerly DECC)</td>
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<tr>
<td>CA</td>
<td>Comparative Assessment</td>
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<tr>
<td>CoP</td>
<td>Cessation of Production</td>
</tr>
<tr>
<td>DECC</td>
<td>Department of Energy and Climate Change (now BEIS)</td>
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<td>DP</td>
<td>Decommissioning Programme</td>
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<tr>
<td>EA</td>
<td>Environmental Appraisal</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ENVID</td>
<td>Environmental Identification</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EUNIS</td>
<td>European University Information Systems Organization</td>
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<tr>
<td>FPAL</td>
<td>First Point Assessment Ltd., the Achilles scheme which identifies, evaluates and pre-qualifies suppliers for major buyers in oil and gas</td>
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<tr>
<td>GMS</td>
<td>Global Marine Systems Ltd.</td>
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<tr>
<td>HLV</td>
<td>Heavy Lift Vessel</td>
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<td>HSE</td>
<td>Health and Safety Executive</td>
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<tr>
<td>HSSE&amp;SP</td>
<td>Health, Safety, Security, Environment and Social Performance</td>
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<td>ICES</td>
<td>International Council for the Exploration of the Sea</td>
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<tr>
<td>JNCC</td>
<td>Joint Nature Conservation Committee</td>
</tr>
<tr>
<td>MCAA</td>
<td>Marine and Coastal Access Act</td>
</tr>
<tr>
<td>NIFPO</td>
<td>Northern Ireland Fish Producers Organisation</td>
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<tr>
<td>NORM</td>
<td>Naturally Occurring Radioactive Material</td>
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<tr>
<td>OBM</td>
<td>Oil Based Mud</td>
</tr>
<tr>
<td>OGA</td>
<td>Oil and Gas Authority</td>
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<td>OGUK</td>
<td>Oil &amp;Gas UK</td>
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<tr>
<td>OiW</td>
<td>Oil-in-Water</td>
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<td>OPRED</td>
<td>Offshore Petroleum Regulator for Environment and Decommissioning</td>
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<tr>
<td>OSPAR</td>
<td>Oslo and Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)</td>
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<td>P&amp;A</td>
<td>Plug and Abandonment</td>
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<td>PETS</td>
<td>Portal Environmental Tracking System</td>
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<td>Term</td>
<td>Explanation</td>
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<td>PMF</td>
<td>Priority Marine Feature</td>
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<tr>
<td>PMS</td>
<td>Power Management System</td>
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<td>PON</td>
<td>Petroleum Operations Notice(s)</td>
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<td>PWA</td>
<td>Pipeline Works Authorisation</td>
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<tr>
<td>ROV</td>
<td>Remote Operated Vehicle</td>
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<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
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<td>SFF</td>
<td>Scottish Fishermen’s Federation</td>
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<td>SLV</td>
<td>Single Lift Vessel</td>
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<tr>
<td>SOPEP</td>
<td>Shipboard Oil Pollution Emergency Plan</td>
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<tr>
<td>SSIV</td>
<td>Subsea Safety Isolation Valve</td>
</tr>
<tr>
<td>Te</td>
<td>Metric Tonne</td>
</tr>
<tr>
<td>TUTU</td>
<td>Topside Umbilical Termination Unit</td>
</tr>
<tr>
<td>UKCS</td>
<td>United Kingdom Continental Shelf</td>
</tr>
<tr>
<td>UTA</td>
<td>Umbilical Termination Assembly</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
</tr>
<tr>
<td>WGS84</td>
<td>World Geodetic System 1984</td>
</tr>
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<td>WMP</td>
<td>Waste Management Plan</td>
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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>
<thead>
<tr>
<th>Field:</th>
<th>Kingfisher</th>
<th>Production Type:</th>
<th>Volatile oil, gas and condensate</th>
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<tbody>
<tr>
<td>Water Depth (m)</td>
<td>114m</td>
<td>UKCS Block:</td>
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### Surface Installations

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<thead>
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<th>Number</th>
<th>Type</th>
<th>Topsides Weight (Te)</th>
<th>Jacket Weight (Te)</th>
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<tr>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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### Subsea Installations

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<th>Type</th>
<th>Platform</th>
<th>Subsea</th>
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<tr>
<td>1</td>
<td>Production Manifold</td>
<td>N/A</td>
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### Drill Cuttings pile(s)

<table>
<thead>
<tr>
<th>Number of Piles</th>
<th>Total Estimated volume (m³)</th>
<th>Distance to median (km)</th>
<th>Distance from nearest UK coastline</th>
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<tr>
<td>1</td>
<td>1508</td>
<td>4.7</td>
<td>197 (Shetland Islands)</td>
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### Table 1.2: Installations Section 29 Notice Holders Summary

<table>
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<th>S29 Notice Holder</th>
<th>Registration Number</th>
<th>Equity Interest</th>
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<tr>
<td>Shell U.K. Limited</td>
<td>00140141</td>
<td>49.74%</td>
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<tr>
<td>Esso Exploration and Production UK Limited</td>
<td>00207426</td>
<td>49.37%</td>
</tr>
<tr>
<td>Fujairah Oil and Gas UK LLC</td>
<td>FC009587 (UK establishments: BR000914 and BR001797)</td>
<td>0.89%</td>
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</table>

1.4.2 Pipelines

### Table 1.3: Pipelines being Decommissioned

<table>
<thead>
<tr>
<th>Number of Pipelines (see Table 2.3 for full details)</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipelines</td>
<td>8</td>
</tr>
<tr>
<td>Umbilicals</td>
<td>7</td>
</tr>
</tbody>
</table>
### Table 1.4: Pipelines Section 29 Notice Holders Summary

<table>
<thead>
<tr>
<th>S29 Notice Holder</th>
<th>Registration Number</th>
<th>Equity Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell U.K. Limited</td>
<td>00140141</td>
<td>49.74%</td>
</tr>
<tr>
<td>Esso Exploration and Production UK Limited</td>
<td>00207426</td>
<td>49.37%</td>
</tr>
<tr>
<td>Fujairah Oil and Gas UK LLC</td>
<td>FC009587 (UK establishments: BR000914 and BR001797)</td>
<td>0.89%</td>
</tr>
</tbody>
</table>

#### 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 30T of rock cover (expected 10T 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 30T 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>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (per PWA)</th>
<th>From</th>
<th>To</th>
<th>Length of Section (m)</th>
<th>Decommissioning Solution</th>
<th>Protection Status</th>
<th>Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Pipeline P1</td>
<td>PL1488</td>
<td>Brae Bravo 500m safety zone boundary ~KP 0.7</td>
<td>Start of rock berm protecting the trench transition ~KP 8.8</td>
<td>~8000</td>
<td>Decommission in situ (CA Group 6)</td>
<td>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</td>
<td>Crosses the Heimdal Pipeline and PMS Cable at ~KP 4.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rock covered</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Start of rock berm protecting the trench transition ~KP 8.8</td>
<td>~50</td>
<td>Decommission in situ (CA Group 5)</td>
<td>Rock covered</td>
<td>None</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (per PWA)</td>
<td>From</td>
<td>To</td>
<td>Length of Section (m)</td>
<td>Decommissioning Solution</td>
<td>Protection Status</td>
<td>Crossings</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>End of rock berm protecting the trench transition ~KP 8.85</td>
<td>PL1489 Brae Bravo 500m safety zone boundary ~KP 0.7</td>
<td>Start of rock berm protecting the trench transition ~KP 8.8</td>
<td>~75</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 14 concrete mattresses (of which 7 matts are shared with PL1489)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (per PWA)</td>
<td>From</td>
<td>To</td>
<td>Length of Section (m)</td>
<td>Decommissioning Solution</td>
<td>Protection Status</td>
<td>Crossings</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>--------------------------------------------</td>
<td>---------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Start of rock berm protecting the trench transition ~KP 8.8</td>
<td></td>
<td>Start of rock berm protecting the trench transition ~KP 8.85</td>
<td>End of rock berm protecting the trench transition ~KP 8.85</td>
<td>~50</td>
<td>Decommission in situ (CA Group 5)</td>
<td>Rock covered</td>
<td>None</td>
</tr>
<tr>
<td>End of rock berm protecting the trench transition ~KP 8.85</td>
<td></td>
<td>Tie-in flange to Kingfisher Production Manifold (disconnected) ~KP 8.9</td>
<td>Tie-in flange to Kingfisher Production Manifold (disconnected) ~KP 8.9</td>
<td>~80</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 16 concrete mattresses (of which 7 mats are shared with PL1488)</td>
<td>None</td>
</tr>
<tr>
<td>Manifold Umbilical</td>
<td>PLU1490</td>
<td>Brae Bravo 500m safety zone boundary ~KP 0.6</td>
<td>Brae Bravo 500m safety zone boundary ~KP 0.6</td>
<td>~8000</td>
<td>Decommission in situ (CA Group 6)</td>
<td>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</td>
<td>Crosses the Heimdal Pipeline and PMS Cable at ~KP 4.8</td>
</tr>
</tbody>
</table>

Note – KP0 is the base of the caisson riser at Brae Bravo
Table 1.5: Pipeline Summary Table

<table>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (per PWA)</th>
<th>From</th>
<th>To</th>
<th>Length of Section (m)</th>
<th>Decommissioning Solution</th>
<th>Protection Status</th>
<th>Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6</td>
<td></td>
<td>End of the transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6</td>
<td>~75</td>
<td></td>
<td>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)</td>
<td>Transition from burial to surface</td>
<td>None</td>
</tr>
<tr>
<td>Transition out of the trench adjacent to Kingfisher Manifold ~KP 8.6</td>
<td></td>
<td>Kingfisher Manifold ~KP 8.8</td>
<td>~155</td>
<td></td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 26 concrete mattresses</td>
<td>None</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1497</td>
<td>Wellhead BP1.1</td>
<td>Kingfisher Manifold</td>
<td>18</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 2 mattresses (matts are shared with PLU1491)</td>
<td>None</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (per PWA)</td>
<td>From</td>
<td>To</td>
<td>Length of Section (m)</td>
<td>Decommissioning Solution</td>
<td>Protection Status</td>
<td>Crossings</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------------</td>
<td>-----------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1498</td>
<td>Wellhead BP1.2</td>
<td>Kingfisher Manifold</td>
<td>25</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 3 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1499</td>
<td>Wellhead BP1.3</td>
<td>Kingfisher Manifold</td>
<td>17</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 2 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1500</td>
<td>Wellhead BP2.1</td>
<td>Kingfisher Manifold</td>
<td>29</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 5 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1501</td>
<td>Wellhead HP1</td>
<td>Kingfisher Manifold</td>
<td>145</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 24 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Production Spool</td>
<td>PL1502</td>
<td>Wellhead HP2</td>
<td>Kingfisher Manifold</td>
<td>30</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 5 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
</tbody>
</table>
### Table 1.5: Pipeline Summary Table

<table>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (per PWA)</th>
<th>From</th>
<th>To</th>
<th>Length of Section (m)</th>
<th>Decommissioning Solution</th>
<th>Protection Status</th>
<th>Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1491</td>
<td>Wellhead BP1.1</td>
<td>Kingfisher Manifold UTA</td>
<td>36</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 2 mattresses (matts are shared with PL1497)</td>
<td>None</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1492</td>
<td>Wellhead BP1.2</td>
<td>Kingfisher Manifold UTA</td>
<td>45</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 4 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1493</td>
<td>Wellhead BP1.3</td>
<td>Kingfisher Manifold UTA</td>
<td>23</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 3 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1494</td>
<td>Wellhead BP2.1</td>
<td>Kingfisher Manifold UTA</td>
<td>40</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 6 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1495</td>
<td>Wellhead HP1</td>
<td>Kingfisher Manifold UTA</td>
<td>155</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 24 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (per PWA)</td>
<td>From</td>
<td>To</td>
<td>Length of Section (m)</td>
<td>Decommissioning Solution</td>
<td>Protection Status</td>
<td>Crossings</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1496</td>
<td>Wellhead HP2</td>
<td>Kingfisher Manifold UTA</td>
<td>40</td>
<td>Full removal (CA Group 2)</td>
<td>Surface-laid with 6 mattresses (matts are shared with several other lines)</td>
<td>None</td>
</tr>
</tbody>
</table>
### 1.4.4 Summary of Proposed Decommissioning Programmes

<table>
<thead>
<tr>
<th>Selected Option</th>
<th>Reason for Selection</th>
<th>Proposed Decommissioning Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Topsides</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2. Jacket/Floating Facility (FPSO etc.)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Subsea Installations</td>
<td>Production Manifold</td>
<td>To leave a clear seabed</td>
</tr>
<tr>
<td>4. Pipelines, Flowlines &amp; Umbilicals</td>
<td>10” Production Pipelines PL1488 and PL1489 trenched and buried sections (Scope group 6) to be decommissioned in situ</td>
<td>The pipeline is sufficiently buried and stable for both the trenched sections and pipeline crossings; Minimal seabed and land disturbance; reduced risk to personnel.</td>
</tr>
<tr>
<td></td>
<td>Pipelines have been flushed and contain seawater</td>
<td></td>
</tr>
<tr>
<td>Selected Option</td>
<td>Reason for Selection</td>
<td>Proposed Decommissioning Solution</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Full removal of 10” Production Pipelines PL1488 and PL1489 surface laid sections (Scope group 2). between trench and Production Manifold</td>
<td>To remove and leave a clear seabed.</td>
<td>Pipelines and associated support/protection to be recovered to shore for re-use / recycling / disposal.</td>
</tr>
<tr>
<td>Pipelines have been flushed and contain seawater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full removal of 6” Production Jumpers PL1497, PL1498, PL1499, PL1500, PL1501 and PL1502 (Scope group 2)</td>
<td>To remove and leave a clear seabed.</td>
<td>Pipelines and associated support/protection to be recovered to shore for re-use / recycling / disposal.</td>
</tr>
<tr>
<td>Jumpers have been flushed and contain seawater</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 1.6: Summary of Decommissioning Programmes

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

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Table 1.6: Summary of Decommissioning Programmes

<table>
<thead>
<tr>
<th>Selected Option</th>
<th>Reason for Selection</th>
<th>Proposed Decommissioning Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Drill Cuttings</td>
<td>Decommissioning in situ. Cuttings pile falls well below the OSPAR 2006/5 thresholds requiring remediation.</td>
<td>Decommissioning in situ to degrade naturally with minimal disturbance, as practicable, during wider Kingfisher decommissioning.</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Owner</th>
<th>Name</th>
<th>Type</th>
<th>Distance/Direction</th>
<th>Information</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAQA Bratani Ltd</td>
<td>Brae Bravo</td>
<td>Platform</td>
<td>8.6km / W</td>
<td>Host platform for Kingfisher.</td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL360</td>
<td>Gas Transfer</td>
<td>8.6km / W</td>
<td><strong>Brae Bravo Bypass to Brae Alpha 18” Gas Transfer Pipeline.</strong></td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL360A</td>
<td>Gas Transfer</td>
<td>8.6km / W</td>
<td><strong>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</strong></td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL361</td>
<td>Condensate Export</td>
<td>8.6km / W</td>
<td><strong>Brae Bravo Condensate Wye to Brae Alpha 18” Condensate Export Pipeline.</strong></td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL361A</td>
<td>Condensate Export</td>
<td>8.6km / W</td>
<td><strong>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</strong></td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PMS</td>
<td>Power Cable</td>
<td>8.6km / W</td>
<td><strong>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</strong></td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PLU4189</td>
<td>Control Umbilical</td>
<td>8.6km / W</td>
<td><strong>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</strong></td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL894</td>
<td>Condensate Pipeline</td>
<td>8.5km / W</td>
<td><strong>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</strong></td>
<td>Active</td>
</tr>
<tr>
<td>BP Exploration Operating Company Limited</td>
<td>PL1971</td>
<td>Gas Interlink</td>
<td>6.6km / SW</td>
<td><strong>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</strong></td>
<td>Inactive</td>
</tr>
</tbody>
</table>
Table 1.7: Adjacent Facilities

<table>
<thead>
<tr>
<th>Owner</th>
<th>Name</th>
<th>Type</th>
<th>Distance/Direction</th>
<th>Information</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PMS Cable</td>
<td>Power Cable</td>
<td>3.1 km / W</td>
<td><strong>Brae Alpha – East Brae Power Cable.</strong> Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°46.779’ N, 01°25.154’ E</td>
<td>Active</td>
</tr>
<tr>
<td>Equinor Energy AS</td>
<td>PL301</td>
<td>Condensate Export</td>
<td>3.1 km / NW</td>
<td><strong>Heimdal to Brae Alpha 8” Pipeline.</strong> Crossed by Kingfisher Production Pipelines PL1488 and PL1489 and umbilical PLU1490 at 58°46.779’ N, 01°25.253’ E</td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PMS Cable</td>
<td>Power Cable</td>
<td>8.6 km / W</td>
<td>Brae Bravo to East Brae Power Cable.</td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PLU4188</td>
<td>Control Umbilical</td>
<td>8.6 km / W</td>
<td>Brae Bravo 18” Gas Transfer SSIV Control Umbilical.</td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL895</td>
<td>Gas Transfer</td>
<td>8.6 km / W</td>
<td>East Brae 18” to Brae Bravo Bypass Gas Transfer Pipeline</td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL895A</td>
<td>Gas Transfer</td>
<td>8.6 km / W</td>
<td>Brae Bravo SSIV XXV3753 to Brae Bravo Gas Transfer Pipeline</td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>PL4164</td>
<td>Gas Transfer</td>
<td>8.6 km / W</td>
<td>SSIV XXV to SSIV XXV3769 Gas Transfer Bypass Pipeline</td>
<td>Active</td>
</tr>
<tr>
<td>BP Exploration (Alpha) Limited</td>
<td>Miller</td>
<td>Platform</td>
<td>7.6 km / SW</td>
<td>Miller Platform. Decommissioned production platform. Topsides removed</td>
<td>Inactive</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>Central Brae</td>
<td>Template</td>
<td>10.8 km / SW</td>
<td>Subsea Template for Central Brae Wells.</td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>East Brae</td>
<td>Platform</td>
<td>11.8 km / N</td>
<td>East Brae production platform.</td>
<td>Active</td>
</tr>
<tr>
<td>TAQA Bratani Ltd</td>
<td>Brae Alpha</td>
<td>Platform</td>
<td>15.0 km / SW</td>
<td>Brae Alpha production platform.</td>
<td>Active</td>
</tr>
</tbody>
</table>

**Impacts of Decommissioning Proposals**

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.
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

<table>
<thead>
<tr>
<th>Name</th>
<th>Facility Type*</th>
<th>Location</th>
<th>Topsides/ Facilities</th>
<th>Weight (Te)</th>
<th>No of modules</th>
<th>Jacket (if applicable)</th>
<th>Weight (Te)</th>
<th>Number of legs</th>
<th>Number of piles</th>
<th>Weight of piles (Te)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

2.1.2 Kingfisher Field Installations: Subsea including Stabilisation Features

Table 2.2: Subsea Installations and Stabilisation Features

<table>
<thead>
<tr>
<th>Subsea installations including Stabilisation Features</th>
<th>No.</th>
<th>Size / Weight (Te)</th>
<th>Location</th>
<th>Comments / Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manifold</td>
<td>1</td>
<td>13.5m x 6.5m x 5m / 123.3Te</td>
<td>WGS84 Decimal Degrees</td>
<td>58.771115°N 1.489731°E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.267’N 01° 29.384’E</td>
</tr>
<tr>
<td>Kingfisher Wellheads (inc flowbase)</td>
<td>6</td>
<td>3.4m x 4.6m x 6.2m / 18.9 Te (BP1.1 -16/08a-K1)</td>
<td>WGS84 Decimal Degrees</td>
<td>58.771153°N 1.489453°E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.269‘N 01° 29.337’ E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4m x 4.6m x 6.2m / 18.9 Te (BP1.2 -16/08a-K2)</td>
<td>WGS84 Decimal Degrees</td>
<td>58.77131°N 1. 489619°E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.280°N 01° 29.377° E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4m x 4.6m x 6.2m / 18.9 Te</td>
<td>WGS84 Decimal Degrees</td>
<td>58.770981°N 1.489683°E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.280°N 01° 29.377° E</td>
</tr>
</tbody>
</table>
Table 2.2: Subsea Installations and Stabilisation Features

<table>
<thead>
<tr>
<th>Subsea installations including Stabilisation Features</th>
<th>No.</th>
<th>Size / Weight (Te)</th>
<th>Location</th>
<th>Comments / Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingfisher Wellheads (inc flowbase)</strong></td>
<td>6</td>
<td>3.4m x 4.6m x 6.2m / 18.9 Te (BP1.3 - 16/08a-K3)</td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.259’ N 01° 29.381’ E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4m x 4.6m x 6.9m / 19.4 Te (BP1.3s1 (16/08a-K4Z))</td>
<td>WGS84 Decimal Degrees</td>
<td>58.771342°N 1.489961°E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4m x 4.6m x 6.9m / 19.4 Te (HP1 - 16/08a-K6)</td>
<td>WGS84 Decimal Minute</td>
<td>58° 46.293’ N 01° 29.506’ E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4m x 4.6m x 6.9m / 19.4 Te (HP2 - 16/08a-K5)</td>
<td>WGS84 Decimal Degrees</td>
<td>58.771164°N 1.490219°E</td>
</tr>
</tbody>
</table>

Concrete mattresses | n/a | n/a | n/a | n/a |
Grout bags | n/a | n/a | n/a | n/a |
Formwork | n/a | n/a | n/a | n/a |
Frond Mats | n/a | n/a | n/a | n/a |
Rock Dump | n/a | n/a | n/a | n/a |
### 2.1.3  Kingfisher Field: Pipelines Including Stabilisation Features

<table>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (as per PWA)</th>
<th>Diameter (inches)</th>
<th>Approx. Length (km)</th>
<th>Description of Component Parts</th>
<th>Product Conveyed</th>
<th>From - To End Points</th>
<th>Burial Status</th>
<th>Pipeline Status</th>
<th>Current Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipelines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production Pipeline</strong></td>
<td>PL1488</td>
<td>10</td>
<td>8.3*</td>
<td>Super Duplex steel with 4-layer polypropylene insulation</td>
<td>Reservoir Fluids</td>
<td>From Kingfisher Manifold to Brae Bravo 500m safety zone *</td>
<td>Trenched and buried with rock cover or natural backfill.; some surface laid sections; spools covered by concrete mattresses.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td><strong>Production Pipeline</strong></td>
<td>PL1489</td>
<td>10</td>
<td>8.3**</td>
<td>Super Duplex steel with 4-layer polypropylene insulation</td>
<td>Reservoir Fluids</td>
<td>From Kingfisher Manifold to Brae Bravo 500m safety zone **</td>
<td>Trenched and buried with rock cover or natural backfill.; some surface laid sections; spools covered by concrete mattresses.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td><strong>Production Jumper</strong></td>
<td>PL1497</td>
<td>6</td>
<td>0.017</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Reservoir Fluids</td>
<td>From Well BP1.1 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (as per PWA)</td>
<td>Diameter (inches)</td>
<td>Approx. Length (km)</td>
<td>Description of Component Parts</td>
<td>Product Conveyed</td>
<td>From - To End Points</td>
<td>Burial Status</td>
<td>Pipeline Status</td>
<td>Current Content</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------</td>
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<td>-------------------------------</td>
<td>---------------------------</td>
<td>------------------------------------</td>
<td>----------------------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Production Jumper</td>
<td>PL1498</td>
<td>6</td>
<td>0.021</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Reservoir Fluids</td>
<td>From Well BP1.2 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Production Jumper</td>
<td>PL1499</td>
<td>6</td>
<td>0.017</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Unused</td>
<td>From Well BP1.3 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Production Jumper</td>
<td>PL1500</td>
<td>6</td>
<td>0.030</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Reservoir Fluids</td>
<td>From Well BP2.1 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Production Jumper</td>
<td>PL1501</td>
<td>6</td>
<td>0.136</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Unused</td>
<td>From Well HP1 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Production Jumper</td>
<td>PL1502</td>
<td>6</td>
<td>0.027</td>
<td>Super Duplex steel with polyurethane insulation</td>
<td>Reservoir Fluids</td>
<td>From Well HP2 to Kingfisher Manifold</td>
<td>Surface laid and covered by concrete mattress.</td>
<td>Non-operational</td>
<td>Seawater</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (as per PWA)</td>
<td>Diameter (inches)</td>
<td>Approx. Length (km)</td>
<td>Description of Component Parts</td>
<td>Product Conveyed</td>
<td>From - To End Points</td>
<td>Burial Status</td>
<td>Pipeline Status</td>
<td>Current Content</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------------</td>
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<td>-------------------------------------------</td>
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<td>--------------</td>
<td>----------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Umbilicals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manifold Chemical and Control Umbilical</td>
<td>PLU1490</td>
<td>5.23</td>
<td>8.1***</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Brae Bravo 500m safety zone to Kingfisher Manifold UTA ***</td>
<td>Trenched and/or buried with rock cover or natural backfill.; some surface laid sections covered by concrete mattresses.</td>
<td>Non-operational</td>
<td>Seawater, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1491</td>
<td>75mm</td>
<td>0.017</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well BP1.1</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Sea water. Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (as per PWA)</th>
<th>Diameter (inches)</th>
<th>Approx. Length (km)</th>
<th>Description of Component Parts</th>
<th>Product Conveyed</th>
<th>From - To End Points</th>
<th>Burial Status</th>
<th>Pipeline Status</th>
<th>Current Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1492</td>
<td>75mm</td>
<td>0.022</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well BP1.2</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Seawater, Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1493</td>
<td>75mm</td>
<td>0.017</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well BP1.3</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
<tr>
<td>Description</td>
<td>Pipeline Number (as per PWA)</td>
<td>Diameter (inches)</td>
<td>Approx. Length (km)</td>
<td>Description of Component Parts</td>
<td>Product Conveyed</td>
<td>From - To End Points</td>
<td>Burial Status</td>
<td>Pipeline Status</td>
<td>Current Content</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>--------------------------------</td>
<td>--------------------------------------</td>
<td>---------------------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1494</td>
<td>75mm</td>
<td>0.030</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well BP2.1</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Sea water Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1495</td>
<td>75mm</td>
<td>0.140</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well HP1</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Sea water Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
</tbody>
</table>
## Table 2.3: Pipeline/Flowline/Umbilical Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Pipeline Number (as per PWA)</th>
<th>Diameter (inches)</th>
<th>Approx. Length (km)</th>
<th>Description of Component Parts</th>
<th>Product Conveyed</th>
<th>From - To End Points</th>
<th>Burial Status</th>
<th>Pipeline Status</th>
<th>Current Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical and Control Umbilical Jumper</td>
<td>PLU1496</td>
<td>75mm</td>
<td>0.027</td>
<td>Electro / Hydraulic / Chemical Control Umbilical</td>
<td>Methanol, Mineral Based Hydraulic Fluid</td>
<td>From Kingfisher Manifold UTA to Well HP2</td>
<td>Surface laid and covered in concrete mattresses</td>
<td>Non-operational</td>
<td>Sea water. Trace Methanol, Water Based Hydraulic Fluid, Mineral Based Hydraulic Fluid</td>
</tr>
</tbody>
</table>

* 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

** 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

*** 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
### Table 2.4: Subsea Pipeline Stabilisation Features

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

### Table 2.5: Subsea Pipeline Structures

<table>
<thead>
<tr>
<th>Pipeline Installations/structures</th>
<th>No.</th>
<th>Size/Weight (Te)</th>
<th>Location</th>
<th>Comments/Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### 2.1.4 Kingfisher Field Wells

**Table 2.6: Well Information**

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

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**

<table>
<thead>
<tr>
<th>Location of Pile Centre (Latitude/Longitude)</th>
<th>Seabed Area (m²)</th>
<th>Estimated volume of cuttings (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre of visible drill cuttings pile near Kingfisher wells: WGS84: 58° 46.275’ N 01° 29.386’ E</td>
<td>5027</td>
<td>1508</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Table 2.8: Kingfisher Material Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Installations</strong></td>
</tr>
<tr>
<td>Carbon Steel</td>
</tr>
<tr>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Non-Ferrous Metal</td>
</tr>
<tr>
<td>Concrete</td>
</tr>
<tr>
<td>Plastics</td>
</tr>
<tr>
<td>Haz Mat/NORM</td>
</tr>
<tr>
<td>Other Non-Hazardous</td>
</tr>
<tr>
<td><strong>Installations Total</strong></td>
</tr>
<tr>
<td><strong>Pipelines</strong></td>
</tr>
<tr>
<td>Carbon Steel</td>
</tr>
<tr>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Non-Ferrous Metal</td>
</tr>
<tr>
<td>Concrete</td>
</tr>
<tr>
<td>Plastics</td>
</tr>
<tr>
<td>Haz Mat/NORM</td>
</tr>
<tr>
<td>Other Non-Hazardous</td>
</tr>
<tr>
<td><strong>Pipelines Total</strong></td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Table 3.1: Topsides Removal Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) HLV (semi-submersible crane vessel) ☐ 2) Monohull crane vessel ☐ 3) SLV ☐ 4) Piece small ☐ 5) Other ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### 3.2 Jacket

There are no jackets associated with the Kingfisher Decommissioning Programmes.

<table>
<thead>
<tr>
<th>Table 3.2: Jacket Decommissioning Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
</tr>
<tr>
<td>N/A</td>
</tr>
</tbody>
</table>

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

### 3.3 Subsea Installations and Stabilisation Features

<table>
<thead>
<tr>
<th>Table 3.3: Subsea Installations and Stabilisation Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsea installations and stabilisation features</td>
</tr>
<tr>
<td>Production Manifold</td>
</tr>
<tr>
<td>Wellheads</td>
</tr>
<tr>
<td>Concrete mattresses</td>
</tr>
<tr>
<td>Grout bags</td>
</tr>
<tr>
<td>Formwork</td>
</tr>
<tr>
<td>Frond Mats</td>
</tr>
<tr>
<td>Rock Dump</td>
</tr>
</tbody>
</table>
### 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>
<thead>
<tr>
<th>Table 3.4: Pipeline or Pipeline Groups Decommissioning Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline / group (as per PWA)</strong></td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>2– Surface-laid lines Outside Brae Bravo 500m Zone PL1488, PL1489, PLU1490, PLU1491, PLU1492, PLU1493, PLU1494, PLU1495, PLU1496-PL1497, PL1498, PL1499, PL1500, PL1501, PL1502</td>
</tr>
<tr>
<td>5 – Pipeline ends at manifold PL1488, PL1489</td>
</tr>
<tr>
<td>6 – Trenched and buried sections PL1488, PL1489, PLU1490</td>
</tr>
<tr>
<td>7 – Umbilical end at manifold PLU1490</td>
</tr>
</tbody>
</table>

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

Note that only the coloured elements of Groups 2, 5, 6 and 7 are included in this DP scope.

'Greyed out' infrastructure will be included in a separate Decommissioning Programme to be issued at a later date.
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

<table>
<thead>
<tr>
<th>Pipeline or Group</th>
<th>Recommended Option</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2– Surface-laid lines Outside Brae Bravo 500m Zone PL1488, PL1489, PLU1490; PLU1491, PLU1492, PLU1493, PLU1494, PLU1495, PLU1496; PL1497, PL1498, PL1499, PL1500, PL1501, PL1502.</td>
<td>Full removal (Option 1)</td>
<td>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</td>
</tr>
<tr>
<td>5 – Pipeline ends at manifold PL1488, PL1489</td>
<td>Decommission in situ (Option 6)</td>
<td>The CA concluded that decommissioning in situ achieves a clear seabed whilst minimising the environmental impact from additional rock, both in the short- and long-term.</td>
</tr>
<tr>
<td>6 – Trenched and buried sections PL1488, PL1489, PLU1490 (includes PL1488, PL1489 and PLU1490 crossings of PL301 and PMS Cable, reference Table 1.7)</td>
<td>Decommission in situ (Option 6)</td>
<td>The CA concluded that decommissioning the pipelines in situ 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 Impact of Decommissioning Proposals, for more information on the pipelines crossings)</td>
</tr>
<tr>
<td>7 – Umbilical end at manifold PLU1490</td>
<td>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</td>
<td>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</td>
</tr>
</tbody>
</table>
3.5 Pipeline Stabilisation Feature(s)

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

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 PONS/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, 2018[1]).

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 km² yr

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 km² yr. This is significantly below the above listed OSPAR threshold of 500 km² yr.

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

<p>| How many drill cuttings piles are present? | 1 |
| <strong>Tick options examined:</strong> | |
| ☐ Remove and re-inject | ☑ Leave in place | ☐ Cover |
| ☐ Relocate on seabed | ☐ Remove and treat onshore | ☐ Remove and treat offshore |
| ☐ Other | |
| <strong>Review of Pile characteristics</strong> | <strong>Pile</strong> |
| 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 (m³) 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, |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What quantity (m³) would have to be displaced/removed?</td>
<td>1096</td>
</tr>
<tr>
<td>Have you carried out a Comparative Assessment of options for the Cuttings Pile?</td>
<td>No</td>
</tr>
</tbody>
</table>

PLU1493, PLU1494, PLU1495, PLU1496 and the partial removal of PL1488, PL1489 and PLU1490
## 3.8 Waste Streams

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Removal and Disposal Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Liquids</td>
<td>The Kingfisher system has been flushed and is free of bulk liquid waste.</td>
</tr>
<tr>
<td>Marine growth</td>
<td>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)</td>
</tr>
<tr>
<td>NORM/LSA Scale</td>
<td>No NORM was reported during operation of the Kingfisher Field, during the well P&amp;L campaign or in the main pipeline (PL1488 &amp; 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.</td>
</tr>
<tr>
<td>Asbestos</td>
<td>There is no asbestos within the Kingfisher subsea infrastructure or pipelines.</td>
</tr>
<tr>
<td>Other hazardous wastes</td>
<td>No other hazardous wastes were identified within the Kingfisher Inventory of Materials.</td>
</tr>
<tr>
<td>Onshore Dismantling sites</td>
<td>Selection of an onshore dismantling site will be made on the basis of a commercial process, taking account of HSSE&amp;SP criteria. 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.</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Environmental Receptor</th>
<th>Main Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation interests</td>
<td>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 ‘Submarine Structures made by leaking gases’ 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). Mobile species of conservation importance likely to be present in the area around the Kingfisher infrastructure include the Harbour Porpoise <em>Phocoena phocoena</em> 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. Observations of individual seapens <em>Virgularia mirabilis</em> and <em>Pennatula phosphorea</em> 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 <em>Arctica islandica</em> were also observed as present in some samples.</td>
</tr>
<tr>
<td>Seabed</td>
<td>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. 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</td>
</tr>
</tbody>
</table>
### Table 4.1: Environmental Sensitivities

<table>
<thead>
<tr>
<th>Environmental Receptor</th>
<th>Main Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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 \textit{Paraphinome jeffrysii} were ranked as the most abundant taxa. Most frequently observed mobile species included sea urchins (Brissindin, \textit{gracilechinus acutus, Spatangus perpureus}), brittle stars, sea lilies, hermit crabs, spider crabs and gastropods. 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 \textit{Cerianthus lloydii}.</td>
</tr>
<tr>
<td>Fish</td>
<td>The Kingfisher infrastructure lies within or in close proximity to known spawning areas for Blue Whiting \textit{Micromesistius poutassou} (January to April); Cod \textit{Gadus morhua} (January to April), Haddock \textit{Melanogrammus aeglefinus} (February to May); Norway Pout \textit{Trispoterus esmarkii} (January to April); Saithe \textit{Pollachius spp.} (January to April); Sandeels \textit{Ammodytidae spp.} (November to February); Norway lobster \textit{Nephrops norvegicus} (All year); Herring and mackerel \textit{Scomber scombrus} (May to September). The area is also used as nursery grounds for those listed above as well as Whiting \textit{Merlangius merlangus}, Ling \textit{Molva molva}, Hake and Angler fish \textit{Lophius piscatorius}. 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 \textit{Cetorhinus maximus} and porbeagle \textit{Lamna nasus} as well as tope \textit{Galeorhinus galeus} and the Spiny dogfish \textit{Squalus acanthias}. There are also historic records of sandy ray \textit{Leucoraja circularis} common skate \textit{Raja batis} in the area around the Kingfisher infrastructure in low densities.</td>
</tr>
<tr>
<td>Fisheries</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Table 4.1: Environmental Sensitivities

<table>
<thead>
<tr>
<th>Environmental Receptor</th>
<th>Main Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marine Mammals</strong></td>
<td>Landings in 2017 were dominated by demersal species (833 tonnes) with some shellfish (57 tonnes).</td>
</tr>
<tr>
<td></td>
<td>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 <em>Phocoena phocoena</em>, White-beaked dolphin <em>Lagenorhynchus albirostris</em> and Minke whale <em>Balaenoptera acutorostrata</em>. Harbour porpoise are listed under Annex II of the EU Habitats Directive and all three species are listed as Scottish PMFs. 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.</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td>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. Seabirds anticipated to be present in the Kingfisher area include: Northern Fulmar <em>Fulmarus glacialis</em> (All year); Northern Gannet <em>Morus bassanus</em> (All year); European Storm Petrel <em>Hydrobates pelagicus</em> (June to October); Pomerine skua <em>Stercorarius pomarinus</em> (March to June); Arctic skua <em>Stercorarius parasiticus</em> (May to August); Great skua <em>Stercorarius skua</em> (May to August); Black-legged kittiwake <em>Rissa tridactyla</em> (All year); Greater black-backed gull <em>Larus marinus</em> (Sept to March); Common gull <em>Larus canus</em> (July to February); Herring gull <em>Larus argentatus</em> (July to April); Guillemot <em>Uria aalge</em> (All year); Little auk <em>Alle alle</em> (November to February); and Atlantic Puffin <em>Fratercula arctica</em> (April to September). Of these species, the European storm petrel, and guillemot are both afforded protection under the EC Birds Directive (2009/147/EC).</td>
</tr>
<tr>
<td><strong>Onshore Communities</strong></td>
<td>The location of the decommissioning contractor’s onshore yard is not yet known.</td>
</tr>
<tr>
<td><strong>Other Users of the Sea</strong></td>
<td>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</td>
</tr>
</tbody>
</table>
## Table 4.1: Environmental Sensitivities

<table>
<thead>
<tr>
<th>Environmental Receptor</th>
<th>Main Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Users of the Sea</td>
<td>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. 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. 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. 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.”</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 infaunal 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>
<thead>
<tr>
<th>Table 4.2: Environmental Impact Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
</tbody>
</table>
| Subsea Installation Removal and Drill Cuttings Disturbance | **Discharge to sea:**  
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. | 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.  
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).  
A post-decommissioning environmental survey will be undertaken. The survey will focus on any chemical and physical |
### Table 4.2: Environmental Impact Management

<table>
<thead>
<tr>
<th>Activity</th>
<th>Main Impacts</th>
<th>Management of the Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>disturbances of the decommissioning activities compared with the pre-</td>
<td>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. 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.</td>
</tr>
<tr>
<td></td>
<td>decommissioning data. Results of this survey will be available once the</td>
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<tr>
<td>Unplanned Events:</td>
<td>work is complete, with a copy forwarded to OPRED. After the summary of the</td>
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<td></td>
<td>survey has been sent to OPRED and reviewed, a post-monitoring survey</td>
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<td></td>
<td>regime will be agreed. Post-decommissioning overtrawl trials or an</td>
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<td></td>
<td>alternative clear seabed verification method, to be discussed and agreed</td>
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<td>with OPRED, will be completed to demonstrate that the as-left condition of</td>
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<td></td>
<td>the seabed does not present a hazard to fishing, and to confirm a clear</td>
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<td></td>
<td>seabed.</td>
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<td></td>
<td>Unplanned Events:</td>
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<td></td>
<td>The potential for loss of vessel fuel from a decommissioning vessel whilst</td>
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<td>undertaking activities at Kingfisher has been considered. For the purposes</td>
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<td>of this assessment it has been assumed that the largest single vessel</td>
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<td>required on site will be a Heavy Lift Vessel (HLV) with a fuel inventory</td>
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<td>of no greater than 2, 695 m³ of vessel diesel. Modelling results show that</td>
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<td>the spill will not reach the UK coastline or any mainland European</td>
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<td>coastline, but there is up to a 70% probability of crossing the UK/Norwegian</td>
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<td>median line within &lt;6 hours during the spring, summer and autumn, with a</td>
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<td>slightly decreased probability of up to 60% during winter. Refer to Section</td>
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<td>The likelihood of a diesel release is low due to operating procedures in</td>
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<td>place (e.g. vessel will be subject to audits and inspections, regular</td>
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<td>maintenance and inspection of hoses and tanks, adequate bunding in place</td>
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<td>etc.). All appropriate notifications to mariners will be made prior to the</td>
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<td>operations. All operations will be carried out within the 500 m safety zone</td>
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<td></td>
<td>around the Kingfisher Manifold. The possibility of a diesel spill during</td>
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<td>operations will be covered under the vessels’ approved Shipboard Oil</td>
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<td></td>
<td>Pollution Emergency Plans (SOPEPs). As diesel is a non-persistent</td>
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<td>hydrocarbon, its residence in the marine environment is low, as such, the</td>
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<td></td>
<td>risk to the marine environment from accidental spills is considered to be</td>
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<tr>
<td></td>
<td>slight or minor, if effectively managed.</td>
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</tr>
<tr>
<td>Decommissioning of Pipelines</td>
<td>Discharges to Sea:</td>
<td>Where pipelines are to be decommissioning in situ they will be trenched and buried within the seabed or covered with rock protection. Whilst plastics in the marine environment are</td>
</tr>
<tr>
<td></td>
<td>An estimated 93 tonnes of plastic from coatings on pipelines and umbilicals,</td>
<td></td>
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<td></td>
<td>and associated with some protective mattress</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Main Impacts</td>
<td>Management of the Impacts</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Structures will be decommissioned in situ. However, note the pipelines and umbilicals to be decommissioned in situ 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.</td>
<td>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 ‘in situ’ will occur extremely slowly, with any degraded plastic products contained within the seabed and not available to the water column or benthic community.</td>
<td></td>
</tr>
<tr>
<td>Seabed Disturbance:</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>Decommissioning Stabilisation Features</td>
<td>Waste Generation: Recovered material will be classed as waste.</td>
<td>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.</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Table 5.1: Summary of Stakeholder Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points raised during statutory and public consultations</td>
</tr>
<tr>
<td>Stakeholder</td>
</tr>
<tr>
<td>National Federation of Fishermen’s Organisations</td>
</tr>
<tr>
<td>Scottish Fishermen’s Federation (SFF)</td>
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<tr>
<td>Northern Ireland Fish Producers Organisation (NIFPO)</td>
</tr>
<tr>
<td>Global Marine Systems Limited (GMS)</td>
</tr>
<tr>
<td>Public</td>
</tr>
</tbody>
</table>
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](image-url)
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>
<thead>
<tr>
<th>OGUK WBS</th>
<th>Item</th>
<th>Estimated Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Operator PM</td>
<td>Provided to OPRED in confidence</td>
</tr>
<tr>
<td>2.0</td>
<td>Facility running/owner costs</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>Wells abandonment</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>Facilities/pipelines making safe</td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>Topsides preparation – Not Relevant for Kingfisher</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>Topsides removal – Not Relevant for Kingfisher</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>Substructure removal – Not Relevant for Kingfisher</td>
<td></td>
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<tr>
<td>8.0</td>
<td>Topsides and substructure onshore recycling – Not Relevant for Kingfisher</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>Subsea Infrastructure</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>Site Remediation</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>Monitoring</td>
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</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Ref</th>
<th>Document Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>[2]</td>
<td>N/A</td>
<td>OPRED GUIDANCE NOTES - Decommissioning of Offshore Oil and Gas Installations and Pipelines November 2018</td>
</tr>
</tbody>
</table>

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.
PARTNER LETTER OF SUPPORT

Esso Exploration and Production UK Limited
Correspondence:
Union Plaza
1 Union Wynd
Aberdeen AB10 1SL
john.gilless@exxonmobil.com

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

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](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

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 · MFS Fishermen’s Association · Fishing Vessel Agents & Owners Association (Scotland) Ltd ·
Mallaig & North-west Fishermen’s Association Ltd · Orkney Fishermen Association · Scottish Inland Fishermen’s Association Ltd ·
The Scottish White Fish Producers’ Association Ltd · Shetland Fishermen’s Association

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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 ongoing 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:

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

G/ Blackbur
James Blackburn, Decommissioning Business Opportunity Manager
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 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 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 APP3-5 – Depth-of-Cover data for PL1488 crossing at Heimdal

Figure APP3-6 – Depth-of-Cover data for PL1489 crossing at Heimdal
Figure APP3-7 – Depth-of-Cover data for PLU1490 crossing at Heimdal