



# **Western Isles Subsea Infrastructure Decommissioning Programmes**

**May 2023**

**Consultation Draft**

UK-WIS-DC-DCM-PLN-0006

## **Preface**

This document sets out the Draft Decommissioning Programmes for the Western Isles (Harris and Barra Fields) subsea infrastructure. It has been submitted to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) which, in turn, required statutory and public consultation.

Stakeholders are invited to respond to the draft proposals during the 30-day consultation which runs from 26 May 2023 to 26 June 2023. Documentation referred to within this consultation draft can be made available for inspection by arrangement where not available online.

Comments should be sent by post to Stuart Wordsworth, Decommissioning Manager, Dana Petroleum (E&P) Limited, 62 Huntly Street, Aberdeen AB10 1RS, or by email to [stuart.wordsworth@dana-petroleum.com](mailto:stuart.wordsworth@dana-petroleum.com).

After consideration of any responses and further discussions with OPRED, the document will be updated and refined as required. Additional discussion with stakeholders may be needed depending on the comments submitted. The 'final' version of the document will incorporate details of comments from statutory and public consultees, indicating how these have been addressed.

Readers should note that the Draft Decommissioning Programmes for the Western Isles Floating Production Storage and Offloading Vessel (FPSO) and associated mooring systems, risers and dynamic umbilicals, served by the subsea infrastructure described in this document, have already formed the basis of a separate consultation earlier in 2023.

**Document Control**

**Approvals**

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**Revision Control**

| Revision No | Reference          | Changes/Comments | Issue Date |
|-------------|--------------------|------------------|------------|
| 1           | First Draft        | For Review       | 11/05/22   |
| 2           | Second Draft       | For Review       | 03/11/22   |
| 3           | Third Draft        | For OPRED Review | 09/03/23   |
| 4           | Fourth Draft       | For OPRED Review | 17/04/23   |
| 5           | Consultation Draft | For Issue        | 26/05/23   |

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## Terms and Abbreviations

| Abbreviation | Explanation  |
|--------------|--|
| BEIS         | Department for Business, Energy and Industrial Strategy  |
| CA           | Comparative Assessment   |
| CoP          | Cessation of Production  |
| EA           | Environmental Appraisal  |
| DP           | Decommissioning Programme  |
| EA           | Environmental Appraisal  |
| EHC          | Electrohydraulic Control   |
| ENE          | East North-East  |
| ESE          | East South-East  |
| FPSO         | Floating Production Storage and Offloading Vessel  |
| HSE          | Health and Safety Executive  |
| INTOG        | Innovation and Targeted Oil and Gas Schemes  |
| JNCC         | Joint Nature Conservation Council  |
| km           | kilometre  |
| LSA          | Low Specific Activity  |
| MWA          | Midwater Arch  |
| NDC          | North Drill Centre   |
| NORM         | Naturally Occurring Radioactive Material   |
| North Bundle | PL3729.1, PL3729.2, PL3729.3, PL3729.4, and PLU3729.5  |
| NRB          | North Riser Base   |
| NSTA         | North Sea Transition Authority   |
| OBM          | Oil-based Mud  |
| OPRED        | Offshore Petroleum Regulator for Environment and Decommissioning   |
| OSPAR        | Convention for the Protection of the Marine Environment of the North-East Atlantic (Oslo Paris Convention) |
| PWA          | Pipeline Works Authorisation   |
| ROV          | Remotely Operated Vehicle  |
| SDC          | South Drill Centre   |
| SFF          | Scottish Fishermen's Federation  |
| South Bundle | PL3730.1, PL3730.2, PL3730.3, PL3730.4, and PLU3730.5  |
| SRB          | South Riser Base   |
| SSE          | South South East   |
| SSIV         | Sub-Sea Isolation Valve  |
| TAQA         | Taqqa Bratani Limited  |
| Te           | Tonnes   |

|      |                                  |
|------|----------------------------------|
| TFSW | Trans Frontier Shipment of Waste |
| THC  | Total Hydrocarbon Concentration  |
| UKCS | United Kingdom Continental Shelf |
| WHPS | Wellhead Protection Structure    |

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# 1 EXECUTIVE SUMMARY

## 1.1 Combined Decommissioning Programmes

This document contains three decommissioning programmes (DPs) for the Western Isles (Barra and Harris) fields:

1. Installations; and
2. Subsea pipelines s29 reference 12.04.06.05/484c including the pipelines, bundles (including the pipelines carried within them), rigid tie-in spools, control jumpers and associated structures and stabilisation and
3. Subsea pipelines s29 reference 12.04.06.05-107u associated with well BP7 including pipelines, spools, jumpers and associated structures and stabilisation.

The items included in the subsea DPs are illustrated in Figure 1-2.

A separate Draft DP was submitted in March 2023 for statutory and public consultation on removal of the Western Isles floating production storage and offloading (FPSO) vessel and its associated mooring systems, risers and dynamic umbilicals.<sup>1</sup>

## 1.2 Requirement for Decommissioning Programmes

### 1.2.1 Installations

In accordance with the Petroleum Act 1998, the Section 29 Notice Holders of the Western Isles (Barra and Harris) fields (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 Table 2-1 of this programme. (See also Section 8 – Section 29 Notice Holders Letters of Support).

### 1.2.2 Pipelines

In accordance with the Petroleum Act 1998, the Section 29 Notice Holders of the Western Isles (Barra and Harris) fields pipelines (see Table 1.4) are applying to OPRED to obtain approval for decommissioning the pipelines detailed in Table 2-2 of this programme. (See also Section 8 – Section 29 Notice Holders Letters of Support).

In conjunction with public, stakeholder and regulatory consultation, the combined DPs are submitted in compliance with national and international regulations and OPRED guidelines (2018). The schedule outlined in this document is for an eight-year decommissioning project (from Define to Post-decommissioning surveys), see section 6.3 for more detail.

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<sup>1</sup> Including the flexible risers and dynamic umbilicals and upper section of mooring lines (top chain, buoyancy and polyester line) to and including the lower H-shackle, excluding the bottom chain and anchors. These, together with the scope of the present DP, are shown in Table 1-1 of the Environmental Appraisal (2023) and repeated in this document at Table 1-7 for the purposes of clarity.

### 1.3 Introduction

The Western Isles comprises the Barra and Harris fields. The fields are located in the UK Continental Shelf (UKCS) Block 210/24a situated 93 km to the North East of Shetland and 12 km west of the Tern platform (as the crow flies) which is the nearest fixed facility. The water depth of the field varies from approximately 150m to 165m.

The field has been developed using a floating production, storage, and offloading (FPSO) facility. Oil is exported by shuttle tanker and excess produced gas was initially exported through a dedicated pipeline to the Tern-North Cormorant gas pipeline. Later in field life due to a reduction of produced gas, gas has been continuously imported to balance the fuel gas deficit. The subsea facilities are tied back to the floating production facility by two subsea pipeline bundles and the pipelines they contain, and flexible risers. Water injection is required to maintain the reservoir pressure and gas lift is also required to assist production. Due to the nature of the reservoir, the production and injection wells are clustered around two drill centres: the North Drill Centre (NDC) and the South Drill Centre (SDC).

The North and South Drill Centre leading towheads have integral eight slot manifolds, allowing for up to 16 wells to be tied back. The NDC has five production and three water injection slots; the SDC has four production and four water injection slots. Refer to Figure 1-2 for schematic layout of facilities.

Following public, stakeholder and regulatory consultation, the combined DPs are submitted without derogation and in full compliance with OPRED guidelines. This document explains the principles of the removal activities and is supported by a Comparative Assessment (CA, 2023) of decommissioning options and an Environmental Appraisal (EA, 2023).

It should be noted that Dana Petroleum ('Dana') is in discussions with the North Sea Transition Authority (NSTA) around an anticipated Cessation of Production (CoP) date for the field. At this time (March 2023) the earliest anticipated CoP could be early 2024. This 'no earlier than' date is being driven by a response to the ongoing works of TAQA Bratani Limited's (TAQA) neighbouring assets and its own CoP forecast which will cut off gas supplies to Western Isles.

## 1.4 Overview of Installations/Pipelines Being Decommissioned

### 1.4.1 Installations

| Table 1-1: Subsea Installations Being Decommissioned |  |  |                 |
|--|--|--|-----------------|
| <b>Fields</b>  | Western Isles (Barra and Harris)   | <b>Production Type (Oil/Gas/Condensate)</b>    | Oil             |
| <b>Water Depth (m)</b>                               | 150m to 165m   | <b>UKCS block</b>                              | 210/24a         |
| <b>Distance to median (km)</b>                       | 58   | <b>Distance from nearest UK coastline (km)</b> | 93              |
| Subsea Installations                                 |  |  | Number of Wells |
| Number   | Type   |  | Subsea          |
| 25   | 2 x Leading Towheads (North Drill Centre (NDC) Leading Towhead and South Drill Centre (SDC) Leading Towhead) (see example in Appendix 1)<br>2 x Trailing Towheads (North Riser Base (NRB) Trailing Towhead and South Riser Base (SRB) Trailing Towhead) (see example in Appendix 1)<br>2 x Midwater Arches (MWA) and Gravity Bases (4 main components: MWA, Primary Base, Secondary Base, and Tether System) (see diagrams Appendix 2)<br>12 x Anchor Piles & Bottom Chains (see diagram Appendix 3)<br>7 x Wellhead Protection Structures (WHPS) <sup>2</sup> |  | 7 <sup>2</sup>  |

| Table 1-2 Installations Section 29 Notice Holders Details |                     |                     |
|---|---------------------|---------------------|
| Section 29 Notice Holders                                 | Registration Number | Equity Interest (%) |
| Dana Petroleum (E&P) Limited                              | 02294746            | 76.9188             |
| Dana Petroleum Limited                                    | 03456891            | 0%                  |
| Itochu Corporation  | JP7120001077358     | 0%                  |
| NEO Energy (UKCS) Limited                                 | 02669936            | 23.0812             |
| NEO Energy Group Limited                                  | SC470677            | 0%                  |
| NEO Energy Upstream UK Limited                            | SC279865            | 0%                  |

<sup>2</sup> The quantity of wells includes Well 210/24a-B11 (BP-7) which was drilled Q2 2022.

## 1.4.1 Pipelines

**Table 1-3 Pipelines Being Decommissioned**

|  |   |
|--|---|
| Number and total length (km) of Pipelines<br>Full details given in Table 2.2 | 32 uniquely numbered lines, 17.7 km total length <sup>3</sup> |
|--|---|

**Table 1-4 Pipelines Section 29 Notice Holders Details**

| Pipeline Number   | Section 29 Notice Holders      | Registration Number | Equity Interest (%) |
|---|--------------------------------|---------------------|---------------------|
| PL3186, PL3729.1, PL3729.2, PL3729.3, PL3729.4, PLU3729.5, PL3730.1, PL3730.2, PL3730.3, PL3730.4, PLU3730.5, PL4142, PL4143, PL4145, PL4146, PL4148, PL4150, PL4151, PL4153, PL 4154, PL4512, PLU4144, PLU4147, PLU4149, PLU4152, PLU4169, PLU4511 | Dana Petroleum (E&P) Limited   | 02294746            | 76.9188             |
|   | Dana Petroleum Limited         | 03456891            | 0%                  |
|   | Itochu Corporation             | JP7120001077358     | 0%                  |
|   | NEO Energy (UKCS) Limited      | 02669936            | 23.0812             |
|   | NEO Energy Group Limited       | SC470677            | 0%                  |
|   | NEO Energy Upstream UK Limited | SC279865            | 0%                  |
| PL6139, PL6140, PL6141, PLU6142, PL6143 (BP-7 related infrastructure)   | Dana Petroleum (E&P) Limited   | 02294746            | 76.9188             |
|   | Dana Petroleum Limited         | 03456891            | 0%                  |
|   | NEO Energy (UKCS) Limited      | 02669936            | 23.0812             |
|   | NEO Energy Group Limited       | SC470677            | 0%                  |
|   | NEO Energy Upstream UK Limited | SC279865            | 0%                  |

<sup>3</sup> The length is based on the two bundles (containing their respective uniquely numbered lines), a single rigid pipeline and associated spools and jumpers.

## 1.5 Summary of Proposed Decommissioning Programmes

| Table 1-5 Summary of Decommissioning Programmes  |   |
|--|---|
| Proposed Decommissioning Solution  | Reason for Selection  |
| <b>1. Subsea Installations</b>   |   |
| <p><b>Leading and Trailing Towheads – Full Removal</b></p> <p>The NDC and SDC leading towheads and NRB and SRB trailing towheads (at the respective ends of their bundles) will be disconnected from the main length of the bundles, recovered and transported onshore for reuse, recycling or appropriate treatment and disposal.</p>   | To remove all seabed structures and leave a clear seabed  |
| <p><b>Midwater Arches – Full Removal</b></p> <p>Post-FPSO sail away, the MWAs and their associated gravity bases (primary and secondary) will be fully recovered and transported onshore for reuse, recycling or appropriate treatment and disposal. Dana intends to recover the MWAs directly from the water column to surface as part of FPSO sail away operations but wish to retain the contingency option to lay down and short-term wet store them safely ahead of recovery, rather than leaving them in mid-water suspension, in the event that direct recovery to surface is not practicable at the time of execution.</p> | To remove all seabed structures and leave a clear seabed  |
| <p><b>Mooring Line Anchor Piles &amp; Bottom Chains – Full Removal</b></p> <p>Recover to shore and transport for final disposal with the lower section of the anchor piles (below -3m) left in place.</p>  | The anchor pile will be cut a minimum of 3m below the seabed, the upper section of the pile will be recovered along with the bottom chain section |
| <p><b>Wellhead Protection Structures – Full Removal</b></p> <p>The WHPS will be recovered and transported onshore for recycling or appropriate treatment and reuse or disposal. Note that the WHPS are integral and the intention is to remove them as part of the later plug and abandonment activities because of this. Should there be any delay between the main removal activities and WHPS removal that could potentially impact other users of the sea appropriate safety methods (e.g. guard vessel) will be introduced and relevant notifications made to FishSAFE and via Notices to Mariners.</p>                       | To remove all seabed structures and leave a clear seabed  |
| <b>2. Pipelines, Flowlines &amp; Umbilicals (Including Stabilisation &amp; Protection Features)</b>  |   |
| <p><b>Bundles</b></p> <p><u>Note:</u> the North and South bundles are carrier pipes which include PL3729.1 to PL3729.4 and PLU3729.5, and PL3730.1 to PL3730.4 and PLU3730.5. (See diagram of internal arrangement at Appendix 4.) Approximately 5,600 Te of rock cover will be applied to each bundle (four ends).</p>  | CA Recommendation: Leave <i>in situ</i>   |

**Table 1-5 Summary of Decommissioning Programmes**

| Proposed Decommissioning Solution  | Reason for Selection   |
|--|--|
| <p><b>Rigid Pipeline – Decommission <i>in situ</i></b></p> <p>The surface laid ends and trench transition sections of the pipelines will be recovered. The exposed ends will then be remediated with approximately 210 Te rock cover. The most recent depth of burial is shown in a schematic at Appendix 5 and will be updated following the survey planned for Q2 2023.</p> <p>At the crossing of the 6” gas import/export pipeline PL3186 with the TAQA Cladhan 7” Western Isles flexible riser, the intention is to decommission this via commercial agreement with TAQA (see <i>Interdependencies</i> below).</p>   | <p>CA Recommendation: Leave <i>in situ</i></p>   |
| <p><b>Rigid Tie-in Spools and Control Jumpers – Full removal</b></p> <p>Rigid Tie-in Spools and Control Jumpers will be disconnected and recovered either as a complete item or (depending on size) recovered in smaller sections and transported onshore for reuse, recycling or appropriate treatment and disposal.</p>  | <p>To remove snagging risk and leave a clear seabed</p>                                      |
| <p><b>Pipeline Stabilisation and Protection Features – Full Removal</b></p> <p>With the exception of rock used to provide protection and stabilisation of the Rigid Gas Import/Export line PL3186 trench transitions, all other protection and stabilisation features, i.e. grout bags and concrete mattresses, will be fully recovered during pipeline decommissioning works.</p>   | <p>To remove all pipeline stabilisation and protection features and leave a clear seabed</p> |
| <b>3. Wells</b>  |  |
| <p>Abandoned in accordance with Offshore Energies UK Guidelines for the Suspension and Abandonment of Wells.</p> <p>An Application to Abandon a Well and the associated relevant environmental permits under the relevant regulations will be submitted in support of Abandonment Operations.</p>  | <p>Meets NSTA and Health and Safety Executive (HSE) regulatory requirements</p>              |
| <b>4. Interdependencies</b>  |  |
| <p>The only crossing associated with this decommissioning proposal is the TAQA Cladhan 7” WI flexible riser which is crossed by Western Isles 6” gas import/export pipeline PL3186 adjacent to Tern Subsea Isolation Valve (SSIV). The actual crossing of the TAQA line is by the spool sections of the PL3186, with grout bag and mattress supports. The spool sections and supports will be removed as part of the decommissioning proposal with no impact to the Cladhan flexible which will be non-operational at this stage. Formal engagement at a commercial and technical level has been initiated with TAQA to seek agreement on field entry, permit to work and technical solution for the separation of WI from the TAQA SSIV pipeline system. Notification mechanisms will be agreed with TAQA to control the timing of operations to complete the CoP process.</p> <p>Subsea infrastructure and pipelines will have been flushed and cleaned prior to the commencement of subsea decommissioning operations.</p> <p><b>Note:</b> This combined DP covers the gas import/export pipeline, bundles, spools, wells and subsea structures associated with the Western Isles fields (mooring line anchors and bottom chains, MWAs, towheads and MWA gravity bases); a separate DP has been prepared which covers the flexible risers, dynamic umbilicals, (upper part of mooring lines) and FPSO. This approach is to enable FPSO sail away.</p> |  |

## 1.6 Field Location Including Field Layout and Adjacent Facilities

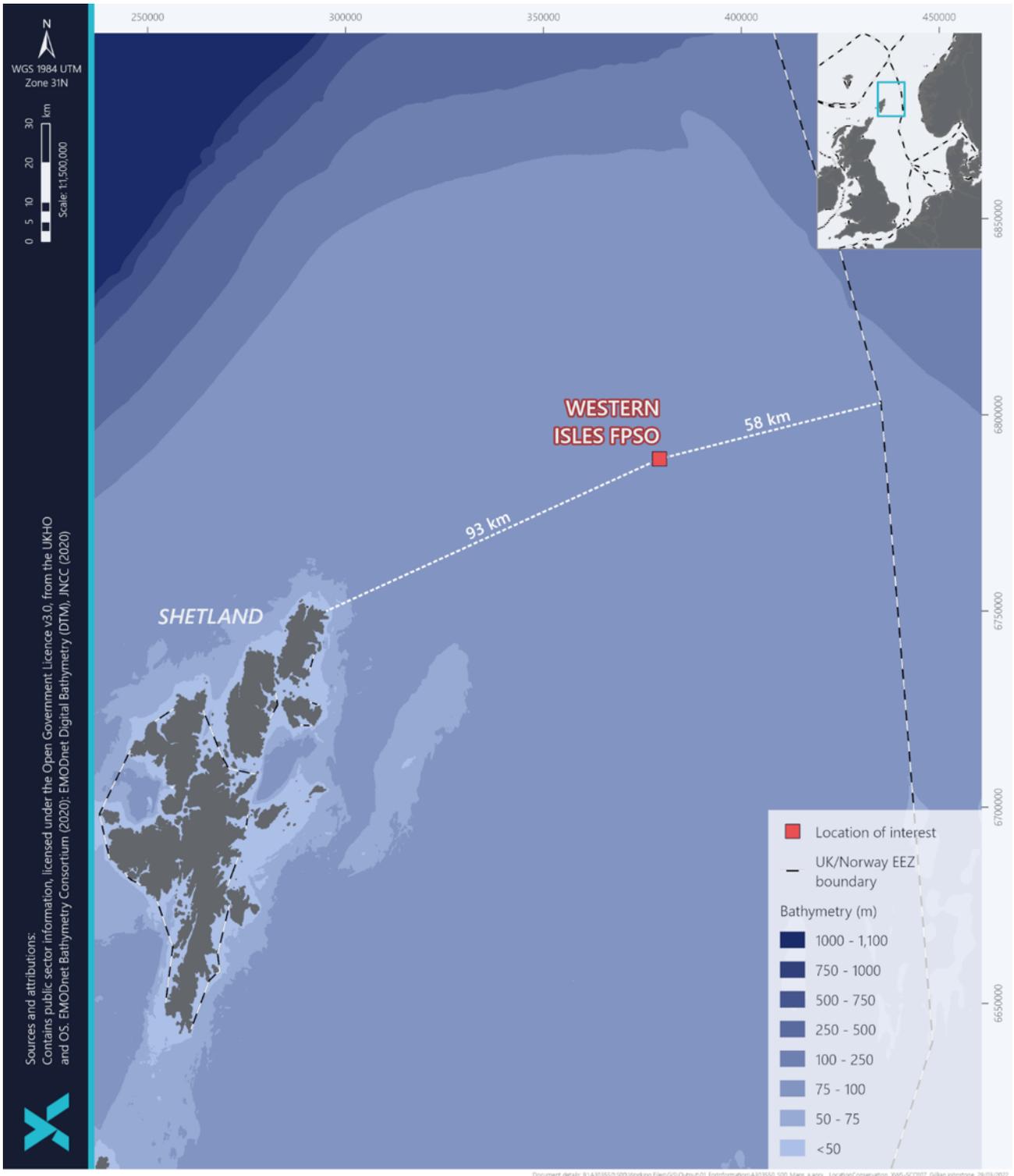
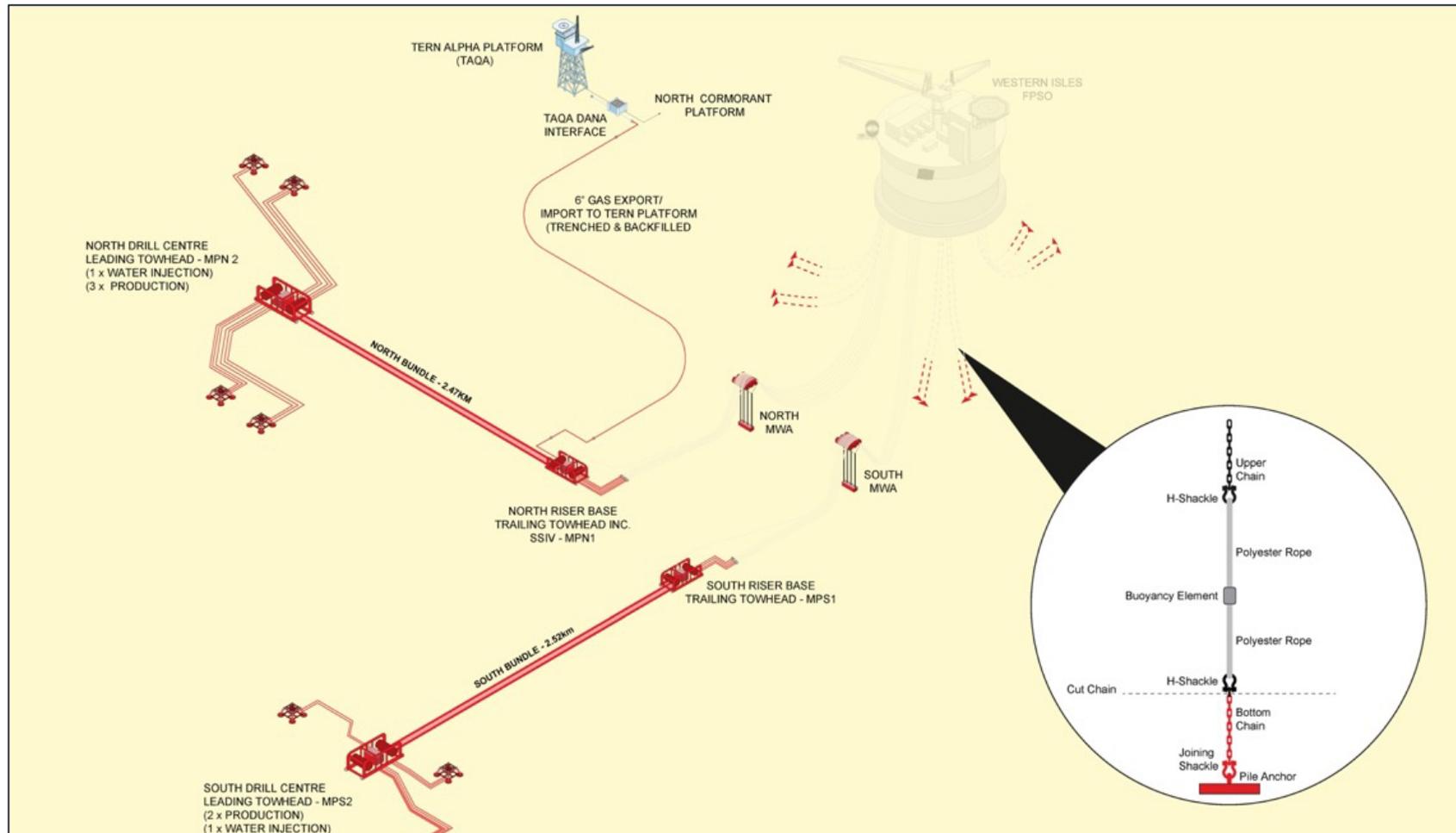


Figure 1-1 Field Location in UKCS



**Figure 1-2 Field Layout, Red denotes equipment within this DP**

**Table 1-6 Adjacent Facilities**

| Owner             | Name            | Type     | Distance/Direction | Information       | Status          |
|-------------------|-----------------|----------|--------------------|-------------------|-----------------|
| TAQA              | Tern            | Platform | 12 km/ENE          | Third party asset | Operational     |
| TAQA              | Cormorant A     | Platform | 21.1 km/ESE        | Third party asset | Operational     |
| TAQA              | Cormorant North | Platform | 21.4 km/ENE        | Third party asset | Operational     |
| TAQA              | Eider A         | Platform | 26.9 km/ENE        | Third party asset | Operational     |
| EnQuest Heather   | Heather A       | Platform | 30.8 km/SSE        | Third party asset | Operational     |
| Fairfield         | Dunlin A        | Platform | 45.7 km/ENE        | Third party asset | Non-operational |
| EnQuest Heather   | Thistle A       | Platform | 47.2 km/ENE        | Third party asset | Operational     |
| CNR International | Ninian Northern | Platform | 49.8 km/ESE        | Third party asset | Non-operational |

**Impacts of Decommissioning Proposals**

None of the adjacent facilities rely on Western Isles for production or services and only TAQA’s Tern SSIV connects to Western Isles which has independent control of the gas routing coming from North Cormorant. Tern Alpha and North Cormorant infrastructure is currently the route by which Western Isles imports gas. When Western Isles goes into CoP, Taqa decommissioning plans for Tern are expected to be well advanced, therefore there is no expected impact on TAQA. Notification mechanisms will be agreed with TAQA to control the timing of operations to complete the CoP process.

None of the other adjacent facilities listed above are affected by this combined DP.

Where appropriate/possible Dana intends to reuse elements of the subsea infrastructure held within this combined DP.

Decommissioning of the Western Isles FPSO has been applied for under a separate combined DP, with the various elements detailed below in Table 1-7 below alongside the subsea infrastructure covered within this present document.

**Table 1-7 Summary of FPSO and Subsea Decommissioning Programmes**

| CA Group | Title                                      | Proposed Decommissioning Solution | Associated Decommissioning Programme | In / Out of Scope of EA Status |
|----------|--|-----------------------------------|--------------------------------------|--------------------------------|
| 1        | FPSO                                       | Full removal                      | FPSO                                 | Out                            |
| 2        | Mooring Lines (Upper Section)              | Full removal                      | FPSO                                 | Out                            |
| 3        | Mid-water Arches                           | Full removal                      | Subsea                               | In                             |
| 4        | Dynamic Flexible Risers                    | Full removal                      | FPSO                                 | Out                            |
| 5        | Dynamic Umbilicals                         | Full removal                      | FPSO                                 | Out                            |
| 6        | Bundles                                    | Decommission <i>in situ</i>       | Subsea                               | In                             |
| 7        | Rigid Pipelines (Trenched and Backfilled)  | Decommission <i>in situ</i>       | Subsea                               | In                             |
| 8        | Spools                                     | Full removal                      | Subsea                               | In                             |
| 9        | Jumpers                                    | Full removal                      | Subsea                               | In                             |
| 10       | Structures                                 | Full removal                      | Subsea                               | In                             |
| 11       | Protection Materials                       | Full removal                      | Subsea                               | In                             |
| 12       | Mooring Lines (Lower Chain & Anchor Piles) | Full removal                      | Subsea                               | In                             |

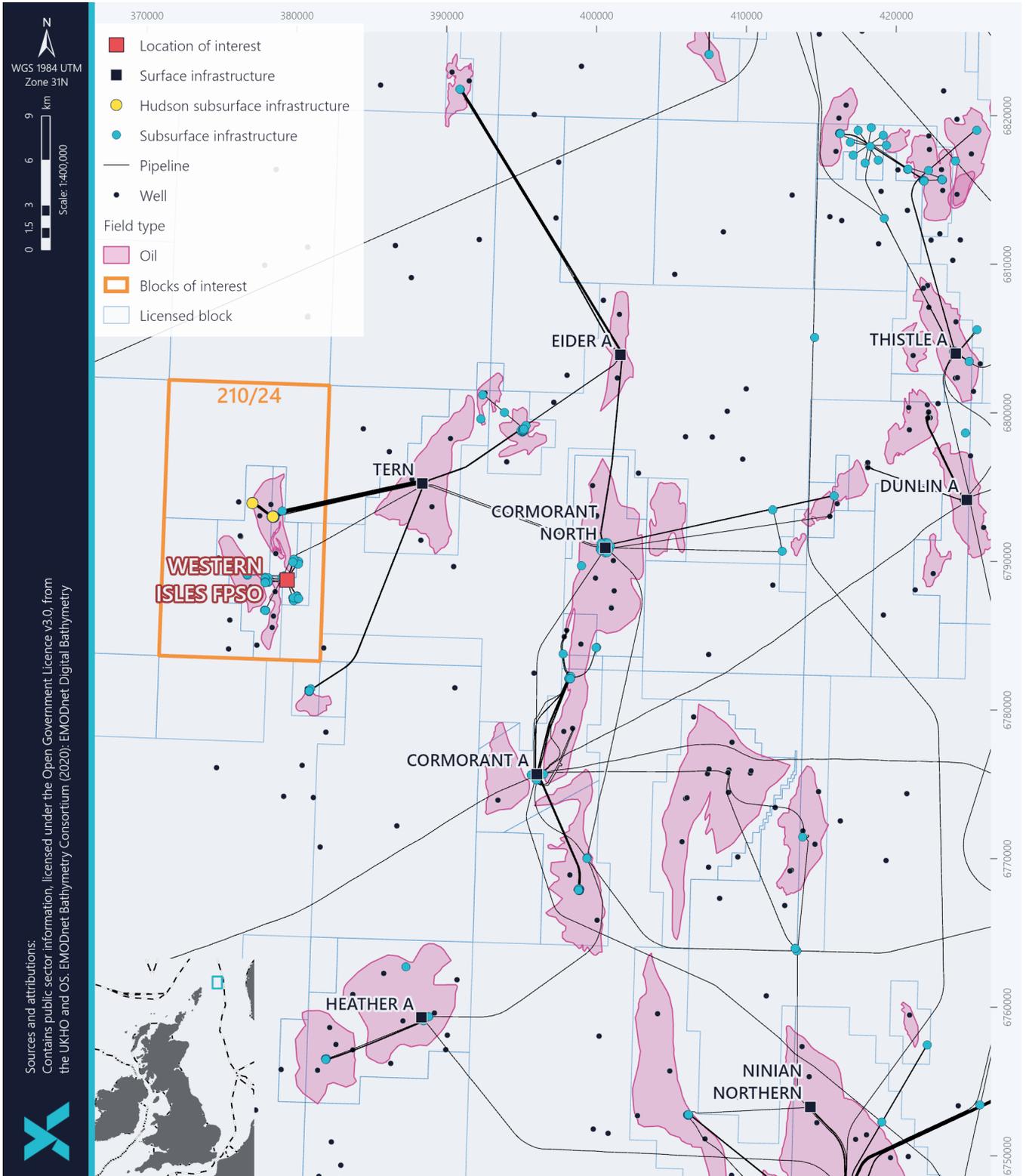


Figure 1-3 Adjacent Facilities



## **1.7 Industrial Implications**

It is Dana's intention to develop a contract strategy that will result in an efficient and cost-effective execution of the decommissioning works. Where appropriate, existing framework agreements may be used to synergise decommissioning activities with other activities, thereby reducing vessel mobilisation costs should the opportunity arise. Dana is in discussion with the NSTA regarding Supply Chain Action Plan (SCAP) requirements.

## 2 DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

### 2.1 Installations: Subsea

| Table 2-1 Subsea Installations                           |     |  |                      |                                       |   |
|--|-----|--|----------------------|---------------------------------------|---|
| Description  | No. | Size/Weight (Te)                                       | Location             |                                       | Comments/ Status  |
| NDC Leading Towhead (MPN2)                               | 1   | 29.375 x 6 x 5.956m (L x W x H)<br>209 Te (In-air)     | WGS84 Decimal        | 61.216895° N<br>0.703995° E           | Gravity Based   |
|  |     |  | WGS84 Decimal Minute | 61° 13' 0.821" N<br>0° 42' 14.383" E  |   |
|  |     |  |                      |                                       |   |
| SDC Leading Towhead (MPS2)                               | 1   | 29.375 x 6 x 5.954m (L x W x H)<br>208 Te (In-air)     | WGS84 Decimal        | 61.195721° N<br>0.727901° E           | Gravity Based   |
|  |     |  | WGS84 Decimal Minute | 61° 11' 44.595" N<br>0° 43' 40.442" E |   |
|  |     |  |                      |                                       |   |
| NRB Trailing Towhead (MPN1)                              | 1   | 19.76 x 6.6 x 5.281m (L x W x H)<br>119.22 Te (In-air) | WGS84 Decimal        | 61.216926° N<br>0.749498° E           | Gravity Based   |
|  |     |  | WGS84 Decimal Minute | 61° 13' 0.933" N<br>0° 44' 58.192" E  |   |
|  |     |  |                      |                                       |   |
| SRB Trailing Towhead (MPS1)                              | 1   | 19.76 x 6.0 x 5.281m (L x W x H)<br>109.72 Te (In-air) | WGS84 Decimal        | 61.216056° N<br>0.747561° E           | Gravity Based   |
|  |     |  | WGS84 Decimal Minute | 61° 12' 57.801" N<br>0° 44' 51.219" E |   |
|  |     |  |                      |                                       |   |
| FPSO Mooring Line Anchor Pile #1 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>137 Te                        | WGS84 Decimal        | 61.212436 °N<br>0.726678 °E           | The lower chain section attached to the anchor pile is included in this DP.<br><br>(The upper chain section, polyester section, buoyancy tanks and H-shackles shall be removed prior to works covered by this DP and details of this are captured in the Western Isles FPSO DPs.) |
|  |     |  | WGS84 Decimal Minute | 61° 12' 44.771" N<br>0° 43' 36.042" E |   |
|  |     |  |                      |                                       |   |
| FPSO Mooring Line Anchor Pile #2 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>137 Te                        | WGS84 Decimal        | 61.212894 °N<br>0.726510 °E           | See comment for FPSO Mooring Line Anchor Pile #1  |
|  |     |  |                      | 61° 12' 46.420" N                     |   |
|  |     |  |                      |                                       |   |

**Table 2-1 Subsea Installations**

| Table 2-1 Subsea Installations                           |     |                                 |                            |                   |  |
|--|-----|---------------------------------|----------------------------|-------------------|--|
| Description  | No. | Size/Weight (Te)                | Location                   |                   | Comments/ Status                                 |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 0° 43' 35.436" E  |  |
| FPSO Mooring Line Anchor Pile #3 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>137 Te | WGS84<br>Decimal           | 61.215172 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.726347 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 12' 54.619" N |  |
|  |     |                                 |                            | 0° 43' 34.848" E  |  |
| FPSO Mooring Line Anchor Pile #4 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>137 Te | WGS84<br>Decimal           | 61.215646 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.726457 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 12' 56.326" N |  |
|  |     |                                 |                            | 0° 43' 35.244" E  |  |
| FPSO Mooring Line Anchor Pile #5 and Lower Chain Section | 1   | 36 x 2.438m (L x Dia)<br>152 Te | WGS84<br>Decimal           | 61.227141 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.761179 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 13' 37.708" N |  |
|  |     |                                 |                            | 0° 45' 40.244" E  |  |
| FPSO Mooring Line Anchor Pile #6 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>152 Te | WGS84<br>Decimal           | 61.227010 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.762100 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 13' 37.238" N |  |
|  |     |                                 |                            | 0° 45' 43.558" E  |  |
| FPSO Mooring Line Anchor Pile #7 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>152 Te | WGS84<br>Decimal           | 61.226102 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.766492 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 13' 33.966" N |  |
|  |     |                                 |                            | 0° 45' 59.370" E  |  |
| FPSO Mooring Line Anchor Pile #8 and Lower Chain Section | 1   | 32 x 2.438m (L x Dia)<br>152 Te | WGS84<br>Decimal           | 61.225878 °N      | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |                                 |                            | 0.767333 °E       |  |
|  |     |                                 | WGS84<br>Decimal<br>Minute | 61° 13' 33.160" N |  |
|  |     |                                 |                            | 0° 46' 2.399"     |  |

Table 2-1 Subsea Installations

| Description  | No. | Size/Weight (Te)   | Location             |                                      | Comments/ Status                                 |
|--|-----|--|----------------------|--------------------------------------|--|
| FPSO Mooring Line Anchor Pile #9 and Lower Chain Section                           | 1   | 35 x 2.438m (L x Dia)<br>149 Te  | WGS84 Decimal        | 61.203547 °N<br>0.768877 °E          | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |  | WGS84 Decimal Minute | 61° 12' 12.771" N<br>0° 46' 7.956" E |  |
| FPSO Mooring Line Anchor Pile #10 and Lower Chain Section                          | 1   | 32 x 2.438m (L x Dia)<br>149 Te  | WGS84 Decimal        | 61.203307 °N<br>0.768098 °E          | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |  | WGS84 Decimal Minute | 61° 12' 11.905" N<br>0° 46' 5.154" E |  |
| FPSO Mooring Line Anchor Pile #11 and Lower Chain Section                          | 1   | 32 x 2.438m (L x Dia)<br>149 Te  | WGS84 Decimal        | 61.202267 °N<br>0.763853 °E          | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |  | WGS84 Decimal Minute | 61° 12' 8.161" N<br>0° 45' 49.870" E |  |
| FPSO Mooring Line Anchor Pile #12 and Lower Chain Section                          | 1   | 32 x 2.438m (L x Dia)<br>149 Te  | WGS84 Decimal        | 61.202092 °N<br>0.762959 °E          | See comment for FPSO Mooring Line Anchor Pile #1 |
|  |     |  | WGS84 Decimal Minute | 61° 12' 7.532" N<br>0° 45' 46.653" E |  |
|  |     |  | WGS84 Decimal Minute |                                      |  |
| MWA (APN1)<br>Inc Gravity bases (APN1-B1 & APN1-B2) & Tether System (APN1 Tethers) | 1   | <u>MWA Arch</u><br>14.5 x 11.4 x 7m (L x W x H)<br>157.9 Te (In air)<br><u>Docking Base</u><br>16 x 10 x 3.2m (L x W x H)<br>212.6 Te (In air)<br><u>Sinker Weight</u> | WGS84 Decimal        | 61.215311°N<br>0.752482°E            | Gravity Based                                    |
|  |     |  | WGS84 Decimal Minute | 61° 12' 55.119" N<br>0° 45' 8.935" E |  |
|  |     |  | WGS84 Decimal Minute |                                      |  |

Table 2-1 Subsea Installations

| Table 2-1 Subsea Installations  |     |   |                      |                                       |                            |
|---|-----|---|----------------------|---------------------------------------|----------------------------|
| Description   | No. | Size/Weight (Te)  | Location             |                                       | Comments/ Status           |
|   |     | 14 x 5 x 1.4m (L x W x H)<br>179.5 Te (In air)<br><u>Sealantic Tethers (4)</u><br>8.4 x 0.7 x 43.2 (L x W x H) 2.74 Te [total inc 4 tethers]  |                      |                                       |                            |
| MWA (APS1)<br>Inc Gravity bases (APS1-B1 & APS1-B2)) & Tether System (APS1 Tethers) | 1   | <u>MWA Arch</u><br>14.5 x 11.4 x 7m (L x W x H)<br>157.1 Te (In air)<br><u>Docking Base</u><br>16 x 10 x 3.2m (L x W x H)<br>210.9 Te (In air)<br><u>Sinker Weight</u><br>14 x 5 x 1.4m (L x W x H)<br>179.2 Te (In air)<br><u>Sealantic Tethers (4)</u><br>8.4 x 0.7 x 43.2 (L x W x H) 2.74Te [total inc 4 tethers] | WGS84 Decimal        | 61.214992°N<br>0.751850°E             | Gravity Based              |
|   |     |   | WGS84 Decimal Minute | 61° 12' 53.970" N<br>0° 45' 6.660" E  |                            |
|   |     |   |                      |                                       |                            |
| WHPS - 210/24a-B8Z (UP-2)   | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air)   | WGS84 Decimal        | 61.195631 °N<br>0.728479°E            | Attached to wellhead XPS2A |
|   |     |   | WGS84 Decimal Minute | 61° 11' 44.271" N<br>0° 43' 42.526" E |                            |
|   |     |   |                      |                                       |                            |
|   | 1   |   |                      | 61.195918 °N                          | Attached to wellhead       |

**Table 2-1 Subsea Installations**

| Description               | No. | Size/Weight (Te)                              | Location             |                   | Comments/ Status           |
|---------------------------|-----|---|----------------------|-------------------|----------------------------|
| WHPS - 210/24a-B10 (LI-2) |     | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 0.727095 °E       | XWS2F                      |
|                           |     |   | WGS84 Decimal Minute | 61° 11' 45.306" N |                            |
|                           |     |   |                      | 0° 43' 37.543" E  |                            |
| WHPS - 210/24a-B11 (BP-7) | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 61.195398 °N      | Attached to wellhead XPS2B |
|                           |     |   | WGS84 Decimal Minute | 0.728203 °E       |                            |
|                           |     |   |                      | 61° 11' 43.432" N |                            |
| WHPS - 210/24a-N1Z (HP-6) | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 61.216504 °N      | Attached to wellhead XPN2C |
|                           |     |   | WGS84 Decimal Minute | 0.704393 °E       |                            |
|                           |     |   |                      | 61° 12' 15.815" N |                            |
| WHPS - 210/24a-N2 (LP-4)  | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 61.217182 °N      | Attached to wellhead XPN2H |
|                           |     |   | WGS84 Decimal Minute | 0.703810 °E       |                            |
|                           |     |   |                      | 61° 13' 1.854" N  |                            |
| WHPS - 210/24a-N3Z (LP-5) | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 61.216606 °N      | Attached to wellhead XPN2D |
|                           |     |   | WGS84 Decimal Minute | 0.704176 °E       |                            |
|                           |     |   |                      | 61° 12' 59.780" N |                            |
| WHPS – 210/24a-N4Z (LI-1) | 1   | 9.1 x 8.7 x 5.3m (L x W x H) 24.8 Te (In air) | WGS84 Decimal        | 61.217261 °N      | Attached to wellhead XWN2G |
|                           |     |   | WGS84 Decimal Minute | 0.703593 °E       |                            |
|                           |     |   |                      | 61° 13' 2.140" N  |                            |
|                           |     |   |                      | 0° 42' 12.936" E  |                            |

## 2.2 Pipelines Including Stabilisation Features

Regular surveys and inspections have been carried out for the Western Isles since 2014 but the most recent pipeline survey scheduled for late 2022 as part of the environmental baseline survey was delayed because of bad weather, with results due Q2 2023. OPRED has agreed that the Draft DP can be submitted for statutory and public consultation with the 2018 pipeline survey data. The Final DP will include the 2023 survey data and addressed in the supporting documents (Environmental Appraisal and Comparative Assessment Report).



For the purposes of clarification, reference in the table below and elsewhere in this document to the North and South bundles should be understood as the carrier pipes which include PL3729.1 to PL3729.4 and PLU3729.5, PL3730.1 to PL3730.4 and PLU3730.5 within them.

Table 2-2 Pipeline/Flowline/Umbilical Information

| # | Description   | Pipeline Number (as per PWA)                                 | Diameter (inches)               | Length (km)   | Description of Component Parts | Product Conveyed | From – To End Points                        | Burial Status                | Pipeline Status | Current Content   |
|---|---|--|---------------------------------|---|--------------------------------|------------------|---|------------------------------|-----------------|---|
| 1 | Rigid Gas Import / Export line  | PL3186   | 6                               | 11.274  | Steel                          | Gas              | NRB Trailing Towhead to Tern SSIV           | Trenched and Buried          | Operational     |   |
| 2 | <b>North Bundle</b><br>(Pipe-in-Pipes and Pipelines within Bundle)<br><u>Note:</u> North Bundle total length is 2.4694 km (inc. Leading and Trailing Towhead)         | PL3729.1,<br>PL3729.2,<br>PL3729.3,<br>PL3729.4<br>PLU3729.5 | 8 / 12<br>8 / 12<br>8<br>6<br>- | 2.42027<br>2.42027<br>2.42027<br>2.42027<br>2.42027 | Steel                          | Oil              | NDC Leading Towhead to NRB Trailing Towhead | Surface laid (within Bundle) | Operational     | Production fluids, Injection water, Lift gas, Various electrical, hydraulic, and chemical cores   |
| 3 | <b>South Bundle</b><br>(Pipe-in-Pipes and Pipelines within Bundle lengths)<br><u>Note:</u> South Bundle total length is 2.5235 km (inc. Leading and Trailing Towhead) | PL3730.1,<br>PL3730.2,<br>PL3730.3,<br>PL3730.4<br>PLU3730.5 | 8 / 12<br>8 / 12<br>8<br>6<br>- | 2.47437<br>2.47437<br>2.47437<br>2.47437<br>2.47437 | Steel                          | Oil              | SDC Leading Towhead to SRB Trailing Towhead | Surface laid (within Bundle) | Operational     | Production fluids, Injection water, Lift gas and Various electrical, hydraulic and chemical cores |

**Table 2-2 Pipeline/Flowline/Umbilical Information**

| # | Description                      | Pipeline Number (as per PWA) | Diameter (inches) | Length (km) | Description of Component Parts | Product Conveyed | From – To End Points   | Burial Status | Pipeline Status | Current Content  |
|---|----------------------------------|------------------------------|-------------------|-------------|--------------------------------|------------------|--|---------------|-----------------|------------------|
| 4 | Gas Import / Export Tie-in Spool | PL3186 Ident No. 2           | 6                 | 0.0054      | Steel                          | Gas              | 6" Gas Import / Export Flexible Riser Flange to NRB Trailing Towhead Toweye  | Surface Laid  | Operational     | Lift gas         |
|   |                                  | PL3186 Ident No. 3           | 6                 | 0.06494     | Steel                          | Gas              | NRB Trailing Towhead Toweye to 6" Gas Import / Export Pipeline Tie-in Flange | Surface Laid  | Operational     | Lift gas         |
|   |                                  | PL3186 Ident No. 5           | 6                 | 0.0599      | Steel                          | Gas              | 6" Gas Import / Export Pipeline Tie-in Flange to Tern SSIV Structure         | Surface Laid  | Operational     | Lift gas         |
| 5 | Production Tie-in Spool          | PL3729.1                     | 8                 | 0.00535     | Steel                          | Oil              | NRB Trailing Towhead Toweye to 8" Production Flexible Riser Flange           | Surface Laid  | Operational     | Production fluid |
|   |                                  | PL3729.2                     | 8                 | 0.00535     | Steel                          | Oil              | NRB Trailing Towhead Toweye to 8" Production Flexible Riser Flange           | Surface Laid  | Operational     | Production fluid |
| 6 | Water Injection Tie-in Spool     | PL3729.3                     | 8                 | 0.00535     | Steel                          | Water            | 8" Water Injection Flexible Riser Flange to NRB Trailing Towhead             | Surface Laid  | Operational     | Injection water  |
| 7 | Gas Lift Tie-in Spool            | PL3729.4                     | 6                 | 0.0054      | Steel                          | Gas              | 6" Gas Lift Flexible Riser Flange to NRB Trailing Towhead                    | Surface Laid  | Operational     | Lift gas         |

**Table 2-2 Pipeline/Flowline/Umbilical Information**

| #  | Description                  | Pipeline Number (as per PWA) | Diameter (inches) | Length (km) | Description of Component Parts | Product Conveyed | From – To End Points   | Burial Status | Pipeline Status | Current Content  |
|----|------------------------------|------------------------------|-------------------|-------------|--------------------------------|------------------|--|---------------|-----------------|------------------|
| 8  | Production Tie-in Spool      | PL3730.1                     | 8                 | 0.02472     | Steel                          | Oil              | SRB Trailing Towhead Toweye to 8" Production Flexible Riser Flange | Surface Laid  | Operational     | Production fluid |
| 9  | Production Tie-in Spool      | PL3730.2                     | 8                 | 0.02662     | Steel                          | Oil              | SRB Trailing Towhead Toweye to 8" Production Flexible Riser Flange | Surface Laid  | Operational     | Production fluid |
| 10 | Water Injection Tie-in Spool | PL3730.3                     | 8                 | 0.02832     | Steel                          | Water            | 9" Water Injection Flexible Riser Flange to NRB Trailing Towhead   | Surface Laid  | Operational     | Injection water  |
| 11 | Gas Lift Tie-in Spool        | PL3730.4                     | 6                 | 0.02407     | Steel                          | Gas              | 6" Gas Lift Flexible Riser Flange to SRB Trailing Towhead          | Surface Laid  | Operational     | Lift gas         |
| 12 | Production Tie-in Spool      | PL4142                       | 6                 | 0.06425     | Steel                          | Oil              | Well XPN2C to NDC Leading Towhead                                  | Surface Laid  | Operational     | Production fluid |
| 13 | Gas Lift Tie-in Spool        | PL4143                       | 2                 | 0.06643     | Steel                          | Gas              | NDC Leading Towhead to Well XPN2C                                  | Surface Laid  | Operational     | Lift gas         |
| 14 | Production Tie-in Spool      | PL4145                       | 6                 | 0.04697     | Steel                          | Oil              | Well XPN2D to NDC Leading Towhead                                  | Surface Laid  | Operational     | Production fluid |
| 15 | Gas Lift Tie-in Spool        | PL4146                       | 2                 | 0.04938     | Steel                          | Gas              | NDC Leading Towhead to Well XPN2D                                  | Surface Laid  | Operational     | Lift gas         |
| 16 | Water Injection Tie-in Spool | PL4148                       | 6                 | 0.05378     | Steel                          | Water            | NDC Leading Towhead to Well XWN2G (LI-1)                           | Surface Laid  | Operational     | Injection water  |
| 17 | Production Tie-in Spool      | PL4150                       | 6                 | 0.04179     | Steel                          | Oil              | Well XPN2H to NDC Leading Towhead                                  | Surface Laid  | Operational     | Production fluid |

**Table 2-2 Pipeline/Flowline/Umbilical Information**

| #  | Description                  | Pipeline Number (as per PWA) | Diameter (inches) | Length (km) | Description of Component Parts | Product Conveyed | From – To End Points                     | Burial Status | Pipeline Status | Current Content  |
|----|------------------------------|------------------------------|-------------------|-------------|--------------------------------|------------------|--|---------------|-----------------|------------------|
| 18 | Gas Lift Tie-in Spool        | PL4151                       | 2                 | 0.04484     | Steel                          | Gas              | NDC Leading Towhead to Well XPN2H        | Surface Laid  | Operational     | Lift gas         |
| 19 | Production Tie-in Spool      | PL4153                       | 6                 | 0.03882     | Steel                          | Oil              | Well XPS2A to SDC Leading Towhead        | Surface Laid  | Operational     | Production fluid |
| 20 | Gas Lift Tie-in Spool        | PL4154                       | 2                 | 0.04251     | Steel                          | Gas              | SDC Leading Towhead to Well XPS2A        | Surface Laid  | Operational     | Lift gas         |
| 21 | Water Injection Tie-in Spool | PL4512                       | 6                 | 0.05672     | Steel                          | Oil              | SDC Leading Towhead to Well XWS2F        | Surface Laid  | Operational     | Injection water  |
| 22 | Services Umbilical Jumper    | PLU4144                      | -                 | 0.092       | Flexible hose                  | Umbilical Jumper | NDC Leading Towhead to Well XPN2C        | Surface Laid  | Operational     |                  |
| 23 | Services Umbilical Jumper    | PLU4147                      | -                 | 0.078       | Flexible hose                  | Umbilical Jumper | NDC Leading Towhead to Well XPN2D        | Surface Laid  | Operational     |                  |
| 24 | Services Umbilical Jumper    | PLU4149                      | -                 | 0.092       | Flexible hose                  | Umbilical Jumper | NDC Leading Towhead to Well XWN2G (LI-1) | Surface Laid  | Operational     |                  |
| 25 | Services Umbilical Jumper    | PLU4152                      | -                 | 0.078       | Flexible hose                  | Umbilical Jumper | NDC Leading Towhead to Well XPN2H        | Surface Laid  | Operational     |                  |
| 26 | Services Umbilical Jumper    | PLU4169                      | -                 | 0.078       | Flexible hose                  | Umbilical Jumper | SDC Leading Towhead to Well XPS2A        | Surface Laid  | Operational     |                  |
| 27 | Services Umbilical Jumper    | PLU4511                      | -                 | 0.092       | Flexible hose                  | Umbilical Jumper | SDC Leading Towhead to Well XWS2F        | Surface Laid  | Operational     |                  |
| 28 | Production Tie-in Spool      | PL6140                       | 6                 | 0.06214     | Steel                          | Oil              | Well XPS2B to SDC Leading Towhead        | Surface Laid  | Operational     |                  |
| 29 | Gas Lift Tie-in Spool        | PL6141                       | 1.2               | 0.06553     | Steel                          | Gas              | SDC Leading Towhead to Well XPS2B        | Surface Laid  | Operational     |                  |

Table 2-2 Pipeline/Flowline/Umbilical Information

| #  | Description                   | Pipeline Number (as per PWA) | Diameter (inches) | Length (km) | Description of Component Parts | Product Conveyed | From – To End Points              | Burial Status | Pipeline Status | Current Content |
|----|-------------------------------|------------------------------|-------------------|-------------|--------------------------------|------------------|-----------------------------------|---------------|-----------------|-----------------|
| 30 | Power/Signal Cable            | PL6139                       | 1.2               | 0.067       | Flexible cable                 | Power / Signal   | SDC Leading Towhead to Well XPS2B | Surface Laid  | Operational     |                 |
| 31 | Hydraulic and Chemical Jumper | PLU6142                      | -                 | 0.078       | Flexible hose                  | Umbilical Jumper | SDC Leading Towhead to Well XPS2B | Surface Laid  | Operational     |                 |
| 32 | Electrical Jumper             | PL6143                       | 1.2               | 0.068       | Flexible cable                 | Electrical       | SDC Leading Towhead to Well XPS2B | Surface Laid  | Operational     |                 |

**Table 2-3 Subsea Pipelines/Flowlines/Bundles and Umbilicals Stabilisation Features**

| Stabilisation Feature   | Total Number* | Weight (Te)           | Locations <sup>4</sup>  | Exposed/Buried/Condition  |
|---|---------------|-----------------------|---|---|
| Concrete Mattresses   | 77            | 395.01 (5.13 Te each) | NRB: 14<br>NDC: 28<br>SRB: 1<br>SDC: 23<br>TERN SSIV: 11                                | Latest survey information indicates surface laid, exposed, as-placed condition. |
| Grout Bags  | 2,160         | 54 (0.025 Te each)    | NRB: 800<br>NDC: 480<br>SRB: 120<br>SDC: 280<br>TERN SSIV: 480                          | Latest survey information indicates surface laid, exposed, as-placed condition. |
| Rock  | N/A           | 2,499                 | Rigid Gas Import/Export line PL3186 trench transitions<br>NRB: 1,578 Te<br>TERN: 921 Te | Exposed   |
| *The numbers quoted for concrete mattresses and grout bags include those used for tie-in of Well BP7 to the South Drill Centre. |               |                       |   |   |

**Note:** All the mattresses used in the field are placed principally for dropped object and overtrawl protection. This is true for pipeline ends and also for the interconnecting spools between wells and Leading Towheads. The grout bags are placed along the tie-in spools and the exposed pipeline and the interconnecting spools between wells and Leading Towheads. The grout bags are used to create a tapered profile for the mattress to rest. In doing so the grout bags provide lateral support to the spools during operation.

Only burial of the pipeline and rock cover provide required stabilisation and none of the grout bags or mattresses are required to stabilise the pipeline system.

<sup>4</sup> Due to bundle tie in configurations the stabilisation features in many cases are across multiple pipelines, therefore the quantity and approximate locations of stabilisation has been included e.g. NRB, SDC, SSIV based on as built information and with reference to associated tie-in locations.

<sup>5</sup> Rock quantities are taken from the Tideway Seahorse daily progress reports from the July 2014 campaign.

## 2.3 Wells

| Table 2-4 Well Information |             |            |                  |
|----------------------------|-------------|------------|------------------|
| Subsea Wells               | Designation | Status     | Category of Well |
| 210/24a-B8Z - XPS2A (UP-2) | Producer    | In Service | SS 3-3-3         |
| 210/24a-B10 - XWS2F (LI-2) | Injector    | In Service | SS 4-3-3         |
| 210/24a-B11 - XPS2B (BP-7) | Producer    | In Service | SS 3-3-3         |
| 210/24a-N1Z - XPN2C (HP-6) | Producer    | In Service | SS 4-3-3         |
| 210/24a-N2 - XPN2H (LP-4)  | Producer    | In Service | SS 4-3-3         |
| 210/24a-N3Z - XPN2D (LP-5) | Producer    | In Service | SS 4-3-3         |
| 210/24a-N4Z - XWN2G (LI-1) | Injector    | In Service | SS 4-3-3         |

Note: Well 210/24a-8 (the Melville E&A well) has been fully abandoned and is therefore excluded from the above table.<sup>6</sup>

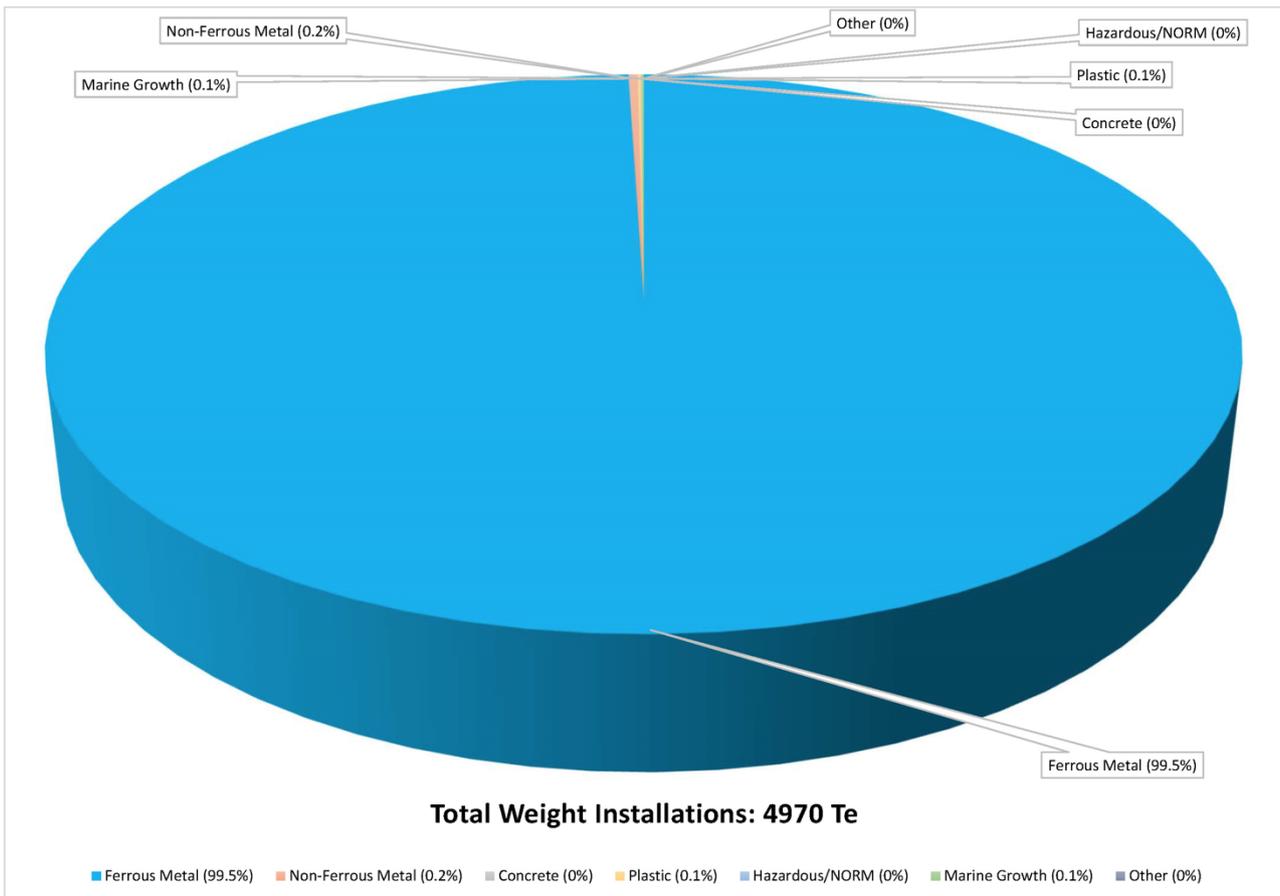
## 2.4 Inventory Estimates

The approximate amount of key materials used in the make-up of the Western Isles (Barra and Harris) fields installations and subsea pipelines has been evaluated. Further review of the inventories of materials will be conducted during the detailed engineering phase of decommissioning. Summary plots of the material inventories are shown in Table 2-5 and Table 2-6 below. An inventory will be shared with SEPA as part of the Active Waste Management Plan for decommissioning activities. See also Section 3.7.7 of the EA (2023).

<sup>6</sup> Included here for information purposes only and outwith the scope of the DP.

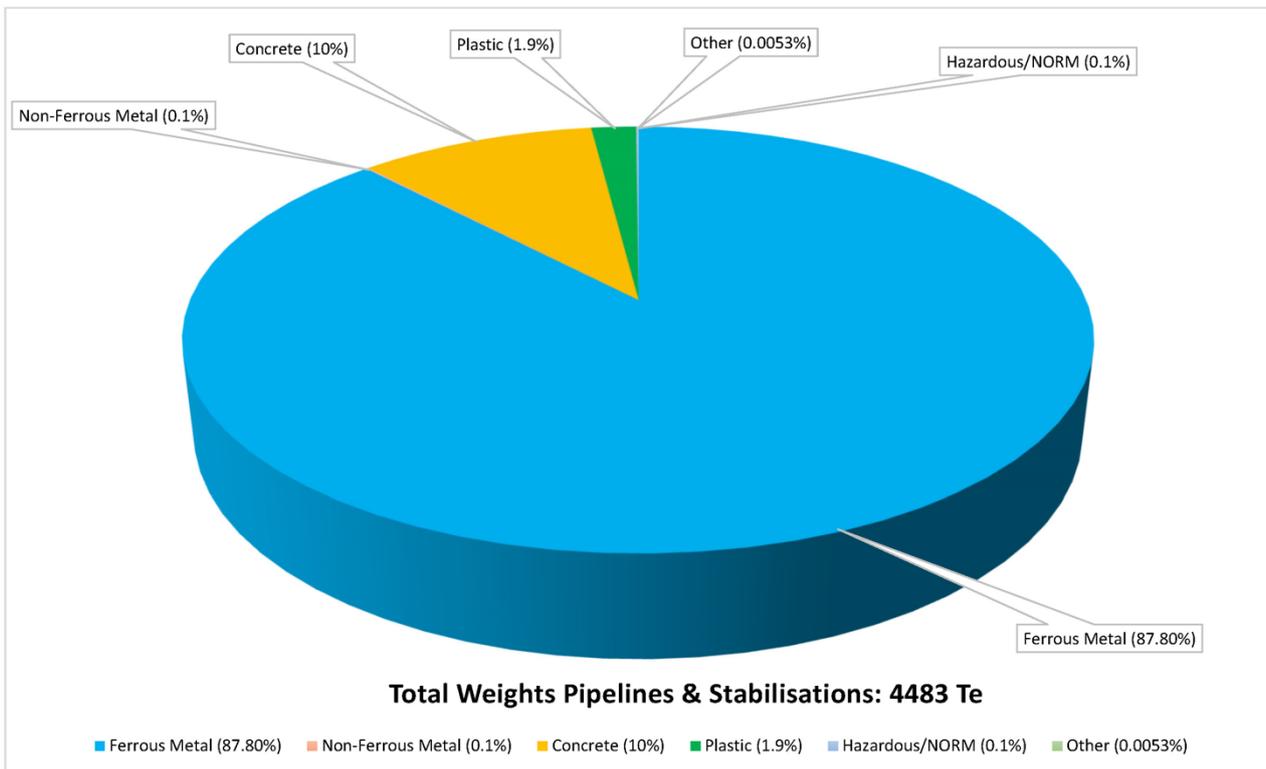
**Table 2-5 Western Isles Field Subsea Installations Estimated Inventory**

| Item                               | Weight (Te) |
|------------------------------------|-------------|
| Ferrous Metal                      | 4943.40     |
| Non-Ferrous Metal                  | 13.10       |
| Concrete                           | 0.00        |
| Plastic                            | 5.10        |
| Hazardous                          | 3.80        |
| Marine Growth (maximum estimation) | 5.00        |
| Other                              | 0           |
| <b>Total (Te)</b>                  | <b>4970</b> |



**Figure 2-1 Pie Chart of Estimated Inventories (Installations)**

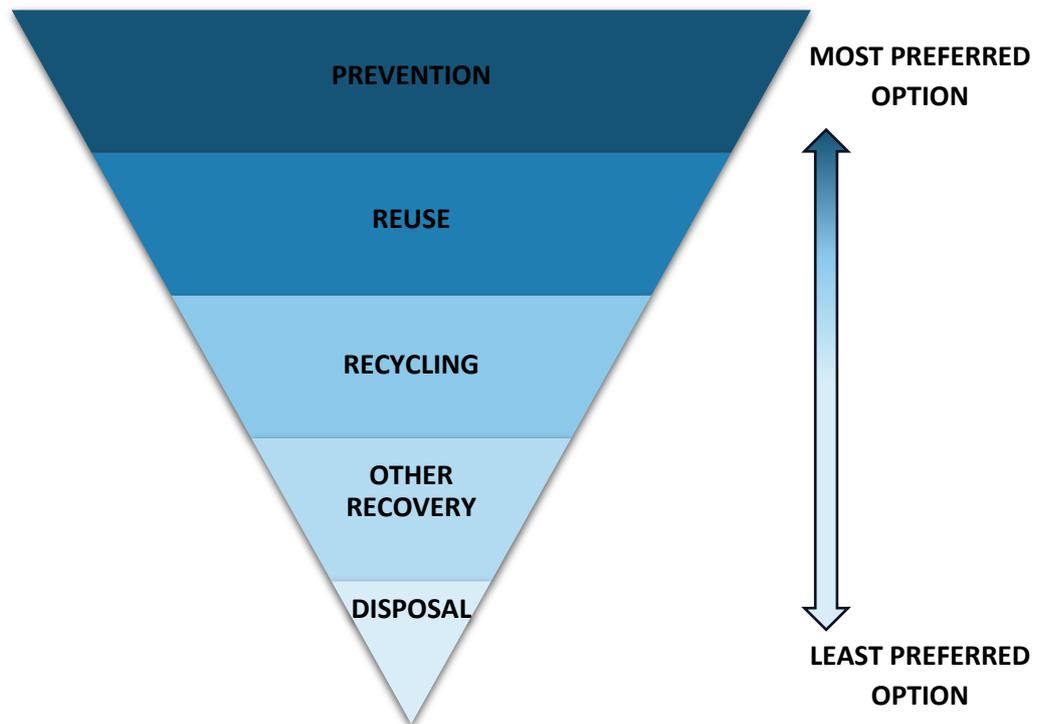
| Table 2-6 Western Isles Field Subsea Pipelines and Stabilisation Estimated Inventory |              |
|--|--------------|
| Item   | Weight (Te)  |
| Ferrous Metal  | 3,937.60     |
| Non-Ferrous Metal  | 6.40         |
| Concrete   | 449.0        |
| Plastic  | 86.10        |
| Hazardous / NORM   | 3.4          |
| Other  | 0.2          |
| <b>Total (Te)</b>  | <b>4,483</b> |



**Figure 2-2 Pie Chart of Estimated Inventory (Pipelines)**

### 3 REMOVAL AND DISPOSAL METHODS

Decommissioning of the Western Isles (Barra and Harris) fields will generate a quantity of waste. Dana is committed to establishing and maintaining environmentally acceptable methods for managing wastes in line with the Waste Framework Directive and principles of the waste hierarchy:



**Figure 3-1 Waste Hierarchy**

In line with the waste hierarchy, Dana have considered other potential reuse options for the Western Isles (Barra and Harris) fields infrastructure. Where no reuse options exist, recovered infrastructure will be returned to shore and transferred to a suitably licensed waste treatment facility. OPRED will be advised once a removal method is defined and once a disposal yard is selected.

It is expected that the recovered infrastructure, i.e. sections of pipeline, spools, towheads, will be cleaned before being largely recycled. Concrete mattresses and grout bags that are recovered will be cleaned of marine growth, if required, and either reused, recovered as aggregate for infrastructure projects or, as a worst case, if no other option is found to be suitable, disposed of in landfill sites.

An appropriately licensed disposal company and yard will be identified through a selection process that will ensure that the chosen facility demonstrates a proven track record of waste stream management throughout the deconstruction process, the ability to deliver innovative reuse/recycling options, and ensure the aims of the waste hierarchy are achieved.

Geographic locations of potential disposal yard options may require the consideration of Trans Frontier Shipment of Waste (TFSW), including hazardous materials. Early engagement with the regulatory authorities will ensure that any issues with TFSW are addressed. Once an appropriately licensed waste contractor has been selected OPRED will be advised.

### 3.1 Subsea Installations and Stabilisation Features

| Table 3-1 Subsea Installations and Stabilisation Features Decommissioning Options             |        |                           |   |
|---|--------|---------------------------|---|
| Subsea installations and stabilisation features   | Number | Option                    | Disposal Route  |
| NDC and SDC Leading and Trailing Towheads   | 4      | Full Removal              | Recover to shore and transport for reuse, recycling or disposal   |
| MWA Systems with 4 main components:<br>MWA<br>Primary Base<br>Secondary Base<br>Tether System | 2      | Full Removal              | Recover to shore and transport for reuse, recycling or disposal   |
| FPSO Mooring Line Anchor Piles  | 12     | Full Removal <sup>7</sup> | Recover to shore and transport for final disposal with the lower section (below -3m) of the anchor pile left in place |
| WHPS  | 7      | Full removal              | Recover to shore and transport for reuse, recycling or disposal   |

Note: The mooring system consists of 12 mooring lines (3 groups of 4 lines). The mooring lines and anchors have been split across two DPs as follows:

- the lower chains and anchor piles are captured within the scope of this combined DP;
- the upper section of mooring lines (upper chain, buoyancy and polyester line) up to and including the lower H-shackle chains are considered as part of the FPSO sail away hence are out with the scope of this combined DP.

<sup>7</sup> Removal of anchor piles to -3m is considered full removal in line with 7.24 & 7.25, BEIS Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines, Nov 2018.

## 3.2 Pipelines

### 3.2.1 Decommissioning Options:

The key options considered are listed below:

#### Group 6 – Bundles

- 1 - Reuse
- 2A - Cut and Lift
- 2B - Reverse S-lay
- 2C - Reverse Installation
- 2D - Cut, Float & Transport
- 3A - Rock Placement Over Entire Line
- 3B - Trench & Bury Entire Line
- 4A - Rock Placement Over Areas of Spans
- 4B - Trench & Bury Areas of Spans
- 4C - Remove Areas of Spans
- 4D - Accelerated Corrosion
- 5 - Remove ends and Remediate Snag Risk
- 6 - Leave as is

#### Group 7 – Trenched & Backfilled Pipeline

- 1 - Reuse
- 2A - Cut and Lift with Deburial
- 2B - Reverse Reel with Deburial
- 2C - Reverse Reel without Deburial
- 3A - Rock Placement Over Entire Line
- 3B – Re-trench & Bury Entire Line
- 4A - Rock Placement Over Areas of Spans/Exposure/Shallow Burial
- 4B - Trench & Bury Areas of Spans/Exposure/Shallow Burial
- 4C - Remove Areas of Spans/Exposure/Shallow Burial
- 4D - Accelerated Corrosion
- 5 - Remove ends and Remediate Snag Risk
- 6 - Leave as is

At each workshop, each decommissioning option for each infrastructure grouping was assessed against each of the assessment criteria utilising a pairwise comparison system. The relative importance of each of the criteria was assessed in a qualitative way, supported by quantification where appropriate.

This process provides for differentiation between decommissioning options in each infrastructure group taking account of stakeholder views.

Note: Consideration was given to potential spanning; however, Dana understanding is that while there is natural seabed undulation, there are no reportable spans. Should this be found to have changed after the 2023 survey, this will be discussed with OPRED and addressed in the final DP.

**Table 3-2 Pipeline or Pipeline Groups Decommissioning Options**

| <b>Pipeline or Group (as per PWA)</b>   | <b>Condition of line/group (Surface laid/trenched/buried/spanning)</b> | <b>Whole or part of pipeline/group</b>  | <b>Decommissioning options considered</b> |
|---|--|---|---|
| Group 6 – Bundles:<br>(North and South Bundles (PL3729.1, PL3729.2, PL3729.3, PL3729.4 , PLU3729.5, and PL3730.1, PL3730.2, PL3730.3, PL3730.4, PLU3730.5 respectively) | Surface laid   | Part of pipeline (as per PWA)<br>Bundle section between the leading and trailing towheads | 2A, 3A, 3B & 5                            |
| Group 7 – Trenched & Backfilled Pipeline:<br>PL3186   | Trenched and backfilled  | Whole line<br>From Tern SSIV to NRB   | 2B & 5                                    |
| Tie in spools <sup>8</sup>  | Surface laid   | Whole line  | Full Removal                              |

**Note:** In summary, trenching and backfilling is an intervention method deployed to bury a subsea pipeline following its installation. It is used as a means of enhancing stability and partially shielding against external hydrodynamic loads. It is a method which is also suitable for providing protection from (for example) fishing gear damage and scour. The method comprises two main operations following pipeline installation on the seabed: i) trenching, which involves the use of either a high pressure water jetting head or a plough to break-up the soil underneath the pipeline, at the end of which a trench is created to accommodate the pipeline; and ii), backfilling, which follows completion of trenching, using the same equipment (i.e. a high pressure water jetting head or a plough for putting the soil back into the trench) in order to bury the subsea pipeline.

### 3.2.2 Comparative Assessment Method

Comparative Assessment is integral to the overall planning and approval of decommissioning options. Dana’s strategy for the CA process is aligned with the Oil & Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes (OGUK, 2015) and the BEIS Guidance Notes for the Decommissioning of Offshore Oil and Gas Installations and Pipelines (OPRED, 2018).

Three pipelines are considered in the CA. All feasible decommissioning options for the infrastructure have been identified, assessed, ranked, and screened, utilising the Guidance Notes (OPRED, 2018) to carry forward credible decommissioning options, assessed through the CA process (see full report at CA, 2022).

The CA process used the five assessment criteria of Safety, Environment, Technical, Societal and Economic to compare the relative merits of each credible decommissioning option for the infrastructure. The assessment criteria were equally weighted to present a balanced assessment and represent the views of each of the stakeholders.

<sup>8</sup> The tie in spools between the wells and NDC and SDC have individual pipeline numbers as such they were identified for full removal prior to the evaluation stage of the CA [Ref CA Recommendation Report A-303550-S00-K-REPT-003].

An independent consultancy using its bespoke Multi Criteria Decision Analysis process was employed to facilitate the CA workshops. These were attended by specialists from key stakeholders and regulators, namely:

- Offshore Petroleum Regulator for Environment and Decommissioning (OPRED)
- Health and Safety Executive (HSE)
- Joint Nature Conservation Council (JNCC)
- Scottish Fishermen’s Federation (SFF)
- Dana Petroleum
- NEO Energy

### 3.2.3 Outcome of Comparative Assessment

| Table 3-3 Outcome of Comparative Assessment   |  |   |
|---|--|---|
| Pipeline or Group (as per PWA)  | Recommended Option   | Justification   |
| North and South Bundles (PL3729.1, PL3729.2, PL3729.3, PL3729.4, PLU3729.5, and PL3730.1, PL3730.2, PL3730.3, PL3730.4, PLU3730.5 respectively) | CA Recommendation: Leave <i>in situ</i>  | No viable technical solution for full recovery  |
| Buried Import Line (PL3186)   | CA Recommendation: Leave <i>in situ</i> after removal of ends and remediation of snag risk | PL3186 is trenched and backfilled along its length - cutting and recovering the end sections removes the snag risk associated with these sections |

### 3.3 Pipeline Protection and Stabilisation Features

The stabilisation features present in the field are only associated with pipeline tie-ins/ends and the single crossing. All mattresses and grout bags are to be fully removed.

| Table 3-4 Pipeline Protection and Stabilisation Features |          |                      |   |
|--|----------|----------------------|---|
| Stabilisation features                                   | Number   | Option               | Disposal Route (if applicable)                                  |
| Concrete Mattresses                                      | 77       | Full Removal         | Recover to shore and transport for reuse, recycling or disposal |
| Grout Bags   | 2,160    | Full Removal         | Recover to shore and transport for reuse, recycling or disposal |
| Rock Cover   | 2,499 Te | Leave <i>in situ</i> | N/A   |

### 3.4 Wells

**Table 3-5 Well Plug and Abandonment**

The wells which remain to be abandoned, as listed in Section 2.4 (Table 2-4) will be plugged and abandoned in accordance with Oil and Gas UK Guidelines for the suspension and abandonment of wells.

A PON5/Portal Environmental Tracking System (PETS)/Marine Licence application will be submitted in support of any such work that is to be carried out.

### 3.5 Waste Streams

The waste management plan will be developed once the contract has been awarded during the project execution phase. The plans shall adhere to the waste stream licensee conditions and controlled accordingly. Discussion with the regulator will ensure that all relevant permits and consents are in place.

| Table 3-6 Waste Stream Management Methods |  |
|---|--|
| Waste Stream                              | Removal and Disposal method  |
| Bulk liquids                              | All pipelines will be flushed, cleaned prior to decommissioning activities taking place. Further cleaning and decontamination will take place onshore prior to recycling/disposal.   |
| Marine growth                             | Where marine growth is encountered some may be removed offshore to aid recovery operations. Remaining marine growth will be managed by a selected onshore waste management contractor and disposed of in accordance with the regulations.  |
| NORM/LSA Scale                            | Historical data from the Western Isles NORM monitoring logs indicates very small amounts of NORM – ‘out of scope’ (detected in the FPSO cargo oil tanks). However, provisions are being made for a worst-case scenario in the event that this changes to ‘in scope/exempt’, e.g. from NORM scale and contaminated washings from the waste cleaning activities. As such, tender requirements specify the need for any receiving site to be permitted for NORM and have suitably trained personnel to undertake the required sampling and testing prior to any cleaning/decontamination activities. Any material found to contain NORM post-testing will be removed, re-packaged and disposed to a suitably permitted onshore facility with the appropriate consignment. |
| Asbestos                                  | No asbestos anticipated to be on location due to age.  |
| Other hazardous wastes                    | Any such materials shall be recovered onshore and will be managed by the selected waste management contractor and disposed of under an appropriate permit.   |
| Onshore dismantling sites                 | Appropriate licensed contractor and sites will be selected. The facility selected must demonstrate competence and a proven disposal track record and waste stream management and traceability throughout the deconstruction process and (preferably) demonstrate their ability to deliver innovative recycling options. OPRED will be advised when an appropriate site is selected.  |

| Table 3-7: Inventory Disposition |                         |                          |                             |
|----------------------------------|-------------------------|--------------------------|-----------------------------|
|                                  | Total Inventory Tonnage | Planned tonnage to shore | Planned left <i>in situ</i> |
| Installations                    | 4970.3                  | 3,249.7                  | 1,720.6 <sup>9</sup>        |
| Pipelines                        | 4,482.6                 | 496.5                    | 3,986.1                     |
| <b>Total:</b>                    | ≈9,453                  | ≈3,746                   | ≈5,707                      |

**Note:** All mooring piles will be cut at 3m below mean seabed. The top section of the mooring piles (3.5m in length) will be recovered and the remaining sections left *in situ*. The lower segments of the 12 mooring chains (210m in length) will be cut at the touch down points. The remaining sections of the mooring chains (approximately 18m) are connected to the pad eyes on the mooring piles located at 8m below mean seabed and will be left *in situ*. The calculated weight of remaining mooring piles and chains totals 1,720.6 Te. The total weight of protection cages is already included in disposal weights shown. Remedial rock cover totalling 11,410 Te will be applied to cut ends.

<sup>9</sup> The planned mass of installations decommissioned *in situ* is comprised entirely of the lower sections of the anchor piles and an 18m length of chain attached to each pile which is buried below the seabed surface.

## 4 ENVIRONMENTAL APPRAISAL OVERVIEW

The environmental sensitivities in the Western Isles (Barra and Harris) project area and the impacts of decommissioning operations on these sensitivities are summarised in Table 4-2. Further details can be found in the supporting Western Isles Decommissioning Environmental Appraisal (EA, 2023).

### 4.1 Environmental Sensitivities (Summary)

| Table 4-1 Environmental Sensitivities |  |
|---------------------------------------|--|
| Environmental Receptor                | Main Features  |
| Conservation interests                | <p>The Western Isles (Barra &amp; Harris) Fields are located approximately 62 km from the nearest conservation site – the Pobie Bank Reef Special Area of Conservation which is designated for the presence of Annex I habitat Reefs. Pobie Bank’s stony and bedrock reef provides a habitat to an extensive community of encrusting and robust sponges and bryozoans, which are found throughout the site. In the shallowest areas the bedrock and boulders also support encrusting coralline algae.</p> <p>All other conservation sites are located over 90 km from the project area. The closest coastal designated site is the Hermaness, Saxa Vord and Valla Field Special Protection Area (approximately 93 km from the Western Isles (Barra &amp; Harris) Fields).</p> <p>Seabed survey imagery did not identify any evidence of Annex I habitats. Only a single ocean quahog (<i>Arctica islandica</i>) was found in the 2012 survey (Gardline, 2012) and none were identified since, including in the 2022 pre-decommissioning Environmental Baseline Survey. There was no other evidence of OSPAR threatened and/or declining species or any UK Biodiversity Action Plan (UKBAP) species in the project area.</p>  |
| Seabed                                | <p>Four habitats were identified within the 2022 survey area and described as the EUNIS level 3 habitat types ‘Atlantic offshore circalittoral coarse sediment’ (MD32), ‘Atlantic offshore circalittoral mixed sediment’ (MD42), ‘Atlantic offshore circalittoral sand’ (MD52) and ‘Atlantic offshore circalittoral mud’ (MD62).</p> <p>Burrows were observed in sufficient density to comprise the OSPAR listed Threatened and/or Declining Species and Habitat ‘Sea pens and burrowing megafaunal communities’ on two transects.</p> <p>There are occasional patches of sediment classed as habitat Features of Conservation Interest (FOCI), including ‘subtidal sands and gravels’.</p> <p>The habitat Feature of Conservation Interest (FOCI) and priority habitat ‘Subtidal sands and gravels’ is also likely to be present.</p> <p>There was no indication from the 2010, 2012 or 2022 surveys of the presence of any Annex I habitats along either of the survey corridors within the in-field area, along the two in-field routes, or along the pipeline route between the FPSO and Tern.</p> <p>The 2022 survey identified that polychaetes were the dominant infaunal species group in the surveyed area, making up 69% of all individuals and 53% of all recorded taxa. Overall, the high number of taxa present at low abundances suggests that the survey area was undisturbed and with limited evidence of localised and low-level contamination from drilling.</p> |

Table 4-1 Environmental Sensitivities

| Environmental Receptor | Main Features  |
|------------------------|--|
| Fish                   | <p>The fields are located in an area of high nursery intensity for blue whiting <i>Micromesistius poutassou</i>. Anglerfish (Monkfish) <i>Lophius piscatorius</i>, European hake <i>Merluccius merluccius</i>, haddock <i>Melanogrammus aeglefinus</i>, herring <i>Clupea harengus</i>, ling <i>Molva molva</i>, mackerel <i>Scomber scombrus</i>, Norway pout <i>Trisopterus esmarkii</i>, spurdog <i>Squalus acanthias</i> and whiting <i>Merlangius merlangus</i> all use the area as nursery grounds (Coull <i>et al.</i>, 1998; Ellis <i>et al.</i>, 2012).</p> <p>Haddock, Norway pout, saithe <i>Pollachius virens</i> and whiting use the area as grounds for spawning, with spawning efforts for these species being concentrated in the first half of the year (between January and June).</p> <p>Of the species which are known to occur in the area in some capacity, a number are species of conservation concern. Anglerfish (Monkfish), blue whiting, herring, ling, mackerel, Norway pout, saithe and whiting are all Scottish Priority Marine Features. Additionally, spurdog is an OSPAR-listed Threatened and/or Declining Species.</p>   |
| Fisheries              | <p>The project area is located in ICES Rectangle 51F0 which is targeted primarily for demersal species. In 2021 (most recent data), the demersal catch live weight was 911 Te with a corresponding value of approximately £1.7 million. This accounts for approximately 67% of landings and approximately 84% of value for the year. 2021 saw a return of pelagic landings from ICES Rectangle 51F0, albeit with a relatively modest catch live weight of 454 Te and a corresponding value of approximately £0.3 million. This accounts for approximately 33% of landings and approximately 16% of value for the year. Rectangle 51F0 contributed approximately 0.25% of landings and 0.3% of value when compared to overall UKCS in 2021. It should be noted that this is significantly lower than ICES rectangles that are regularly targeted by pelagic fisheries.</p> <p>Overall, fishing effort in this ICES area is relatively low, although there is a recent trend showing increased effort; in 2021 there were 218 fishing days compared to 131 days in 2017. Historically, effort was mostly concentrated in the summer months and in November and December. However, as of 2021, fishing occurred in all months except for December. Fishing intensity along the PL3186 pipeline is also low, reaching a maximum of 150 hours (total), attributed to fishing vessels passing over the pipeline during transiting periods.</p> |

Table 4-1 Environmental Sensitivities

| Environmental Receptor | Main Features  |
|------------------------|--|
| Marine Mammals         | <p>Harbour porpoise (<i>Phocoena phocoena</i>) are frequently found throughout UK waters. They typically occur in groups of one to three individuals in shallow waters, although they have been sighted in larger groups and in deep waters. They are present in UK waters throughout the year and are most likely to be observed in the Western Isles fields in the summer months (Reid <i>et al.</i>, 2003). The density of harbour porpoise in the project area is estimated to be 0.402 animals/km<sup>2</sup> (Hammond <i>et al.</i>, 2021). Harbour porpoise is an Annex II listed species and European Protected Species.</p> <p>Minke whales (<i>Balaenoptera acutorostrata</i>) occur in water depths of 200 m or less throughout the NNS and Central North Sea. They are usually sighted in pairs or in solitude; however, groups of up to 15 individuals can be sighted feeding. It appears that animals return to the same seasonal feeding grounds (Reid <i>et al.</i>, 2003). Minke whales are most likely to be observed in the project area in the summer months and in low numbers. Their density is predicted to be 0.0316 animals/km<sup>2</sup> which is the highest across all areas surveyed (Hammond <i>et al.</i>, 2021). Minke whale are also listed as a UK Biodiversity Action Plan (BAP) species.</p> <p>While Atlantic white-sided dolphin are likely to be seen in the project area, this is only likely during July, although in high numbers at this time. The density of Atlantic white-sided dolphins in the project area is estimated to be 0.003 animals/km<sup>2</sup>.</p> <p>No other cetacean species are likely to be present in the project area.</p> <p>Two species of seal are resident in UK waters: the grey seal (<i>Halichoerus grypus</i>) and the harbour or common seal (<i>Phoca vitulina</i>), both occurring regularly over large parts of the North Sea. The estimated grey seal-at-sea density within the Western Isles area is thought to be 0.009 individuals per 25 km<sup>2</sup> (Russell <i>et al.</i>, 2017). The percentage of the grey seal population in the Western Isles area at any given time is ≤0.001% (Carter and Russell, 2020). The estimated harbour seal-at-sea density in the area is thought to be 0.005 individuals per km<sup>2</sup> (Russell <i>et al.</i>, 2017). The percentage of the harbour seal population in the Western Isles area at any given time is ≤0.001% (Carter and Russell, 2020).</p> |
| Birds                  | <p>The area surrounding the Western Isles (Barra &amp; Harris) Fields are utilised by the following species at various times of the year: European storm petrel <i>Hydrobates pelagicus</i>, long tailed skua <i>Stercorarius longicaudus</i>, northern gannet <i>Morus bassanus</i>, great skua <i>Stercorarius skua</i>, black-legged kittiwake <i>Rissa tridactyla</i>, glaucous gull <i>Larus hyperboreus</i>, great black-backed gull <i>Larus marinus</i>, herring gull <i>Larus argentatus</i>, common guillemot <i>Uria aalge</i>, little auk <i>Alle alle</i>, razorbill <i>Alca torda</i> and Atlantic puffin <i>Fratercula arctica</i> (Kober <i>et al.</i>, 2010).</p>   |

**Table 4-1 Environmental Sensitivities**

| Environmental Receptor | Main Features  |
|------------------------|--|
| Other Users of the Sea | <p>Shipping activity within Blocks 210/24 and 210/25 is considered to be very low and low respectively (Oil and Gas Authority, 2016).</p> <p>There are no operational offshore wind farms (OWFs) in the vicinity of the Western Isles (Barra &amp; Harris) Fields. However, the project area is close to areas identified under the Innovation and Targeted Oil and Gas (INTOG) scheme. The INTOG areas represent areas within which projects targeting oil and gas decarbonisation or which will generate &gt;100 MW of energy will be considered for approval (Marine Scotland, 2021). The Western Isles FPSO lies approximately 27 km southwest of the NE-a and NE-b INTOG areas.</p> <p>There are no other renewables developments, proposed or active, near the project area.</p> <p>There are no active or disused cables within 100 km of the Western Isles field. The CANTAT-3 active telecom cable is located approximately 107 km northeast of the Western Isles FPSO.</p> <p>Blocks 210/24 and 210/25 are not considered blocks of concern to the Ministry of Defence (Oil and Gas Authority, 2019).</p> <p>There are few wrecks recorded in the vicinity of the Western Isles (Barra &amp; Harris) Fields. The closest wreck is 20 km due east of the Western Isles FPSO and is considered non-dangerous. Closer to the project area lies an area of foul ground and an unknown obstacle; both are 10 km from the FPSO and are located &lt;1 km from the associated pipeline (NMPI, 2022).</p> |

## 4.2 Potential Environmental Impacts and their Management

### 4.2.1 Environmental Impact Assessment Summary

The Western Isles Decommissioning EA (2023) process has considered Scotland’s National Marine Plan, adopted by the Scottish Government to help ensure sustainable development of the marine area. Dana considers that the proposed decommissioning activities are in alignment with its objectives and policies.

Having reviewed the project activities within the wider regional context and taking into consideration the mitigation measures to limit any potential impacts, the findings of this EA conclude that the activities do not pose any significant threat to environmental or societal receptors and that there is not expected to be a significant impact on any European or nationally designated protected sites in proximity to the activities.

Table 4-2 details the decommissioning activities and their potential environmental impacts and the management and mitigation measures that will be put in place to further reduce the potential for environmental or societal effects.

### 4.2.2 Overview

| Table 4-2 Environmental Impact Management |   |   |
|---|---|---|
| Activity                                  | Main Impacts  | Management  |
| Subsea Installations Removal              | Atmospheric emissions impacts from excavation and removal of subsea installations | <ul style="list-style-type: none"> <li>Minimal number of vessels deployed and streamlining of activities through planning to reduce the time required for vessels will be required for these activities and will support the drive to reduce emissions.</li> <li>Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information of minimising fuel consumptions, e.g. economical speeds when operationally appropriate.</li> <li>Vessel equipment maintained according to manufacturer's recommendations.</li> <li>Use of low sulphur diesel.</li> <li>Green dynamic positioning or economical speeds when operationally appropriate.</li> <li>Dana Vessel Assurance process / procedure.</li> <li>Third Party Contractor Assurance process / procedure.</li> <li>Dana have also commissioned an Energy and Emissions Report to provide insight into the full lifecycle of emissions associated with the project and to highlight where emissions savings could be made.</li> </ul> |
|   | Seabed disturbance impacts from excavation and removal of subsea installations    | <ul style="list-style-type: none"> <li>All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that disturbance is minimised. In practical terms this means that dynamically positioned vessels will be used to undertake the decommissioning operations, any excavation will only be</li> </ul>   |

**Table 4-2 Environmental Impact Management**

| Activity                  | Main Impacts  | Management  |
|---------------------------|---|---|
|                           |   | <p>undertaken where necessary to facilitate cutting / recovery of items and that recovery basket deployment will be minimised.</p> <ul style="list-style-type: none"> <li>• A debris survey will be undertaken at the completion of the decommissioning activities. Any debris identified as resulting from oil and gas activities will be recovered from the seabed where possible.</li> </ul>   |
| Decommissioning Pipelines | Atmospheric emissions impacts from excavation and removal associated with decommissioning pipelines | <ul style="list-style-type: none"> <li>• Minimal number of vessels deployed and streamlining of activities through planning to reduce the time required for vessels will be required for these activities and will support the drive to reduce emissions.</li> <li>• Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information of minimising fuel consumptions e.g., economical speeds when operationally appropriate.</li> <li>• Vessel equipment maintained according to manufacturer's recommendations.</li> <li>• Use of low sulphur diesel.</li> <li>• Green dynamic positioning or economical speeds when operationally appropriate.</li> <li>• Dana Vessel Assurance process / procedure.</li> <li>• Third Party Contractor Assurance process / procedure.</li> <li>• Dana have also commissioned an Energy and Emissions Report to provide insight into the full lifecycle of emissions associated with the project and to highlight where emissions savings could be made.</li> </ul> |
|                           | Seabed disturbance impacts from excavation, removal (and subsequent remediation) of pipelines       | <ul style="list-style-type: none"> <li>• All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that disturbance is minimised. In practical terms this means that dynamically positioned vessels will be used to undertake the decommissioning operations, any excavation will only be undertaken where necessary to facilitate cutting / recovery of items and that recovery basket deployment will be minimised.</li> <li>• A debris survey will be undertaken at the completion of the decommissioning activities. Any debris identified as resulting from oil and gas activities will be recovered from the seabed where possible.</li> <li>• Rock cover will be applied by a fall pipe vessel equipped with an underwater camera to ensure accurate placement and reduce unnecessary spreading of the footprint while ensuring the minimum safe quantity is used.</li> </ul>   |
|                           | Snagging risk to commercial fisheries   | <ul style="list-style-type: none"> <li>• The Western Isles pipelines are currently shown on Admiralty Charts, the FishSAFE system and the OGA Infrastructure data</li> </ul>  |

**Table 4-2 Environmental Impact Management**

| Activity                                      | Main Impacts  | Management  |
|---|---|---|
|   | <p>associated with pipelines decommissioned <i>in situ</i></p>                              | <p>systems (OGA Open Data). Once decommissioning activities are complete, updated information (i.e., which infrastructure remains <i>in situ</i> and which has been removed) will be made available to allow Admiralty charts and the FishSAFE system to be updated.</p> <ul style="list-style-type: none"> <li>• Any exposures or cut pipeline ends will be rock covered to ensure they are overtrawlable by fishing vessels.</li> <li>• Any objects dropped during decommissioning activities will be removed from the seabed where appropriate.</li> <li>• Dana will monitor the seabed to assess any seabed depressions or clay berms which may present a snag risk. The survey results will be used in discussion with OPRED prior to the commencement of any intervention.</li> <li>• Clear seabed verification will ensure there is no residual risk to other sea users. The proposed method for clear seabed validation is through non-intrusive methodologies such as Sidescan Sonar and Multi-Beam Echosounder. If non-intrusive methods are deemed inconclusive during verification, alternative methods will be discussed and agreed with OPRED.</li> <li>• Ongoing consultation with fisheries representatives.</li> <li>• Dana recognises its obligation to monitor any infrastructure decommissioned <i>in situ</i> and therefore intends to set up arrangements to undertake post-decommissioning monitoring. The frequency of the monitoring that will be required will be agreed with OPRED and future monitoring will be determined through a risk-based approach established from the findings of each survey in turn. During the period over which monitoring is required, the burial status of the infrastructure decommissioned <i>in situ</i> would be reviewed and any necessary remedial action undertaken to ensure it does not pose a risk to other sea users.</li> </ul> |
| <p>Decommissioning Stabilisation Features</p> | <p>Atmospheric emissions impacts from excavation and removal of stabilisation materials</p> | <ul style="list-style-type: none"> <li>• Minimal number of vessels deployed and streamlining of activities through planning to reduce the time required for vessels will be required for these activities and will support the drive to reduce emissions.</li> <li>• Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information of minimising fuel consumptions e.g., economical speeds when operationally appropriate.</li> <li>• Vessel equipment maintained according to manufacturer's recommendations.</li> <li>• Use of low sulphur diesel.</li> </ul>  |

**Table 4-2 Environmental Impact Management**

| Activity | Main Impacts   | Management  |
|----------|--|---|
|          |  | <ul style="list-style-type: none"> <li>• Green dynamic positioning or economical speeds when operationally appropriate.</li> <li>• Dana Vessel Assurance process / procedure.</li> <li>• Third Party Contractor Assurance process / procedure.</li> <li>• Dana have also commissioned an Energy and Emissions Report to provide insight into the full lifecycle of emissions associated with the project and to highlight where emissions savings could be made.</li> </ul>   |
|          | <p>Seabed disturbance impacts from excavation and removal of stabilisation materials</p> | <ul style="list-style-type: none"> <li>• All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that disturbance is minimised. In practical terms this means that dynamically positioned vessels will be used to undertake the decommissioning operations, any excavation will only be undertaken where necessary to facilitate cutting / recovery of items and that recovery basket deployment will be minimised.</li> <li>• A debris survey will be undertaken at the completion of the decommissioning activities. Any debris identified as resulting from oil and gas activities will be recovered from the seabed where possible.</li> </ul> |

## 5 INTERESTED PARTY CONSULTATIONS

### 5.1 Consultations Summary

| Table 5-1 Summary of Stakeholder Comments                   |   |          |
|---|---|----------|
| Who   | Comment   | Response |
| <b>Statutory Stakeholder Consultations</b>                  |   |          |
| National Federation of Fishermen's Organisations            | For completion post-consultation  |          |
| Northern Ireland Fish Producers Organisation                | For completion post-consultation  |          |
| Global Marine Systems Limited                               | For completion post-consultation  |          |
| Scottish Fishermen's Federation                             | For completion post-consultation  |          |
| <b>Informal Consultations Before Submission of Draft DP</b> |   |          |
| HSE   | Introductory engagement on the Western Isles FPSO and subsea decommissioning programmes on 28 <sup>th</sup> July 2022 (virtual meeting). Attendance at the Comparative Assessment workshop on 17 August 2022.   |          |
| SFF   | Introductory engagement on the Western Isles FPSO and subsea decommissioning programmes on 28 <sup>th</sup> July 2022 (virtual meeting). Attendance at the Comparative Assessment workshop on 17 August 2022.   |          |
| JNCC  | Introductory engagement on the Western Isles FPSO and subsea decommissioning programmes on 11 <sup>th</sup> August 2022 (virtual meeting). Attendance at the Comparative Assessment workshop on 17 August 2022. |          |
| SEPA  | Opening engagement and general information sharing on the Western Isles FPSO and subsea decommissioning on 23 January 2023 (virtual meeting).   |          |

## 6 PROGRAMME MANAGEMENT

### 6.1 Project Management and Verification

A Project Management team will be appointed to manage suitable sub-contractors for the removal of the Western Isles infrastructure. Standard 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 Northern North Sea. The Project Management team will monitor and track the process of consents and the consultations required as part of this process. Any changes in detail to the offshore removal programme will be discussed and agreed with OPRED.

### 6.2 Post-Decommissioning Debris Clearance and Verification

Following completion of all decommissioning works in the Western Isles (Barra and Harris) Fields a post-decommissioning site survey will be carried out around a 500m radius of installation sites and a 100m corridor (50m either side) along each existing pipeline route to identify any debris. Any seabed debris related to offshore oil and gas activities will be recovered for onshore disposal or recycling in line with existing disposal methods. The proposed method for clear seabed validation is through non-intrusive methodologies such as Side Scan Sonar/ROV. If non-intrusive methods are deemed inconclusive during verification alternative methods will be discussed and agreed with OPRED. Upon verification of a clear seabed a statement of clearance to all relevant governmental departments and non-governmental organisations will be issued. It is proposed the verification work for the scope of this combined DP be completed in conjunction with the Western Isles FPSO DPs.

### 6.3 Schedule

The high-level Gantt chart below (Figure 6-1) provides the proposed schedule for the programme of decommissioning activities. The commencement of any execution activities is subject to commercial agreements and contracts. At this time this schedule is based on earliest anticipated CoP, subject to further discussions.

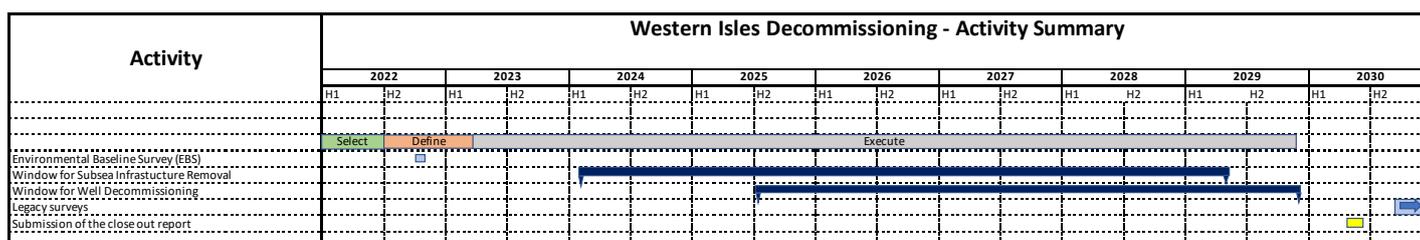


Figure 6-1 Gantt Chart of Project Plan

### 6.4 Costs

The decommissioning programme costs will be provided directly to OPRED.

### 6.5 Close Out

In accordance with the OPRED Guidelines, a close out report will be submitted to OPRED within one year of the completion of the offshore decommissioning scope including debris clearance, verification of seabed clearance and the first post-decommissioning environmental survey. 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 will revisit sample locations from the pre-decommissioning baseline survey in 2022. The pipeline routes and installation sites will be the subject of oilfield debris clearance and a non-invasive as-left verification surveys when decommissioning activity has concluded.

The main risk from infrastructure remaining *in situ* is the potential for interaction with other users of the sea, specifically from fishing related activities. Appropriate methods to verify that no snag hazards remain following completion of the subsea decommissioning activities shall be agreed with OPRED and employed.

The infrastructure is currently shown on Admiralty Charts and the FishSAFE system. When decommissioning activity has been completed, information will be made available to update these. The Section 29 Notice Holders recognise their commitment to undertake post-decommissioning monitoring of infrastructure left *in situ*. After the post-decommissioning survey reports have been submitted to OPRED and reviewed, a post-decommissioning monitoring survey regime, scope and frequency, will be agreed with OPRED.

## 7 SUPPORTING DOCUMENTS

| Table 7-1 Supporting Documents |   |
|--------------------------------|---|
| Reference                      | Title   |
| CA, 2023                       | Western Isles Comparative Assessment Recommendation Report, Xodus Group for Dana Petroleum A-303550-S00-K-REPT-003, 2022  |
| EA, 2023                       | Western Isles Subsea Environmental Appraisal, Xodus Group, A-303550-S00-A-ESIA-001, 2023  |
| Cost Schedule                  | Provided in confidence to OPRED   |
| References                     |   |
| Reference                      | Title   |
| Carter and Russell, 2020       | Carter, M. and Russell, D. J. F. (2020). At-Sea Density Maps for Grey and Harbour Seals in the British Isles (2020) (dataset). Available online at: <a href="https://risweb.st-andrews.ac.uk/portal/en/datasets/atsea-density-maps-for-grey-and-harbour-seals-in-the-british-isles-2020-dataset(dcebb865-3177-4498-ac9d-13a0f10b74e1).html">https://risweb.st-andrews.ac.uk/portal/en/datasets/atsea-density-maps-for-grey-and-harbour-seals-in-the-british-isles-2020-dataset(dcebb865-3177-4498-ac9d-13a0f10b74e1).html</a> |
| Coull et al., 1998             | Coull, K., Johnstone, R. & Rogers, S., 1998. Fisheries Sensitivity Maps in British Waters, Published and distributed by UKOOA Ltd. Available online at: <a href="http://marine.gov.scot/data/fisheries-sensitivity-maps-british-waters-coull-et-al-1998">http://marine.gov.scot/data/fisheries-sensitivity-maps-british-waters-coull-et-al-1998</a>   |
| Ellis et al., 2012             | Ellis, J.R., Milligan, S., Readdy, L., South, A., Taylor, N. & Brown, M., 2012. Mapping the spawning and nursery grounds of selected fish for spatial planning. Report to the Department of Environment, Food and Rural Affairs from Cefas. Defra Contract No. MB5301. Available online at: <a href="https://www.cefas.co.uk/publications/techrep/TechRep147.pdf">https://www.cefas.co.uk/publications/techrep/TechRep147.pdf</a>   |
| Gardline (2010a)               | UKCS Block 210/24 Western Isles Development Site Survey: Environmental Baseline Report (October 2010)   |
| Gardline (2010b)               | UKCS Block 210/24 Western Isles Development Pipeline Route Survey: Environmental Baseline Report (October 2010)   |
| Gardline (2012)                | UKCS Block 210/24a Western Isles Development Infield Routes Survey: Pipeline Route Survey (December 2012)   |
| Hammond et al., 2021           | Hammond, P. S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., MacLeod, K., Ridoux, V., Santos, M. B., Scheidat, M., Teilmann, J. and Øien, N., 2021. Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Revised 2021)  |
| Kober et al., 2010             | Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S., Wilson, J. L., Reid, B. J., 2010. An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. ISSN; 0963-8091. JNCC report No. 431  |
| NMPi, 2022                     | NMPi, 2021. National Marine Plan Interactive. Available online at: <a href="http://www.gov.scot/Topics/marine/seamanagement/nmpihome">http://www.gov.scot/Topics/marine/seamanagement/nmpihome</a>  |
| OGUK, 2015                     | Oil and Gas UK (now OEUK). Guidelines for Comparative Assessment in Decommissioning Programmes, October 2015, ISBN: 1 903 004 55 1, Issue: 1  |

|                                       |  |
|---------------------------------------|--|
| Oil and Gas Authority, 2016           | Oil and Gas Authority, 2016. Information of levels of shipping activity. 29th Offshore Licensing Round information and resources   |
| Oil and Gas Authority, 2019           | Oil and Gas Authority, 2019. Other Regulatory Issues 32nd Licensing Round information and Resources. Available online at:<br><a href="https://www.ogauthority.co.uk/media/5883/other-regulatory-issues-july-2019.pdf">https://www.ogauthority.co.uk/media/5883/other-regulatory-issues-july-2019.pdf</a>   |
| OPRED (2018)                          | Offshore Petroleum Regulator for Environment and Decommissioning, 2018. Offshore Oil and Gas Decommissioning Guidance Notes. Available online at:<br><a href="https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf">https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf</a>           |
| Reid et al., 2003                     | Reid, J., Evans, P. & Northridge, S., 2003. An atlas of cetacean distribution on the northwest European Continental Shelf, Joint Nature Conservation Committee: Peterborough.  |
| Russell et al., 2017                  | Russell, D. F., Jones, E. L., Morris, C. D. (2017). Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals, Scottish Marine and Freshwater Science Report Vol 8 No 25. Available online at:<br><a href="https://data.marine.gov.scot/dataset/updated-seal-usage-maps-estimated-sea-distribution-grey-and-harbour-seals">https://data.marine.gov.scot/dataset/updated-seal-usage-maps-estimated-sea-distribution-grey-and-harbour-seals</a> |
| Scottish Government, 2021             | Scottish Government, 2021. Scottish Sea Fisheries Statistics, 2020. Scottish Government. Available online at:<br><a href="https://data.marine.gov.scot/dataset/2020-provisional-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value">https://data.marine.gov.scot/dataset/2020-provisional-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value</a>   |
| Tideway Seahorse Progress Report 2014 | Tideway DPFV Seahorse Daily Progress Report 15 July 2014, Table 8D, document number: TW-D395-5111-DPR-005  |



## 8 SECTION 29 NOTICE HOLDERS LETTERS OF SUPPORT

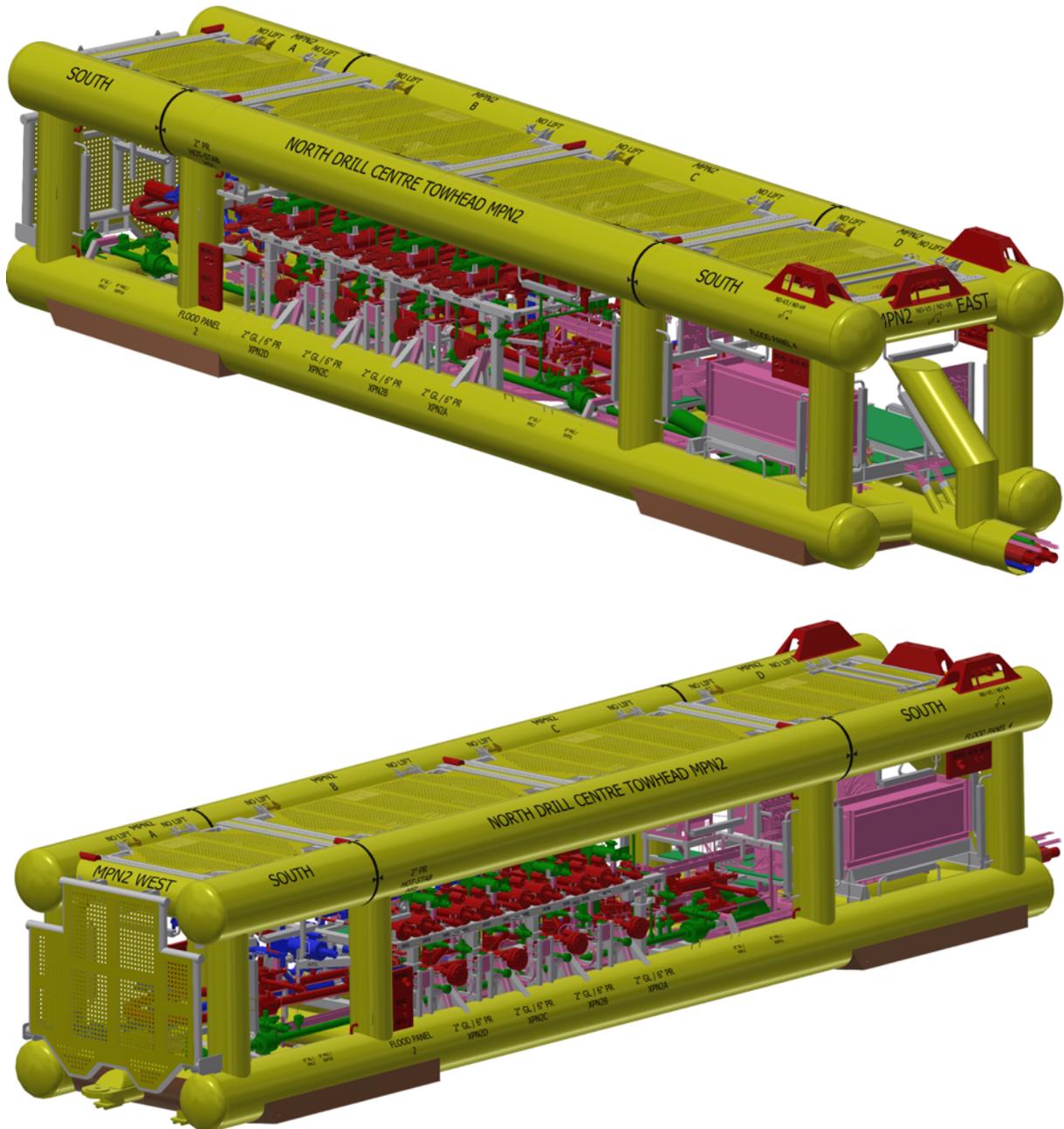
*[Section to be updated prior to final submission]*



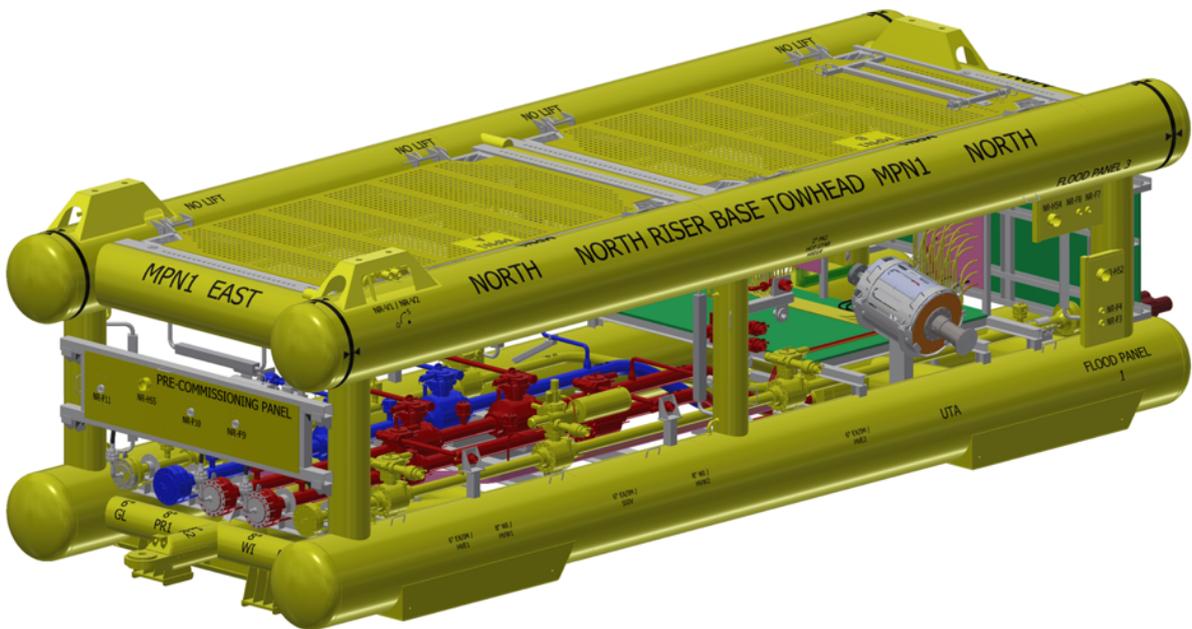
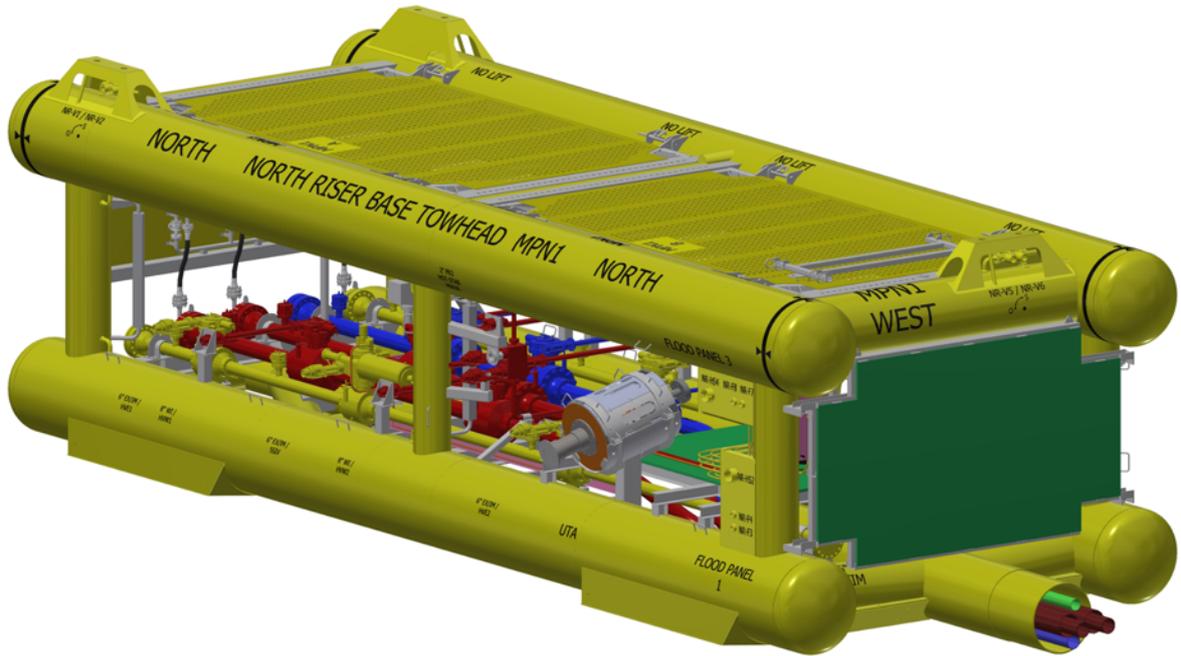
## 9 STATUTORY CONSULTEE CORRESPONDENCE

*[Section to be updated prior to final submission]*

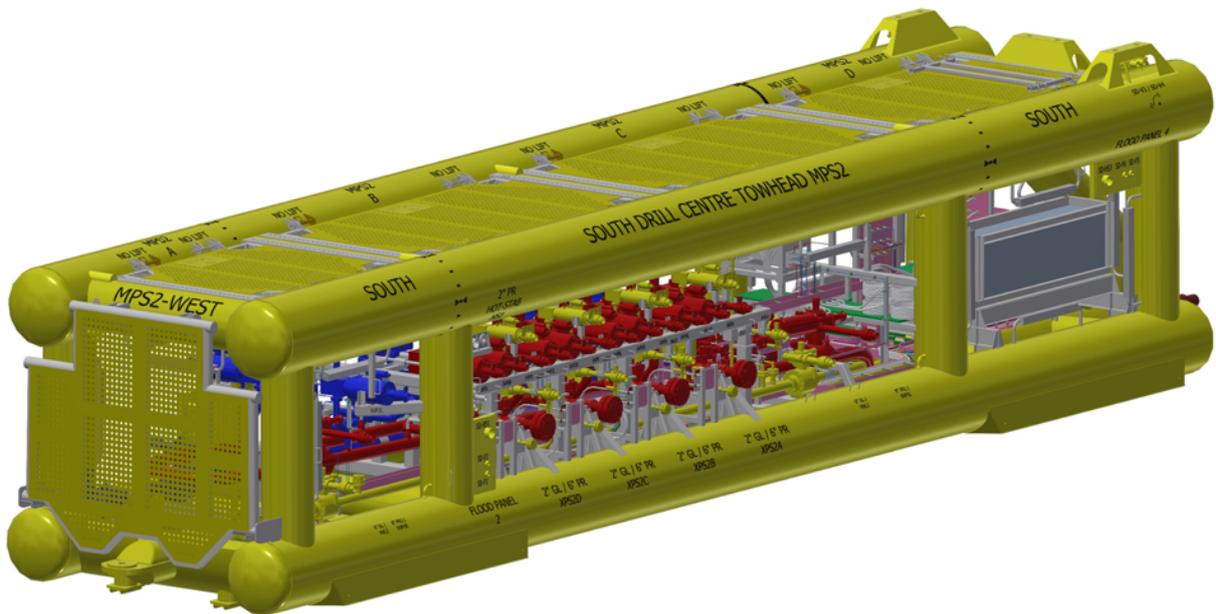
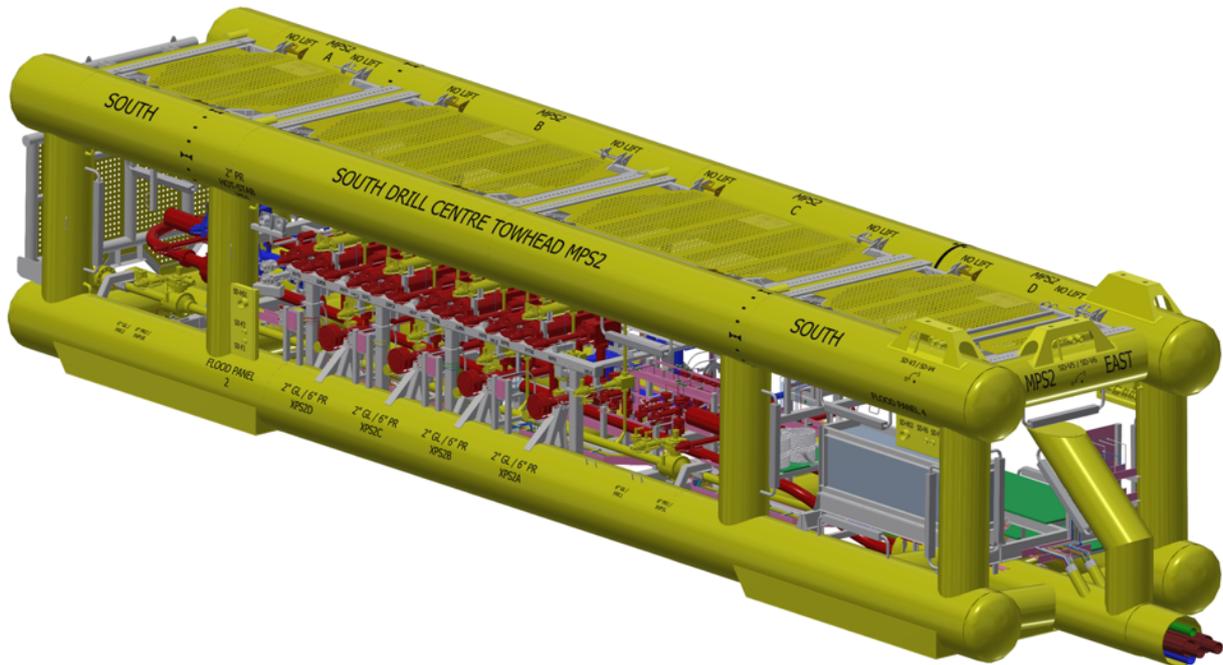
# APPENDIX 1 TOWHEAD SCHEMATICS



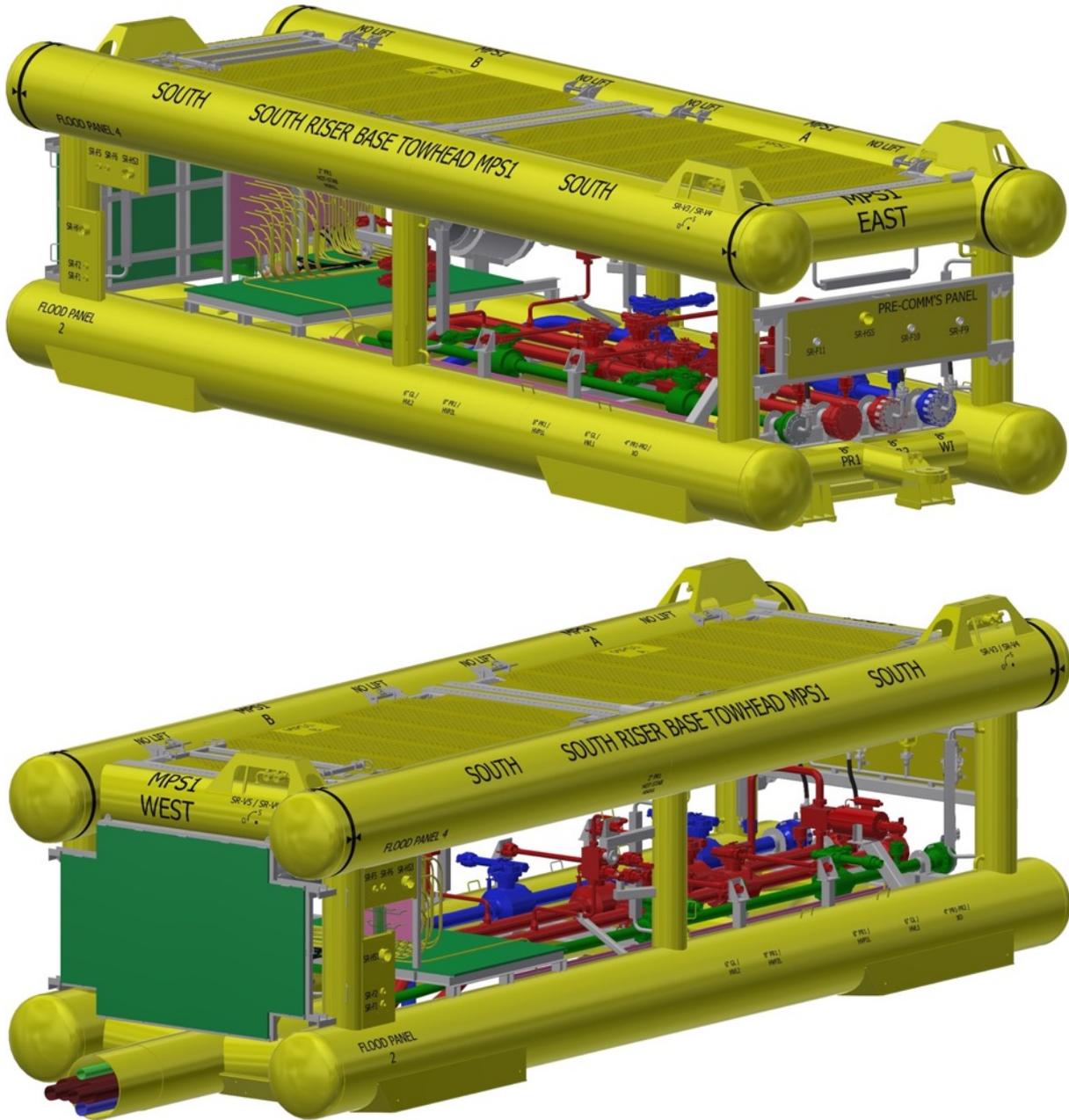
**North Drill Centre Leading Towhead**



**North Riser Base Trailing Towhead**

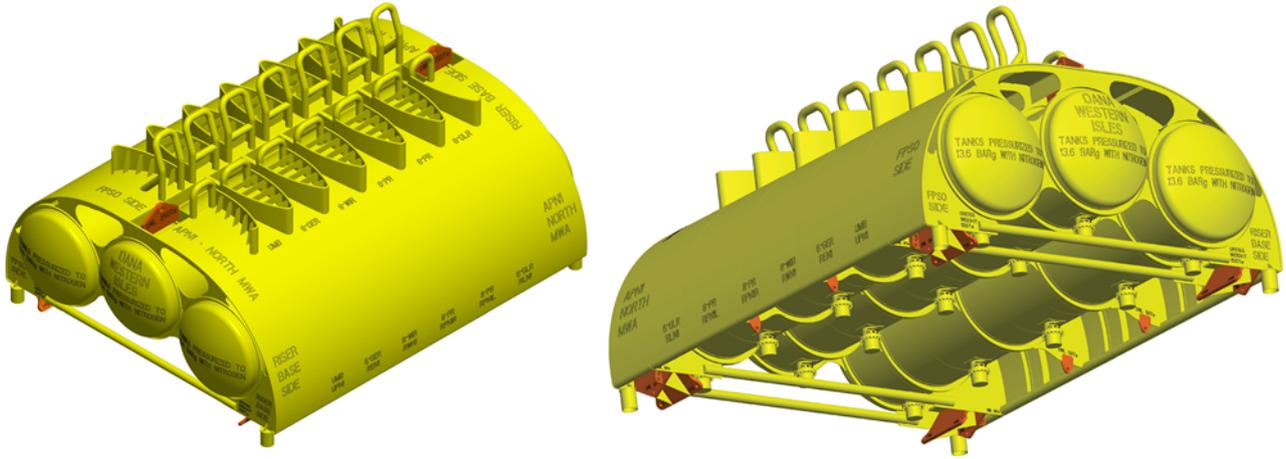


**South Drill Centre Leading Towhead**

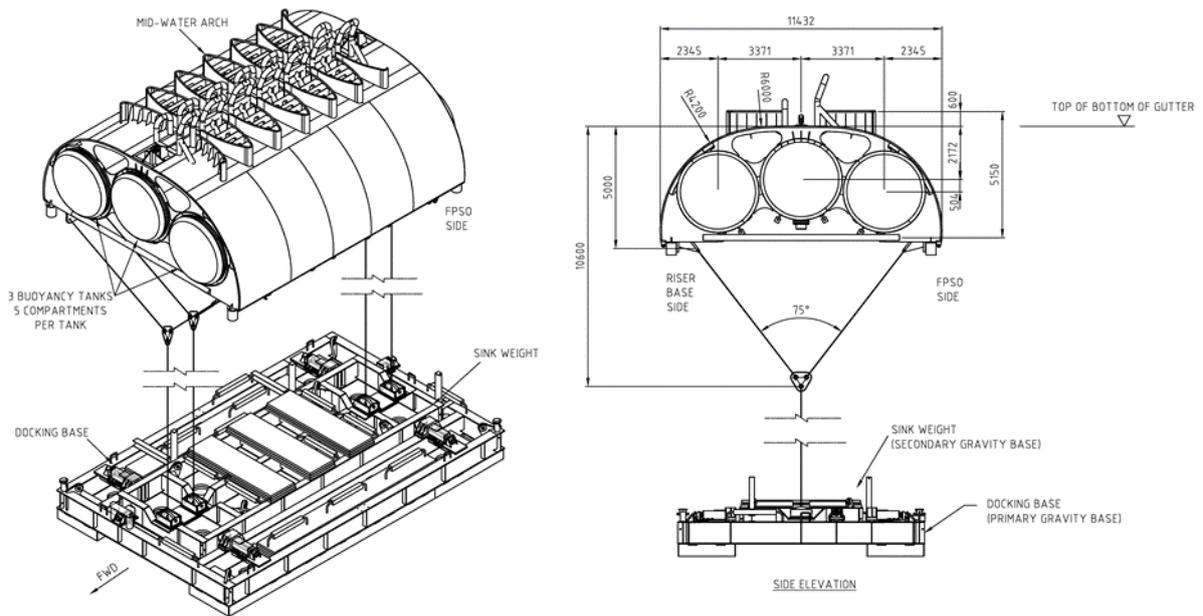


**South Riser Base Trailing Towhead**

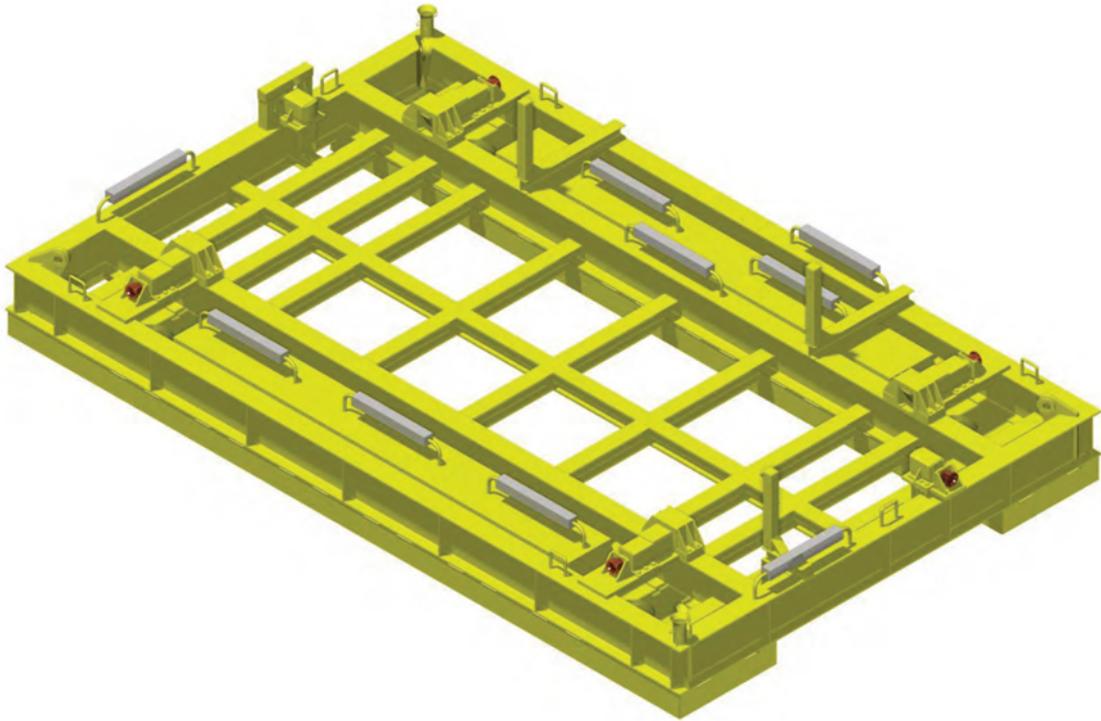
## APPENDIX 2 MIDWATER ARCHES AND GRAVITY BASES



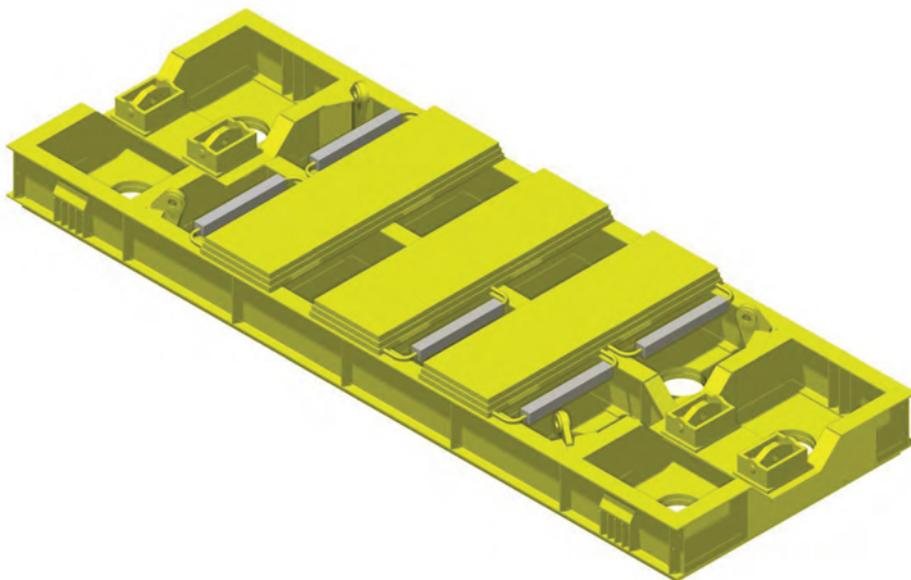
North MWA ISO View



Western Isles MWA System Installed Assembly

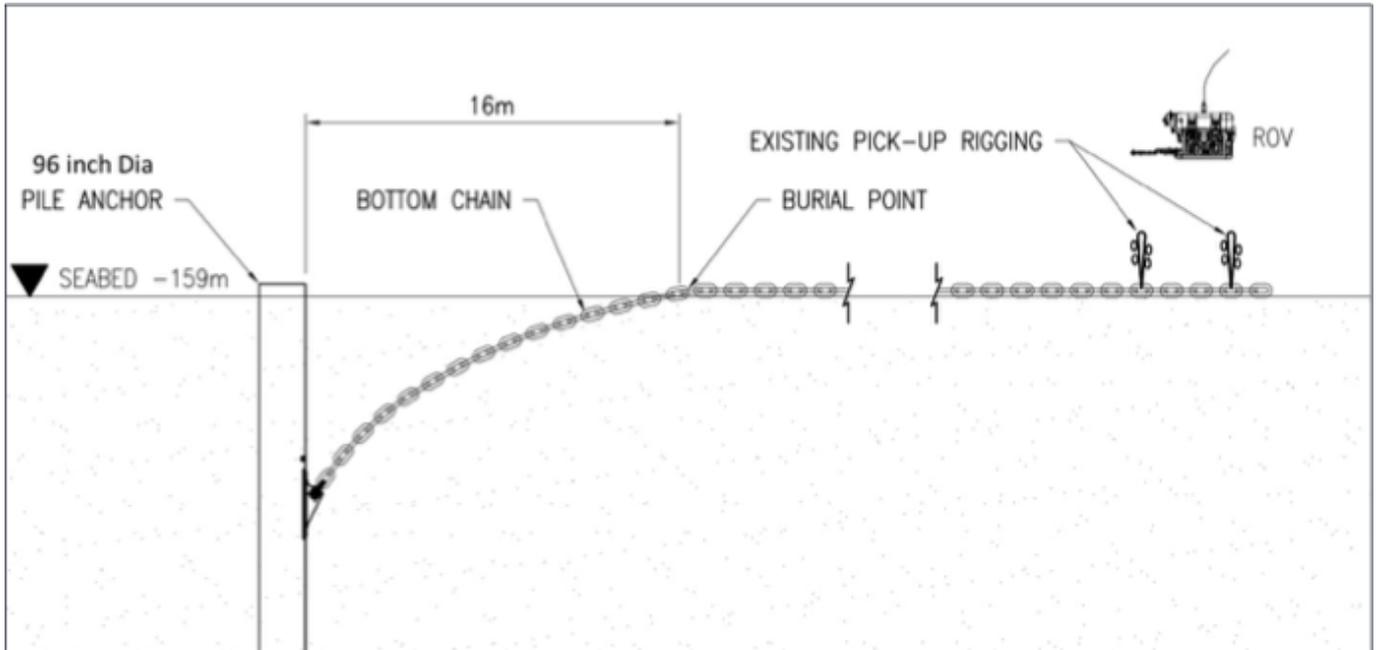


**Western Isles MWA Primary Gravity Base**



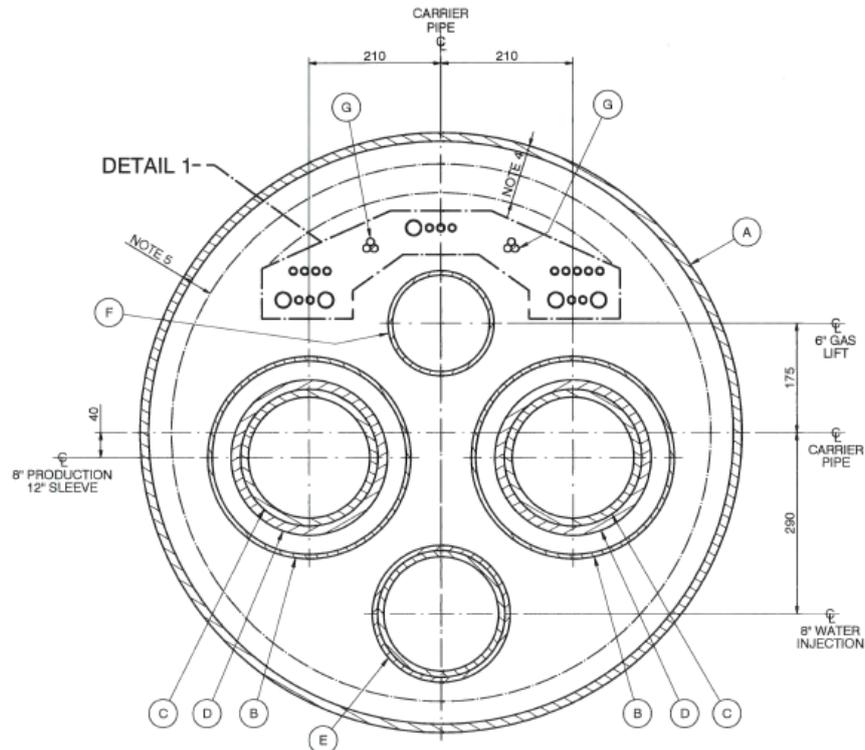
**Western Isles MWA Sinker Base**

## APPENDIX 3 ANCHOR PILES AND CHAIN ARRANGEMENT



**Mooring Piles and Chain Arrangement**

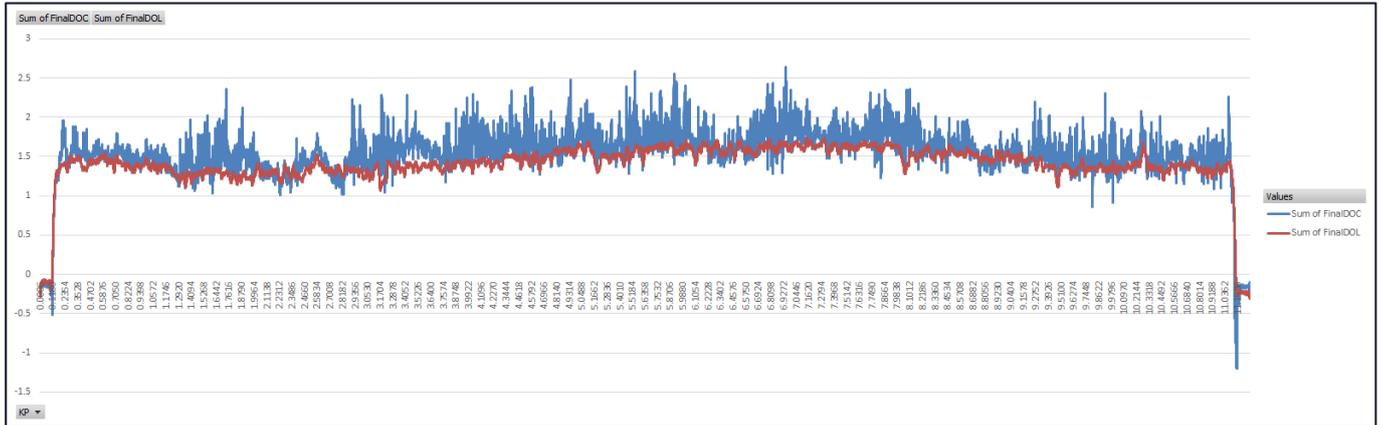
## APPENDIX 4 BUNDLES – INTERNAL ARRANGEMENT



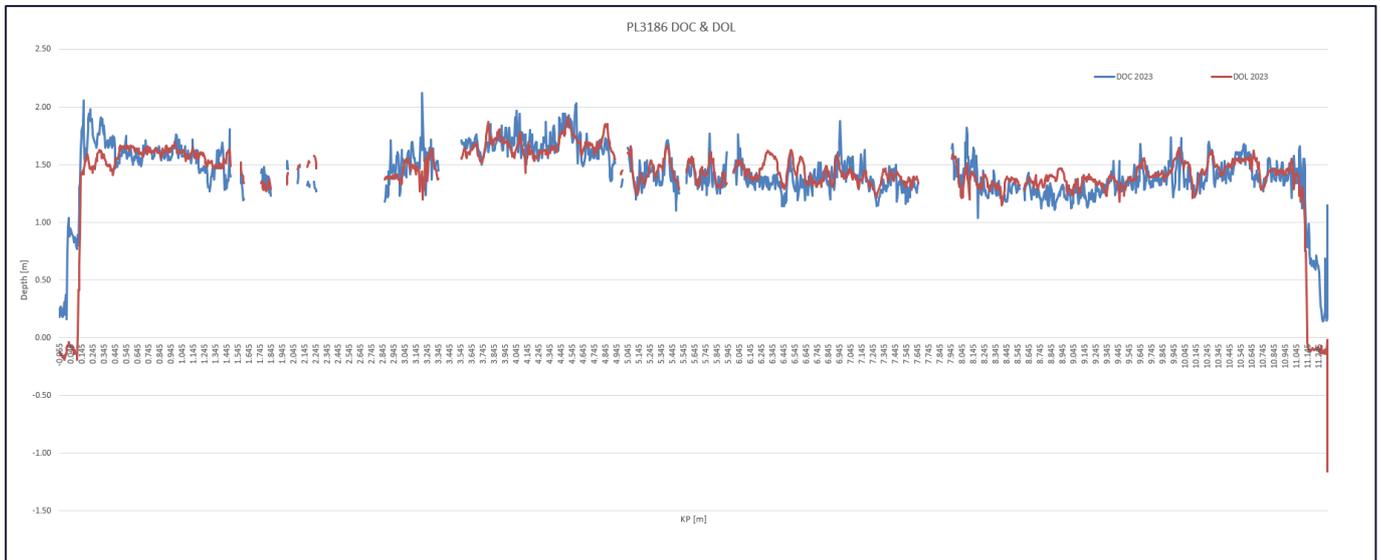
| Item | Quantity | Description   |
|------|----------|---|
| A    | 1        | 37.8" Carrier Pipe  |
| B    | 2        | 12" Sleeve Pipe   |
| C    | 2        | 8" Production Pipe  |
| D    | 2        | LDPUF Insulation  |
| E    | 1        | 8" Water Injection (HPDE Lined)                                     |
| F    | 1        | 6" Gas Lift Pipe  |
| G    | 5        | Quad Power, Signal Cable and Data Highway Cable (Bundle Monitoring) |

### Bundles – Internal Arrangement

## APPENDIX 5 PL3186: DEPTH OF BURIAL PROFILE



2018 Survey Results



2023 Survey Results

**Note:** In areas where no Depth of Cover (DOC) or Depth of Lay (DOL) is reported for 2023, Fugro can confidently state that due to a combination of the ROV flying altitude at the time and the detection capabilities of the 440 Pipetracker system for a 6" pipeline, the pipeline is out of range and therefore must have a depth of burial of over 1 m.



## APPENDIX 6 PUBLIC NOTICE

*Example to be added post-consultation*