Decommissioning Programmes for the Stella FPF-1, Moorings and Riser Systems

Consultation draft

ITHACA ENERGY

Document Control

Approvals

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Section 29 Notice Holders, etc.	1 electronic

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Figures and tables

Abbreviation	Explanation
~	approximately
AHV	Anchor Handling Vessel
AI	Asphaltene Inhibitor (used in Table 1.6.1)
AIS	Automatic Identification System
BAT	Best Available Techniques
BEP	Best Environmental Practice
CATS	Central Area Transmission System which is a natural gas transportation and processing system that transports natural gas through a 404-kilometre pipeline from the Central North Sea to a reception and processing terminal at Teesside in the North East of England.
cf.	Short for Latin 'confer' or 'conferatur, both meaning 'compare'
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
CoCC	Committee on Climate Change (used in section 7)
CoP	Cessation of Production
CSV	Construction Support Vessel
c/w	complete with
DECC	Department of Energy and Climate Change (superseded – see DESNZ)
DESNZ	Department for Energy Security and Net Zero
Dist.	Distance (used in Table 1.6.1)
DP(s)	Decommissioning Programme(s)
DSV	Dive Support Vessel
EEMS	Environmental and Emissions Monitoring System
ERRV	Emergency Response and Rescue Vessel
ESDV	Emergency Shutdown Valve
ET	Escort Tug
EUNIS	European Nature Information System
FEAST	Feature Activity Sensitivity Tool
FPF-1	FPF-1. Floating Production Facility
FPSO	Floating Production Storage and Offloading (used in Table 4.4.1)
GHG	Green House Gas
GMG	Global Marine Group (Statutory Consultee)
GSA	Greater Stella Area
GWP	Global Warming Potential
ICES	International Council for the Exploration of the Seas
ID	Identification (used for pipelines in Pipeline Works Authorisations and variations thereof, approved by NSTA)
IMO	International Maritime Organisation
INTOG	Targeted Oil and Gas
IoP	The Institute of Petroleum
Ithaca	Ithaca Energy (UK) Limited
JNCC	Joint Nature Conservation Committee
Kg	Kilogram
KHI	Kinetic Hydrate Inhibitor (used in Table 1.6.1)
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCZ	Marine Conservation Zone
MDC	(Stella) Main Drill Centre
MeOH	Methanol (used in Table 1.6.1)
mm	Millimetre
Mooring chain	This specifically refers to the final 60m of mooring chain that is connected to the padeye on the anchor pile.
Mooring line	Describes the whole of a mooring line as distinct from the lower mooring chain that is part buried in the seabed.
MP	Mooring Pile Identifier (used in Table 3.2.1)
MSV	Multipurpose Support Vessel
MTe	Million Tonnes
MWA	Mid Water Arch (buoyancy tank that provides support for the dynamic flexible risers in the water column)
n/a	Not available

Abbreviation	Explanation
N, NE, NW, NNW, NWW	North, North-East, North-West, North-North-West and North-West-West (used in Table 1.6.1)
NDC	(Stella) North Drill Centre
NFFO	National Federation of Fishermen's Organisations (Statutory Consultee)
NIFPO	Northern Ireland Fish Producer's Organisation (Statutory Consultee)
No.	Number (of)
NMPCA	Nature Conservation Marine Protected Area
Norpipe	Norpipe is an offshore pipeline system that transports oil and gas produced from the Ekofisk field in the Norwegian part of the North Sea. It consists of an oil pipeline to Teesside in the UK and a gas pipeline to Emden, Germany.
NO_2	Nitrogen Dioxide
NORM	Naturally Occurring Radiative Material
NO_x	Nitrous Oxides
NSTA	North Sea Transition Authority
OEPS	Oil Export Pigging Structure
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo-Paris Convention (The Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention')
PiP	Pipe In Pipe (One pipeline inside another, usually so that additional insulation can be accommodated around the pipe inside the outer pipe). (Used in Figure 1.6.3 and Table 1.6.1)
Pipeline crossing	This is where pipelines cross over each other. Usually, the pipeline with the higher Identification (ID) number crosses over the top of a pipeline with a lower number, but it can depend on the sequence in which the ID numbers were allocated. For example, some older pipelines were not always allocated ID until after they were installed.
PPC	Pollution Prevention Control
PL, PLU	Pipeline Identification Number as defined by NSTA using the PWA application process or Pipeline (refer Table 2.3.1)
PMF	Priority Marine Feature
PWA	Pipeline Works Authorisation
REWS	Radar Early Warning Systems
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SAL	Single Anchor Loading
SCANS	Small Cetaceans in European Atlantic Waters. SCANS is a large-scale ship-based and aerial survey designed to study the distribution and abundance of cetaceans in the northwest Atlantic.
SCP1, SCP2, SCP3	Stella Central Production Wellhead Identifiers (used in Table 1.6.1)
S, SE, SSE	South, South-East, South-South-East (used in Table 1.6.1)
SFF	Scottish Fishermen's Federation (Statutory Consultee)
SI	Scale Inhibitor (used in Table 1.6.1)
SIMOPS	Simultaneous Operations
SKT	Station Keeping Tug (used in Table 4.3.1)
SNP2, SNP3	Stella North Production Wellhead Identifiers (used in Table 1.6.1)
SOPEP	Shipboard Oil Pollution Emergency Plan
SO_x	Sulphur Oxides
SSS wire	Sheathed Spiral Stand wire
Te	Metric Tonnes (1,000 kg)
TFSW	Trans-Frontier Shipment of Waste
TUTU	Topside Umbilical Termination Unit
TYP.	Typical (a detail that is repeated on a schematic or drawing)
UKCS	United Kingdom Continental Shelf
VOC	Volatile Organic Compound
WD	Wax Dispersant (used in Table 1.6.1)
WHPS	Wellhead Protection Structure (used in Table 1.6.1)
WI	Wax Inhibitor (used in Table 1.6.1)
WT	Wall thickness (used in Table 2.2.1)

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1. EXECUTIVE SUMMARY

1.1 Combined Decommissioning Programmes

This document contains four decommissioning programmes for each set of notices served under Section 29 of the Petroleum Act 1998 as described in Section 1.4. The Decommissioning Programmes (DPs) are for:

Stella installations:

- Stella Floating Production Facility (hereafter referred to as FPF-1) serving the Stella development complete with its mooring system(s) and mooring piles.
- Mid-water arch (MWA), tether chain, guide frame, clump weights and ballast boxes associated with the Stella risers.

Vorlich installations:

- MWA, tether chain, guide frame, clump weights and ballast boxes associated with the Vorlich risers.

Stella pipelines:

- Risers associated with the Stella development, including the following. The Pipeline Works Authorisation ID numbers are presented in Table 2.3.1 in section 2.3:
    - PL3078 PWA ID-1, ID-2, ID-3 (~287 m of the 395 m long riser is to be removed under this DP) and ID-4
    - PL3080 PWA ID 7 (~253m of the 400 m long riser is to be removed under this DP), 8, and 9
    - PL3081 PWA ID 1, 2 and 3 (~317 m of the 400 m long riser is to be removed under this DP)
    - PLU3082 PWA 1 (~269 m of the 395 m long riser is to be removed under this DP) and 2

  and
    - PL3532.PWA ID 1, 2, 3 (~241 m of the 400 m long riser is to be removed under this DP) and 4.
- Stella MWA riser hold back structure
- Stella umbilical riser base
- Stella production riser base
- Stella oil and gas export riser base
- Stella umbilical riser clump weight and tether

Vorlich pipelines:

- Risers associated with the Vorlich development, including:
    - PL4596 PWA ID-5, 6 (~258m of the 428m long riser is to be removed under this DP), 7 and 8.

  and
    - PLU4599 PWA ID-1, 2 (~349m of the 510m long riser is to be removed under this DP) and 3.
- Vorlich MWA riser hold back structure
- Vorlich riser base
- Vorlich umbilical riser clump weight and tether

The rest of the infrastructure associated with the Greater Stella Area (GSA) – including the surface laid infrastructure in between the riser hold back structures and riser bases, Abigail Drill Centre, Harrier Drill Centre, Stella Main Drill Centre (MDC), Stella North Drill Centre (NDC), Vorlich Drill Centre, the Stella gas export tee, the SAL Base and the oil export route to the Oil Export Pigging Structure (OEPS) including the tie-in spool between the OEPS and the J-Block Southern Wye, is not being decommissioned at this time and will be included within separate DPs to be submitted by Ithaca. The decommissioning solutions proposed, and timescales involved will not prejudice solutions for decommissioning the remaining Greater Stella infrastructure.

1.2 Requirement for Decommissioning Programmes

Installations: In accordance with the Petroleum Act 1998, Ithaca Energy (UK) Limited (Ithaca) as operator of the Stella field and the Section 29 notice holders (Table 1.4.2, Table 1.4.3), are applying to the Offshore Petroleum

Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the Stella and Vorlich installations as detailed in Section 1.4.1 of this document. The DP for the Vorlich installation is being submitted by Ithaca for and on behalf of the Ithaca MA Limited, operator of the Vorlich field and installation. Letters of support from the Section 29 notice holders will be included in the Appendix following public and statutory consultation.

Pipelines: In accordance with the Petroleum Act 1998, Ithaca Energy (UK) Limited as operator of the Stella field, and the Section 29 notice holders (Table 1.4.5, Table 1.4.7), are applying to OPRED to obtain approval for decommissioning the Stella and Vorlich pipelines as detailed in Section 1.4.2 of this document. The DP for the Vorlich pipelines is being submitted by Ithaca as operator of the Vorlich pipelines for and on behalf of Ithaca Energy MA Limited, the operator of the Vorlich field. Letters of support from the Section 29 notice holders will be included in the Appendix following public and statutory consultation.

In conjunction with public, stakeholder and regulatory consultation, the DPs contained herein are submitted in compliance with national and international regulations and OPRED guidance notes [40]. The eight-year schedule outlined in this document is for the decommissioning of the associated installations and infrastructure to be undertaken between 2025 to 2032. For outline schedule refer Figure 6.3.1.

1.3 Introduction

The Stella FPF-1 floating production facility is located in block 30/6a in the United Kingdom Continental Shelf (UKCS) in the North Sea. The Greater Stella Development Area lies about 256 km east south east of Aberdeen, Scotland, and ~25 km from the UK/Norway median line in the UK Central North Sea, in water depths of ~89 m.

First production from Stella commenced in February 2017. First production from Harrier (UKCS block 30/6a), Vorlich (UKCS block 30/1c) and most recently Abigail (UKCS block 29/10b), was achieved in August 2018, November 2020 and October 2022 respectively.

The Stella and Harrier Fields are each tied back to the FPF-1 via a single dedicated subsea manifold separate from the Vorlich field. The Vorlich field is tied-back to the FPF-1 via its own dedicated subsea manifold. Abigail is tied back to the Stella Main Drill Centre (MDC), with production being commingled with Stella and Harrier production and processed on the FPF-1 facility.

Oil from FPF-1 is exported via subsea pipeline transport system by a controlled tie-in to Norpipe. Gas is exported via subsea pipeline to the Central Area Transmission System (CATS).

FPF-1 itself is a spread moored floating production facility that is kept on a set heading. The 12-point mooring system is arranged in four groups of three and uses a combination of chain and rigging arrangements from each corner column connected to chains fixed to the seabed by piles. All the piles are ~1.2 km from the FPF-1.

The timing of Cessation of Production (CoP) is currently being evaluated with field partners and NSTA and once the wells have been finally shut-in the FPF-1 will no longer be required as production will no longer be economically viable. The earliest departure of the FPF-1 from the field will be sometime 2026. The activities associated with this DP are scheduled to commence earliest in 2025 with completion in 2032.

The DPs explain the principles of the removal activities for the disconnection and sail away of the FPF-1. It has been agreed with OPRED that it will not be necessary to prepare a comparative assessment or an environmental appraisal in support of the pipeline decommissioning programme as the risers will be removed in accordance with mandatory requirements [40]. The environmental impacts associated with the work in this DP have been assessed, and are detailed within Section 4. Marine License applications will be submitted as appropriate. Decommissioning of the pipelines and infrastructure associated with the wider Greater Stella Development Area will be addressed in separate DPs submitted by Ithaca that will be supported by a comparative assessment and an environmental appraisal.

1.4 Overview

1.4.1 Installations

Table 1.4.1: Installations being decommissioned			
Field(s)	Stella, Vorlich	**Production type**	Oil, Gas
Water depth (m)	~89m	**UKCS Block**	30/6a, 30/1c
Surface installations			
Number	**Type**	**Vessel mass (Te)**	**Mooring system mass (Te)**
1	FPF	22,394	4,612.3 (Note 1)
Subsea installations			
Number	**Type**		
1	FPF-1 mooring system (12x mooring lines and mooring piles)		
2 (1,1)	Mid-Water Arch (Stella, Vorlich)		
4 (2,2)	Mid-Water Arch Clump Weights (Stella, Vorlich)		
Distance to median		**Distance from nearest UK coastline**	
~25 km		~256 km ESE of Aberdeen	

NOTES

1. 12x mooring piles, 2.133mØ70mmWT, 35.5m long installed such that the top of the pile protrudes 0.5m above mean seabed. The combined mass of 12x piles is 1,565.4Te.

Table 1.4.2: Section 29 Notice Holders – Stella installations		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Ithaca Energy (E&P) Limited	JE126983 / 126983	0%
Ithaca Energy (UK) Limited	SC272009	65.6%
Ithaca GSA Limited	FC033620 / GBJE109212	20.0%
Ithaca Minerals (North Sea) Limited	SC274666	0%
Ithaca Oil and Gas Limited	01546623	14.4%
One-Dyas E&P Limited	04024945	0%

Table 1.4.3: Section 29 Notice Holders – Vorlich installations		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
BP Exploration Operating Company Limited	00305943	66%
Ithaca Energy (UK) Limited	SC272009	0%
Ithaca MA Limited	03947050	34%

1.4.2 Pipelines

Table 1.4.4: Stella pipelines being decommissioned		
Number of pipelines, cables, umbilicals	5	See Table 2.3.1

Table 1.4.5: Section 29 Notice Holders – Stella pipelines		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Ithaca Energy (E&P) Limited	JE126983 / 126983	0%
Ithaca Energy (UK) Limited	SC272009	65.6%
Ithaca GSA Limited	FC033620 / GBJE109212	20.0%
Ithaca Minerals (North Sea) Limited	SC274666	0%

Table 1.4.5: Section 29 Notice Holders – Stella pipelines		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Ithaca Oil and Gas Limited	01546623	14.4%
One-Dyas E&P Limited	04024945	0%

Table 1.4.6: Vorlich pipelines being decommissioned		
Number of pipelines, cables, umbilicals	2	See Table 2.3.1

Table 1.4.7: Section 29 Notice Holders –Vorlich pipelines		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Ithaca Energy (E&P) Limited	JE126983 / 126983	0%
Ithaca Energy (UK) Limited	SC272009	65.6%
Ithaca GSA Limited	FC033620 / GBJE109212	20.0%
Ithaca Oil and Gas Limited	01546623	14.4%

1.5 Summary of proposed Decommissioning Programmes

Table 1.5.1: Summary of Decommissioning Programmes	
Proposed decommissioning solution	**Reason for selection**
1. Surface installations	
Complete removal and recycle. The FPF-1 will be removed and recovered to shore and recycled unless alternative re-use options are found to be viable and more appropriate. Any applications and permits will be submitted for the work associated with removal of the vessel.	Complies with mandatory requirements. Allows the FPF-1 to be removed and maximises opportunity for reuse or recycling of materials. If not reused the decommissioned FPF-1 will be recycled or disposed of in compliance with the applicable laws and regulations of the United Kingdom, EU and Norway as applicable.
2. Subsea installations	
Mooring lines. Partial removal of 12x mooring lines, with the severed ends of the lower chain section cut and buried to a depth 1 m below seabed using suitable dredging equipment with the local seabed being remediated with deposited rock. The removed sections will be recovered for reuse or recycling. Sediment will be displaced as the mooring lines are recovered. **Mooring piles**. The 12x mooring piles were installed so that the tops of the piles would protrude above the seabed by 0.5 m. The piles will be cut internally to a depth 3 m below seabed while leaving the remainder of the mooring piles *in situ*. Should any difficulties be encountered (e.g. if the piles cannot be cut internally) OPRED will be consulted. **Mid-water arches.** Complete removal of 2x mid-water arches. Both the Stella and Vorlich mid-water arches c/w tether chain, clump weights, guideframes, and ballast box weights will be completely removed, with safety measures put in place for mariners for the period between the departure of the FPF-1 and removal of the MWAs. Permit applications will be submitted for work associated with removal of the FPF-1 moorings and contingency works (e.g. an external cut) for the mooring piles.	Complies with mandatory requirements for clear seabed and to maximise reuse opportunities. Removes a potential obstruction to fishing operations and maximises recycling of materials.

Table 1.5.1: Summary of Decommissioning Programmes	
Proposed decommissioning solution	**Reason for selection**
3. Risers	
Part removal of each of the risers with the remainder being recovered under a separate DP. All seven dynamic flexible risers will be flushed and cleaned with seawater and subject to agreement and detailed engineering the resulting flushing effluent will be directed either downhole or to the respective oil and gas export routes. While the chemical cores within the two umbilical systems will be flushed, water-based hydraulic oil inside the hydraulic cores in the umbilicals will remain. This DP concerns the removal of just part of the Stella risers: PL3078 (~287m *cf.* 395 m long), PL3080 (~253m *cf.* 400 m long), PL3081 (~317m *cf.* 400 m long), PLU3082 (~269m *cf.* 395 m long) and PL3532 (~241m *cf.* 400 m) will be removed and recovered to shore for reuse, recycling or disposal as appropriate. The remaining riser lengths will be dealt with in a separate DP and will be fully recovered as part of the decommissioning activities associated with the wider GSA. This DP concerns the removal of just part of the Vorlich risers: PL4596 (~258m *cf.* 428 m long) and PLU4599 (~349m *cf.* 510 m long), will be removed and recovered to shore for reuse, recycling or disposal as appropriate. The remaining lengths of the risers will be dealt with in a separate DP and will be fully recovered as part of the decommissioning activities associated with the wider GSA. Applications and permits will be submitted for the work associated with pipeline pigging, flushing, discharges, cutting and removal.	Complies with mandatory requirements, removes potential obstructions to fishing operations and maximises recycling of materials.
4. Pipeline structures	
All pipeline structures within the FPF-1 500m safety zone will be completely removed. The items to be completely removed include: **Stella pipeline structures:** • Stella MWA riser hold back structure • Stella umbilical riser base • Stella production riser base • Stella oil and gas export riser base • Stella umbilical riser clump weight and tether **Vorlich pipeline structures:** • Vorlich MWA riser hold back structure • Vorlich riser base • Vorlich umbilical riser clump weight and tether Applications and permits will be submitted for the work associated with removing the pipeline structures.	Complies with mandatory requirements, removes potential obstructions to fishing operations and maximises recycling of materials.
5. Interdependencies	
No third-party pipeline crossings will be disturbed as a result of the decommissioning proposals. Removal of the dynamic flexible risers, MWAs, MWA riser hold back structures and riser bases will not affect the ability to decommission the remaining infrastructure sometime in the future. With the FPF-1 no longer being on location, the 500 m safety zone will be relinquished, and so it is recognised that the remaining riser bases, riser holdback structures and remaining pipeline infrastructure within the current 500 m safety zone will present a potential hazard to other users of the sea. The MWAs, clump weights, guideframes, ballast box weights, dynamic flexible risers (part of), riser bases and MWA riser hold back structures will be removed sometime after the FPF-1 has departed the 500 m safety zone. Therefore, Ithaca will adopt appropriate safety measures to protect the remaining pipeline infrastructure until it is decommissioned sometime in the future. The proposed safety measures will be discussed and agreed with SFF and OPRED before they are implemented.	

1.6 Field Location including field layout and adjacent facilities

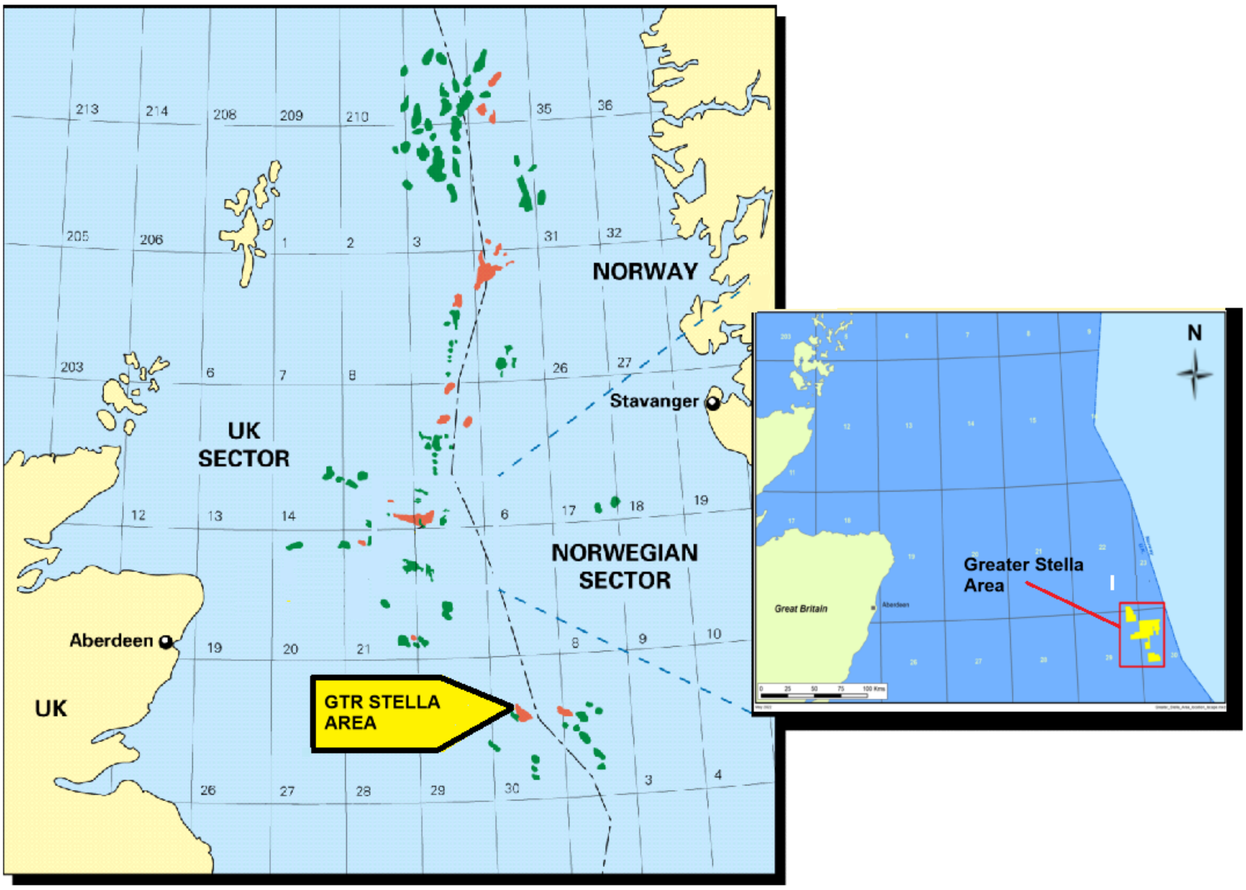


Figure 1.6.1: Location of Greater Stella Development Area in UKCS

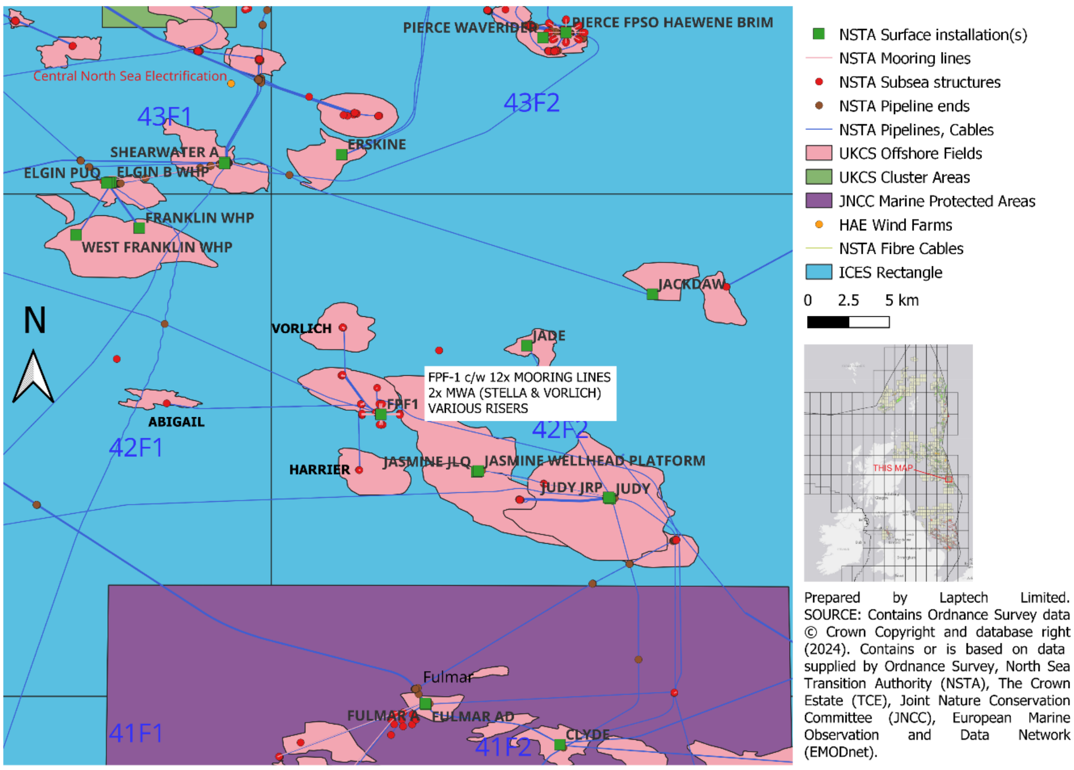


Figure 1.6.2: Installations and infrastructure local to GSA in UKCS

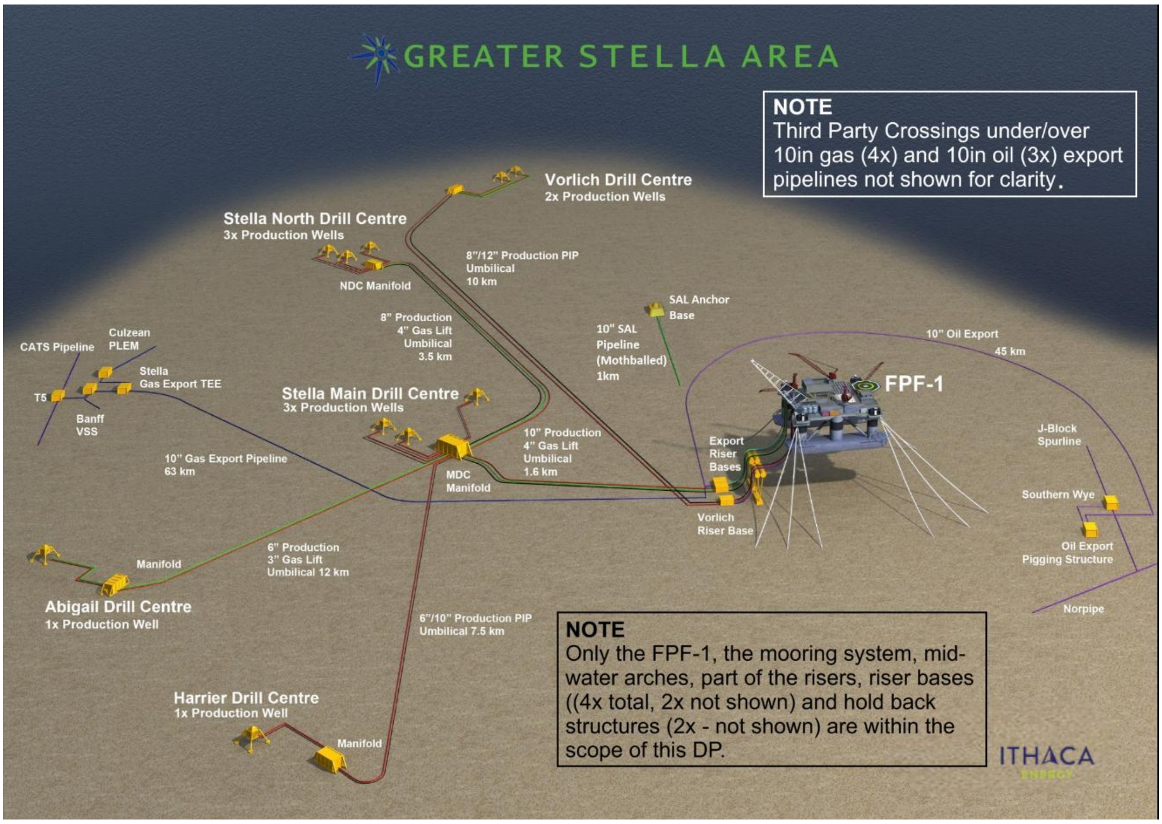


Figure 1.6.3: GSA installations and infrastructure[1]

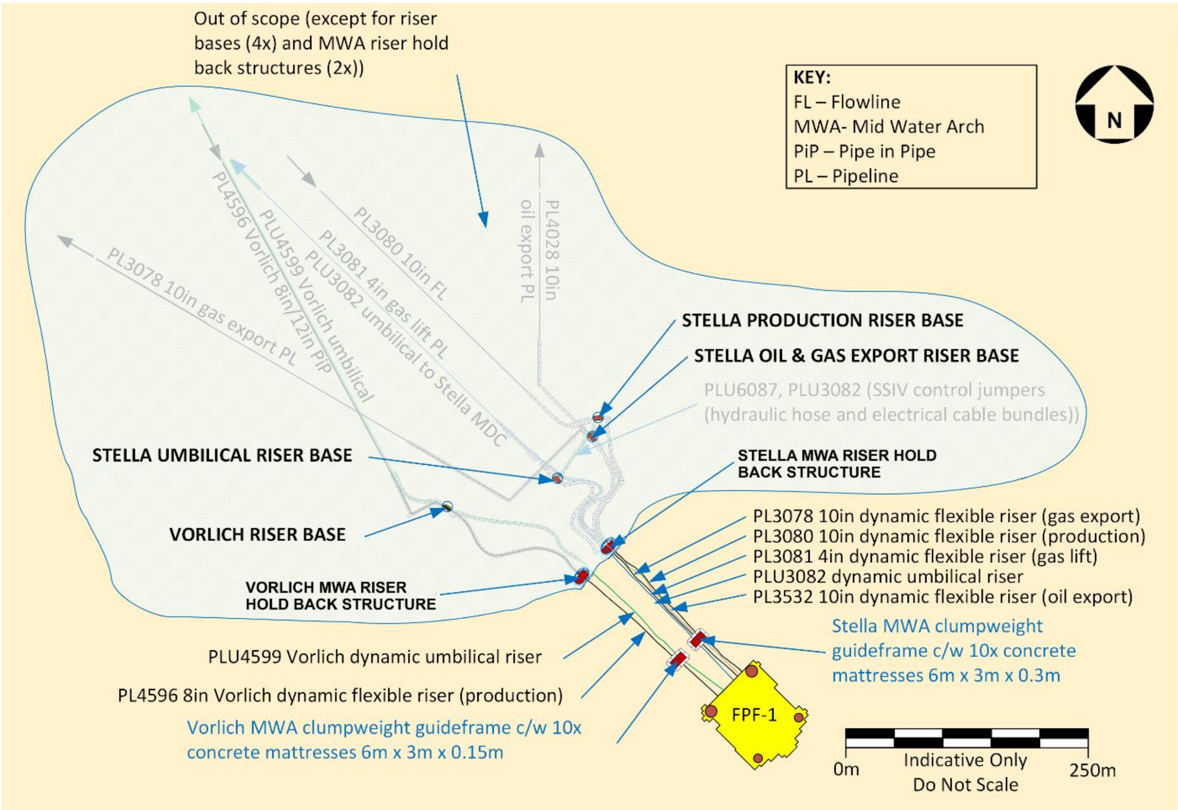


Figure 1.6.4: Stella FPF-1 and local infrastructure[2]

[1] Just part of the risers are being removed under this DP. The remainder will be removed under a DP to be submitted separately.

[2] The umbilical riser clump weights adjacent to the Stella and Vorlich MWA riser hold back structures are not shown for clarity.

1.6.1 Adjacent facilities

<table>
<tr><th colspan="6">Table 1.6.1: Adjacent facilities</th></tr>
<tr><th>Operator</th><th>Name</th><th>Type</th><th>Direction & Dist. from FPF-1</th><th>Information</th><th>Status</th></tr>
<tr><td rowspan="8">Ithaca Energy (UK) Limited</td><td>MDC Manifold</td><td>Manifold</td><td>NWW, 1.6 km</td><td rowspan="8"></td><td rowspan="8"></td></tr>
<tr><td>MDC Tree SCP1</td><td>WHPS</td><td>NWW, 1.7 km</td></tr>
<tr><td>MDC Tree SCP2</td><td>WHPS</td><td>NW, 1.7 km</td></tr>
<tr><td>MDC Tree SCP3</td><td>WHPS</td><td>NWW, 1.7 km</td></tr>
<tr><td>NDC Manifold</td><td>Manifold</td><td>NW, 4.9 km</td></tr>
<tr><td>NDC Well W11</td><td>WHPS</td><td>NW, 5km</td></tr>
<tr><td>NDC Tree SNP2</td><td>WHPS</td><td>NW, 4.9 km</td></tr>
<tr><td>NDC Tree SNP3</td><td>WHPS</td><td>NW, 4.9 km</td></tr>
<tr><td>Ithaca Energy (UK) Limited</td><td>Single Anchor Loading Base</td><td>SAL Base</td><td>N, 2.9 km</td><td>Original export route for Stella</td><td>Out of use</td></tr>
<tr><td rowspan="2">Ithaca SP E&P Limited</td><td>Abigail Manifold</td><td>Manifold</td><td>W, 13.1 km</td><td rowspan="7">Within GSA</td><td rowspan="7">Operational</td></tr>
<tr><td>Abigail Production Well 2</td><td>WHPS</td><td>W, 13.1 km</td></tr>
<tr><td rowspan="2">Ithaca Energy (UK) Limited</td><td>Harrier Manifold</td><td>Manifold</td><td>S, 6.3 km</td></tr>
<tr><td>Harrier Production Well</td><td>WHPS</td><td>S, 6.3 km</td></tr>
<tr><td rowspan="3">Ithaca MA Limited</td><td>Vorlich Manifold</td><td>Manifold</td><td>NNW, 9.8 km</td></tr>
<tr><td>Vorlich South Well W31</td><td>WHPS</td><td>NNW, 9.9 km</td></tr>
<tr><td>Vorlich North Well W32</td><td>WHPS</td><td>NNW, 9.9 km</td></tr>
<tr><td>Total Energies Upstream UK Limited</td><td>Pipeline crossing, PL3078 / PL1570 (Shearwater-Bacton)</td><td>Pipeline crossing</td><td>NWW, 16.5 km</td><td>PL1570 34in Seal Gas Export</td><td>Operational</td></tr>
<tr><td rowspan="10">Ithaca Energy (UK) Limited</td><td>Pipeline crossing PL6083 & PL6085 / PL3078</td><td>Pipeline crossing</td><td>NWW, 2 km</td><td rowspan="10">Within GSA</td><td rowspan="10">Operational</td></tr>
<tr><td>Pipeline crossing, PLU6081 / PL4028</td><td>Pipeline crossing</td><td>NWW, 2 km</td></tr>
<tr><td>Pipeline crossing PLU4386 & PL4385 / PL3078</td><td>Pipeline crossing</td><td>NWW, 1.5 km</td></tr>
<tr><td>Pipeline crossing PL4596 & PLU4599 / PL3078</td><td>Pipeline crossing</td><td>NWW, 0.6 km</td></tr>
<tr><td>Pipeline crossing PL4596 & PLU4599 / PL3080</td><td>Pipeline crossing</td><td>NWW, 1.0 km</td></tr>
<tr><td>Pipeline crossing PL4596 & PLU4599 / PL3081</td><td>Pipeline crossing</td><td>NWW, 0.8 km</td></tr>
<tr><td>Pipeline crossing PL4596 & PLU4599 / PLU3082</td><td>Pipeline crossing</td><td>NNW, 0.4 km</td></tr>
<tr><td>Pipeline crossing, PLU3082 / PL3078</td><td>Pipeline crossing</td><td>NWW, 0.8 km</td></tr>
<tr><td>Pipeline crossing, PL3081 / PL3078</td><td>Pipeline crossing</td><td>NWW, 0.8 km</td></tr>
<tr><td>Pipeline crossing, PL3080 / PL3078</td><td>Pipeline crossing</td><td>NWW, 1 km</td></tr>
<tr><td>Shell PLC</td><td>Pipeline crossing PL4568 / PL3078</td><td>Pipeline crossing</td><td>NWW, 18.9 km</td><td></td><td>Operational</td></tr>
<tr><td rowspan="5">Harbour Energy PLC</td><td>Pipeline crossing, PL4028 / PL1773</td><td>Pipeline crossing</td><td>E, 13.6 km</td><td></td><td rowspan="5">Operational</td></tr>
<tr><td>Jade Platform</td><td>Fixed Steel Jacket</td><td>NE, 11.7 km</td><td></td></tr>
<tr><td>Jasmine Wellhead Platform</td><td>Wellhead Platform</td><td>SE, 8.6 km</td><td></td></tr>
<tr><td>Jasmine Living Quarters Platform</td><td>Fixed Steel Jacket</td><td>SE, 8.6 km</td><td></td></tr>
<tr><td>Joanne Manifold</td><td>Manifold</td><td>SE, 12.4 km</td><td></td></tr>
</table>

Table 1.6.1: Adjacent facilities					
Operator	**Name**	**Type**	**Direction & Dist. from FPF-1**	**Information**	**Status**
Impacts of decommissioning proposals					
There are no direct impacts on adjacent facilities from the decommissioning works associated with the FPF-1 installation and associated pipelines and infrastructure. As part of the operational phase of the decommissioning works any potential environmental impacts will be mitigated in two ways. The first is via direct communication with the parties involved, and the other is via submission of the Master Application Templates and Supplementary Application Templates.					

1.7 Industrial implications

It is Ithaca's intention to develop a contract strategy and Supply Chain Action Plan that will result in an efficient and cost-effective execution of the decommissioning works.

Where appropriate existing framework agreements may be used for decommissioning of the pipelines and pipeline stabilisation features. Should the opportunity arise, Ithaca will try to combine FPF-1 sail away, disconnection and recovery activities with other development or decommissioning activities to reduce fuel requirements and mobilisation costs.

2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Surface installations

Table 2.1.1: Surface facilities information				
Name & facility type	Location		Topsides / Facilities	
	WGS84 Decimal	WGS84 Decimal Minute	Mass (Te)	No of modules
FPF-1	56.798947° N 2.066752° E	56°47.9368' N 2°04.0051' E	22,394	1

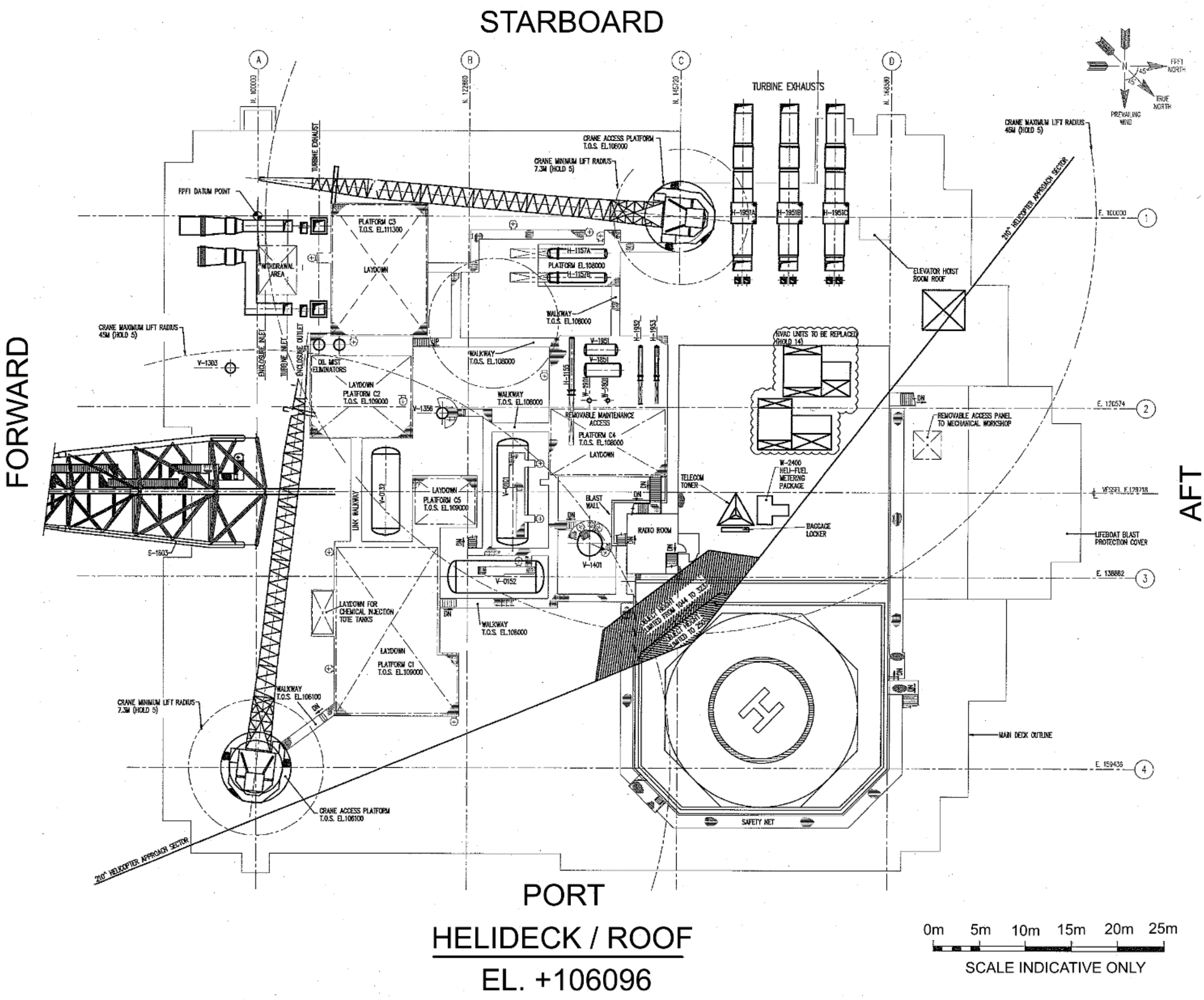


Figure 2.1.1: FPF-1 plan view – helideck / roof (EL. +106096)

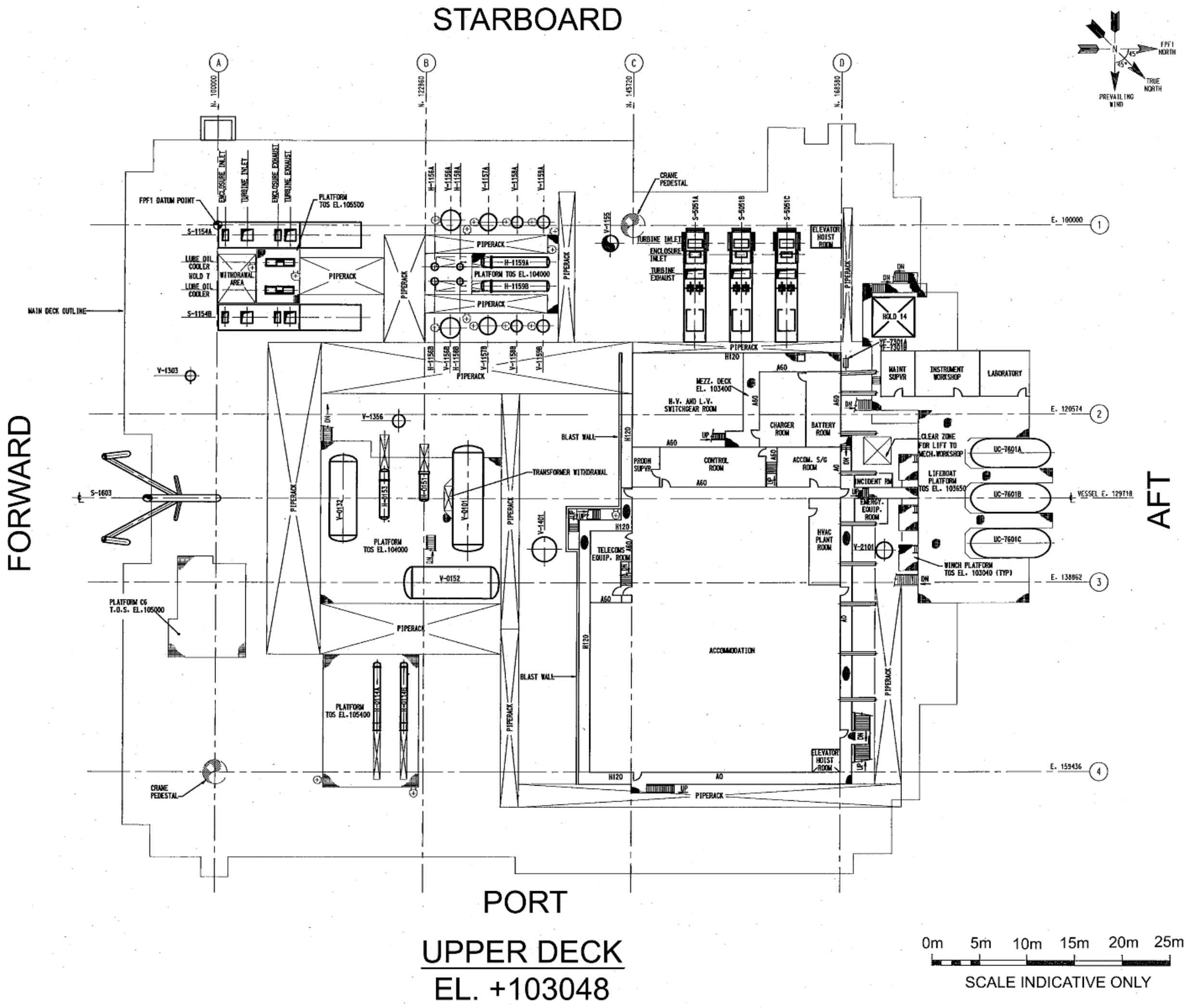


Figure 2.1.2: FPF-1 plan view – upper deck (EL. +103048)

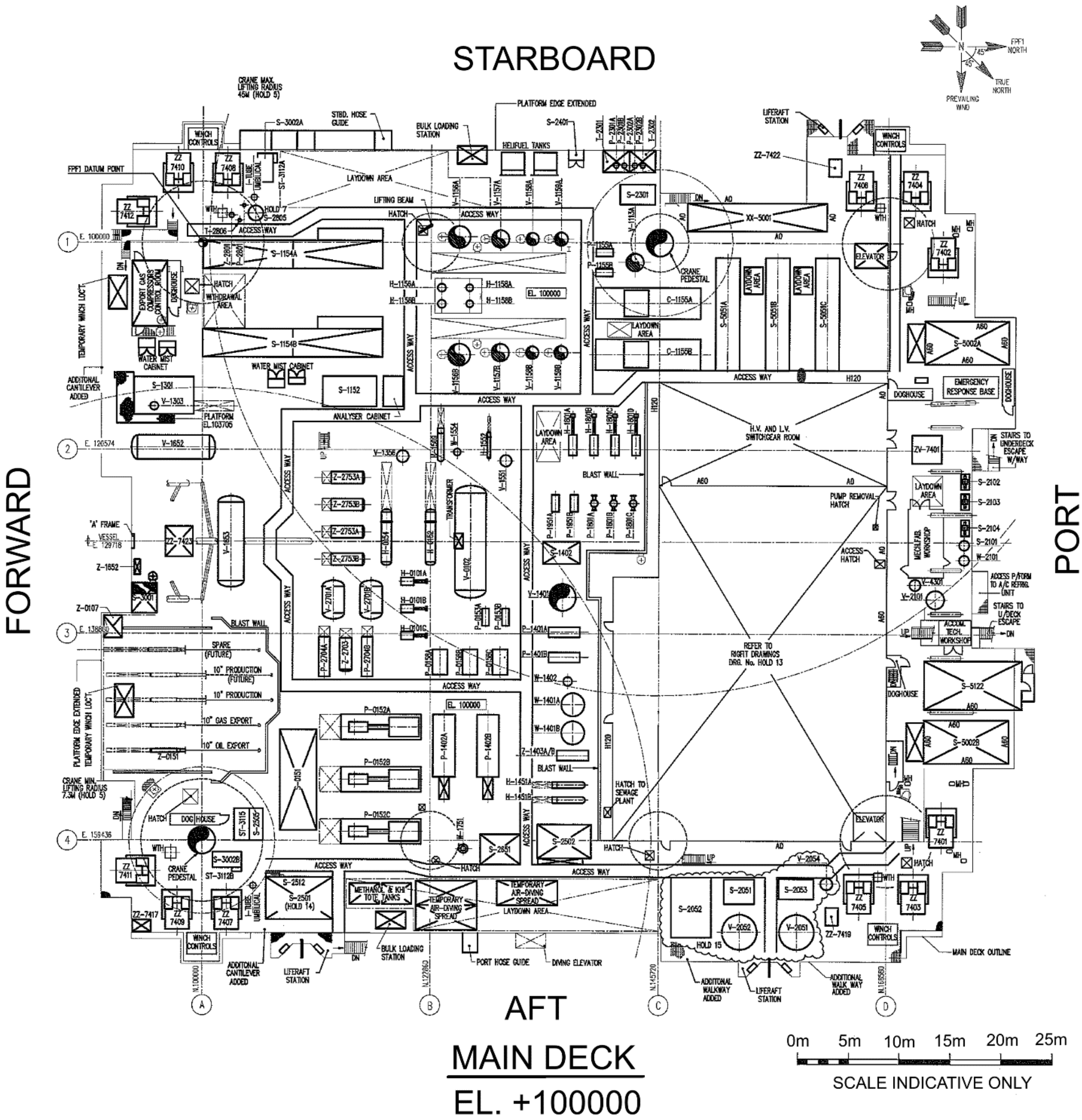


Figure 2.1.3: FPF-1 plan view – main deck (EL. +100000)

2.2 Subsea installations

Table 2.2.1: Subsea installations information					
Subsea Installations Including Stabilisation Features	No.	Size / Dimensions	Location		Comments/ Status
		Mass (Te)	WGS84 Decimal	WGS84 Decimal Minute	
Mooring piles	12	MP1	56.771133° N	56°46.2680' N	All piles 2134OD70, 35.5 m long. Each pile driven to a target penetration depth of 35 m, leaving 0.5 m of pile protruding above the seabed.
		130.45	2.112289° E	2°6.7373' E	
		MP2	56.771077° N	56°46.2646' N	
		130.45	2.110752° E	2°6.6451' E	
		MP3	56.771111° N	56°46.2667' N	
		130.45	2.109311° E	2°6.5587' E	
		MP4	56.780490° N	56°46.8294' N	
		130.45	2.091775° E	2°5.5065' E	
		MP5	56.781352° N	56°46.8811' N	
		130.45	2.091672° E	2°5.5003' E	
		MP6	56.782125° N	56°46.9275' N	
		130.45	2.091735° E	2°5.5041' E	
		MP7	56.791744° N	56°47.5047' N	
		130.45	2.108888° E	2°6.5333' E	
		MP8	56.791799° N	56°47.5079' N	
		130.45	2.110245° E	2°6.6147' E	
		MP9	56.791765° N	56°47.5059' N	
		130.45	2.111785° E	2°6.7071' E	
		MP10	56.782366° N	56°46.9419' N	
		130.45	2.129322° E	2°7.7593' E	
		MP11	56.781513° N	56°46.8908' N	
		130.45	2.129424° E	2°7.7654' E	
		MP12	56.780695° N	56°46.8417' N	
		130.45	2.129361° E	2°7.7617' E	
Mooring lines	12	1,145.5m long	159m (120mm chain), 3x120m (127mm chain), 670m (115mm Sheathed Spiral Stand Wire (SSS) wire), 125m (115mm SSS wire) & 60m (120mm studless chain) c/w links, tri-plates, closed-sockets and anchor shackles		Overall length = 159+120+670+125+60+11.5 (links, shackles, tri-plates, closed sockets & anchor shackles).
		3,046.9			
Stella MWA	1	12.9 x 12.45 x 8.11m	56.782133° N	56°46.9280' N	
		110.1	2.109573° E	2°6.5744' E	
Stella MWA guide frame	1	15.7 x 8.1 x 2.5 m	As above	As above	
		47.4			
Stella MWA sinker clump weights	2	3.2 m diameter	As above	As above	
		84.1			
Stella MWA ballast box weights	7	3.2 x 1.3 x 1.6 m	As above	As above	
		42.0			

Table 2.2.1: Subsea installations information					
Subsea Installations Including Stabilisation Features	No.	Size / Dimensions	Location		Comments/ Status
		Mass (Te)	WGS84 Decimal	WGS84 Decimal Minute	
Vorlich MWA	1	12.9 x 12.45 x 8.11m	56.782688° N	56°46.9613' N	Includes mass of MWA, guide frame, clump weights (x2), ballast box weights (7x)
		106.4	2.107600° E	2°6.4560' E	
Vorlich MWA guide frame	1	15.7 x 8.1 x 2.5 m	As above	As above	
		50.4			
Vorlich MWA sinker clump weights	2	3.2m diameter	As above	As above	
		90.1			
Vorlich MWA ballast box weights	7	3.2 x 1.3 x 1.6 m	As above	As above	
		40.3			
NOTE					
The overall mass of mooring system is 4,612.3 Te, including the mass of the piles. Plan dimensions of the FPF-1 are ~87m x 94m.					

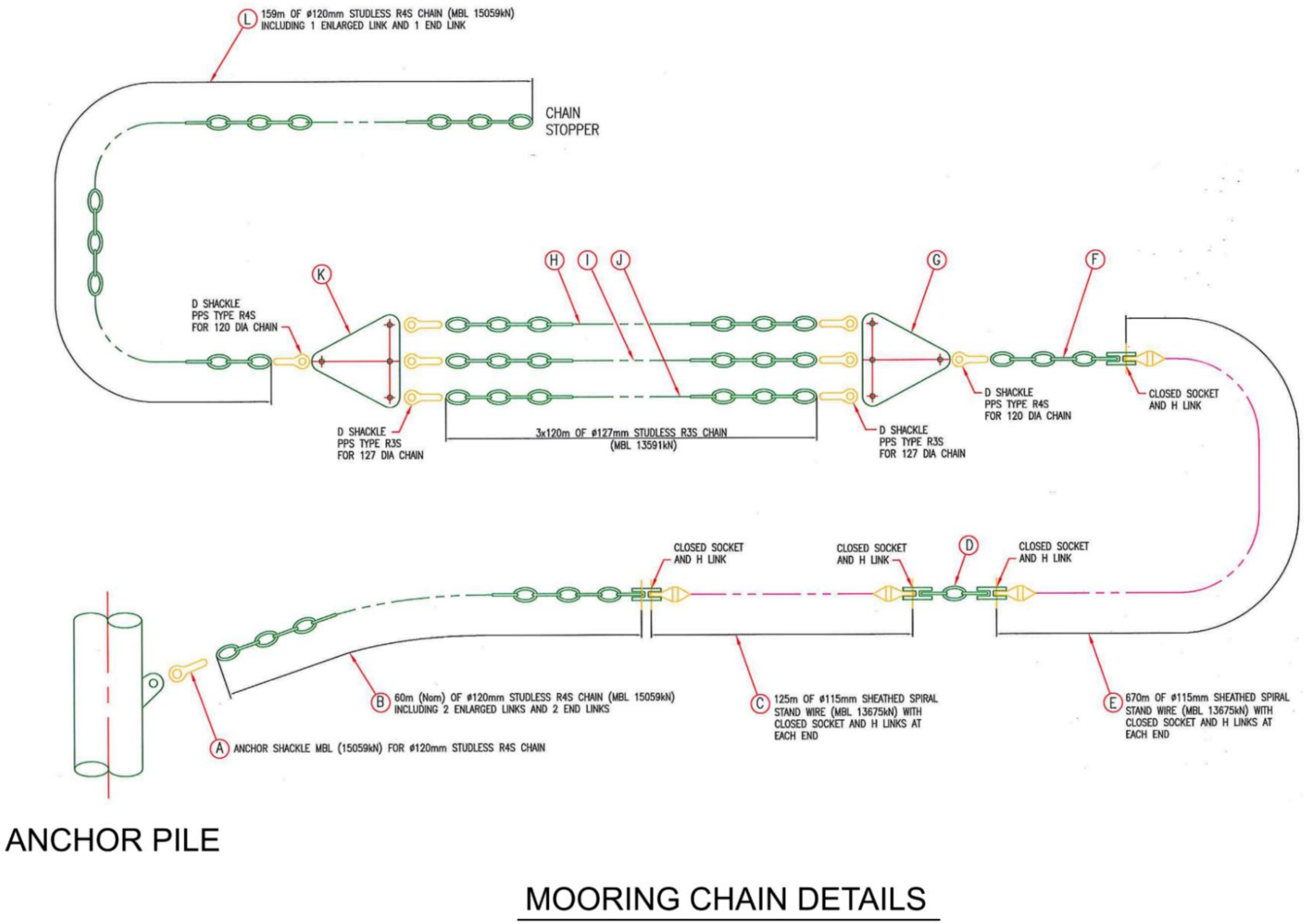


Figure 2.2.1: FPF-1 – typical mooring line arrangement

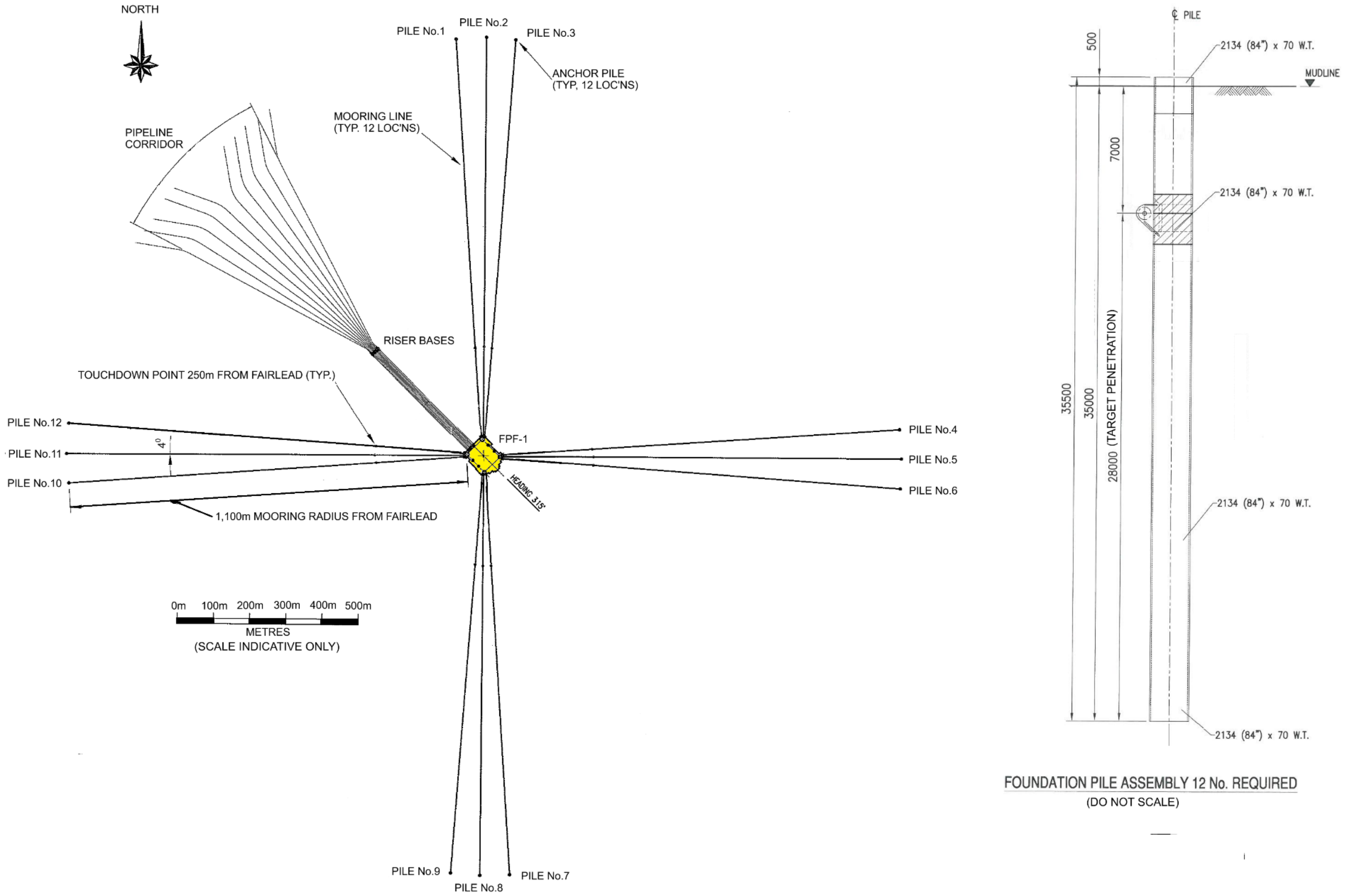


Figure 2.2.2: FPF-1 – Mooring line pattern

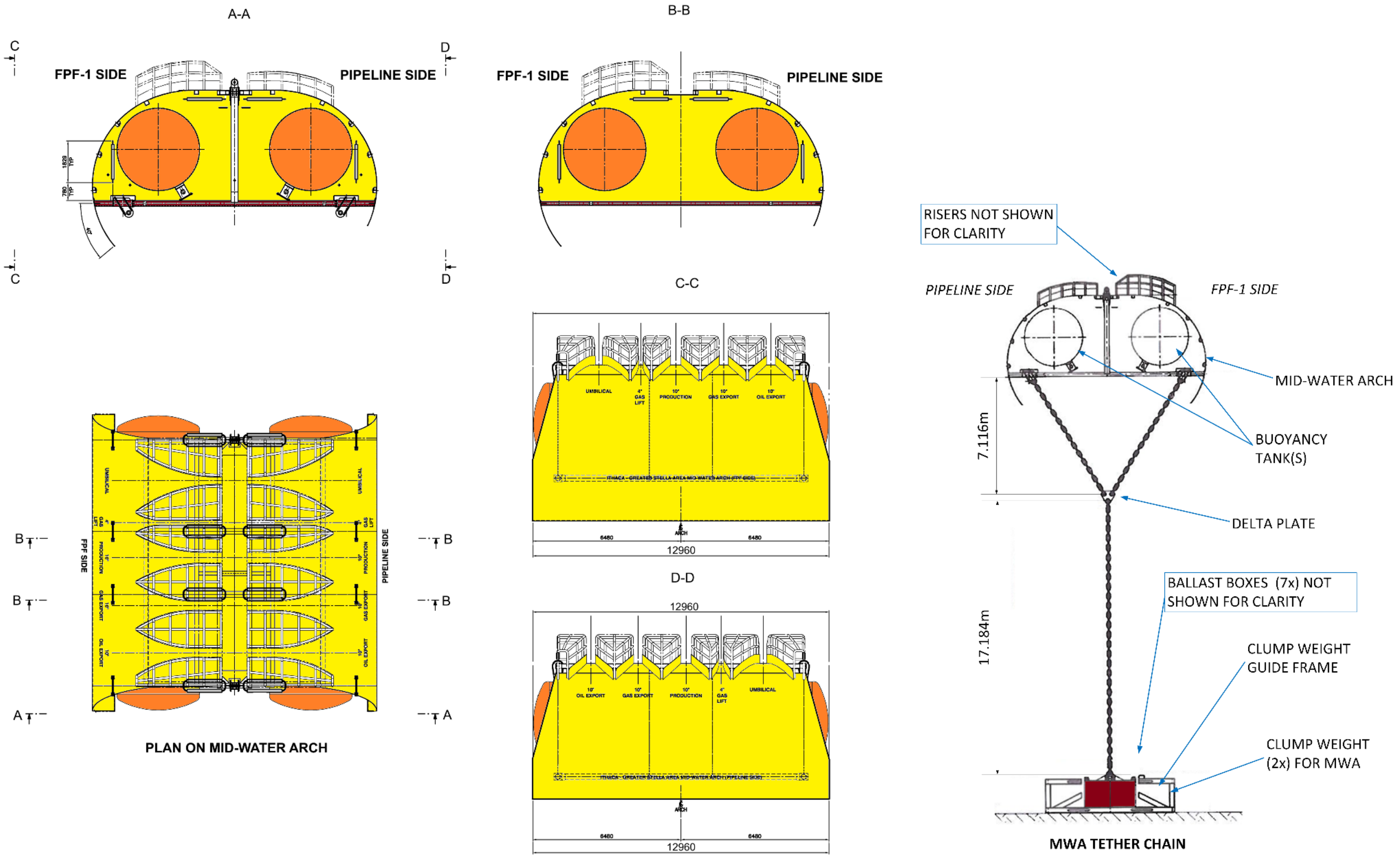


Figure 2.2.3: Stella & Vorlich – MWA & tether chain for clump weight details (both similar)

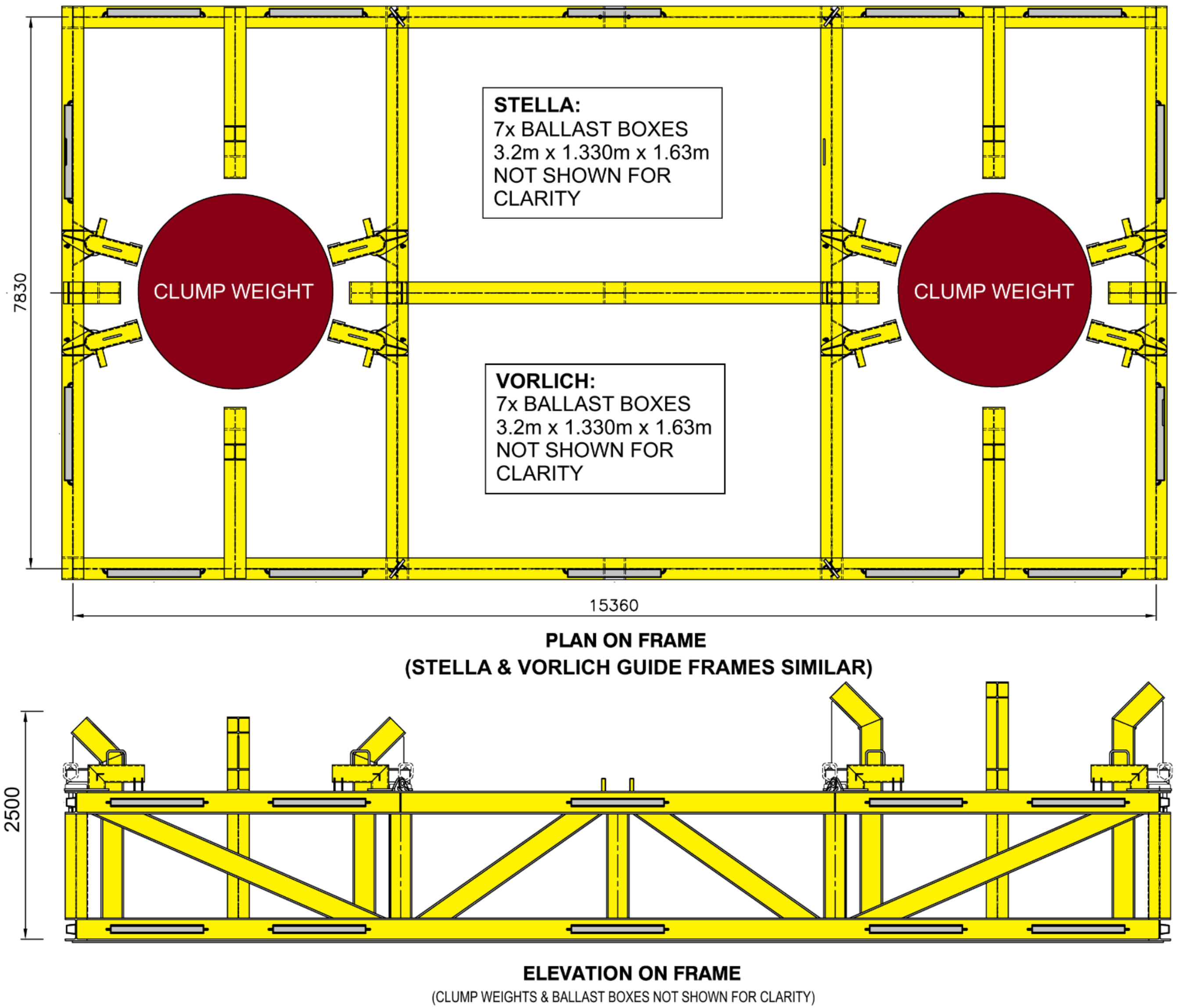


Figure 2.2.4: Stella & Vorlich – Guide frame for clump weights & ballast boxes

ITHACA ENERGY

2.3 Pipelines including stabilisation features

Table 2.3.1: Pipeline, flowline and umbilical information									
Description	**Pipeline ID (as per PWA)[4]**	**Diameter (NB) (inches)[1]**	**Length (m)[3]**	**Description of component parts**	**Product conveyed**	**From to end points**	**Burial status**	**Pipeline status**	**Current content**
STELLA PIPELINES									
Gas Export Pipeline	PL3078 (1)	n/a	2 m	Topsides riser ESDV	Gas	ESDV to ESDV	n/a	Operating	As product conveyed
	PL3078 (2)	10in	50 m	Topsides riser pipework		ESDV to 10in dynamic flexible riser flange	n/a		
	PL3078 (3)	10in	395 m (~287 m)	10in Dynamic flexible riser		10in dynamic flexible riser flange to 10in export riser base flange	Suspended in water column		
	PL3078 (4)	10in	10 m	10in export riser base pipework		10in flexible riser base flange to 10in rigid tie-in spool flange	n/a		
Production pipeline	PL3080 (7)	10in	400 m (~253 m)	10in Dynamic flexible riser	Oil / Gas / Condensate / Produced Water / Traces of Chemicals	10in dynamic flexible riser tie-in flange (subsea) to 10in dynamic riser tie-in flange (Topsides)	Suspended in water column	Operating	As product conveyed
	PL3080 (8)	10in	50 m	10in Topsides riser pipework		10in Dynamic flexible riser tie-in flange (topsides) to FPF-1 topsides riser ESDV	n/a		
	PL3080 (9)	n/a	2 m	Stella FPF-1 topsides riser ESDV		FPF-1 Topsides Riser ESDV to FPF-1 Topsides Riser ESDV	n/a		
Gas Lift Pipeline	PL3081 (1)	n/a	2 m	Topsides riser ESDV	Gas	ESDV to ESDV	n/a	Operating	As product conveyed
	PL3081 (2)	4in	50 m	Topsides riser pipework		ESDV to dynamic flexible riser flange	n/a		
	PL3081 (3)	4in	400 m (~317 m)	4in dynamic flexible riser		Dynamic flexible riser flange to 4in flexible pipeline flange	Suspended in water column		
	PLU3082 (1)	266.6mm	395 m (~269 m)	Dynamic umbilical riser	MeOH (1), SI (3), KHI (2),	FPF-1 TUTU to umbilical riser base	Suspended in water column	Operating	As product conveyed

Table 2.3.1: Pipeline, flowline and umbilical information									
Description	**Pipeline ID (as per PWA)[4]**	**Diameter (NB) (inches)[1]**	**Length (m)[3]**	**Description of component parts**	**Product conveyed**	**From to end points**	**Burial status**	**Pipeline status**	**Current content**
Chemical Injection Umbilical	PLU3082 (2)	n/a	5 m	Jumpers within umbilical riser base	WI/WD (4), AI (2), Biocide (1), MeOH (6)	Umbilical riser base to umbilical riser base	Within riser base		
This row has deliberately left blank to allow continuity of table on next page.									
Crude Oil Export	PL3532 (1)	n/a	2 m	ESDV	Crude oil	FPF-1 topsides riser ESDV to FPF-1 topside riser ESDV	n/a	Operating	As product conveyed
	PL3532 (2)	10in	50 m	Topsides riser pipework		FPF-1 topside riser ESDV to 10in dynamic flexible riser flange	n/a		
	PL3532 (3)	10in	400 m (~241 m)	10in dynamic flexible riser		10in dynamic flexible riser flange to export riser base flange	Suspended in water column		
	PL3532 (4)	10in	10 m	Export riser base		Export riser base flange to export riser base flange	Contained within Riser base		
VORLICH PIPELINES									
Production pipeline	PL4596 (5)	8in	8 m	Riser base	Produced Fluids	Vorlich riser base to Vorlich riser base	Contained within Riser Base	Operating	As product conveyed
	PL4596 (6)	8in	428 m (~258 m)	8in flexible riser		Vorlich riser base to Stella FPF-1 riser pipework flange	Suspended in water column		
	PL4596 (7)	10in	50 m	Topsides riser pipework		Stella FPF-1 riser pipework flange to Stella FPF-1 riser ESDV	n/a		
	PL4596 (8)	n/a	2 m	Riser ESDV		Stella FPF-1 riser ESDV to Stella FPF-1 riser ESDV	n/a		
Controls & Chemical Injection Umbilical	PLU4599 (1)	n/a	n/a	TUTU	Hydraulic (x14), Electric (x9), Chemical (x23)	Stella FPF-1 TUTU to Stella FPF-1 TUTU	n/a	Operating	As product conveyed
Controls &	PLU4599 (2)	294mm	510 m (~349 m)	Dynamic services umbilical	Hydraulic (x14), Electric	Stella FPF-1 TUTU to Vorlich riser base	Suspended in water column	Operating	As product conveyed

Table 2.3.1: Pipeline, flowline and umbilical information									
Description	**Pipeline ID (as per PWA)[4]**	**Diameter (NB) (inches)[1]**	**Length (m)[3]**	**Description of component parts**	**Product conveyed**	**From to end points**	**Burial status**	**Pipeline status**	**Current content**
Chemical Injection Umbilical					(x9), Chemical (x23)				
	PLU4599 (3)	n/a	10 m	Riser base	Hydraulic (x6), Electric (x3), Chemical (x9)	Vorlich riser base to Vorlich riser base	Contained within Riser Base		

NOTES

1. If diameter is expressed in mm it refers to outside diameter of the flexible dynamic riser.
2. The number in brackets next to the pipeline ID is the ident number from Table A in the reference Pipeline Works Authorisation (PWA).
3. The length quoted is the full length associated with the pipeline ID. The number in brackets refers to the length of riser to be removed. The remaining length will be dealt with in a DP to be submitted separately.
4. Reference PWA 6/W/13 & 286/V/24 (PL3078, PL3080, PL3081, PLU3082), 308V16 (PL3078), 57/V15, 142/V/18 (both PL3532), 2/W/19 (PL4596, PLU4599), 269/V/24 (PL4596) and 9/V/25 (PLU4599).

2.4 Pipeline structures

Table 2.4.1: Pipeline structure information					
Pipeline structure incl. stabilisation features	**No**	**Size (m)**	**Location**		**Comments / status**
		Mass (Te)	**WGS84 Decimal**	**WGS84 Decimal Minute**	
STELLA					
Stella riser hold back structure	1	15.4m x 8.7m x 2.35m	56.782965° N	56°46.9779' N	Protected and stabilised by 10x concrete mattresses. Quoted mass includes mass of holdback structure, and mass of ballast boxes (5x) contained within the structure. Refer Figure 2.4.1.
		278.3	2.108056° E	2°6.4833' E	
Stella umbilical riser base	1	7m x 4.5m x 3.35m	56.783592° N	56°47.0155' N	Refer Figure 2.4.2.
		27.4	2.107164° E	2°6.4299' E	
Stella oil and gas export riser base	1	9.6m x 4.0m x 2.9m	56.783982° N	56°47.0389' N	Refer Figure 2.4.3.
		68.2	2.107730° E	2°6.4638' E	
Stella production riser base	1	9.5m x 5m x 4.1m	56.784148° N	56°47.0489' N	Figure 2.4.4.
		114.4	2.107825° E	2°6.4695' E	

Table 2.4.1: Pipeline structure information					
Pipeline structure incl. stabilisation features	**No**	**Size (m)**	**Location**		**Comments / status**
		Mass (Te)	**WGS84 Decimal**	**WGS84 Decimal Minute**	
Stella umbilical riser clump weight	1	4.93m x 4.8m x 1.061m	56.783321° N	56°46.9993' N	Tethered to the umbilical using a pipe clamp. Refer Figure 2.4.6 and Figure 2.4.5
		27.4	2.105317° E	2°6.3190' E	
VORLICH					
Vorlich riser hold back structure	1	15.1m x 8.64m x 2.34m	56.782688° N	56°46.9613' N	Protected and stabilised by 10x concrete mattresses. Quoted mass includes mass of holdback structure, and mass of ballast boxes (3x) contained within the structure. Refer Figure 2.4.7.
		186.7	2.107600° E	2°6.4560' E	
Vorlich riser base	1	7.5m x 5.2m x 3.5m	56.783321° N	56°46.9993' N	Refer Figure 2.4.8.
		117.2	2.105317° E	2°6.3190' E	
Vorlich umbilical riser clump weight	1	4.9m x 4.8m x 1.1m	56.783982° N	56°47.0389' N	Tethered to the umbilical using a pipe clamp. Figure 2.4.9 and Figure 2.4.10.
		28.2	2.107730° E	2°6.4638' E	
NOTE: The concrete mattresses associated with the MWA riser hold back structures will be dealt with in a separate DP to be submitted for the wider GSA infrastructure. They will meantime be left *in situ* for recovery in accordance with mandatory requirements when decommissioning activities are executed for the infrastructure associated with the GSA.					

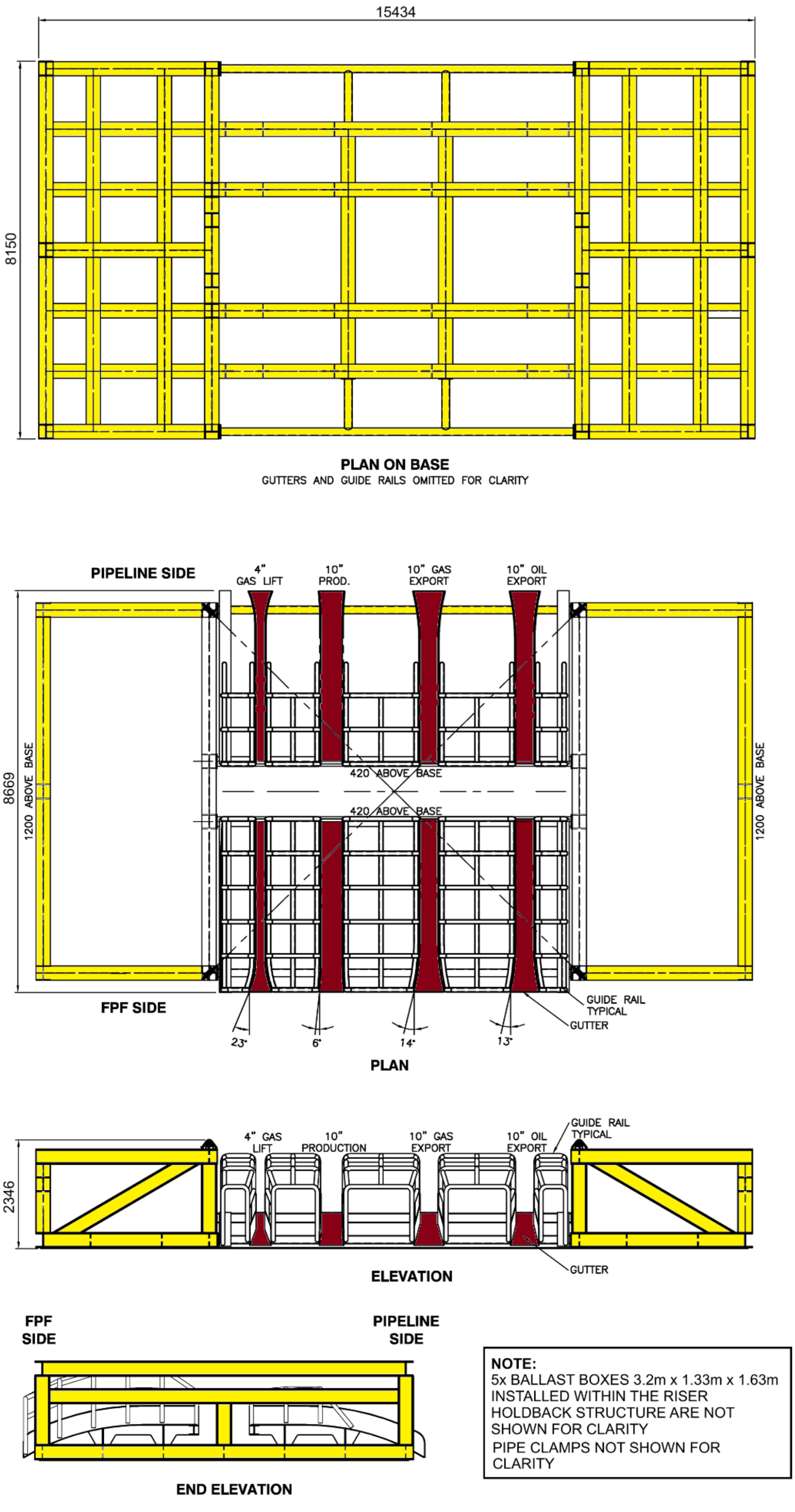


Figure 2.4.1: Stella MWA riser hold back structure

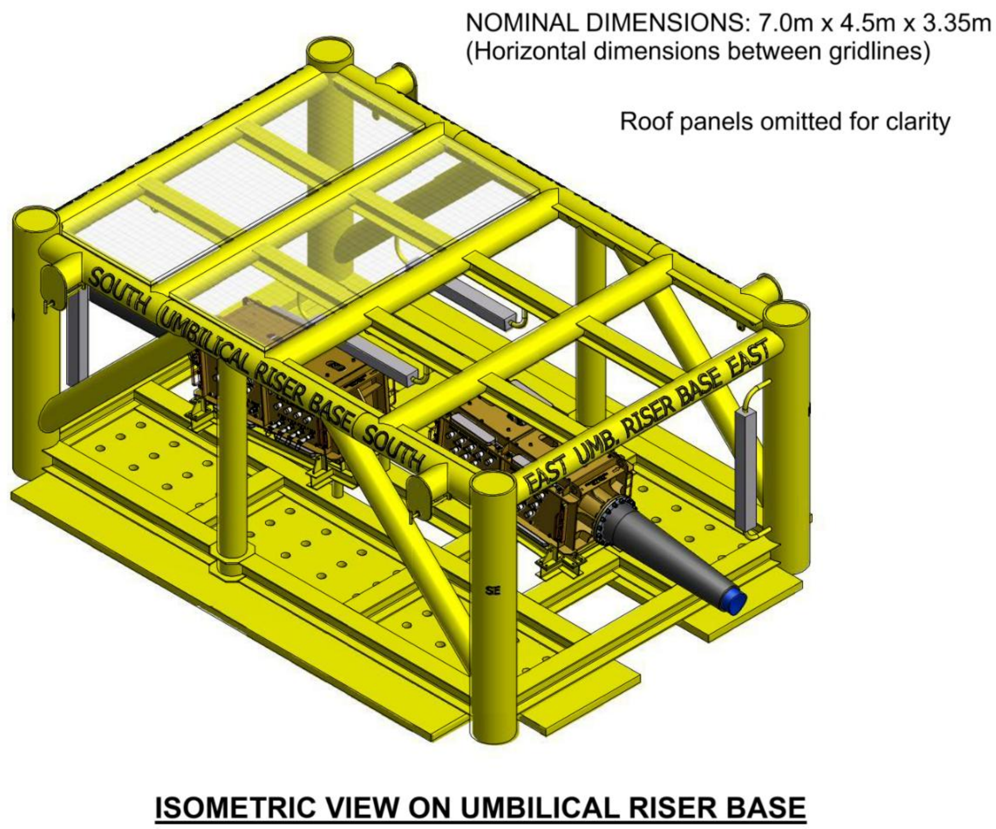


Figure 2.4.2: Stella umbilical riser base

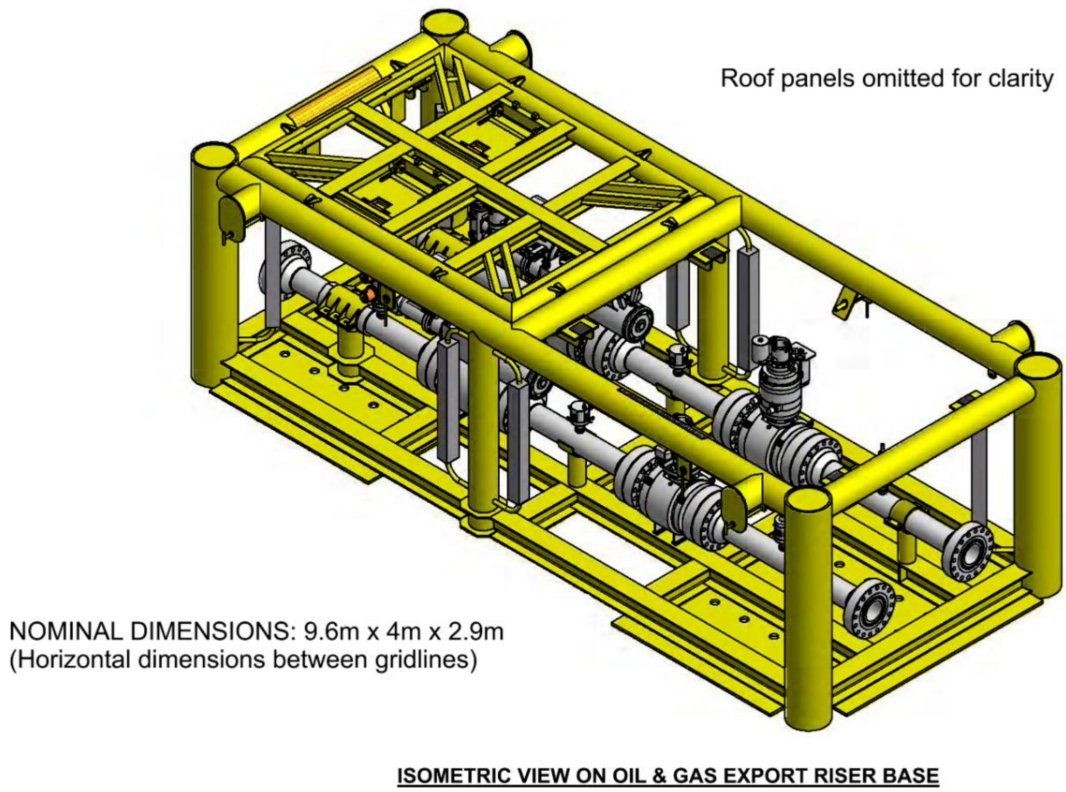
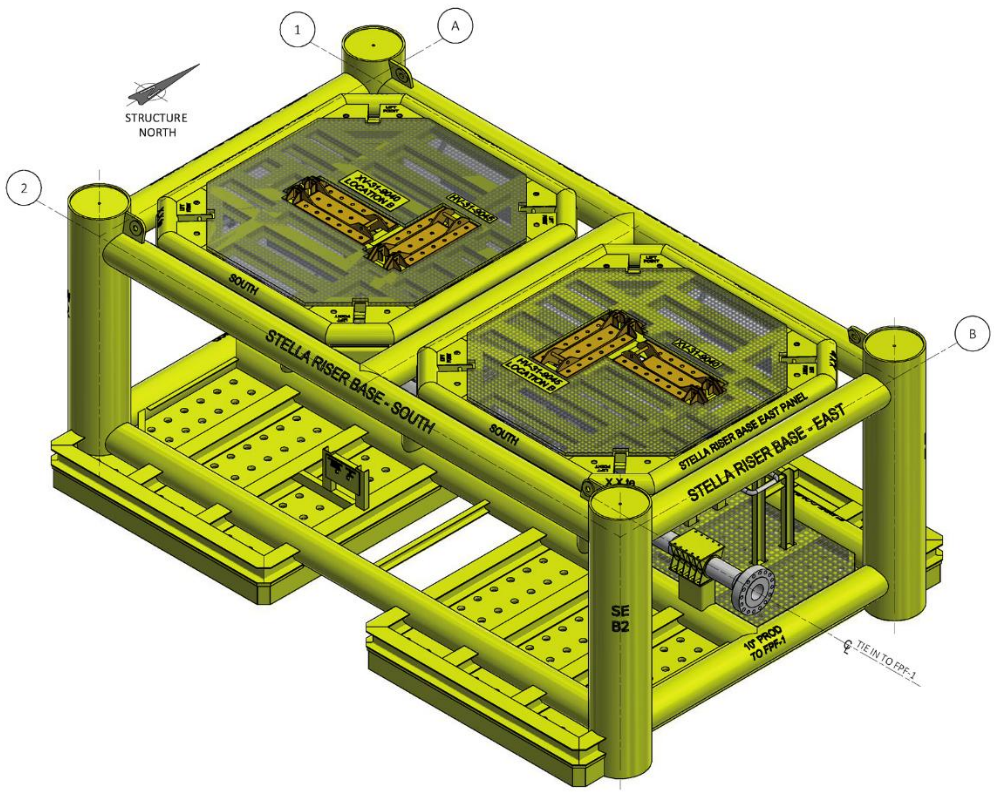


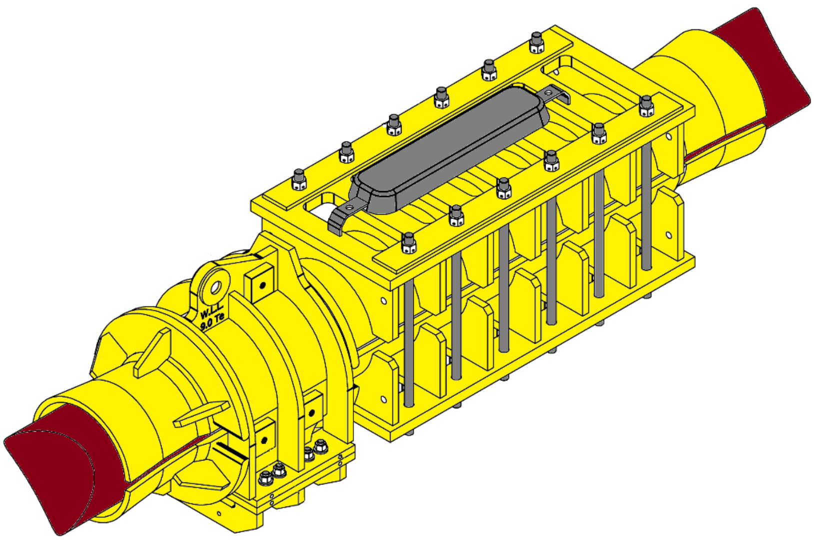
Figure 2.4.3: Stella oil and gas export riser base



NOMINAL DIMENSIONS: 9.5m x 5.0m x 4.1m
(Horizontal dimensions between gridlines)

ISOMETRIC VIEW ON PRODUCTION RISER BASE

Figure 2.4.4: Stella production riser base



STELLA UMBILICAL RISER HOLD BACK CLAMP

Figure 2.4.5: Stella umbilical riser hold back clamp

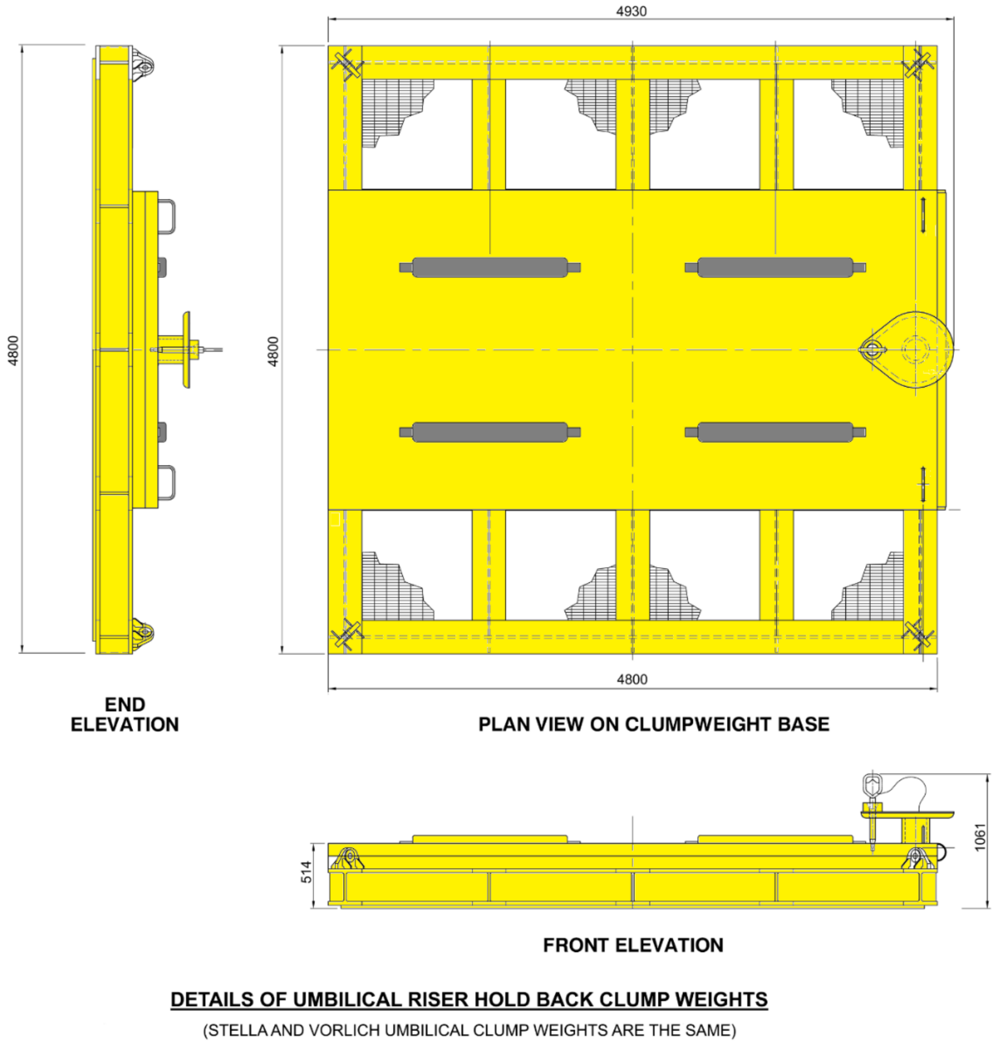


Figure 2.4.6: Stella umbilical riser clump weight (tether not shown)

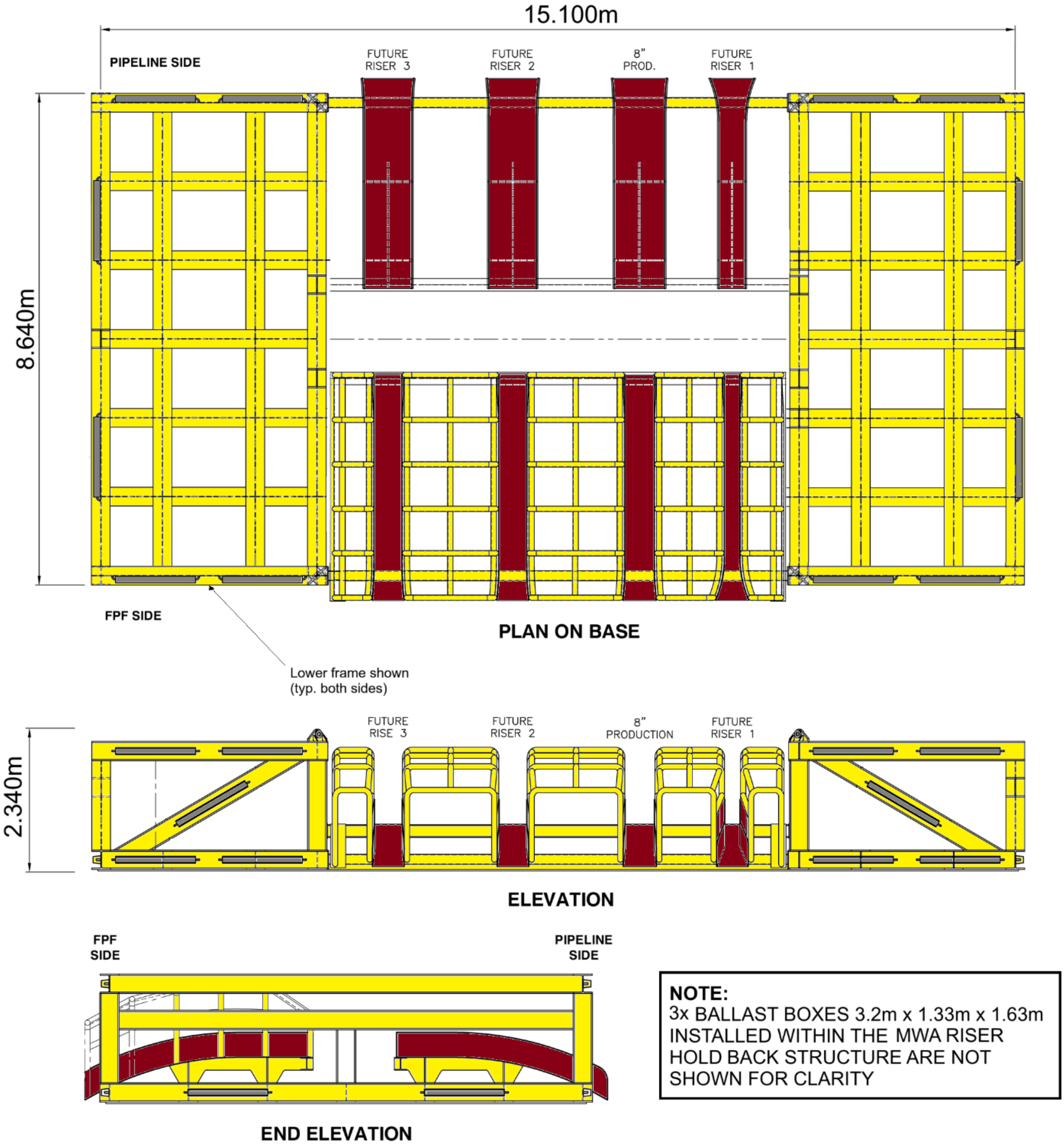


Figure 2.4.7: Vorlich MWA riser hold back structure

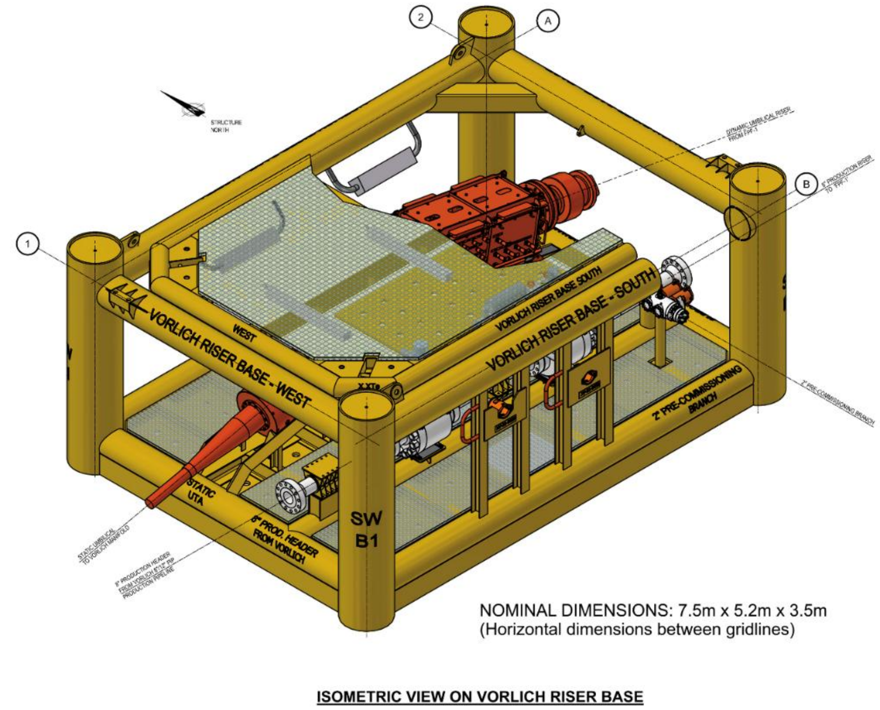


Figure 2.4.8: Vorlich riser base

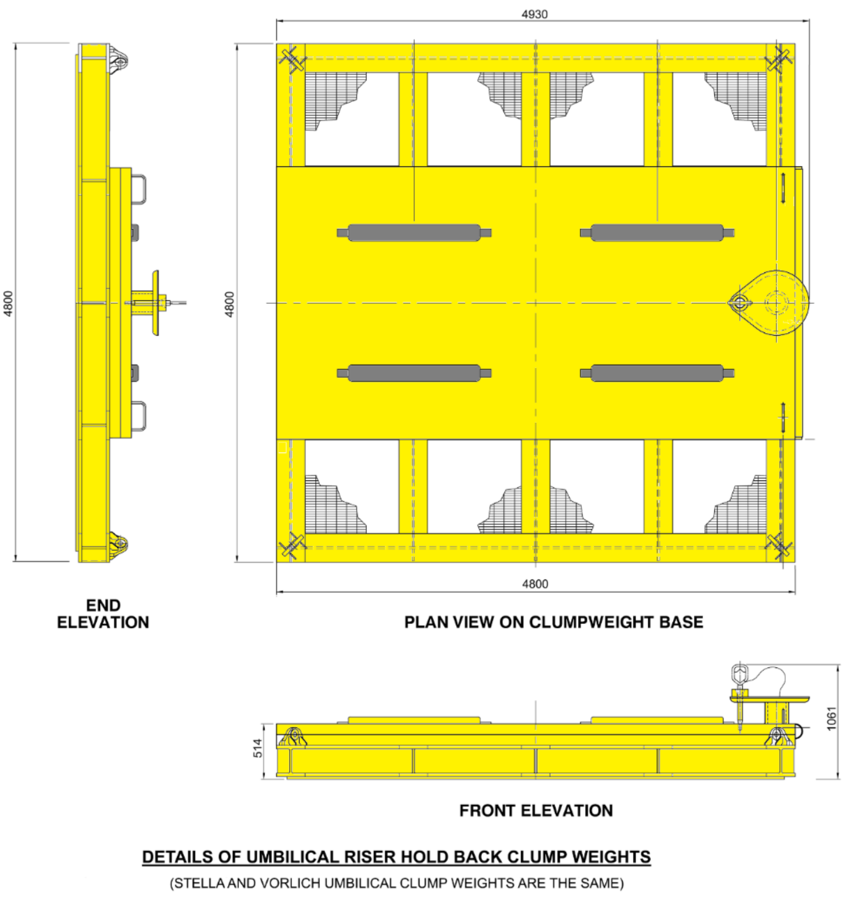


Figure 2.4.9: Vorlich umbilical riser hold back clump weight (tether not shown)

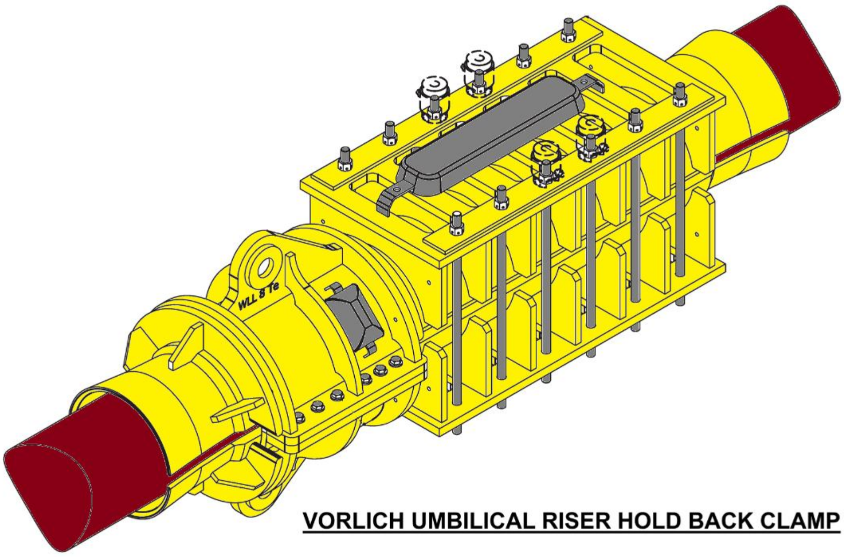


Figure 2.4.10: Vorlich umbilical riser hold back clamp

2.5 Inventory estimate

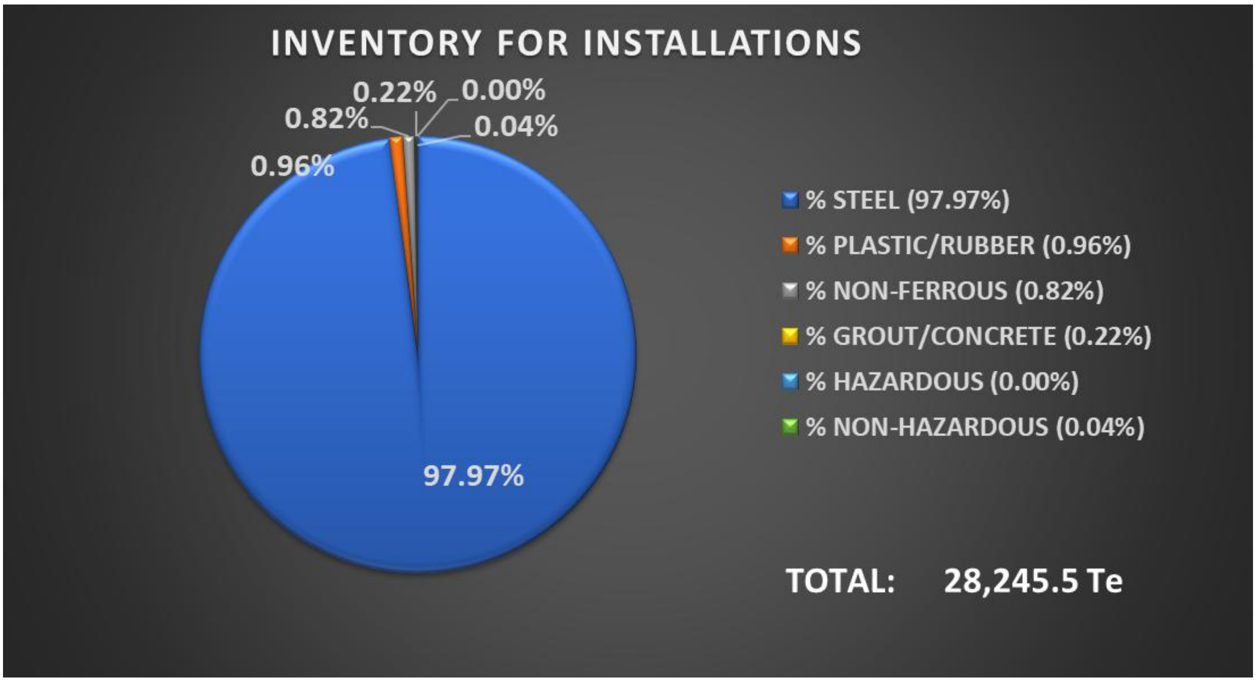


Figure 2.5.1: Inventory of installations (FPF-1 and mooring systems)[3]

[3] Mass of installations includes Stella FPF-1, Mooring System, and Mid-Water Arches and ancillaries.

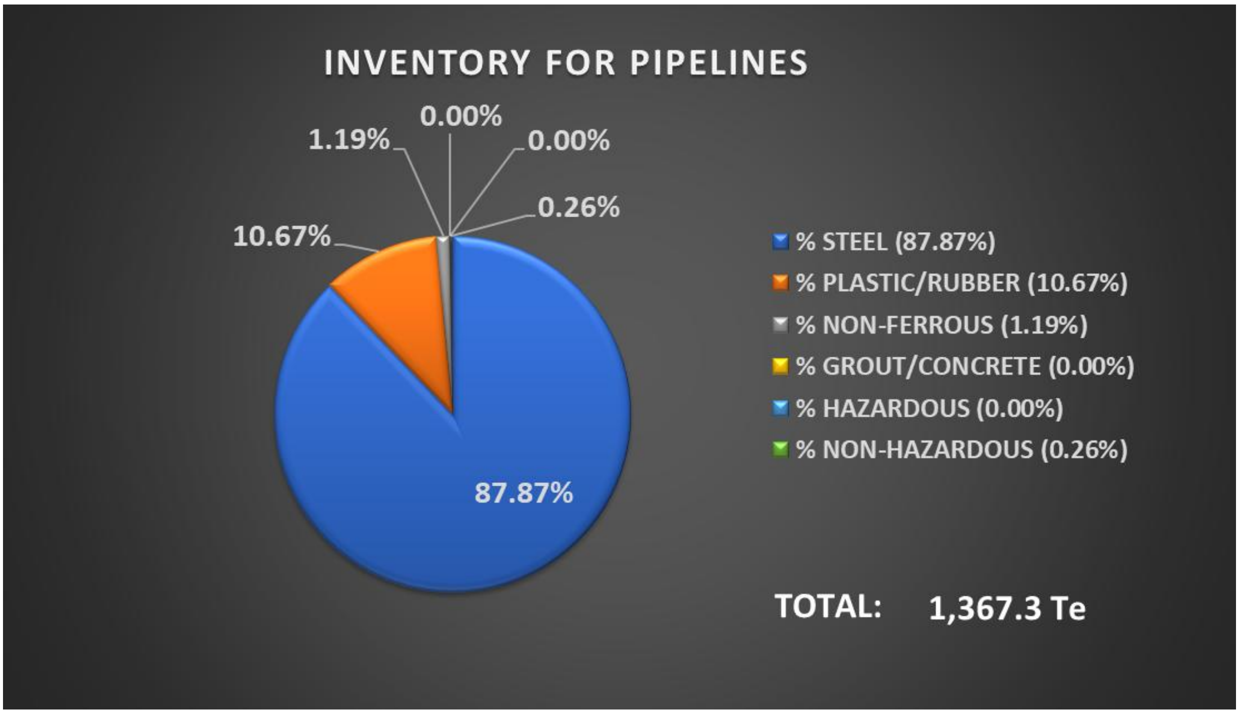


Figure 2.5.2: Inventory of pipelines (and appurtenances incl. pipeline structures, etc)

3. REMOVAL AND DISPOSAL METHODS

The FPF-1 will be taken off station with the assistance of Anchor Handling Vessels (AHV). The mooring lines and risers will thereafter be recovered using AHVs, Construction Support Vessel (CSV), Dive Support Vessel (DSV) or Multi-Support Vessels (MSV) as required. While the mooring disconnection works are underway the FPF-1 will be held in position using Heading Control Tugs (HCT). The FPF-1 will be towed to port using tugs.

Waste will be dealt with in accordance with the Waste Framework Directive. The re-use of an installation, pipeline, or umbilical pipeline or parts thereof, is first in the order of preferred decommissioning options and such options are currently under investigation. Waste generated during decommissioning will be segregated by type and periodically transported to shore in an auditable manner through licensed waste contractors. Steel and other recyclable metals are estimated to account for the greatest proportion of the materials inventory.

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 relevant waste regulatory authorities will ensure that any issues with TFSW are addressed.

Removal activities will be performed using all available techniques and methods will be in line with current guidance and Best Available Techniques (BAT) and Best Environmental Practice (BEP). All necessary permits will be applied for.

3.1 Surface installations

After completion of the operation at its current location, the FPF-1 will be towed from the field and either redeployed or towed to a suitable licensed location for preparation for re-use or decommissioning. Ithaca will be responsible for taking reasonable measures to assure itself that proposals to re-use the vessel will be credible, and that disposal of the FPF-1 will comply with the IMO Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships [28].

Preparation and cleaning: The methods that will be used to vent and purge the FPF-1 prior to removal to shore are summarised in Table 3.1.1.

Table 3.1.1: Cleaning of FPF-1 for removal

Waste type	Composition of Waste	Disposal Route
On-board hydrocarbons (liquids)	Bulk liquid waste will be produced during the flushing of the Greater Stella Field production systems and during the cleaning of the FPF-1 process equipment.	Where possible, on-board hydrocarbons will be evacuated to an export route. Bulk liquids will be offloaded and transported to shore for treatment and disposal. Further cleaning and decontamination of the FPF-1 will take place onshore prior to reuse, recycling or disposal.
Other hazardous materials	The presence of NORM found in fluids during the cleaning activities will be identified.	NORM, if present, will be disposed of in accordance with the appropriate permit.

Table 3.1.2: Topside removal methods

1) Semi-Submersible Crane Vessel ☐; 2) Monohull Crane Vessel ☐; 3) Shear Leg Vessel ☐; 4) Jack up Work barge ☐; 5) Piece small or large ☐; 6) Complete with jacket ☐; 7) Other ☑

Method	Description
Proposed removal method and disposal route	**The FPF-1 will be released from its moorings after all the export and production risers and chemical cores of the umbilicals have been cleaned and flushed, and once all the risers have been disconnected. The FPF-1 will then be towed to port for cleaning and, or refurbishment before being reused, or towed to an alternative location at a licensed facility to be decommissioned.** **The opportunities for reuse will be determined by the Ithaca. OPRED will be notified once a disposal yard or reuse opportunity has been selected.**

3.2 Subsea installations

The offshore oil and gas decommissioning guidance notes [40] that certain aspects of mooring systems are identified as subsea installations (e.g. mooring lines), and are considered to fall within the definition of "steel installation" for the purposes of OSPAR Decision 98/3, such that they should be fully removed. It is a policy objective that a clear seabed is left, such that any element of moorings which are not buried, should be removed.

Two options are considered in the comparative assessment (CA) [33] in relation to the removal of the buried section of the mooring lines. These are:

- **Removal to 1 m below seabed** – This would involve excavating each mooring line in the lower chain section locally to 1.5 m below seabed using tracked mechanical dredging equipment or similar, to enable access to cut the chain. Deposited rock would then be used to backfill the excavation.
- **Removal to 3 m below seabed** – This would involve excavating each mooring line in the lower chain section locally to 3.5 m below seabed using tracked mechanical dredging equipment or similar, to enable access to cut the chain. Deposited rock would then be used to backfill the excavation.

The anchor piles will be cut internally at 3 m below seabed in accordance with the offshore decommissioning oil and gas guidance notes [40] unless difficulties are encountered, in which case OPRED will be consulted. Therefore, decommissioning of the piles is not a subject of the CA [33].

The comparative assessment concluded that there would be no tangible benefit in excavating the seabed to sever the lower mooring chain sections to at least 3 m below seabed. The quantity of material recovered would be largely the same, and no snagging hazard from the cut chain ends would remain after either option had been implemented. In firm to stiff to very stiff clay the -3 m option would require a much larger overall excavation (up to ~558 m^3 (-3 m option) vs. up to ~72 m^3 (-1 m option)) as well as dispersal of excavated lumpy clay material to the surrounding area. Rock (total ~3,718 Te (-3 m option) vs. 268 Te (-1 m option)) would be needed to backfill the excavations and remediate the lumpy clay berms on the seabed; an increasingly large area of seabed would need to be remediated after activities had been completed.

The recommendation of the CA is to Excavate and cut the lower chain section of the mooring line such that it will be buried to 1 m below the seabed on the basis that no snagging risk would remain, and the environmental impact – particularly to the seabed, would be minimised.

Table 3.2.1: Subsea installations & stabilisation features

Subsea installations and stabilisation features	No.	Option	Disposal Route (if applicable)
FPF-1 mooring piles	12	Cut the piles 3 m below seabed and remove the upper section. Leave the remainder of the piles *in situ*.	Return the 3.5 m long sections to shore for reuse, recycling, or disposal. Leave the rest of the piles more than 3 m deep *in situ*.
Mooring lines	12	Complete recovery except for a short chain section of the mooring line approaching the mooring pile padeye that is more than 1 m below seabed with the local seabed being remediated with deposited rock where necessary. This short-section will be left *in situ*.	Return to shore for reuse, recycling, or disposal.
Stella MWA c/w 2x tether chains	1	Complete removal	Return to shore for reuse, recycling, or disposal.
Stella MWA guide frame	1		
Stella MWA clump weights	2		
Stella MWA ballast boxes	7		
Vorlich MWA c/w 2x tether chains	1		
Vorlich MWA guide frame	1	Complete removal	Return to shore for reuse, recycling, or disposal.
Vorlich MWA clump weights	2		
Vorlich MWA ballast boxes	7		

Table 3.2.1: Subsea installations & stabilisation features			
Subsea installations and stabilisation features	**No.**	**Option**	**Disposal Route (if applicable)**
NOTE 1. In practical terms, it is not possible to retrieve the full length of the mooring lines down to the padeye, which is 7 m below seabed. In order to recover the full length of the mooring line the seabed would need to be excavated down to the depth of the padeye so that the line can be cut. The approach taken here is an appropriate balance of the technical issues, safety implications and environmental impacts. Therefore, the mooring lines will be cut, with the ends buried so that they will be at least 1 m below seabed. Should any problems arise with this approach, OPRED will be consulted.			

3.3 Pipelines

The risers and pipelines identified in this document have not been subjected to a full comparative assessment on the basis that the risers are suspended in the water column and would ordinarily be removed in accordance with mandatory requirements. The option to leave the risers *in situ* was not considered.

All pipelines will be flushed and cleaned with seawater to a cleanliness level agreed with OPRED.

The dynamic flexible risers (5x) and dynamic flexible umbilicals (2x) will all be completely removed. The topsides components identified in Table 2.3.1 will remain on the vessel and will be dealt with along with the FPF-1 when it is brought to shore.

Table 3.3.1: Proposals for pipeline & cables		
Pipeline	**Condition and current status**	**Decommissioning options considered**
STELLA PIPELINES		
PL3078 (ID 3) 10in gas export pipeline dynamic riser, complete with riser bend stiffeners.	Operational. Suspended over the MWA in seawater	Complete removal with ~287m of the riser being removed in this DP. Refer Figure 3.4.1.
PL3080 (ID 7) 10in production pipeline dynamic riser, complete with riser bend stiffeners.		Complete removal with ~253m of the riser being removed in this DP. Refer Figure 3.4.1
PL3081 (ID 3) 4in gas lift pipeline dynamic riser, complete with riser bend stiffeners and buoyancy modules.		Complete removal with ~317m of the riser being removed in this DP. Refer Figure 3.4.1
PLU3082 (ID 1) chemical injection umbilical dynamic riser, complete with riser bend stiffeners and buoyancy modules.		Complete removal with ~269m of the riser being removed in this DP. Refer Figure 3.4.1
PL3532 (ID 3) 10in crude oil export pipeline dynamic riser, complete with riser bend stiffeners.		Complete removal with ~241m of the riser being removed in this DP. Refer Figure 3.4.1
VORLICH PIPELINES		
PL4596 (ID 6) 8in production pipeline dynamic riser, complete with riser bend stiffeners.	Operational. Suspended over the MWA in seawater	Complete removal with ~258m of the riser being removed in this DP. Refer Figure 3.4.1
PLU4599 (ID 1) Vorlich dynamic services umbilical riser, complete with riser bend stiffeners and buoyancy modules.		Complete removal with ~349m of the riser being removed in this DP. Refer Figure 3.4.1
NOTE: If a pipeline ID listed in Table 2.3.1 is not listed here it is because the part concerned will be removed along with either the FPF-1 or with the riser base listed in Table 3.4.1.		

3.4 Pipeline structures

Table 3.4.1: Subsea pipeline structures & stabilisation features			
Subsea pipeline structure and stabilisation features	**No**	**Option**	**Disposal Route (if applicable)**
STELLA			
Stella riser holdback structure c/w all ballast boxes	1	Complete removal.	Return to shore for reuse or recycling.
Stella umbilical riser base	1		
Stella oil and gas riser base	1		
Stella production riser base	1		
Stella riser clump weight c/w tether and umbilical clamp	1		
VORLICH			
Vorlich riser holdback structure c/w all ballast boxes	1	Complete removal.	Return to shore for reuse or recycling.
Vorlich riser base	1		
Vorlich umbilical riser clump weight c/w tether and umbilical clamp	1		

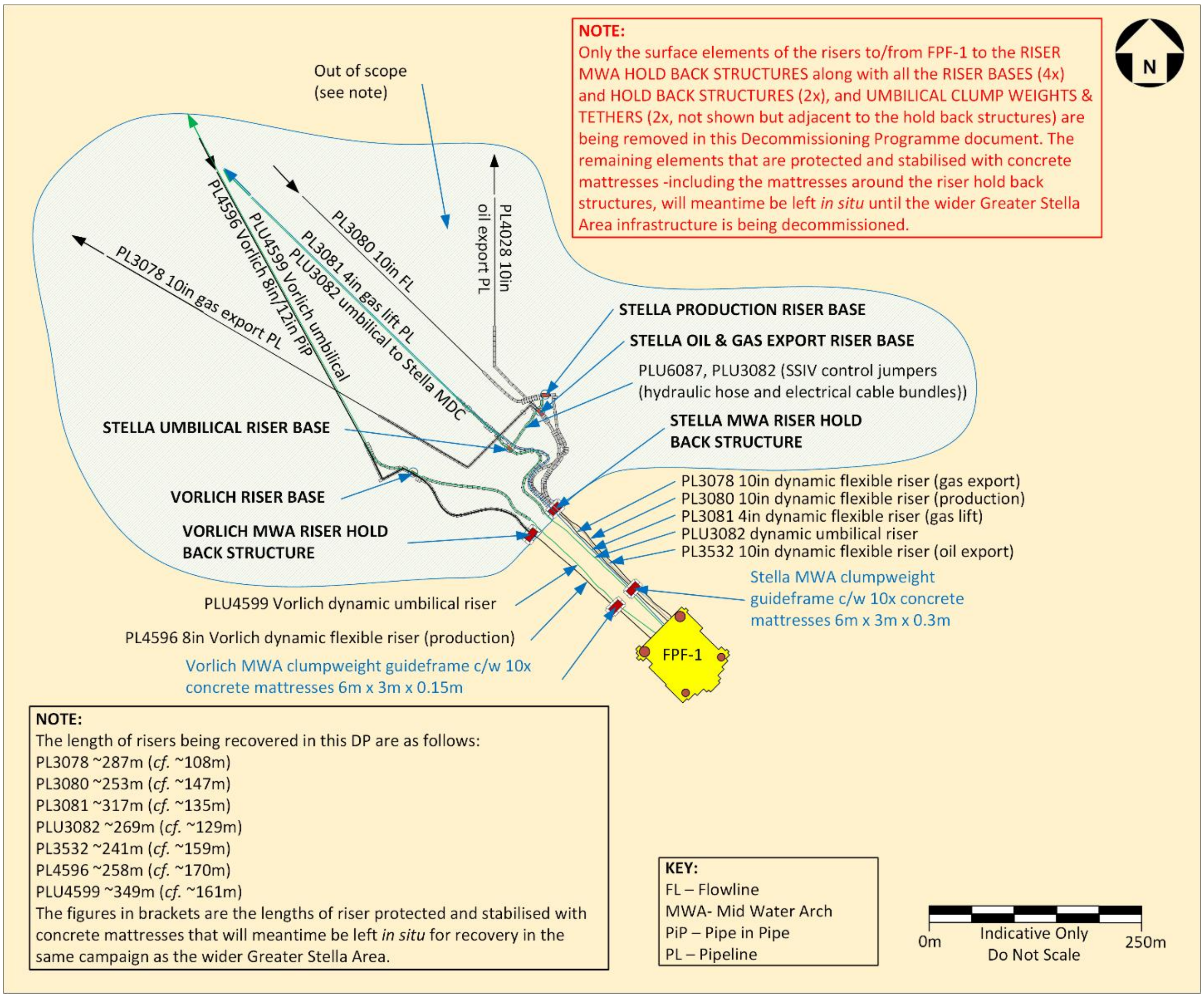


Figure 3.4.1: Stella FPF-1, part risers & pipeline structures removal scope[4]

[4] The umbilical riser clump weights adjacent to the Stella and Vorlich MWA riser hold back structures are not shown for clarity.

ITHACA ENERGY

3.5 Waste streams

3.5.1 Waste Stream Management Methods

Table 3.5.1: Waste stream management methods	
Waste Stream	**Removal and disposal method**
Bulk liquids	Bulk hydrocarbons will be exported to an export route, with any residual hydrocarbons removed from the FPF-1 in accordance with contractual agreements. Any seawater used to evacuate hydrocarbons from topsides will be cleaned and disposed overboard or to a pipeline under permit. The risers will be flushed and left filled with seawater as appropriate prior to being disconnected. Any residual fluids from within these pipelines will be released to marine environment under permit prior to removal to shore. Further cleaning and decontamination will take place onshore prior to reuse, recycling or disposal.
Marine growth	Some marine growth is likely to detach itself from the FPF-1 during tow. For subsea equipment, marine growth is likely to dry out and detach itself while it is in transit. Marine growth that remains attached to the subsea equipment and, or the FPF-1 after load-in to the onshore dismantling site will be removed. It will be recycled or disposed of in accordance with the regulations in force at the site following the licensed site operator's procedures, guidelines, and company policies.
NORM	Based on production records to date, NORM is expected. Tests for NORM will be undertaken offshore, and any NORM encountered will be dealt with and disposed of in accordance with guidelines and company policies.
Asbestos	Asbestos is expected to be present on the FPF-1 installation. Any such material found will be dealt with and disposed of in accordance with guidelines and company policies.
Other hazardous wastes	Will be recovered to shore and disposed of according to guidelines and company policies.
Onshore dismantling sites	Appropriate licensed sites will be selected. Dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver reuse and recycling options.

Table 3.5.2: Inventory disposition				
Inventory	**Total inventory (Te)**	**Planned tonnage to shore (Te)**	**Planned tonnage to shore (GSA scope) (Te)** [1]	**Planned left *in situ* (Te)**
FPF-1 c/w mooring system, MWA, guide frames, clump weights, tether chains, ballast boxes	28,245.5	26,821.1	0.0	1,424.4[2]
Dynamic flexible risers	475.8	325.5	150.3	0.0
Pipeline structures (MWA riser hold back structures and riser bases)	891.5	891.5	0.0	0.0

NOTE:

1. As stated in Figure 3.4.1, the remainder of the riser sections that are protected and stabilised by concrete mattresses will be dealt with in the DP for the wider GSA. They will be completely removed as part of the decommissioning activities associated with the wider GSA infrastructure.
2. This material relates to buried sections of the mooring chain to be left *in situ*.

Table 3.5.3: Re-use, recycle & disposal aspirations for recovered material			
Inventory	**Re-use**	**Recycle**	**Disposal (e.g., Landfill)**
FPF-1 c/w mooring system, MWA and appurtenances	<5%	>95%	<5%
Dynamic flexible risers (part thereof), riser bases and MWA riser hold back structures	<5%	>95%	<5%

4. ENVIRONMENTAL APPRAISAL

4.1 Environmental sensitivities

The key environmental sensitivities in the project area are summarised in Table 4.1.1. Except where referenced, the data have been obtained from the Environmental Statement for the Stella, Harrier and Vorlich Fields [1][31] where information relates to the FPF-1 mooring line area, including installation of the anchor piles. Several environmental surveys were conducted in the GSA area, between 2006 and 2012 for initial development of the GSA and between 2017 and 2021 environmental baseline and habitats assessment surveys were conducted in support of the Abigail and Vorlich subsea tie-backs. In addition, an ROV inspection of five of the FPF-1 mooring lines/anchor piles was undertaken in September 2024.

The information that is currently available [13][14][15][20][22][23][24][25][32] is considered adequate to inform the baseline environment at the location of the Stella FPF-1 and its attendant mooring lines - including the seabed within which these sit, and to adequately identify and assess any potential impacts that could result from the decommissioning activities which are the subject of these DPs.

An environmental baseline survey of the wider fields - encompassing the drill centres and the pipelines is planned for 2025, the data obtained from this, and the habitats assessment at the FPF-1 in 2024, will be used to inform the various permits required for decommissioning operations.

Table 4.1.1: Environmental and societal sensitivities

Environmental receptor	Main features
Physical environment	The water depth at the FPF-1 location is ~89 m. Wind direction varies, although dominant directions range from southeast to northwest through southwest. Residual near-surface currents are weak (0.5 m/s) and predominantly to the south and east, although the pattern of water movement may be strongly influenced by short-medium term weather conditions. Thermal stratification occurs in April/May; stratification breaks down in autumn with increasing frequency and severity of storms and cooling.
Bathymetry and seabed sediments	The seabed in the area is generally flat and featureless, with some evidence of previous fishing activity. Superficial sediment is predominantly rippled muddy, silty sand, medium to dense sand, with areas of coarse material (primarily bivalve shells) which form small ripples/waves, there are also areas of large shells and scattered cobbles [32]. The European Nature Information System (EUNIS) classification for the FPF-1 area is Atlantic offshore circalittoral sand. These superficial sediments, down to around 0.5m are underlain by low to medium strength clay, down to around 4 m. There is some variability seen at the depths at which clay is encountered. From the installation of the FPF-1 mooring system, sand was encountered down to 0.2 m, 0.5 m and 0.7 m at three of the four clusters, after which it was firm to stiff clay. At one cluster, firm to stiff clay was encountered at seabed surface down to 17.2m. Footage from the ROV inspection indicated an absence of scour around the anchor piles, indicating low sediment mobility in the area (e.g. relative to the southern North Sea, where high energy currents results in significant sediment mobility) – see Appendix A. The Priority Marine Feature (PMF) distribution maps [43] report the PMF seabed features burrowed mud and offshore subtidal sands and gravels are known to occur within Block 30/06 – see Conservation section below.
Plankton	A phytoplankton bloom occurs in spring, followed by a smaller peak in autumn. Zooplankton abundance follows a similar seasonality to phytoplankton, although peak abundances lag slightly behind. The zooplankton is dominated in terms of biomass and productivity by Calanoid copepods, which constitute a major food resource for many commercial fish species. Key: *Period of increased plankton abundance shown in darker blue (Jan to Dec)*

<table>
<tr><th colspan="13">Table 4.1.1: Environmental and societal sensitivities</th></tr>
<tr><td>Benthos</td><td colspan="12">The macrofaunal community found during the area surveys ([17][18][22][23][24]), were dominated by Galathowenia oculata (polychaete), Echinoidea juveniles, Paramphinome jeffreysii (polychaete), Ophiuroidea juveniles, Thyasira pygmaea (bivalve), Ampharetinae juveniles (polychaete), Eclysippe cf. vanelli (polychaete), Spiophanes kroyeri, Pholoe inornata (polychaete), and Minuspio cirrifera (polychaete).

The visible fauna was sparse, predominantly hermit crab (Pagurus bernhardus), sea pens (Virgularia mirabilis) and lebensspuren related to crustacean burrows, vents and worm casts. Occasional large sea anemones (Bolocera tuediae) and soft corals (Alcyonium sp.) were observed, usually attached to large relict shells – see Appendix A.

Arctica islandica were also recorded, however, these were in low numbers, with no aggregations identified.</td></tr>
<tr><td rowspan="3">Fish, spawning and nursery Areas</td><td colspan="12">The FPF-1 is located within International Council for the Exploration of the Seas (ICES) rectangle 42F2 and this overlaps with reported spawning areas for mackerel, cod, Norway pout, plaice, lemon sole and sandeel. The area also supports nursery grounds for: herring, mackerel, cod, haddock, whiting, , blue whiting, hake, Norway pout, ling, plaice, monkfish, sandeel, spurdog and spotted ray. Of these species, mackerel, cod, Norway pout, herring, ling, monkfish, sandeel and spurdog are PMFs in Scottish waters [6][12][27].</td></tr>
<tr><td>4</td><td>4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td colspan="12">Key: 1 = 1 species spawning, 2 = 2 species spawning, 3 = 3 species spawning, etc, Jan to Dec</td></tr>
<tr><td rowspan="3">Seabirds</td><td colspan="12">The area may be considered to be of low importance for seabirds in the context of the North Sea as a whole. This is related to the distance from breeding colonies (~248 km from shore) and the availability of prey species. Birds present vary seasonally, and being far offshore, those present are likely to be transiting through the area during migration, and during post-breeding dispersion from colonies.

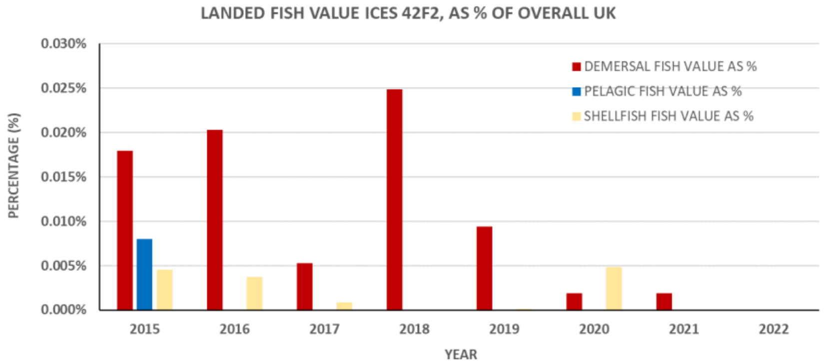
Seabird oil spill sensitivity [46] is low for Block 30/06 for those months with data. Where no data coverage is available, where possible JNCC guidance [36] was used to reduce the extent of coverage gaps (these are shown in red with an *, below). Data gaps that could not be reduced are shown with N and highlighted yellow.

Seabird oil spill sensitivity in Block 30/06 (Jan to Dec):</td></tr>
<tr><td>5*</td><td>5</td><td>5*</td><td>N</td><td>5*</td><td>5</td><td>5</td><td>5</td><td>5*</td><td>N</td><td>N</td><td>N</td></tr>
<tr><td colspan="12">Key: 1 = Extremely High; 2 = Very High; 3 = High, 4= Medium, 5= Low, N = No data</td></tr>
<tr><td>Marine mammals</td><td colspan="12">Harbour porpoise are frequently sighted throughout the central North Sea and are likely to be the most abundant species of marine mammal in the GSA. White-beaked dolphins, although generally less abundant, are also sighted in the area and throughout the year. Minke whales are widely distributed throughout the central and northern North Sea in summer; with a distinct peak in July and August. Densities of minke whale are likely to be low, with more sightings occurring further west, off the east coast of Scotland and northern England. Overall, species of marine mammals are expected to be present in the area throughout the year, but with higher densities likely in summer and autumn [42][45].

The area is distant from seal breeding colonies and haul-out sites, therefore, the presence of either species in the GSA is very low [4].

The most recent SCANS survey is SCANS IV [26], and GSA is located in SCANS survey strata NS-G (a block referenced in [26]), previously Q in SCANS III). The most recent data records harbour porpoise at a density of 1.0398 (animals/km^2), white-beaked dolphin at 0.1051/km^2 and minke whale 0.0103/km^2 in the NS-G.</td></tr>
</table>

Table 4.1.1: Environmental and societal sensitivities	
Conservation sites and features	The east coast of Scotland has a variety of important habitats and species protected under international, national and local designations; however, the closest coastal site (the Buchan Ness to Collieston Coast Special Protection Area) is at least 230 km from the FPF-1 location. The closest offshore Special Area of Conservation (SAC) is the Dogger Bank, approximately 157 km to the south, the closest Marine Conservation Zone (MCZ) is the Fulmar MCZ, (designated for subtidal mixed sediment, subtidal sand, subtidal mud and *Arctica islandica* aggregation) approximately 20 km to the south, and the closest Nature Conservation Marine Protected Area (NCMPA) is the East of Gannet and Montrose Fields NCMPA (designated for deep sea muds and *A. islandica* aggregations) approximately 34 km to the northwest. The FPF-1 - including the mooring system, is not located within or near to, a designated conservation site. The EUNIS classification for the FPF-1 area is Atlantic offshore circalittoral sand, also found at the Vorlich manifold and along the Vorlich pipeline (Appendix A). A second biotope is present in the GSA area, Atlantic Offshore Circalittoral Mud; the Abigail tie back (manifold and pipeline) along with the majority of the gas export pipeline, is located within this biotope. The FPF-1 to SAL base survey [3] provides the closest survey stations to the FPF-1 location (*ca*. 1km from FPF-1). The survey found the dominant sediment type of silty fine to medium sand to be relatively homogeneous along the pipeline, with evidence of bioturbation and active crustacean burrows and worm casts in the soft sediments. The sea pen *Virgularia mirabilis* was observed in areas of silty sand. The survey concluded that the regional habitat generally conforms to a sandier form of the UKBAP habitat designation of 'Mud Habitat in Deep-Water' and the OSPAR habitat 'Sea pens & burrowing megafauna communities'. Survey data for the Vorlich field is of relevance to the FPF-1 location (some 10km from FPF-1) This recorded the sediment type as 'circalittoral muddy sand' across the Vorlich area [14]. Habitat assessments of video transect data from two stations at Vorlich concluded that while sea pens were the dominant epifauna, burrows were not considered to be a prominent feature (burrows were observed at 'frequent' abundances at one of the two stations but the report concluded that in most cases the fauna creating the burrows was unclear) and as such the habitat was not considered to conform to the OSPAR description for 'Sea pens and burrowing megafauna communities' [19]. Fauna typical of the sea pen and burrowed mud biotope includes the sea pens (*Virgularia mirabilis* and *Pennatula phosphorea*) and the burrowing crustaceans *N. norvegicus Calocaris macandreae* or *Callianassa subterranea* [2]. Offshore mud habitats can be characterised by the burrowing urchin *Brissopsis lyrifera* and the brittle stars *Amphiura chiajei* and *Amphiura* spp. [35]. The epibenthic scavengers *Asterias rubens*, *Pagurus bernhardus* and *Liocarcinus depurator* are generally present in low numbers; and the brittlestars *Ophiura albida* and *Ophiura ophiura* may be present but are more common in coarser sediments. Fauna typical of this biotope were generally absent from the Vorlich sample stations. The polychaete worms *Galathowenia oculata* and *Paramphinome jeffreysii* were the most abundant infauna species recorded from the Vorlich survey, accounting for over 55% of the overall abundance. The bivalve mollusc *Adontorhina similis* and the amphipod crustacean *Ampelisca tenuicornis* were the remaining top taxa; these accounted for <7% of the overall abundance at each of the 10 stations sampled. In contrast, sediment across the Abigail survey area were classified as 'Deep Circalittoral Mud' (main sediment types observed being sandy mud and muddy sand) [17]; this being in a different biotope to the FPF-1 (Appendix A). Sea pens along with *Nephrops* burrows, were recorded and it was concluded the 'sea pens and burrowing megafauna communities' was potentially present, this based on the sediment type and the presence of burrows, although mounds were absent. Footage from the ROV inspection of the FPF-1 moorings undertaken in September 2024 (Appendix A) shows rippled muddy sand around the mooring chains and anchor piles, with sea pens (both *Virgularia mirabilis* and *Pennatula phosphorea*) and burrowing fauna present, predominantly polychaetes; small mounds are evident, with lugworm like ejecta coils/lines, which make this 'sea pens and burrowing megafauna communities' habitat different to that of for example, the Fladen Ground where most of the burrowing is by crustacea. The sandy sediment at Stella may in general not be cohesive enough to support crustacean burrows (i.e. collapse of burrows). However, taking a precautionary approach, and on the basis of evidence (the presence of fine slightly silty sand and muddy sand, and the presence of sea pens and burrows), it is considered, for the basis of assessment, that the sediments could constitute the "sea pens and burrowing megafauna communities" habitat as defined by OSPAR and expanded on by JNCC [35].

Table 4.1.1: Environmental and societal sensitivities	
Commercial fishing	The FPF-1 is located in ICES rectangle 42F2. Although pelagic fishing activities used to be more prominent, the demersal activities have been prevalent since 2015, but the combined fishing effort from demersal, pelagic and shell fishing has contributed less than 0.01% to the UK total landings since 2020 (Figure 4.1.1).  **Figure 4.1.1: Landed fish values for ICES 42F2 as a % of overall UK** Effort and landings data from 42F2 were disclosive (for all groups) in 2022, meaning they were very small and cannot be disclosed for reasons of confidentiality.
Other offshore industries	FPF-1 is in the north of the central North Sea oil and gas development area with several fields nearby. The closest oil and gas installation is Jasmine (~9 km away). Shipping intensity is moderate for Block 30/06, this traffic mainly consisting of energy (oil and gas) supply and tanker vessel activity. From the Innovation and Targeted Oil and Gas (INTOG) leasing round, thirteen projects were offered initial agreements (exclusivity agreements) which would enable them to proceed with offshore wind development work. The closest of these to the FPF-1 is Area 1, for Harbour Energy, at ~16 km away. There are no operational, or in construction/in planning offshore windfarms close to the Stella FPF-1, the closest of these is 109km away, and is a development in the pre-planning stage. There are no Ministry of Defence exercise areas, dredging areas, or marine disposal sites in the vicinity and there are no telecommunication cables within the GSA; the closest active cable is the TAMPNET Offshore (Norsea Coms) cable, at its closest point is ~ 3 km from the FPF-1. One wreck is present in the wider GSA ~ 2.2 km east of the Stella MDC.

4.2 Potential environmental impacts and their management

There will be some environmental impacts arising from the planned activities associated with the sail away of the FPF-1 and the decommissioning of the associated appurtenances, principally the removal of the Stella FPF-1 mooring system. Two options were considered for part-removal of the anchor chain from the padeye on the anchor pile such that the remain section of chain would be buried to a depth of either 1 m or 3 m below the seabed.

These activities were considered together with their potential interactions with the environment and legislative and policy requirements. The activity/environmental interactions were identified using a range of sources, including: regional and site specific environmental data; installation descriptions and drawings and typical support vessel specifications. These were then systematically screened against criteria for potential environmental effects; main impacts identified were seabed disturbance and potential impact (snagging) on other maritime users (principally fishing).

Long-term environmental impacts from the decommissioning operations are expected to be of low magnitude and localised to seabed areas where the mooring chains are cut. Incremental cumulative impacts and trans-boundary effects associated with the planned decommissioning operations are expected to be negligible, due to the small temporal and spatial scale of impacts, localised to areas in and around the FPF-1 and mooring system, and distance to nearest median line (~25 km away).

Ithaca understands the importance of minimising the potential for environmental impact in line with safety and technical feasibility issues and will consider how engineering decisions reached for the sail away of the FPF-1 can be made to limit the impact accordingly. Where design decisions cannot do this on their own, Ithaca will develop measures to limit the extent of any potential impact as far as practical to do so. It is acknowledged that environmental permits and approvals will be required.

Table 4.2.1: Environmental Impacts		
Activity	**Main impacts**	**Mitigations**
FPF-1 sailaway	Atmospheric emissions. These are presented in section 4.3.	Refer Table 4.4.1 below.
Recovery of mooring lines	Recovery of the mooring line at twelve locations will result in temporary disturbance of the seabed from their laydown on the seabed, when initially disconnected from the FPF-1 and subsequently recovered by the AHV. This disturbance will include physical impact and the suspension of seabed sediment. Such disturbance will be of short duration and localised in nature, being limited to the mooring line laydown areas, some of this area may overlap with areas previously disturbed from catenary action of the mooring lines during operational field life. Note, currents at the FPF-1 are weak and lateral movement or scour of the mooring lines after laydown are not anticipated, as there is no evidence of scour around anchor piles for example, disturbance of the seabed will be within the initial laydown corridor until recovered by the AHV shortly after. On average the length of each mooring line is ~1,145.6 m (12x). If a conservative buffer zone of ~5 m is assumed for each line, as a worst case the total area of seabed directly impacted would be ~68,734 m^2. The volumes and areas of seabed disturbed from decommissioning of the mooring lines will be localised to these areas, with faunal recolonisation of disturbed sediments expected. Footage from the ROV inspection (2024, Appendix A), showed the presence of sea pens and evidence of faunal activity around the area of the mooring chains/anchor piles, indicating recovery of seabed since the installation of the infrastructure. Seabed disturbance will also occur where the mooring lines are cut and where the cut lower chain ends are buried. Excavation will be required in firm to stiff to very stiff clay. In such seabed material, to allow the lower mooring chain to be cut 1 m below the seabed, this will result in an estimated seabed disturbance of up to 12 x 5.9 m^3 = 72 m^3; excavating to allow the lower mooring chain to be cut 3 m below seabed will result in an estimated seabed disturbance of up to 12 x 47 m^3 = 564 m^3; . the seabed disturbance being significantly more from the 3 m option, compared with the 1 m option. In both cases, given the sediment type present, lumpy clay berms will be left on the seabed from the excavated material, proportionally larger as the excavated depth increases. At a depth of more than 50 cm, the firm clay would need to be mechanically cut and removed from the excavation using tracked equipment (i.e. a dredger mounted on tracks). Any berms formed by the excavations will require remediation, either by mechanically backfilling the excavated material, or by the deposition of rock in the excavation and surrounding area. Given the relative low energy nature of the FPF-1 area and the sediment type, natural backfill of excavated material is not expected. All seabed disturbance will result in direct physical effects which may include mortality as a result of physical trauma, smothering (from both the deposition of excavated sediment onto the seabed and from the deposition of rock for remediation, although the footprint of the latter will largely overlap the footprint of the former) and re-suspended sediment. Species identified during surveys are typical of these offshore circalittoral sand habitats and described in Table 4.1 above. The response of benthic macrofauna to physical disturbance has been	Proposal is to cut the mooring lines and bury the remaining chain ends so that they are at least 1 m below seabed with rock remediation where required; this results in a smaller overall footprint of seabed disturbance and smaller quantities of rock for remediation. The FPF-1 and the mooring system is not located within, or near a conservation designated area, the closest of these being 20 km away. The habitat at the FPF-1 and mooring system location is widespread and the overall footprint of seabed disturbance from recovery of the mooring lines in relation to the wider presence of this habitat is very small. New hard substrate (rock) will be used, the quantity of this will be kept to the minimum to mitigate against potential snagging. Refer "Seabed disturbance" in Table 4.4.1 below.

Table 4.2.1: Environmental Impacts		
Activity	**Main impacts**	**Mitigations**
	well characterised, although relevant information on the recovery of benthic habitats to smothering mainly comes from studies of dredge disposal areas; increases in abundance of small opportunistic fauna and decreases in larger more specialised fauna is expected (e.g. [8],[10],[37],[44]). Recovery following disturbance occurs through a mixture of vertical migration of buried fauna, together with sideways migration into the area from the edges, and settlement of new larvae from the plankton. Defaunated sediments will be rapidly recolonised, likely by a combination of opportunistic species and the species more typical of the GSA area. It may take more than two years for a community to return to a closer resemblance of its original state (although if long lived species were present this could be much longer) [18]. The duration of effects on benthic community structure are related to individual species' biology and to successional development of community structure. The seabed species recorded in the Stella area are known or believed to have short lifespans (a few years or less) and relatively high reproductive rates, indicating the potential for population recovery, typically between 1 to 5 years [39], such that any effect will be temporary. The faunal species present (i.e. polychaetes) have a widespread distribution and are characteristic of the sediments present. Mortality of pennatulid sea pens (*Virgularia spp.* and *P. phosphorea*), may be high following physical disturbance, but crustaceans are probably able to restore burrow entrances following limited physical disturbance of the sediment surface (a few cm). *P. phosphorea* spawns annually and its fecundity is high [11], information on the reproduction of *Virgularia spp* is sparse but based on its wide distribution and abundance is considered likely to be similarly fecund. Gates & Jones [21] suggest that re-establishment of pennatulids is likely to take in excess of five years due to their slow growth rate (based on the Arctic species *Halipteris willemoesi*). Any mortality of seabed species will be localised to the mooring line laydown locations. From their information on subsurface abrasion/penetration and surface abrasion, the Feature Activity Sensitivity Tool (FEAST) [38] looks at the feature sensitivity of "burrowed mud" primarily in relation to trawling activity and in both cases listed the feature sensitivity as "Medium". It describes how deep burrowers will be able to re-establish burrow openings, if these become blocked, and that long term experimental trawling found no effect on *Virgularia mirabilis* populations, while sea pens were found to be quite resilient to being smothered, dragged or uprooted by creels. Trawling disturbance did result in reduced species diversity and a disproportionate increase in the abundance of a few dominant species, with the long term effects on infauna still noticeable after 18 months; short term effects on epifauna recovered 6 months after fishing ceased. Abrasion and physical disturbance of the seabed surface was predicted to affect mobile and sessile epifaunal and shallow burrowers with damage to sea pen species likely to take place as a result of greater sediment disturbance; species have however, been found to re-anchor themselves in the sediment if dislodged. In the longer term, the deposition of new rock as proposed for remediation, introduces new hard substrate to the area; this will be permanent. For the 1 m depth of burial option, some 138 tonnes of rock has been estimated, this increasing to 1,056 tonnes for the 3 m depth of cut option. There is already hard substrate in the area, both from rock placement as part of the original development, and naturally occurring coarse sand, gravel, pebbles, cobbles and large bivalve shells (evidence from multiple surveys in the GSA area). Introducing additional rock, in the quantities and areas (these being localised to the mooring chain/pile locations) as	

Table 4.2.1: Environmental Impacts		
Activity	**Main impacts**	**Mitigations**
	proposed for both options, is not expected to result in a physical change (to another seabed type). As for sediment disturbance, impact of rock placement will result in direct physical effects which may include mortality as a result of physical trauma, smothering and re-suspended sediment. Recovery of the mooring lines is not expected to result in a future snagging hazard. Natural sediment movement in the FPF-1 area is not significant, i.e. compared to the southern North Sea. Footage from the ROV inspection shows no scour in the area around the anchor piles, supporting the conclusion that once buried to 1m depth below seabed, and remediated using rock, the cut chain is not expected to become exposed; this would also be the case for the 3m option. The excavated material for the 1m option would be considerably less than that excavated for the 3m option, however, in both cases, left unremediated, this could pose a potential snagging hazard. In both cases, the rock used to remediate is expected to be over-trawlable (rock has been used throughout the GSA area at trench transitions and for spot rock protection for pipelines, with no fishing incident (snagging) throughout the operational life of the development. Any potential impacts will be fully assessed in the environmental assessments submitted in conjunction with the relevant environmental permit requirements.	
Mooring piles	**Excavation of soil plug for internal cut** The base case is to dredge the piles internally sufficiently to allow a cutting tool to be deployed inside the piles. The seabed will be disturbed as the cut section of the pile is recovered by pulling through the seabed. Assume a 1.0 m buffer around each of 12x piles: Total *area* of seabed impacted: 12 x ~13.42 m^2 = 161 m^2. Should any difficulties be encountered OPRED will be consulted. Any potential impacts will be fully assessed in the environmental assessments submitted in conjunction with the relevant environmental permit requirements.	Taking this approach will result in the least environmental impact. The FPF-1 and the mooring piles are not located within, or near a conservation designated area, the closest of these being 20 km away. The habitat at the FPF-1 and mooring system location is widespread and the overall footprint of seabed disturbance from recovery of the mooring piles in relation to the wider presence of this habitat is very small.
Disconnection and recovering dynamic flexible risers	Recovery of the part of the seven flexible dynamic risers will result in the suspension of seabed sediment. Such disturbance will be of short duration and localised in nature. As a temporary measure the risers may be laid down on the seabed as part of the recovery operations. The length of each of the dynamic flexible risers is PL3078 (287 m), PL3080 (253 m), PL3081 (317 m), PLU3082 (269 m), PL3532 (241 m), PL4596 (258 m), PLU4599 (349 m). Total length = 1,974 m. If a buffer zone of 5 m is assumed for each of the seven dynamic flexible risers, the total area of seabed directly impacted would be ~9,870 m^2. Seabed disturbance will result in the same direct physical effects as described for recovery of the mooring lines above; for the dynamic risers, any mortality of seabed species will be localised to the laydown areas of the risers. Note, this is an area that has previously been disturbed during operational field life with the tie-in of Harrier, Stella, Vorlich and Abigail infrastructure (the most recent of these being Abigail in 2022) and as such, it is expected that this will have been colonised by opportunistic species only in the intervening period. Any potential impacts will be fully assessed in the environmental	The FPF-1 and the dynamic risers are not located within, or near a conservation designated area, the closest of these being 20 km away. The habitat at the FPF-1 and dynamic riser system location is widespread and the overall footprint of seabed disturbance from recovery of the risers in relation to the wider presence of this habitat is very small. Refer “Seabed disturbance” in Table 4.4.1 below.

Table 4.2.1: Environmental Impacts		
Activity	**Main impacts**	**Mitigations**
	assessments submitted in conjunction with the relevant environmental permit requirements.	
Recovery of MWA and appurtenances	Subject to detailed engineering and design the Stella and Vorlich MWA and appurtenances may either be recovered directly (which is more likely for most of the equipment) or laid down on the seabed before they are recovered. If laid down on the seabed, this will result in temporary disturbance of the seabed from their laydown on the seabed, and subsequent recovery. This disturbance will be similar to that described above for the mooring lines and will include physical impacts to any fauna immediately within the footprint of the laid down area, and the suspension of seabed sediment. Any disturbance will be localised to these areas. As a contingency, this assumes a conservative 5m buffer zone all around the MWA (12.9 m x 12.5 m), the guide frame (15.7 m x 8.1 m), the clump weight (3.2 m diameter), ballast boxes (3.2 m x 1.3 m) and assume a 5 m buffer zone for each of the two the tether chains per MWA (~31 m long). On this basis the area of seabed impacted by contingency operations would be ~2,444 m^2. (MWA – 514.1 m^2, guide frame (465.7 m^2), tether chain (310 m^2), clump weight (105.6 m^2) and ballast boxes (1,048.8 m^2). Total area impacted by removal of both the Stella and Vorlich MWAs and appurtenances would be 2 x 2,444 m^2 = 4,888 m^2. Seabed disturbance will result in same types of impact (i.e. burial/smothering) as described above, any mortality of seabed species will be localised to the MWA and appurtenances areas, any mortality of benthic organisms will be localised to the laydown areas of these structures. Note, this is an area that has previously been disturbed, during operational field life with the tie-in of Harrier, Stella, Vorlich and Abigail (the most recent of these being Abigail in 2022) and as such, it is expected that this will have been colonised by opportunistic species only in the intervening period. Any potential impacts will be fully assessed in the environmental assessments submitted in conjunction with the relevant environmental permit requirements.	The FPF-1 and the MWAs and appurtenances are not located within, or near a conservation designated area, the closest of these being 20 km away. The habitat at the FPF-1 and MWA location is widespread and the overall footprint of seabed disturbance from recovery of the MWAs and associated appurtenances in relation to the wider presence of this habitat is very small. Refer "Seabed disturbance" in Table 4.4.1 below.
Pipeline structures and appurtenances	Subject to detailed engineering and design the appurtenance such as pipe clamps, ballast boxes contained within the pipeline structures may either be recovered directly - which is more likely for most of the equipment, or laid down on the seabed before they are recovered. If laid down on the seabed, this will result in temporary disturbance of the seabed before their subsequent recovery. This disturbance will include physical impact similar to that described for the mooring lines above, and will include physical impacts to any fauna immediately within the footprint of the laid down area, and the suspension of seabed sediment. Any disturbance will be localised to these areas. As a contingency, assume a conservative 5m buffer zone all around the Stella riser hold back centre (15.4 m x 8.7 m), the ballast boxes (each 3.2 m x 1.3 m), Stella riser clump weight (4.9 m x 4.8 m), Stella production riser base (9.5 m x 5.0 m), Stella export riser base (9.6m x 4.0m and the Stella umbilical riser base (7.0 m x 4.5 m) and assume a 5 m buffer zone for the tether chain between the clump weight and umbilical riser (9.9 m long). Total area impacted by removal the Stella riser bases etc, would be ~2,956 m^2. As a contingency, this assumes a conservative 5m buffer zone all around the Vorlich riser hold back centre (15.1 m x 8.6 m), the ballast boxes (each 3.2 m x 1.3 m), Vorlich riser clump weight (4.9 m x 4.8 m), Vorlich umbilical	The pipeline structures and appurtenances are not located within, or near a conservation designated area, the closest of these being 20 km away. The habitat at the FPF-1 and pipeline structures' location is widespread and the overall footprint of seabed disturbance from recovery of these items in relation to the wider presence of this habitat is very small. Refer "Seabed disturbance" in Table 4.4.1 below.

Table 4.2.1: Environmental Impacts		
Activity	**Main impacts**	**Mitigations**
	riser base (7.5 m x 5.2 m), and assume a 5 m buffer zone for the tether chain between the clump weight and umbilical riser (9.9 m long). Total area impacted by removal the Vorlich riser bases etc, would be ~2,502 m^2.	
Post sail away seabed verification	Potential seabed interaction, including short-term disturbance to the seabed.	Refer "Seabed disturbance" in Table 4.4.1 below.
Onshore disposal[5]	Energy and emissions to air; potential recycling of materials and disposal of small quantities of material to landfill.	Refer Table 3.5.1 and use of onshore dismantling sites.

The combined area of seabed impacted by decommissioning of the mooring systems (68,895 m^2 with piles cut internally), the removal of the risers (9,870 m^2), the MWAs (4,888 m^2) and the pipeline structures (5,458 m^2) is 83,652 m^2. Subject to detailed engineering and design, should the piles need to be cut externally using equipment mounted externally on the pile, this would increase up to 89,359 m^2 with up to 5,469 Te (-3 m cut) of rock being required to backfill any external excavation.

A summary of mitigation and control measures including more general mitigation measures is presented in Table 4.4.1.

4.3 Atmospheric emissions

Concerns regarding climate change has prompted increasing stakeholder concern regarding the anthropogenic impacts on the environment such as atmospheric emissions and the potential contribution of these greenhouse gas (GHG) emissions to climate change.

The quantification and impact assessment of the atmospheric emissions associated with the proposed FPF-1 removal activities, is presented in this section of the Decommissioning Programme. The only source of atmospheric emissions relating to the decommissioning of the FPF-1 is from power generation associated with vessels used for the decommissioning activities.

The GHG of concern is CO_2 as it constitutes both the largest component of global combustion emissions (generally ~80% of total GHG emissions) and has a long atmospheric residence time.

On a local scale, emissions such as sulphur oxides (SO_x), nitrogen oxides (NO_x/NO_2) and carbon monoxide (CO) may affect air quality. While such emissions may be assessed against any local air quality guidelines to understand the potential magnitude of impact on human health and the environment, air quality effects relating to human health are not accounted for due to the distance from the FPF-1 to shore (~256 km).

4.3.1 Description and quantification of impacts

Total vessel fuel use has been calculated using an estimated number of days on location (Table 4.3.1). Emissions of relevant gas species have been estimated, using standard Environmental and Emissions Monitoring System (EEMS) conversion factors [7] and the Global Warming Potentials (GWP) values from (Table 4.3.2). These have been used to estimate CO_2 equivalent (CO_2e.) emissions (Table 4.3.2), which are based on the radiative forcing effect of each GHG species relative to CO_2 and the atmospheric residence time of each gas. The GWP factor therefore changes, depending on the "time horizon" considered. For the purposes of this assessment, a 100-year time-horizon has been used, in line with its adoption by the United Nations Framework Convention on Climate Change and use in the Kyoto protocol. GWP factors for CO have previously been calculated as 1.9 at 100 years, and as for the NO_x factor is considered highly uncertain. Therefore, these are not calculated. GWP for SO_2 and VOCs have also not been calculated due to the greater

[5] 'Onshore disposal' assumes that the FPF-1 has not been reassigned for use elsewhere.

uncertainty surrounding factors for these.

Table 4.3.1: FPF-1 decommissioning vessel activity				
Activity	**Vessel**	**Duration (days)**	**Fuel use/day (Te)**	**Fuel use (Te)**
Anchor Handling Vessel for removal of mooring lines and towing of FPF-1 to port.	AHV	35	21.0	735
Construction Support Vessel for cutting mooring lines, excavation and cutting of piles, removal of MWA, MWA riser hold back structures, riser bases and appurtenances.	CSV	51	15.8	804
Tug station keeping, disconnection of mooring lines and risers, and recovery of riser systems incl. MWA and associated appurtenances.	ET, SKT	11	15.7	173
Single Lift Vessel or equivalent for recovery of part of the piles.	AHV	25	113.2	2,830
	TOTAL	**122**	**37.2**	**4,542**

NOTES

1. Quantity of fuel is either based on [29] or project estimates.
2. Vessel days include mobilisation, demobilisation, transits to and from port and in-field working days and are included in the activities for disconnection of the mooring lines and risers and recovery of the riser systems.
3. At the time of writing, it has not been established whether diving activities will be required. This requirement will be established during detailed design. The vessel durations included here assume that diving activities will **not** be required.

Table 4.3.2: Environmental impact – pollutants due to vessel activity								
Fuel (Te):	**4,542**	**CO_2**	**CO**	**NOx**	**N_2O**	**SO_2**	**CH_4**	**VOC**
Factor for emissions (Te) per Te of fuel [29]:		**3.17**	**0.0157**	**0.059**	**0.00022**	**0.012**	**0.00018**	**0.0024**
Sub-total (Te)		13,969	71.30	267.95	1.00	54.50	0.82	10.90
CO_2e factor [30]:		**1**	**1.6±0.5**	**15.6±5.8**	**265**	**n/a**	**30.0**	**5.6±2.8**
CO_2e: (sub-total x CO_2e factor):		*14,398*	*n/a*	*n/a*	*264.8*	*n/a*	*23.6*	*n/a*
CO_2e (SUB-TOTAL):		***14,687***	*Attributed to vessel activity, based on mid-range CO_2e factors [30].*					

For context, in 2023, emissions from UK domestic shipping bunkers were estimated to be 6.3 MtCCO2e which is equivalent to 1.6% of UK total emissions (384 $MtCO_2e$) in 2023 [9].

The vessel activity associated with the decommissioning programmes contained herein are the equivalent of 0.233% of UK domestic shipping emissions in 2023, and the equivalent of or less than 0.004% of UK total emissions in 2023.

4.4 Mitigation and control measures

Table 4.4.1: Summary of mitigation and control measures
General and existing
• Lessons learnt from previous FPSO sail away scopes – including Athena, Alba FSU and where available, from other operators will be reviewed and implemented where available. • Vessels will be managed in accordance with Ithaca's Marine Assurance Standard. • The vessels' work programme will be optimised to minimise use of vessels. • The OPEP is one of the controls included in a comprehensive management and operational controls plan developed to minimise the likelihood of large hydrocarbon releases and to mitigate their impacts should they occur. • All vessels undertaking decommissioning activities will have an approved ship-board oil pollution emergency plan (SOPEP). • Existing processes will be used for contractor management to assure and manage environmental impacts and threats. • The respective company management of change process will be followed should changes of scope be required.
Underwater noise
• A SIMOPS plan for vessel activity in the field will be put in place. • Vessel, riser cutting operations will use standard methods and equipment. No explosives will be used. •

Table 4.4.1: Summary of mitigation and control measures
Discharges and small releases to sea
• All contracted vessels will operate in line with IMO and MARPOL regulations. • If not already done, all pipelines and spools are to be flushed, filled with seawater, and isolated prior to disconnection. • All discharges will be permitted under applicable UK legislation.
Accidental events
• All contracted vessels will have a SOPEP in place. • A Collision Risk Management Plan will be developed and implemented. • Agreed arrangements in place with oil spill response organisation for mobilising resources in event of a spill. • Existing field OPEP in place to reduce the likelihood of hydrocarbon release and define spill response in place. • Lifting operations will be planned to manage the risk. • Recovery of any dropped objects will take place. • Vessel contactors will have procedures for fuel bunkering that meet Ithaca's standards. • Where practicable, re-fuelling will take place during daylight hours only.
Physical presence of vessels and infrastructure
• All vessels will comply with standard marking conditions and consent to locate conditions. • If required, a specific SIMOPS plan for vessel activity in the field will be put in place, noting that a standard DSV SIMOPS Guideline already exists for the asset. • The FPF-1 500 m safety zone will remain in place until the vessel (FPF-1) has departed. • Following departure of the FPF-1, the 500 m safety zone will meantime be surveyed for oil and gas debris. However, the 500 m zone area will not be subject to full survey until the wider GSA infrastructure decommissioning activities have been completed. The survey findings will be described in the close out report. • The FPF-1 will depart the field with the mooring systems decommissioned before the risers (or part thereof), MWAs, riser bases and MWA riser hold back structures and associated appurtenances have been removed. The infrastructure associated with the Greater Stella Development Area such as the pipeline infrastructure will remain in place until it is decommissioned in future. With the FPF-1 no longer being on location, the 500 m safety zone would normally be relinquished, and so it is recognised that the MWA, tether chain, clump weight, riser bases and MWA riser hold back structures - until they are removed later in the decommissioning campaign, and remaining pipeline infrastructure will present a potential hazard to other users of the sea. Therefore, Ithaca will adopt appropriate safety measures to protect mariners from these assets until they are decommissioned sometime in future. The safety measures could include an application for a new 500m subsea safety zone in the area, use of a guard vessel, use of a virtual Automatic Identification System (AIS) and Emergency Response and Rescue Vessel (ERRV), a Cardinal Buoy with AIS or a mixture of these depending on location and suitability of local surface installations. • The remaining GSA infrastructure will meantime remain 'as is' in the interim period between departure of the FPF-1 and a final trawl sweep will be conducted to confirm final clearance of the 500 m safety zone following decommissioning of the GSA. • Kingfisher bulletins issued prior to operations commencing. • A notice to mariners will be issued prior to operations commencing to give vessels advance warning of the decommissioning operations.
Energy use and atmospheric emissions
• Time vessels spend in the field will be optimised, with a SIMOPS plan in place. • Reuse or recycling of materials will be the preferred option. • All material taken onshore will be handled by licenced waste management contractors at sites that hold Environmental Permits or Pollution Prevention Control (PPC) permits.
Waste production
• Onshore treatment will take place at waste management site with appropriate permits and licenses. • UK waste disposal sites will be used where practicable. • A Waste Management Plan for the Decommissioning Programmes will be prepared and implemented in line with the Waste Framework Directive. • All waste will be managed in compliance with relevant waste legislation by a licenced waste management contractor. • As part of Ithaca's standard processes, all sites and waste carriers will have appropriate environmental and operating licences to carry out this work and will be closely managed within Ithaca's contractor assurance processes.
Remaining Infrastructure
• Monitoring will be performed as per usual for the remaining pipeline infrastructure while they remain operational or until they are formally decommissioned. •
Transboundary

Table 4.4.1: Summary of mitigation and control measures
If waste is shipped internationally, the FPF-1 Waste Management Plan will present the responsibilities Ithaca has under the 'Duty of Care' legislation and identify appropriately licenced international onshore facilities where the waste can be treated.
Seabed disturbance
• Activities which may lead to seabed disturbance will be planned, managed, and implemented in such a way that disturbance is minimised as far as practical. in practical terms, this includes controlled lowering of the mooring lines at disconnect and during recovery through controlled manoeuvring, such that lateral movement is minimised, thereby minimising seabed impact. • Decommissioning activities will be undertaken by vessels under dynamic positioning, such that anchors will not be deployed, thus minimising seabed disturbance • A Marine Licence will be in place for any planned operational disturbance and any potential impacts will be assessed and addressed in the environmental assessment submitted in conjunction with the marine licences. • Seabed disturbance effects will be temporary (with the exception of rock, if used to remediate excavated areas) with the footprint localised to areas of laydown and excavated areas • Debris survey undertaken on completion of the activities including a survey of the mooring pile locations. • Minimising disturbance to seabed from overtrawl through liaison with fishing organisations and regulator.
Large releases to sea
• All vessel activities will be planned, managed, and implemented in such a way that vessel durations in the field are minimised. • The respective company's existing marine standard will be followed to minimise risk of hydrocarbon releases.

5. INTERESTED PARTY CONSULTATIONS

5.1 Consultation Summary

Table 5.1.1: Summary of stakeholder comments		
Who	**Comment**	**Response**
INFORMAL CONSULTATIONS		
NIFPO		
NFFO		
SFF	A meeting was held with SFF 17 December 2024 to present the FPF-1 decommissioning proposals.	No adverse feedback arose from the meeting but SFF did suggest that they would have a preference for a guard vessel to be on site until the snagging hazards have been removed. Also, FishSAFE is only updated twice a year.
NSTA		
Section 29 Holders	Ithaca Energy (UK) Limited has consulted with NSTA under S29(2A) of the Petroleum Act.	
STATUTORY CONSULTATIONS		
GMG		
NFFO		
SFF		
NIFPO		
NSTA		
PUBLIC CONSULTATION		
Public		

6. PROGRAMME MANAGEMENT

6.1 Project management and verification

An Ithaca project management team will manage the operations of competent contractors selected for all decommissioning activities. The team will ensure the decommissioning is executed safely, in accordance with legislation and Ithaca's Health and Safety principles. In the unlikely event that changes to the Decommissioning Programmes are required, they will be discussed with OPRED with any necessary approvals sought.

6.2 Post-decommissioning debris clearance and verification

The FPF-1 installation site and it's 500 m safety zone including the remaining parts of the mooring lines and the mooring pile locations will be subject to verification of a clear seabed.

Once the FPF-1 has departed with the mooring lines and risers (part thereof), riser bases and MWA hold back structures removed and the mooring piles decommissioned, the wider infrastructure associated with the Greater Stella Area will remain in place until it is decommissioned in future. With the FPF-1 no longer being on location, the 500 m safety zone will be relinquished, and so it is recognised that the remaining surface laid pipeline infrastructure will present a potential hazard to other users of the sea. Therefore, Ithaca will adopt appropriate safety measures to protect these items until they are decommissioned sometime in future. The safety measures could include an application for a new 500m subsea safety zone in the area, deployment of a guard vessel, use of a virtual AIS and ERRV, a Cardinal Buoy with AIS or a mixture of these depending on location and suitability of local surface installations. A risk assessment shall be carried out to determine the most appropriate solution. The proposed solution will be discussed and agreed with the SFF, and it will remain in place until the wider Greater Stella Area infrastructure has been decommissioned. The safety measures will be discussed and agreed with OPRED.

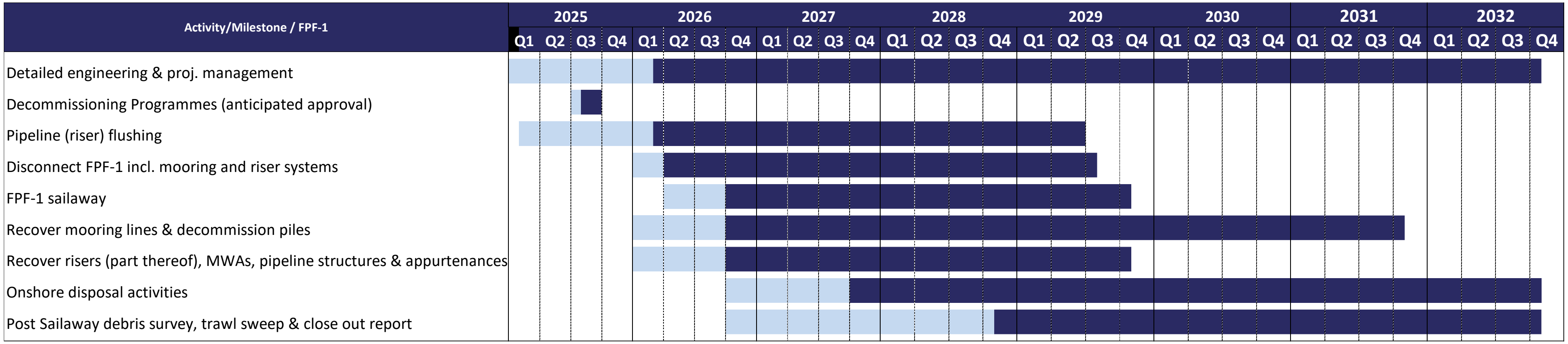
As infrastructure will remain, it may not be possible to demonstrate that the whole of the 500 m safety zone would be clear of infrastructure and oil and gas debris. Therefore, Ithaca would propose to work with OPRED and SFF to investigate use of an evidence-based approach to establish an acceptable clear seabed for infrastructure that has been removed from the existing 500 m safety zone.

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

6.3 Schedule

A proposed schedule is provided in Figure 6.3.1. The activities are subject to the acceptance of the Decommissioning Programmes presented in this document and any unavoidable constraints (e.g. vessel availability) that may be encountered while executing the decommissioning activities. Therefore, activity schedule windows have been included to account for this uncertainty.

The commencement of offshore decommissioning activities will depend on commercial agreements and commitments.



<u>Notes / Key</u>

Earliest potential activity

Activity window to allow commercial flexibility associated with the decommissioning activities

Figure 6.3.1: Gantt Chart of project plan

6.4 Costs

Decommissioning costs will be provided separately to OPRED.

6.5 Close out

Only the FPF-1, its mooring system the dynamic flexible risers (or part thereof) and umbilicals, including the Stella and Vorlich MWAs, four riser bases and two MWA riser hold back structures and associated appurtenances are being decommissioned at this time. Therefore, post-decommissioning surveys will be limited to 'as-left' surveys inside the FPF-1 500 m safety zone and the mooring piles. The findings will be included in the Close Out report as required in the OPRED guidance notes. Subject to agreement with OPRED, environmental surveys will not be completed following sail away of the FPF-1 and removal of the risers but will be completed once the Greater Stella Area infrastructure and facilities have been decommissioned. The report will explain any variance from the Decommissioning Programmes.

6.6 Post-decommissioning monitoring and evaluation

After sail away of the FPF-1 has been completed the exposed sections of the mooring lines will have been removed, with the remaining cut ends buried *in situ*. After removal of the top section, the mooring piles will be decommissioned *in situ*. Parts of the dynamic flexible risers along with the two mid-water arches, two MWA riser hold back structures and four riser bases and associated appurtenances will have been removed. The rest of the GSA pipeline infrastructure will remain in place and will be decommissioned sometime in the future. As proposed in section 6.2, in agreement with key stakeholders, Ithaca will implement appropriate safety measures. As explained in section 6.2 these safety measures will also be discussed and agreed with OPRED.

Residual liability associated with the infrastructure remaining in place or not being decommissioned at this time will remain with the Section 29 notice holders identified in section 1.4. Unless agreed otherwise in advance with OPRED, Ithaca will remain the focal point for such matters, such as any change in ownership, for example.

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ITHACA ENERGY

APPENDIX A REPRESENTATIVE SEABED AT FPF-1 MOORINGS

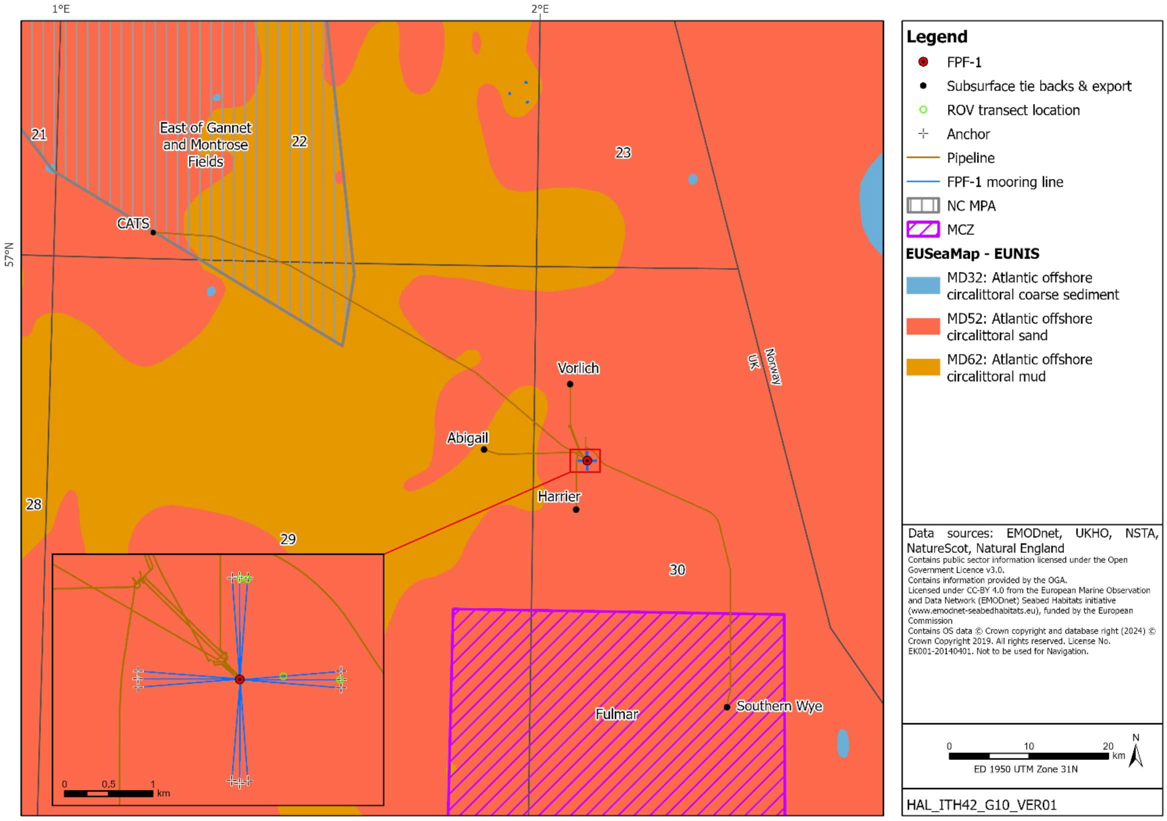

Figure A.1: EUNIS Seabed Classifications for the GSA and wider area

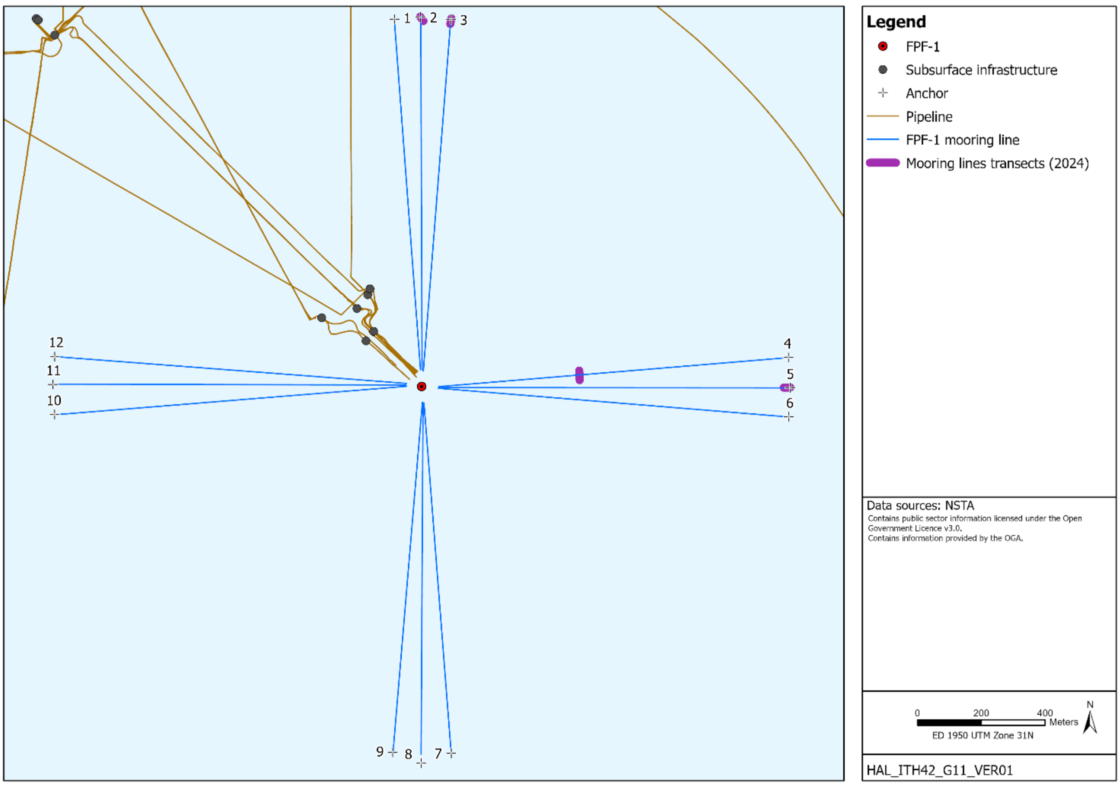

Figure A.2: FPF-1 mooring system and location of ROV inspection transects

Presented below are a series of photographs from the ROV inspection [32] around the FPF-1 mooring chains and anchor piles. They are representative of the whole area. These show rippled muddy sand, with some areas of coarse material (i.e. shells), an absence of visible scour around the chains/anchor piles (indicating a low energy environment, with little natural sediment movement) and the presence of sea pens and polychaete burrows beside the chains/anchor piles, supporting expectation of faunal recovery after disturbance.

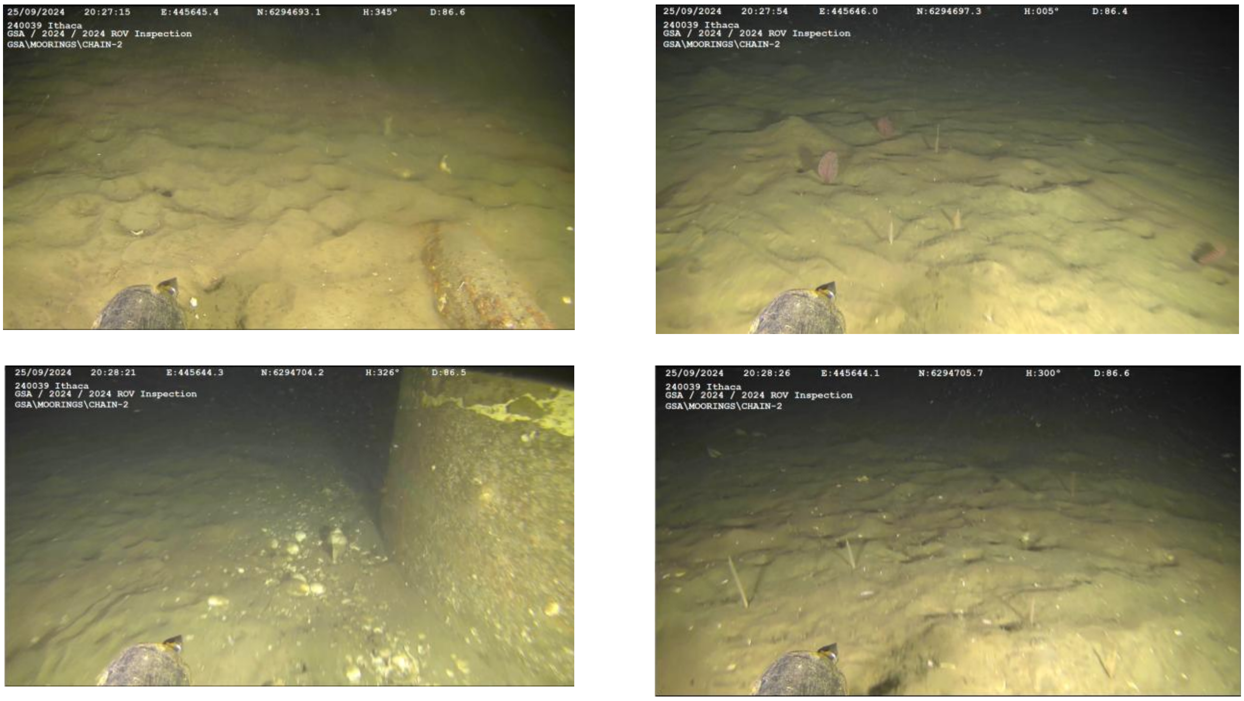

Figure A.3: Photos of seabed around FPF-1 mooring chain 2 and anchor piles

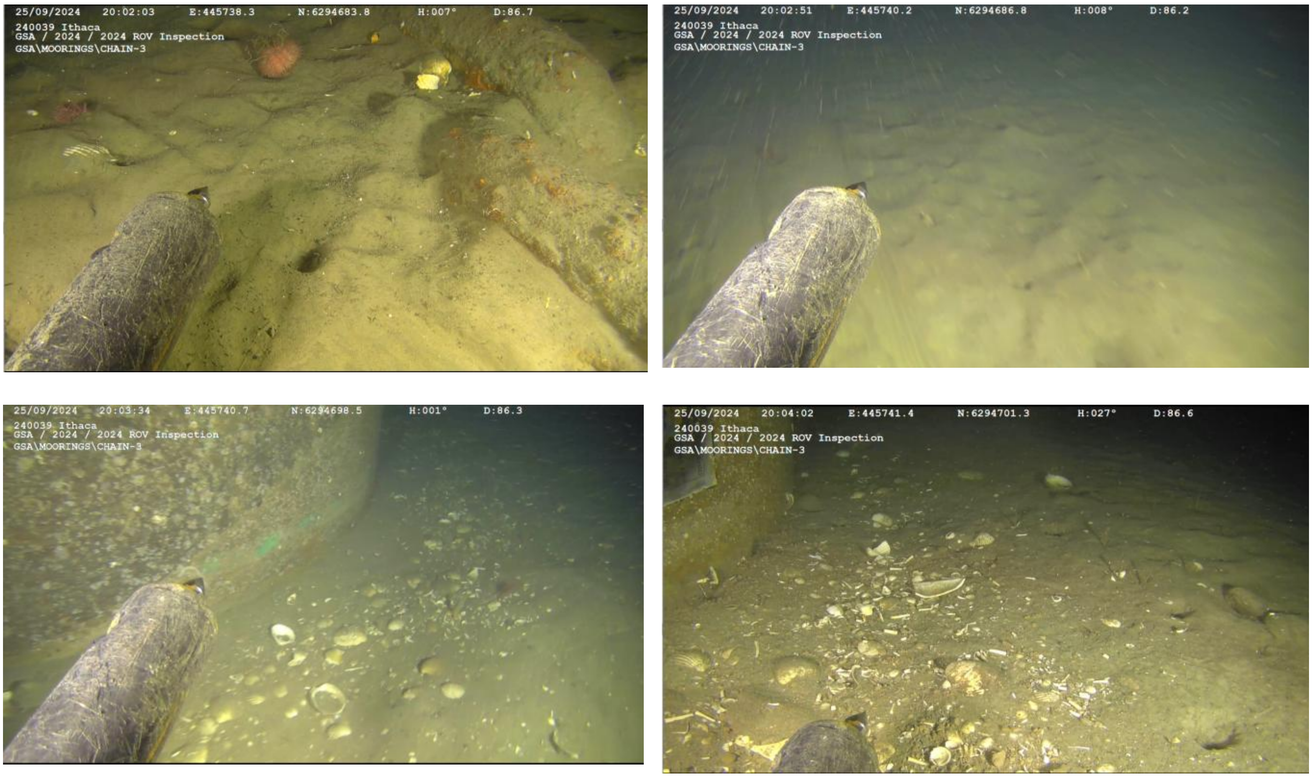

Figure A.4: Photos of seabed around FPF-1 mooring chain 3 and anchor piles

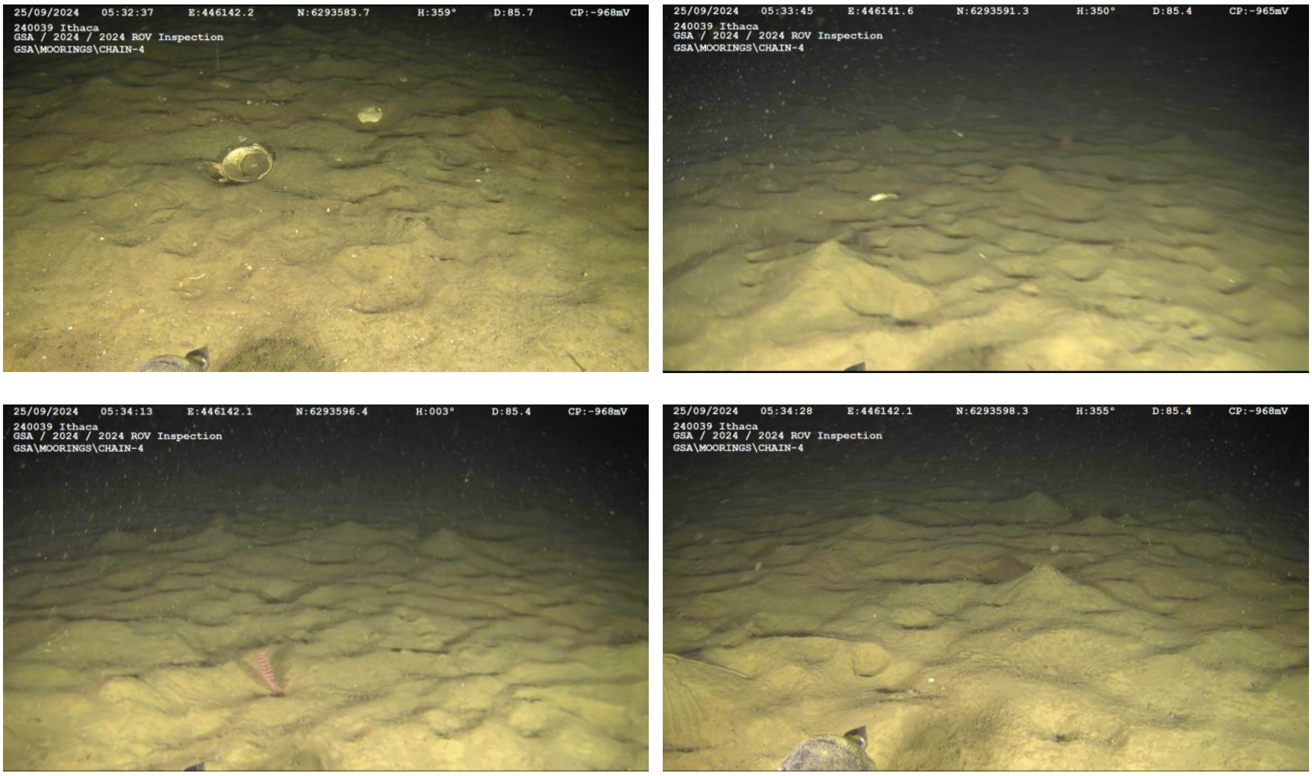

Figure A.5: Photos of seabed around FPF-1 mooring chain 4 and anchor piles

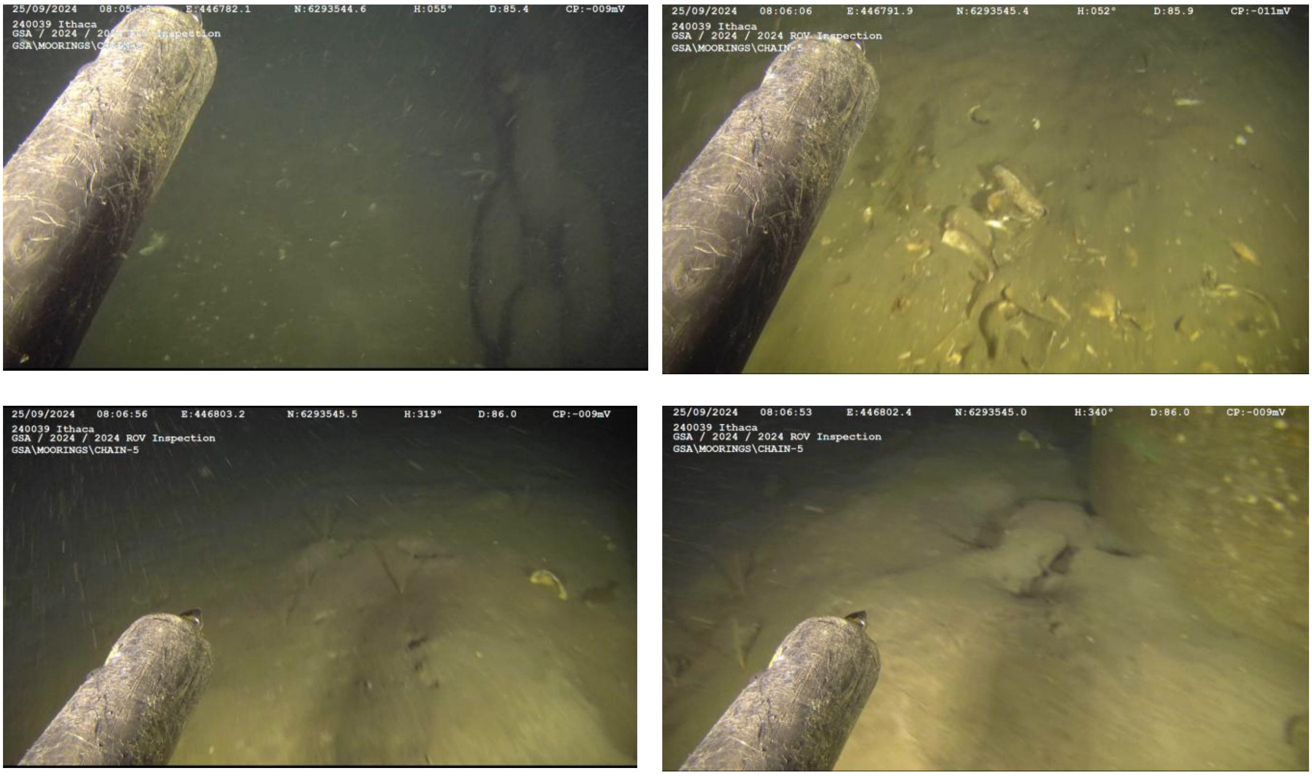

Figure A.6: Photos of seabed around FPF-1 mooring chain 5 and anchor piles

APPENDIX B PUBLIC NOTICES

APPENDIX C CORRESPONDENCE WITH STATUTORY CONSULTEES

APPENDIX D LETTERS OF SUPPORT