

# **Combined Decommissioning Programmes for Hummingbird Spirit FPSO Sailaway and Disconnection of Risers**



**DOCUMENT CONTROL**

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**TABLE OF TERMS AND ABBREVIATIONS**

ABBREVIATION	EXPLANATION
AHV	Anchor Handling Vessel
AIS	Automatic Identification System
approaches	Refer to pipelines of umbilicals as they come nearer to their destination or termination point
BLP	Britannia Bridge-linked platform controlled remotely from the Britannia platform
CATS	Central Area Transmission System
Control Riser Base	Anchor point for the umbilical flowline riser. Connects the umbilical flowline riser and umbilical flowline
COSHH	Control of Substances Hazardous to Health
CSV	Construction Support Vessel
dia.	Diameter
DSV	Diving Support Vessel
E&P	Exploration & Production
Eltex® TUB172	Is a medium-density polyethylene copolymer designed for the extrusion of pressure pipes for gas applications
ERRV	Emergency Response and Rescue Vessel
EU	European Union
FPSO	Floating, Production, Storage, Offloading (Vessel)
FSU	Floating Storage Unit
GMG	Global Marine Group
Harbour Energy	Harbour Energy Plc
HSE	Health and Safety Executive
in	Inch; 25.4 millimetres
Installation	Offshore structure, typically comprising topsides and jacket, or a subsea wellhead protection structure, subsea manifold structure or an FPSO
INST	Ticked if applicable to Installations in the Table of Contents
IMO	International Maritime Organisation
kg	Kilogramme
kgf	Kilogramme-force
km	Kilometre
m	Metre(s)
MARPOL	The International Convention for the Prevention of Pollution from Ships
MAT	Master Application Template
MSV	Multipurpose Support Vessel
N,S,E,W	North, South, East, West
n/a	Not Applicable
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NLB	Northern Lighthouse Board
NORM	Naturally Occurring Radioactive Material
OBM	Oil Based Mud
OGA	Oil and Gas Authority
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
P1, P2, P3, P4	Production Well Identifier
P/L	Ticked if applicable to pipelines in the Table of Contents
PL, PLU	Pipeline (or Umbilical) Identification numbers (UK)
PLEM	Pipeline End Manifold
PON	Petroleum Operations Notice
PPC	Pollution Prevention Control
PPE	Personal Protective Equipment
Production Riser Base	Anchor point for the production flowline riser. Connects the production flowline riser and the production flowline
PWA	Pipeline Works Authorisation
SAT	Supplementary Application Template
SFF	Scottish Fishermen's Federation
SOPEP	Shipboard Oil Pollution Emergency Plan
Spirit Energy	Spirit Energy North Sea Oil Limited
Te	Metric Tonne (1000kgf)

ABBREVIATION	EXPLANATION
Teekay	Teekay Hummingbird Production Limited owns contract with Spirit Energy for lease of the Hummingbird Spirit FPSO
TFSW	Trans Frontier Shipment of Waste
Topsides	Offshore structure typically furnished with reception and processing equipment for produced hydrocarbons, in this case an FPSO
Towhead	A towhead is a space frame that supports and protects the manifold valves, pipework and control equipment using during operation of a pipeline bundle
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UKHO	UK Hydrographic Office
WGS84	World Geodetic System 1984
WHPS	Wellhead Protection Structure
WI Flowline Riser Base	Anchor point for the water injection flowline riser. Connects the water injection flowline riser and the water injection flowline
x	Number of (e.g., 16x = 16 in Number)



## 1. EXECUTIVE SUMMARY

### 1.1 Combined Decommissioning Programmes

This document contains combined Decommissioning Programmes for the departure of the Hummingbird Spirit floating production storage and offloading vessel, and for the removal of the associated riser systems. The riser systems affected include the production flowline riser - part of PL2421, the water injection flowline riser - part of PL2422 and the umbilical riser, PLU2423.

The rest of the infrastructure associated with Chestnut is not being decommissioned at this time and will be available for reuse, although a recent appraisal has not revealed any new development opportunities. Decommissioning of the wells and remaining infrastructure will occur between 2023 and 2028. The timescales involved will not prejudice solutions for decommissioning the remaining infrastructure.

**Installations:** In accordance with the Petroleum Act 1998, Spirit Energy as operator of the Chestnut field, and on behalf of the Section 29 notice holders (Table 1.3.2), is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installations detailed in Section 2 of this document. Partner letters of support will be provided separately following statutory consultation.

**Pipelines:** In accordance with the Petroleum Act 1998, Spirit Energy as operator of the Chestnut field, and on behalf of the Section 29 notice holders (Table 1.3.4), is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. Partner letters of support will be provided separately following statutory consultation.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and OPRED guidance notes. For contractual reasons, the schedule outlined in this document is for up to a three-year offshore period with sailaway of the FPSO late Q3 or early Q4 2021.

### 1.2 Introduction

The Chestnut oil field is situated in block 22/2a of the United Kingdom Continental Shelf and operated by Spirit-Energy North Sea Oil Limited. It is located approximately 193km East North East of Aberdeen, in water depths of ~123m.

The field is produced via three subsea wells, supported by one subsea water injection well, tied back to a floating production, storage, and offloading (FPSO) installation designed and built by Sevan Marine ASA – the installation name is Hummingbird Spirit, formerly known as the “Sevan Hummingbird”. The FPSO is owned by Hummingbird Spirit L.L.C.

The Chestnut field was developed as a single joint development and came onstream in late 2008. It has three production wells 21/2a-11 (P1), 22/2a-16 (P2), 22/2a-18 (P3) and a water injection well 22/2a-12. All these are tied back to the Hummingbird Spirit via flexible risers. Spirit Energy carried out well construction activities to drill and complete the Chestnut 22/2a-18 well (P3 well, located 85m from the existing P2 well) in August 2017. Two of these production wells (P1 and P2) were drilled before the arrival of the Hummingbird, and the third production well (P3) was drilled in 2017 during the Chestnut Infill Well Project carried out by Spirit Energy to drain the additional areas of the reservoir. In March 2020, the P2 well was sidetracked to P4 to improve productivity.

The justification for meantime shutting in the wells is in the process of being agreed with the Oil and Gas Authority.

These Decommissioning Programmes explain the principles of the removal activities for the disconnection and sailaway of the Hummingbird Spirit. Decommissioning of the pipelines and infrastructure associated with the Chestnut field will be addressed in separate Decommissioning



Programmes supported by a comparative assessment and an environmental appraisal.

### 1.3 Chestnut Field – Overview

#### 1.3.1 Chestnut Field – Installation

Table 1.3.1: Installations Being Decommissioned			
Field(s):	Chestnut	Production Type	Oil
Water Depth (m)	~123m	UKCS Block	22/2a
Surface Installations			
Number	Type	Topsides Mass (Te)	Mooring System Mass (Te)
1	FPSO	27,596	4,120
Subsea Installation(s)		Number of Wells	
Number	Type	Platform	Subsea
n/a	n/a	n/a	4
Drill Cuttings piles		Distance to median	Distance from nearest UK coastline
n/a		36.7km	~193km ENE of Aberdeen

Table 1.3.2: Hummingbird Spirit Installation Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	Equity Interest (%)
Atlantic Petroleum UK Limited	04395761	0%
Spirit Energy North Sea Oil Limited	SC210361	0%
Centrica Resources (UK) Limited	06791610	0%
Dana Petroleum (BVUK) Limited	03337437	0%
Dana Petroleum (E&P) Limited	02294746	0%
GB Gas Holdings Limited	03186121	0%
Hummingbird Spirit L.L.C.	962374 (Marshall Islands)	100%
P/F Atlantic Petroleum	BR006465 (Faroe Islands)	0%
Magnora ASA	983 218 180 (Norway)	0%
Atlantic Petroleum North Sea Limited	06459546	0%
<b>NOTE:</b>		
1. The equity interest in this table is for the Hummingbird Spirit FPSO only and does not include license equity split as no other installations are being decommissioned as part of this Decommissioning Programme.		

#### 1.3.2 Chestnut Field - Pipelines

Table 1.3.3: Chestnut Pipelines Being Decommissioned		
Number of Pipelines, Cables, Umbilicals	3	See Table 2.3.1

Table 1.3.4: Chestnut Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	License Equity Interest (%)
Atlantic Petroleum UK Limited	04395761	0%
Spirit Energy North Sea Oil Limited	SC210361	82.206%
Centrica Resources (UK) Limited	06791610	0%
Dana Petroleum (BVUK) Limited	03337437	17.794%
Dana Petroleum (E&P) Limited	02294746	0%
GB Gas Holdings Limited	03186121	0%
P/F Atlantic Petroleum	BR006465 (Faroe Islands)	0%
Atlantic Petroleum North Sea Limited	06459546	0%





## 1.4 Summary of Proposed Decommissioning Programmes

Table 1.4.1: Summary of Decommissioning Programmes	
Proposed Decommissioning Solution	Reason for Selection
<b>1. FPSO</b>	
Complete removal and recycle. The FPSO 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 required for work associated with removal of the vessel will be submitted.	Allows FPSO to be removed and maximises opportunity for reuse or recycling of materials.
<b>2. Mooring &amp; Anchors</b>	
Complete removal and reuse or recycling. The 12x mooring suction anchors will be fully recovered to shore for refurbishment for further reuse or for recycling. The mooring lines will be disconnected and pending commercial agreements will be temporarily laid on the seabed. Along with the suction anchors they may remain in place up to two years before eventual recovery, with small amounts of sediment being displaced as the suction anchors are recovered. The suction anchors were designed for reverse installation which is the intended recovery method. We would consult with OPRED when exploring alternative decommissioning options in the event the suction anchors cannot be recovered in their current configuration. Any permit applications required for work associated with removal of the FPSO Moorings and Anchors will be submitted.	To maximise reuse opportunities. Removes a potential obstruction to fishing operations and maximises recycling of materials.
<b>3. Pipelines</b>	
All the flexible risers, chemical cores in the umbilicals and pipelines associated with the Chestnut development will all be flushed and cleaned and filled with seawater. The risers between the FPSO and the riser bases ( <b>PL2421, PL2422, PLU2423</b> ) will be fully recovered to shore. Pending future development opportunities and commercial agreements all remaining flowlines and control system umbilical pipelines, jumpers, riser bases, etc. will meantime be left <i>in situ</i> for decommissioning sometime in the future. Any applications and permits required for work associated with pipeline pigging, flushing, cutting and removal will be submitted.	Removes potential obstructions to fishing operations and maximises recycling of materials.
<b>4. Wells</b>	
As there are no new development opportunities available, all wells will meantime be shut in and decommissioned in the next phase of decommissioning using a well intervention vessel or a semi-submersible drilling rig as deemed necessary. Historical survey data suggests that drill cuttings may be present ~200m SE of the Water Injection well, but there is no record of drill cuttings directly associated with any the Chestnut wells.	Meets the OGA and HSE regulatory requirements.
<b>5. Interdependencies</b>	
No third-party pipeline crossings will be disturbed because of the decommissioning proposals. Note that the 500m safety zones for the FPSO and Well P1 overlap slightly. Once the FPSO vessel has been removed, infrastructure such as the wellhead for production well P1 and two riser bases as well as pipelines connected to the riser bases will remain within the 500m Safety Zone. Therefore, appropriate safety measures will be used to protect the suction anchors, mooring lines, as well as the production P1 wellhead, flowline riser bases and control umbilical riser bases being meantime left <i>in situ</i> for decommissioning sometime in future. These could include a guard vessel, and Emergency Response and Rescue Vessel (ERRV), a Cardinal Buoy with an Automatic Identification System (AIS) or a mixture of all three depending on location and suitability of local surface installations. A risk assessment shall be carried out to determine the most appropriate solution.	

## 1.5 Field Locations including Field Layout and Adjacent Facilities

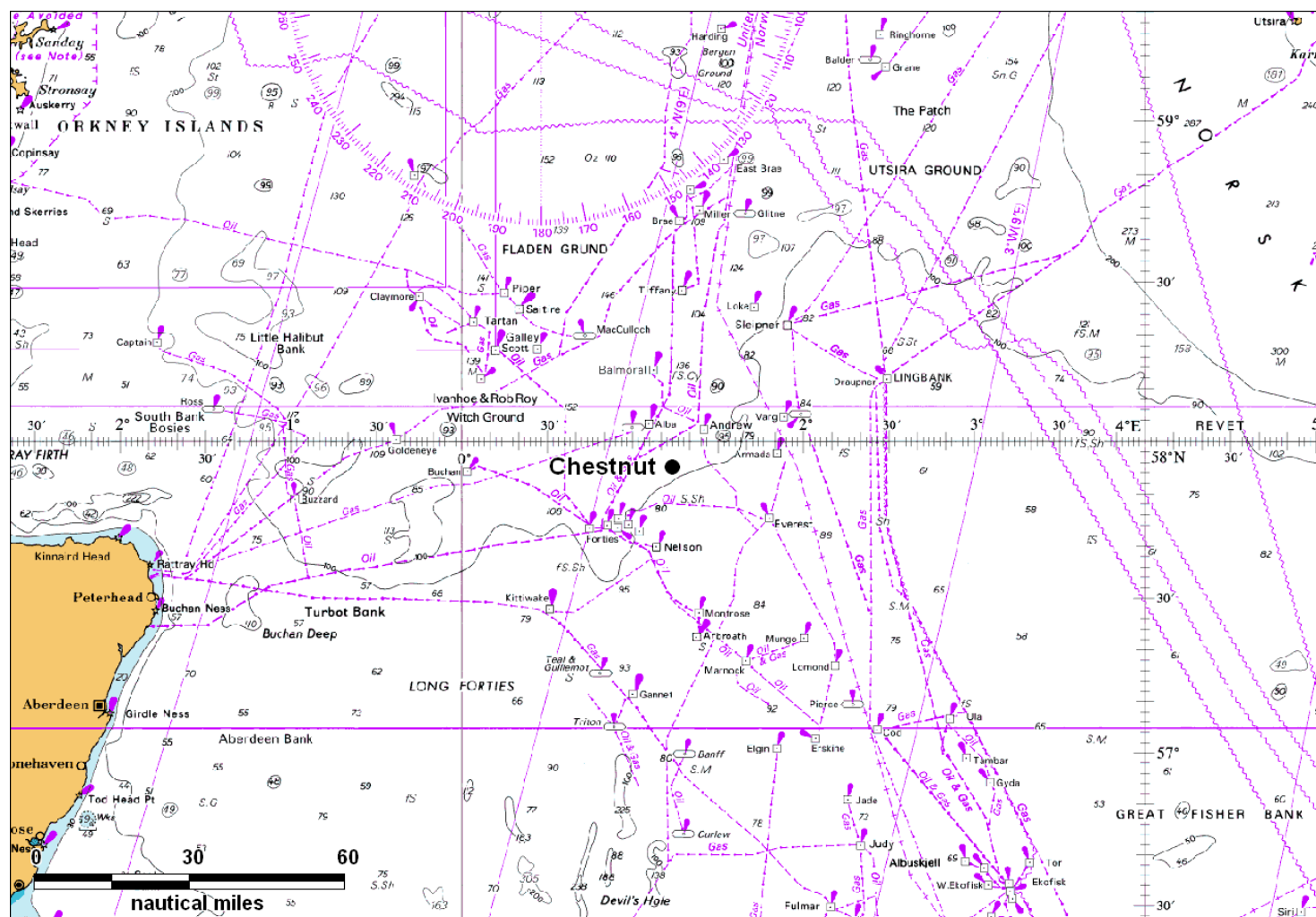
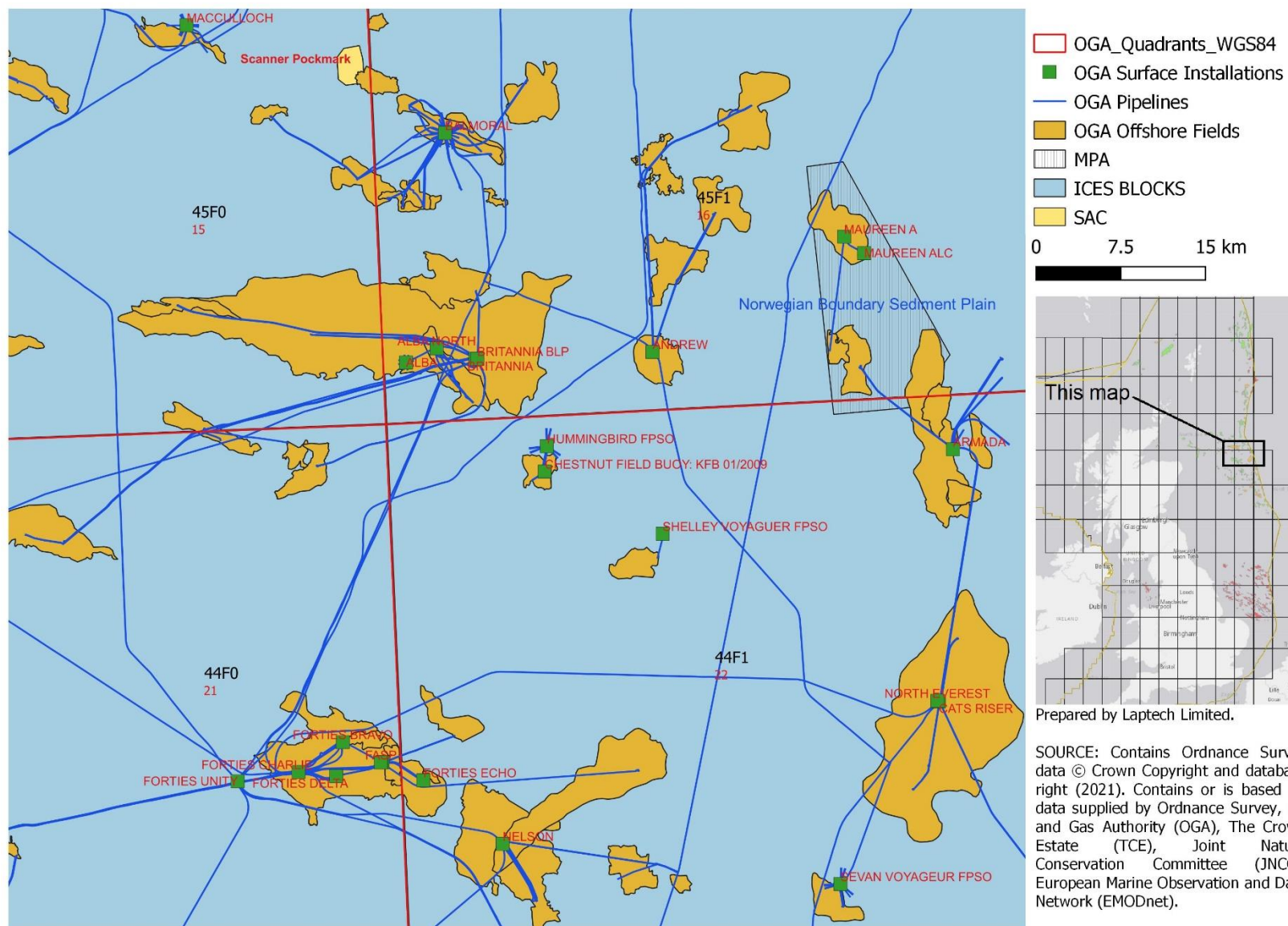


Figure 1.5.1: Field location in UKCS



**Figure 1.5.2: Chestnut & Hummingbird Spirit adjacent facilities**

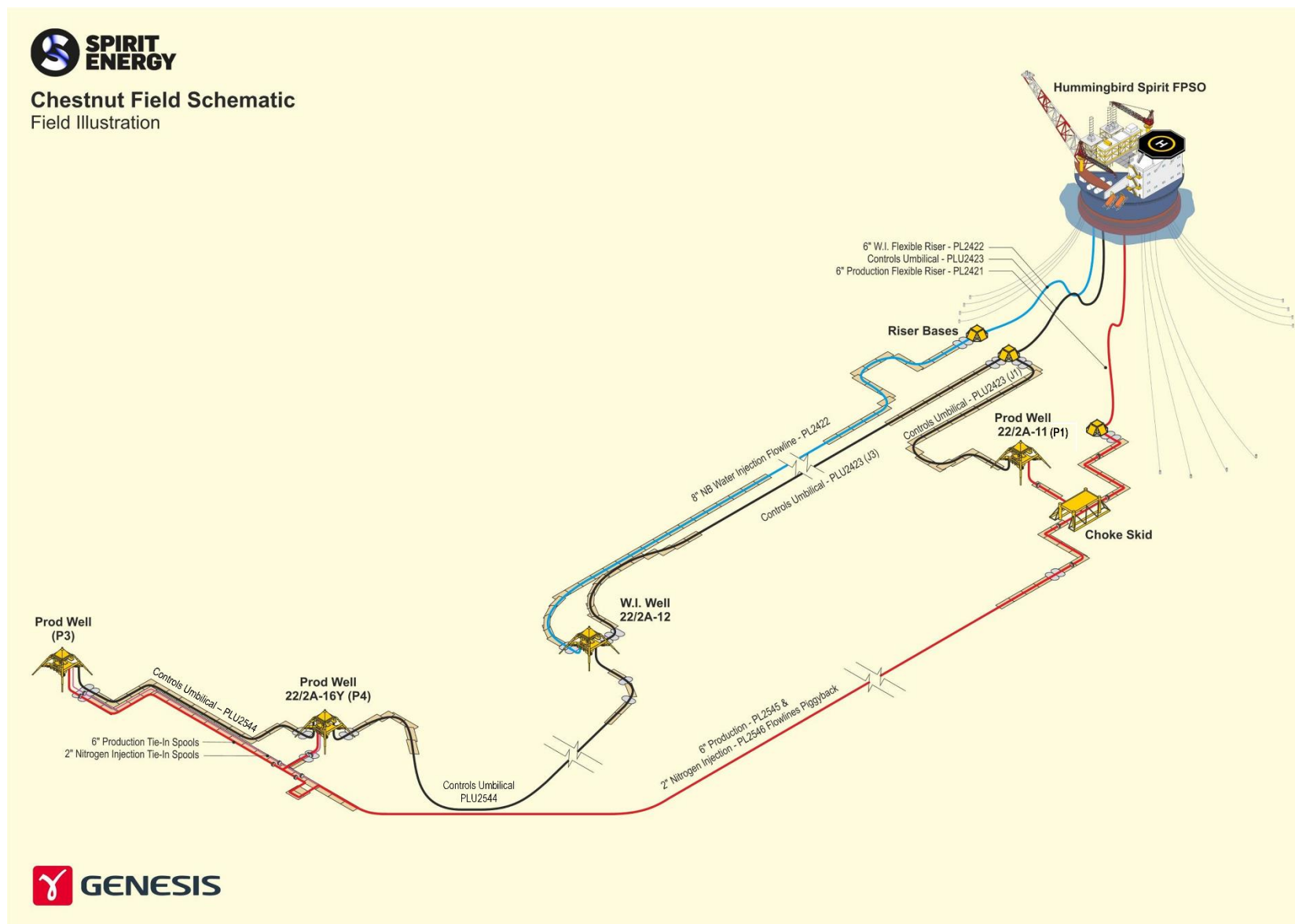


Figure 1.5.3: Hummingbird Spirit FPSO prior to sailaway

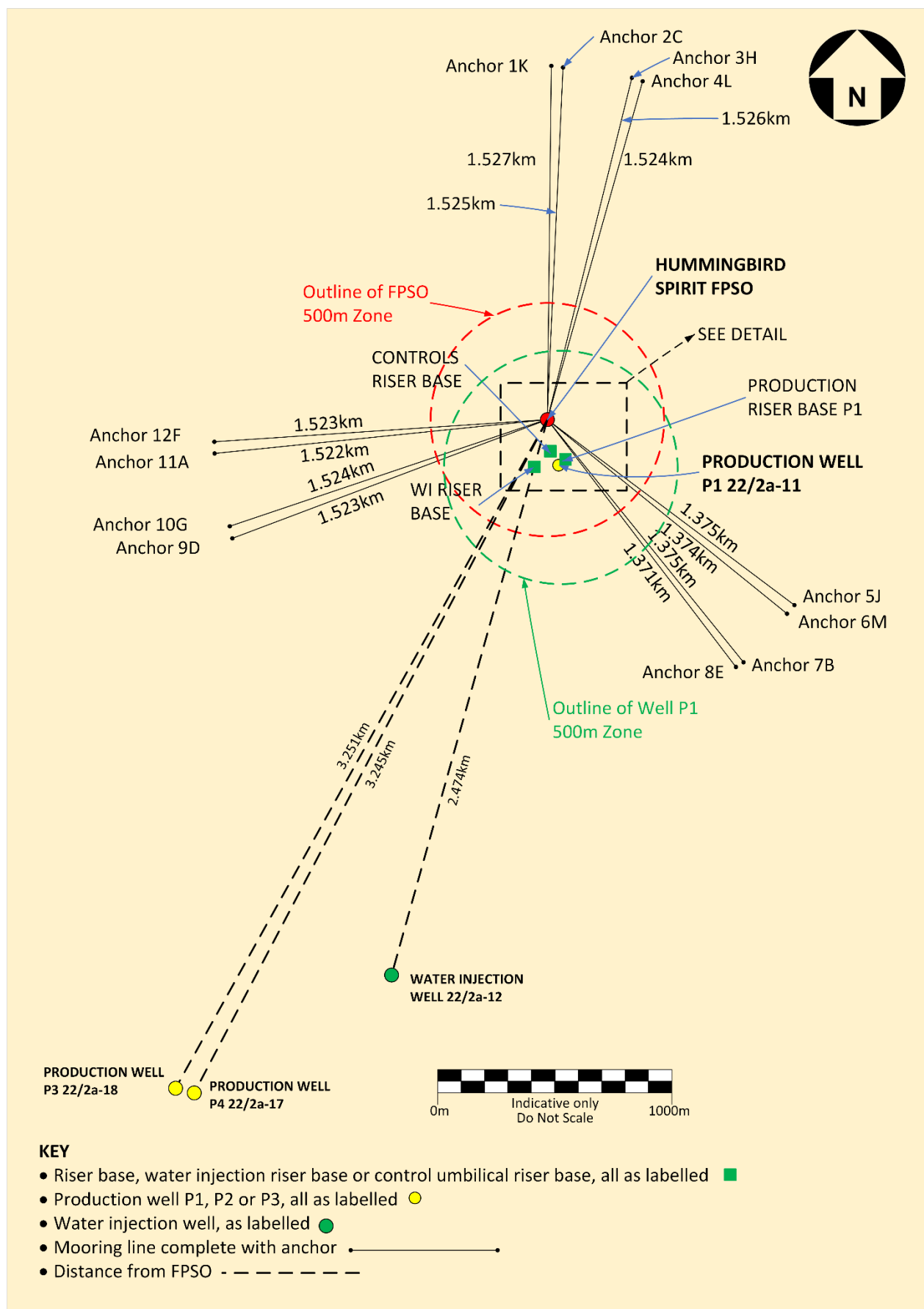


Figure 1.5.4: Overview of Hummingbird Spirit anchor pattern



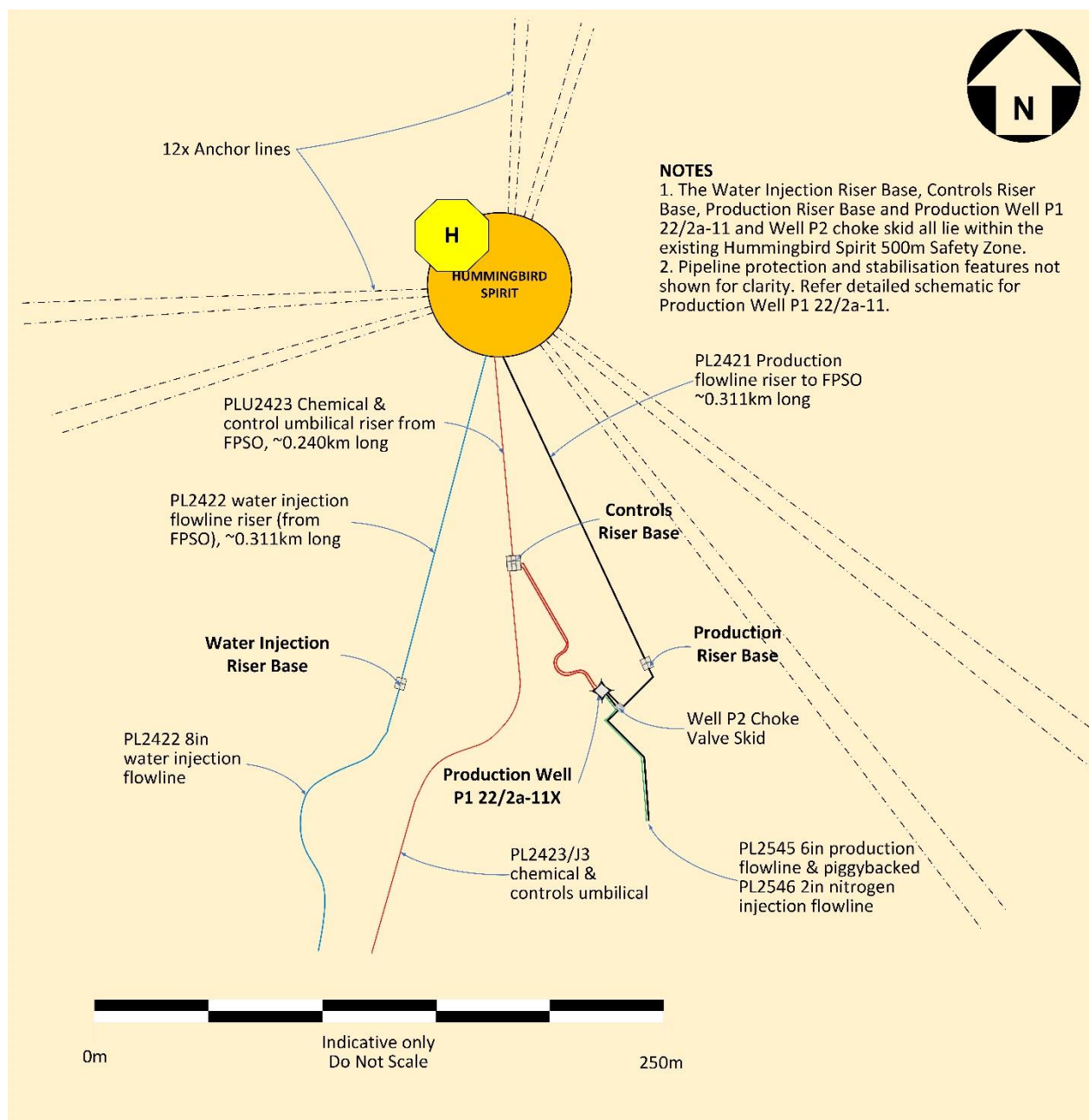


Figure 1.5.5: Details (part) inside Hummingbird Spirit 500m Safety Zone



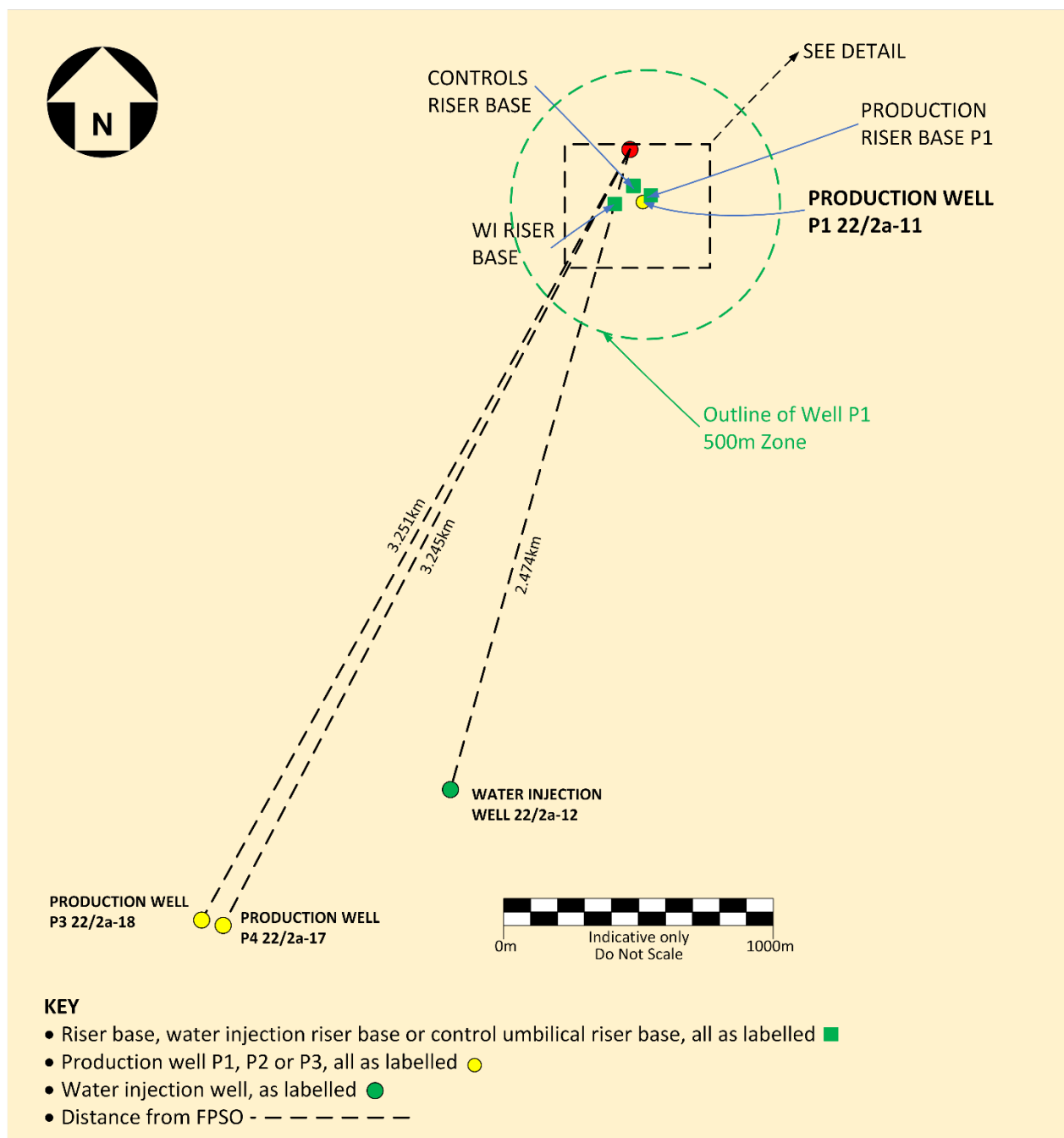


Figure 1.5.6: Chestnut infrastructure remaining after departure of FPSO

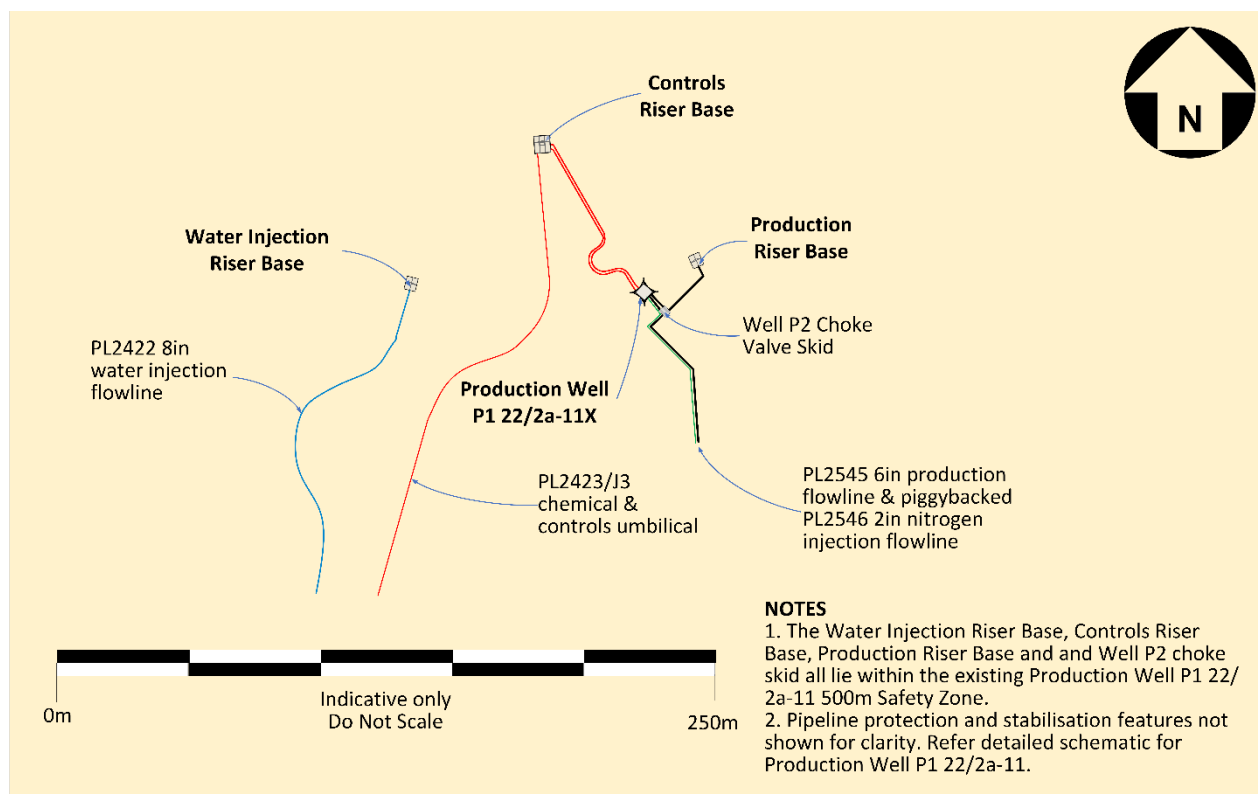
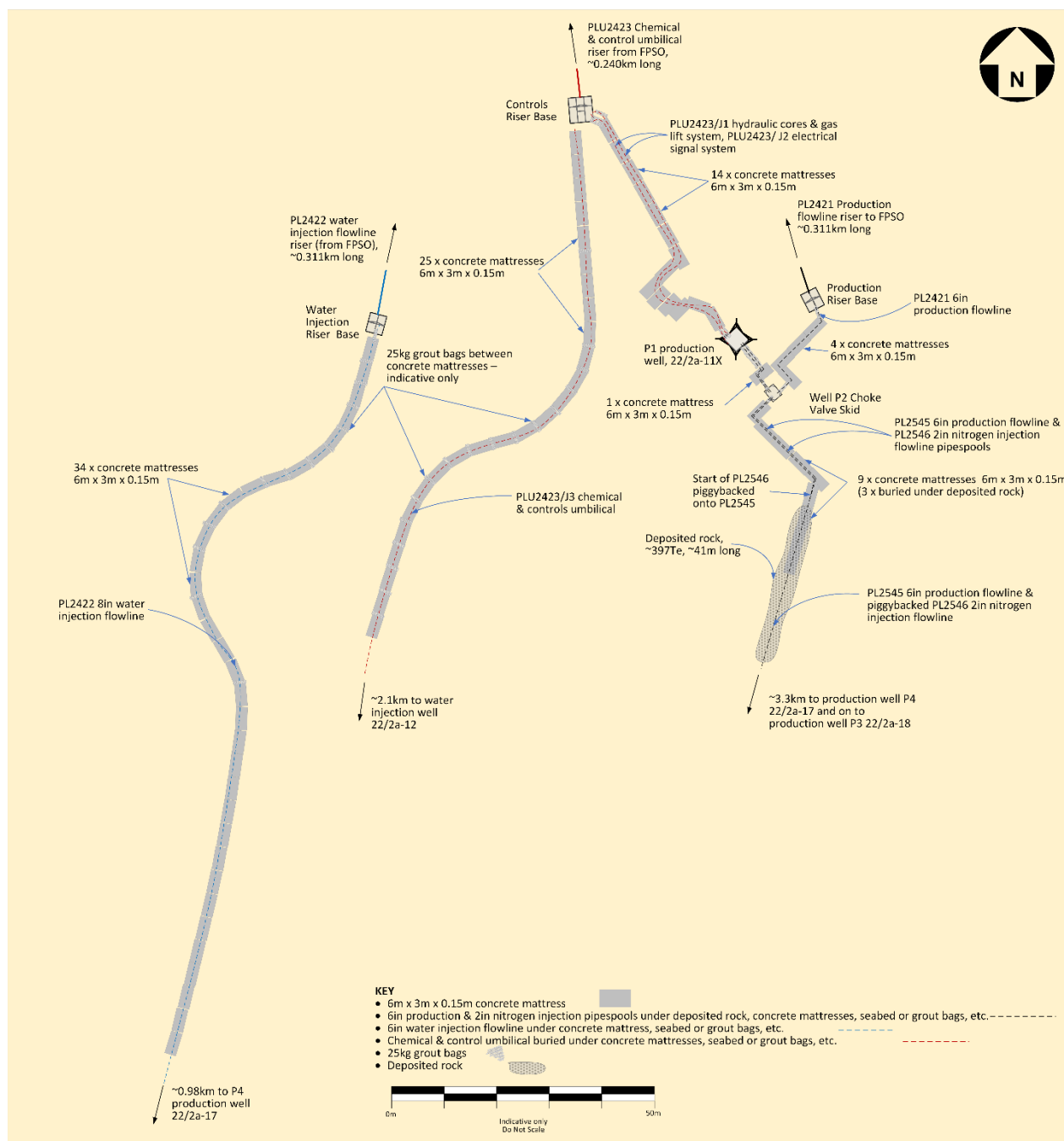


Figure 1.5.7: Details (part) inside Well P1 500m Safety Zone after departure of FPSO



**Figure 1.5.8: Overview of production well P1 & approaches**

**Table 1.5.1: Adjacent Facilities**

Operator	Name	Type	Direction / Distance from Hummingbird Spirit	Information	Status
Serica Energy UK Limited	PL815	24in pipeline	NW, ~3.4km	Condensate pipeline, Bruce to Forties Unity	Operational
bp Exploration Operating Company Limited	PL1079	8in pipeline	E, ~11.3km	Andrew to CATS Tee gas export pipeline	Operational
Ithaca Oil & Gas Limited	Sadie	WI Manifolds (3) & WI WHPS (3)	NWW, ~7.5km	Tied back to the Alba Northern Platform	Operational
Chrysaor UK Britannia Limited	Britannia	Platforms (2)	NW, ~9.8 & 9.9km	Export route for Brodgar, Callanish, & Enochdhu fields	Operational
bp Exploration Operating Company	Andrew	Platform	NE, ~12.3km	Export route for Andrew, Arundel, Cyrus, Farragon and Kinnoull fields	Operational
	Andrew	Towhead & PLEM Towhead	NE, ~12.6km	Tied back to the Andrew Platform	Operational
Ithaca oil & gas Limited	Alba North	Platform	NWW, ~12.9km	Oil exported via pipeline PL927/PL928 to Alba FSU	Operational
	Alba	FSU	NWW, ~14.4km	Oil exported via shuttle tanker	Operational
Chrysaor Production UK Limited	Enochdhu	Towhead	W, ~22.8km	Tied back to Callanish manifold and Britannia platforms	Operational
Chrysaor North Sea Limited	Maria	Manifolds (2) & Wellheads (2)	NEE, ~28.6km	Tied back to the CATS riser tower	Operational
Apache North Sea Limited	Bacchus West	Wellhead	S, ~26.2km	Tied-back to Bacchus Towhead	Operational
Apache North Sea Limited	Bacchus	Towhead	S, ~26.8km	Tied back to Forties Alpha	Operational
Apache North Sea Limited	Bacchus South	Wellhead	S, ~26.8km	Tied-back to Bacchus Towhead	Operational
Apache North Sea Limited	Aviat	Wellhead	SSE, ~29.7km	Tied back to Forties infrastructure	Operational
Apache North Sea Limited	Forties Alpha	Platform	SSW, ~29.8km	Part of Forties field	Operational

**Impacts of Decommissioning Proposals**

There are no direct impacts on adjacent facilities from the decommissioning works associated with the disconnection and sailaway of the Hummingbird Spirit FPSO.

As part of the operational phase any potential in combination or cumulative impacts will be mitigated by a risk assessment and appropriate mitigations will be built into the project execution documentation. This approach will be accompanied via direct communication with the parties involved, and the submission of MATs and SATs.

**1.6 Industrial Implications**

The Hummingbird Spirit will be taken off station with the assistance of Anchor Handling Vessels (AHV). The mooring lines and suction anchors will thereafter be recovered using AHVs,



Construction Support Vessel (CSVs), Dive Support Vessel (DSV) or Multi Support Vessel (MSV) as required.

It is the vessel owner and Spirit Energy's intention to develop a contract strategy that will result in an efficient and cost-effective execution of the decommissioning works. Where appropriate existing framework agreements may be used for decommissioning of the pipelines and pipeline stabilisation features. The vessel owner and Spirit Energy will try to combine Hummingbird Spirit sailaway and disconnection activities with other development or decommissioning activities to reduce mobilisation costs should the opportunity arise.

## 2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

### 2.1 Installations: Surface Facilities

**Table 2.1.1: Surface Facilities Information**

Name & Facility Type	Location		Topsides/ Facilities		Mooring System		
	WGS84 Decimal	WGS84 Decimal Minute	Mass (Te)	No of modules	Mass (Te)	Number of mooring lines & anchors	Mass of anchors (Te)
Hummingbird Spirit FPSO	57.975296°N 1.24007°E	57°58.5172'N 1°14.4041'E	27,596	1	2,680 <sup>1</sup>	12	1,440

**NOTE**

1. The overall mass of mooring system is 4,120Te, including the mass of the suction anchors.

### 2.2 Installations: Subsea including Stabilisation Features

**Table 2.2.1: Subsea Facilities Information**

Subsea Installations Including Stabilisation Features	No.	Size / Mass (Te)	Location		Comments/ Status
			WGS84 Decimal	WGS84 Decimal Minute	
FPSO Mooring suction anchor, cluster 1	4	<b>1K</b> 120.0	57.99194°N 1.2393°E	57°59.51647'N 1°14.3583'E	Cluster 1, 6m diameter suction anchors, each 15.685m long, penetrating 14.5m into the seabed leaving 1.185m of the suction anchor protruding above the seabed.
		<b>2C</b> 120.0	57.99192°N 1.24022°E	57°59.51502'N 1°14.41349'E	
		<b>3H</b> 120.0	57.99149°N 1.24554°E	57°59.48914'N 1°14.73267'E	
		<b>4L</b> 120	57.99135°N 1.24641°E	57°59.48106'N 1°14.78432'E	
FPSO Mooring suction anchor, cluster 2	4	<b>5J</b> 120.0	57.97101°N 1.25803°E	57°58.26074'N 1°15.48203E	Cluster 2, 6m diameter suction anchors, each 15.685m long, penetrating 14.5m into the seabed leaving 1.185m of suction anchor protruding above the seabed.
		<b>6M</b> 120.0	57.97067°N 1.25753°E	57°58.24'N 1°15.45169'E	
		<b>7B</b> 120.0	57.96879°N 1.25418°E	57°58.12723'N 1°15.25094'E	
		<b>8E</b> 120.0	57.96856°N 1.25356°E	57°58.11367N 1°15.21335'E	
FPSO Mooring suction anchor, cluster 3	4	<b>9D</b> 120.0	57.97361°N 1.21472°E	57°58.41678'N 1°12.88316'E	Cluster 3, 6m diameter suction anchors, each 15.685m long, penetrating 14.5m into the seabed leaving the suction anchor protruding 1.185m above the seabed.
		<b>10G</b> 120.0	57.97408°N 1.21444°E	57°58.44463'N 1°12.8664'E	
		<b>11A</b> 120.0	57.97689°N 1.21338°E	57°58.61366'N 1°12.8028'E	
		<b>12F</b> 120.0	57.97735°N	57°58.64082'N	



**Table 2.2.1: Subsea Facilities Information**

Subsea Installations Including Stabilisation Features	No.	Size / Mass (Te)	Location		Comments/ Status
			WGS84 Decimal	WGS84 Decimal Minute	
			1.2133°E	1°12.79812'E	
Mooring system	12	Length ~8x 1556m, 4x 1406m Mass – 8x 225.0Te 4x 220.0Te	Top chain 120mm dia. studlink 376m long Polyester Rope ~8x 1000m and 4x 850m long Pennant chains 9x 84mm dia. links each Bottom chain 120mm dia. studlink 180m long		Connected to suction anchors. Lines 1-4 and 9-12 1556m long Lines 5-8 1406m long.

**NOTES:**

1. No stabilisation features such as concrete mattresses, grout bags, or deposited rock are associated with the items listed above.

## 2.3 Pipelines including Stabilisation Features

**Table 2.3.1: Pipeline/Flowline/Umbilical Information**

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches)	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Production pipeline system riser	PL2421 (7)	6	0.311	Flexible production flowline Eltex® TUB172	Produced Crude Oil	Riser Base to Hummingbird Spirit FPSO	Surface laid or suspended in seawater	Operational	Produced Crude Oil
Water injection pipeline system riser	PL2422 (1)	6	0.311	Flexible water injection flowline Eltex® TUB172	Produced water & de-aerated seawater	Hummingbird Spirit FPSO to WI Riser Base	Surface laid or suspended in seawater	Operational	Produced water & de-aerated seawater
Umbilical pipeline riser	PLU2423	153mm	0.240	Hydraulic, chemical gas lift, electrical control system umbilical riser; polyurethane outer sheath	Methanol, nitrogen, hydraulic fluids, electrical signals & power	Hummingbird Spirit FPSO to Controls Riser Base	Surface laid or suspended in seawater	Operational	Methanol, nitrogen, hydraulic fluids, electrical signals & power

### NOTES

- Under "Pipeline Number", The number in bracket is the pipeline ident on the PWA;
- If diameter is expressed in mm it refers to outside diameter of electrical cable or umbilical pipeline.

## 2.4 Wells

Table 2.4.1: Well Information			
Well ID	Designation	Status	Category of Well
22/2a-11x	Oil production	In Service	SS-3-4-3
22/2a-12	Water Injection	Decommissioned	SS-0-0-0
22/2a-19Z	Oil production	In Service	SS-3-4-3
22/2a-17	Water Injection (sidetracked from 22/2a-12)	In Service	SS-3-4-3
22/2a-18	Oil production	In Service	SS-3-4-3
<b>NOTES</b> 1. For details of well categorisation please refer the latest version of the Oil & Gas UK Guidelines for the Decommissioning of Wells; 2. In preparation for departure of the FPSO the wells will be shut-in until they are decommissioned. Any monitoring requirements will be agreed separately with HSE and the Environmental Inspectorate at OPRED.			

## 2.5 Drill Cuttings

Table 2.5.1: Chestnut Drill Cutting(s) Pile Information		
Location of Pile Centre	Seabed Area (m <sup>2</sup> )	Estimated Volume of drill Cuttings (m <sup>3</sup> )
Water based mud cuttings were discharged to sea under permit, while the majority of oil-based mud cuttings were shipped to shore for treatment. Oil based cuttings for 22/2a-17 were processed before being discharged to sea under permit. This will be confirmed by environmental survey before the Phase 2 decommissioning works. The extent of any drill cuttings will be detailed within the Decommissioning Programmes for the remaining infrastructure.		

## 2.6 Inventory Estimate

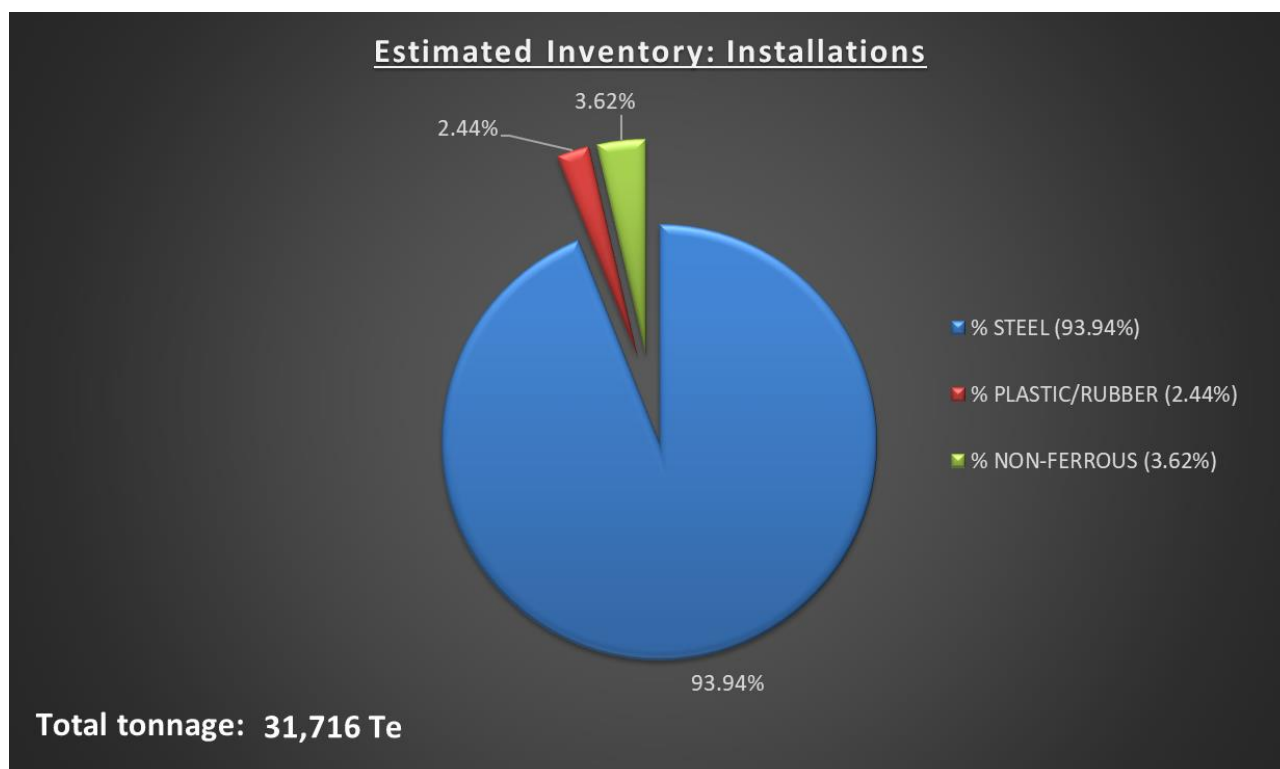


Figure 2.6.1: Pie-Chart of estimated inventories (FPSO & mooring systems)

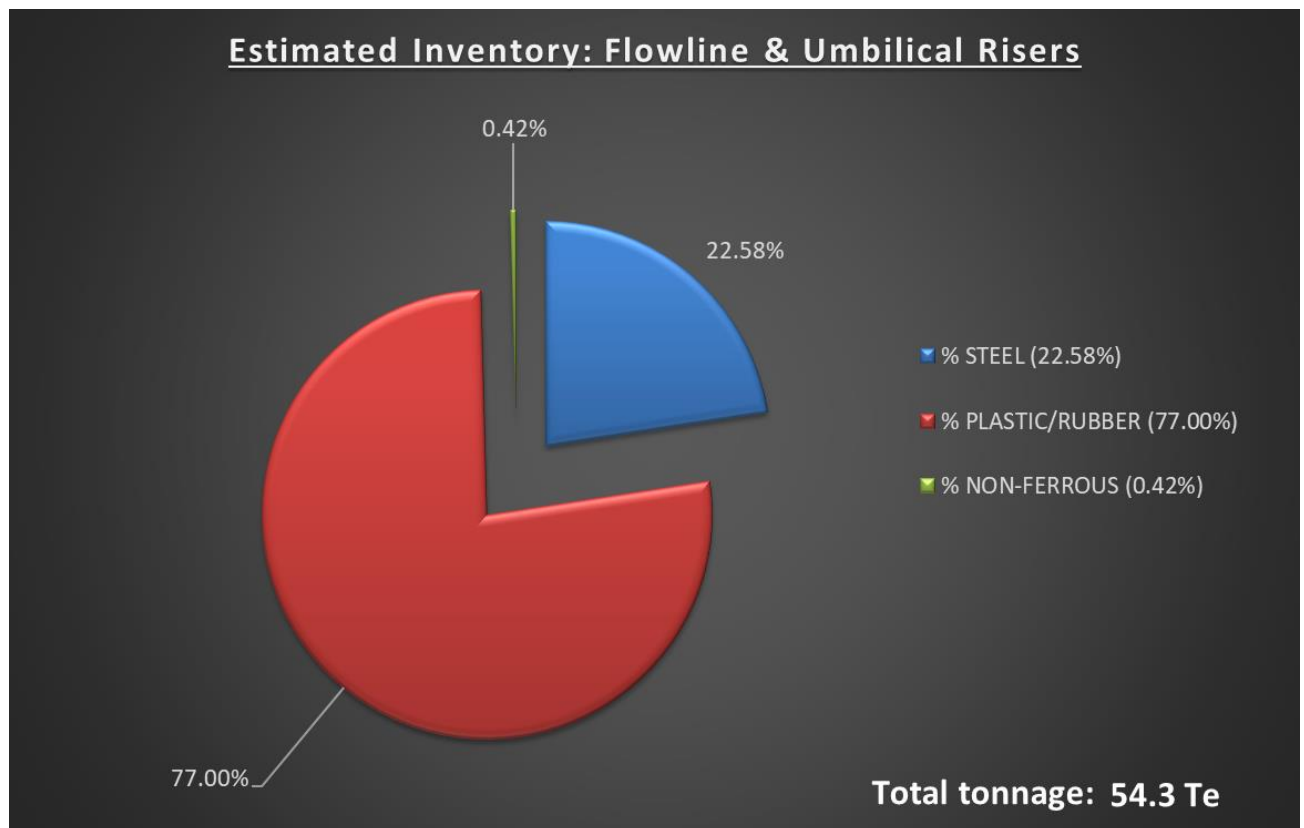


Figure 2.6.2: Pie-Chart of estimated inventories (flowline & umbilical risers)

### 3. REMOVAL AND DISPOSAL METHODS

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.

Materials for which no re-use or recycling opportunities are available will be tracked through to final disposal.

Decommissioning execution responsibilities shall be in accordance with the Section 29 notice holders' responsibilities, as outlined in Table 1.3.2 and Table 1.3.4.

#### 3.1 Surface Installations - FPSO

The Hummingbird Spirit FPSO is under a lease and cooperate contract between the vessel owners and the Chestnut partners until end of field life has been declared by Spirit Energy and field partners. After completion of the operation at its current location, at the discretion of its owners, the FPSO will be towed from the field and either redeployed or towed to a suitable licensed location for preparation for re-use or decommissioning. The owner 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 FPSO will comply with the IMO Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

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

Table 3.1.1: Cleaning of FPSO for removal		
Waste type	Composition of Waste	Disposal Route
On-board hydrocarbons	Bulk liquid waste will be produced during the flushing of the Chestnut field production systems and during the cleaning of the FPSO process equipment. Bulk liquids will be offloaded and transported to shore for treatment and disposal.	Where possible, on-board hydrocarbons will be evacuated to tanker with residual materials being pumped into a donor well. Should this approach be unsuccessful, on-board hydrocarbons will be returned to shore for separation and use.
Other hazardous materials	The presence of NORM 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 <input type="checkbox"/> ; 2) Monohull Crane Vessel <input type="checkbox"/> ; 3) Shear Leg Vessel <input type="checkbox"/> ; 4) Jack up Work barge <input type="checkbox"/> ; 5) Piece small or large <input type="checkbox"/> ; 6) Complete with jacket <input type="checkbox"/> ; 7) Other <input checked="" type="checkbox"/>	
Method	Description
Proposed removal method and disposal route	<p>The Hummingbird Spirit will be released from its moorings after all production pipelines, water injection pipelines and chemical cores in the umbilicals have been cleaned and flushed and the dynamic risers disconnected and laid down. The FPSO will then be returned to owners of the facility who will either arrange for the FPSO to 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.</p> <p>The opportunities for reuse will be determined by the vessel owner.</p>

## 3.2 Subsea Installations & Stabilisation Features

Table 3.2.1: Subsea Installations & Stabilisation Features			
Subsea installations and stabilisation features	Number	Option	Disposal Route (if applicable)
FPSO mooring suction anchors	12	Complete recovery	Return to shore for reuse or recycling.
Mooring system	12	Complete recovery	Return to shore for reuse, recycling, or disposal.
<b>NOTE</b> 1. The suction anchors were designed for reverse installation which is the intended recovery method. We would consult with OPRED when exploring alternative decommissioning options in the event the suction anchors cannot be recovered in their current configuration.			

## 3.3 Pipelines and Cables

### 3.3.1 Decommissioning Options:

The production flowline riser (part of **PL2421**), the water injection flowline riser (part of **PL2422**) and the umbilical riser (part of **PLU2423**) between the FPSO and the respective riser bases will be completely removed. The option to leave these risers *in situ* was not considered a viable option.

Table 3.3.1: Proposals for pipeline & cables		
Pipeline	Condition and Current Status	Decommissioning Options considered
<b>PL2421</b> (6in production pipeline system riser, complete with riser bend stiffeners and buoyancy modules)	Surface laid or suspended in seawater	Complete removal only
<b>PL2422</b> (6in water injection pipeline system riser, complete with riser bend stiffeners and buoyancy modules)	Surface laid or suspended in seawater	Complete removal only
<b>PLU2423</b> (153mm diameter umbilical pipeline riser, complete with riser bend stiffeners and buoyancy modules)	Surface laid or suspended in seawater	Complete removal only



### 3.4 Wells

**Table 3.4.1: Well Decommissioning**

The Chestnut field hosts a total of three production wells and one water injection well. (**Chestnut:** 22/2a-11X, 22/2a-19Z, 22/2a-17 and 22/2a-18). The water injection well has already been decommissioned. All wells will be decommissioned in accordance with latest version of the Oil & Gas UK Well Decommissioning Guidelines. A Master Application Template and the supporting Supplementary Application Template will be submitted in support of works carried out. An application to decommission the wells will be made via the online Well Operations Notification System (WONS) on the OGA Energy Portal. Well decommissioning will be scheduled in accordance with the outline schedule presented in section 6.3.

### 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 tanker, with any residual hydrocarbons removed from the FPSO in accordance with contractual agreements with the vessel owner. Any associated bulk seawater from topsides will be cleaned and disposed overboard or downhole under permit. The production risers and pipelines, water injection flowlines and umbilical pipelines will be pigged, flushed, and left filled with seawater as appropriate prior to being disconnected at the ends. 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 recycling / re-use.
Marine growth	Some marine growth is likely to detach itself from the FPSO 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 FPSO after load-in to the onshore dismantling site will be removed. It will be disposed of in accordance with the regulations in force at the site following the 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	No asbestos is associated with the Hummingbird Spirit installation. However, any such material found will be dealt with and disposed of in accordance with guidelines and company policies.
Chromium VI	Should Chromium VI paints have been used for corrosion protection checks will be done to confirm whether Chromium IV is present using the correct PPE taking account of COSHH Regulations 2002. The material will be disposed of according to guidelines and company policies and under appropriate permit.
Other hazardous wastes	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 left <i>in situ</i> (Te)
Hummingbird Spirit c/w mooring system	31,716	31,716	0
Flowline & umbilical risers	54.3	54.3	0

<b>Table 3.5.3: Re-use, Recycle &amp; Disposal Aspirations for Recovered Material</b>			
<b>Inventory</b>	<b>Re-use</b>	<b>Recycle</b>	<b>Disposal (e.g., Landfill)</b>
<b>Hummingbird Spirit</b>	>95%	<5%	<5%
<b>Flowline &amp; Umbilical Risers incl. Appurtenances</b>	<5%	>95%	<5%

All recovered material will be transported onshore for reuse, recycling, or disposal. The expectation is that any synthetic materials associated with the pipelines will be incinerated with the resultant heat being used for energy. It is not possible to predict the market for reusable materials with any confidence so the figures in Table 3.5.3 are aspirational.

## 4. ENVIRONMENTAL APPRAISAL

### 4.1 Potential Environmental Impacts and their Management

There will be some planned and unplanned environmental impacts arising from the sailaway of the Hummingbird Spirit FPSO. Long-term environmental impacts from the decommissioning operations are expected to be low. Incremental cumulative impacts and trans-boundary effects associated with the planned decommissioning operations are also expected to be low.

Spirit Energy understands the importance of minimising potential for environmental impact in line with safety and technical feasibility issues and will consider how engineering decisions reached for the sailaway of the Hummingbird Spirit can be made to limit the impact accordingly. Where design decisions cannot alone do this, Spirit Energy will develop measures to limit the extent of any potential impact. It is acknowledged that environmental permits and approvals will be required.

**Table 4.1.1: Environmental Impact Management**

Activity	Main Impacts
FPSO Sailaway	Energy and emissions to air
Recovery of suction anchors and mooring lines	Recovery of the suction anchors on the twelve locations as well as the associated mooring lines will result in suspension of seabed sediment. Such disturbance will be of short duration and localised in nature.  The diameter of the suction anchors is 6m. If a buffer zone of 5m is assumed around each suction anchor, the total area of seabed directly impacted would be ~2,413m <sup>2</sup> .  The length of each mooring line is between ~1,406m (4x) and 1,556m (8x). If a buffer zone of ~5m is assumed for each line, as a worst case the total area of seabed directly impacted would be ~90,360m <sup>2</sup> .
Disconnection and recovering flowline risers and umbilical risers	Recovery of the three risers will result in the suspension of seabed sediment. Such disturbance will be of short duration and localised in nature.  The length of each of the production and water injection flowline risers is 311m, and the length of the control umbilical is 240m.  If a buffer zone of 5m is assumed for each of the three risers, as a worst case the total area of seabed directly impacted would be ~4,310m <sup>2</sup> .
Post sailaway seabed verification	Potential seabed interaction, including short-term disturbance to the seabed.
Onshore disposal <sup>1</sup>	Energy and emissions to air; potential recycling of materials and disposal of small quantities of material to landfill.

A summary of mitigation and control measures is presented in Table 4.1.2:.

**Table 4.1.2: Summary of Mitigation and Control Measures**

General and Existing
<ul style="list-style-type: none"> <li>Lessons learnt from previous FPSO sailaway scopes will be reviewed and implemented where available;</li> <li>Vessels will be managed in accordance with Spirit Energy's Marine Assurance Standard;</li> <li>The vessels' work programme will be optimised to minimise vessel use;</li> <li>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;</li> <li>All vessels undertaking decommissioning activities will have an approved SOPEP;</li> <li>Existing processes will be used for contractor management to assure and manage environmental impacts and threats;</li> <li>The respective company management of change process will be followed should changes of scope be required.</li> </ul>
Underwater Noise
<ul style="list-style-type: none"> <li>A SIMOPS plan for vessel activity in the field will be put in place;</li> <li>Vessel, riser cutting operations will use standard methods and equipment. No explosives used.</li> </ul>

<sup>1</sup> 'Onshore disposal' assumes that the FPSO has not been reassigned for use elsewhere.

**Table 4.1.2: Summary of Mitigation and Control Measures**

<b>Discharges and Small Releases to Sea</b>	
<ul style="list-style-type: none"> <li>All contracted vessels will operate in line with IMO and MARPOL regulations;</li> <li>Pipelines and spools are to be flushed, filled with seawater, and isolated prior to disconnection;</li> <li>All discharges will be permitted under applicable UK legislation.</li> </ul>	
<b>Accidental Events</b>	
<ul style="list-style-type: none"> <li>All contracted vessels will have a ship-board oil pollution emergency plan (SOPEP) in place;</li> <li>A Collision Risk Management Plan will be developed and implemented;</li> <li>Agreed arrangements in place with oil spill response organisation for mobilising resources in event of a spill;</li> <li>Existing field OPEP in place to reduce the likelihood of hydrocarbon release and define spill response in place;</li> <li>Lifting operations will be planned to manage the risk;</li> <li>Recovery of any dropped objects will take place;</li> <li>Vessel contactors will have procedures for fuel bunkering that meet Spirit Energy's standard;</li> <li>Where practicable, re-fuelling will take place during daylight hours only.</li> </ul>	
<b>Physical Presence of Vessels and Infrastructure</b>	
<ul style="list-style-type: none"> <li>All vessels will comply with standard marking conditions and consent to locate conditions;</li> <li>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;</li> <li>As explained in section 6.2, the Chestnut infrastructure will be fully protected on the seabed in the interim period between departure of the Hummingbird Spirit FPSO and final clearance of the 500m safety zone following decommissioning of the wider Chestnut field;</li> <li>Following departure of the FPSO, the 500m zone will meantime be surveyed for oil and gas debris. However, the 500m zone will not be subject to full survey until the wider Chestnut decommissioning activities have been completed. The survey findings will be described in the close out report.</li> </ul>	
<b>Atmospheric Emissions &amp; Energy Use</b>	
<ul style="list-style-type: none"> <li>Time vessels spend in the field will be optimised, with a SIMOPS plan in place;</li> <li>Reuse or recycling of materials will be the preferential option;</li> <li>All material taken onshore will be handled by licenced waste management contractors at sites that hold Environmental Permits or Pollution Prevention Control (PPC) permits.</li> </ul>	
<b>Waste Production</b>	
<ul style="list-style-type: none"> <li>Onshore treatment will take place at waste management site with appropriate permits and licenses;</li> <li>UK waste disposal sites will be used where practicable;</li> <li>A Waste Management Plan for the Decommissioning Programmes will be prepared and implemented in line with the Waste Framework Directive;</li> <li>All waste will be managed in compliance with relevant waste legislation by a licenced waste management contractor;</li> <li>As part of Spirit Energy'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 Spirit Energy's contractor assurance processes.</li> </ul>	
<b>Remaining Infrastructure</b>	
<ul style="list-style-type: none"> <li>Monitoring will be performed as per usual for flowlines and umbilical pipelines remaining in situ until they are formally decommissioned;</li> <li>A notice to mariners will be issued prior to operations commencing to give vessels advance warning of the decommissioning operations;</li> <li>Kingfisher bulletins issued prior to operations commencing.</li> </ul>	
<b>Transboundary</b>	
<p>If waste is shipped internationally, the Chestnut Waste Management Plan will present the responsibilities Spirit Energy has under the 'Duty of Care' legislation and identify appropriately licenced international onshore facilities where the waste can be treated.</p>	
<b>Seabed Disturbance</b>	
<ul style="list-style-type: none"> <li>Activities which may lead to seabed disturbance planned, managed, and implemented in such a way that disturbance is minimised. A Marine License will be in place for any planned operational disturbance;</li> <li>Debris survey undertaken on completion of the activities and where possible resultant debris will be recovered;</li> <li>Minimising disturbance to seabed from overtrawl through liaison with fishing organisations and regulator.</li> </ul>	
<b>Large Releases to Sea</b>	
<ul style="list-style-type: none"> <li>All vessel activities will be planned, managed, and implemented in such a way that vessel durations in the field are minimised.</li> <li>The respective company's existing marine standard will be followed to minimise risk of hydrocarbon releases.</li> </ul>	

## 5. INTERESTED PARTY CONSULTATIONS

### 5.1 General

Table 5.1.1: Summary of Stakeholder Comments		
Who	Comment	Response
<b>INFORMAL CONSULTATIONS</b>		
NIFPO		
NFFO		
SFF	The decommissioning proposals were presented to SFF on 26 May 2021.	<p>The following notes were recorded:</p> <ul style="list-style-type: none"> <li>SFF had no adverse comment to make concerning the Phase 1 decommissioning proposals relating to the departure of the Hummingbird Spirit FPSO;</li> <li>The current thinking is that once the FPSO has departed, Spirit Energy (or authorised custodian) to use an existing vessel monitoring system currently based on the Andrew platform ~7 nautical miles away. SFF noted that the area can be busy with fishing activity as ~20 prawn fishing vessels have been seen in the area at any one time. Weather permitting, the ERRV would need to be responsive and capable of sharing its time between the Andrew platform and the Chestnut area – including the mooring lines and suction anchors. Spirit Energy to revert once capability and range are better understood;</li> <li>SFF would wish security messages to be expressed as WGS84 decimal or WBS84 decimal minutes but NOT WGS84 degrees, minutes, and seconds as this can give rise to confusion when seconds are quoted;</li> <li>SFF would be inclined not to favour use of cardinal buoys as markers. Not always visible especially in inclement seas, can break free and consider them to be surface hazards. SFF have expressed their concerns to Marine Contractor Association.</li> </ul>
Teekay Corp		
<b>STATUTORY CONSULTATIONS</b>		
NFFO		
SFF		
NIFPO		
GMG		
Public		

## 6. PROGRAMME MANAGEMENT

### 6.1 Project Management and Verification

A Spirit-Energy 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 Spirit-Energy Health and Safety principles. Changes to the Decommissioning Programmes will be discussed with OPRED with any necessary approvals sought.

### 6.2 Post-Decommissioning Debris Clearance and Verification

The Hummingbird Spirit installation site and respective 500m safety zone will be subject to verification of a clear seabed. The riser bases and production well P1 that are located within the FPSO 500m zone will remain *in situ*.

Once the FPSO vessel has been removed, the mooring lines and suction anchors may be left *in situ* for a period of up to two years. Infrastructure such as the wellhead for production well P1 and two riser bases as well as pipelines connected to the riser bases will remain within the well P1 500m Safety Zone. With the FPSO no longer being on location it is recognised that these will present a hazard to other users of the sea.

Therefore, appropriate safety measures will be used to protect the mooring lines, as well as the production P1 wellhead, flowline riser bases and control umbilical riser bases being meantime left *in situ* for decommissioning sometime in future. These could include a guard vessel, and ERRV, a Cardinal Buoy with AIS or a mixture of all three depending on location and suitability of local surface installations. A risk assessment shall be carried out to determine the most appropriate solution. These will remain in place until the wider Chestnut infrastructure has been decommissioned.

As infrastructure will remain, it would not be possible to demonstrate that the whole of the 500m zone would be clear of decommissioned infrastructure. Therefore, we 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 500m safety zone.

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

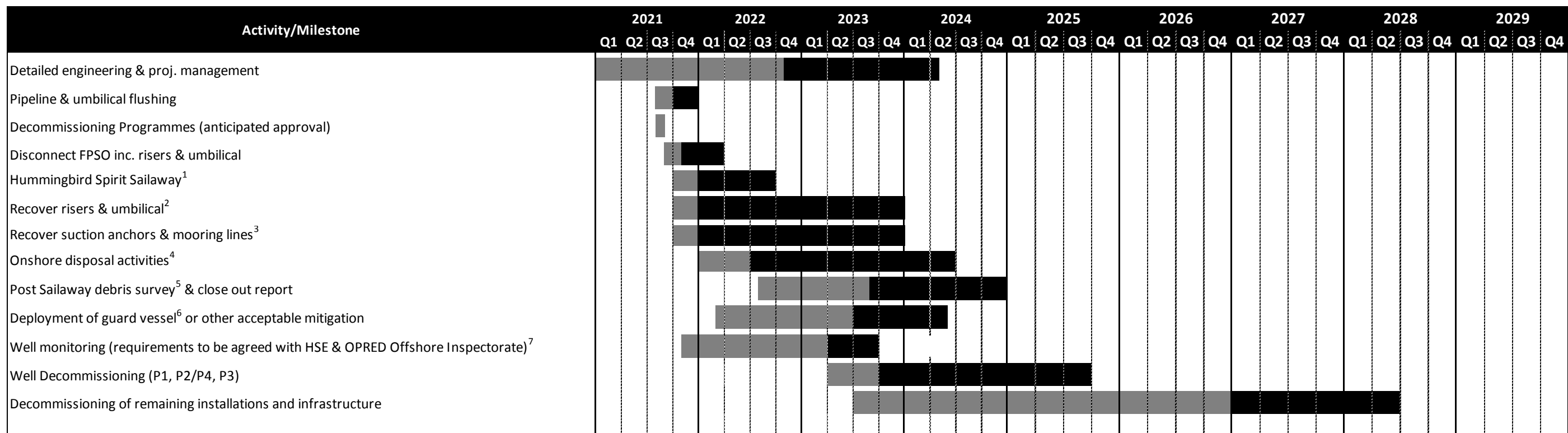
After the decommissioning of the wider Chestnut infrastructure has been completed, post-decommissioning pipeline and environmental surveys will be carried out. This will be explained in the Decommissioning Programmes for the next phase of the decommissioning works. It is likely that independent verification of seabed state will be obtained by trawling the areas affected by the decommissioning works and this will be supported by a Certificate of Clearance. This will be included in the Close Out Report and sent to the Seabed Data Centre (Offshore Installations) at the Hydrographic Office.

### 6.3 Schedule

A proposed schedule is provided in Figure 6.3.1. The activities are subject to the acceptance of the Decommissioning 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.





Notes / Key

Earliest potential activity

Activity window to allow commercial flexibility associated with well abandonment and decommissioning activities

1. Current indications are that sailaway will be carried out in late Q3 or early Q4 2021;
2. To promote synergistic opportunities recover of the risers may be timed to coincide with the same campaign as recovery of the mooring lines and suction anchors or other decommissioning activities in the central North Sea;
3. Under current contract with Spirit Energy the vessel owner is obliged to recover the mooring lines and suction anchors within 2 years of sailaway;
4. Redeployment, reuse or disposal of the FPSO is outside scope, as this is the responsibility of the vessel owners, not the License Section 29 Holders;
5. As there will remain wellheads and infratructure within the 500m zone the extent of the debris survey will necessarily need to be limited for practical reasons;
6. Subject to risk assessment, deployment of a guard vessel will likely be required required for the interim period between sailaway decommissioning of the wider Chestnut infrastructure inside the 500m zone;
7. Requirements for monitoring the integrity of the wells between sailaway of the FPSO and well decommissioning will be agreed between Spirit Energy, HSE and OPRED Offshore Environemntal Inspectorate.

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 FPSO and the 3x risers are being decommissioned at this time. Therefore, post-decommissioning surveys will be limited to 'as-left' surveys inside the FPSO 500m zone. 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 sailaway of the FPSO and removal of the risers but will be completed once the wider Chestnut infrastructure and facilities have been decommissioned. The report will explain any variance from the Decommissioning Programmes.

## **6.6 Post-Decommissioning Monitoring and Evaluation**

After sailaway of the FPSO has been completed, the suction anchors and associated mooring lines, the production flowline riser, the water injection flowline riser, and the umbilical riser between the FPSO and flowline riser and umbilical bases will have been completely removed. This will leave the riser and umbilical bases and associated flowlines and umbilical pipelines remaining inside the existing well P1 500m safety zone. Residual liability associated with the infrastructure remaining in place or not being decommissioned at this time will remain with the Section 29 holders identified in Table 1.3.2 and Table 1.3.4. Unless agreed otherwise in advance with OPRED, Spirit-Energy will remain the focal point for such matters, such as any change in ownership, for example.

The requirement for legacy and liability management such as the need of a guard vessel meantime will be described in more detail in the Close Out report.

## **7. SUPPORTING DOCUMENTS**

- [1] OPRED (2018) Offshore Oil and Gas Decommissioning Guidance Notes. Weblink last accessed 27 Jan 2020:  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/760560/Decom\\_Guidance\\_Notes\\_November\\_2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf)

It has not been deemed necessary to prepare a comparative assessment or an environmental appraisal in support of this decommissioning programme, and this approach has been agreed with OPRED.

## APPENDIX A ASSOCIATED INFRASTRUCTURE

### Appendix A.1 Production Well P4 & P3 Approaches

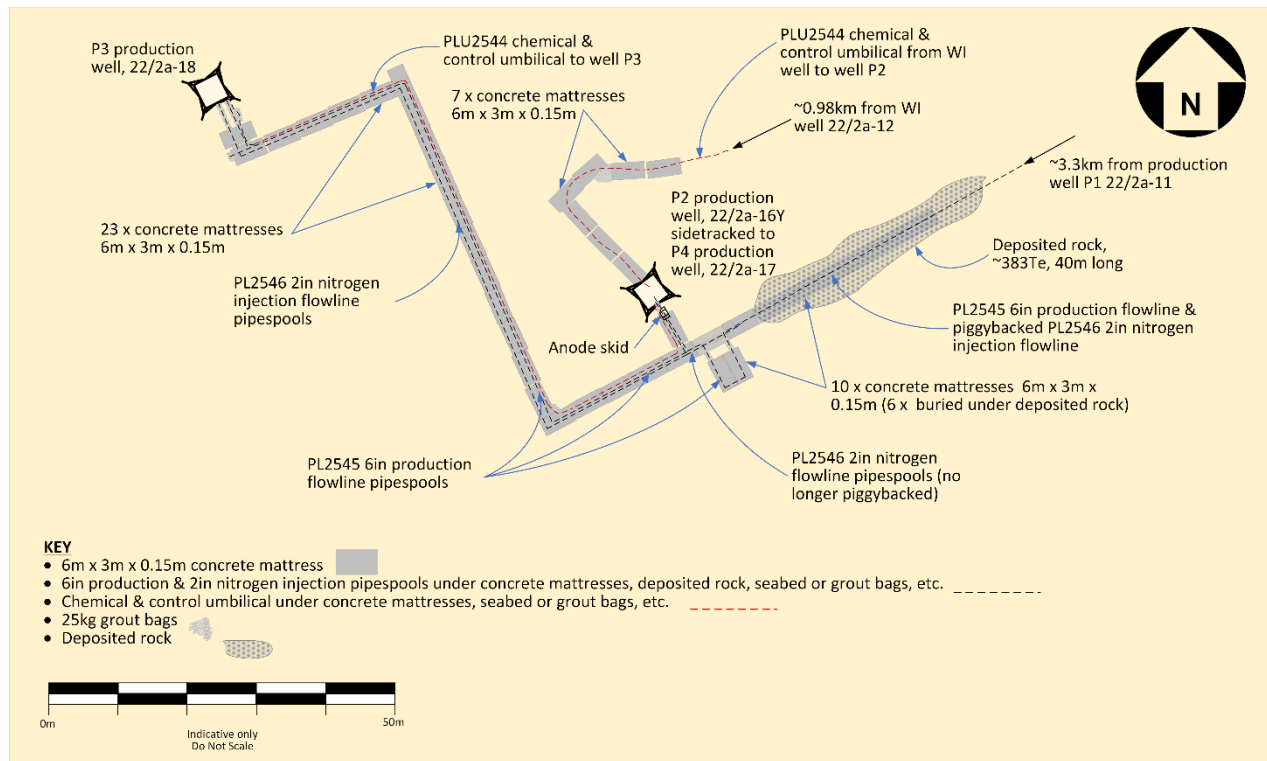
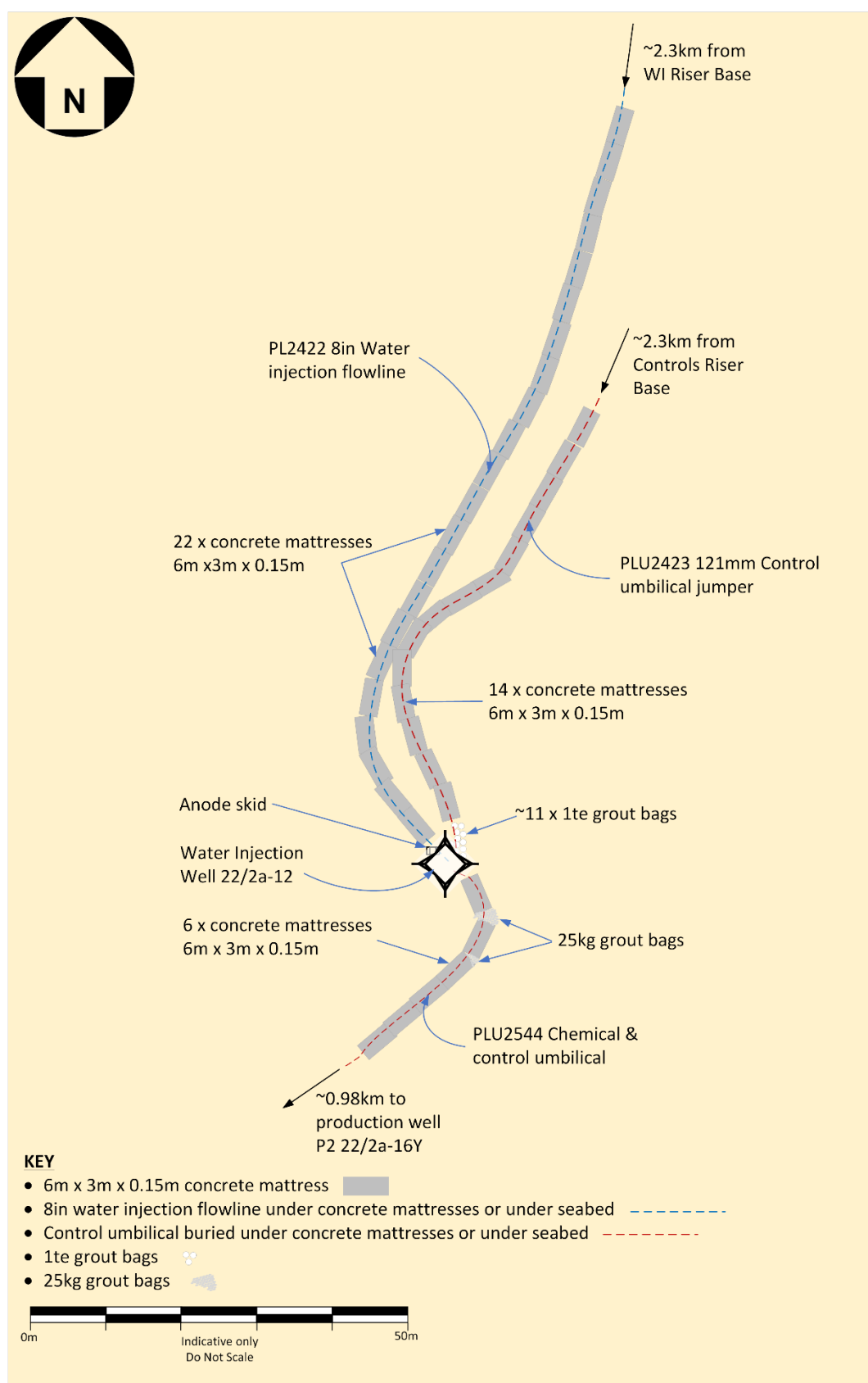


Figure A.1.1: Overview of Production Well P4<sup>2</sup> & P3 Approaches

<sup>2</sup> Production well P2 22/2a-16Y was sidetracked and is now designated P4 22/2a-17.

## Appendix A.2 Water Injection Well Approaches



**Figure A.2.1: Overview of Water Injection Well Approaches**

## **APPENDIX B PUBLIC NOTICE & CONSULTEE CORRESPONDENCE**

### **Appendix B.1 Public Notices**

The public notices and consultee correspondence will be added following Statutory Consultation.