Hummingbird Spirit FPSO Sailaway and Riser Disconnection Close Out Report

SPIRIT ENERGY

TEEKAY

DOCUMENT CONTROL

Document ID:		CHESDC-SPT-F-0000-REP-0018	
Document Classification:		PUBLIC	
Document Ownership:		Decommissioning	
Date of Document:	01 March 2023	Signature	Date
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REVISION RECORD

Revision No.	Date of Revision	Reason for Issue
A1	22/02/2024	Issued to OPRED for review and comment
C1	24/05/2024	Issued to OPRED for consultation
C2	11/12/2024	FINAL Version
C3	22/05/2025	FINAL Version reissued (Table 5.2.3 added)

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TABLE OF TERMS AND ABBREVIATIONS

ABBREVIATION	EXPLANATION
AHTS	Anchor Handling Tug Supply (Vessel)
CSV	Construction Support Vessel
DP	Decommissioning Programme(s)
DFPV	Drain, Flush Purge & Vent
FPSO	Floating, Production, Storage, Offloading (Vessel)
LCV	Light Construction Vessel
n/a	Not Applicable
NORM	Naturally Occurring Radioactive Material
NSTA	North Sea Transition Authority
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PON	Petroleum Operations Notification
PWA	Pipeline Works Authorisation
REWS	Radar Early Warning System (https://ascoworld.com/services/vessel-monitoring-and-collision-management)
SEPA	Scottish Environment Protection Agency
Sevan Hummingbird	New name for “Hummingbird Spirit” referred to in the Chestnut Phase 1 DP [2]

1. INTRODUCTION

1.1 Overview

This document is the close out report for the combined Decommissioning Programmes for the departure of the Sevan Hummingbird[1] floating production storage and offloading vessel, and for the removal of the associated riser systems. One for each set of notices under Section 29 of the Petroleum Act 1998.

Key elements of the Decommissioning Programmes are summarised as follows:

- Departure of the Sevan Hummingbird FPSO and recovery of the mooring lines and suction anchors;
- Removal of the three associated pipelines, PL2421 (part), PL2422 (part) and PLU2423.

The DP underwent Statutory Consultation between 31 August 2021 and 30 September 2021, and were approved by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) 30 March 2022.

The DP explains the principles of the removal activities and are supported by an examination of the key environmental impacts. The close out report marks the formal close out submission to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

The pipelines and umbilicals were flushed, cleaned and disconnected between April and June 2022. The three risers were removed between 28 November and 02 December 2022. The FPSO mooring lines were severed from the suction anchors and recovered between 24 June and 09 July 2022. The suction anchors were removed between 28 September and 08 October 2022.

The rest of the infrastructure associated with the Chestnut field was not being decommissioned at this time and remained available for reuse, although a recent appraisal had not revealed any new development opportunities. Decommissioning of the wells and remaining infrastructure will occur between 2023 and 2028. The timescales involved have not prejudiced decommissioning solutions for the remaining infrastructure. The Decommissioning Programmes for the rest of the Chestnut infrastructure were approved by OPRED for and on behalf of the Secretary of State on 07 June 2023.

1.2 Chestnut Field

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.

Cessation of Production for the Chestnut field was accepted by the North Sea Transition Authority

[1] Previously referred to as Hummingbird Spirit.

(NSTA) on 29 November 2021 and Cessation of Production took place on 31 March 2022.

1.3 Safety measures for interim period between decommissioning phases

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. Therefore, post-decommissioning surveys were limited to 'as-left' surveys inside the FPSO 500m zone.

Once the FPSO has sailed away, as a safety consideration to other users of the sea, an existing Radar Early Warning System (REWS) based on the Andrew platform ~7 nautical miles away and monitored from an onshore control room (Asco marine control centre) was used to monitor maritime traffic until such time as the subsea decommissioning works both within and outside the immediate 500m safety zone area had been completed.

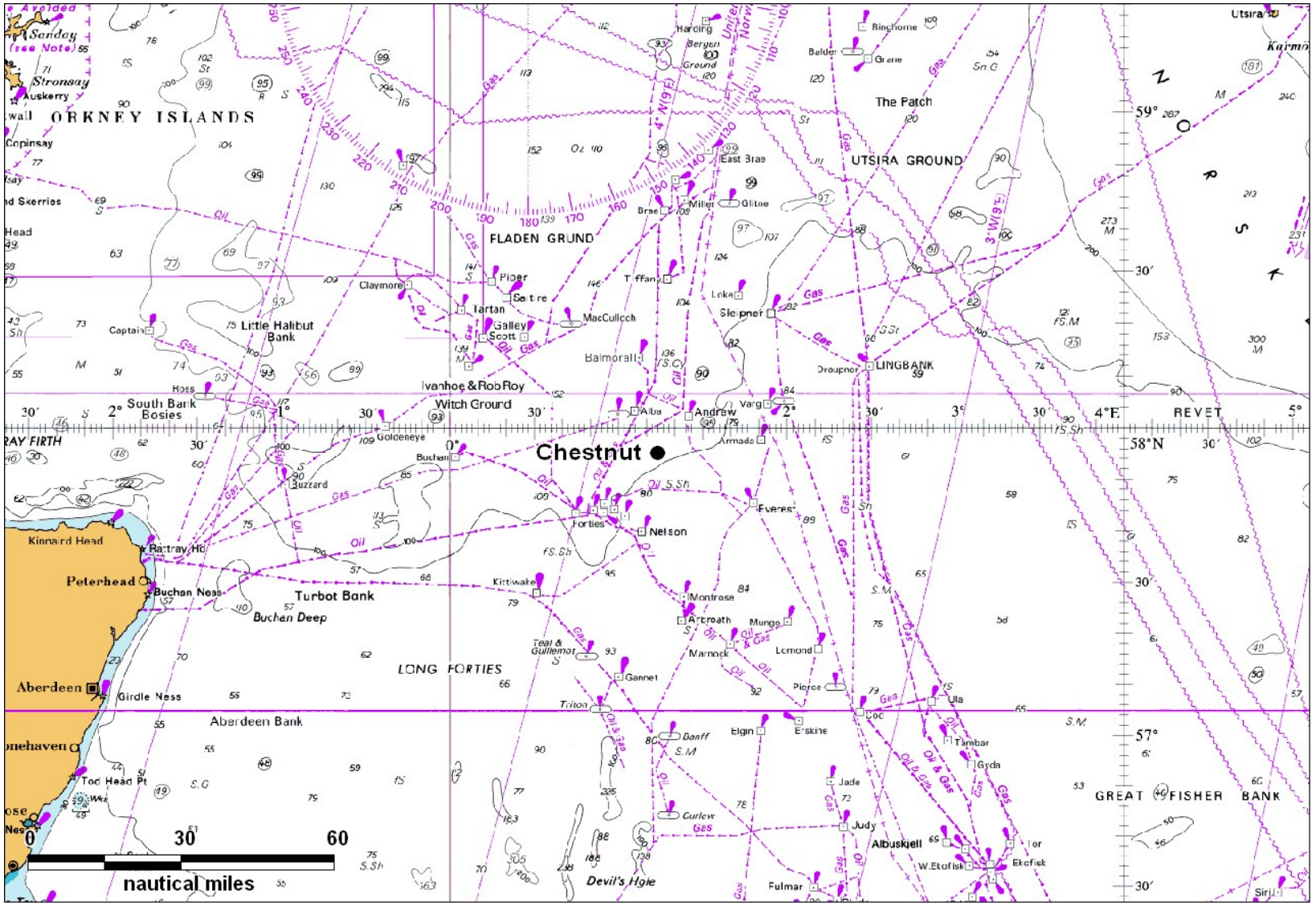


Figure 1.3.1: Field location in UKCS

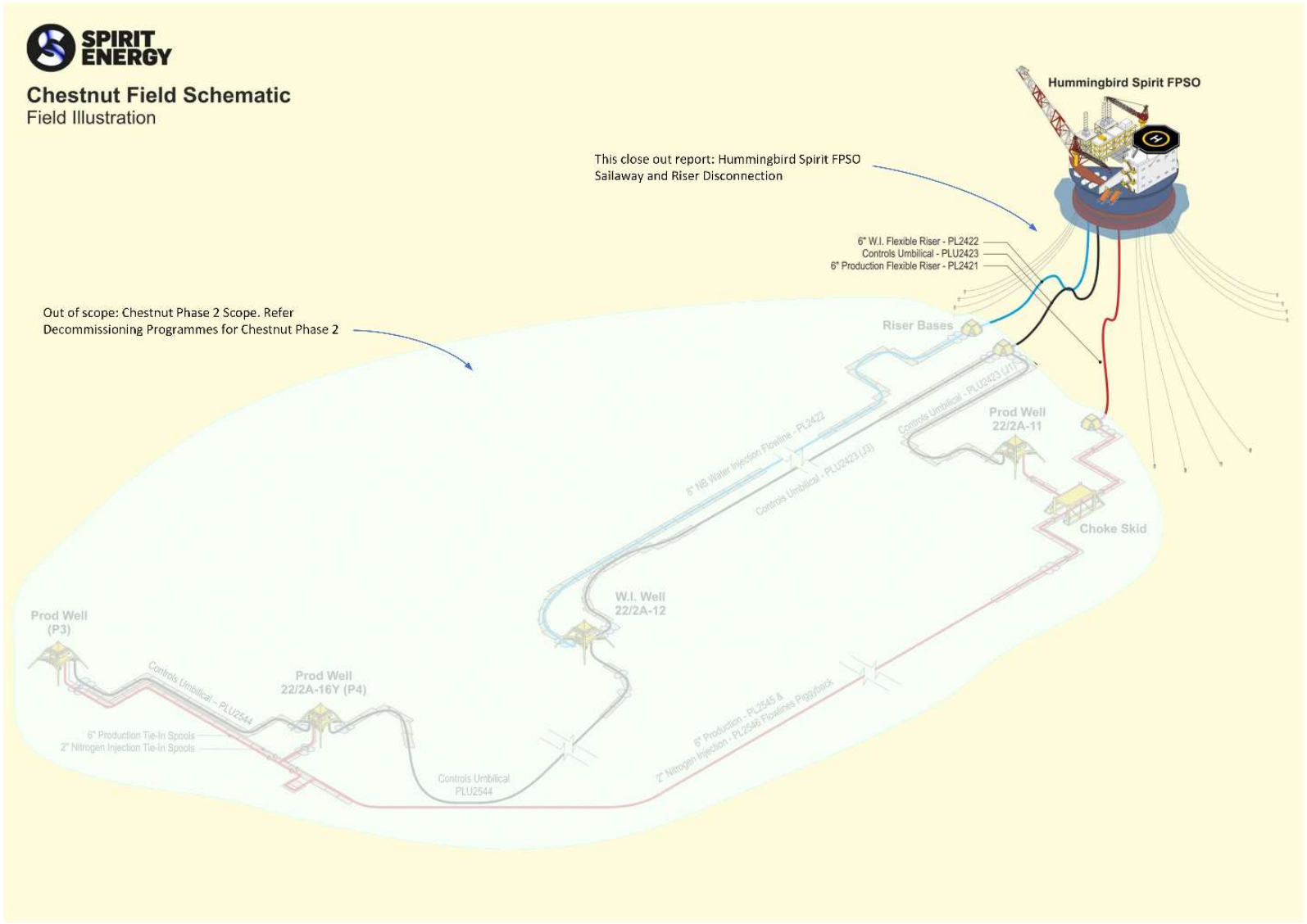


Figure 1.3.2: Scope of Decommissioning Programmes

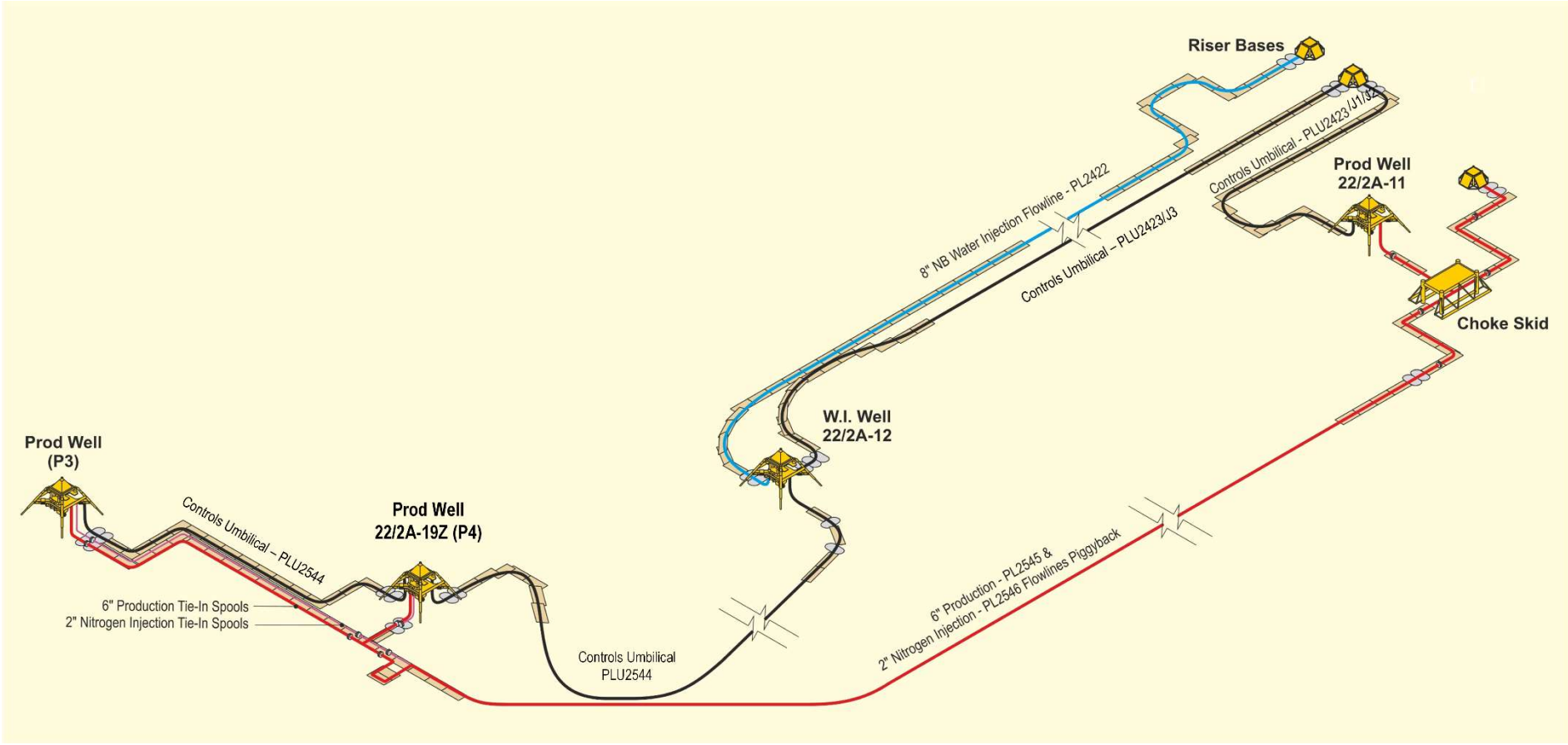


Figure 1.3.3: Hummingbird Spirit FPSO after sailaway

2. DECOMMISSIONING PROGRAMMES

The Decommissioning Programmes underwent Statutory Consultation between 31 August 2021 and 30 September 2021, and were approved by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) 30 March 2022.

Key elements of the Decommissioning Programmes are summarised below:

- Departure of the Sevan Hummingbird FPSO and recovery of the mooring lines and suction anchors;
- Removal of the three associated pipelines, PL2421 (part), PL2422 (part) and PLU2423.

The rest of the infrastructure associated with the Chestnut field was not being decommissioned at this time and remained available for reuse, although a recent appraisal had 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.

2.1 Overview of assets being decommissioned

2.1.1 Installations

A summary of the scope is presented in Table 2.3.1 below.

Table 2.1.1: Installations being decommissioned

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**	**Drill Cuttings**
n/a	n/a	n/a	4	n/a

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].

2.1.2 Pipelines

Table 2.1.2: Pipelines being decommissioned

Pipeline ID	Diameter (NB)	Length (m)	Status/Other
PL2421 (7)	6in	311	Removed except for a small section connected to the riser base
PL2422 (1)	6in	311	Removed except for a small section connected to the riser base
PLU2423	153mm	240	Removed except for a small section connected to the riser base

NOTES

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

2.2 Wells

Table 2.2.1: 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

NOTES

1. The status of the well(s) is that stated in the Decommissioning Programmes(s). This may have changed as a result of well decommissioning activities associated with phase 2 of the decommissioning works.
2. For details of well categorisation please refer the latest version of the Oil & Gas UK Guidelines for the Decommissioning of Wells;
3. Following departure of the FPSO, wells were monitored in line with Spirit's Well Integrity Management system and response arrangements in the event of a risk of pollution agreed with OPRED and detailed within the approved field OPEP.

2.3 Decommissioning summary

Table 2.3.1: Summary of Decommissioning Programmes	
Asset	**Approved decommissioning option**
Sevan Hummingbird FPSO	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.
Mooring lines and suction anchors	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.
Pipelines (risers)	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 (**PL2421, PL2422, PLU2423)** 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 *in situ* for decommissioning sometime in the future as part of the Phase 2 works.
Wells	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.
Drill cuttings	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

2.4 Gantt Chart

Activity/Milestone	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pipeline & umbilical flushing *Pipeline & umbilical flushing, April 2022 (as-built)*																				
Cessation of Production window *Cessation of Production 31 March 2022 (as-built)*																				
Decommissioning Programmes (approved 30 March 2021) *Decommissioning Programmes approved 30 March 2022 (as-built)*																				
Disconnect FPSO incl. risers & umbilical *Disconnect FPSO incl. risers & umbilical, July 2022 (as-built)*																				
Sevan Hummingbird sailaway *Sevan Hummingbird sailaway, July 2022 (as-built)*																				
Recover risers & umbilical *Recover risers & umbilical, end Nov/early Dec 2022 (as-built)*																				
Recover suction anchors & mooring lines *Recover suction anchors & mooring lines, end Sept/early Oct 2022 (as-built)*																				
Onshore disposal activities *Onshore disposal activities, July 2022 through July 2023 (as-built)*																				
Post Sailaway debris survey & close out report *Post Sailaway debris survey (June 2022 through Dec 2022) & close out report (Q1 2024)*																				
Deployment of guard vessel or other acceptable mitigation *Use of existing vesel monitoring system supported by ERRV, July 2022 onwards (as-built)*																				

Figure 2.4.1: Gantt Chart of original c/w 'as-built' project plan

2.5 Associated Decommissioning Approvals

Table 2.5.1: Associated Decommissioning Approvals			
Activity	**Document**	**Approval**	**Completion Date**
Disconnection and removal of risers (PL2421 (311m), PL2422 (311m) and PLU2423 (240m)	Pipeline Works Authorisations: 1/V/22 (Cat 2 Var) 234/V/22 (Cat 2 Var) 366/V/22 (Decommissioning) 2/V/23 (Cat 2 Var)	Authorised by NSTA 12 Jan 2022 23 June 2022 25 Oct 2022 06 Jan 2023	September 2022
NOTE 1. Approved by OPRED for and on behalf of the Secretary of State.			

2.6 Amendments to & deviations from the DP

No formal amendments were made to the approved Decommissioning Programmes, but one deviation in the form of a deferral was made as a result of operational difficulties in the field.

Table 2.6.1: Amendments to & deviations from the DP		
Description of deviation	**Reference in DP**	**Reason for deviation request**
HB-01-2015 NM Section of grating missing from offload reel platform. On the 19 January 2016, a technician was carrying out lighting inspection of the Starboard Offload Reel. The technician ascended the access ladder to the upper platform of the offload reel. On gaining access the technician conducted his checks on the light fitting, when he moved across the platform, he noticed that a single section of grating was missing from the end of the platform. A PON2 was submitted 22 January 2016.	Due to an oversight, this was not recorded in the Decommissioning Programmes [2] and will be dealt with as part of the Phase 2 works and recorded in the Close Out Report for the Decommissioning Programmes for Phase 2 [3].	Operational efficiency
A 30m section of PL2421 (production riser) and a short stub (~6.5m high) on the riser base have been left on the seabed for recovery as part of Chestnut Phase 2 decommissioning operations. Refer footnote at bottom of table.	Section 2.3, Table 2.3.1.	Operational efficiency
A 30m section of PL2422 (water injection riser) and a short stub (~6.5m high) on the riser base have been left on the seabed for recovery as part of Chestnut Phase 2 decommissioning operations. Refer footnote at bottom of table.	Section 2.3, Table 2.3.1.	Operational efficiency
A 30m section of PLU2423 (umbilical riser) and a short stub (~6m high) on the riser base have been left on the seabed for recovery as part of Chestnut Phase 2 decommissioning operations. Refer footnote at bottom of table.	Section 2.3, Table 2.3.1.	Operational efficiency
NOTE: Leaving the 30m sections of the risers for PL2421, PL2422, PLU2423 on the seabed for recovery as part of phase 2 was discussed and agreed with OPRED 08 November 2023.		

3. DECOMMISSIONING ACTIVITIES

3.1 Contracts awarded

Table 3.1.1: Contracts awarded		
Activity	**Award date**	**Contractor**
FPSO Drain, Flush, Purge, & Vent (DFPV via existing contract)	20 Dec 2021	IKM
FPSO cleaning (via existing contract)	20 Dec 2021	Stork
Mooring line disconnection, removal and recovery and suction anchor removal and recovery	Q2 2022	DOF Subsea Norway
Riser disconnection & removal	10 Dec 2021	Deepocean Group
NOTE: Riser removal works were conducted as part of a wider campaign of work with 'A Fields' and 'Ensign'.		

3.2 Platform operations

Table 3.2.1: Platform operations	
Activity	**Period of activity**
Cleaning of cargo oil (6x) and slops tanks (2x)	April - June 2022
Cleaning of separators (2x), produced water degasser (1x), open drains tank (1x), closed drains tank (1x), flare knock out drum (1x), deaerator tower (1x), hydrocyclone (1x), produced water filters (2x), fuel gas scrubber (1x)	April - June 2022
Cleaning of process system pipework	April - June 2022
Removal of bulk NORM solids and sand	April - June 2022
Recovery of wave rider buoy	June 2022
FPSO Disconnection & recovery of mooring lines (12x)	24 June to 09 July 2022
FPSO Recovery of suction anchors (12x)	28 Sept – 08 Oct 2022
Recovery of wave rider buoy clump weights	06 Oct to 07 Oct 2022
FPSO sail away	July 2022

3.3 Well Decommissioning

Table 3.3.1: Well Information			
Well ID	**Designation**	**Status**	**Category of well**
22/2a-11X	Oil production	Shut-in	SS-3-4-3
22/2a-12	Water Injection	Decommissioned, AB1	SS-0-0-0
22/2a-19Z	Oil production	Decommissioned, AB1	SS-3-4-3
22/2a-17	Water Injection (side-tracked from 22/2a-12)	Shut-in	SS-3-4-3
22/2a-18	Oil production	Shut-in	SS-3-4-3
NOTES 1. For details of well categorisation please refer the latest version of the OEUK Guidelines for the Decommissioning of Wells. 2. The well status quoted here is as per the Decommissioning Programmes for Phase 2 [3]. 3. In preparation for departure of the FPSO wells will be shut-in until they are decommissioned. Following removal of the FPSO, wells were monitored in line with Spirit's Well Integrity Management system and response			

Table 3.3.1: Well Information
arrangements in the event of a risk of pollution were agreed with OPRED and detailed within the approved field OPEP. The wells will be decommissioned as part of the Phase 2 decommissioning activities.

3.4 Risers, pipelines, umbilicals & jumpers

Table 3.4.1: Risers, pipelines, umbilicals & jumpers		
ID	**Activity**	**Period of activity**
PL2421	Cleaning	April 2022
PL2422	Cleaning	April 2022
PLU2423	Cleaning	April 2022
PL2421 riser	Disconnection from FPSO	July 2022
PL2422 riser	Disconnection from FPSO	July 2022
PLU2423 riser	Disconnection from FPSO	July 2022
PL2421 riser	Removal	28 Nov to 02 Dec 2022
PL2422 riser	Removal	28 Nov to 02 Dec 2022
PLU2423 riser	Removal	28 Nov to 02 Dec 2022

3.5 Post decommissioning survey results

Table 3.5.1: Post decommissioning survey results		
Activity	**Result**	**Period of activity**
Mooring line debris survey	Clear seabed	27 June to 09 July 2022
Suction anchor debris survey	Clear seabed	04 Oct to 08 Oct 2022
Riser base debris survey	Riser base remains *in situ*	28 Nov to 02 Dec 2022
Environmental Survey	n/a	n/a

NOTES:

1. Riser bases remains *in situ* until removal as part of Chestnut Phase 2 [2]
2. Environmental survey will be conducted at the end of Chestnut Phase 2 operations [2].
3. A fishing net was recovered at suction anchor 4. Ref Figure 8.3.1.
4. A trawl sweep will be conducted on completion of the Phase 2 decommissioning activities. Meantime an existing vessel monitoring system deployed from the Andrew platform is being used as a warning system for vessels in the area.

3.6 Key milestones

Table 3.6.1: Key milestones	
Activity	**Completion date**
Topsides DPFV	June 2022
Flushing and cleaning of pipelines	April 2022
Disconnection of mooring lines	June 2022
Disconnection of risers	July 2022
FPSO sailaway	July 2022
The cleaning of topsides, the evacuation of hydrocarbons from pipelines, the disconnection of mooring lines and risers all needed to be conducted before the Sevan Hummingbird FPSO could depart the location.	

3.7 Stakeholder Engagement

Spirit Energy consulted with SFF in a meeting on 21 May 2021. SFF had no adverse comments to make concerning the phase 1 decommissioning works.

SFF noted that they 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.

SFF advised that they would be inclined not to favour use of cardinal buoys as markers as these are not always visible especially in inclement seas, can break free and SFF consider them to be surface hazards. SFF have expressed their concerns to Marine Contractor Association.

4. ENVIRONMENTAL & SAFETY IMPACT

4.1 Details of incidents or accidents during project execution

No environmental incidents were recorded for Chestnut Phase 1 decommissioning activities.

One non-work-related safety incident was recorded whereby an injured party slipped in the shower area in his cabin.

4.2 Future monitoring

No future monitoring activities are required following departure of the Sevan Hummingbird FPSO and the disconnection and removal of the risers.

5. WASTE MANAGEMENT

5.1 Commitments

Waste was to be dealt with in accordance with the Waste Framework Directive. The reuse of an installation or pipelines - or parts thereof, is first in the order of preferred decommissioning options. Steel and other recyclable metal are estimated to account for the greatest proportion of the materials inventory. The estimated mass of material to be returned to shore and aspirations for the disposal of waste were described in the decommissioning programmes (Table 5.1.1 and Table 5.1.2).

Table 5.1.1: Inventory disposition			
Inventory	**Total inventory (Te)**	**Planned tonnage to shore (Te)**	**Planned left *in situ* (Te)**
Sevan Hummingbird c/w mooring system	31,716	31,716	-
Flowline & umbilical risers	54.3	54.3	-

Table 5.1.2: Re-use, recycle & disposal aspirations for recovered material			
Inventory	**Re-use**	**Recycle**	**Disposal (e.g., Landfill)**
Sevan Hummingbird	>95%	<5%	<5%
Flowline & Umbilical Risers incl. Appurtenances	<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 5.1.2 were aspirational.

The Sevan Hummingbird vessel was sold for re-use with the intention of the vessel being redeployed.

5.2 Performance

The waste authorities such as SEPA were informed as part of the notifications process. The Hummingbird Spirit's mooring lines and suction anchors were fully recovered with the majority of material being reused, as indicated in Table 5.2.1.

Table 5.2.1: Summary of waste management performance for mooring system(s)					
Description	**Mass (Te)**	**Location, Date**	**Reused (Te)**	**Recycled (Te)**	**Recycled as Energy (Te)**
MOORING LINES AND SUCTION ANCHORS					
Mooring lines	2,570.3	Montrose 10 Jul 2022	2,225	13.8	346.0
Suction anchors	1,454.4	Peterhead 10 Oct 2022	1,440	-	-
Wave Rider Buoy anchor weights	2.7	Montrose 10 Jul 2022	-	2.7	-
SUB-TOTAL:	**4,027.4**		**3665.0**	**16.5**	**346.0**

The performance of the waste management aspects for the risers was that in overall terms little of the material returned to shore were disposed of to landfill, and this was limited to part of the bend restrictor material recovered from inside the risers. The buoyancy modules were recycled as energy. As indicated in Table 5.2.2, most of the pipeline related material was recycled.

Table 5.2.2: Summary of waste management performance for risers

Description	Mass (Te)	Location, Date	Reused (Te)	Recycled (Te)	Recycled as Energy (Te)	Landfill (Te)
RISERS (OR PARTS THEREOF)						
Risers	70.2	Port of Blyth NE24 1SD 02-03 Dec 2022	-	38.3	30.9	1.0
TOTAL:	**70.2**		**-**	**38.3**	**30.9**	**1.0**

The management of waste for the above were dealt with by the companies listed in Table 5.2.3:

Table 5.2.3: SEPA permit numbers for waste management

Company	Address	SEPA Permit Number
K2 Polymers,	Riverside Business Park, Amec Drive, Wallsend, NE28 6UA,	WEX254204
Suez Recycling & Recovery UK Ltd	Ellington Road, Ashington, NE63 9XS	DP3238SB
NWH Waste Services Ltd	1 Cowen Road, Blaydon on Tyne, Gateshead, NE21 5TW	EPR/KB3301TN/T001
Enviro-clean Scotland Ltd	Shotts facility, Springhill Road, Shotts, ML7 5HH	WML/L/1018933

6. LESSONS LEARNED

6.1 Lessons learned

Table 6.1.1: Lessons learned		
Lesson	**Root cause**	**Positive or negative?**
Operational resilience. Ensure contingency plans are fully developed for high-risk operations to allow quick change to contingency options i.e. slops injection to tanker offload.	Slops injection could not be completed, tanker contingency was fully developed which all quick change of direction which caused now delays	Positive
Collaboration and Integration. Use of integrated plan between all parties to ensure priorities are fully understood.	Integrated plan developed and continuality reviewed and progressed during the operations	Positive
Utilization of key asset personnel to become focal points onboard the asset for all Decommissioning scope of work.	Lesson from previous Teekay project	Positive
Development of Client Rep onboarding process updates to roles and responsibilities and process development.	Feedback during the process	Positive
Relationships. Asset, wells, commercial/legal, assurance and projects teams all aligned on objectives of phase 1 with each department aggregating their core competences to the benefit of the overall project.	Effective operating rhythm, steering group support and individuals' personal commitment	Positive

7. COST SUMMARY

Costs provided separately to OPRED in confidence.

8. PHOTOGRAPHS

8.1 Sevan Hummingbird FPSO

Figure 8.1.1: Sevan Hummingbird FPSO

Figure 8.1.2: Suction anchor recovery to vessel

Figure 8.1.3: Sevan Hummingbird FPSO 12x suction anchors

8.2 Wave rider buoy clump weight

Figure 8.2.1: Wave rider buoy clump weight #3 being recovered

8.3 Suction anchor 4 – fishing net

Figure 8.3.1: Suction Anchor 4 – Fishing Net

Figure 8.3.2: Typical rigging arrangement for product recovery

Figure 8.3.3: Typical hold-down rigging arrangement before product recovery

8.4 PL2421 production riser cut end

Figure 2: Production riser cut end

Figure 8.4.1: PL2421 production riser cut end before recovery

8.5 PL2422 water injection riser cut end

Figure 8: Water injection riser cut end

Figure 8.5.1: PLU2423 water injection riser cut end before recovery

8.6 PLU2423 control umbilical riser cut end

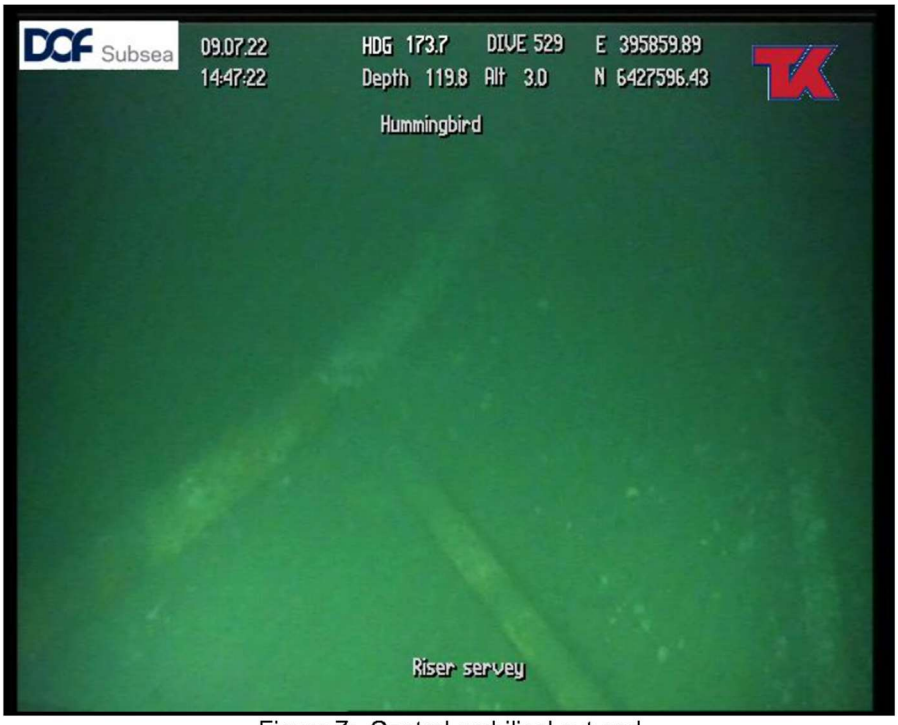


Figure 7: Control umbilical cut end

Figure 8.6.1: PLU2423 umbilical riser cut end before recovery

8.7 Equipment used for removal of flexible risers

Figure 8.7.1: UTROV™ & shear cutter (left), CRT200 pipe clamp (right)

Figure 8.7.2: Chinese finger used to recover flexible risers

Figure 8.7.3: Product spooling (left) & storage on drum (right)

Figure 8.7.4: AHTS / LCV deck layout

8.8 Recovery of risers to deck

Figure 8.8.1: Buoyancy modules on deck following recovery

Figure 8.8.2: Riser rand buoyancy module recovery

Figure 8.8.3: Riser recovery, drum

Figure 8.8.4: Riser recovery, tails

8.9 Recovery to shore, offloading

Figure 8.9.1: Riser offloading, quayside set-up I

Figure 8.9.2: Riser offloading, quayside set up II

Figure 8.9.3: Riser offloading, towing tractor

Figure 8.9.4: Riser offloading, quayside at AHTS/LCV

9. SUPPORTING DOCUMENTS

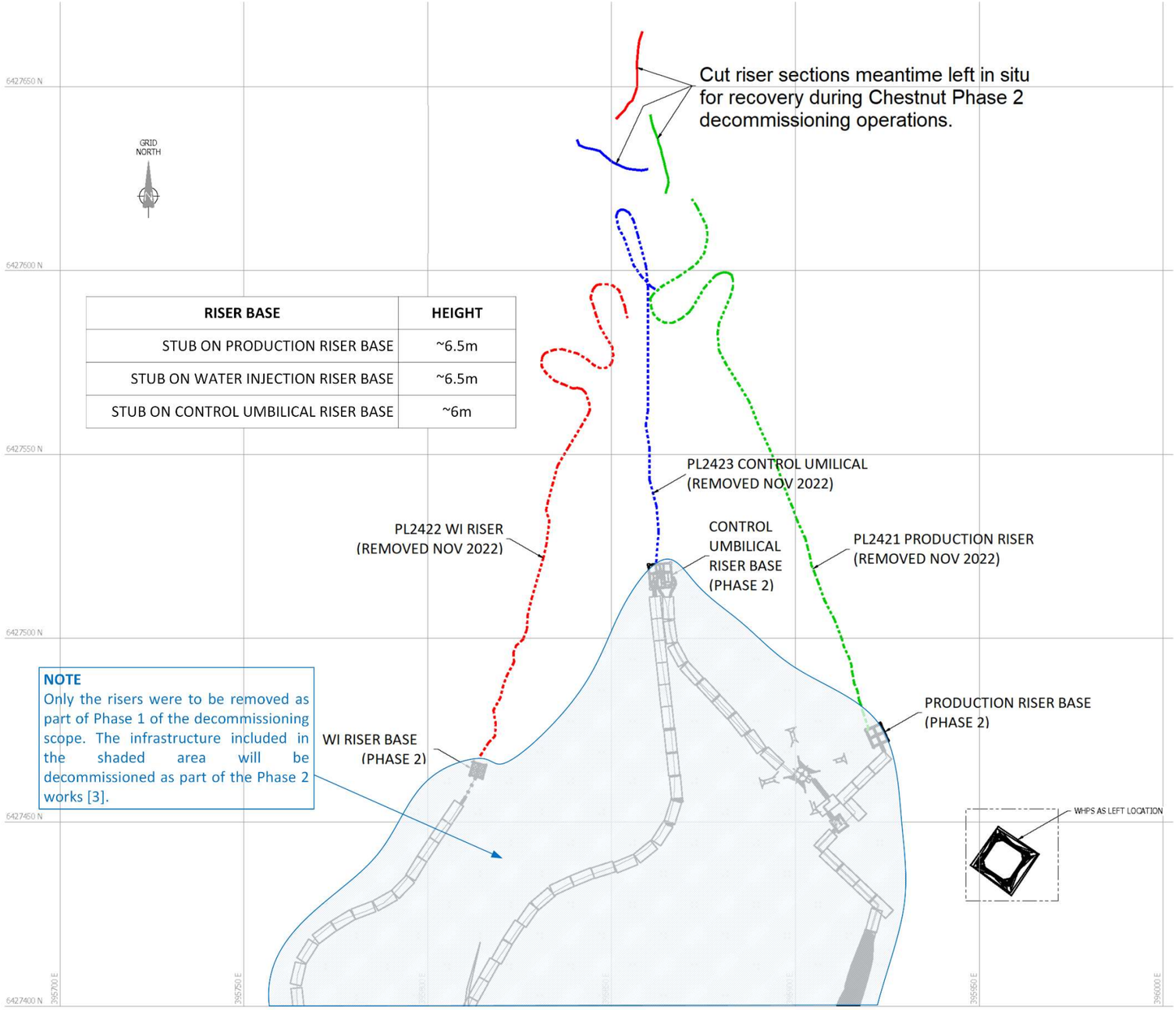
[1] OPRED (2018) Offshore Oil and Gas Decommissioning Guidance Notes. Weblink last accessed 27 Jan 2020: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf

[2] SENSOL (2022) Combined Decommissioning Programmes for Hummingbird Spirit Sailaway and Chestnut Riser Disconnection, CHESDC-SPT-J-0000-REP-0001. Chestnut Phase 1.pdf

[3] SENSOL (2023) Decommissioning Programmes for Chestnut Field Phase 2, CHESDC-SPT-Z-0000-PRG-0002

APPENDIX A RISER SECTIONS MEANTIME LEFT ON SEABED

Appendix A.1 PL2421, PL2422 & PLU2423 Meantime left i*n situ*



RISER BASE	HEIGHT
STUB ON PRODUCTION RISER BASE	~6.5m
STUB ON WATER INJECTION RISER BASE	~6.5m
STUB ON CONTROL UMBILICAL RISER BASE	~6m

Figure A.1.1: PL2421, PL2422 & PLU2423 riser sections meantime left *in situ*