

# **Markham ST-1 Decommissioning Programmes**



**Final Version – 31 January 2018**

## DOCUMENT CONTROL

<b>Document ID:</b>		CEU-DCM-GMA0025-REP-0010	
<b>Document Classification:</b>		PUBLIC	
<b>Document Ownership:</b>		Decommissioning	
<b>Date of Document:</b>	31/01/18	<b>Signature</b>	<b>Date</b>
<b>Prepared by:</b>	S. Axon	<i>S. Axon</i>	31/1/18
<b>Reviewed by:</b>	S. Mackenzie	<i>S. Mackenzie</i>	31/1/18
<b>Approved by:</b>	F. Weir	<i>F. Weir</i>	31/1/18

## REVISION RECORD

Revision No.	Date of Revision	Changes / Comments	Reason for Issue
A1-A3	Previous issue record available on request		
A4	04/07/16	Partner & further OPRED comments incorporated	Issued for statutory consultation
A5	30/09/16	Minor updates; stakeholder feedback	Issued to OPRED for final review
A6	02/11/17	Updated to 'Draft' Version	Draft
C1	31/01/18	Branding updated	FINAL VERSION

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<b>TABLE OF CONTENTS</b>		<b>INST</b>	<b>P/L</b>
<b>1.</b>	<b>EXECUTIVE SUMMARY..... 7</b>	√	√
1.1	Combined Decommissioning Programmes..... 7	√	√
1.2	Requirement for Decommissioning Programmes..... 7	√	√
1.3	Introduction..... 7	√	√
1.4	Overview of Installation/Pipelines Being Decommissioned..... 8	√	√
1.5	Summary of Proposed Decommissioning Programmes..... 9	√	√
1.6	Field Location including Field Layout and Adjacent Facilities..... 11	√	√
1.7	Industrial Implications..... 14	√	√
<b>2.</b>	<b>DESCRIPTION OF ITEMS TO BE DECOMMISSIONED ..... 15</b>	√	√
2.1	Installation: Surface Facilities..... 15	√	
2.2	Installations: Subsea including Stabilisation Features..... 15		
2.3	Pipelines including stabilisation features..... 16		√
2.4	Wells..... 20	√	
2.5	Drill Cuttings..... 20	√	
2.6	Inventory Estimates..... 20	√	√
<b>3.</b>	<b>REMOVAL AND DISPOSAL METHODS ..... 21</b>	√	√
3.1	Topsides..... 21	√	
3.2	Jacket..... 23	√	
3.3	Subsea Installation(s) and Stabilisation Feature(s)..... 25		
3.4	Pipelines..... 26		√
3.5	Pipeline Stabilisation Features..... 27		√
3.6	Wells..... 27	√	
3.7	Drill Cuttings..... 27	√	
3.8	Waste Streams..... 28	√	√
<b>4.</b>	<b>ENVIRONMENTAL IMPACT ASSESSMENT ..... 30</b>	√	√
4.1	Environmental Sensitivities..... 30	√	√
4.2	Potential Environmental Impacts and their Management..... 32	√	√
<b>5.</b>	<b>INTERESTED PARTY CONSULTATIONS ..... 36</b>	√	√
5.1	General..... 36	√	√
<b>6.</b>	<b>PROGRAMME MANAGEMENT ..... 37</b>	√	√
6.1	Project Management and Verification..... 37	√	√
6.2	Post-Decommissioning Debris Clearance and Verification..... 37	√	√
6.3	Schedule..... 37	√	√
6.4	Costs..... 38	√	√
6.5	Close Out..... 38	√	√
6.6	Post-Decommissioning Monitoring and Evaluation..... 38	√	√
<b>7.</b>	<b>SUPPORTING DOCUMENTS..... 39</b>	√	√
<b>8.</b>	<b>PARTNER LETTERS OF SUPPORT ..... 40</b>		

## FIGURES AND TABLES

Figure 1.6.1: Markham Field Location in UKCS .....	11
Figure 1.6.2: Markham & Windermere Field Layout.....	11
Figure 1.6.3: ST-1 installation & pipelines prior to decommissioning .....	12
Figure 1.6.4: Markham & ST-1 Adjacent Facilities .....	13
Figure 2.3.1: Sketch showing ST-1 pipeline disconnections & stabilisation features.....	19
Figure 2.6.1: Pie chart of estimated inventories (Installations) .....	20
Figure 2.6.2: Pie chart of estimated inventory (Pipelines) .....	21
Figure 3.1.1: Schematic of ST-1 topsides looking south .....	22
Figure 3.2.1: Jacket Elevations.....	24
Figure 6.3.1: Gantt Chart of Project Plan .....	38
Figure 6.6.1: Burial profile of ST-1 pipelines.....	41

Table 1.4.1: Installation Being Decommissioned .....	8
Table 1.4.2: Installation Section 29 Notice Holders Details.....	8
Table 1.4.3: Pipelines Being Decommissioned.....	9
Table 1.4.4: Pipelines Section 29 Notice Holders Details .....	9
Table 1.5.1: Summary of Decommissioning Programmes .....	9
Table 1.6.1: Adjacent Facilities.....	12
Table 2.1.1: Surface Facilities Information.....	15
Table 2.2.1: Installations: Subsea including Stabilisation Features.....	15
Table 2.3.1: Flowline/Pipeline/Umbilical Information .....	16
Table 2.3.2: Subsea Pipeline Stabilisation Features.....	18
Table 2.4.1: Well Information.....	20
Table 2.5.1: Drill Cuttings Pile Information.....	20
Table 3.1.1: Cleaning of topsides for removal.....	23
Table 3.1.2: Topside Removal Methods .....	23
Table 3.2.1: Jacket Decommissioning Methods.....	25
Table 3.3.1: Subsea Installation(s) and Stabilisation Feature(s) .....	25
Table 3.4.1: Pipeline or Pipeline Groups Decommissioning Options.....	26
Table 3.4.2: Outcomes of Comparative Assessment .....	26
Table 3.5.1: Pipeline Stabilisation Features.....	27
Table 3.6.1: Well Plug and Abandonment .....	27
Table 3.8.1: Waste Stream Management Methods.....	28
Table 3.8.2: Inventory Disposition .....	28
Table 3.8.3: Reuse, Recycle & Disposal Aspirations for Recovered Material.....	29
Table 4.1.1: Environmental Sensitivities [Reference [1] in Table 6.6.1].....	30
Table 4.2.1: Environmental Impact Management [Reference [1] in Table 6.6.1] .....	32
Table 5.1.1: Summary of Stakeholder Comments .....	36
Table 6.4.1: Provisional Decommissioning Programmes Costs .....	38
Table 6.6.1: Supporting Documents .....	39

## TABLE OF APPENDICES

APPENDIX	DESCRIPTION	PAGE
A	Pipeline burial profiles	41
B	Public Notice & Consultee Correspondence	42

## **TERMS AND ABBREVIATIONS**

<b>ABBREVIATION</b>	<b>EXPLANATION</b>
Centrica <a href="http://www.centrica.com">www.centrica.com</a>	Spirit-Energy <a href="http://www.spirit-energy.com">www.spirit-energy.com</a>
Centrica North Sea Gas Limited	Spirit Energy North Sea Gas Limited
CTP	Compression Tower Platform (adjoining J6A)
DCA	Decommissioning Operations
DCCN	Dutch Chamber of Commerce Number
DSV	Diving Support Vessel
EALs	Environment Acceptance Levels
EL	Elevation (relative to Lowest Astronomical Tide)
ESDV	Emergency Shutdown Valve
HSE	Health and Safety Executive
"	Inch; 25.4millimetres
ICES	International Council for the Exploration of the Sea
Ineos	Ineos UK SNS Limited
J6A	Markham J6A Platform
JNCC	Joint Nature Conservation Committee
JUWB	Jack Up Work Barge
km	Kilometre
LAT	Lowest Astronomical Tide
LSA	Low Specific Activity
MAT, SAT	Master Application Template, Supplementary Application Template
MCV	Monohull Crane Vessel
N,S,E,W	North, South, East, West
n/a	Not Applicable
NFFO	National Federation of Fishermen's Organisations
NL	Netherlands
NLCS, UKCS	Netherlands Continental Shelf, United Kingdom Continental Shelf
NORM	Naturally Occurring Radioactive Material
NUI	Normally Unattended Installation
Ø (Figure 3.2.1)	Diameter 1250Ø25-40 - 1250mm diameter with a wall thickness range between 25-40mm
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo-Paris Convention
Piggybacked	The 2" pipeline is adjacent and clamped to the 12" pipeline throughout its length

ABBREVIATION	EXPLANATION
Platform	Installation comprising topsides and jacket
PL, PLU	Pipeline Identification Numbers (UK)
PLA	Pipeline Operations as defined in MAT Operation Types
PON	Petroleum Operations Notice
PWA	Pipeline Works Authorisation (Approved by DTi & SSM 30 March 1994)
rMCZ	Recommended Marine Conservation Zone
SAC	Special Area of Conservation
SCI	Sites of Scientific Importance
SFF	Scottish Fisherman's Federation
SLV	Shear Leg Vessel
Spirit Energy	In November 2017 Centrica Exploration and Production and Bayerngas formed a Joint Venture called Spirit Energy
SSCV	Semi-Submersible Crane Vessel
SSM	State Supervision of Mines
ST-1	Markham ST-1 Platform
TOP	Top of Plate
TOS	Top of Steel
TYP	Typical (i.e. Dimensions typical for similar structural members)
UK	United Kingdom
WGS84	World Geodetic System 1984
WHPS	Wellhead Protection Structure

## **1. EXECUTIVE SUMMARY**

### **1.1 Combined Decommissioning Programmes**

This document contains two Decommissioning Programmes, one for each set of notices under Section 29 of the Petroleum Act 1998. The Decommissioning Programmes are:

- The Markham ST-1 installation (a steel jacket and topsides structure); and,
- The associated two pipelines.

Although decommissioning of the ST-1 installation and pipelines is being treated as a standalone project we will continue to explore cost saving synergies with other projects.

### **1.2 Requirement for Decommissioning Programmes**

**Installation:** In accordance with the Petroleum Act 1998, Spirit Energy Nederland B.V. (Spirit Energy) as operator of the Markham field, and on behalf of the Section 29 notice holders (see Table 1.4.2), is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installation detailed in Section 2 of this document.

**Pipelines:** In accordance with the Petroleum Act 1998, Spirit Energy Nederland B.V. as operator of the ST-1 pipelines, and on behalf of the Section 29 notice holders (see Table 1.4.4), is applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2 of this document.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and OPRED guidance notes. The schedule outlined in this document is for a two to three year period due to begin in 2018. See also Section 8 – partner letters of support.

### **1.3 Introduction**

The Markham field was discovered in 1984 and extends over license blocks 49/5a and 49/10b on the UK Continental Shelf and license blocks J3b and J6 on the Netherlands Continental Shelf. ST-1 comprises six wells and a single installation connected via two pipelines (12" and piggybacked 2" nominal bore) to the Markham J6A installation on the Dutch sector 5.6km (measured via pipeline length, 5km as the crow flies) from the ST-1 installation. The pipelines cross the median line into the Dutch sector and are covered by the Markham Treaty. Therefore, Spirit Energy is also liaising with the State Supervision of Mines and the Ministry of Economic Affairs in Netherlands. A cessation of production justification was submitted on 22 April 2016.

The ST-1 installation and pipelines as well as the J6A installation are owned by the Markham partners. ST-1 was installed in 1994 and is a normally unattended installation (NUI) supported by a four leg steel jacket in a water depth of 31m. Primary control is exercised from J6A. The decommissioned Stamford and live Grove pipelines cross the ST-1 to J6A pipelines in the J6A 500m zone in the NL sector.

Historically the ST-1 installation also exported gas to J6A from the Windermere installation which is operated by Ineos UK SNS Limited. The Windermere installation, pipeline and umbilical will be addressed by separate Decommissioning Programmes submitted independently by Ineos in due course.

Following public, stakeholder and regulatory consultation, the Decommissioning Programmes will be submitted without derogation and in full compliance with the OPRED guidance notes. The Decommissioning Programmes explain the principles of the removal activities and are supported by an environmental impact assessment. The Decommissioning Programme for the pipelines is also supported by a comparative assessment.



## 1.4 Overview of Installation/Pipelines Being Decommissioned

### 1.4.1 Installation

Table 1.4.1: Installation Being Decommissioned			
Field(s):	Markham (ST-1)	Production Type	Gas
Water Depth (m)	Approx. 31m	UKCS Block	49/5a, 49/10b
Surface Installations			
Number	Type	Topsides Weight (Te)	Jacket Weight (Te)
1	Steel jacket	1,300	888 <sup>(1)</sup>
Subsea Installation(s)		Number of Wells	
Number	Type	Platform	Subsea
n/a	n/a	6	0
Drill Cuttings pile(s)	Water Depth (m)	Distance to median	Distance from nearest UK coastline
Number of Piles	Total Estimated volume (m <sup>3</sup> )	km	km
0	n/a	2.34	160

Table 1.4.2: Installation Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	Equity Interest (%)
Spirit Energy Nederland B.V.	DCCN 34081068	10.3250
Spirit Energy North Sea Limited	04594558	27.2025
Euroil Exploration Limited	02324368	3.06511
Ineos UK SNS Limited	01021338	3.38065
Total E&P UK Limited	00811900	7.35174
Total E&P Nederland B.V.	DCCN 27075440	14.7500
Dyas B.V.	DCCN 30108055	4.4250
EBN B.V.	DCCN 14026250	29.5000
Spirit Energy North Sea Gas Limited	SC182822	0.0000

<sup>1</sup> The jacket weight excludes the weight of conductors. Including conductors this weight increases to 1,219 Te



## 1.4.2 Pipelines

**Table 1.4.3: Pipelines Being Decommissioned**

Number of Pipelines / Umbilicals	2	(See Table 2.3.1)
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**Table 1.4.4: Pipelines Section 29 Notice Holders Details**

Section 29 Notice Holder	Registration Number	Equity Interest (%)
Spirit Energy Nederland B.V.	DCCN 34081068	10.3250
Spirit Energy North Sea Limited	04594558	27.2025
Euroil Exploration Limited	02324368	3.06511
Ineos UK SNS Limited	01021338	3.38065
Total E&P UK Limited	00811900	7.35174
Total E&P Nederland B.V.	DCCN 27075440	14.7500
Dyas B.V.	DCCN 30108055	4.4250
EBN B.V.	DCCN 14026250	29.5000
Spirit Energy North Sea Gas Limited	SC182822	0.0000

## 1.5 Summary of Proposed Decommissioning Programmes

**Table 1.5.1: Summary of Decommissioning Programmes**

Selected Option	Reason for Selection	Proposed Decommissioning Solution
<b>1. Topsides</b>		
Complete removal and recycling	Allows jacket to be removed and maximises recycling of materials	The topsides will be removed and transported to shore and recycled unless alternative options are meantime found to be viable and more appropriate. Any permit applications required for work associated with removal of the topsides (DCA MAT) will be submitted.
<b>2. Jacket/Floating Facility (FPSO etc.)</b>		
Complete removal and recycling	To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials	The leg piles will be cut 2m below seabed and the jacket will be removed and transported to shore for recycling Any permit applications required for work associated with removal of the topsides (DCA MAT) will be submitted.
<b>3. Subsea Installation</b>		
n/a	n/a	n/a
<b>4. Pipelines, Flowlines &amp; Umbilicals</b>		
Pipelines will be flushed and left buried <i>in situ</i> .	Both pipelines are sufficiently buried and stable, posing no hazard to marine users. Minimal seabed disturbance, lower energy usage, reduced risk to	The pipelines will be left <i>in situ</i> . In the UK sector the pipeline ends will be excavated locally to the cut location to ensure that the ends remain buried. Surveys indicate that both pipelines will

**Table 1.5.1: Summary of Decommissioning Programmes**

Selected Option	Reason for Selection	Proposed Decommissioning Solution
	personnel engaged in the activity.	<p>remain buried with flooding. Degradation will occur over a long period within the seabed sediment, not expected to represent a hazard to other users of the sea.</p> <p>Any permit applications required for work associated with pipeline pigging, flushing, cutting and removal (PLA MAT) will be submitted</p> <p>In the NL sector, while the tie-in pipe spools along with the associated concrete mattresses and sand bags will be fully recovered, the pipeline itself and the local concrete mattresses will remain with J6A until the installation is decommissioned.</p>
<b>5. Wells</b>		
Wells will be plugged and abandoned to comply with HSE "Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996" and in accordance with Oil & Gas UK Guidelines for the Suspension and Abandonment of Wells (Issue 5, July 2015).	Meets the OPRED and HSE regulatory requirements.	The ST-1 wells will be plugged and abandoned from the installation with support from a JUWB. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of activities carried out. A PON5 will also be submitted to the OPRED for application to abandon the wells.
<b>6. Drill Cuttings</b>		
No cuttings pile exists at ST-1.	Cuttings are widely dispersed and fall below OSPAR 2006/5 thresholds.	n/a
<b>7. Interdependencies</b>		
The whole of the jacket can be removed; there is no cuttings pile. The jacket piles can be cut with small amounts of seabed sediment being displaced to allow access for cutting. ST-1 is tied into J6A in the NL sector. In the UK sector, pipeline stabilisation features such as concrete mattresses and sand bags will be removed as part of the pipeline decommissioning activities, but some of these will remain <i>in situ</i> in the NL Sector until J6A is decommissioned.		

## 1.6 Field Location including Field Layout and Adjacent Facilities

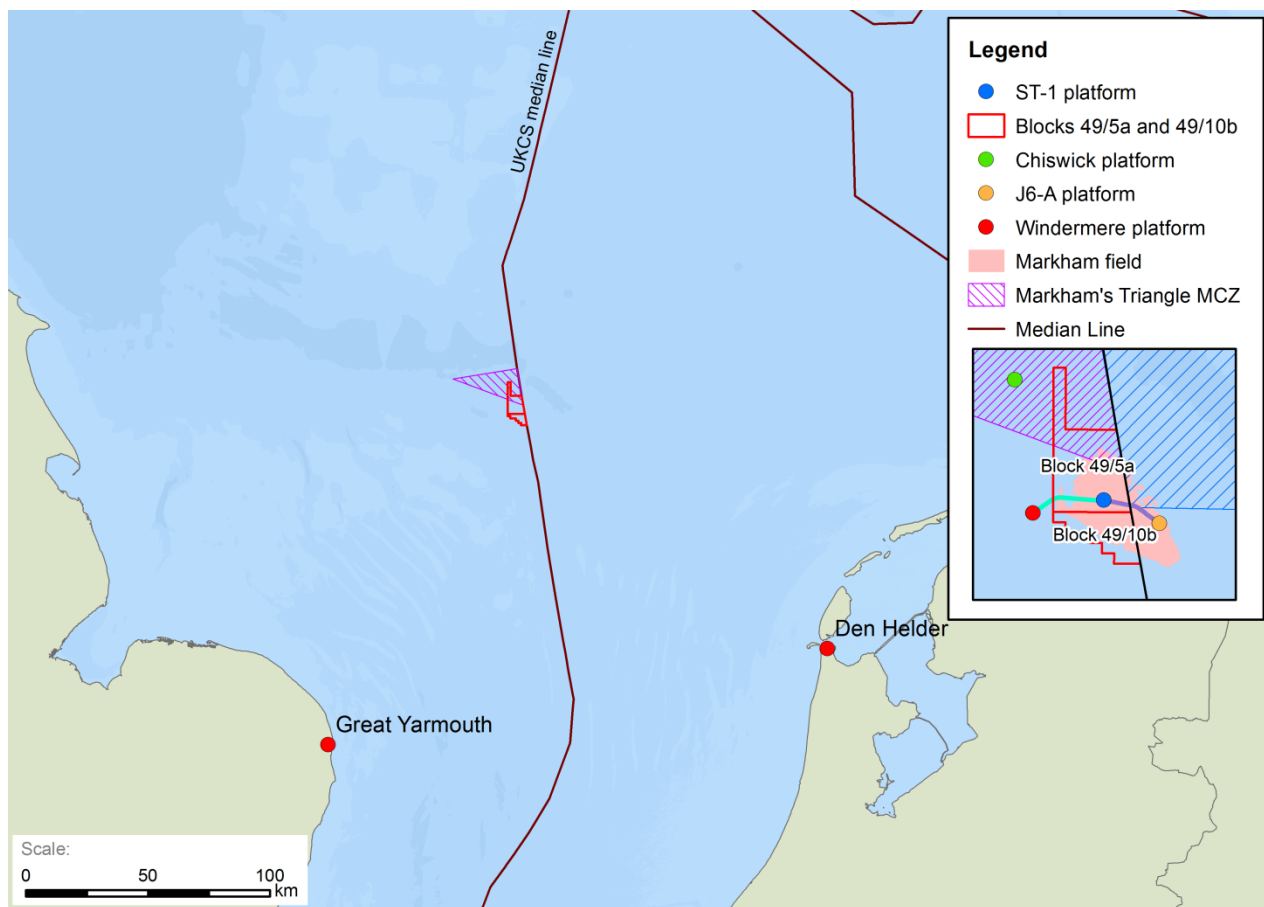


Figure 1.6.1: Markham Field Location in UKCS

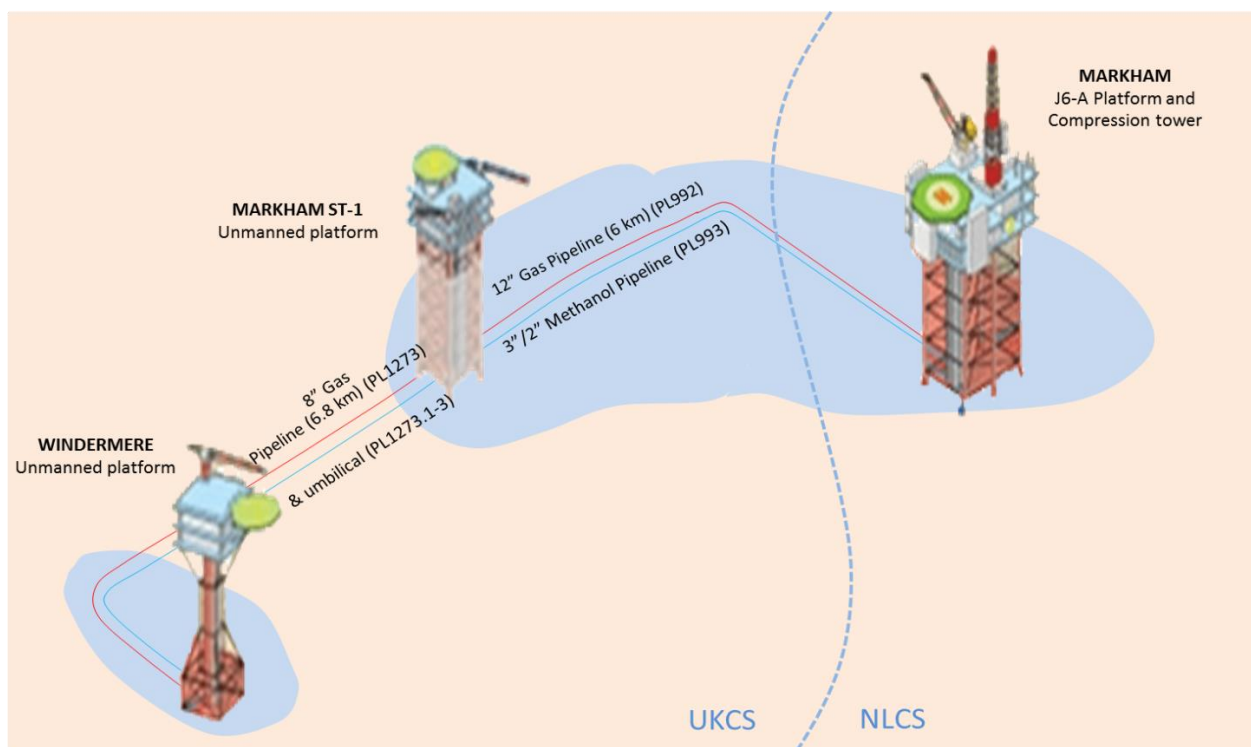


Figure 1.6.2: Markham & Windermere Field Layout

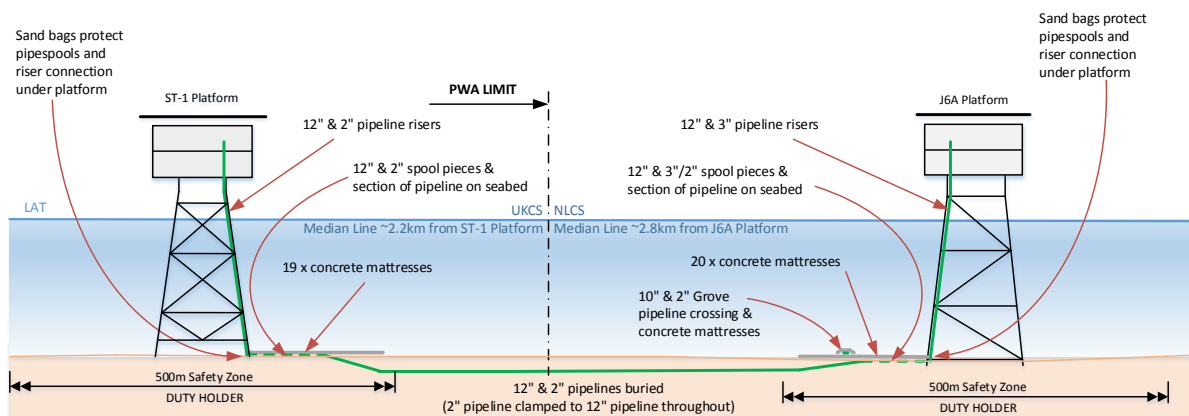


Figure 1.6.3: ST-1 installation & pipelines prior to decommissioning

Table 1.6.1: Adjacent Facilities

Owner	Name	Type	Distance/Direction		Information	Status
Spirit Energy	CTP/J6A	Bridge linked platforms at Markham	Reception for ST-1 pipeline, 5km <sup>2</sup> South East of ST-1 platform		Host platform for various subsea gas tiebacks. Exports gas and condensate to Wintershall operated K-13A platform, which in turn exports to Den Helder in the Netherlands	Operational
			WGS84 Decimal	53.823484 2.943308		
			WGS84 Dec Min	53° 49.409' N 02° 56.598' E		
Spirit Energy	PL2319 PL2320	10" gas pipeline and 2" methanol line	From Grove platform to reception at CTP/J6A, 13.4km long		Markham platform is host for the Grove platform; These two pipelines cross over PL992 and PL993 at J6A.	Operational
			WGS84 Decimal	53.716636 2.854994		
			WGS84 Dec Min	53° 42.998' N 02° 51.300' E		
Spirit Energy	PL2567 PLU2568	6" gas pipeline and umbilical	From Stamford wellhead (removed to shore) to Markham J6A ~7.5km long		The Stamford pipelines cross over PL992 and PL993 and cross over PL2353 and PL2354 at J6A	Decommissioned
			WGS84 Decimal	53.823247 2.943719		
			WGS84 Dec Min	53° 49.395' N 02° 56.623' E		
Spirit Energy	PL2353 PL2354	10" gas pipeline and 2" methanol line	From Chiswick to CTP/J6A, 18.3km long		These pipelines are crossed by PL2567 (flexible riser) and	Operational
			WGS84 Decimal	53.823484 2.943308		

<sup>2</sup> 5km as the crow flies; 5.6km measured along the pipelines

Table 1.6.1: Adjacent Facilities						
Owner	Name	Type	Distance/Direction		Information	Status
			WGS84 Dec Min	53° 49.409' N 02° 56.598' E	PLU2568 at J6A	
Ineos	Windermere platform, PL1273 PL1273.1 PL1273.2 PL1273.3	Platform, 8” gas pipeline & 2” umbilical	Windermere platform is 6.5km west of ST-1, PL1273 & umbilical 6.8km long		ST-1 provides Windermere with electrical power, control & chemicals. Windermere exports gas via ST-1	Production ceased
			WGS84 Decimal	53.8322819 002.7727297		
			WGS84 Dec Min	53°49.937' 002°46.364'		
Total	No ID	4.5” gas pipeline and 3” umbilical	At J6A (from K4-aD, 7.3km long)		Wholly routed in Dutch Sector from K4-aD to J6A	Operational
Total	No ID	14” gas pipeline and 2” methanol line	At J6A (from K1-A, 9.1km long)		Wholly routed in Dutch Sector from K1-A to J6A	Operational
Wintershall Noordzee B.V.	No ID	24” gas export line	At J6A (to K13-A 85.8km long)		Wholly routed in Dutch Sector	Operational
Impacts of Decommissioning Proposals						
No impact is expected.						

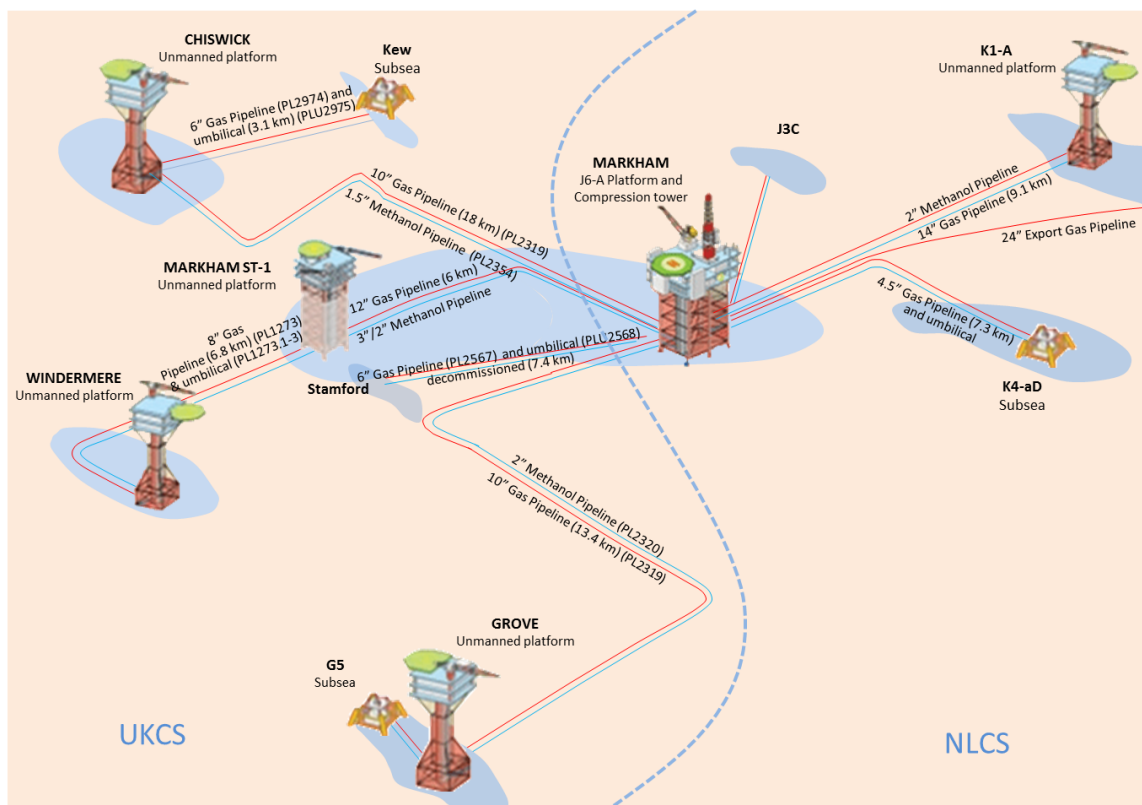


Figure 1.6.4: Markham & ST-1 Adjacent Facilities

## **1.7 Industrial Implications**

The activities to decommission the ST-1 wells, installation and pipelines will be completed using a jack up work barge, a crane vessel and a Diving Support Vessel (DSV).

It is 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. Spirit Energy will also try to combine ST-1 decommissioning activities with other development or decommissioning activities to reduce mobilisation costs should the opportunity arise. The decommissioning schedule is extended to allow flexibility for when decommissioning operations are carried out and completed.

## 2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

### 2.1 Installation: Surface Facilities

Table 2.1.1: Surface Facilities Information									
Name	Facility Type	Location		Topsides/ Facilities		Jacket (if applicable)			
				Weight (Te)	No of modules	Weight (Te)	Number of legs	Number of piles	Weight of piles (Te)
ST-1 Platform	Small fixed steel	WGS84 Decimal	53.842116 2.867643	1,299	1	1,219	4	4	662
		WGS84 Decimal Minute	53° 50.527' N 02° 52.059' E						

**Note:** The jacket weight (1,219Te) includes the weight of conductors

### 2.2 Installations: Subsea including Stabilisation Features

Table 2.2.1: Installations: Subsea including Stabilisation Features				
Subsea installations including Stabilisation Features	Number	Size/ Weight (Te)	Location	Comments/Status
Wellheads	n/a			
WHPS	n/a			
Tree	n/a			
Concrete mattresses	n/a			
Sand or grout bags	n/a			
Formwork	n/a			
Froned mattresses	n/a			
Rock emplacement	n/a			



## 2.3 Pipelines including stabilisation features

Table 2.3.1: Flowline/Pipeline/Umbilical Information

Description <sup>(4)</sup>	Region	Pipeline Number (as per PWA)	Diameter (NB) (inches)	Length (m)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Riser at ST-1	UK	PL992	12"	58	Steel pipe with 0.5 mm fusion bonded epoxy anti-corrosion coating	Wet dense phase gas	ESDV to bottom of ST-1 riser	n/a	Operational	Hydrocarbons
Spool pieces at ST-1	UK	PL992	12"	88	Steel pipework with 0.5 mm fusion bonded epoxy anti-corrosion coating	Wet dense phase gas	ST-1 platform base of riser to start of pipeline	Covered by concrete mattresses	Operational	Hydrocarbon
Flowline	UK	PL992	12"	2,350 <sup>(5)</sup>	Steel pipeline with 0.5 mm fusion bonded epoxy anti-corrosion coating	Wet dense phase gas	End of ST-1 platform spool pieces to Median line	Trenched and buried (for burial profile please refer to Figure 6.6.1)	Operational	Hydrocarbon
Flowline	NL	PL992	12"	3,130	Steel pipeline with 0.5 mm fusion bonded epoxy anti-corrosion coating	Wet dense phase gas	Median line to end of J6A platform spool pieces	Trenched and buried (for burial profile please refer to Figure 6.6.1)	Operational	Hydrocarbon
Spool pieces at J6A	NL	PL992	12"	49	Steel pipework with 0.5 mm fusion bonded epoxy anti-corrosion coating	Wet dense phase gas	From end of pipeline to base of J6A platform riser	Covered by concrete mattresses	Operational	Hydrocarbon
Riser at ST-1	UK	PL993	2"	58	Steel pipeline with 0.5 mm fusion bonded epoxy anti-corrosion coating	Methanol	ESDV to bottom of ST-1 riser	n/a	Operational	Methanol

Table 2.3.1: Flowline/Pipeline/Umbilical Information										
Description <sup>(4)</sup>	Region	Pipeline Number (as per PWA)	Diameter (NB) (inches)	Length (m)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Spool pieces at ST-1	UK	PL993	2"	93	Steel pipework with 0.5 mm fusion bonded epoxy anti-corrosion coating	Methanol	ST-1 platform base of riser to start of pipeline	Covered by concrete mattresses	Operational	Methanol
Pipeline	UK	PL993	2"	2,347 <sup>(5)</sup>	Steel pipeline with 0.5 mm fusion bonded epoxy anti-corrosion coating	Methanol	End of ST-1 platform spool pieces to Median line	Trenched and buried (for burial profile please refer to Figure 6.6.1)	Operational	Methanol
Pipeline	NL	PL993	2"	3,127	Steel pipeline with 0.5 mm fusion bonded epoxy anti-corrosion coating	Methanol	Median line to end of J6A platform spool pieces	Trenched and buried (for burial profile please refer to Figure 6.6.1)	Operational	Methanol
Spool pieces at J6A	NL	PL993	2"/3"	52	Steel pipework with 0.5 mm fusion bonded epoxy anti-corrosion coating	Methanol	From end of pipeline to base of J6A 3" platform riser <sup>(4)</sup>	Covered by concrete mattresses	Operational	Methanol

<sup>4</sup> The 3" Methanol and 12" gas pipelines risers at J6A (NL sector) are not listed here on the basis that they were originally installed with the J6A jacket.

<sup>5</sup> It is acknowledged that the dimensions for the 2" (PL993) and 12" (PL992) pipelines differ slightly from those quoted in the original PWA (UK Sector). The flowline & methanol pipeline dimensions included here are obtained from 'as-laid' survey data. While the lengths of the 12" pipe spools are the same as quoted in the original PWA, the 2" pipe spools are found to be ~5m longer. The discrepancy can be largely explained by the overall length of the 2" pipeline being ~6m shorter than the 12" pipeline, with any remaining discrepancy between the 2" and 12" pipelines being catered for by the relative orientation of each of the pipeline risers.

Table 2.3.2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	Total Number	Total Weight (Te)	Locations	Exposed/Buried/Condition
Concrete 'linklok' mattresses	39	181	19 within vicinity of ST-1 platform 20 within vicinity of J6A platform Locations as shown in Figure 2.3.1	Survey data suggests that all mattresses are exposed
Sand bags	UK – 200 NL – 200 Equivalent to ~5m <sup>3</sup> )	~5 (UK) ~5 (NL)	Located local to each of the ST-1 and J6A jacket structures within 500m zones as shown in Figure 2.3.1	Assumed exposed; no survey data available
Rock emplacement	0	n/a	n/a	No rock emplacements recorded
Formwork	n/a			
Froned Mattresses	n/a			
Other	n/a			

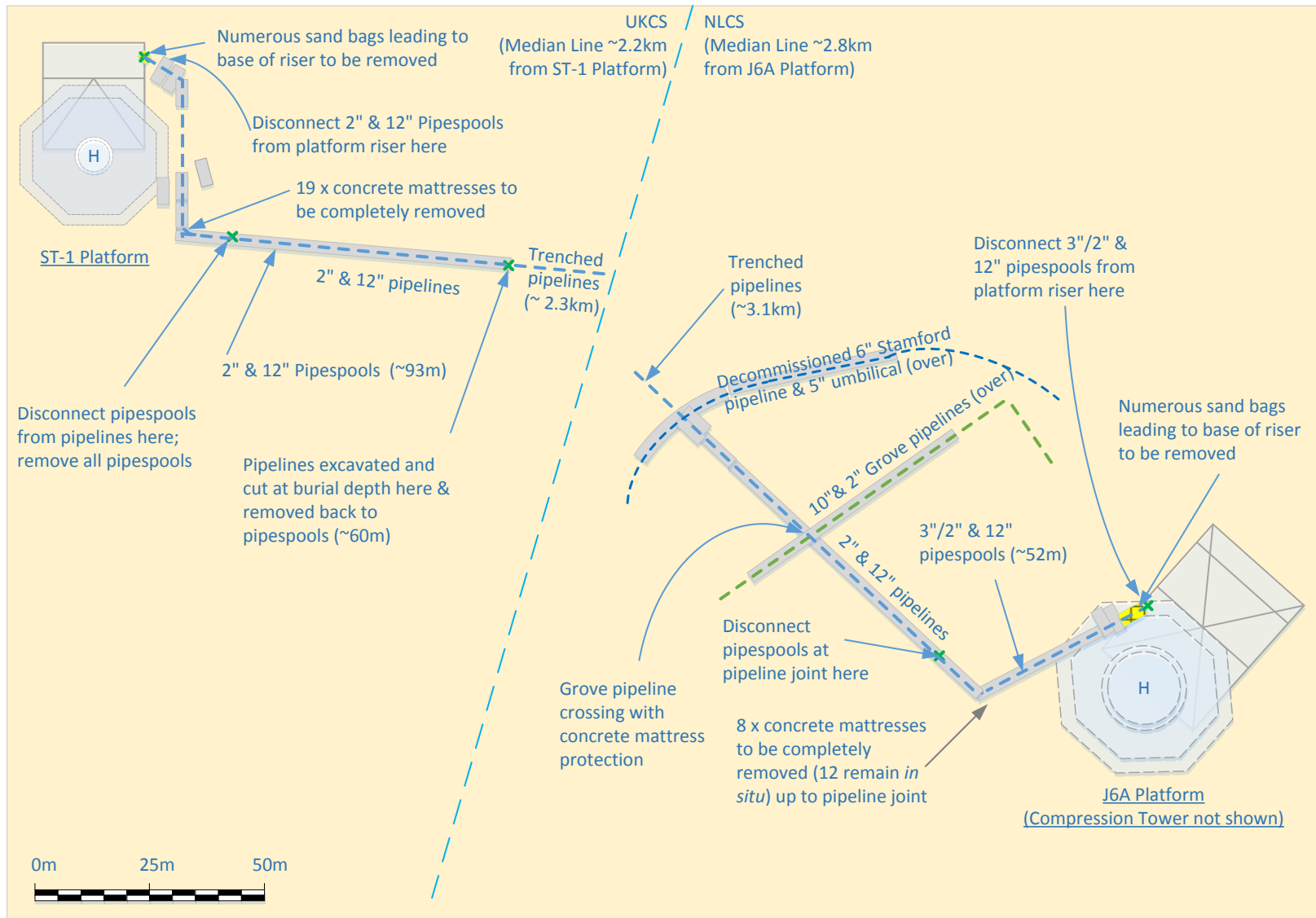


Figure 2.3.1: Sketch showing ST-1 pipeline disconnections & stabilisation features

## 2.4 Wells

Table 2.4.1: Well Information			
Platform Wells	Designation	Status	Category of Well
49/5a-B1	Gas production	Shut-in	PL 1.1.1
49/5a-B2	Gas production	Shut-in	PL 1.1.1
49/5a-B3	Gas production	Shut-in	PL 1.1.1
49/5a-B4	Gas production	Shut-in	PL 1.1.1
49/5a-B5	Gas production	Shut-in	PL 1.1.1
49/5a-B6	Gas production	Shut-in	PL 1.1.1

For details of well categorisation see the Oil & Gas UK Guidelines for the Suspension or Abandonment of Wells. Issue 5, Appendix D, July 2015.

## 2.5 Drill Cuttings

(See Section 3.7 for further information)

Table 2.5.1: Drill Cuttings Pile Information		
Location of Pile Centre (Latitude/Longitude)	Seabed Area (m <sup>2</sup> )	Estimated volume of cuttings (m <sup>3</sup> )
No drill cuttings pile exists at ST-1. See Section 3 of the Environmental Decommissioning Survey [3] in section 7.	n/a	n/a

## 2.6 Inventory Estimates

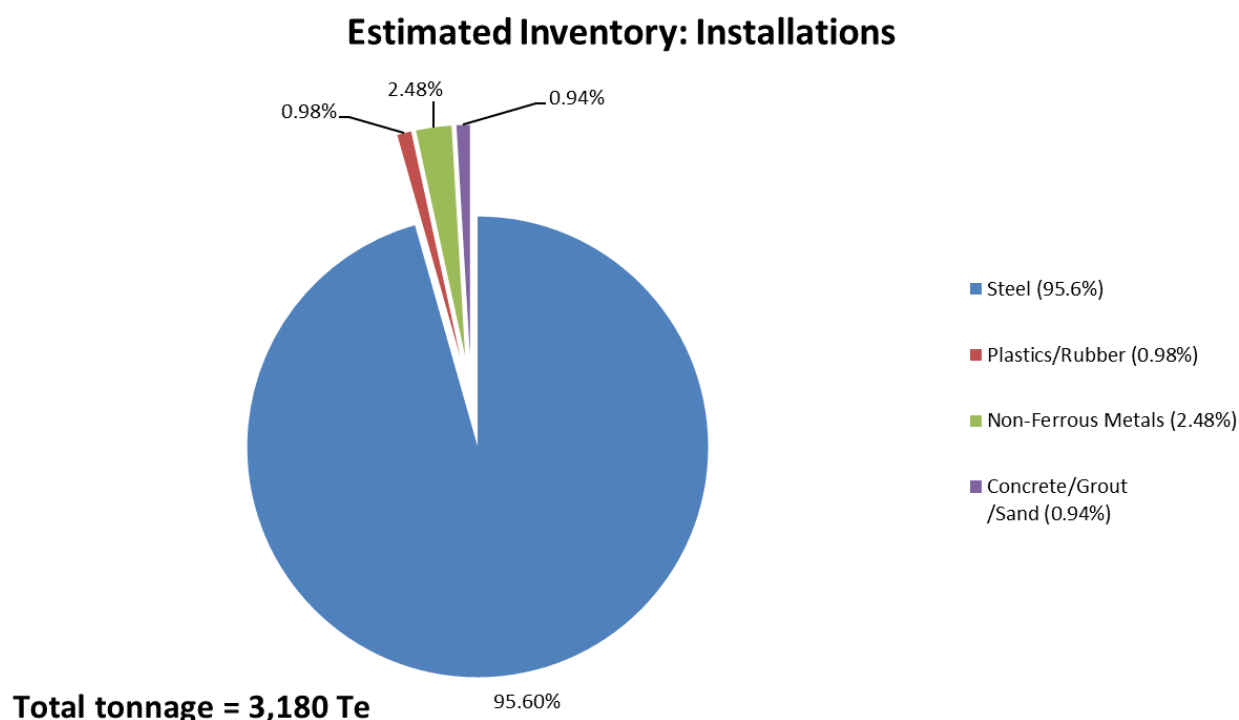
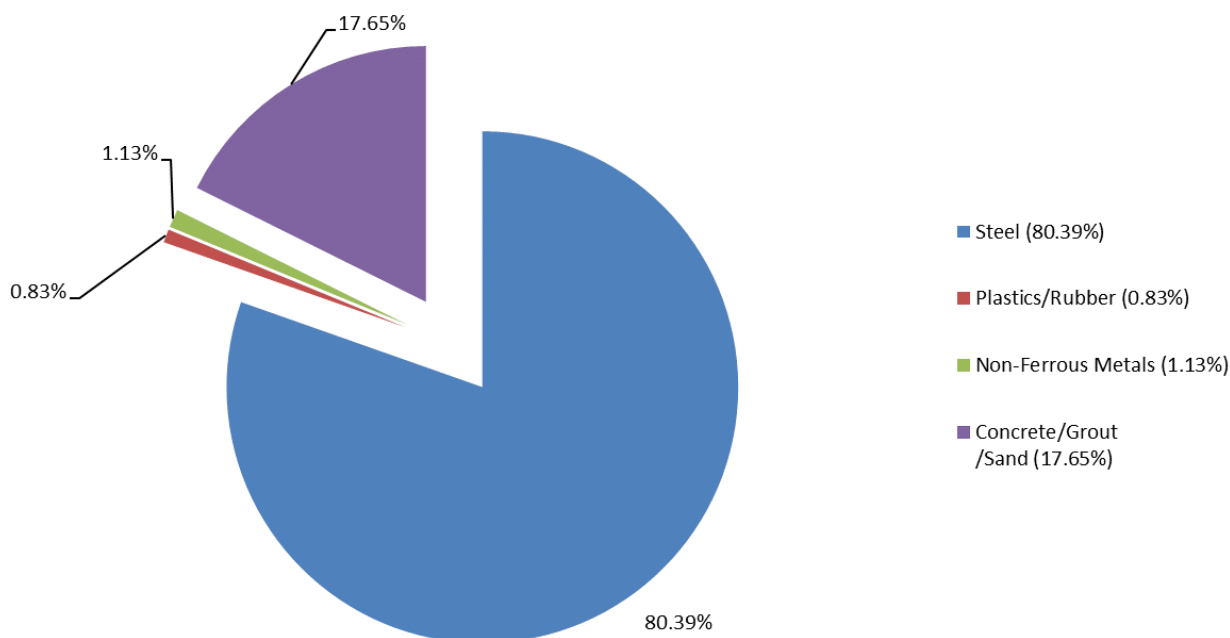


Figure 2.6.1: Pie chart of estimated inventories (Installations)

Please refer to Section 6.6 of the Environmental Impact Assessment [1] in section 7 for further details.

### Estimated Inventory: Pipelines & Stabilisation Features



**Total tonnage = 1,156 Te**

Figure 2.6.2: Pie chart of estimated inventory (Pipelines)

Please refer to Section 6.6 of the Environmental Impact Assessment [1] in section 7 for further details.

## 3. REMOVAL AND DISPOSAL METHODS

Wastes generated during decommissioning will be segregated and recorded by type and periodically transported to shore in an auditable manner through licensed waste contractors. Steel and other recyclable metal are estimated to account for the greatest proportion of the materials inventory.

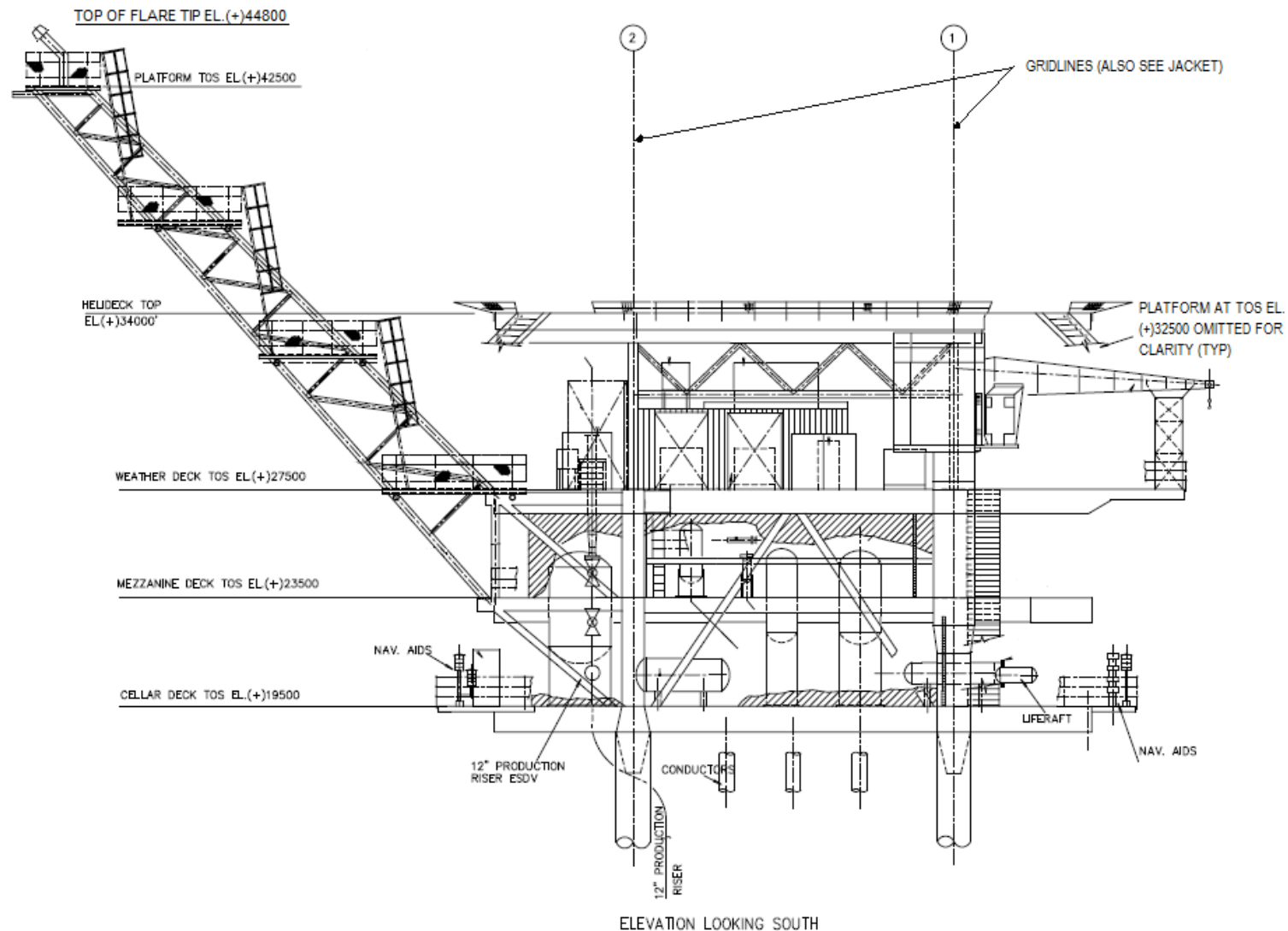
### 3.1 Topsides

#### 3.1.1 Topsides Decommissioning Overview

**Topsides description:** the ST-1 topside structure comprises three levels and weighs approximately 1,299Te. It consists of: the cellar deck EL +19.500m, the mezzanine deck EL +23.500m, and the weather deck EL +27.500m (Figure 3.1.1). The main topsides plan area is 26.3m x 22.0m with the wellheads set above the cellar deck and the Xmas trees above the mezzanine deck. An eight-man accommodation unit is located on the cellar deck and a pedestal crane is on the weather deck.

**Removal method:** the topsides will be completely removed and returned to shore. Possible methods are described in Table 3.1.2.

A final decision on removal methods will be made following a commercial tendering process.



**Figure 3.1.1: Schematic of ST-1 topsides looking south**



**Preparation & cleaning:** The methods that will be used to flush, purge and clean the topsides prior to removal to shore are summarised in Table 3.1.1.

Table 3.1.1: Cleaning of topsides for removal		
Waste type	Composition of Waste	Disposal Route
On-board hydrocarbons	Full recovery	Return 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
Original paint coating	The presence of lead based paints will be identified	May give off toxic fumes / dust if flame-cutting or grinding / blasting is used so appropriate safety measures will be taken. Painted items will be disposed of onshore with consideration given to any toxic components.
Asbestos and ceramic fibre	Asbestos is not present on the installation itself but small quantities are expected to be present in the free-fall lifeboat.	Asbestos will be disposed of via an appropriately licenced waste management contractor.

Table 3.1.2: Topside Removal Methods	
1) Semi-Submersible Crane Vessel <input checked="" type="checkbox"/> ; 2) Monohull Crane Vessel <input checked="" type="checkbox"/> ; 3) Shear Leg Vessel <input checked="" type="checkbox"/> ; 4) Jack up Work barge <input checked="" type="checkbox"/> ; 5) Piece small or large <input checked="" type="checkbox"/> ; 6) Complete with jacket <input checked="" type="checkbox"/> ;	
Method	Description
Single lift removal by SSCV / MCV / SLV	Removal of topsides and jacket as a complete unit followed by transportation to shore for re-use, recycling, and disposal as appropriate
Single lift removal with jacket by SSCV / MCV / SLV	Removal of topsides as a single unit followed by transportation to shore for re-use, recycling, disposal as appropriate
Piece-small or piece-large removal using JUWB	Removal of topsides in a series of smaller sub-units making use of the JUWB used for the well decommissioning activities, followed by transportation to shore for a programme of re-use, recycling or disposal as appropriate
<b>Proposed removal method and disposal route</b>	<b>Removal of topsides and jacket followed by transportation to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method will be made following a commercial tendering process.</b>

## 3.2 Jacket

### 3.2.1 Jacket Decommissioning Overview

The jacket weighs approximately 888Te, excluding the weight of 30" conductors (1,219Te includes the weight of conductors). The legs will be cut at an appropriate elevation to allow the lift aids to be installed, and the jacket will be removed in a single lift, see Figure 3.2.1 below. The piles will be cut internally 2m below the sea bed unless any difficulties are encountered and an external excavation is required to access the piles, in which case OPRED will be consulted before the piles are cut. The jacket will be returned to shore for recycling.

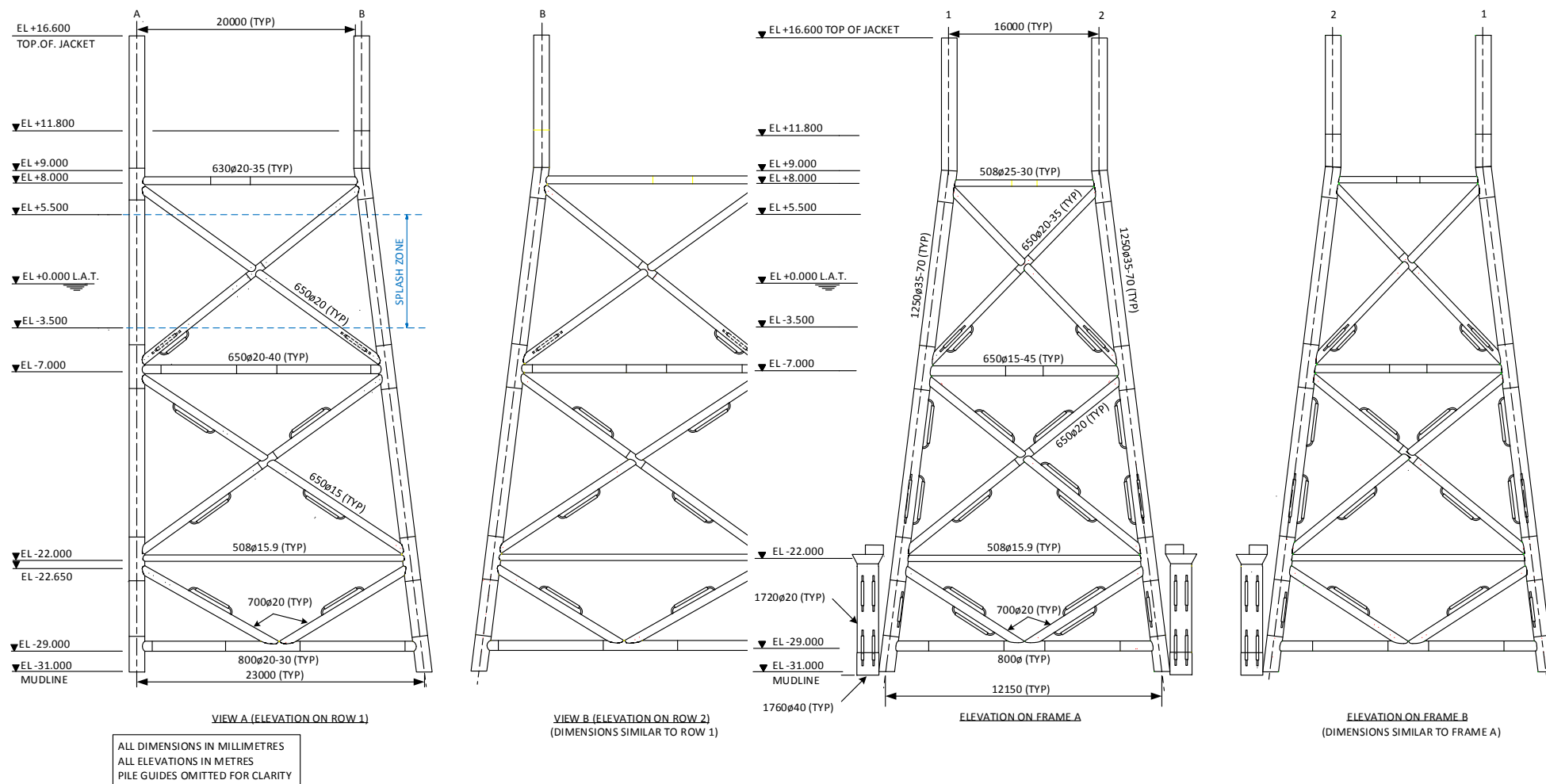


Figure 3.2.1: Jacket Elevations

**Table 3.2.1: Jacket Decommissioning Methods**

1) Semi-Submersible Crane Vessel ☒; 2) Monohull Crane Vessel ☒; 3) Shear Leg Vessel ☒; 4) Jack up Work barge ☒; 5) Complete with topsides ☒

Method	Description
Single lift removal by SSCV / MCV / SLV	Removal of topsides and jacket as a complete unit followed by transportation to shore for re-use, recycling, and disposal as appropriate.
Single lift removal with jacket by SSCV / MCV / SLV	Removal of jacket as a single unit followed by transportation to shore for re-use, recycling, disposal as appropriate
<b>Proposed removal method and disposal route</b>	<b>Removal of jacket as a single unit followed by transportation to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method will be made following a commercial tendering process.</b>

### 3.3 Subsea Installation(s) and Stabilisation Feature(s)

**Table 3.3.1: Subsea Installation(s) and Stabilisation Feature(s)**

Subsea installation(s) and stabilisation feature(s)	Number	Option	Disposal Route (if applicable)
Wellhead	n/a		
Manifold	n/a		
Template	n/a		
Wellhead protection structure	n/a		
Tree	n/a		
Concrete mattresses	n/a		
Sand and grout bags	n/a		
Formwork	n/a		
Froned mattresses	n/a		
Deposited rock	n/a		
Other	n/a		

### 3.4 Pipelines

#### Decommissioning Options:

The following options considered (and identified in terms of applicability to the pipelines in Table 3.4.1) are:

Option 1 – Complete removal;

Option 2 – Partial removal and make the pipeline ends safe.

**Table 3.4.1: Pipeline or Pipeline Groups Decommissioning Options**

Pipeline or Group (as per PWA)	Condition of line/group (Surface laid/Trenched/ Buried/ Spanning)	Whole or part of pipeline/group	Decommissioning options considered
PL992	Trenched & naturally backfilled	Whole pipeline	1, 2
PL993	Trenched & naturally backfilled	Whole pipeline	1, 2

#### 3.4.1 Comparative Assessment Method

A comparative assessment of the decommissioning options was completed in accordance with the Spirit Energy guidance for comparative assessments for decommissioning. Each decommissioning option was quantitatively and qualitatively assessed against safety, environmental, technical, societal, and cost criteria. Please refer [2] in section 7 for details.

#### 3.4.2 Outcome of Comparative Assessment:

**Table 3.4.2: Outcomes of Comparative Assessment**

Pipeline or Group	Recommended Option	Justification
PL992 & PL993	<p>Option 2: Partial removal, leaving the majority of the pipeline <i>in situ</i> and making safe the ends.</p> <p>At the ST-1 installation (UK) the pipe spools for both pipelines will be disconnected from the base of the risers, and approximately 88m/93m (12"/2" pipeline respectively) of spool pieces will be recovered. A further 60m (approx.) of the pipeline(s) will be removed from where they are bolted to the pipeline spools to the end of the transition, cut at a depth of at least 0.6m to top of pipe below the seabed as shown in Figure 2.3.1.</p> <p>At the J6A installation (NL), due to the location of the Grove pipeline crossings only the tie-in pipe spool(s) (approximately 49m/52m (12"/3"/2" pipeline respectively) and associated concrete mattresses will be recovered. In order to minimise potential complications with the Grove pipeline crossing the pipeline on the seabed and the transition section will remain in place until the J6A installation is decommissioned.</p>	<p>The majority of the pipelines will be left <i>in situ</i>. Minimal seabed disturbance, lower energy usage, reduced risk to personnel and lower cost all contribute to the proposed recommendation. Most of the seabed area comprises gravelly sand towards the ST-1 end and sandy gravel towards the J6A end.</p> <p>The pipelines are buried to a depth of &gt;1.0m for most of their length, and will be safe to leave <i>in situ</i>. Minimal seabed disturbance, lower energy usage and reduced risk to personnel all contribute to the proposed recommendation. Please refer to Appendix A.1 for burial profiles.</p> <p>Monitoring to confirm the pipeline remains buried will be completed to a schedule agreed with OPRED (UK) and SSM (NL) regulators.</p>

### 3.5 Pipeline Stabilisation Features

All concrete mattresses and sand bags in UK will be recovered to shore. The removal of some materials in NL will be deferred due to the proximity of the two Grove pipeline crossings.

Table 3.5.1: Pipeline Stabilisation Features			
Stabilisation features	Number	Option	Disposal Route (if applicable)
Concrete 'linklok' mattresses (over pipeline spools, pipeline on seabed and transition sections)	39	19 fully recovered (UK) 8 fully recovered (NL) 12 <i>deferred</i> (NL)	Recover to shore for reuse, recycling or disposal. Remainder to be left until decommissioned along with Markham J6A
Sand bags	~200 (UK) ~200 (NL)	Fully recovered (UK) Fully recovered (NL)	Recover to shore for reuse, recycling or disposal.
Deposited Rock	n/a		
Formwork	n/a		
Froned Mattresses	n/a		
Other	n/a		

### 3.6 Wells

Table 3.6.1: Well Plug and Abandonment
The Markham (ST-1) field consists of six production wells (49/5a-B1, B2, B3, B4, B5 & B6). The wells listed in Section 2.4 (Table 2.4.1) on page 20 will be plugged and finally abandoned in accordance with latest version of the Oil & Gas UK Guidelines for the Suspension and Abandonment of Wells (Issue 5, July 2015). A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of works carried out. A PON5 will also be submitted to OPRED for application to abandon the wells. Well abandonment is scheduled to occur March 2018.

### 3.7 Drill Cuttings

There are no existing drill cuttings associated with ST-1. This conclusion is supported by the 2013 survey data. The bathymetry data obtained from the 2013 survey showed no evidence of an accumulation of cuttings at the well locations (see Section 2.7 of the Environmental Decommissioning Survey [3] in section 7). The level of barium (an indicator of the presence of contamination from drilling) was below published guidance levels in the immediate vicinity of the ST-1 installation.

### 3.8 Waste Streams

**Table 3.8.1: Waste Stream Management Methods**

Waste Stream	Removal and Disposal method
<b>Bulk liquids</b>	Residual hydrocarbons will be removed from topsides and any associated bulk seawater from topsides will be cleaned and disposed overboard under permit. The 12" pipeline will be pigged, flushed and left filled with seawater. The corrosion inhibitor and methanol will be removed from the smaller 2"/3" methanol line prior to the start of the decommissioning activities. 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.
<b>Marine growth</b>	Where necessary and practicable to allow access some marine growth will be removed offshore. The remainder will be brought to shore and disposed of according to guidelines and company policies.
<b>NORM/LSA Scale</b>	NORM is expected and has been seen before in the coalescer and separators. 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 and under appropriate permit.
<b>Asbestos</b>	No asbestos is expected on the installation but small quantities are expected to be present in free fall life boat e.g. heat protection of engine and exhaust; the final disposal route will depend on the quantities found, but will be dealt with and disposed of in accordance with guidelines and company policies.
<b>Other hazardous wastes</b>	Will be recovered to shore and disposed of according to guidelines and company policies and under appropriate permit.
<b>Onshore Dismantling sites</b>	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 innovative reuse and recycling options.

**Table 3.8.2: Inventory Disposition**

Inventory	Region	Total Inventory Tonnage	Planned tonnage to shore	Planned tonnage decommissioned <i>in situ</i>	Planned tonnage left <i>in situ</i> (deferred)
<b>Installations</b>	<b>UK</b>	3,180	2,482	698	0
	<b>Netherlands</b>	n/a	n/a	n/a	n/a
<b>Pipelines</b>	<b>UK</b>	514	120	394	0
	<b>Netherlands</b>	642	51	525	66

A distinction is made between the planned quantity decommissioned *in situ* and that in the Dutch sector left for decommissioning at a later date (deferred). The quantity decommissioned *in situ* comprises the majority of the flowlines inclusive of protective coating and piggyback clamps. The section of flowline protected by concrete mattresses and the transition section will be removed when the J6A installation is decommissioned at some point in the future. In order to minimise complications associated with the Grove pipeline crossing only tie-in pipe spools and concrete mattresses covering them (estimated at ~8 no.) will be recovered at this time. The pipe spools will be disconnected from the bottom of the riser at J6A and from the flowline at the pipeline flanges and removed. The two risers (12" and 3") will be removed along with the J6A installation when it is decommissioned sometime in the future. As they were installed with the J6A installation their weight is not accounted for here.

All recovered material will be transported onshore for reuse, recycling or disposal. It is not possible to predict the market for reusable materials with any confidence; so the figures in Table

3.8.3 are disposal aspirations.

Table 3.8.3: Reuse, Recycle & Disposal Aspirations for Recovered Material				
Inventory	Region	Re-use	Recycle	Disposal
Installations	UK (2,482 Tonnes)	<5%	>95%	<5%
	NL (0 Tonnes)	n/a	n/a	n/a
Pipelines	UK (120 Tonnes)	<5%	>95%	<5%
	NL (51 Tonnes)	<5%	>95%	<5%

Please refer to Section 5.6 of the Environmental Impact Assessment [1] in section 7 for further details.



## 4. ENVIRONMENTAL IMPACT ASSESSMENT

### 4.1 Environmental Sensitivities

**Table 4.1.1: Environmental Sensitivities [Reference [1] in Table 6.6.1]**

Environmental Receptor	Main Features
Conservation Interests	The nearest protected areas to ST-1 installation are the Klaverbank SCI, the North Norfolk Sandbanks and Saturn Reef SCI and the Dogger Bank SAC located c.2 km east, 35 km south and 50 km north, respectively. The nearest rMCZ to the area is the Markham's Triangle located c.3 km north of the development.
Seabed	Installation survey data was interpreted as showing a sandy seabed along the pipeline route with some areas of overlying gravel and pebbles. The 2013 survey showed the seabed sediments in the area to comprise fine to medium rippled sand with occasional shell fragments and gravel. Trawl scars have been identified throughout the area. Water depths within the survey area ranged between 25.5 m and 52.2 m below LAT with the main pipeline corridor having a gentle slope ranging from 32 m to 35 m below LAT northwest to southeast
Atmosphere	ST-1 is in a remote location, with the closest installation being J6-A approximately 5.5km east. The area has moderate shipping activity. Therefore atmosphere is anticipated not to have elevated levels of combustion gasses and air quality is anticipated to be below EALs and in line with published background data.
Birds	Seabirds are generally not at risk from routine offshore operations. However, they may be vulnerable to pollution from less regular activities, for example from accidental hydrocarbon discharges. JNCC has produced an Offshore Vulnerability Index (OVI) for seabirds encountered within each offshore licence block within the North Sea. The seabird vulnerability to surface pollution in the vicinity of ST-1 is variable throughout the year. In Block 49/5 vulnerability is very high in November and December, moderate in June, August and September and high for the rest of the year. Overall annual vulnerability is considered moderate in Block 49/5.
Fish	<p>Spawning and nursery areas cannot be defined with absolute accuracy and are found to shift over time. Low density nursery areas of anglerfish, cod, herring, mackerel, sandeel, spurdog and tope shark. Low densities of cod, whiting, herring, sandeels and sole were also found to spawn in the area.</p> <p>An assessment of the physical characteristics of the ST-1 site in terms of herring spawning potential showed that the majority of the survey area was characterised as having no to low herring spawning potential due to the lack of localised elevation and gravel sediments. One station (station 11 which is 1km away from ST-1 perpendicular to the tidal axis) was considered to have moderate potential for herring spawning due to the presence of a small proportion of gravel.</p>
Marine Mammals	<p>Harbour porpoise, minke whale, pilot whale and white-beaked dolphin have been sighted in the area around ST-1.</p> <p>Grey and harbour seals are both known to occur within the Dogger Bank SAC and the rMCZ Markham's Triangle as the abundance of sandeels in Markham's Triangle form a key food source for seals. As such it is possible that seals may pass through the area around ST-1, but they are unlikely to spend significant periods there, particularly during the</p>

Table 4.1.1: Environmental Sensitivities [Reference [1] in Table 6.6.1]	
Environmental Receptor	Main Features
	pupping and moulting seasons when they will spend more time ashore. Overall seal abundance in the area is low.
Fishing Industry	The ST-1 installation lies in ICES rectangle 36F2. The UK fishing effort within this area varies throughout the year and annually can be considered low with an average fishing effort of 140 days per annum (2010 – 2013). Approximately 0.07 % of total UK landings between 2010 and 2013 were taken from the area. The area is targeted primarily for demersal species. The data suggests that ICES rectangle 36F2 is of relatively low value to the UK fishing industry.
Other Users of the Sea	<p>Block 49/5 is in an area of moderate shipping activity. The nearest shipping lane is c.7 km north of ST-1. There are a further two shipping lanes 15 km and 27 km to the south west.</p> <p>The Markham field is located in a region well developed by the oil and gas industry.</p> <p>There are no military exercise areas in the vicinity of ST-1.</p> <p>ST-1 is located at the eastern boundary of the Hornsea offshore windfarm licensed area; however, there are currently no existing wind farm developments or wind farms developments with planning permission in the vicinity of the ST-1 area.</p>
Onshore Communities	Cleaning, engineering down and dismantling of the structures when brought onshore have the potential to cause disturbance to the local community. Such disturbance could take the form of increased noise and vibration, odour, light, dust, gaseous emissions and visual disturbance. However, as the facilities being considered for the work regularly undertake work of this kind, the onshore activities associated with decommissioning of ST-1 are unlikely to represent an increase in current impacts to the community.

## 4.2 Potential Environmental Impacts and their Management

### Environmental Impact Assessment Summary:

There will be some planned and unplanned environmental impacts arising from decommissioning the ST-1 infrastructure. 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 expected to be low.

### Overview:

**Table 4.2.1: Environmental Impact Management [Reference [1] in Table 6.6.1]**

Activity	Main Impacts	Management
Topsides removal	<p>Decommissioning of the topside will require cutting of the facilities at the surface and lifting activities using anchored large lift vessels. The removal may lead to discharges of residual fluids from the topsides, including drainage spaces.</p> <p>The principle impacts will include:</p> <ul style="list-style-type: none"> <li>• physical presence of vessels and equipment</li> <li>• energy use and atmospheric emissions</li> <li>• underwater noise from vessels,</li> <li>• surface noise from cutting</li> <li>• discharges to the marine environment from vessels and residues from topsides</li> <li>• disturbance of the seabed from anchors</li> <li>• production of waste materials</li> </ul> <p>Risks of additional impact will include:</p> <ul style="list-style-type: none"> <li>• disturbance to the seabed from potential dropped objects</li> <li>• large and small hydrocarbon and chemical releases to the marine environment</li> <li>• disruption to fishing activities</li> </ul>	<p>All planned impacts are expected to be short-term and localised and of low significance provided the proposed mitigation measures are implemented when carrying out the topside decommissioning activities.</p> <p>The exception to this is the risk of a large hydrocarbon releases which could have the potential to have a moderate significant impact.</p> <p>The assessment of potential cumulative impacts concludes that no significant impacts are expected to occur as a result of decommissioning operations.</p> <p>Activities will be planned to be executed as efficiently as possible, minimising cutting in order to reduce the potential noise impacts.</p> <p>The contractors' capability, processes and procedures will be subject to audit and evaluation as part of the selection process and their vessels will be audited as part of selection and pre-mobilisation and the marine assurance standard adhered to.</p> <p>Vessels will be managed to minimise the durations required and associated discharge. In addition, on board operational practices will address fuel efficiency, noise management and minimise waste.</p> <p>Anchoring procedures will be developed.</p> <p>Risk assessments will be undertaken for the work at key stages throughout planning and execution.</p>

**Table 4.2.1: Environmental Impact Management [Reference [1] in Table 6.6.1]**

Activity	Main Impacts	Management
		<p>The waste hierarchy will be followed with material being segregated and reused where practicable, and recycling where possible. Waste material will only be sent to landfill if no other options are possible.</p> <p>Spirit Energy will continue to monitor the performance of the contractor throughout via our offshore representatives.</p> <p>Compliance with EU and UK waste legislation and duty of care.</p> <p>A post decommissioning debris survey will be conducted and any debris recovered.</p> <p>As part of the OPEP specialist oil spill management and response services will be in place, to minimise impacts from potential releases to the marine environment.</p>
Jacket removal	<p>Decommissioning of the jacket will require cutting of the facilities at the seabed and lifting activities using anchored large lift vessels. The piles will be cut below the seabed which may require local water jetting of sediments and temporary placement of equipment and components.</p> <p>The principle impacts will include:</p> <ul style="list-style-type: none"> <li>• physical presence of vessels and equipment</li> <li>• energy use and atmospheric emissions</li> <li>• underwater noise from vessels, cutting and excavation operations</li> <li>• discharges to the marine environment from vessels</li> <li>• disturbance of the seabed</li> <li>• production of waste materials</li> </ul> <p>Risks of additional impact will include:</p> <ul style="list-style-type: none"> <li>• disturbance to the seabed from potential dropped objects</li> </ul>	<p>All planned impacts are expected to be short-term and localised and of low significance provided the proposed mitigation measures are implemented when carrying out the jacket decommissioning activities.</p> <p>The exception to this is the risk of a large hydrocarbon releases which could have the potential to have a moderate significant impact.</p> <p>The assessment of potential cumulative impacts concludes that no significant impacts are expected to occur as a result of decommissioning operations.</p> <p>Activities will be planned to be executed as efficiently as possible, minimising cutting and disturbance of the seabed in order to reduce the potential for impact on the area around the jacket.</p> <p>The contractors' capability, processes and procedures will be subject to audit and evaluation as part of the selection process and their vessels will be audited as part of selection and pre-mobilisation and the marine assurance standard adhered to.</p> <p>Vessels will be managed to minimise the durations required and associated discharge. In addition, on board operational practices will address fuel efficiency, noise management and minimise</p>

**Table 4.2.1: Environmental Impact Management [Reference [1] in Table 6.6.1]**

Activity	Main Impacts	Management
	<ul style="list-style-type: none"> <li>large and small hydrocarbon and chemical releases to the marine environment</li> <li>disruption to fishing activities</li> </ul>	<p>waste.</p> <p>Anchoring procedures will be developed.</p> <p>Risk assessments will be undertaken for the work at key stages throughout planning and execution.</p> <p>The waste hierarchy will be followed with material being segregated and reused where practicable and by recycling where possible. Waste material will only be sent to landfill if no other options are possible.</p> <p>Spirit Energy will continue to monitor the performance of the contractor throughout via our offshore representatives.</p> <p>Compliance with EU and UK waste legislation and duty of care.</p> <p>A post decommissioning debris survey will be conducted and any debris recovered.</p> <p>As part of the OPEP specialist oil spill management and response services will be in place, to minimise impacts from potential releases to the marine environment.</p>
Subsea installation removal	n/a	n/a
Decommissioning pipelines	<p>Decommissioning of the pipelines <i>in situ</i> will require activities such as local water-jetting of sediments, cutting and temporary placement of equipment or components. Any exposed pipeline ends will be cut back at the buried location. Removed components will be lifted from the seabed by DSV. Principal impacts will include</p> <ul style="list-style-type: none"> <li>disturbance of the seabed from cutting and removal activities</li> <li>noise from removal and cutting activities and operational support vessels</li> <li>operational discharges from vessels</li> <li>production of waste material</li> </ul>	<p>Activities will be planned to be executed as efficiently as possible, minimising disturbance of the seabed in order to reduce the potential for impact on the area around the pipelines.</p> <p>Consideration will be given where equipment and/or components should be temporarily placed on the seabed prior to removal, seeking to minimise the requirement wherever possible.</p> <p>Vessels will be managed to minimise the durations required and associated discharges. In addition, on board operational practices will address fuel efficiency, noise management and minimise waste.</p>

**Table 4.2.1: Environmental Impact Management [Reference [1] in Table 6.6.1]**

Activity	Main Impacts	Management
	These effects are expected to be short-term and localised. The seabed and associated ecosystem is expected to recover rapidly once activities cease.	
Decommissioning stabilisation features	The Decommissioning Programmes include the removal of existing concrete mattresses and sand bags. Mattresses and sand bags will be lifted from the seabed by DSV. Impacts will include disturbance of the seabed and noise from vessels. These effects are expected to be short-term and localised. The seabed and associated ecosystem is expected to recover rapidly once activities cease.	<p>Activities will be planned to be executed as efficiently as possible, minimising disturbance of the seabed in order to reduce the potential for impact.</p> <p>Consideration will be given to how the work is to be conducted seeking to minimise the requirement wherever possible.</p> <p>Vessels will be managed to minimise the durations required and associated discharges.</p> <p>In addition on board operational practices will address fuel efficiency, noise management and minimise waste, in accordance with the marine assurance standard.</p>
Decommissioning Drill Cuttings	n/a	n/a

## 5. INTERESTED PARTY CONSULTATIONS

### 5.1 General

During the public consultation period (13 July 2016 to 10 August 2016), copies of the Decommissioning Programmes and supporting documents were forwarded to the following Statutory Consultees:

- The National Federation of Fishermen's Organisations (NFFO);
- The Scottish Fishermen's Federation (SFF);
- The Northern Ireland Fish Producer's Organisation (NIFPO); and,
- Global Marine Systems Limited (GMS).

Meetings and telephone calls have been held with NFFO to advise of progress and to provide more detail of the proposals.

We also sent copies of the Decommissioning Programmes and supporting documents to Markham Partners listed in Table 1.4.4.

Copies of the Decommissioning Programmes and supporting documents were also made available as a download from the Spirit Energy website:

<https://www.spirit-energy.com/assets-locations/decommissioning><sup>3</sup>

A bound copy of the Decommissioning Programmes was also made available in the Great Yarmouth Community Library.

A public notice was published in both the Eastern Daily Press and the London Gazette on 13 July 2016 (please refer to Appendix B.1 for a copy of the public notice). The public notice gave instructions for representations to be made in writing by Tuesday 10 August 2016. Spirit Energy received no comments or any written or verbal representation from the public in direct response to the public notice or during the public consultation period.

Copies were also submitted for consideration to OPRED.

**Table 5.1.1: Summary of Stakeholder Comments**

Who	Comment	Response
<b>INFORMAL CONSULTATIONS</b>		
<b>Markham Partners</b>	Markham Partners have raised no concerns or have adverse comment to make in relation to the draft ST-1 Decommissioning Programmes	Refer Appendix B.6
<b>STATUTORY CONSULTATIONS</b>		
<b>National Federation of Fishermen's Organisation</b>	The NFFO have no adverse comments to make on the proposals	Refer Appendix B.2
<b>Scottish Fishermen's Federation</b>	Given the locality of this particular Field, the SFF advise that the SFF is content to leave it with the National Federation of Fishermen's Organisations (NFFO) to respond on the proposals	Refer Appendix B.3

<sup>3</sup> This web address was [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning) prior to November 2017



Table 5.1.1: Summary of Stakeholder Comments		
Who	Comment	Response
Northern Irish Fish Producers Organisation	As this field is outside the main area of operation, the NIFPO have no comment to make on the proposals	Refer Appendix B.4
Global Marine Systems	<p>GMS don't have any specific comments on the programme of works itself as no in-service submarine cables should be directly affected in the immediate vicinity. The nearest in-service fibre optic cable is SMW3 approximately 30km away from the Markham field. If any interaction were to be necessary in the course of engineering the project, then it would be necessary to liaise with specific cable owners. Contact details and general cable information for most systems can be found using KIS-ORCA cable awareness charts/interactive map <a href="http://www.kis-orca.eu/map#.VPmDJHZFDIU">http://www.kis-orca.eu/map#.VPmDJHZFDIU</a>.</p> <p>I also ask that when notice to mariners are arranged for any offshore works, that the kingfisher fortnightly bulletin be updated to include details of the works to inform sea users as well as additional notification to the relevant authorities and UKHO.</p>	Refer Appendix B.5 Spirit Energy will keep Kingfisher informed of any planned operations
Public	No concerns or objections were raised	

## 6. PROGRAMME MANAGEMENT

### 6.1 Project Management and Verification

A Spirit Energy project management team will be appointed to 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 and SSM with any necessary approvals sought.

### 6.2 Post-Decommissioning Debris Clearance and Verification

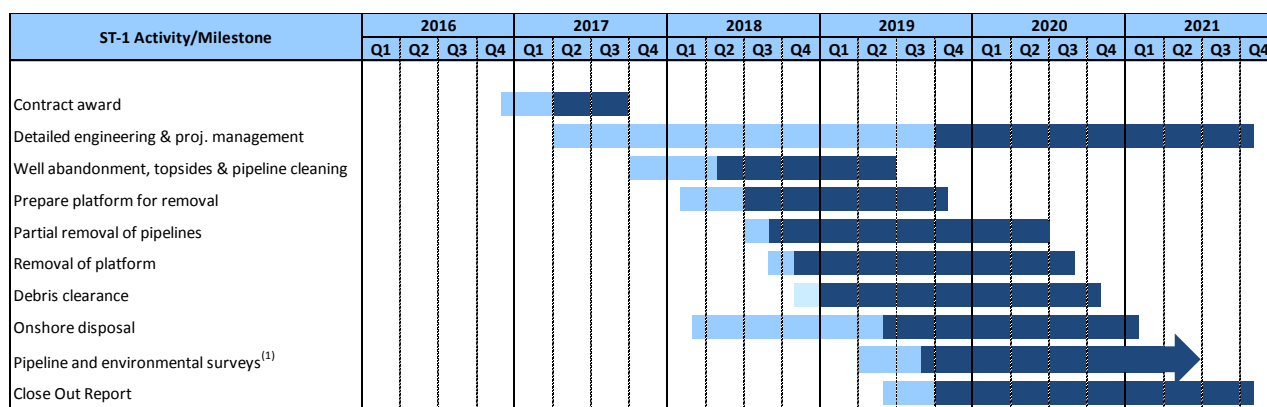
All pipeline routes and the ST-1 installation site will be the subject of debris and trawlability surveys when decommissioning activities have concluded. The survey will include a 200-metre wide corridor along the pipeline route and the wellhead 500 metre zone. Any seabed oil and gas debris will be recovered for onshore disposal or recycling in line with existing disposal methods. Independent verification of seabed state will be obtained by trawling the jacket and pipeline area 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, installation and pipeline decommissioning activities



1. First Decommissioning survey and environmental survey; timing of future surveys to be agreed with BEIS and SSM

Figure 6.3.1: Gantt Chart of Project Plan

## 6.4 Costs

Table 6.4.1: Provisional Decommissioning Programmes Costs

Item	Estimated Cost (£m)
Topsides/jacket – preparation / removal and disposal	tba
Pipeline decommissioning	tba
Well abandonment	tba
Future pipeline and environmental survey requirements*	tba
<b>TOTAL</b>	<b>tba</b>

\* Based on four inspections – 2 x Environmental and 2 x Pipeline Surveys

## 6.5 Close Out

A close out report will be submitted within a timescale to be agreed with OPRED following completion of the offshore work, including debris clearance and post-decommissioning surveys, as required in OPRED guidance notes. The report will explain any variance from the Decommissioning Programmes.

## 6.6 Post-Decommissioning Monitoring and Evaluation

A post-decommissioning environmental seabed survey at the ST-1 jacket location and along the pipeline route will be compared with the pre-decommissioning environmental survey. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED.

On completion of decommissioning activities, pipeline status surveys and environmental surveys will be completed with the findings being sent to OPRED and SSM. The requirement and frequency of future surveys will be agreed with OPRED and SSM in Nederland.

In the NL after the post-decommissioning survey, subject to agreement it will be proposed that two future surveys will be carried out, one a maximum of five years after decommissioning has been completed and a further survey a maximum ten years after decommissioning has been completed. Using these data it will then be proposed that the frequency of future surveys be assessed using a risk-based approach.

The risers will remain with the J6A installation until end of field life when they will be removed.

## 7. SUPPORTING DOCUMENTS

Table 6.6.1: Supporting Documents	
Document Number	Title
[1] CEU-HSEQ-GMA0025-REP-0002	ST-1 Decommissioning Environmental Impact Assessment (Nov 2015)
[2] CEU-DCM-GMA0025-REP-0009	ST-1 Decommissioning Comparative Assessment (Nov 2015)
[3] Fugro EMU Report J/1/25/2440.1 FSLTD Report No. 130019.1V1.2	ST-1 Decommissioning Survey. Environmental Assessment with Herring Spawning Ground Assessment Volume 1 of 2 (Sept 2013)
[4] Fugro EMU Report J/1/25/2440 FSLTD Report No. 130019.1V2.3	ST-1 Decommissioning Survey. Environmental Baseline Report Volume 2 of 2 (Sept 2013)

## 8. PARTNER LETTERS OF SUPPORT

HOLD

## APPENDIX A BURIAL PROFILES

### Appendix A.1 Burial Profile – Pipelines

The 2" pipeline (PL993) is piggybacked (i.e. clamped) onto the 12" pipeline (PL992). Pipeline survey data from 2014 is presented in Figure 6.6.1 with severance locations marked. KP0 is located at the pipeline flange at the base of the J6A risers, with KP increasing heading west towards the pipeline flange at the base of the ST-1 risers. The cut position at ST-1 shows that the pipelines will be cut at a depth of 0.6m to top of pipe. At J6A the pipe spools will be disconnected from the riser and the main pipeline flange. The pipelines show excellent levels of burial along their full length.

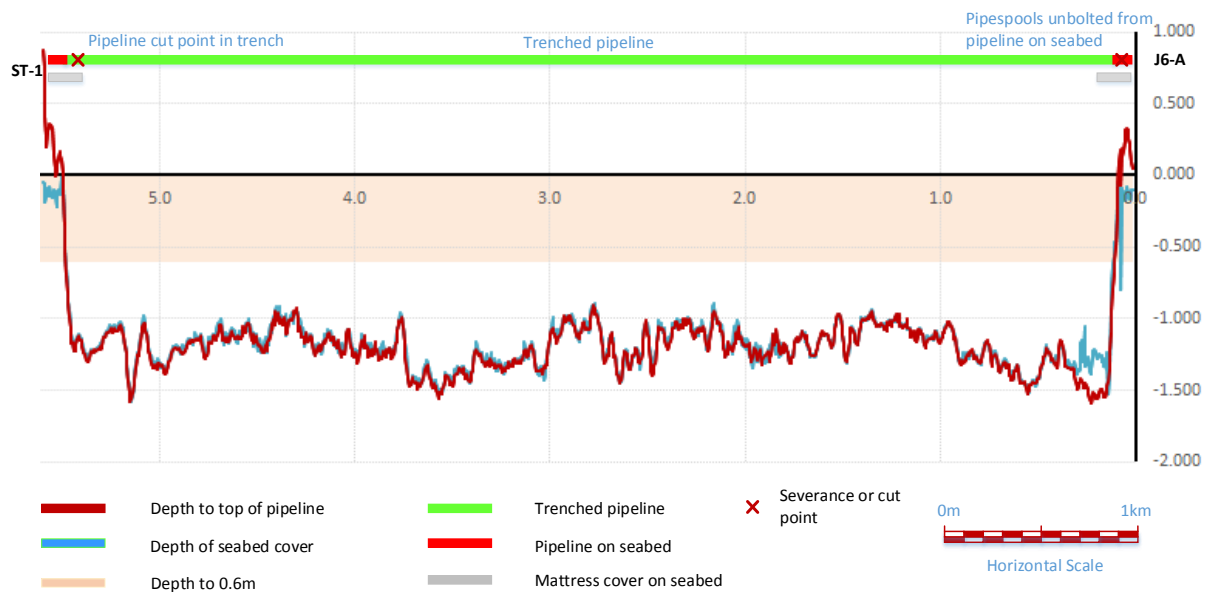


Figure 6.6.1: Burial profile of ST-1 pipelines

## APPENDIX B PUBLIC NOTICE & CONSULTEE CORRESPONDENCE

### Appendix B.1 Public Notices

#### Centrica North Sea Gas Ltd

##### THE PETROLEUM ACT 1998

##### MARKHAM ST-1 DECOMMISSIONING PROJECT

Centrica North Sea Gas Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Gas Ltd hereby gives notice that a summary of the ST-1 Decommissioning Programmes can be viewed at the internet address: [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively a hard copy of the Programmes can be inspected by contacting Ross Davidson, Senior Public Relations Manager, at the following location during office hours:

Centrica  
iQ Building  
15 Justice Mill Lane  
Aberdeen  
AB11 6EQ

A hard copy of the Programmes will also be made available at Great Yarmouth Community Library, Tolhouse Street, Great Yarmouth, Norfolk, NR30 2SH.

Representations regarding the ST-1 Decommissioning Programmes should be submitted in writing to Ross Davidson, Senior Public Relations Manager, at the above address. Representations should be received by Wednesday, 10 August 2016, and should state the grounds upon which any representations are being made.

Date: 13 July 2016

Ross Davidson, Senior Public Relations Manager, Centrica, iQ Building, 15 Justice Mill Lane, Aberdeen, AB11 6EQ

## ENVIRONMENT & INFRASTRUCTURE

### ENERGY

#### CENTRICA NORTH SEA LTD

##### THE PETROLEUM ACT 1998

##### MARKHAM ST-1 DECOMMISSIONING PROJECT

Centrica North Sea Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

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iQ Building  
15 Justice Mill Lane  
Aberdeen  
AB11 6EQ

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Representations regarding the ST-1 Decommissioning Programmes should be submitted in writing to Ross Davidson, Senior Public Relations Manager, at the above address. Representations should be received by Wednesday, 10 August 2016, and should state the grounds upon which any representations are being made.

Date: 13 July 2016

Ross Davidson, Senior Public Relations Manager, Centrica, iQ Building, 15 Justice Mill Lane, Aberdeen, AB11 6EQ (2572886)

Public Notices: Eastern Daily Press & The London Gazette (both 13 July 2016)

## Appendix B.2 NFFO – Mr Alan Piggott via Email

**From:** Alan Piggott  
**Sent:** 10 August 2016 13:52  
**To:** Axon, Simon  
**Cc:** Davidson, Ross  
**Subject:** RE: Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

Hello Simon

Sorry for my tardiness – I can confirm the Federation has no adverse comment on the application.

Best Regards, Alan Piggott, General Manager, National Federation of Fishermen's Organisations, 30 Monkgate, York, YO31 7PF

---

**From:** Davidson, Ross  
**Sent:** 13 July 2016 09:53  
**To:** Alan Piggott  
**Cc:** Aberdeen DC  
**Subject:** Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment  
**Attachments:** Decommissioning Programmes, Comparative Assessment

Dear Alan,

Centrica North Sea Gas Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Gas Ltd hereby gives notice that from Wednesday, 13 July, 2016, the ST-1 Decommissioning Programmes can be viewed at the internet address: [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively, electronic copies of the Decommissioning Programmes and Comparative Assessment are attached to this email.

Separately you will receive a document transmittal from our document control department, please can you return this to acknowledge receipt.

Please can you confirm that you've received all the information you require, and if you have any questions or concerns, please make any representations to the undersigned by Wednesday, 10 August, 2016.

Best regards, Ross Davidson, Senior Public Relations Manager, Centrica plc, +44 (0) 7557 617098, [www.centrica.com](http://www.centrica.com)





## Appendix B.3 SFF – Mr. John Watt via Email

**From:** Steven Alexander  
**Sent:** 09 August 2016 11:24  
**To:** Davidson, Ross

**Cc:** John Watt

**Subject:** RE: Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

Dear Ross,

On behalf of John and myself, thank you for the earlier correspondence sent to the Scottish Fishermen's Federation (SFF) in relation to Centrica North Sea Gas Ltd's draft Decommissioning Programmes for the Markham ST-1 installation and associated pipelines.

Given the locality of this particular Field, I can advise that the SFF is content to leave it with the National Federation of Fishermen's Organisations (NFFO) to respond to you on these plans.

Kind regards, Steven Alexander, Offshore Liaison, Scottish Fishermen's Federation  
24 Rubislaw Terrace, Aberdeen, AB10 1XE

---

**From:** Davidson, Ross  
**Sent:** 13 July 2016 09:55

**To:** John Watt

**Cc:** Axon, Simon; Aberdeen DC

**Subject:** Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

**Attachments:** Decommissioning Programmes, Comparative Assessment

Dear John,

Centrica North Sea Gas Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Gas Ltd hereby gives notice that from Wednesday, 13 July, 2016, the ST-1 Decommissioning Programmes can be viewed at the internet address:

[www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively, electronic copies of the Decommissioning Programmes and Comparative Assessment are attached to this email.

Separately you will receive a document transmittal from our document control department, please can you return this to acknowledge receipt.

Please can you confirm that you've received all the information you require, and if you have any questions or concerns, please make any representations to the undersigned by Wednesday, 10 August, 2016.

Best regards, Ross Davidson, Senior Public Relations Manager, Centrica plc, +44 (0) 7557 617098, [www.centrica.com](http://www.centrica.com)



## Appendix B.4 NIFPO - Mr. Ian Kelly via Email

**From:** Ian Kelly

**Sent:** 12 August 2016 09:34

**To:** Axon, Simon

**Subject:** RE: Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

Simon

As per phone call, this field is outside the main area of operation for our members and as such we have no comment to make on the proposals.

Ian

---

**From:** Davidson, Ross

**Sent:** 13 July 2016 09:52

**To:** [nifpo@btconnect.com](mailto:nifpo@btconnect.com)

**Cc:** Axon, Simon; Aberdeen DC

**Subject:** Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

**Attachments:** Decommissioning Programmes, Comparative Assessment

Dear Ian,

Centrica North Sea Gas Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Gas Ltd hereby gives notice that from Wednesday, 13 July, 2016, the ST-1 Decommissioning Programmes can be viewed at the internet address: [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively, electronic copies of the Decommissioning Programmes and Comparative Assessment are attached to this email.

Separately you will receive a document transmittal from our document control department, please can you return this to acknowledge receipt.

Please can you confirm that you've received all the information you require, and if you have any questions or concerns, please make any representations to the undersigned by Wednesday, 10 August, 2016.

Best regards, Ross Davidson, Senior Public Relations Manager, Centrica plc, +44 (0) 7557 617098, [www.centrica.com](http://www.centrica.com)



## Appendix B.5 Global Marine Systems Ltd – Mr John Wrottesley via Email

**From:** Wrottesley, John (GMSL)

**Sent:** 09 August 2016 20:52

**To:** Davidson, Ross

**Cc:** Axon, Simon

**Subject:** RE: Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

Dear Ross,

Thank you for the reminder.

I have not received any further comments from colleagues, and don't have any specific comments on the programme of works itself as no in-service submarine cables should be directly affected in the immediate vicinity. The nearest in-service fibre optic cable is SMW3 approximately 30km away from the Markham field. If any interaction were to be necessary in the course of engineering the project, then it would be necessary to liaise with specific cable owners. Contact details and general cable information for most systems can be found using KIS-ORCA cable awareness charts/interactive map <http://www.kis-orca.eu/map#.VPmDJHZFDIU>.

I also ask that when notice to mariners are arranged for any offshore works, that the kingfisher fortnightly bulletin be updated to include details of the works to inform sea users as well as additional notification to the relevant authorities and UKHO.

Please let me know if you need any further information or clarification.

Best regards, John

---

**From:** Davidson, Ross

**Sent:** 13 July 2016 09:52

**To:** John Wrottesley

**Cc:** Axon, Simon; Aberdeen DC

**Subject:** Submission of Draft ST-1 Decommissioning Programmes and Comparative Assessment

**Attachments:** Decommissioning Programmes, Comparative Assessment

Dear John,

Centrica North Sea Gas Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Gas Ltd hereby gives notice that from Wednesday, 13 July, 2016, the ST-1 Decommissioning Programmes can be viewed at the internet address: [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively, electronic copies of the Decommissioning Programmes and Comparative Assessment are attached to this email.

Separately you will receive a document transmittal from our document control department, please can you return this to acknowledge receipt.



Please can you confirm that you've received all the information you require, and if you have any questions or concerns, please make any representations to the undersigned by Wednesday, 10 August, 2016.

Best regards, Ross Davidson, Senior Public Relations Manager, Centrica plc, +44 (0) 7557 617098, [www.centrica.com](http://www.centrica.com)

## Appendix B.6 Markham Partners via Email

**From:** Rhijn, Jaap van  
**Sent:** 26 September 2016 10:49  
**To:** Axon, Simon  
**Cc:** Internal Comms  
**Subject:** RE: Markham ST-1 Decommissioning - Statutory Consultation & Partner Communications - Feedback?

Hi Simon,  
No comments or concerns noted.  
Best regards,  
Jaap

**From:** Rhijn, Jaap van  
**Sent:** 13 July 2016 08:19  
**To:** Various  
**Cc:** Various  
**Subject:** Markham ST-1 Decommissioning - Statutory Consultation & Partner Communications

Dear Markham Partners,  
Please be informed as follows.

**CENTRICA NORTH SEA LTD  
THE PETROLEUM ACT 1998  
MARKHAM ST-1 DECOMMISSIONING PROJECT**

Centrica North Sea Ltd has submitted, for the consideration of the Secretary of State for Energy and Climate Change, draft Decommissioning Programmes for the ST-1 installation and associated pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The assets covered by the Decommissioning Programmes are:

- The Markham ST-1 field, 120km offshore UK, block 49/5a and 49/10b in the southern North Sea, including the platform structure
- The pipelines connecting ST-1 to the nearby Markham J6A platform offshore Netherlands,
- The concrete mattresses and grout bags used as subsea pipeline stabilisation features.

Centrica North Sea Ltd hereby gives notice that a summary of the ST-1 Decommissioning Programmes can be viewed at the internet address: [www.centrica.com/decommissioning](http://www.centrica.com/decommissioning)

Alternatively, a hard copy of the Programmes can be inspected by contacting Ross Davidson (Ross.Davidson@centrica.com), Senior Public Relations Manager, at the following location during office hours:

Centrica, IQ Building, 15 Justice Mill Lane, Aberdeen, AB11 6EQ

A hard copy of the Programmes will also be made available at Great Yarmouth Community Library, Tolhouse Street, Great Yarmouth, Norfolk, NR30 2SH.

Representations regarding the ST-1 Decommissioning Programmes should be submitted in writing to Ross Davidson, Senior Public Relations Manager, at the above address.

Representations should be received by Wednesday, 10 August 2016, and should state the grounds upon which any representations are being made.

Date: 13 July 2016

Ross Davidson, Senior Public Relations Manager, Centrica, iQ Building, 15 Justice Mill Lane,



Aberdeen, AB11 6EQ

Please note that when Centrica North Sea Limited submits the Decommissioning Programmes for final approval we will be seeking a formal letter of support from each of the Markham Partners as noted in the Section 29 Notice. It is our expectation that submission of the final version to the UK Secretary of State for approval will occur circa December 2016. We shall keep you informed of developments, and if useful can provide a specimen letter of support on request.

Best regards,  
Jaap