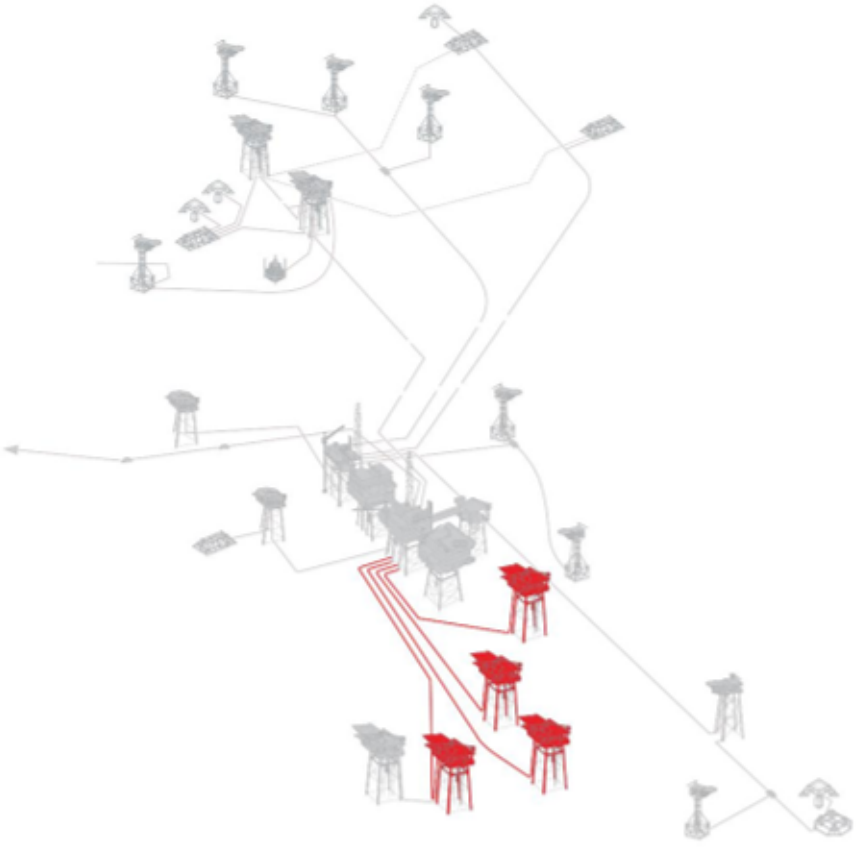
CHRYSAOR



Decommissioning Programmes
LOGGS Satellites V-Fields Area, LDP4

Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines

FINAL
08 April 2022

DOCUMENT CONTROL

Document Number		CYR-SNS-L-XX-P-PM-12-00001	
Document Classification		Public	
Document Ownership		Decommissioning	
Prepared by	S. Axon	Date: 08/04/22	S. Axon
Reviewed by	M. Burnett / C. Marston	Date: 08/04/22	M. Burnett, C. Marston
Approved by	R. Tocher	Date: 08/04/22	R. Tocher

REVISION RECORD

Revision No	Description of Revision	Date
1	Issued for Internal Review	25/06/20
2	Issued to OPRED for Review and Comment	13/07/20
3	Updated and re-issued to OPRED	23/04/21
4	Issued for Statutory Consultation	20/09/21
5	Updated following Statutory Consultation	21/01/22
6	FINAL Version	08/04/22

DISTRIBUTION

Name	Position	Company	No. of Copies
R. Tocher	Decommissioning Manager	Chrysaor Production (U.K.) Limited	1 electronic
L. Harpley	Business Manager	BP Exploration Operating Company Ltd	1 electronic
F. Livingston	Senior Decommissioning Mgr	OPRED	1 electronic
I. Rowe	General Manager	NFFO	1 electronic
S Alexander	Managing Director	SFF	1 electronic
R. James	Secretary	NIFPO	1 electronic
A. Riddell	Permitting Manager	Global Marine Group	1 electronic
	Head Librarian	Great Yarmouth Community Library	1 hardcopy

TABLE OF CONTENTS

INST = Installations; P/L = Pipelines			INST	P/L
1	**EXECUTIVE SUMMARY**	**10**	✓	✓
1.1	COMBINED DECOMMISSIONING PROGRAMMES	10	✓	✓
1.2	REQUIREMENT FOR DECOMMISSIONING PROGRAMMES	10	✓	✓
1.3	INTRODUCTION	10	✓	✓
1.4	DECOMMISSIONING OVERVIEW	13	✓	✓
1.5	SUMMARY OF PROPOSED DECOMMISSIONING PROGRAMMES	17	✓	✓
1.6	FIELD LOCATION INCLUDING FIELD LAYOUT AND ADJACENT FACILITIES	20	✓	✓
1.7	INDUSTRIAL IMPLICATIONS	26	✓	✓
2	**DESCRIPTION OF ITEMS TO BE DECOMMISSIONED**	**27**	✓	✓
2.1	SURFACE FACILITIES (TOPSIDES AND JACKETS)	27	✓	
2.2	PIPELINES INCLUDING STABILISATION FEATURES	29		✓
2.3	WELLS	40	✓	
2.4	INVENTORY ESTIMATES	41	✓	✓
3	**REMOVAL AND DISPOSAL METHODS**	**42**	✓	✓
3.1	TOPSIDES DECOMMISSIONING	42	✓	
3.2	JACKET DECOMMISSIONING	44	✓	
3.3	PIPELINES	46		✓
3.4	PIPELINE STABILISATION FEATURES	49		✓
3.5	WELLS	51	✓	
3.6	WASTE STREAMS	52	✓	
4	**ENVIRONMENTAL APPRAISAL OVERVIEW**	**53**	✓	✓
4.1	ENVIRONMENTAL SENSITIVITIES (SUMMARY)	53	✓	✓
4.2	POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MANAGEMENT	57	✓	✓
5	**INTERESTED PARTY CONSULTATIONS**	**60**	✓	✓
5.1	CONSULTATIONS SUMMARY	60	✓	✓
6	**PROGRAMME MANAGEMENT**	**61**	✓	✓
6.1	PROJECT MANAGEMENT AND VERIFICATION	61	✓	✓
6.2	POST-DECOMMISSIONING DEBRIS CLEARANCE AND VERIFICATION	61	✓	✓
6.3	SCHEDULE	61	✓	✓
6.4	COSTS	63	✓	✓
6.5	CLOSE OUT	63	✓	✓
6.6	POST DECOMMISSIONING MONITORING AND EVALUATION	63	✓	✓
7	**SUPPORTING DOCUMENTS**	**64**	✓	✓
APPENDIX 1	**PIPELINE BURIAL PROFILES**	**65**	✓	✓
APPENDIX 1.1	PL456 & PL457 BURIAL PROFILE	65		✓
APPENDIX 1.2	PL458 & PL459 BURIAL PROFILE	67		✓
APPENDIX 1.3	PL460 & PL461 BURIAL PROFILE	69		✓
APPENDIX 1.4	PL470 & PL471 BURIAL PROFILE	71		✓
APPENDIX 2	**PIPELINE SURVEY HISTORY**	**73**		✓
APPENDIX 2.1	PL456 & PL457 SURVEY HISTORY	73		✓
APPENDIX 2.2	PL457 & PL458 SURVEY HISTORY	73		✓
APPENDIX 2.3	PL457 & PL458 SURVEY HISTORY	74		✓
APPENDIX 2.4	PL470 & PL471 SURVEY HISTORY	74		✓
APPENDIX 3	**PUBLIC & CONSULTEE CORRESPONDENCE**	**75**	✓	✓
APPENDIX 3.1	PUBLIC NOTICES	75	✓	✓
APPENDIX 3.2	CORRESPONDENCE WITH STATUTORY CONSULTEES	76	✓	✓
APPENDIX 4	**PARTNER LETTERS OF SUPPORT**	**77**	✓	✓
APPENDIX 4.1	BP EXPLORATION (ALPHA)	77	✓	✓
APPENDIX 4.2	ARCO BRITISH LIMITED LLC	78	✓	✓
APPENDIX 4.3	BP EXPLORATION BETA LIMITED	79	✓	✓
APPENDIX 4.4	BRITOIL LIMITED	80	✓	✓
APPENDIX 4.5	CHRYSAOR (U.K.) ALPHA LIMITED	81	✓	✓
APPENDIX 4.6	CHRYSAOR DEVELOPMENTS LIMITED	82	✓	✓
APPENDIX 4.7	CHRYSAOR PETROLEUM LIMITED	83	✓	✓

FIGURES AND TABLES

Figure 1.1.1: The difference between pipeline burial, exposures, and spans 9
Figure 1.1.2: The length of exposure may include a span length 9
Figure 1.6.1: V-fields Location in UKCS 20
Figure 1.6.2: V-fields Development Layout 21
Figure 1.6.3: Adjacent facilities (V-fields installations and pipelines in red) 24
Figure 1.6.4: Adjacent facilities in relation to non-oil and gas features and infrastructure 25
Figure 2.1.1: Photograph of Vanguard QD 28
Figure 2.1.2: Photograph of North Valiant SP 28
Figure 2.1.3: Photograph South Valiant TD 28
Figure 2.1.4: Photograph of Vulcan RD 28
Figure 2.2.1: PL456 & PL457 Approaches at Vanguard QD Platform 32
Figure 2.2.3: PL460 & PL461 Approaches at South Valiant TD Platform 34
Figure 2.2.4: PL458 & PL459 Approaches at Vulcan RD Platform 35
Figure 2.2.5: V-field pipeline Approaches at LOGGS PP 36
Figure 2.4.1: Pie-chart of estimated installation inventory 41
Figure 2.4.2: Pie-chart of estimated pipeline inventory, excluding deposited rock 41
Figure 3.1.1: Typical V-field Installation - Topsides 42
Figure 3.2.1: Vulcan RD Jacket (Others Similar) 45
Figure 3.2.2: Subsea Template at North Valiant SP and Vulcan RD Jackets 45
Figure A6.6.1: PL456 & PL457 Seabed & Burial Profile 65
Figure A6.6.2: PL456 & PL457 Depth of Cover Profile 66
Figure A6.6.3: PL458 & PL459 Seabed & Burial Profile 67
Figure A6.6.4: PL458 & PL459 Depth of Cover Profile[6] 68
Figure A6.6.5: PL460 & PL461 Seabed & Burial Profile 69
Figure A6.6.6: PL460 & PL461 Depth of Cover Profile[6] 70
Figure A6.6.7: PL470 & PL471 Seabed & Burial Profile 71
Figure A6.6.8: PL470 & PL471 Depth of Cover Profile[6] 72

Table 1.4.1 Installations Being Decommissioned 13
Table 1.4.2: Installation Section 29 Notice Holders Details – Vanguard QD 14
Table 1.4.3: Installation Section 29 Notice Holders Details – North Valiant SP 14
Table 1.4.4: Installation Section 29 Notice Holders Details – South Valiant TD 14
Table 1.4.5: Installation Section 29 Notice Holders Details – Vulcan RD 14
Table 1.4.6: Pipelines Being Decommissioned 15
Table 1.4.7: Pipeline Section 29 Notice Holders Details – Vanguard QD 15
Table 1.4.8: Pipeline Section 29 Notice Holders Details – North Valiant SP 15
Table 1.4.9: Pipeline Section 29 Notice Holders Details – South Valiant TD 15
Table 1.4.10: Pipeline Section 29 Notice Holders Details – Vulcan RD 16
Table 1.5.1: Summary of Decommissioning Programmes 17
Table 1.6.1: List of Adjacent Facilities 22
Table 2.1.1: Surface Facilities Information 27
Table 2.1.2: Subsea Templates 27
Table 2.2.1: Pipeline / Flowline / Umbilical Information 29
Table 2.2.2: Subsea Pipeline Stabilisation Features 37
Table 2.3.1: Well Information 40
Table 3.1.1: Cleaning of Topsides for Removal 43
Table 3.1.2: Topsides Removal Methods 43
Table 3.2.1: Jacket Removal Methods 44
Table 3.3.1: Pipeline or Pipeline Groups - Decommissioning Options 46
Table 3.3.2: Outcomes of Comparative Assessment 47
Table 3.4.1: Pipeline Stabilisation Features 49
Table 3.5.1: Well Decommissioning 51
Table 3.6.1: Waste Stream Management Method 52
Table 3.6.2: Inventory Disposition 52
Table 4.1.1: Environmental Impact Management 53
Table 4.2.1: Environmental Impact Management 57
Table 5.1.1: Summary of Stakeholder Comments 60

Table A6.6.1: PL456 & PL457 Survey History 73
Table A6.6.2: PL458 & PL459 Survey History 73
Table A6.6.3: PL460 & PL461 Survey History 74
Table A6.6.4: PL470 & PL471 Survey History 74

TABLE OF TERMS AND ABBREVIATIONS

Abbreviation	Explanation
AB	Deprecated term 'Abandoned' but included in Table 2.3.1 to indicate extent to which wells have been decommissioned (Phase 1, Phase 2, etc.)
ADJL	Adjacent seabed (as may be referred to in the pipeline burial profiles)
Approaches	Refer to pipelines as they come nearer to the risers on the installations
Arco British Limited LLC	Subsidiary wholly owned by bp
bp	BP Company (formerly The British Petroleum Company plc and BP Amoco plc)
buried	native material is covered in seabed sediment
CA	Comparative Assessment (Report)
Chrysaor	Chrysaor Production (UK) Limited
Crossing	Pipeline crossing. A pipeline with a higher identification number crosses over the top of a pipeline with a lower identification number. Typically pipeline crossings might be protected with concrete mattresses and overlain with deposited rock
CSV	Construction Support Vessel
CTE	Coal Tar Enamel (pipeline coating)
Cut and lift	The 'cut and lift' method of removing trenched and buried pipelines would involve excavating the pipelines from within the seabed and thereafter cutting the pipeline into recoverable and transportable lengths.
CWC	Concrete Weight Coated
DOC	The blue line on the burial profiles shows the profile of cover. The area between the blue line and maroon line (DOL) shows the depth of sediment above the top of the pipeline.
DOL	Pipeline trench profile; depth of lowering to top of pipe.
DP	Decommissioning Programme
EA	Environmental Appraisal
EMS	Environmental Management System
ESDV	Emergency Shutdown Valve
Exposed	Visible without protection and recognisable
Exposure	An exposure occurs when the 'crown' of a pipeline or umbilical can be seen. This does not generally mean it is a hazard
FBE	Fusion Bonded Epoxy
FishSAFE	The FishSAFE database contains a host of oil & gas structures, pipelines, and potential fishing hazards. This includes information and changes as the data are reported for pipelines and cables, suspended wellheads pipeline spans, surface & subsurface structures, safety zones& pipeline gates (www.fishsafe.eu)
FPAL	First Point Assessment Limited (UK)
Free-span	Sometimes referred to as a 'span'. Similar to an exposure except that the whole of the section of pipeline is visible above the seabed rather than just part of it. Once the height and length dimensions meet or exceed certain criteria it becomes a potential snagging hazard and the span becomes reportable to FishSAFE and is called a 'reportable span'
Full removal	The full removal options for decommissioning the pipelines would most likely involve using the 'cut and lift' method of removal due to the presence of concrete weight coating and piggyback clamps
GMG	Global Marine Group
HLV	Heavy Lift Vessel
HSE	Health & Safety Executive
JNCC	Joint Nature Conservation Committee

Abbreviation	Explanation
JUWB	Jack-up Work Barge or Accommodation Work Vessel
kg	kilogram
km	kilometre
KP	Kilometre Point usually measured from point of origin, the start of the pipeline
LAT	Lowest Astronomical Tide
Leave *in situ*	Leave *in situ* for pipelines would involve leaving pipelines that are mostly trenched and buried *in situ* and risk assessing any exposures and spans
lg	Long (refer burial profiles in Appendix 1
LOGGS	Lincolnshire Offshore Gas Gathering System
LOGGS Installation	The LOGGS Installation comprises LOGGS PA, PC, PP, PR and North Valiant (1) PD. All installations are bridge-linked
LOGGS PA	LOGGS PA Accommodation Platform
LOGGS PC	LOGGS PC Compression Platform
LOGGS PP	LOGGS PP Processing Platform
LOGGS PR	LOGGS PR Riser Platform
North Valiant PD	North Valiant (1) PD Platform, bridge linked to LOGGS PP
m	metres
MAT, SAT	Master Application Template, Supplementary Application Template
MCV	Monohull Crane Vessel
MCZ	Marine Conservation Zone
MeOH	Methanol
MSB	Mean Seabed (as may be referred to in the pipeline burial profiles)
n/a	Not Applicable
N,S,E,W	North, South East & West
North Valiant SP	Second North Valiant (2) SP installation comprising small topsides and jacket held in location using 4x piles
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NORM	Naturally Occurring Radioactive Material
NTS	Not To Scale (as indicated on various schematics)
NUI	Normally Unattended Installation
OGA	Oil and Gas Authority
OGUK	Oil and Gas UK
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo-Paris Convention
Partial removal	The partial removal decommissioning option for pipelines would involve excavating trenched and buried pipelines local to the exposed ends of the pipeline and thereafter effecting removal of the section of pipeline using the 'cut and lift' method. Typically, the excavated locations and cut pipeline ends in the seabed may need to be remediated in some way, either by backfilling the excavated material or by depositing rock. Note that backfilling of excavated material may not be viable option in the mobile seabed in the southern North Sea
Piggybacked	Pipeline clamped or connected to another pipeline along its length
Pipeline crossing	A pipeline with a higher identification number crosses over the top of a pipeline with a lower identification number. Typically, pipeline crossings might be protected with concrete mattresses and overlain with deposited rock
PL	Pipeline identification numbers

Abbreviation	Explanation
Pltfm	Abbreviation used for "Platform" in Table 1.6.1
Platform	Installation, typically comprising topsides and jacket
PON	Petroleum Operations Notice
PPE	Personal Protective Equipment
PWA	Pipeline Works Authorisation
Riser	Pipe that connects the pipeline to the topsides' pipework
SAC	Special Areas of Conservation
SFF	Scottish Fishermen's Federation
Shell	Shell U.K. Limited
SLV	Shear Leg Vessel
SNS	Southern North Sea
SPA	Special Protection Area
Span	Sometimes referred to as a 'free-span'. Similar to an exposure except that the whole of the section of pipeline is visible above the seabed rather than just part of it. Once the height and length dimensions meet or exceed certain criteria it becomes a potential snagging hazard, where the span becomes reportable to FishSAFE and is called a 'reportable span'
SSCV	Semi-Submersible Crane Vessel
South Valiant TD	Installation comprising small topsides and jacket held in location using 4x piles
Te	Tonne(s)
TOP	Top of Pipe
Trenched and buried	Pipeline installed into a trench and covered in seabed sediment. Refer Figure 1.1.1.
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
V-fields	Collectively along with the Vulcan UR installation, Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD are known as the V-fields satellites
Vanguard QD	Installation comprising small topsides and jacket held in location using 4x piles
Vulcan RD	First Vulcan (Vulcan (1) RD) installation comprising small topsides and jacket held in location using 4x piles
Vulcan UR	Second Vulcan (i.e. Vulcan (2) UR) installation comprising small topsides and jacket held in location using 4x piles
WGS84	World Geodetic System 84 is the reference coordinate system used by the Global Positioning System

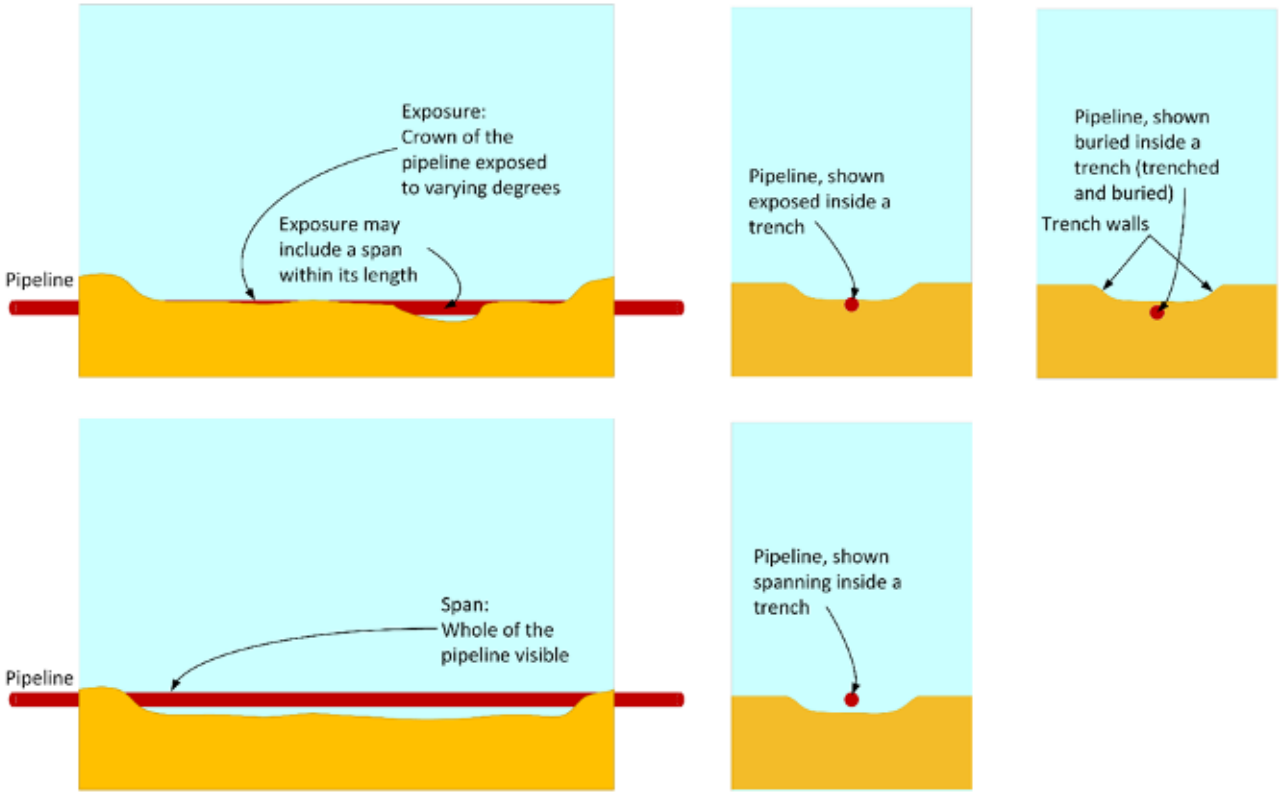


Figure 1.1.1: The difference between pipeline burial, exposures, and spans[1]

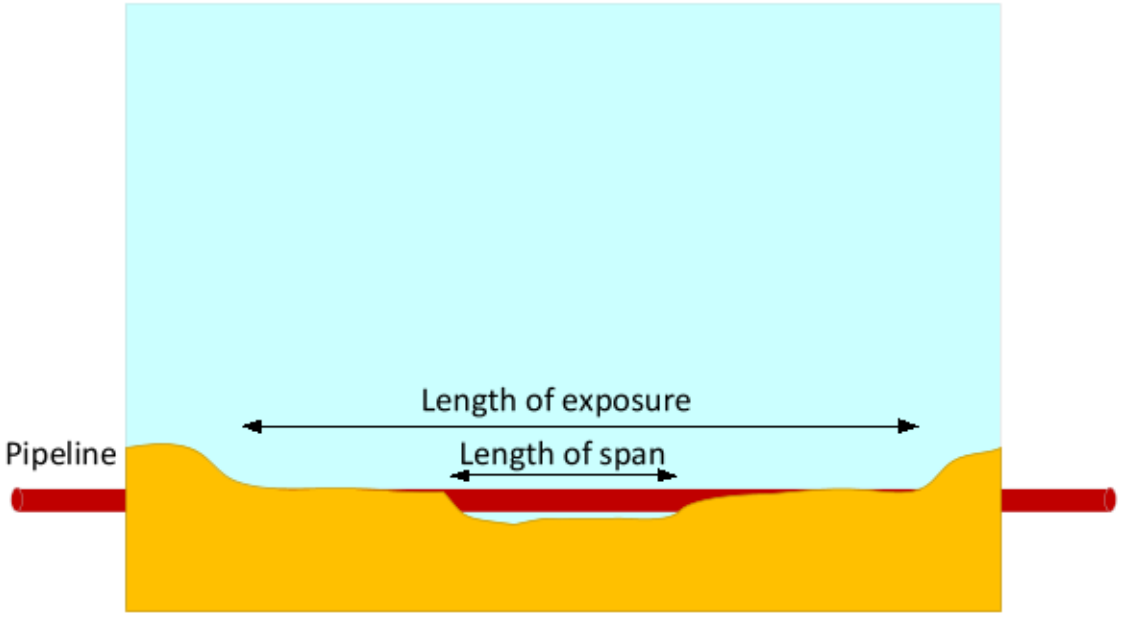


Figure 1.1.2: The length of exposure may include a span length[2]

[1] Trench walls may or may not be prominent;
[2] In the burial profiles in Appendix 1 although the length of an exposure and a span may be quoted separately, the length of the span may already be included in the length quoted for the exposure.

1 Executive Summary

1.1 Combined Decommissioning Programmes

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

- Vanguard QD installation;
- The pipelines associated with Vanguard QD, PL456 and PL457;
- North Valiant SP installation;
- The pipelines associated with North Valiant SP, PL470 and PL471;
- South Valiant TD installation;
- The pipelines associated with South Valiant TD, PL460 and PL461;
- Vulcan RD installation;
- The pipelines associated with Vulcan RD PL458 and PL459.

Collectively along with the Vulcan UR installation – which is dealt with separately in the LDP1 Decommissioning Programmes [5], these installations are known as the LOGGS V-field satellites due to the commonality of design. Although the decommissioning of these installations and pipelines is being treated in this document as a standalone project, the operational phase will be carried out as part of a wider decommissioning campaign in the LOGGS area. Chrysaor Production (U.K.) Limited (Chrysaor) shall also continue to explore cost saving synergies with other projects. The LDP1 Decommissioning Programmes were approved in November 2017.

1.2 Requirement for Decommissioning Programmes

Installations: In accordance with the Petroleum Act 1998, Chrysaor as operator of the Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD installations, and on behalf of the Section 29 notice holders (Table 1.4.2, Table 1.4.3, Table 1.4.4 & Table 1.4.5), is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installations detailed in Section 2 of this document. Partner Letters of Support will be added to the Decommissioning Programmes following statutory consultation.

Pipelines: In accordance with the Petroleum Act 1998, Chrysaor as operator of the Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD pipelines, and on behalf of the Section 29 notice holders (Table 1.4.7, Table 1.4.8, Table 1.4.9 & Table 1.4.10), is applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. Partner Letters of Support will be added to the Decommissioning Programmes following statutory consultation.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and OPRED guidance notes [7]. The schedule outlined in this document is for a decommissioning project which commenced with the pipeline flushing and platform removal preparation from an Accommodation Work Vessel in 2018. Well decommissioning also commenced in 2018 and decommissioning activities will continue for a further 9 years until completion in 2027. Note that the Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD wells have already been decommissioned, although three conductor stubs remain: 49/16-Q1 at Vanguard QD platform, and 49/16-S2 and 49/16-S4 at North Valiant SP platform. This is because they could not be retrieved while the jackets remain on location. These conductor stubs will be recovered at the same time as the jackets.

1.3 Introduction

1.3.1 Overview of LOGGS

Chrysaor's Lincolnshire Offshore Gas Gathering System (LOGGS) was originally developed to process and transport gas from four fields: Vulcan, North and South Valiant and Vanguard, collectively known as the V-fields. Since the initial development, additional Chrysaor operated fields Jupiter (Ganymede, Europa, Callisto, NW Bell), Vampire, Viscount and Saturn (Saturn, Mimas, and Tethys) were added to the system.

LOGGS comprises a central complex, known as the LOGGS Installation - including the North Valiant PD Wellhead Platform, and the products from the V-fields used to be exported to the installation. The collected products used to be exported from the LOGGS Installation via PL454, a 36" trunkline to the Theddlethorpe Gas Terminal. Methanol and chemicals used to be imported at LOGGS PP from Theddlethorpe via PL455, a 4" pipeline.

The LOGGS Installation and pipelines PL454 and PL455 are addressed in LDP5 Decommissioning Programmes submitted separately [1]. The LDP5 Decommissioning Programmes were approved April 2021.

1.3.2 Vanguard QD

The Vanguard gas field was discovered in 1982 and lies within the main Southern North Sea (SNS) Gas Province in UK Block 49/16a. The field lies ~117km due East from the Theddlethorpe Gas Terminal and ~72km North East of the North Norfolk coast in a water depth of ~29m.

It was developed using a single installation, Vanguard QD. The field achieved first production in 1988. The installation is a normally unattended installation (NUI) supported by a conventional four-legged piled wellhead steel jacket. Gas from the Vanguard QD installation used to be exported to LOGGS PP via PL456, a 10" concrete coated pipeline. This pipeline is piggybacked by PL457, a 3" pipeline that used to supply methanol and chemicals from LOGGS PP. The Cessation of Production justification for Vanguard was approved by the Oil and Gas Authority on 20 Sept 2016.

1.3.3 North Valiant SP

The North Valiant field was discovered in 1970 and lies within the main Southern North Sea (SNS) Gas Province in UK Blocks 49/16. The field lies ~119km East South East from the Theddlethorpe Gas Terminal and ~69km North East of the North Norfolk coast in water depths between 21.9m and 28.3m.

It was developed using two installations, the North Valiant PD and North Valiant SP. The field achieved first production in 1988. Both installations are normally unattended installations (NUIs) supported by conventional four-legged piled wellhead steel jackets. Gas from the North Valiant SP installation used to be exported to LOGGS PP via PL470, a 10" concrete coated pipeline. This pipeline is piggybacked by PL471, a 3" pipeline that used to supply methanol and chemicals from LOGGS PP. The Cessation of Production justification for North Valiant was approved by the Oil and Gas Authority on 20 Sept 2016.

Decommissioning of the North Valiant PD installation is addressed in LDP5 Decommissioning Programmes submitted separately [1].

1.3.4 South Valiant TD

The South Valiant gas field was discovered in 1970 and lies within the main Southern North Sea (SNS) Gas Province in UK Blocks 49/21a and 49/21b. The field lies ~120km East South East from the Theddlethorpe Gas Terminal and ~67km North East of the North Norfolk coast in a water depth of ~34.1m.

It was developed using a single installation, the South Valiant TD. The field achieved first production in 1988. The installation is a normally unattended installation (NUI) supported by conventional four-legged piled wellhead steel jacket. Gas from the South Valiant TD installation used to be exported to LOGGS PP via PL460, a 10" concrete coated pipeline. This pipeline is piggybacked by PL461, a 3" pipeline that used to supply methanol and chemicals from LOGGS PP. The Cessation of Production justification for South Valiant was approved by the Oil and Gas Authority on 24 Aug 2017.

1.3.5 Vulcan RD

The Vulcan gas field was discovered in 1983 and lies within the main Southern North Sea (SNS) Gas Province and straddles UK Blocks 49/21a and 48/25b. The field lies ~120km East South East from the Theddlethorpe Gas Terminal and ~57km North East of the North Norfolk coast in a water depth of ~31.7m.

It was developed using two installations, the Vulcan UR, and Vulcan RD. The field achieved first production in 1988. Both installations are normally unattended installations (NUIs) supported by conventional four-legged piled wellhead steel jackets. Gas from Vulcan UR used to be exported to Vulcan RD via PL462, a 12" concrete coated pipeline, and methanol used to be imported via PL463, a 3" pipeline. The gas from the Vulcan UR (via Vulcan RD) and Vulcan RD installations used to be exported to LOGGS PP via PL458, an 18" concrete coated

pipeline. This pipeline is piggybacked by PL459, a 3" pipeline that used to supply methanol and chemicals from LOGGS PP. The Cessation of Production justification for Vulcan was approved by the Oil and Gas Authority on 5 May 2017.

The Vulcan UR installation and associated pipelines (PL462 & PL463) are addressed in LDP1 Decommissioning Programmes submitted separately and approved in November 2017 [5].

1.3.6 Submission of Decommissioning Programmes

Following public, stakeholder and regulatory consultation, the Decommissioning Programmes will be submitted without derogation and in full compliance with the OPRED guidance notes [7]. The Decommissioning Programmes explain the principles of the removal activities and are supported by an environmental appraisal [3]. The Decommissioning Programmes for the pipelines are also supported by a comparative assessment [4].

1.4 Decommissioning Overview

1.4.1 Installations

Table 1.4.1 Installations Being Decommissioned

Field Names		Quad / Block		Surface Installations					Distances	
Field Installation ID	Water Depth	Type of Production	UKCS Block(s)	Number	Function	Type	Topsides Weight (Te)	Jacket Weight (Te)[1]	Distance to Median (Netherlands)	Distance from nearest UK coastline
Vanguard QD	~29.0m	Gas, Condensate	49/16a	1	Wellhead Platform	Steel Jacket (Vanguard QD)	946	1,863	~61km	~72km
North Valiant SP	~28.3m	Gas, Condensate	49/16	1	Wellhead Platform	Steel Jacket (North Valiant SP)	968	1,862	~66km	~69km
South Valiant TD	~34.1m	Gas, Condensate	49/21a, 49/21b	1	Wellhead Platform	Steel Jacket (South Valiant TD)	845	1,863	~63km	~67km
Vulcan RD	~31.7m	Gas, Condensate	49/21a, 48/25b	1	Wellhead Platform	Steel Jacket (Vulcan RD)	970	1,868	~69km	~57km

Drill Cuttings			Subsea Installations			Number of Wells	
Field Installation ID	Drill Cuttings Pile(s)	Total Estimated Volume (m^3)	Number	Type[2]	Template Weight (Te)	Platform	Subsea
Vanguard QD	n/a	n/a	n/a	n/a		5	n/a
North Valiant SP	n/a	n/a	1	Conductor Template	113	9	n/a
South Valiant TD	n/a	n/a	n/a	n/a		6	n/a
Vulcan RD	n/a	n/a	1	Conductor Template	113	12	n/a

NOTES

1. Include weight of piles;
2. The conductor templates are located on the seabed within the confines of the jacket.

Table 1.4.2: Installation Section 29 Notice Holders Details – Vanguard QD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
BP Exploration (Alpha) Limited	01021007	50.0%
Chrysaor Developments Limited	02180666	50.0%
Chrysaor Petroleum Limited	01247477	0.0%
Chrysaor Production (U.K.) Limited (Operator)	00524868	0.0%

Table 1.4.3: Installation Section 29 Notice Holders Details – North Valiant SP		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
BP Exploration (Alpha) Limited	01021007	38.866%
Britoil Limited	SC077750	0.0%
Chrysaor Developments Limited	02180666	61.134%
Chrysaor Production (U.K.) Limited (Operator)	00524868	0.0%

Table 1.4.4: Installation Section 29 Notice Holders Details – South Valiant TD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
Arco British Limited LLC	FC005677	12.5%
BP Exploration Beta Limited	00895797	37.5%
Chrysaor Developments Limited	02180666	12.5%
Chrysaor Petroleum Limited	01247477	25.0%
Chrysaor Production (U.K.) Limited (Operator)	00524868	0.0%
Chrysaor (U.K.) Alpha Limited	02374592	12.5%

Table 1.4.5: Installation Section 29 Notice Holders Details – Vulcan RD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
Arco British Limited LLC	FC005677	7.875%
BP Exploration (Alpha) Limited	01021007	42.125%
Chrysaor Developments Limited	02180666	7.875%
Chrysaor Production (U.K.) Limited (Operator)	00524868	34.250%
Chrysaor (U.K.) Alpha Limited	02374592	7.875%

1.4.2 Pipelines

Table 1.4.6: Pipelines Being Decommissioned		
Field / Installation ID	**Number of Pipelines**	
Vanguard QD	2	Refer Table 2.2.1
Vulcan RD	2	Refer Table 2.2.1
South Valiant TD	2	Refer Table 2.2.1
North Valiant SP	2	Refer Table 2.2.1

Table 1.4.7: Pipeline Section 29 Notice Holders Details – Vanguard QD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
BP Exploration (Alpha) Limited	01021007	50.0%
Chrysaor Developments Limited	02180666	50.0%

Table 1.4.8: Pipeline Section 29 Notice Holders Details – North Valiant SP		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
BP Exploration (Alpha) Limited	01021007	38.866%
Britoil Limited	SC077750	0.0%
Chrysaor Developments Limited	02180666	61.134%

Table 1.4.9: Pipeline Section 29 Notice Holders Details – South Valiant TD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
Arco British Limited LLC	FC005677	12.5%
BP Exploration Beta Limited	00895797	37.5%
Chrysaor Developments Limited	02180666	12.5%
Chrysaor Petroleum Limited	01247477	25.0%
Chrysaor (U.K.) Alpha Limited	02374592	12.5%

Table 1.4.10: Pipeline Section 29 Notice Holders Details – Vulcan RD		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
Arco British Limited LLC	FC005677	7.875%
BP Exploration (Alpha) Limited	01021007	42.125%
Chrysaor Developments Limited	02180666	7.875%
Chrysaor Production (U.K.) Limited (Operator)	00524868	34.250%
Chrysaor (U.K.) Alpha Limited	02374592	7.875%

1.5 Summary of Proposed Decommissioning Programmes

Table 1.5.1: Summary of Decommissioning Programmes	
Proposed Decommissioning Solution	**Reason for Selection**
1. Topsides (Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD)	
Complete removal and recycling. The topsides will be removed and recovered to shore and recycled. Environmental permit applications required for work associated with removal of the topsides will be applied for.	Allows jacket to be removed and maximises recycling of materials.
2. Jackets (Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD)	
Complete removal and recycling. The leg piles will be cut 3.0m below seabed and the jacket(s) will be removed and recovered to shore for recycling. Environmental permit applications required for work associated with removal of the jacket(s) will be applied for.	To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials.
3. Pipelines (Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD)	
PL456 & PL457. **Leave *in situ*.** These pipelines have been flushed and will be left buried *in situ*. At Vanguard QD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~10m long) and exposed 3" flexible pipespools (~13m) to shore. Lengths include the freespan 5.2m long. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~15m long) and exposed 3" flexible pipespools (~19m) to shore. Lengths include the freespan 9.1m long. If the 14.1m long freespan (FS 14.1 – refer Figure A6.6.8) on approach to LOGGS PP is found to be present during decommissioning activities, it will also be removed with deposited rock being used to bury each end of the removed section. Up to 25Te of rock will be deposited to bury each cut pipeline end, although the amount used will be kept to a practical minimum. If exposed, the grout bags supporting the pipelines near the risers will be removed to shore. Pipeline stabilisation materials that are buried such as scour protection concrete mattresses and any grout bags between them will be left *in situ*. The pipelines have already been flushed and cleaned. Any permit applications required for work associated with pipeline cutting and removal will be submitted.	Outside the 500m safety zones the pipelines will already have been exposed to fishing activity. Apart from the freespans on the end approaches to the platforms only the 18m long freespan at KP0.544 is currently reportable to FishSAFE. The two freespans on approach to the platforms will be removed, leaving one reportable freespan 18m long at KP0.544 which will remain *in situ*. Most of the length of the pipelines are sufficiently buried and stable. Following decommissioning, although the pipelines will likely continue to suffer from exposures (8x total length ~273m) and freespans (3x total length ~22.5m), they have not posed a hazard to marine users. Minimal seabed disturbance, lower energy usage, reduced risk to personnel engaged in the activity. Reduces the requirement for the introduction of new material such as deposited rock to the North Norfolk Sandbanks and Saturn Reef Special Area of Conservation (SAC). Given the mobile nature of the seabed, monitoring will be used to determine the extent of change to freespans and to confirm that the pipelines remain buried. This will be completed to a schedule agreed with OPRED.
PL458 & PL459. **Leave *in situ*.** These pipelines have been flushed and will be left buried *in situ*;	The reasons for taking this approach are the same as for PL456 & PL457.

Table 1.5.1: Summary of Decommissioning Programmes	
Proposed Decommissioning Solution	**Reason for Selection**
At Vulcan RD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~7m long) and exposed 3" flexible pipespools (~9m) to shore. Lengths include the freespan 8m long. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~29m long) and exposed 3" flexible pipespools (~36m) to shore. Length include the freespan 11.7m long. Up to 25Te of rock will be deposited to bury each cut pipeline end, although the amount used will be kept to a practical minimum. If exposed, the grout bags supporting the pipelines near the risers will be removed to shore. Pipeline stabilisation materials that are buried such as scour protection concrete mattresses and any grout bags between them will be left *in situ*. The pipelines have already been flushed and cleaned. Any permit applications required for work associated with pipeline cutting and removal will be submitted.	The two freespans on approach to the platforms will be removed. Following decommissioning, exposures 20x total length up to ~120m and freespans 5x total length ~30m will likely be present. All remaining exposures are quoted as being <5m long. None of the remaining 5x freespans are reportable to FishSAFE.
PL460 & PL461. **Leave *in situ*.** These pipelines have been flushed and will be left buried *in situ*. At South Valiant TD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial in the rock. Completely remove exposed 10" pipespools (~40m long) and exposed 3" flexible pipespools (~50m) to shore. Remove the exposed concrete mattress on top of the pipeline to shore to allow access to the full length. Lengths include 4x freespans 10m, 4m, 1m and 6m long respectively. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~34m long) and exposed 3" flexible pipespools (~43m) to shore. Lengths include the freespan 9m long. Up to 25Te of rock will be deposited to bury each cut pipeline end, although the amount used will be kept to a practical minimum. If exposed, the grout bags supporting the pipelines near the risers will be removed to shore. Pipeline stabilisation materials that are buried such as scour protection concrete mattresses and any grout bags between them will be left *in situ*. The pipelines have already been flushed and cleaned. Any permit applications required for work associated with pipeline cutting and removal will be submitted.	The reasons for taking this approach are the same as for PL456 & PL457. The 5x freespans on approach to the platforms will be removed. Following decommissioning activities, exposures 16x total length up to ~80m and freespans 1x total length ~3m will likely be present. All exposures are quoted as <5m long. The remaining freespan is not reportable to FishSAFE.
PL470 & PL471. **Leave *in situ*.** These pipelines have been flushed and will be left buried *in situ*. At North Valiant SP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~24m long) and exposed 3" flexible pipespools (~29m) to shore. Lengths include freespan 23.6m long. At LOGGS PP sever the pipelines at each end of the exposed	The reasons for taking this approach are the same as for PL456 & PL457. The two freespans on approach to the platforms will be removed as will the reportable exposure 32.6m long between KP4.155 and KP4.188 that includes a freespan 27.4m long if it is found to be present during decommissioning activities.

Table 1.5.1: Summary of Decommissioning Programmes	
Proposed Decommissioning Solution	**Reason for Selection**
length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~28m long) and exposed 3" flexible pipespools (~35m) to shore. Remove the exposed concrete mattress on top of the pipeline to shore to allow access to the full length. Lengths include freespan 6.18m long. If the 32.6m long exposure (EXP 32.6, including 27.4m long freespan (FS 27.4 – refer Figure A6.6.8) at KP 4.155 is found to be present during decommissioning activities, it will also be removed, with deposited rock being used to bury each end of the removed section. Up to 25Te of rock will be deposited to bury each cut pipeline end, although the amount used will be kept to a practical minimum. If exposed, the grout bags supporting the pipelines near the risers will be removed to shore. Pipeline stabilisation materials that are buried such as scour protection concrete mattresses and any grout bags between them will be left *in situ*. The pipelines have already been flushed and cleaned. Any permit applications required for work associated with pipeline cutting and removal will be submitted.	Exposures 15x total length ~67.1m and no freespans will remain after decommissioning has been completed. All remaining exposures are <5m long.
4.Well Decommissioning (Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD)	
All the wells will be decommissioned to comply with HSE "Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996" and in accordance with the version of Oil & Gas UK Well Decommissioning Guidelines relevant at the time.	Meets the OGA and HSE regulatory requirements.
5. Drill Cuttings (Vanguard QD, North Valiant SP, South Valiant TD, and Vulcan RD)	
None required.	No Drill Cuttings Piles have been identified by seabed survey.
6. Interdependencies	
The whole of the four installations will be removed. The piles can be cut with seabed sediment being displaced to allow access for cutting. No third-party pipeline crossings will be disturbed as a result of the decommissioning proposals. Any concrete mattresses and grout bags serving a stabilisation function are to remain *in situ*. Those that are disturbed to gain access to infrastructure will be removed to shore. If stabilisation material is visible and no longer serves a purpose it is to be fully removed to shore. Deposited rock will remain *in situ*.	

1.6 Field Location including Field Layout and Adjacent Facilities

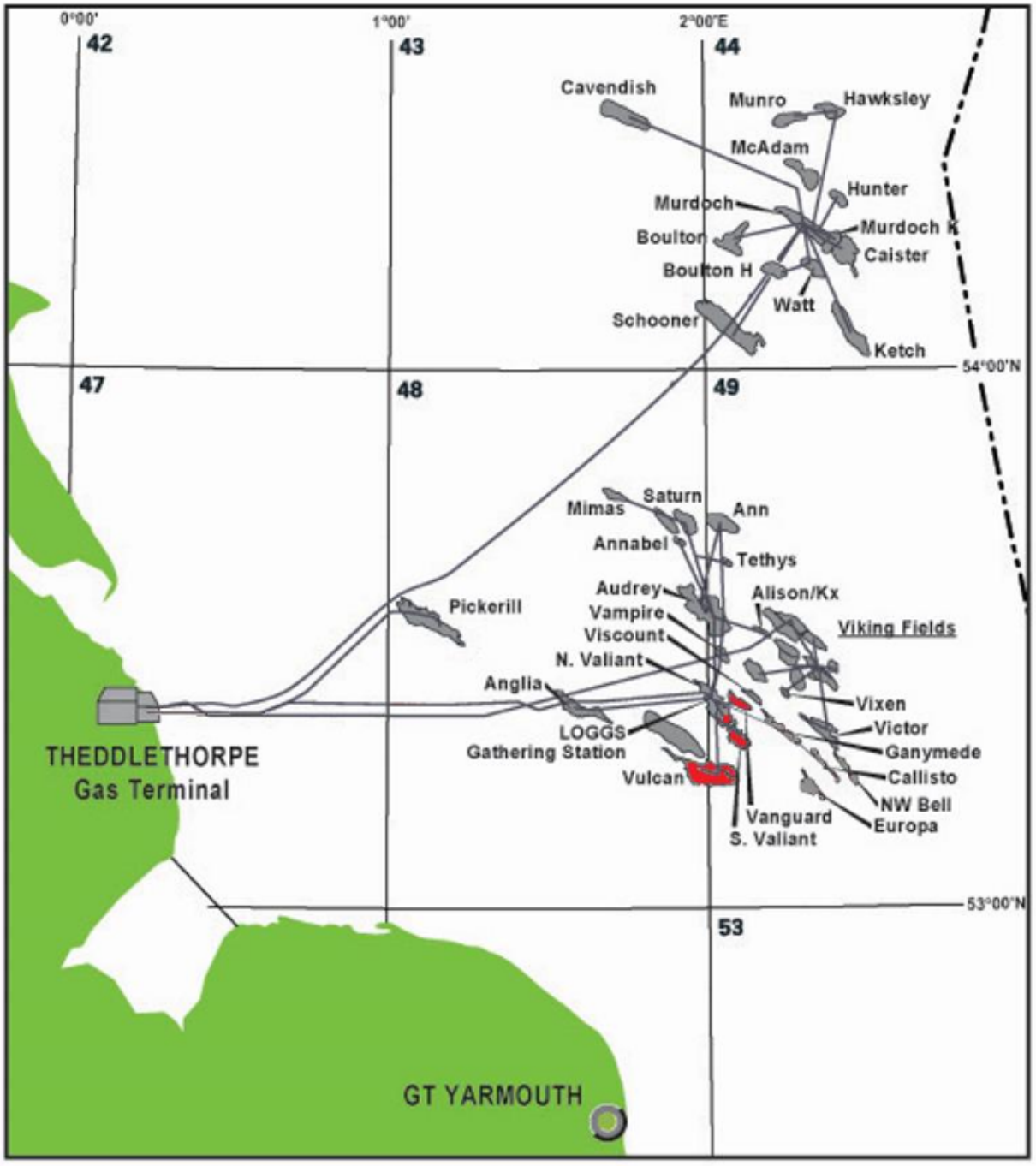


Figure 1.6.1: V-fields Location in UKCS

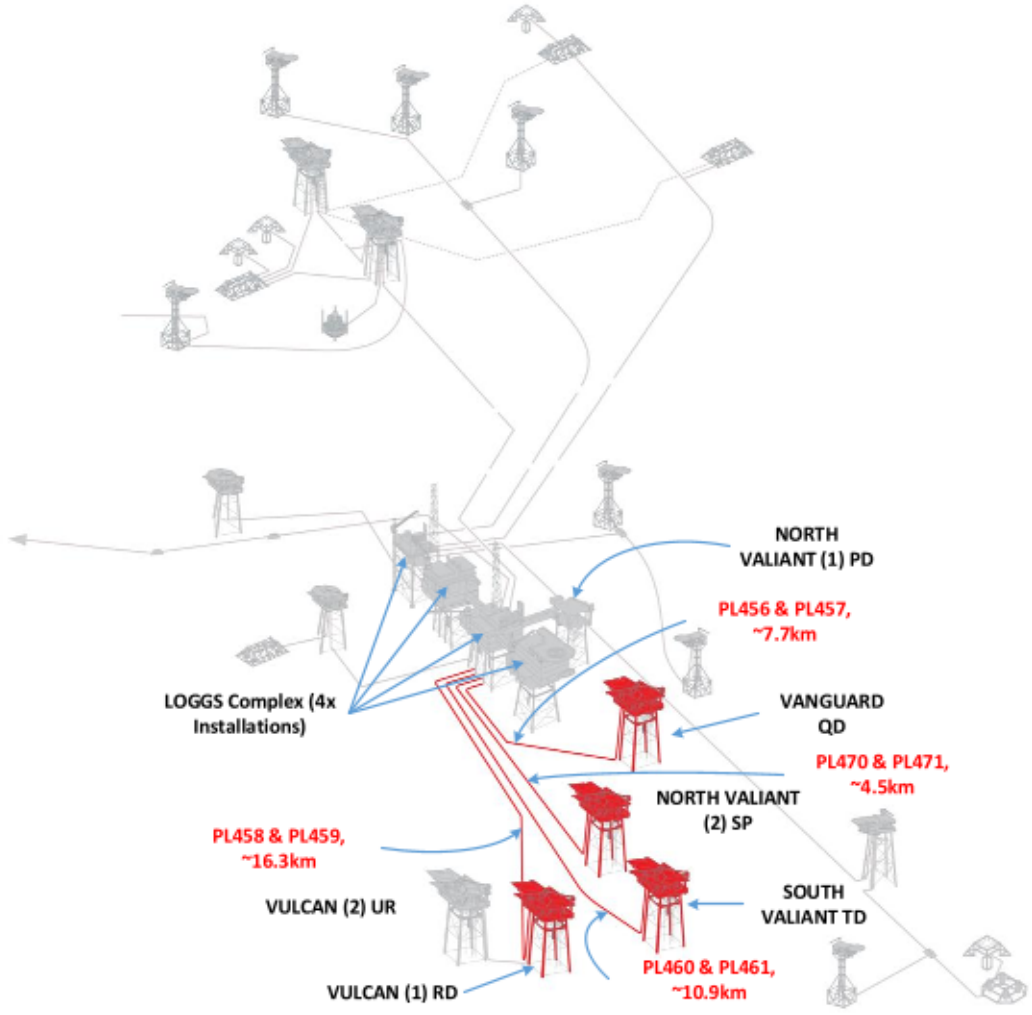


Figure 1.6.2: V-fields Development Layout

Table 1.6.1: List of Adjacent Facilities								
Owner	**Name**	**Type**	**Direction & Distance from Vanguard QD**	**Direction & Distance from South Valiant TD**	**Direction & Distance from North Valiant SP**	**Direction & Distance from Vulcan RD**	**Information**	**Status**
Chrysaor	Vanguard QD	Fixed Steel Wellhead Pltfm	n/a	N, 6.7 km, N	NE, 5.3 km, NE	N, 15.6 km	Subject of this DP	Out of use
Shell	Skiff Platform	Fixed Steel Pltfm	NWW, 16.9 km	NW, 20.1 km	NWW, 14.4 km	NW, 24.1 km		Operational
Chrysaor	Vampire OD	Fixed Steel Wellhead Pltfm	NW, 10.8km	NNW, 16.8km	N, 12.1km	N, 24.3km	DP approved November 2017; to be removed in 2020	Out of use
Chrysaor	LOGGS PR	Fixed Steel Riser Pltfm	W, 7.3km	NW, 10.1km	NW, 4.5km	NNW, 16km	Part of the LOGGS Installation	Out of use
Chrysaor	LOGGS PC	Fixed Steel Compression Pltfm	W, 7.2km	NW, 10km	NW, 4.4km	NNW, 15.9km	Part of the LOGGS Installation	Out of use
Chrysaor	LOGGS PP	Fixed Steel Wellhead Pltfm	W, 7.2km	NW, 10km	NW, 4.3km	NNW, 15.9km	Part of the LOGGS Installation	Out of use
Chrysaor	North Valiant PD	Fixed Steel Wellhead Pltfm	W, 7.1km	NW, 10km	NW, 4.3km	NNW, 15.9km	Subject of LDP5 DP [1]	Out of use
Chrysaor	LOGGS PA	Fixed Steel Accommodation Pltfm	W, 7.1km	NW, 9.9km	NW, 4.3km	NNW, 15.8km	Part of the LOGGS Installation	Out of use
Chrysaor	South Valiant TD	Fixed Steel Wellhead Pltfm	S, 6.7km	n/a	SE, 5.7km	NNE, 9.2km	Subject of this DP	Out of use
Chrysaor	North Valiant SP	Fixed Steel Wellhead Pltfm	SW, 5.3km	NW, 5.7km	n/a	N, 12.2km	Subject of this DP	Out of use

Table 1.6.1: List of Adjacent Facilities								
Owner	**Name**	**Type**	**Direction & Distance from Vanguard QD**	**Direction & Distance from South Valiant TD**	**Direction & Distance from North Valiant SP**	**Direction & Distance from Vulcan RD**	**Information**	**Status**
Chrysaor	Viscount VO	Fixed Steel Satellite Pltfm	NEE, 2.7km	NNE, 8.4km	NE, 8km	NNE, 17.6km	DP approved November 2017; to be removed in 2020	Out of use
Chrysaor	Vixen VM	Subsea Wellhead	NEE, 8.4km	NE, 12.8km	NEE, 13.7km	NNE, 21.8km	DP approved January 2019	Out of use
Chrysaor	Vulcan RD	Fixed Steel Wellhead Pltfm	S, 15.6km	SSW, 9.2km	S, 12.2km	n/a	Subject of this DP	Out of use
Shell	Leman G	Fixed Steel Wellhead Pltfm	S, 29.1km	SSE, 22.5km	SSE, 27.1km	SSE, 15.5km		Operational
Chrysaor	18" Ganymede ZD gas export c/w 3" MeOH pipelines	PL1093 & PL1094 Pipeline Crossing	W, 7.3km	NW, 10km	NW, 4.3km	NNW, 15.8km	Separate pipeline crossings over both PL454 and PL455. Distance between crossings ~20m	Out of use
Chrysaor	16" Viking BP gas export c/w 3" MeOH pipelines	PL2643 & PL2644 Pipeline Crossing	W, 7.3km	NW, 10km	NW, 4.4km	NNW, 15.8km	Separate pipeline crossings over both PL454 and PL455. Distance between crossings ~20m DP approved January 2019	Out of use
Impacts of Decommissioning Proposals								
No impact is expected.								

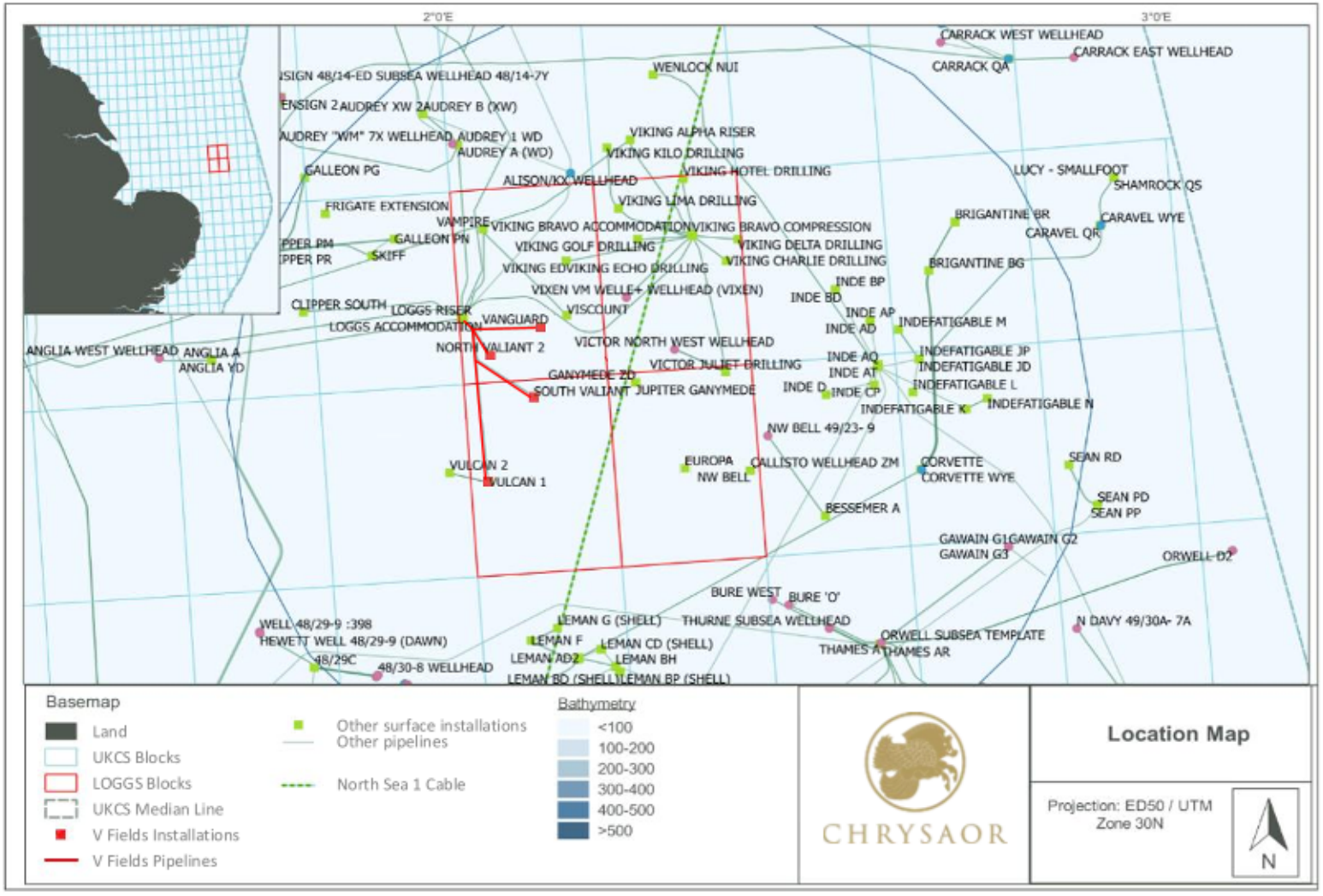


Figure 1.6.3: Adjacent facilities (V-fields installations and pipelines in red)

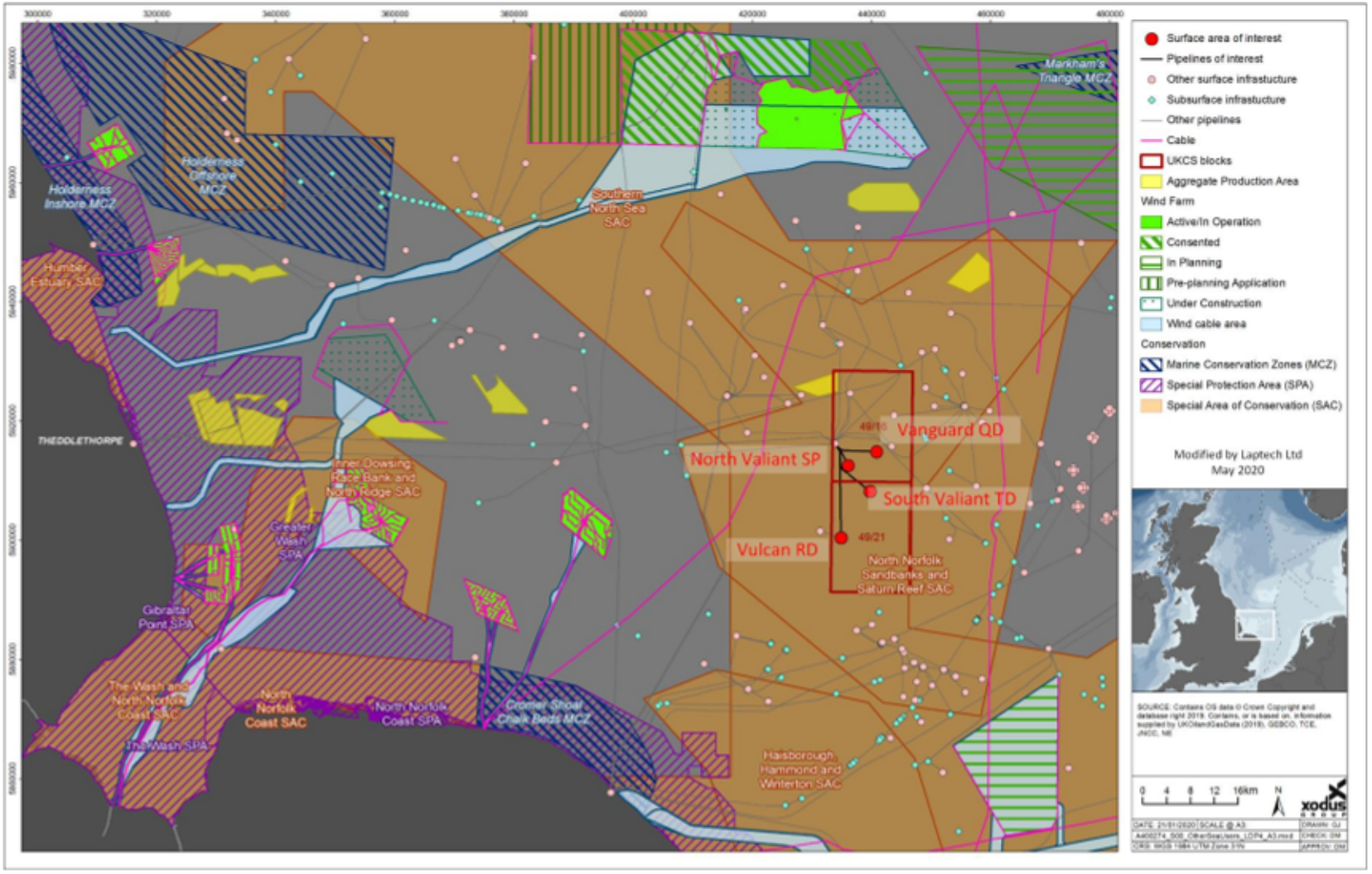


Figure 1.6.4: Adjacent facilities in relation to non-oil and gas features and infrastructure

1.7 Industrial Implications

Principles of the contracting and procurement strategies to be utilised by Chrysaor as operator and on behalf of the other Section 29 notice holders, for the decommissioning of the V-fields facilities (Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD) and associated pipelines are listed below:

1) Chrysaor participates in the PILOT Share Fair events providing one-to-one sessions with the UK supply chain on the SNS decommissioning programmes and timeline;
2) The First Point Assessment (FPAL) database is the primary source for establishing tender lists for contracts or purchases valued at US$ 100,000 and above, although it is also used under this limit;
3) Chrysaor is committed to competitively bidding all its major contracts where possible and practicable. We are supporters of the UK Supply Chain Code of Practice and our performance in this regard has been acknowledged through Excellence Awards from Oil & Gas UK;
4) Chrysaor are active participants in various industry initiatives including:
    a. Oil & Gas UK Supply Chain Forum;
    b. Inventory sharing initiative (Ampelius);
    c. OGA Decommissioning Board - Supply Chain sub-group.

2 Description of Items to be Decommissioned

2.1 Surface Facilities (Topsides and Jackets)

Table 2.1.1: Surface Facilities Information

Name	Facility Type	Location	Topsides / Facilities		Jacket (if applicable)		
		WGS84 Decimal WGS84 Decimal Minute	Weight (Te)	No of modules	Weight (Te)	No of Legs, Piles	Weight of piles (Te)
Vanguard QD	Fixed Steel Wellhead Jacket	53.377525° N 2.110263° E 53° 22.6515' N 02° 6.6158' E	946	1	1,405	4, 4	458
North Valiant SP	Fixed Steel Wellhead Jacket	53.356280° N 2.038587° E 53° 21.3768' N 02° 2.3152' E	968	1	1,404	4, 4	458
South Valiant TD	Fixed Steel Wellhead Jacket	53.317575° N 2.094400° E 53° 19.0545' N 02° 5.6640' E	845	1	1,405	4, 4	458
Vulcan RD	Fixed Steel Wellhead Jacket	53.247038° N 2.023117° E 53° 14.8223' N 02° 1.3870' E	970	1	1,410	4, 4	458

Table 2.1.2: Subsea Templates

Name	Facility Type	Location	Subsea Template	
		WGS84 Decimal WGS84 Decimal Minute	Weight (Te)	Other Observations
North Valiant SP	Template	53.356280° N 2.038587° E 53° 21.3768' N 02° 2.3152' E	113	Secured to the seabed using 3x 762mm diameter piles
Vulcan RD	Template	53.247038° N 2.023117° E 53° 14.8223' N 02° 1.3870' E	113	Secured to the seabed using 3x 762mm diameter piles



Figure 2.1.1: Photograph of Vanguard QD



Figure 2.1.2: Photograph of North Valiant SP



Figure 2.1.3: Photograph South Valiant TD



Figure 2.1.4: Photograph of Vulcan RD

2.2 Pipelines Including Stabilisation Features

Table 2.2.1: Pipeline / Flowline / Umbilical Information									
Description	**Pipeline No (as per PWA)**	**Diameter (inches)**	**Length (km)**	**Description of Component Parts**	**Product Conveyed**	**From – To End Points**	**Burial Status[1]**	**Pipeline Status**	**Current Content**
10" gas pipeline	PL456	10in	7.654	CTE coated steel pipeline with a CWC for most of its length	Natural gas, condensate, water	Cut point in riser at Vanguard QD to ESDV on LOGGS PP	PL456 is piggybacked by PL457. Trenched and buried with 8x exposures (total length ~42m) and 6x freespans (total ~56m). Refer Figure A6.6.2. Two of the freespans occur on the end approaches to the platforms.	Out of Use	Seawater
3" MeOH import pipeline	PL457	3in	7.710	FBE resin coated steel pipeline with two polyethylene flexible tie-in spools at each end (42.5m & 47.5m long respectively)	Methanol and corrosion inhibitor	ESDV on LOGGS PP to cut point in riser at Vanguard QD		Out of Use	Seawater
18" gas pipeline	PL458	18in	16.260	CTE coated steel pipeline with a CWC for most of its length	Natural gas, condensate, water	Cut point in riser at Vulcan RD to ESDV on LOGGS PP	PL458 is piggybacked by PL459. Trenched and buried with 22x exposures (total length up to ~112.3m) and 12x freespans (total ~80.3m). Refer Figure A6.6.4. Two of the freespans occur on the end approaches to the platforms.	Out of Use	Seawater
3" MeOH import pipeline	PL459	3in	16.285	FBE resin coated steel pipeline with two polyethylene flexible tie-in spools at each end (72.5m & 62.5m long respectively)	Methanol and corrosion inhibitor	ESDV on LOGGS PP to cut point in riser at Vulcan RD		Out of Use	Seawater

Table 2.2.1: Pipeline / Flowline / Umbilical Information									
Description	**Pipeline No (as per PWA)**	**Diameter (inches)**	**Length (km)**	**Description of Component Parts**	**Product Conveyed**	**From – To End Points**	**Burial Status[1]**	**Pipeline Status**	**Current Content**
10" gas pipeline	PL460	10in	10.832	CTE coated steel pipeline with a CWC for most of its length	Natural gas, condensate, water	Cut point in riser at South Valiant TD to ESDV on LOGGS PP	PL460 is piggybacked by PL461. Trenched and buried with 19x exposures (total length up to ~95m) and 6x freespans (total ~33m). Refer Figure A6.6.6. All freespans occur on the end approaches to the platforms.	Out of Use	Seawater
3" MeOH import pipeline	PL461	3in	10.850	FBE resin coated steel pipeline with two polyethylene flexible tie-in spools at each end (60m & 72.5m long respectively)	Methanol and corrosion inhibitor	ESDV on LOGGS PP to cut point in riser at South Valiant TD		Out of Use	Seawater
10" gas pipeline	PL470	10in	4.507	CTE coated steel pipeline with a CWC for most of its length	Natural gas, condensate, water	Cut point in riser at North Valiant SP to ESDV on LOGGS PP	PL470 is piggybacked by PL471. Trenched and buried with 15x exposures (total length ~100m) and 3x freespans (total ~57.5m). Two of the freespans occur on the end approaches to the platforms.	Out of Use	Seawater
3" MeOH import pipeline	PL471	3in	4.529	FBE resin coated steel pipeline with two polyethylene flexible tie-in spools at each end (50m & 50m long respectively)	Methanol and corrosion inhibitor	Cut point on riser at North Valiant SP to ESDV on LOGGS PP		Out of Use	Seawater

NOTES:

1. For further information refer the Comparative Assessment report [4]
2. PL456 & PL457. The Comparative Assessment refers to total length of exposures 102.5m long and total length of freespans 60m. The data included in this table are based on more recent survey data. Apart from the freespans on the end approaches to the platforms only the 18m long freespan at KP0.544 is reportable to FishSAFE;

Table 2.2.1: Pipeline / Flowline / Umbilical Information									
Description	**Pipeline No (as per PWA)**	**Diameter (inches)**	**Length (km)**	**Description of Component Parts**	**Product Conveyed**	**From – To End Points**	**Burial Status[1]**	**Pipeline Status**	**Current Content**

3. PL458 & PL459. The Comparative Assessment refers to total length of exposures 253m long and total length of spans 12m. The data included in this table are based on more recent survey data. Total length quoted as 'up to' because burial data only indicates that most if not all exposures are <5m long. Apart from the freespan at LOGGS PP none are reportable to FishSAFE;
4. PL460 & PL461. The Comparative Assessment refers to total length of exposures 119.7m long and total length of spans 11.27m. The data included in this table are based on more recent survey data. Total length quoted as 'up to' because burial data only indicates that most if not all exposures are <5m long. Apart from the freespans on the end approaches none are reportable to FishSAFE;
5. PL470 & PL471. The Comparative Assessment refers to total length of exposures 129.4m long and total length of spans 55m. The slight discrepancy arises because the quantities and lengths of exposures and spans in this table take account of freespans and exposures overlapping, whereas in the Comparative Assessment they are treated as being separate. e.g. at KP-0.018 the length of exposure is quoted as 23.57m long whereas a freespan starting at the same KP is 21.62m long. Similarly, at KP4.356 the length of exposure is quoted as 6.18m long whereas a freespan starting at the same KP is 5.61m long. For simplicity, the full lengths of both exposures are treated as spans. Only the freespans on the end approaches are reportable to FishSAFE.

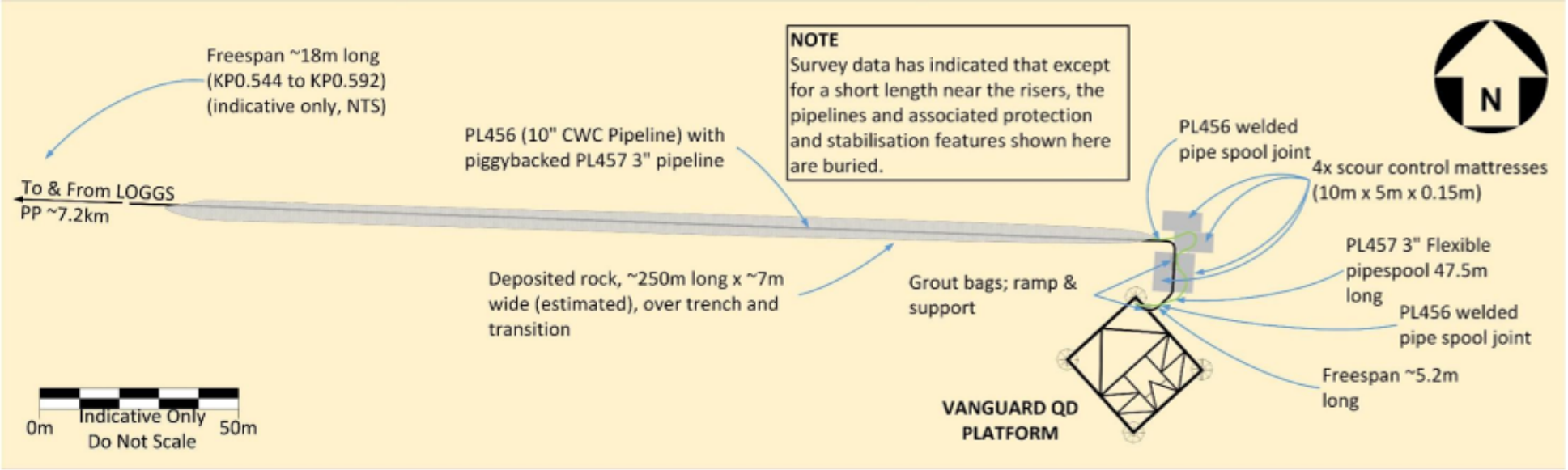


Figure 2.2.1: PL456 & PL457 Approaches at Vanguard QD Platform

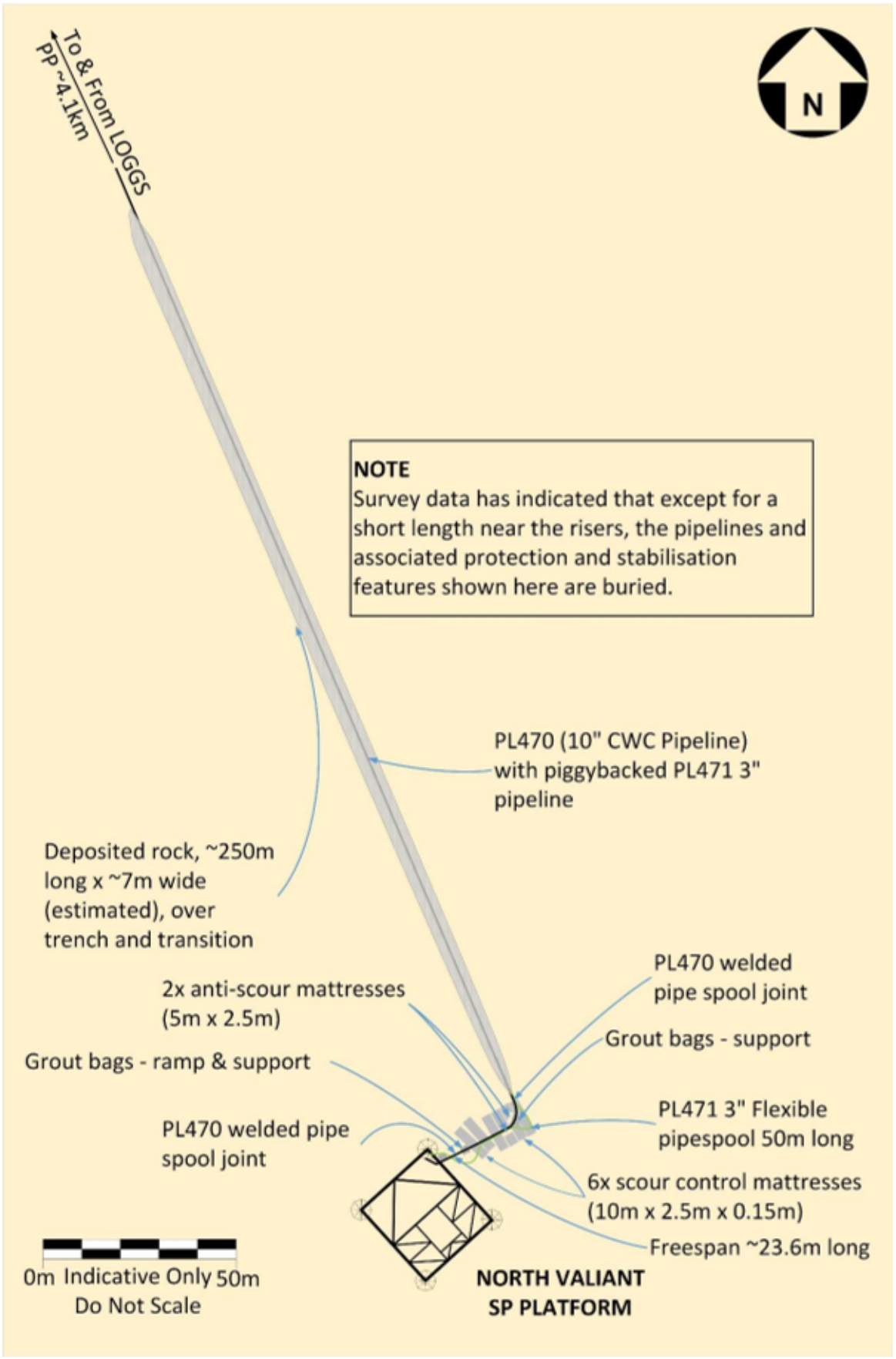


Figure 2.2.2: PL470 & PL471 Approaches at North Valiant SP Platform

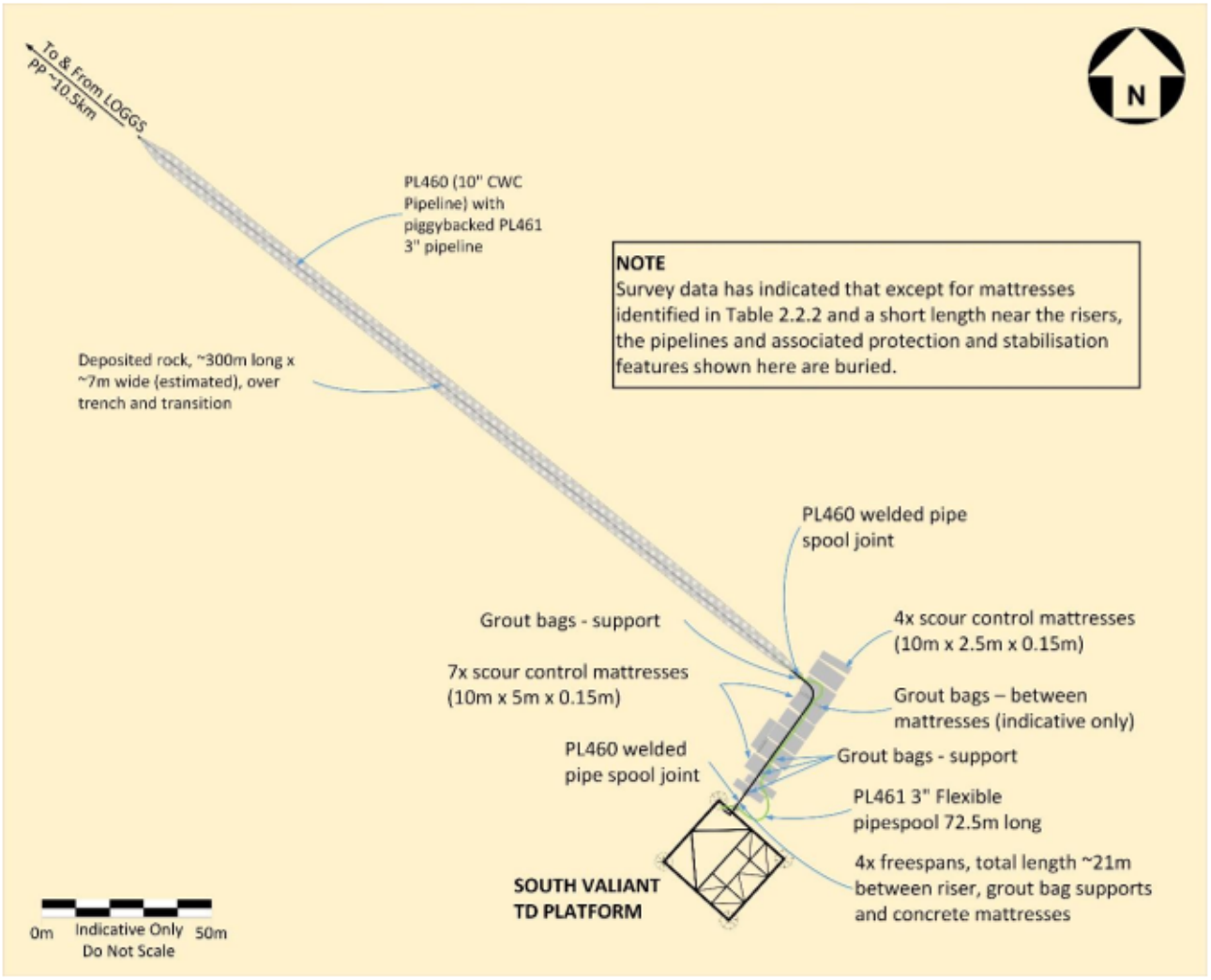


Figure 2.2.3: PL460 & PL461 Approaches at South Valiant TD Platform

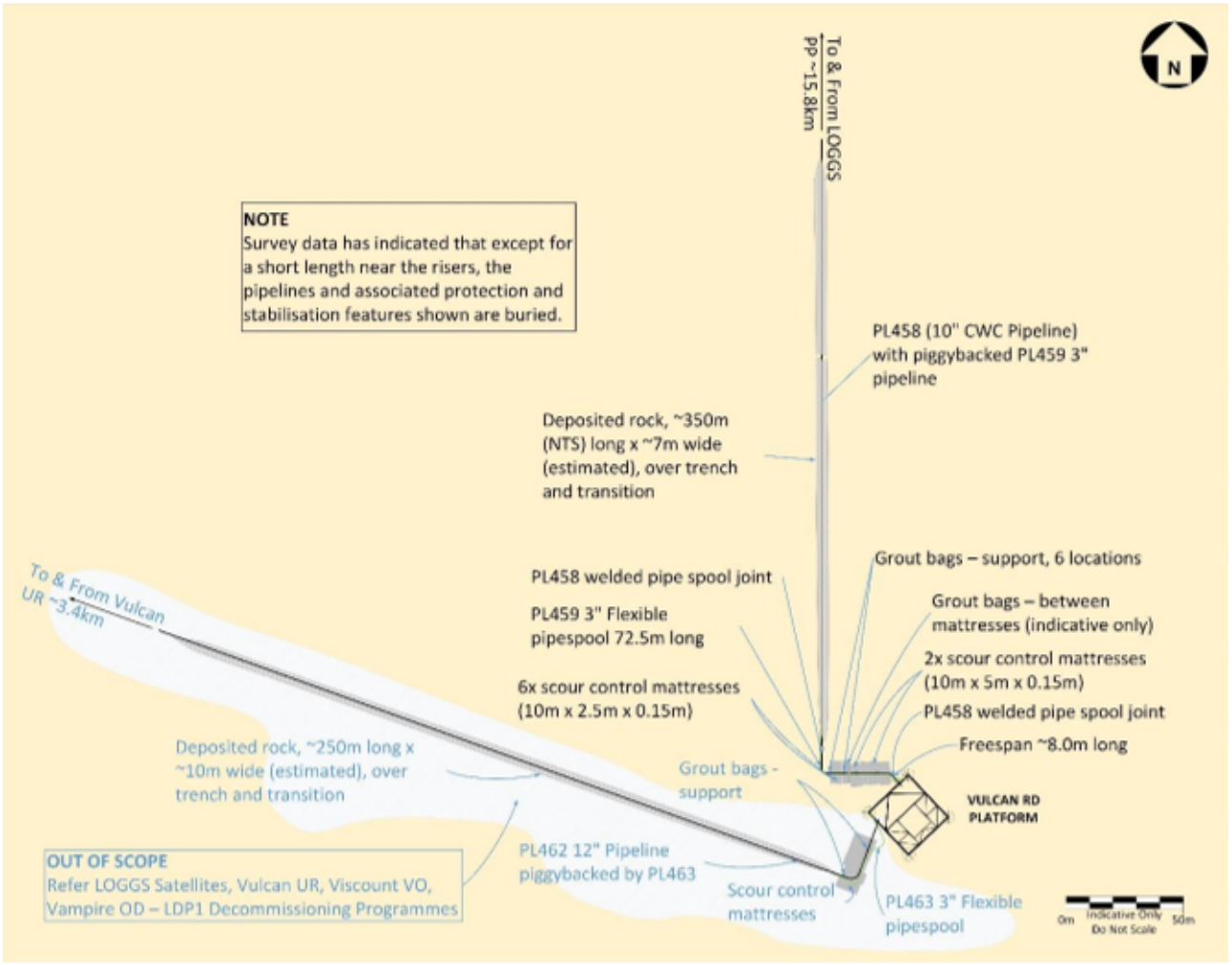


Figure 2.2.4: PL458 & PL459 Approaches at Vulcan RD Platform

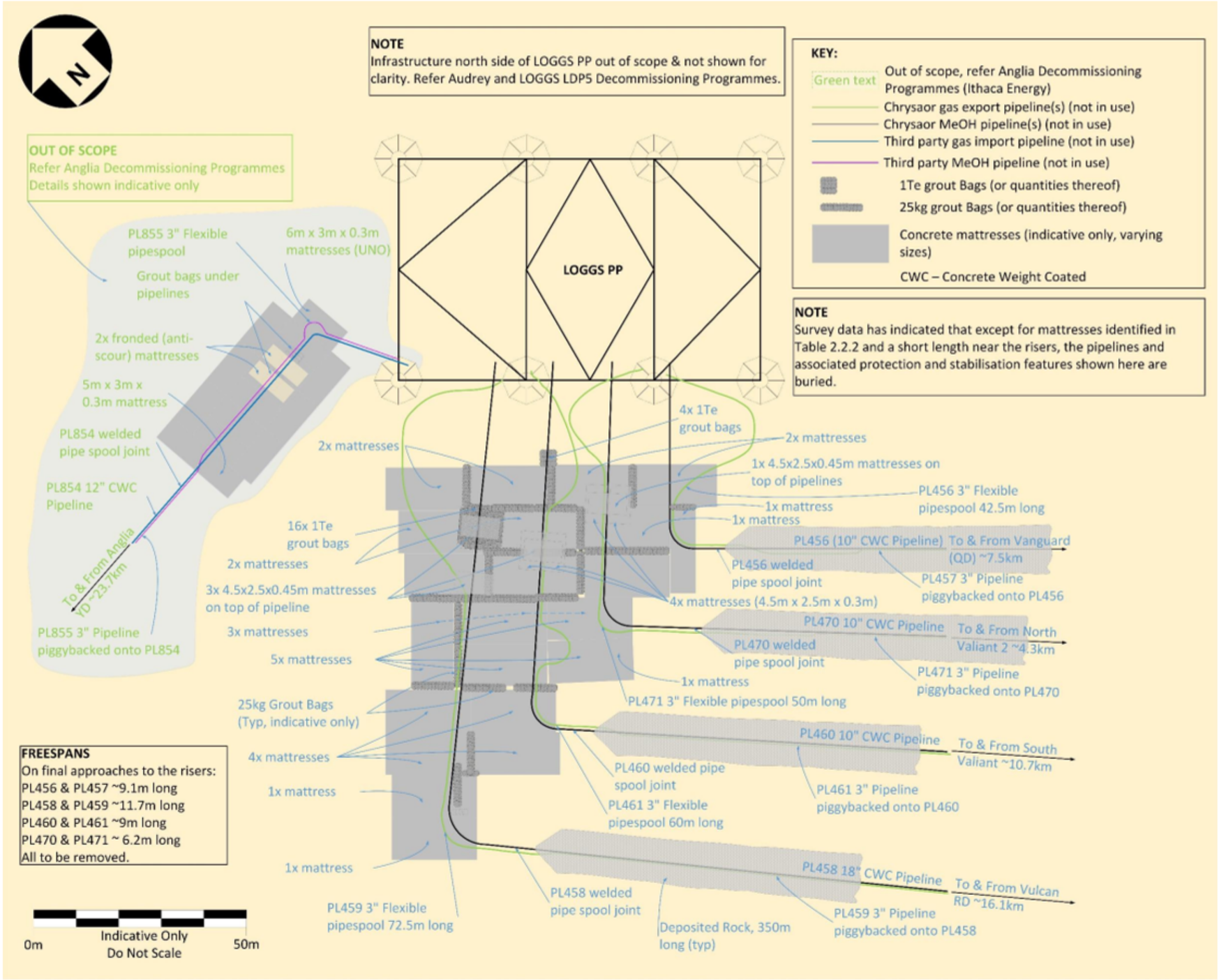


Figure 2.2.5: V-field pipeline Approaches at LOGGS PP

Table 2.2.2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number**	**Total Weight (Te)**	**Location(s)**	**Exposed / Buried / Condition**
Concrete mattresses	4	30	Vanguard QD Approach (PL456 & PL457), Various sizes. Refer Figure 2.2.1	Survey data has indicated that the concrete mattresses are buried.
	8	26.3	North Valiant SP Approach (PL470 & PL471). Various sizes. Refer Figure 2.2.2	
	11	67.5	South Valiant TD Approach (PL460 & PL461). Various sizes. Refer Figure 2.2.3	Survey data has indicated that the concrete mattresses are buried.
	8	37.5	Vulcan RD Approach (PL458 & PL459). Various sizes. Refer Figure 2.2.4	Most recent survey data suggests that one mattress is visible on top of the pipelines on approach to South Valiant TD.
	3	22.5	LOGGS PP South, PL456 & PL457. Various sizes. Refer Figure 2.2.5	Survey data has indicated that the concrete mattresses are buried.
	11	69.4	LOGGS PP South, PL458 & PL459. Various sizes. Refer Figure 2.2.5	Most recent survey data suggests that two mattresses are visible on top of the pipelines on approach to LOGGS PP.
	10	65.1	LOGGS PP South, PL460 & PL461. Various sizes. Refer Figure 2.2.5	Survey data has indicated that the concrete mattresses are buried.
	7	41.8	LOGGS PP South, PL470 & PL471. Various sizes. Refer Figure 2.2.5	Most recent survey data suggests that one mattress is visible on top of the pipelines on approach to LOGGS PP.
Fronded mattresses	n/a	n/a	n/a	
Grout bags[1] (1Te)	12	12	Vanguard QD Approach (PL456 & PL457), 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.1	Survey data has indicated that except for grout bags that may have been used as ramps or pipe supports - especially at, or near the risers, the grout bags will be buried.
	12	12	North Valiant SP Approach (PL470 & PL471). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.2	
	16	16	South Valiant TD Approach (PL460 & PL461). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.3	
	24	24	Vulcan RD Approach (PL458 & PL459). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.4	

Table 2.2.2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number**	**Total Weight (Te)**	**Location(s)**	**Exposed / Buried / Condition**
	0	0	LOGGS PP South, PL456 & PL457. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	Survey data has indicated that the grout bags are buried.
	8	8	LOGGS PP South, PL458 & PL459. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	
	4	4	LOGGS PP South, PL460 & PL461. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	Survey data has indicated that the grout bags are buried.
	0	0	LOGGS PP South, PL470 & PL471. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	
Grout bags[2] (25kg)	75	1.9	Vanguard QD Approach (PL456 & PL457), 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.1	Survey data has indicated that these are all buried.
	75	1.9	North Valiant SP Approach (PL470 & PL471). 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.2	
	108	2.7	South Valiant TD Approach (PL460 & PL461). 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.3	
	67	1.7	Vulcan RD Approach (PL458 & PL459). 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.4	
	19	0.5	LOGGS PP South, PL456 & PL457. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	Survey data has indicated that these are all buried.
	66	1.7	LOGGS PP South, PL458 & PL459. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
	27	0.7	LOGGS PP South, PL460 & PL461. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
	29	0.7	LOGGS PP South, PL470 & PL471. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
Deposited rock[3]	250m	3,922	Vanguard QD Approach (PL456 & PL457). Refer Figure 2.2.1	Much of the deposited rock was installed inside the trenches at the approaches; significant lengths of deposited rock appear to be buried in seabed sediment.
	250m	3,922	North Valiant SP Approach (PL470 & PL471). Refer Figure 2.2.2	
	300m	4,706	South Valiant TD Approach (PL460 & PL461). Refer Figure 2.2.3	

Table 2.2.2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number**	**Total Weight (Te)**	**Location(s)**	**Exposed / Buried / Condition**
	350m	5,491	Vulcan RD Approach (PL458 & PL459). Refer Figure 2.2.4	
	350m	5,491	LOGGS PP South, PL456 & PL457. Refer Figure 2.2.5	Much of the deposited rock was installed inside the trenches at the approaches; significant lengths of deposited rock appear to be buried in seabed sediment.
	350m	5,491	LOGGS PP South, PL458 & PL459. Refer Figure 2.2.5	
	350m	5,491	LOGGS PP South, PL460 & PL461. Refer Figure 2.2.5	
	350m	5,491	LOGGS PP South, PL470 & PL471. Refer Figure 2.2.5	

NOTES:

1. Notional number of grout bags as as-built data are not explicit. Numbers are estimated and based on sketches prepared for inspection activities. It has been assumed that grout bags have been used as ramps and supports at the risers;
2. Quantity of 25kg grout bags is not specified on any as-built drawings and is a notional figure based on the location of scour protection concrete mattresses;
3. Weight of deposited rock is estimated, based on the volume of the profile using a density 2.650 Te/m^3;
4. The quantities of rock itemised here exclude rock deposited for the purposes of stabilising attendant barges and drilling rigs.

2.3 Wells

Table 2.3.1: Well Information			
Vanguard QD Platform Wells	**Designation**	**Status**	**Category of Well**
49/16-Q1	Gas production	Decommissioned, AB2	PL 1-0-3
49/16-Q3	Gas Production	Decommissioned, AB3	PL 1-0-3
49/16-Q4	Gas Production	Decommissioned, AB3	PL 1-3-3
49/16-Q5	Gas Production	Decommissioned, AB3	PL 1-0-3
49/16-Q7	Gas Production	Decommissioned, AB3	PL 1-0-3
North Valiant SP Platform Wells	**Designation**	**Status**	**Category of Well**
49/16-S1	Gas Production	Decommissioned, AB3	PL 2-0-3
49/16-S2	Gas Production	Decommissioned, AB2	PL 2-0-3
49/16-S3	Gas Production	Decommissioned, AB3	PL 2-3-3
49/16-S4	Gas Production	Decommissioned, AB2	PL 3-0-3
49/16-S6	Gas Production	Decommissioned, AB3	PL 2-0-3
49/16-S7	Gas Production	Decommissioned, AB3	PL 1-0-3
49/16-S8z	Gas Production	Decommissioned, AB3	PL 3-0-3
49/16-S9	Gas Production	Decommissioned, AB3	PL 2-0-3
49/16-S10	Gas Production	Decommissioned, AB3	PL 2-0-3
South Valiant TD Platform Wells	**Designation**	**Status**	**Category of Well**
49/21-T1	Gas Production	Decommissioned, AB3	PL 4-3-3
49/21-T2	Gas Production	Decommissioned, AB3	PL 3-3-3
49/21-T3	Gas Production	Decommissioned, AB3	PL 4-3-3
49/21-T4	Gas Production	Decommissioned, AB3	PL 3-3-3
49/21-T5	Gas Production	Decommissioned, AB3	PL 4-3-3
49/21-T6	Gas Production	Decommissioned, AB3	PL 3-3-3
Vulcan RD Platform Wells	**Designation**	**Status**	**Category of Well**
49/21-R1	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R2	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R3	Gas Production	Decommissioned, AB3	PL 3-0-3
49/21-R4	Gas Production	Decommissioned, AB3	PL 3-0-3
49/21-R5	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R6	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R7	Gas Production	Decommissioned, AB3	PL 1-0-3
49/21-R8	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R9	Gas Production	Decommissioned, AB3	PL 4-0-3
49/21-R10	Gas Production	Decommissioned, AB3	PL 3-0-3
49/21-R11	Gas Production	Decommissioned, AB3	PL 1-0-3
49/21-R13	Gas Production	Decommissioned, AB3	PL 3-0-3

For details of well categorisation see the latest version of the Oil & Gas UK Guidelines for the Decommissioning of Wells.

2.4 Inventory Estimates

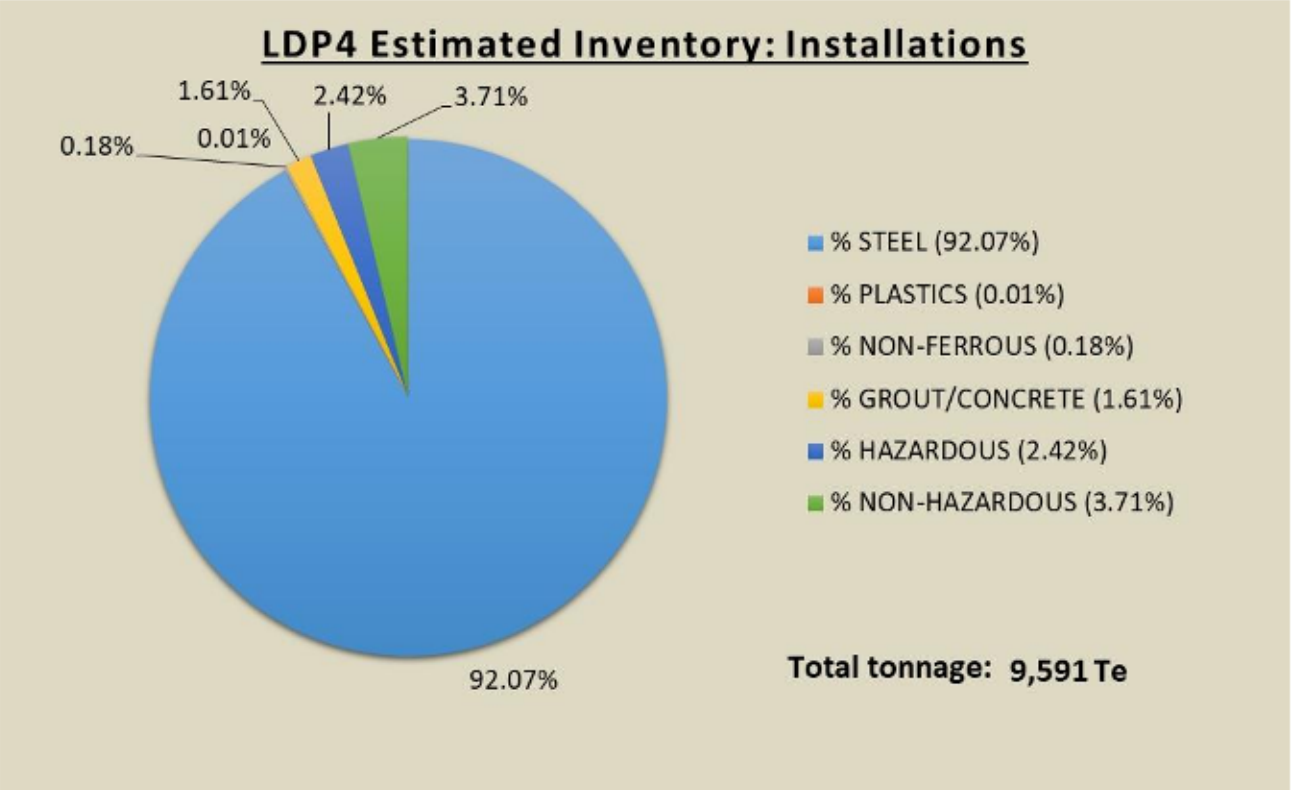


Figure 2.4.1: Pie-chart of estimated installation inventory

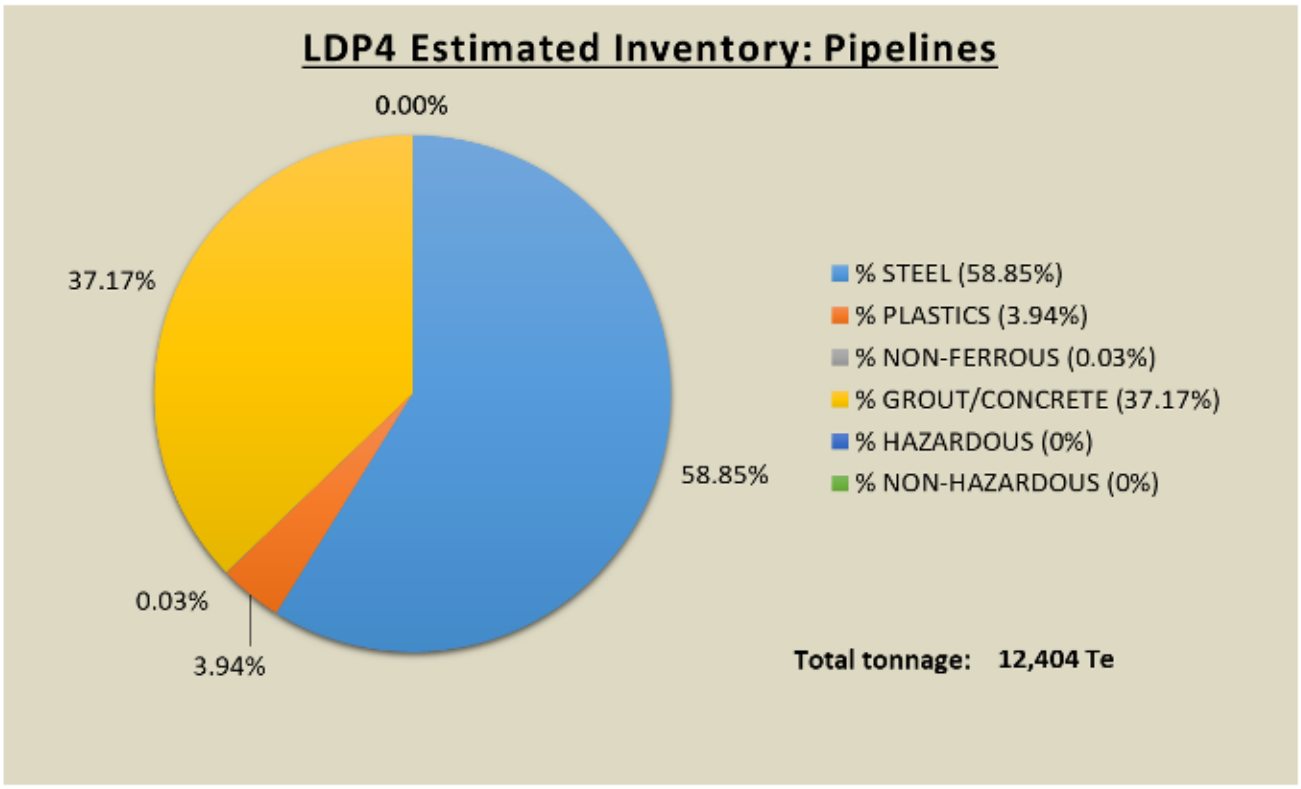


Figure 2.4.2: Pie-chart of estimated pipeline inventory, excluding deposited rock

3 Removal and Disposal Methods

Waste will 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. However, given the age of the installations and infrastructure it is unlikely that reuse opportunities will be realised. Waste generated during decommissioning will be segregated by type and transported to shore in an auditable manner through licensed waste contractors. Transfrontier shipment of waste will not be required. Steel and other recyclable metal are estimated to account for the greatest proportion of the materials inventory. Refer to section 5.4 of the Environmental Appraisal [3] for further details concerning disposal of waste.

3.1 Topsides Decommissioning

Topsides description: the Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD topside structures are virtually identical. All of the installations comprise a Helideck, Main Deck, Cellar Deck and Spider Deck as illustrated in Figure 3.1.1 and they each weigh between 845Te and 970Te. The dimensions of the Main Deck are ~27m x 30m and the overall height between the Spider Deck and Helideck is ~29m although this varies slightly between structures.

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

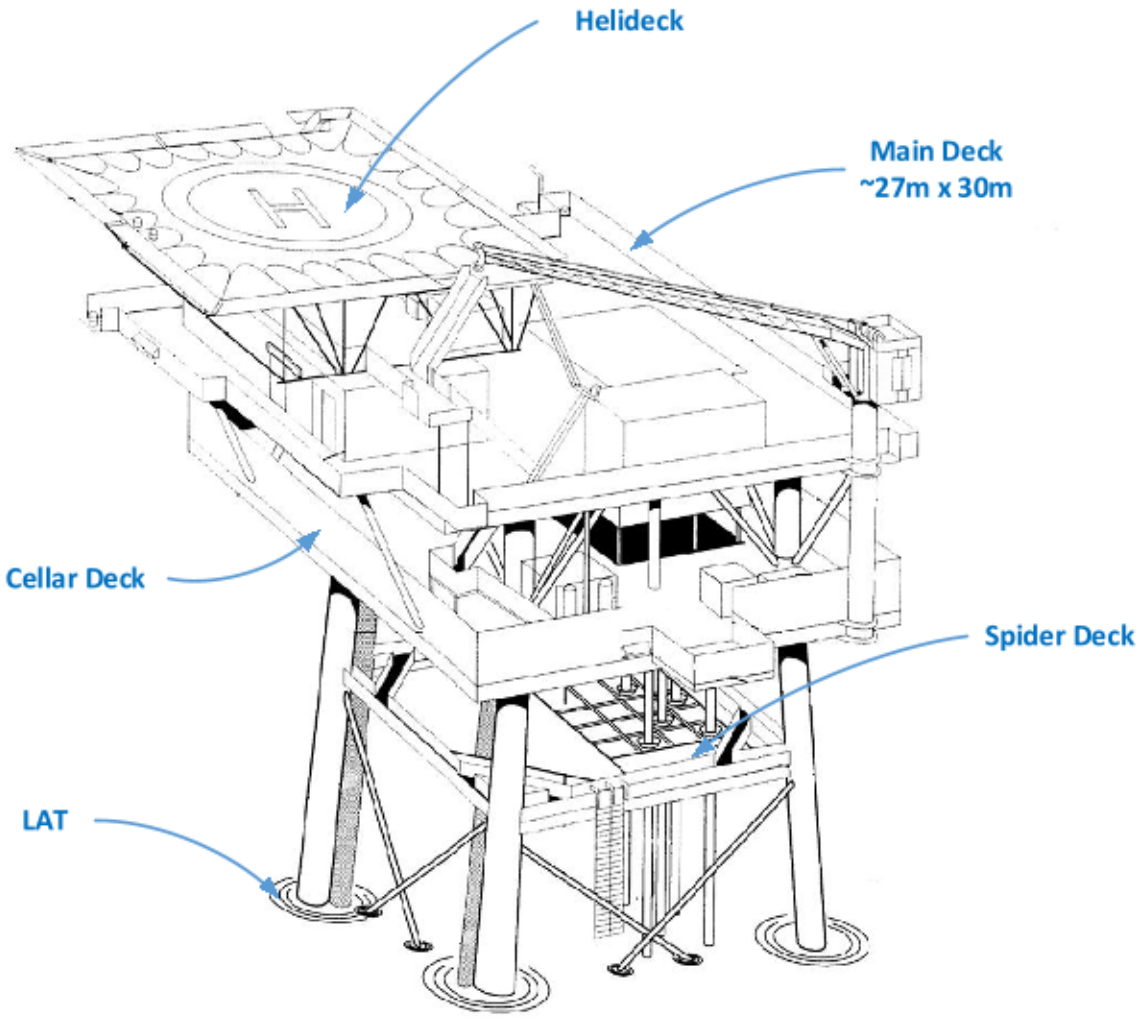


Figure 3.1.1: Typical V-field Installation - Topsides

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**
Hydrocarbons	Process fluids	Process systems have been flushed, Nitrogen purged vented and made liquid free.
Produced solids	Sand, NORM	Any pipeline debris captured in filter packages, will be returned onshore for disposal. Any solids remaining in vessels will be removed and disposed of during the dismantlement of the Topsides onshore.
Diesel	Bunkered diesel fuel	Bunkered diesel has been drained and returned onshore for re-use or disposal.
Lubricating oils	Lubricants for equipment e.g. gearboxes, pumps, pedestal crane compressor skid	Lubricating oils have been drained and returned onshore for re-use or disposal.

3.1.1 Topsides Removal Methods

Table 3.1.2: Topsides Removal Methods	
1) Semi-Submersible Crane Vessel ☑; 2) Monohulled Crane Vessel ☑; 3) Shear Leg Vessel ☑; 4) Jack up Work Barge ☑; 5) Piece small or large ☑; 6) Complete with jacket ☑	
Methods Considered	**Description**
Single lift removal by SSCV / MCV / SLV / JUWB	Removal of entire installation as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
Single lift removal by SSCV / MCV / SLV / JUWB	Removal of topsides as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
Piece-small or piece large removal using attendant support vessel such as a JUWB.	Removal of topsides in a series of smaller sub-units making use of a JUWB, followed by recovery to shore for a programme of re-use, recycling, or disposal as appropriate.
Proposed removal method and disposal route	**Removal of topsides as a single unit followed by recovery to shore for reuse, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method was made following a commercial tendering process and the removal contract has now been awarded.**

3.2 Jacket Decommissioning

Jacket description: The jackets are almost identical in design and weigh ~1,410Te excluding the subsea templates, piles, rigging, and lifting aids (Figure 3.2.1). The legs will be cut at an appropriate elevation to allow the lifting aids to be installed, and the jackets will ideally each be removed in a single lift[3]. Assuming there would be no technical issues, the jacket legs will initially be cut near seabed level and the jackets removed. Thereafter, the remaining pile stubs will be internally cut 3.0m below the seabed. A similar approach is envisaged for the 3x piles securing each of the subsea conductor templates at North Valiant SP and Vulcan RD platforms. Should any difficulties be encountered in accessing the pile stubs internally such that an excavation will be required, OPRED will be consulted before the piles are cut. The jacket will be returned to shore for recycling.

Removal methods: the jacket will be completely removed along with the subsea conductor templates at North Valiant SP and Vulcan RD platforms and returned to shore. Possible methods are described in Table 3.2.1.

3.2.1 Jacket Removal Methods

Table 3.2.1: Jacket Removal Methods

1) Semi-Submersible Crane Vessel ☑; 2) Monohulled Crane Vessel ☑; 3) Shear Leg Vessel ☑; 4) Jack up Work Barge ☑; 5) Piece small or large ☑; 6) Complete with topsides ☑	
Methods Considered	**Description**
Single lift removal along with topsides using SSCV / MCV / SLV / JUWB	Removal of entire installation as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
Single lift removal using SSCV / MCV / SLV / JUWB	Removal of the jacket as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
Offshore removal 'piece-small' for onshore disposal	Removal of jacket and dismantlement offshore followed by transportation to shore for disposal and recycling.
Proposed removal method and disposal route	**Removal of jacket as a single unit followed by recovery to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method was made following a commercial tendering process and the removal contract has now been awarded.**

[3] The technique adopted for removal of the jacket will be subject to engineering feasibility and any commercial agreements.

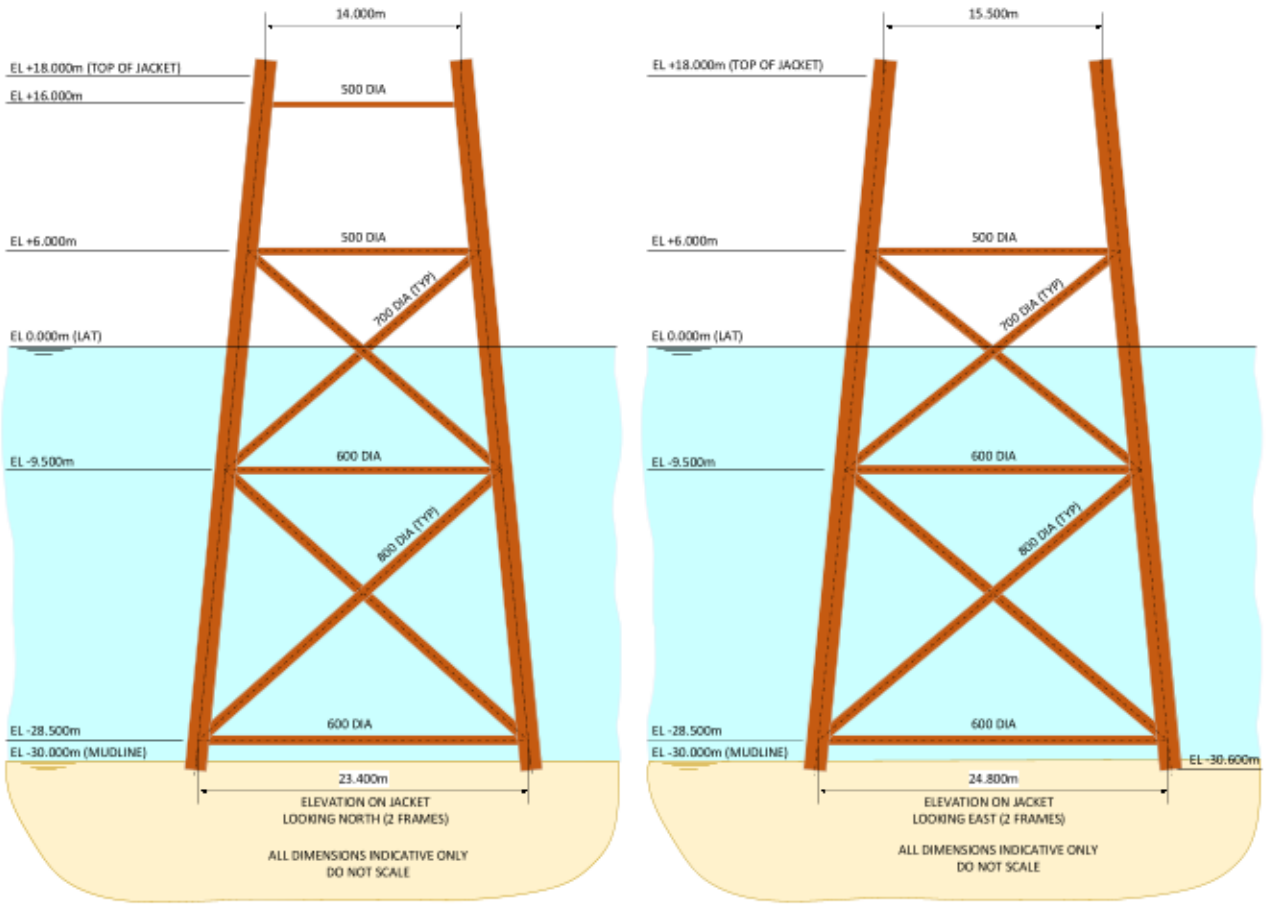


Figure 3.2.1: Vulcan RD Jacket (Others Similar)

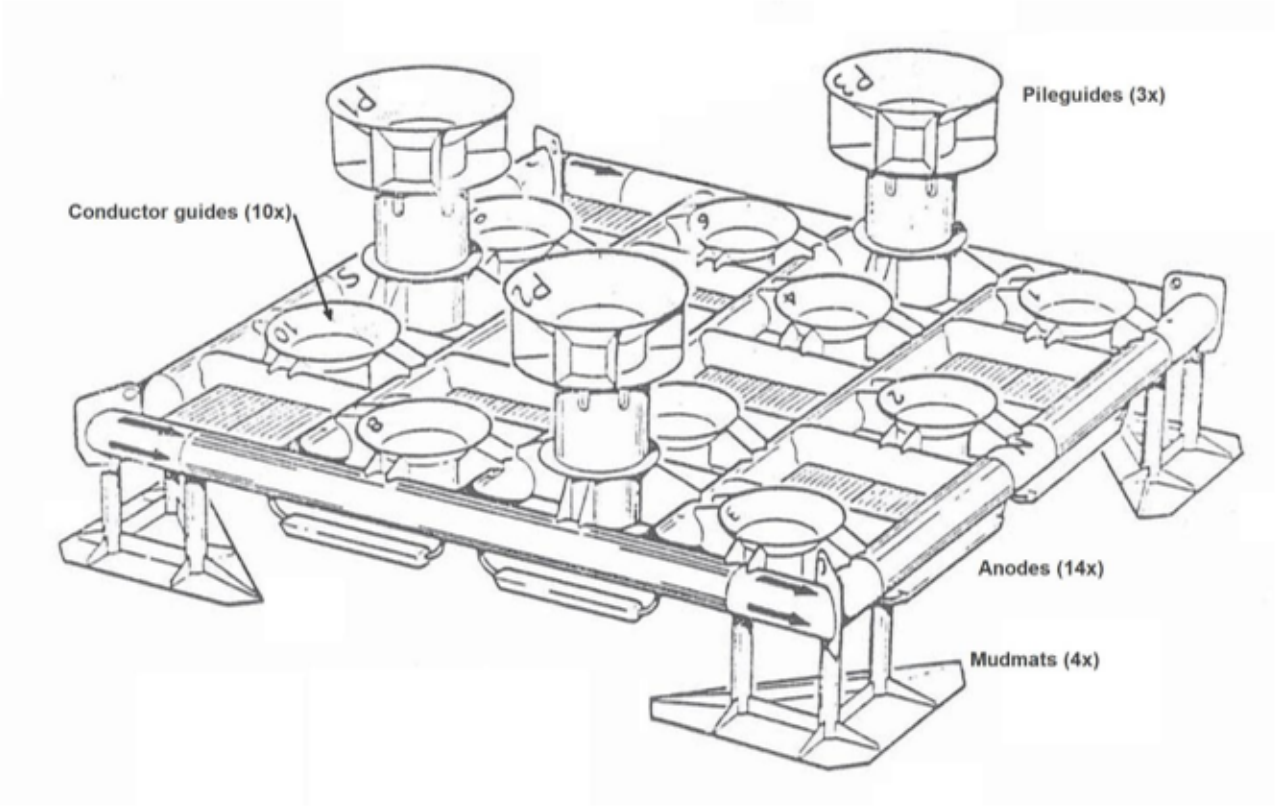


Figure 3.2.2: Subsea Template at North Valiant SP and Vulcan RD Jackets

3.3 Pipelines

3.3.1 Decommissioning Options

All exposed pipelines or pipespools on approach to each of the V-fields installations and LOGGS PP will be completely removed.

Having carried out a pre-screening exercise of several potential decommissioning options for the pipelines listed in Table 1.4.6. The following options were retained for the comparative assessment [4] and used for the pipelines as listed in Table 3.3.1:

- Option 1a: Decommission *in situ* – removal of pipeline ends and rock placement/ burial of cut ends only;
- Option 2a: Decommission *in situ* – removal of pipeline ends and rock placement over cut ends and all exposed pipeline sections;
- Option 4: Partial removal - Exposed pipeline sections removed by cut and lift and rock cover over exposed pipeline ends;
- Option 6: Full removal – full pipeline removal by cut and lift techniques.

For all options, exposures at pipeline ends will be decommissioned as explained in Table 3.3.2.

Table 3.3.1: Pipeline or Pipeline Groups - Decommissioning Options

Pipelines Group 3c	Condition of line / group (Surface laid/Trenched/Buried/Spanning)	Whole or part of pipeline/group	Decommissioning Options considered
PL456 & PL457, PL460 & PL461, PL470 & PL471	Trenched and buried in the seabed throughout the length of the pipeline albeit with exposures and freespans (refer Table 2.2.1) except on approach to the installations where the pipelines are buried under deposited rock.	Whole 10" pipelines and piggybacked 3" pipelines, except for short-exposed lengths of welded pipespools between the deposited rock and the platform risers Refer Figure 2.2.1, Figure 2.2.2 & Figure 2.2.3	1a, 2a, 4 & 6.
Pipelines Group 4	**Condition of line / group (Surface laid/Trenched/Buried/Spanning)**	**Whole or part of pipeline/group**	**Decommissioning Options considered**
PL458 & PL459,	Trenched and buried in the seabed throughout the length of the pipeline albeit with exposures and freespans (refer Table 2.2.1) except on approach to the installations where the pipelines are buried under deposited rock.	Whole 18" pipeline and piggybacked 3" pipeline, except for short-exposed lengths of welded pipespools between the deposited rock and the platform risers. Refer Figure 2.2.4.	1a, 2a, 4 & 6.

3.3.2 Outcomes of Comparative Assessment

A comparative assessment of the decommissioning options was carried out in accordance with the OPRED guidance notes [7]. Each decommissioning option was assessed against Safety, Environment, Technical and Societal and Cost using the pair-wise comparison technique. Refer [4] for details.

The chosen option is leave *in situ*. The influence of existing infrastructure that had been removed could affect the mobility local seabed. In order to minimise the deposition of additional rock, and to minimise any potential increase in snagging hazards, for example, by removing intermediate exposures or spans, it was considered that leave *in situ* would be appropriate. The means that the pipelines would meantime remain as they are, and any existing reportable spans would remain recorded in FishSAFE. Use of historical pipeline survey data with future pipeline surveys would better inform the future strategy for monitoring the pipelines.

Table 3.3.2: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
PL456 & PL457	Option 1a. Decommission *in situ*. At Vanguard QD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~10m long) and exposed 3" flexible pipespools (~13m) to shore. These dimensions will be subject to confirmation during decommissioning operations but include the freespan 5.2m long indicated in Figure A6.6.2. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~15m long) and exposed 3" flexible pipespools (~19m) to shore. These dimensions will be subject to confirmation during decommissioning operations but include the freespan 9.1m long indicated in Figure A6.6.2. If the 14.1m long freespan (FS 14.1 – refer Figure A6.6.2) on approach to LOGGS PP is found to be present during decommissioning activities, it will also be removed, with deposited rock being used to bury each end of the removed section. Up to 25Te of rock will be deposited over each of the cut pipeline ends, with the amount used being kept to a practical minimum. Therefore, except for the removal of the exposed sections of pipe on approach to the platforms the pipelines will be left *in situ* in their current state. Stabilisation and protection features that are buried will remain *in situ*. The risers at LOGGS will be removed along with the LOGGS installation jackets. Given the mobile nature of the seabed, monitoring will be used to confirm stability and burial including the reportable span between KP0.54 and KP0.56, and to confirm that the pipelines remain buried. This will be completed to a schedule agreed with OPRED.	Both pipelines are buried and stable for most of their length except for the ends at Vanguard QD and LOGGS PP, and the reportable span'. Therefore, except for the removal of the exposed ends the pipelines will be left *in situ* in their current state. This will result in minimal seabed disturbance, avoids the deposition of additional rock on exposed sections of the pipeline in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation. Refer Appendix 1.1 for burial profiles.
PL458 & PL459	Option 1a. Decommission *in situ*. At Vulcan RD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~7m long) and exposed 3" flexible pipespools (~9m) to shore. These dimensions will be subject to confirmation during decommissioning operations but will include the freespan 8.0m long indicated in Figure A6.6.4. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~29m long) and exposed 3" flexible pipespools (~36m) to shore. Remove the two exposed concrete mattresses on top of the pipeline	Albeit with several exposed and freespan sections, both pipelines are buried and stable for most of their length except for the ends at Vulcan RD and LOGGS PP. This will result in minimal seabed disturbance, avoids the deposition of additional rock on exposed sections of the pipeline in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation.

Table 3.3.2: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
	to shore to allow access to the full length. These dimensions will be subject to confirmation during decommissioning operations but will include the freespan 11.7m long indicated in Figure A6.6.3. Up to 25Te of rock will be deposited over each of the cut pipeline ends, with the amount used being kept to a practical minimum. Therefore, except for the removal of the exposed sections of pipe approach to the platforms the pipelines will be left *in situ* in their current state. Stabilisation and protection features that are buried will remain *in situ*. The risers at LOGGS will be removed along with the LOGGS installation jackets. Given the mobile nature of the seabed, monitoring will be used to confirm stability and burial including a free span ~11m long between KP7.448 and KP7.459, and to confirm that the pipelines remain buried. This will be completed to a schedule agreed with OPRED.	Refer Appendix 1.2 for burial profiles.
PL460 & PL461	Option 1a. Decommission *in situ.* At South Valiant TD sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial in the rock. Completely remove exposed 10" pipespools (~40m long) and exposed 3" flexible pipespools (~50m) to shore. Remove the exposed concrete mattress on top of the pipeline to allow access to the full length. These dimensions will be subject to confirmation during decommissioning operations but will include the 4x freespans 10m, 4m, 1m and 6m long respectively as indicated in Figure A6.6.5. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~34m long) and exposed 3" flexible pipespools (~43m) to shore. These dimensions will be subject to confirmation during decommissioning operations but will include the freespan 9m long as indicated in Figure A6.6.5. Up to 25Te of rock will be deposited over each of the cut pipeline ends, with the amount used being kept to a practical minimum. Therefore, except for the removal of the exposed sections of pipe on approach to the platforms the pipelines will be left *in situ* in their current state. Stabilisation and protection features that are buried will remain *in situ*. The risers at LOGGS will be removed along with the LOGGS installation jackets. Monitoring to confirm the pipelines remain buried will be completed to a schedule agreed with OPRED.	Albeit with several exposed sections, both pipelines are buried and stable for most of their length except for the ends at South Valiant TD and LOGGS PP. This will result in minimal seabed disturbance, avoids the deposition of additional rock on exposed sections of the pipeline in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation. Refer Appendix 1.3 for burial profiles.

Table 3.3.2: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
PL470 & PL471	Option 1a. Decommission *in situ*. At North Valiant SP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~24m long) and exposed 3" flexible pipespools (~29m) to shore. These dimensions will be subject to confirmation during decommissioning operations but will include the freespan 23.6m long indicated in Figure A6.6.8. At LOGGS PP sever the pipelines at each end of the exposed length – at the base of the riser and where they enter burial. Completely remove exposed 10" pipespools (~28m long) and exposed 3" flexible pipespools (~35m) to shore. Remove the exposed concrete mattress on top of the pipeline to shore to allow access to the full length. These dimensions will be subject to confirmation during decommissioning operations but will include the freespan 6.18m long indicated in Figure A6.6.8. If the 32.6m long exposure (EXP 32.6, including 27.4m long freespan (FS 27.4 – refer Figure A6.6.8) at KP 4.155 is found to be present during decommissioning activities, it will also be removed, with deposited rock being used to bury each end of the removed section. Up to 25Te of rock will be deposited over each of the cut pipeline ends, with the amount used being kept to a practical minimum. Therefore, except for the removal of the exposed sections of pipe on approach to the platforms the pipelines will be left *in situ* in their current state. Stabilisation and protection features that are buried will remain *in situ*. The risers at LOGGS will be removed along with the LOGGS installation jackets. Given the mobile nature of the seabed, monitoring will be used to confirm stability and burial, and to confirm that the pipelines remain buried. This will be completed to a schedule agreed with OPRED.	Albeit with several exposed sections, both pipelines are buried and stable for most of their length except for the ends at North Valiant SP and LOGGS PP. This will result in minimal seabed disturbance, avoids the deposition of additional rock on exposed sections of the pipeline in a sensitive area, lower energy use, and reduced risk to personnel and lower cost; all these aspects contribute to the proposed recommendation. Refer Appendix 1.4 for burial profiles.

3.4 Pipeline Stabilisation Features

Table 3.4.1: Pipeline Stabilisation Features			
Stabilisation Features	**Number**	**Description**	**Disposal Route (if applicable)**
Concrete mattresses	4	Vanguard QD Approach (PL456 & PL457), Various sizes. Refer Figure 2.2.1	Leave undisturbed concrete mattresses *in situ*.
	3	North Valiant SP Approach (PL470 & PL471). Various sizes. Refer Figure 2.2.2	
	11	South Valiant TD Approach (PL460 & PL461). Various sizes. Refer Figure 2.2.3	Leave undisturbed concrete mattresses *in situ*.

Table 3.4.1: Pipeline Stabilisation Features			
Stabilisation Features	**Number**	**Description**	**Disposal Route (if applicable)**
	8	Vulcan RD Approach (PL458 & PL459). Various sizes. Refer Figure 2.2.4	Remove the exposed concrete mattress on top of the pipeline to allow access to the full length of pipe being removed.
	3	LOGGS PP South, PL456 & PL457. Various sizes. Refer Figure 2.2.5	Leave undisturbed concrete mattresses *in situ*.
	11	LOGGS PP South, PL458 & PL459. Various sizes. Refer Figure 2.2.5	Remove the two exposed concrete mattress on top of the pipeline to allow access to the full length of pipe being removed.
	10	LOGGS PP South, PL460 & PL461. Various sizes. Refer Figure 2.2.5	Leave undisturbed concrete mattresses *in situ*.
	7	LOGGS PP South, PL470 & PL471. Various sizes. Refer Figure 2.2.5	Remove the exposed concrete mattress on top of the pipeline to allow access to the full length of pipe being removed.
Grout bags (1Te)	12	Vanguard QD Approach (PL456 & PL457), 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.1	Recover exposed grout bags, estimated as follows: Vanguard 4x North Valiant 8x South Valiant 8x Vulcan 4x Leave undisturbed 1Te grout bags *in situ*.
	12	North Valiant SP Approach (PL470 & PL471). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.2	
	16	South Valiant TD Approach (PL460 & PL461). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.3	
	24	Vulcan RD Approach (PL458 & PL459). 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.4	
	n/a	LOGGS PP South, PL456 & PL457. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	Leave undisturbed 1Te grout bags *in situ*.
	8	LOGGS PP South, PL458 & PL459. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	
	4	LOGGS PP South, PL460 & PL461. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	
	n/a	LOGGS PP South, PL470 & PL471. 1Te or equivalent number of 25kg grout bags. Refer Figure 2.2.5	
Grout bags (25kg)	75	Vanguard QD Approach (PL456 & PL457), 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.1	Leave undisturbed 25kg grout bags that are buried with the mattresses *in situ*.
	75	North Valiant SP Approach (PL470 & PL471). 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.2	
	108	South Valiant TD Approach (PL460 & PL461).	

Table 3.4.1: Pipeline Stabilisation Features			
Stabilisation Features	**Number**	**Description**	**Disposal Route (if applicable)**
		25kg grout bags in between scour protection mattresses. Refer Figure 2.2.3	
	67	Vulcan RD Approach (PL458 & PL459). 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.4	
	19	LOGGS PP South, PL456 & PL457. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	Leave undisturbed 25kg grout bags that are buried with the mattresses *in situ*.
	66	LOGGS PP South, PL458 & PL459. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
	27	LOGGS PP South, PL460 & PL461. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
	29	LOGGS PP South, PL470 & PL471. 25kg grout bags in between scour protection mattresses. Refer Figure 2.2.5	
Deposited rock	40,004Te	On platform approaches. Refer Figure 2.2.1, Figure 2.2.2, Figure 2.2.3 & Figure 2.2.4	Leave *in situ*.

NOTE:

1. Any concrete mattresses and grout bags serving a stabilisation function are to remain *in situ*. Those that are disturbed to gain access to infrastructure will be removed to shore. If stabilisation material is visible and no longer serves a purpose it is to be fully removed to shore. Deposited rock will remain *in situ*;
2. There may be a slight discrepancy in these figures and those presented in Table 3.6.2 due to rounding errors in the native data.

3.5 Wells

Table 3.5.1: Well Decommissioning
The Vanguard QD and North Valiant SP wells listed in Section 2.3, Table 2.3.1 have already been fully decommissioned.
The remaining South Valiant TD and Vulcan RD wells will be decommissioned in accordance with the latest version of the Oil & Gas UK Well Decommissioning Guidelines. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of works carried out. An application to decommission the wells will be made via the online Well Operations Notification System (WONS) on the OGA Energy Portal. The decommissioning is scheduled to be completed by the end of 2021.

3.6 Waste Streams

Table 3.6.1: Waste Stream Management Method	
Waste Stream	**Removal and Disposal Method**
Bulk liquids	Residual hydrocarbons have already been removed from topsides. Further cleaning and decontamination will take place onshore prior to re-use or recycling.
Marine growth	Where necessary and practicable, to allow access some marine growth will be removed offshore under a Marine Licence application. The remainder will be brought to shore and disposed of according to guidelines and company policies.
NORM	Tests for NORM have been undertaken offshore by the Radiation Protection Supervisor. and recorded. Any NORM encountered onshore will be dealt with and disposed of in accordance with guidelines and company policies and under appropriate permit.
Asbestos	Given the age of the installations asbestos can be expected and will be dealt with and disposed of in accordance with guidelines and company policies.
Chromium VI	Given the age of the platforms Chromium VI paints may have been used for corrosion protection. Checks will be done to confirm whether Chromium IV is present on the platform using the correct PPE taking account of COSHH Regulations 2002. The material will be disposed of according to guidelines and company policies and under appropriate permit.
Other hazardous wastes	Other hazardous waste will be recovered to shore and disposed of according to guidelines and company policies and under appropriate permit.
Onshore Dismantling sites	Appropriate licensed sites will be selected. The dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver re-use and recycling options.

Table 3.6.2: Inventory Disposition				
Asset	**Inventory**	**Total (Te)**	**Planned Materials to Shore (Te)**	**Planned Materials Decommissioned *in situ* (Te)**
Vanguard QD	Installation	2,361	1,932	420
	Pipelines	1,893	10	1,884
	Deposited Rock	9,413		9,413
North Valiant SP	Installation	2,485	2,050	436
	Pipelines	1,019	19	1,000
	Deposited Rock	9,413		9,413
South Valiant TD	Installation	2,250	1,831	420
	Pipelines	2,582	25	2,557
	Deposited Rock	10,197		10,197
Vulcan RD	Installation	2,494	2,058	436
	Pipelines	6,909	47	6,862
	Deposited Rock	10,982		10,982
SUB-TOTAL:	**Installations**	**9,591**	**7,870**	**1,711**
SUB-TOTAL:	**Pipelines**	**12,404**	**102**	**12,303**
SUB-TOTAL:	**Deposited Rock**	**40,004**	**0**	**40,004**

NOTES:

1. There may be a slight discrepancy in these figures due to rounding errors in the native data.

4 Environmental Appraisal Overview

4.1 Environmental Sensitivities (Summary)

Table 4.1.1: Environmental Impact Management	
Environmental Receptor	**Main Features**
Conservation interests	**Sites of Conservation Importance** The LOGGS infrastructure included within the scope of the Decommissioning Programmes is located within two sites of conservation importance: the North Norfolk Sandbanks and Saturn Reef SAC, and the Southern North Sea SAC. The North Norfolk Sandbanks and Saturn Reef SAC site has been selected for designation due to the presence of the Annex I habitats: sandbanks that are slightly covered by water at all times, and biogenic reef habitats formed by Sabellaria spinulosa. The Conservation Objectives for the North Norfolk Sandbanks and Saturn Reef SAC are for the features to be in favourable condition, thus ensuring site integrity in the long term and contribution to Favourable Conservation Status of Sandbanks and Reefs. This contribution would be achieved by maintaining or restoring, subject to natural change: • The extent and distribution of the qualifying habitats in the site; • The structure and function of the qualifying habitats in the site; and • The supporting processes on which the qualifying habitats rely. The Southern North Sea SAC has been identified as an area of importance for the Annex II species the harbour porpoise. This site includes key winter and summer habitat for this species. The Conservation Objectives of the site are to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status for Harbour Porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: • Harbour porpoise is a viable component of the site; • There is no significant disturbance of the species; and • The condition of supporting habitats and processes, and the availability of prey is maintained. Annex II species likely to be sighted within the area of the proposed decommissioning activities include bottlenose dolphins, harbour porpoise, grey seals and common or harbour seals (Environmental Appraisal report [3], Section 4.3 [3]). The total length of pipeline lying within the Southern North Sea SAC is ~38km; The total length of pipelines lying within the North Norfolk Sandbanks and Saturn Reef SAC is ~34km.

Table 4.1.1: Environmental Impact Management	
Environmental Receptor	**Main Features**
	Marine Conservation Zones (MCZs) The installations and pipelines included within the scope of the Decommissioning Programmes do not transect any MCZs. **Special Protection Areas (SPAs)** The installations and pipelines included within the scope of the Decommissioning Programmes do not transect any SPAs.
Seabed	The seabed near the LOGGS infrastructure is predominantly composed of sand with shells and shell fragments, with some gravel and cobbles. Sediments are generally well sorted and uniform. The Bathymetry across the area is relatively flat with mega-ripples and sand formations (Environmental Appraisal report [3], Section 4.1). There is no evidence of bedrock, pockmarks or unusual or irregular bedforms. The infaunal community is generally dominated by crustacea and polychaete worms. The species are typical of the sandy sediments of southern North Sea. Whilst epifauna are generally sparse across the area due to the lack of hard substrata, polychaete worms, hermit crabs, fish including sand eels and flatfish, starfish including the common starfish and the sea star, and the soft coral dead mans' fingers are all observed. In terms of habitat classification, most stations within the associated pre-decommissioning baseline survey were categorised as 'infralittoral fine sand', which corresponds to clean sands occurring in shallow water (generally shallower than 20m), either on open coast or in tide swept channels of marine inlets. This is consistent with the protected Annex I habitat 'sandbanks slightly covered by seawater all the time'. There is a high probability of Sabellaria spinulosa across the region. A small fragment of tube structure recovered in a sieve during sampling at the Ganymede ZD location was considered to have possibly been made by the Ross worm Sabellaria spinulosa aggregations of such tubes can sometimes create reef structures which are of conservation concern. However, no Sabellaria spinulosa were evident either as individuals or as tube aggregations from the survey, and none of the geophysical data suggested the presence of such structures. Seabed imagery did not provide any evidence of any threatened and/or declining species and habitats on the OSPAR (2008) list or any species on the International Union for Conservation of Nature Global Red List of threatened species [7][8].
Fish	The area is located within the spawning grounds of various species including: • cod (January to April; [peak spawning February to March]); • lemon sole (April to September); • Norway lobster (January to December [peak spawning April to June]); • plaice (December to March [peak spawning January to February]);

Table 4.1.1: Environmental Impact Management	
Environmental Receptor	**Main Features**
	• sandeels (November to February); • sole (December and March to May [peak spawning in April]; • sprat (May to August [peak spawning May to June]); • thornback ray (February to September [peak spawning April to August]); and, • whiting (February to June). Within the area of facilities and infrastructure being decommissioned there is an area of high intensity spawning for plaice. The following species have nursery grounds in the vicinity of the decommissioning works: anglerfish, cod, herring, lemon sole, plaice, sandeel, sprat, mackerel, spurdog, herring, Norway lobster, sole, tope, thornback ray and whiting. Within the decommissioning area is an area of high intensity nursery grounds for cod, herring and whiting.
Fishing Industry	Across wider LOGGS Area (North and South), fishing grounds are fished at varying degrees by the following fleets [6]: • Dutch beam trawlers, demersal otter trawlers, and fly seiners; • UK potters, shrimp beam trawlers, shellfish dredgers, otter trawlers, long-liners, and netters; • Belgian beam trawlers and demersal otter trawlers; • Danish sandeelers, midwater and demersal trawlers and seine netters; • Norwegian purse seiners and midwater otter trawlers; • German beam trawlers and demersal otter trawlers; • French otter trawlers (demersal and pelagic); and, • French purse seine netters. The main species targeted are shellfish, with demersal species dominate catch in some areas. The highest number of effort days takes place in the summer months (July-September). Activity is low to moderate except at the Europa platform where fishing intensity is higher (Environmental Appraisal report [3], Section 4.5).
Marine mammals	Cetaceans regularly recorded in the North Sea include the harbour porpoise, bottlenose dolphin, minke whale, killer whale, Atlantic white-sided dolphin, and white-beaked dolphin. Rarer species that are occasionally observed in the North Sea include fin whale, long-finned pilot whale, Risso's dolphin and the short beaked common dolphin. However, harbour porpoise and white-beaked dolphin are the only cetaceans considered as regular visitors in the Southern North Sea throughout most of the year, and minke whale as a frequent seasonal visitor (Environmental Appraisal report [3], Section 4.3.1). Pinnipeds sighted in the area include grey seals, and harbour seals. Grey seals may travel past the infrastructure towards foraging grounds, but densities generally reduce with distance offshore. Harbour seals are more likely to be sighted further offshore, travelling to this area from breeding and haul out sites in The Wash to forage for food (Environmental Appraisal report [3], Section

Table 4.1.1: Environmental Impact Management	
Environmental Receptor	**Main Features**
	4.3.2).
Birds	The most common species of seabird found in these areas of the SNS include fulmar, gannet, guillemot, kittiwake, razorbill, puffin, and little auk, as well as numerous species of gull, tern and skua. In the decommissioning area the sensitivity of seabirds to oil pollution in the following blocks (49/16 & 49/12), reflected by the Seabird Oil Sensitivity Index, has periods of low sensitivity to oil pollution from June to August. Between November and March, the Seabird Oil Sensitivity Index is very high to extremely high. There is no data for April to June for many of the blocks, and again for October and November. Note that disturbance of breeding birds is an offence under The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended). OPRED recommended action for Operators is to undertake a pre-decommissioning survey and if there is found to be nesting birds on a platform to discuss and agree action with OPRED. A Birds Addendum [10] has been prepared that describes the survey effort and results applicable to the decommissioning programmes. Additional ornithological surveys will be planned prior to any removal operations to identify any birds. Chrysaor will not commence any decommissioning operations on LDP2-LDP5 if there are any nests or eggs on any of the installations, unless the specific activities are covered by a Wildlife Licence.
Onshore communities	An onshore decontamination and dismantlement facility will be UK based and will be one that is deemed able to comply with all relevant permitting and legislative requirements.
Other users of the sea	**Shipping** Shipping density in the area of the infrastructure to be decommissioned ranges from very low to high. The main contributing factor of very high vessel density in the area closer to shore is the number of large international ports within the region including Hull, Immingham, Grimsby, and Great Yarmouth (Environmental Appraisal report [3], Section 4.7) & Navigation Risk Assessment [1]. **Oil & Gas Industry** The infrastructure is located in the SNS gas basin, which is densely populated by various installations, some of which will be decommissioned within a similar timeframe to the assets in LDP4. Please refer Table 1.6.1, Figure 1.6.3, Figure 1.6.4 for information regarding adjacent facilities. Proposed new developments Blythe and Elgood development located ~15km east, and Southward Development located entirely with the North Norfolk Sandbanks and Saturn Reef with installation scheduled for 2021. **Offshore Renewables** The nearest windfarms to the V-field installations – distance and direction in brackets, are Hornsea zone including Hornsea Project One (~50km N), Project Two (~55km NNW), Project Three (~55km NNE), and East Anglia (70km SE). The Dudgeon windfarm site which is located approximately 42km SW of the V-field installations. The Hornsea Project 2 is scheduled to be fully operational by 2022, and The Development Consent Order Application for Hornsea III was submitted in 2018 for which a decision

Table 4.1.1: Environmental Impact Management	
Environmental Receptor	**Main Features**
	was made 31 December 2021.
Atmosphere	Energy will be used during decommissioning activities and this will result in atmospheric emissions. Once decommissioning has been completed, pipeline surveys will likely be required in future, incurring further use of energy use and the resulting emissions. Refer Environmental Appraisal report [3], Section 3.1).

4.2 Potential Environmental Impacts and their Management

4.2.1 Environmental Impact Assessment Summary

The potential environmental impacts associated with the decommissioning activities have been assessed and it is concluded that the proposed decommissioning of the infrastructure can be completed without causing significant adverse impact to the environment. The EA assesses the potential environmental impacts by identifying interactions between the proposed decommissioning activities and the associated environmental receptors. It also describes the proposed mitigation measures designed to avoid or reduce the identified potential environmental impacts and how these will be managed in accordance with Chrysaor's Environmental Management System (EMS) while considering responses from stakeholders.

Table 4.2.1: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
Topsides Removal	Energy use and atmospheric emissions	All engines, generators and combustion plant on the vessels will be well maintained and correctly operated to ensure that they are working efficiently to minimise energy use and gaseous emissions. Vessel operations will be minimised where practical.
	Underwater noise	A noise assessment has been completed to determine the likely impact of noise generated by the proposed operations on marine mammals in the surrounding area. The results of the assessment will be used during the planning of vessel operations.
	Accidental hydrocarbon release	Hydrocarbon inventories are to be removed from the topsides prior to commencing removal operations. The SNS Oil Pollution Emergency Plan has been updated in agreement with OPRED to include all planned decommissioning operations.
Jacket Removal	Energy use and atmospheric emissions	All engines, generators and combustion plant on the vessels will be well maintained and correctly operated to ensure that they are working efficiently to minimise energy use and gaseous emissions. Vessel operations will be minimised where practical.

Table 4.2.1: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
	Underwater noise	A noise assessment has been completed to determine the likely impact of noise generated by the proposed operations on marine mammals in the surrounding area. The results of the assessment will be used during the planning of vessel operations. There is no intention to use underwater explosives during these activities. In the unlikely event that the requirement changes, project-specific noise modelling may be undertaken to inform the level of risk in the impact assessment and mitigation requirements. The requirement will be discussed with OPRED Environmental Management Team.
	Accidental hydrocarbon release	The SNS Oil Pollution Emergency Plan has been updated in agreement with OPRED to include all planned decommissioning operations.
	Seabed disturbance and loss of habitat	The decommissioning operations will be carefully designed and executed to minimise the area of seabed that will be disturbed. Loss of habitat through the introduction of new material to the marine environment is to be avoided or minimised throughout the proposed operations.
Decommissioning Pipelines	Energy use and atmospheric emissions	All engines, generators and combustion plant on the vessels will be well maintained and correctly operated to ensure that they are working efficiently to minimise energy use and gaseous emissions.
	Underwater noise	A noise assessment has been completed to determine the likely impact of noise generated by the proposed operations on marine mammals in the surrounding area. The results of the assessment will be used during the planning of vessel operations.
	Seabed disturbance and loss of habitat	The operations to remove the pipeline ends will be carefully designed and executed to minimise the area of seabed that will be disturbed. Loss of habitat through the introduction of new material to the marine environment is to be avoided or minimised throughout the proposed operations. The resulting rock berm profile will be overtrawlable.
	Discharges to sea	The pipelines have already been flushed, cleaned, and filled with inhibited seawater prior to cutting of the pipeline ends. A chemical risk assessment will be undertaken, and operations permitted under the Offshore Chemicals Regulations 2002 (as amended). Hydrocarbon discharges during subsea pipeline disconnect operations will be permitted under the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended).

Table 4.2.1: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
		Residual hydrocarbons, scale and sediments will be released gradually after through-wall corrosion occurs and the integrity of the pipelines progressively fails. Through-wall degradation is anticipated to begin to occur after many decades (i.e. 60 – 100 years). Pathways from the pipelines to the receptors would be via the interstitial spaces in seabed sediments, overlying deposited rock - where applicable, and the water column. Release would therefore be gradual and prolonged such that the effects on the receiving marine environment are negligible.
	Physical presence of infrastructure decommissioned *in situ*. Snagging hazard of exposed sections of pipeline remaining *in situ*.	The total seabed footprint of the V-fields pipelines being decommissioned *in situ* is estimated as 0.73km^2, 0.3848 (0.39km^2 of which will be within Southern North Sea SAC, 0.3417 (0.34)km^2 of which will be within the North Norfolk Sandbanks and Saturn Reef SAC. This represent 0.011% of the total SAC area. Although it has been assessed that the introduction of additional deposited rock will not change the character of the species typically present in the area as a whole, decommissioning of mattresses and grout bags *in situ* is recommended as this will reduce the amount of additional deposited rock required for remedial works. The presence of decommissioned pipelines will not compromise the integrity of the environmental feature of the seabed in the area. Pipelines decommissioned *in situ* will continue to be shown on Navigational charts with reportable spans added to FishSAFE as required.
Decommissioning Stabilisation Features	Physical presence of infrastructure decommissioned *in situ*. Snagging hazard of stabilisation feature associated with pipeline.	Stabilisation features associated with pipelines remain *in situ*. Non-invasive survey techniques owing to the environmental sensitivities of the area in the 500m zones where stabilisation features predominantly exist and at locations beyond the 500m zones where exposed mattresses may have been identified. The presence of decommissioned stabilisation features will not compromise the integrity of the environmental feature of the seabed in the area. Stabilisation features are inherently overtrawlable by design, so they may not need to be verified by overtrawl. when verifying a clear seabed following completion of decommissioning activities.

5 Interested Party Consultations

5.1 Consultations Summary

During the public consultation period (16 September 2021 to 15 October 2021), 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 Group (GMG).

Copies of the Decommissioning Programmes and supporting documents were made available as a download from the Chrysaor website: https://www.chrysaor.com/operations/decommissioning. A bound copy of the Decommissioning Programmes was made available in the Great Yarmouth Community Library.

A public notice was published in the following publications on 15 October 2021. Please refer to Appendix 3.1 for a copy of the public notices:

- The London Gazette;
- The Daily Telegraph;
- The Hull Daily Mail.

The public notice gave instructions for representations to be made in writing by Thursday 15 October 2021. Chrysaor 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

Stakeholder	Comment	Response
STATUTORY CONSULTATIONS		
NFFO	Meeting held with NFFO 11 November 2021.	The NFFO had no adverse comment to make regarding the decommissioning proposals.
NIFPO	Defer to NFFO.	No response.
SFF	Defer to NFFO.	No response.
GMG		No response.
Public		No adverse comments received.

6 Programme Management

6.1 Project Management and Verification

Chrysaor has established a UK decommissioning organisation as a department to manage and execute decommissioning projects. Chrysaor's existing processes for Operations, Planning, Project Management, Procurement, Health Safety and Environment, will be used and tailored to meet the specific requirements of decommissioning projects. Chrysaor will manage all permitting, licences, authorisations, notices, consents, and consultations.

Any changes to this decommissioning document will be discussed and agreed with OPRED.

6.2 Post-Decommissioning Debris Clearance and Verification

A post decommissioning debris survey will be carried out within all 500m safety zones. Discussions are underway with OPRED regarding the level of appropriate coverage for pipeline corridor survey along each existing pipeline route. Oil and gas debris will be recovered for onshore disposal or recycling in line with existing disposal methods.

Verification of seabed state will be obtained. Whilst the worst-case seabed disturbance from overtrawl has been assessed, it is recognised that all the decommissioning activities are occurring in the North Norfolk Sandbanks and Saturn Reef SAC, and so different methods of determining debris clearance and snag risk may be required. The methods used will therefore be discussed and finalised with OPRED. This will be followed by a statement of clearance to all relevant governmental departments and statutory consultees.

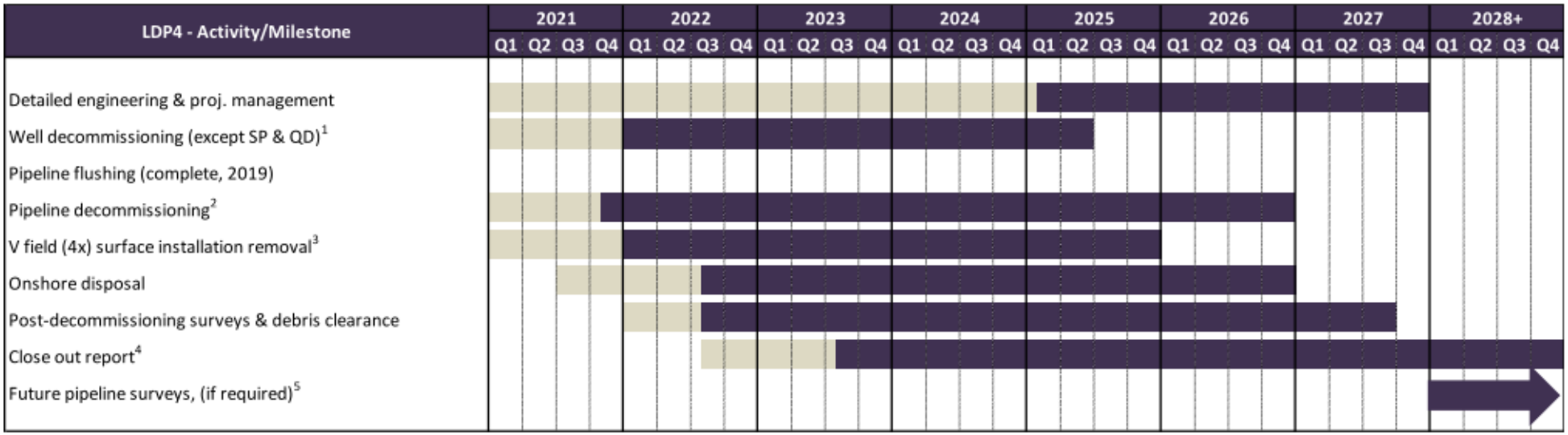
Oil and gas debris activity and verification along the remaining pipeline corridor of the infield pipeline sections not subject to actual decommissioning works, will be carried out in accordance with OPRED guidance in operation at the time those activities commence. This activity will reflect the environmental setting of the North Norfolk Sandbanks and Saturn Reef Special Area of Conservation.

The outcomes of the surveys in the 500m zones and of the pipelines will be reported 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 Programme 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 decommissioning activities

1. Decommissioning of wells at North Valiant(2) SP & Vanguard QD was completed in 2019;
2. Initial pipeline disconnections completed in 2019;
3. Includes Vulcan (1) RD, South Valiant TD, North Valiant (2) SP and Vanguard QD;
4. The close out report will be prepared on completion of offshore activities. It will contain results of environmental suveys, debris survey (identification/removal) and clear seabed verification survey;
5. The close out report will also explain the strategy based on risk assessments and results of post decommissioning surveys.

Figure 6.3.1: Gantt Chart of Project Plan

6.4 Costs

Decommissioning costs will be provided separately to OPRED and OGA.

6.5 Close Out

In accordance with OPRED guidelines, a close out report covering the completion of the offshore decommissioning scope of this Decommissioning Programme will be submitted at time agreed by OPRED. The close out report will contain debris removal and verification of seabed clearance, the first post decommissioning environmental survey and explanation of any variations to the approved Decommissioning Programmes.

6.6 Post Decommissioning Monitoring and Evaluation

After decommissioning activities have been concluded, pipeline status surveys and environmental surveys will be completed with the findings being sent to OPRED in the close out report. The frequency and scope of future surveys will be agreed with OPRED and supported by a risk assessment. Residual liability will remain with the Section 29 holders identified in Table 1.4.7 (Vanguard QD), Table 1.4.8 (North Valiant SP), Table 1.4.9 (South Valiant TD), and Table 1.4.10 (Vulcan RD). Unless agreed otherwise in advance with OPRED, Chrysaor will remain the focal point for such matters, such as any change in ownership, for example.

A post decommissioning environmental seabed survey will be carried out once the offshore decommissioning work scope covered by this decommissioning document has been completed. The survey will include seabed sampling to monitor levels of hydrocarbons, heavy metals, and other contaminants to allow for a comparison with the results of the pre-decommissioning survey. Results of this survey will be available once the decommissioning document work scope is complete.

PIPELINE RISK BASED MONITORING PROGRAMME

All pipeline systems covered within this Decommissioning Document scope will be subject to survey. The post decommissioning pipeline (and associated stabilisation features) monitoring programme, to be agreed with OPRED, will:

- Begin with an initial baseline survey covering the full length of each pipeline;
- Be followed by a risk-based assessment for each pipeline (and associated stabilisation materials) which will inform the minimum agreed extent and frequency of future surveying. This will take account of pipeline burial, exposure and spanning data derived from the initial baseline survey, all available historical survey information and fisheries impact assessment;
- Provide a report of each required survey (with analysis of the findings, the impact on the risk-based assessment and identification of the proposed timing of the next survey in accordance with the agreed RBA approach), for discussion and agreement of OPRED;
- Include provision for remediation in the framework where such a requirement is identified. Appropriate remediation will be discussed and agreed with OPRED;
- Where remediation has been undertaken, a follow up survey of the remediated section(s) will be required;
- In the event of a reported snagging incident on any section of a pipeline, the requirement for any additional survey and/or remediation, will be discussed and agreed with OPRED;
- Will include a further fisheries impact assessment following completion of the agreed survey programme;
- Monitoring will become reactive following completion of the agreed survey programme and OPRED agreement of the analysis of the outcomes;
- Require pipeline information to be recorded on Navigation charts and FishSAFE.

The monitoring programme will also include discussion with OPRED of the long-term pipeline degradation and potential risk to other users of the sea following conclusion of the planned survey programme.

7 Supporting Documents

[1] Anatec (2017) Navigational Risk Assessment – LOGGS Area Decommissioning. Anatec report no. No. A309-CoP-NRA-1. Revision C1 (Final), November 2017;

[2] Chrysaor (2020) LDP5 Decommissioning Programmes for LOGGS Installation & Associated Pipelines, CYR-SNS-L-XX-P-PM-12-00002;

[3] Chrysaor (2020) Environmental Appraisal LOGGS Area Decommissioning (Decommissioning Programmes LDP2, LDP3, LDP4, LDP5), XOD-SNS-L-XX-X-HS-02-00005;

[4] Chrysaor (2020) Comparative Assessment Report LOGGS Area Decommissioning (Decommissioning Programmes LDP2, LDP3, LDP4, LDP5), XOD-SNS-L-XX-X-HS-02-00003;

[5] ConocoPhillips (2017) Decommissioning Programmes for LOGGS Satellites Vulcan UR, Viscount VO, Vampire OD & Associated Infield Pipelines – LDP1. Weblink last accessed 25 January 2020: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664296/LDP1_Final.pdf

[6] ConocoPhillips (2017). Commercial Fisheries Baseline Characterisation: LOGGS South, LOGGS North and CMS Areas. Report No. BMM-SNS-P-XX-S-HS-02-00001;

[7] Gardline (2015). SNS Decommissioning Survey LOGGS Gas Fields (LOGGS Hub, Mimas MN, Ganymede ZD, South Valiant TD, Europa EZ). Habitat Assessment Report. August 2015. Report No. 10553.1;

[8] Gardline (2015). SNS Decommissioning Survey LOGGS Gas Fields (LOGGS Hub, Mimas MN, Ganymede ZD, South Valiant TD, Europa EZ). Pre-decommissioning Survey Report. August 2015. Report No. 10553.2;

[9] 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

[10] Birds Addendum: Document XOD-SNS-L-XX-X-HS-02-00007

Appendix 1 Pipeline Burial Profiles

Appendix 1.1 PL456 & PL457 Burial Profile

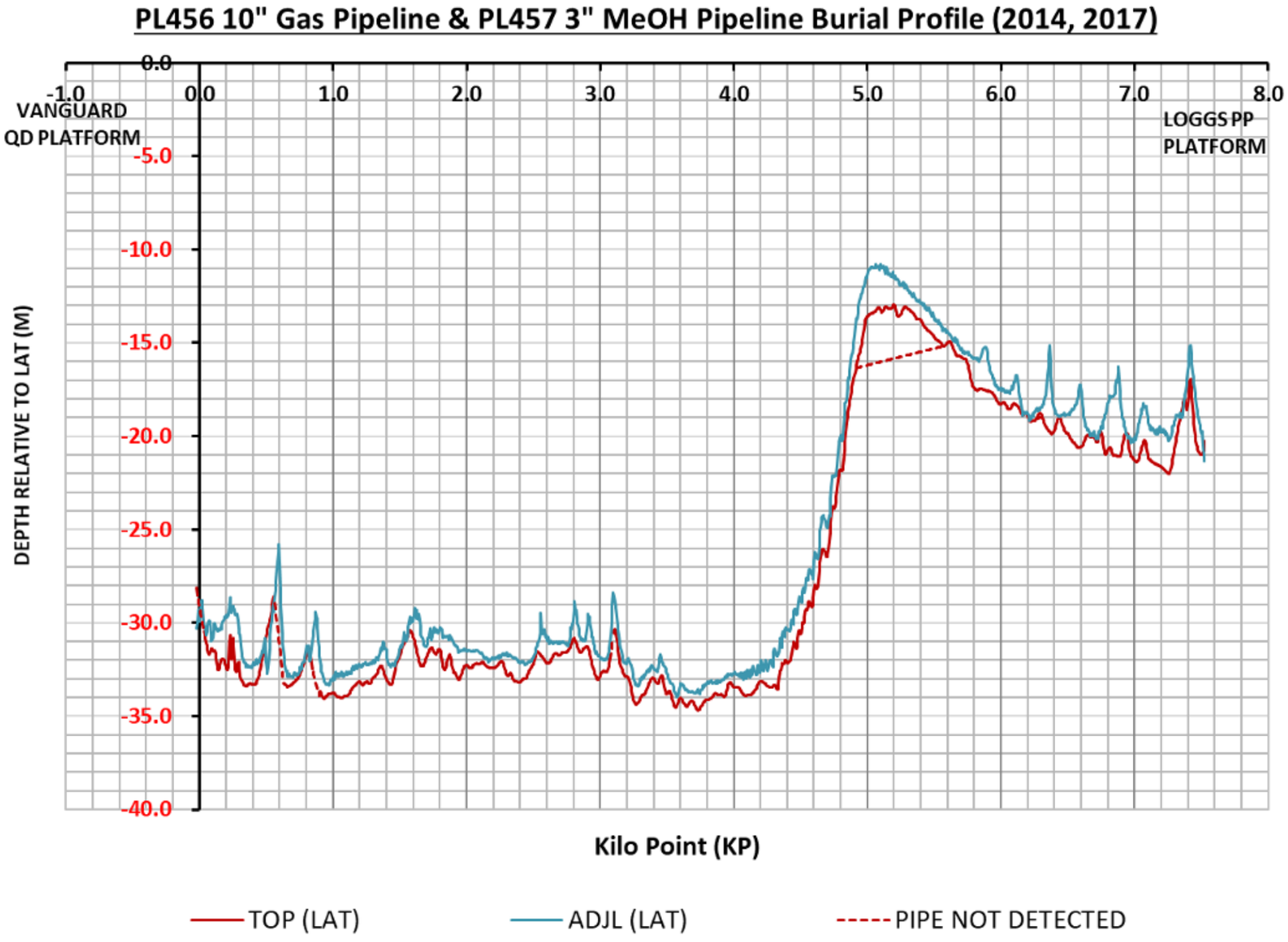


Figure A6.6.1: PL456 & PL457 Seabed & Burial Profile[4,5]

[4] Gap in data due to shallow water over a sandbank; no survey data obtained;
[5] "Pipe not detected" - hypothetical profile shown based on available data. This footnote applies to all pipeline burial profiles.

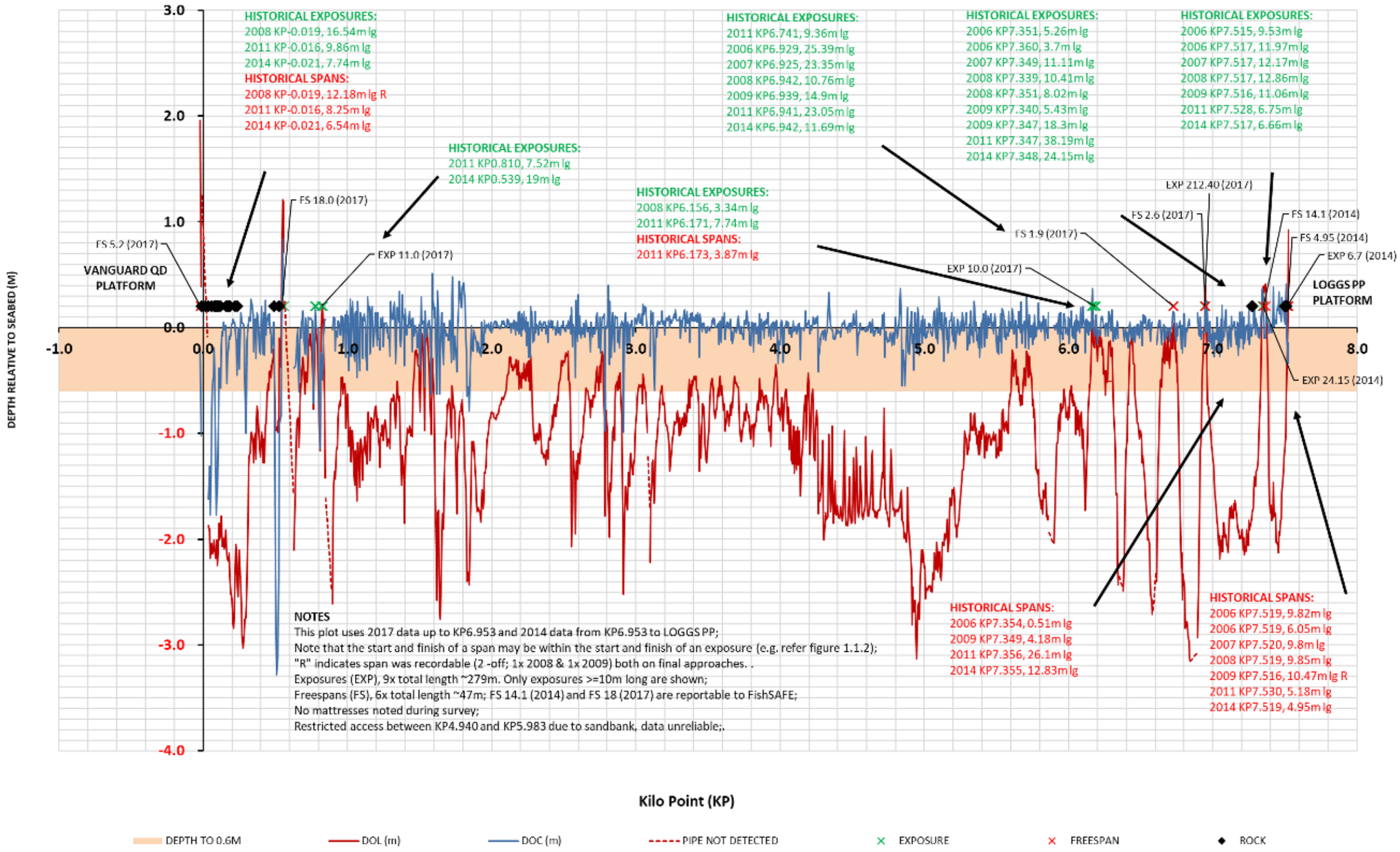


Figure A6.6.2: PL456 & PL457 Depth of Cover Profile[6]

[6] The number of exposures or spans detected for any particular year may not be directly comparable as a difference length might have been surveyed. Refer summary tables in Appendix 2.

Appendix 1.2 PL458 & PL459 Burial Profile

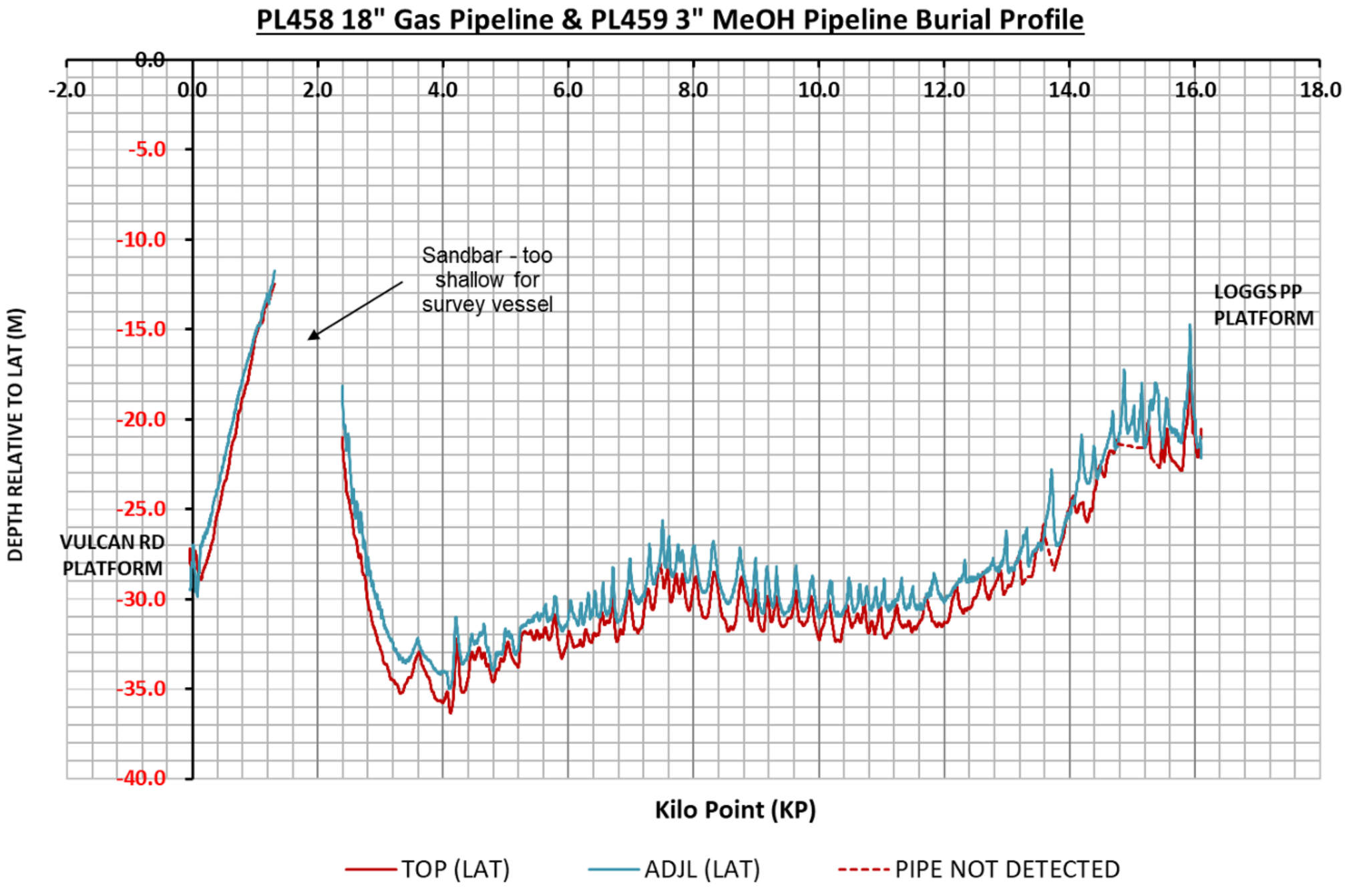


Figure A6.6.3: PL458 & PL459 Seabed & Burial Profile

PL458 18" Gas Pipeline & PL459 3" MeOH Pipeline Burial Profile

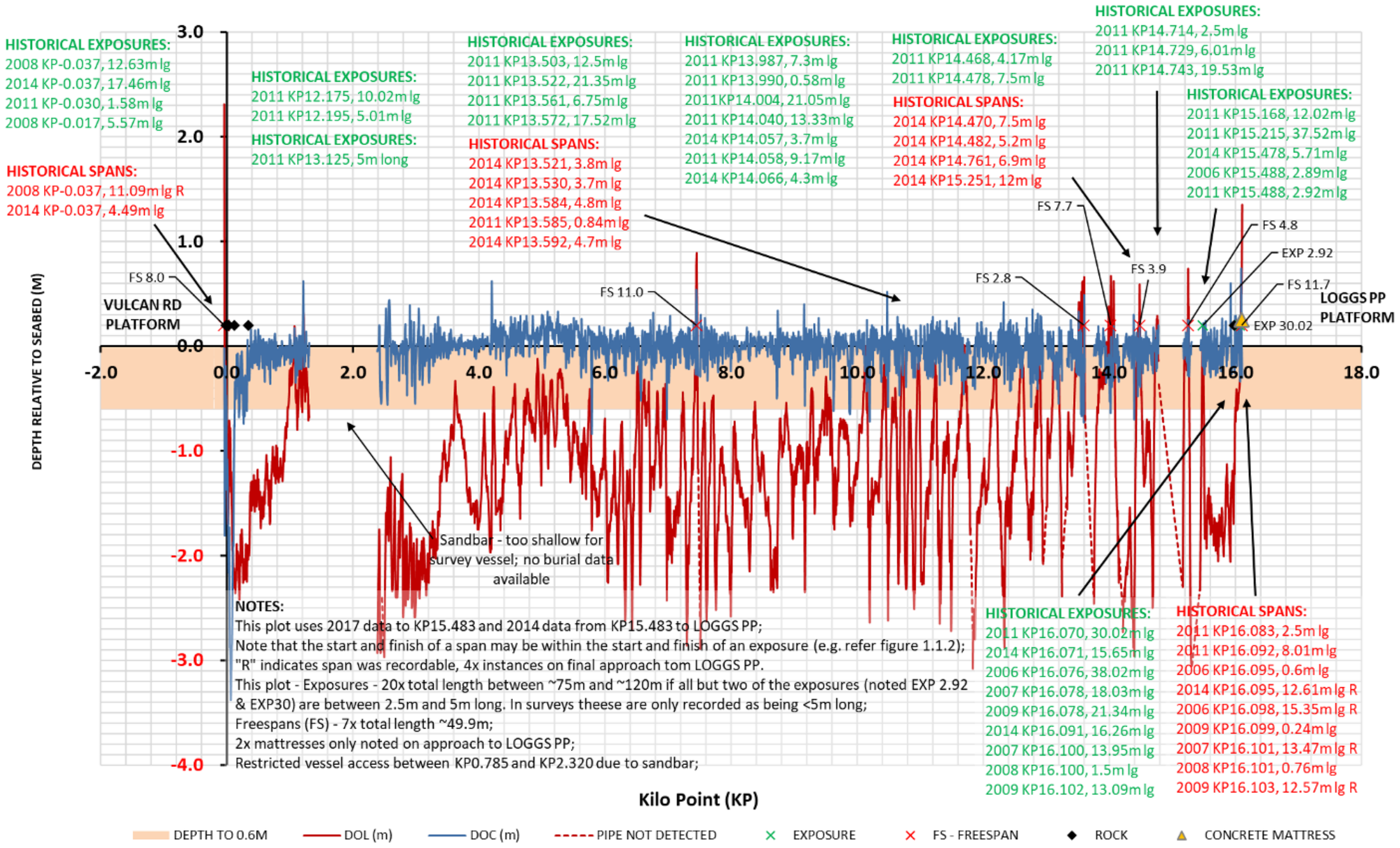


Figure A6.6.4: PL458 & PL459 Depth of Cover Profile[6]

Appendix 1.3 PL460 & PL461 Burial Profile

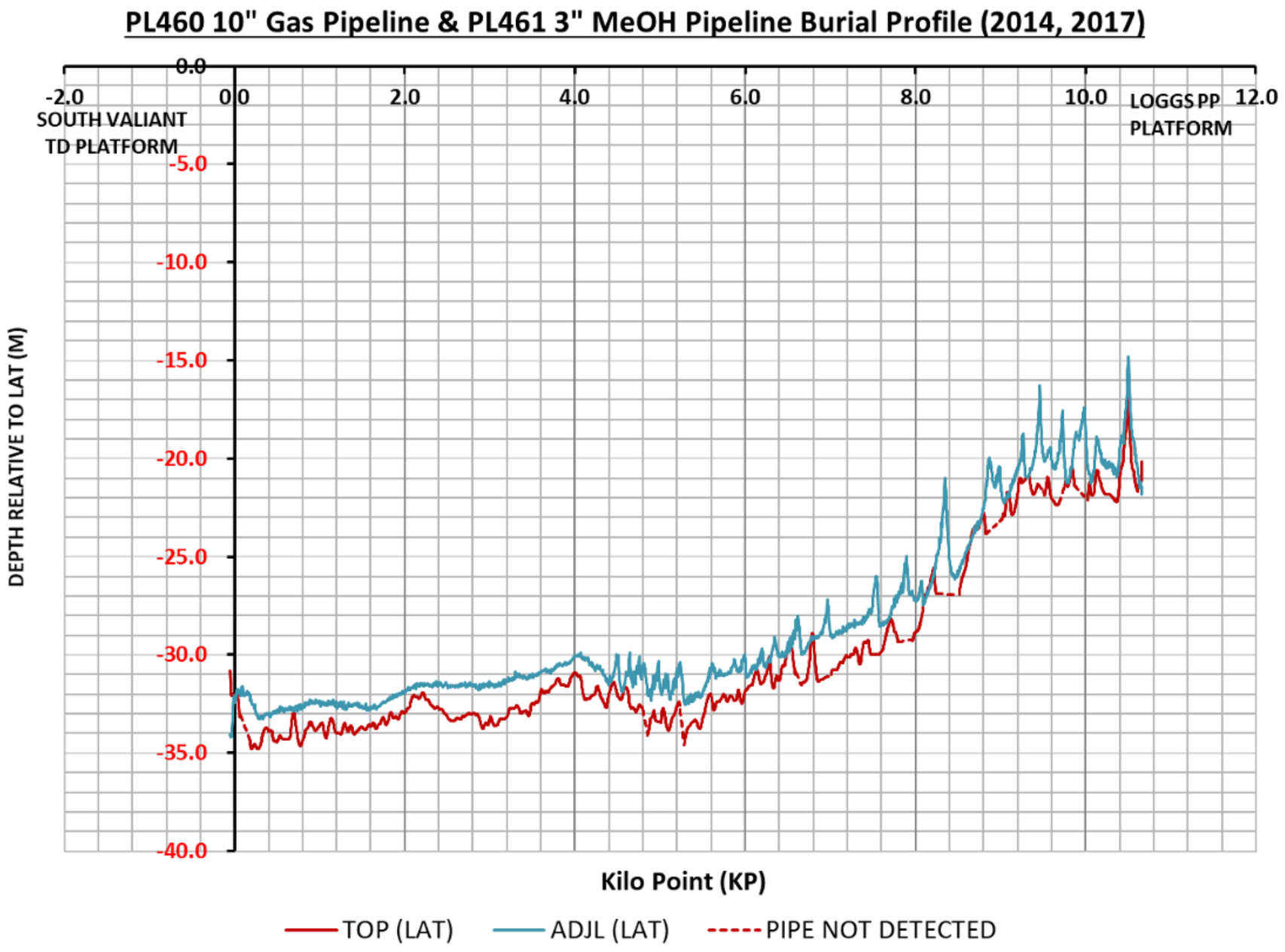


Figure A6.6.5: PL460 & PL461 Seabed & Burial Profile

PL460 10" Gas Pipeline & PL461 3" MeOH Pipeline Burial Profile

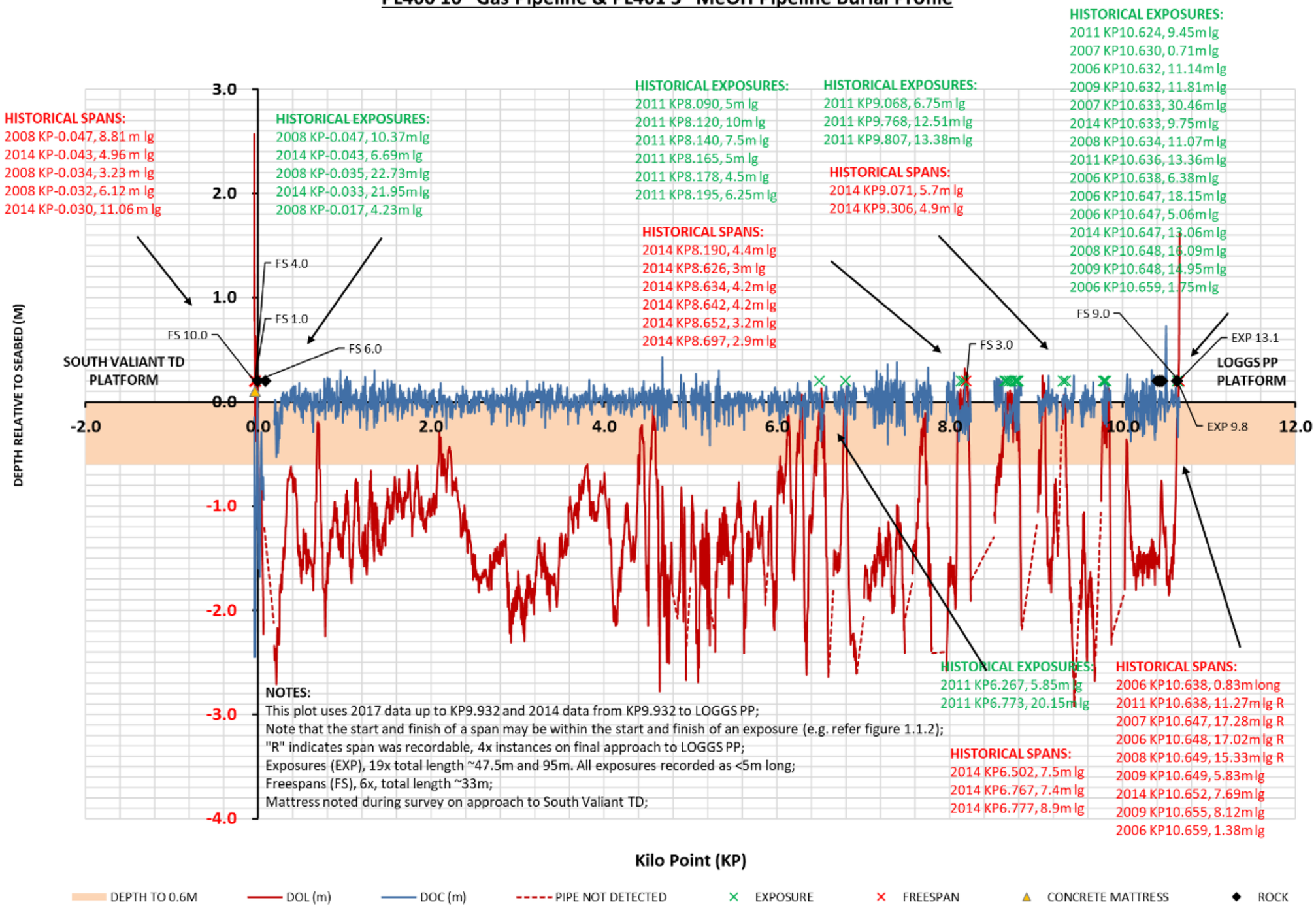


Figure A6.6.6: PL460 & PL461 Depth of Cover Profile[6]

Appendix 1.4 PL470 & PL471 Burial Profile

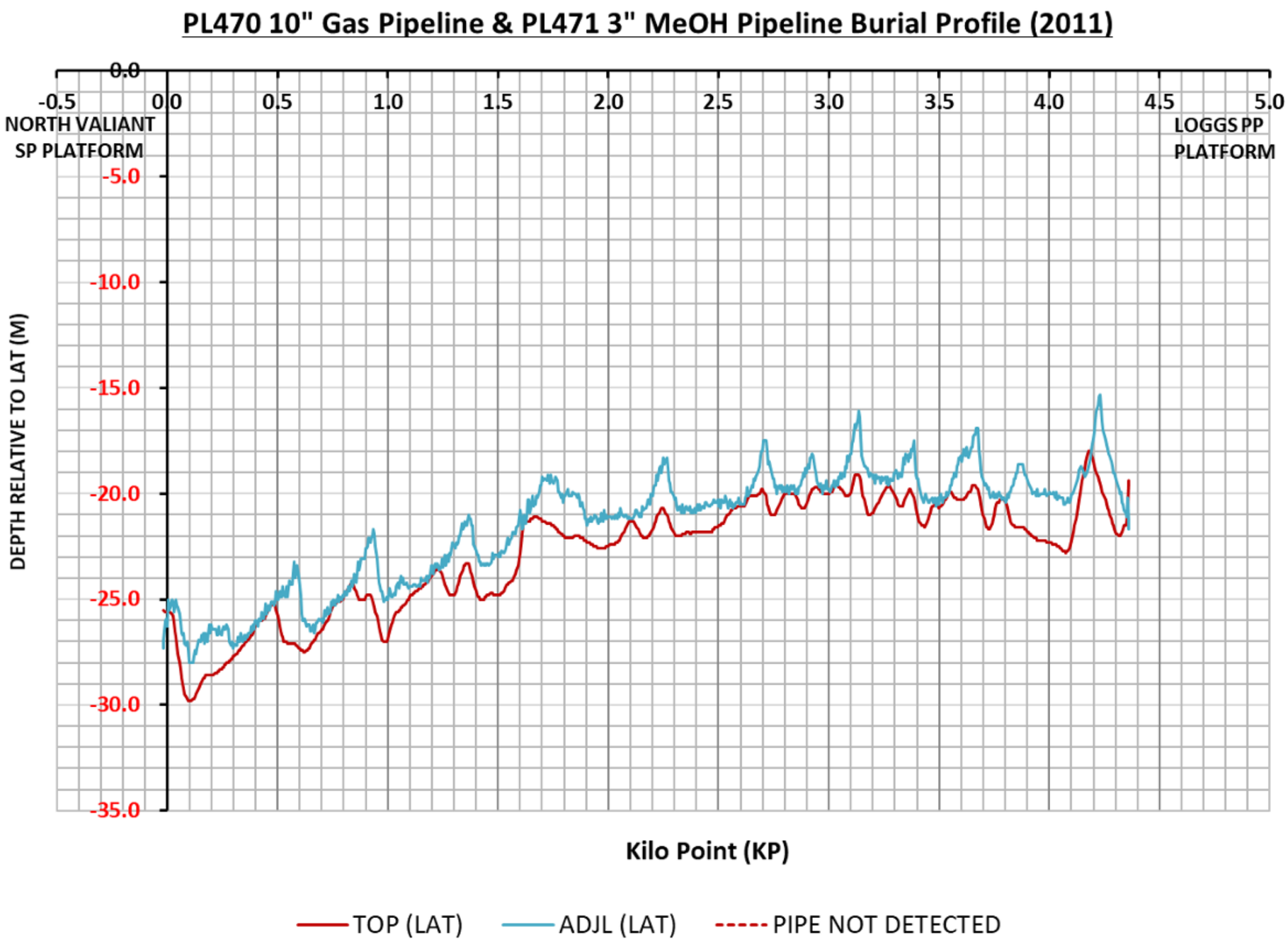


Figure A6.6.7: PL470 & PL471 Seabed & Burial Profile

PL470 10" Gas Pipeline & PL471 3" MeOH Pipeline Burial Profile

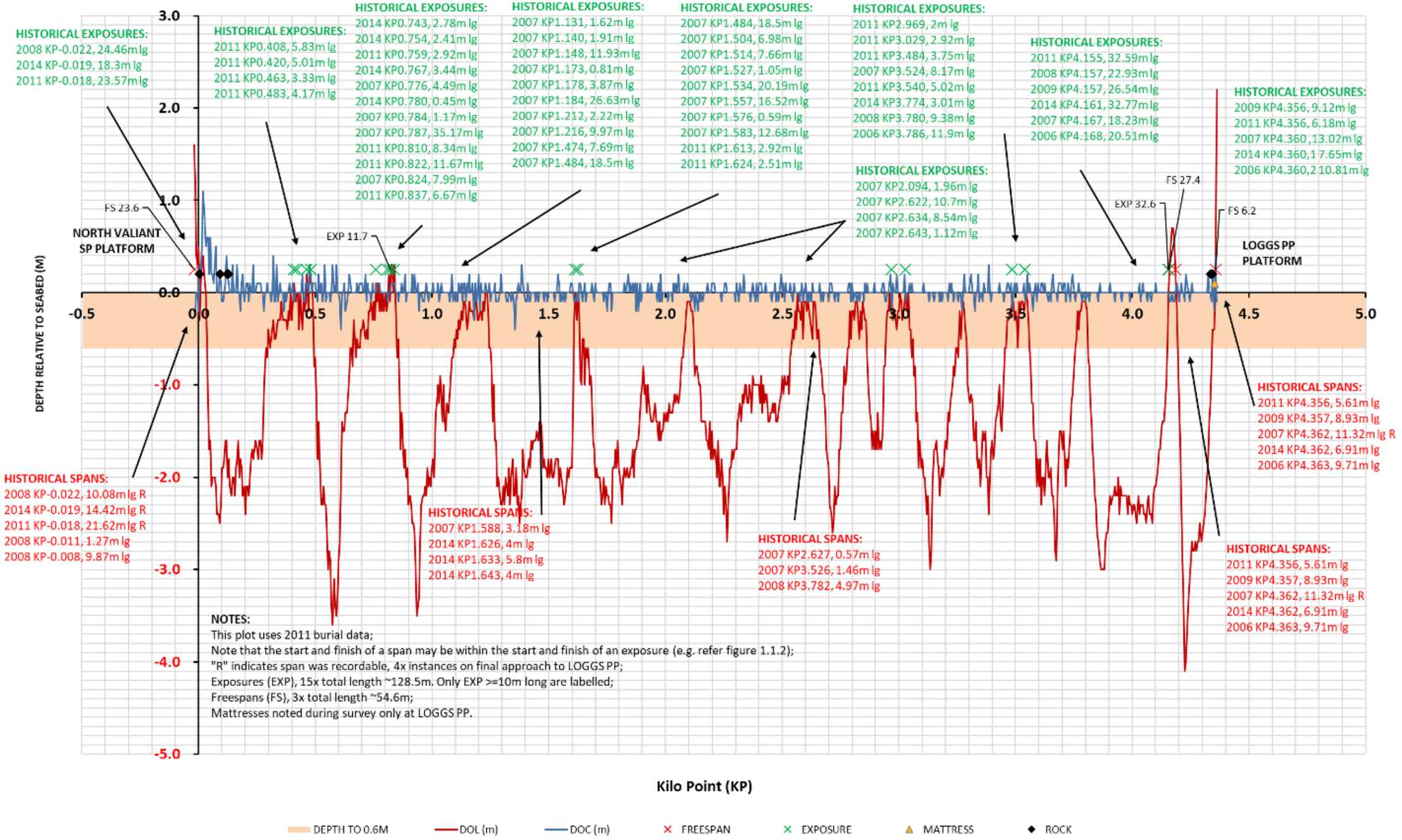


Figure A6.6.8: PL470 & PL471 Depth of Cover Profile[6]

Appendix 2 Pipeline Survey History

Appendix 2.1 PL456 & PL457 Survey History

Table A6.6.1: PL456 & PL457 Survey History			
Survey Year	**Start KP**	**End KP**	**Length Surveyed (km)**
2006	6.923	7.525	0.602
2007	6.925	7.530	0.605
2008	-0.019	0.513	0.532
	5.965	7.528	1.563
2009	6.939	7.526	0.587
2011	-0.016	7.536	7.552
2014	-0.021	0.645	0.666
	6.655	7.524	0.869
	0.556	6.735	6.179
2017	-0.020	7.524	7.544

Appendix 2.2 PL457 & PL458 Survey History

Table A6.6.2: PL458 & PL459 Survey History			
Survey Year	**Start KP**	**End KP**	**Length Surveyed (km)**
2006	15.465	16.112	0.647
2007	15.494	16.113	0.619
2008	-0.037	0.355	0.392
	15.491	16.101	0.610
2009	15.487	16.115	0.628
2011	-0.030	0.785	0.815
2014	2.320	16.100	13.780
	-0.037	2.475	2.512
	15.315	16.107	0.792
	2.455	15.392	12.937
2017	-0.040	10.045	10.093

Appendix 2.3 PL457 & PL458 Survey History

Table A2.3.1: PL460 & PL461 Survey History			
Survey Year	**Start KP**	**End KP**	**Length Surveyed (km)**
2006	10.026	10.66	0.634
2007	10.039	10.664	0.625
2008	-0.046	0.468	0.514
	10.062	10.663	0.601
2009	10.056	10.662	0.606
2011	-0.059	10.649	10.708
2014	-0.043	0.96	1.003
	9.93	10.66	0.730
	0.679	10.009	9.330
2017	-0.048	10.045	10.093

Appendix 2.4 PL470 & PL471 Survey History

Table A2.4.1: PL470 & PL471 Survey History			
Survey Year	**Start KP**	**End KP**	**Length Surveyed (km)**
2006	3.737	4.372	0.635
2007	0.499	4.374	3.875
2008	-0.021	0.531	0.552
	3.763	4.35	0.587
2009	3.761	4.365	0.604
2011	-0.018	4.362	4.380
2014	-0.019	0.78	0.799
	3.480	4.369	0.889
	0.706	3.544	2.838

Appendix 3 Public & Consultee Correspondence

Appendix 3.1 Public Notices

Legal Notices

Friday 15 October 2021 *The Daily Telegraph*

The Petroleum Act 1998

Decommissioning Programmes for the LOGGS Satellites V-Fields Area - Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD, and Associated Infield Pipelines.

Chrysaor Production (U.K.) Limited (a Harbour Energy company) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD installations, and associated infield 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 LOGGS Satellites V-Fields Area, consisting of Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD, respectively lie approximately 72 kilometres, 69 kilometres, 67 kilometres and 57 kilometres north-east of the North Norfolk coast in Blocks 48/25b, 49/16, 49/16a, 49/21a and 49/21b. The facilities include four platforms, each comprising a topside and a jacket structure, two subsea templates, eight pipelines and associated subsea stabilisation features.

Harbour Energy hereby gives notice that the LOGGS Satellites V-Fields Area Decommissioning Programmes are available on its website at www.harbourenergy.com, or alternatively a hard copy of the document may be requested by contacting Harbour Energy during office hours on 01224 205000.

Representations regarding the LOGGS Satellites V-Fields Area Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to DecommissioningDCMailbox@chrysaor.com, by the consultation closing date of 12 November 2021. Submissions should state the grounds upon which any representations are being made.

Dated: 15 October 2021

Harbour Energy, Rubislaw House, Anderson Drive, Aberdeen, AB15 6FZ

Mike Burnett, Decommissioning Strategy & Integration Manager

Public Notices

FRIDAY, OCTOBER 15, 2021

HULL-LIVE.CO.UK

The Petroleum Act 1998

Decommissioning Programmes for the LOGGS Satellites V-Fields Area - Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD, and Associated Infield Pipelines.

Chrysaor Production (U.K.) Limited (a Harbour Energy company) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD installations, and associated infield 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 LOGGS Satellites V-Fields Area, consisting of Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD, respectively lie approximately 72 kilometres, 69 kilometres, 67 kilometres and 57 kilometres north-east of the North Norfolk coast in Blocks 48/25b, 49/16, 49/16a, 49/21a and 49/21b. The facilities include four platforms, each comprising a topside and a jacket structure, two subsea templates, eight pipelines and associated subsea stabilisation features.

Harbour Energy hereby gives notice that the LOGGS Satellites V-Fields Area Decommissioning Programmes are available on its website at www.harbourenergy.com, or alternatively a hard copy of the document may be requested by contacting Harbour Energy during office hours on 01224 205000.

Representations regarding the LOGGS Satellites V-Fields Area Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to DecommissioningDCMailbox@chrysaor.com, by the consultation closing date of **12 November 2021**. Submissions should state the grounds upon which any representations are being made.

Dated: 15 October 2021

Harbour Energy,
Rubislaw House,
Anderson Drive,
Aberdeen, AB15 6FZ

Mike Burnett
Decommissioning Strategy & Integration Manager

Table A3.1.1: Public Notices The Daily Telegraph & Hull Daily Mail (15 October 2021)

ENVIRONMENT & INFRASTRUCTURE

ENERGY

CHRYSAOR PRODUCTION (U.K.) LIMITED
THE PETROLEUM ACT 1998
DECOMMISSIONING PROGRAMMES FOR THE LOGGS SATELLITES V-FIELDS AREA - VANGUARD QD, NORTH VALIANT SP, SOUTH VALIANT TD AND VULCAN RD, AND ASSOCIATED INFIELD PIPELINES.

Chrysaor Production (U.K.) Limited (a Harbour Energy company) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD installations, and associated infield 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 LOGGS Satellites V-Fields Area, consisting of Vanguard QD, North Valiant SP, South Valiant TD and Vulcan RD, respectively lie approximately 72 kilometres, 69 kilometres, 67 kilometres and 57 kilometres north-east of the North Norfolk coast in Blocks 48/25b, 49/16, 49/16a, 49/21a and 49/21b. The facilities include four platforms, each comprising a topside and a jacket structure, two subsea templates, eight pipelines and associated subsea stabilisation features.

Harbour Energy hereby gives notice that the LOGGS Satellites V-Fields Area Decommissioning Programmes are available on its website at www.harbourenergy.com, or alternatively a hard copy of the document may be requested by contacting Harbour Energy during office hours on 01224 205000.

Representations regarding the LOGGS Satellites V-Fields Area Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to DecommissioningDCMailbox@chrysaor.com, by the consultation closing date of 12 November 2021. Submissions should state the grounds upon which any representations are being made.

Dated: 15 October 2021

Mike Burnett, Decommissioning Strategy & Integration Manager, Harbour Energy, Rubislaw House, Anderson Drive, Aberdeen, AB15 6FZ (3905406)

Table A3.1.2: Public Notices The Daily Telegraph & Hull Daily Mail (15 October 2021)

Appendix 3.2 Correspondence with Statutory Consultees

The correspondence with the Statutory Consultees will be added on completion of the Statutory Consultation.

Appendix 4 Partner Letters of Support

Appendix 4.1 BP Exploration (Alpha)

bp

To:

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 11th April 2022

Dear Sir or Madam,

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (7th April 2022).

We, BP Exploration (Alpha) Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

L. Harpley

Lynda Harpley
Finance Advisor

For and on behalf of BP Exploration (Alpha) Limited

Appendix 4.2 ARCO British Limited LLC

bp

To:

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 11th April 2022

Dear Sir or Madam,

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (7th April 2022).

We, Arco British Limited LCC confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

L. Harpley.

Lynda Harpley
Finance Advisor

For and on behalf of Arco British Limited LLC

Appendix 4.3 BP Exploration Beta Limited

bp

To:

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 11th April 2022

Dear Sir or Madam,

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (7th April 2022).

We, BP Exploration Beta Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

L. Harpley

Lynda Harpley
Finance Advisor

For and on behalf of BP Exploration Beta Limited

Appendix 4.4 Britoil Limited

bp

To:

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Petroleum Regulator for Environment & Decommissioning
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Date: 11th April 2022

Dear Sir or Madam,

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

PETROLEUM ACT 1998

We acknowledge receipt of your letter dated (7th April 2022).

We, Britoil Limited confirm that we hereby authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

L. Harpley

Lynda Harpley
Finance Advisor

For and on behalf of Britoil Limited

Appendix 4.5 Chrysaor (U.K.) Alpha Limited

Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

13th April 2022

Dear Sir or Madam

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

We acknowledge receipt of your letter dated 7th April 2022.

We, Chrysaor (U.K.) Alpha Limited confirm that we authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Richard Tocher
SVP Decommissioning & Major Projects

For and on behalf of Chrysaor (U.K.) Alpha Limited

Appendix 4.6 Chrysaor Developments Limited

Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

13th April 2022

Dear Sir or Madam

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

We acknowledge receipt of your letter dated 7th April 2022.

We, Chrysaor Developments Limited confirm that we authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Richard Tocher
SVP Decommissioning & Major Projects

For and on behalf of Chrysaor Developments Limited

Registered in England & Wales, Brettenham House, Lancaster Place, London, WC2E 7EN. Company No. 00524868

Appendix 4.7 Chrysaor Petroleum Limited

CHRYSAOR

Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

13th April 2022

Dear Sir or Madam

The Petroleum Act 1998
LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes: LDP4

We acknowledge receipt of your letter dated 7th April 2022.

We, Chrysaor Petroleum Limited confirm that we authorise Chrysaor Production (U.K.) Limited to submit on our behalf abandonment programmes for the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes, as directed by the Secretary of State on 7th April 2022.

We confirm that we support the proposals detailed in the LOGGS Satellites V-Fields Area – Vanguard QD, North Valiant SP, South Valiant TD & Vulcan RD & Associated Infield Pipelines Decommissioning Programmes dated 8th April 2022, which are to be submitted by Chrysaor Production (U.K.) Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Richard Tocher
SVP Decommissioning & Major Projects

For and on behalf of Chrysaor Petroleum Limited

Registered in England & Wales, Brettenham House, Lancaster Place, London, WC2E 7EN. Company No. 00524868