

Offshore Decommissioning Unit

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FAO: Alex Mateo, Decommissioning Manager

16 October 2015

RE: THAMES COMPLEX DECOMMISSIONING PROGRAMMES PETROLEUM ACT 1998

Dear Sir,

We, Perenco UK Limited, hereby submit abandonment programmes dated 15 October 2015 relating to the Thames Complex as directed by you on behalf of the Secretary of State on 14 October 2015.

The Thames Complex Decommissioning Programmes are submitted on behalf of Section 29 Notice holders Centrica Resources Limited, GB Gas Holdings Limited, Tullow Oil plc and Tullow Oil SK Limited as a requirement under section 29 of the Petroleum Act 1998.

Yours faithfully

Brian James

General Manager and Director

Perenco UK Limited

THAMES COMPLEX DECOMMISSIONING PROGRAMMES



DOCUMENT CONTROL

Approvals

	Name	Signature	Date
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Approved by	Frederic De Meo		15 th Oct 2015

Revision Control

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Natasha Anderson	Centrica Resources Limited	1
Alex Mateo	DECC	6

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A. TABLE OF TERMS AND ABBREVIATIONS

Abbreviation	Explanation
AP	Alpha Production (The Production Platform, AP)
AR	Alpha Reception (The Riser Platform, AR)
AW	Alpha Wellhead (The Wellhead Platform, AW)
CoP	Cessation of Production
DECC	Department of Energy and Climate Change
DPs	Decommissioning Programmes
DSV	Diving Support Vessel
ES	Environmental Statement
ESDV	Emergency Shut Down Valve
FPSO	Floating Production, Storage and Offloading System
HLV	Heavy Lift Vessel
LAT	Lowest Astronomical Tide
M	Metres
MEG	Monoethylene Glycol
NUI	Normally Unattended Installation
OGUK	Oil & Gas UK
OPEP	Oil Pollution Emergency Plans
ORSL	Oil Spill Response Ltd
OSPAR	Oslo and Paris Convention
Perenco	Perenco (UK) Ltd
P & A	Plug and Abandonment
PL	Pipe Line
QRA	Quantitative Risk Assessment
SLV	Sheer Leg Vessels
SNS	Southern North Sea
SWAT	Suspended Well Abandonment Tool
UKCS	UK Continental Shelf

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1. EXECUTIVE SUMMARY

1.1 Combined Decommissioning Programmes

This document contains two Decommissioning Programmes (DPs). (1) the Thames Complex Installations and (2) the Thames pipelines. A separate programme for each set of associated notices under Section 29 of the Petroleum Act 1998 is incorporated within this document.

Thames area Decommissioning Project activities include Thames Complex, Arthur, Gawain, Horne and Wren, Wissey, Thurne and Orwell work scopes. There may be constraints that require some fields for the well and facility decommissioning to be stand alone projects. There are separate Decommissioning Programmes associated with the whole Thames area Decommissioning

The Cessation of Production (CoP) date was 14th May 2014. The CoP documentation was approved by DECC.

PUK have explored all avenues for continuing production, these include the addition of offshore compression, greater liquid handling and subsea well stimulation. Therefore PUK concluded that due to reduction of gas production, operations were uneconomical so CoP was declared in preparation for decommissioning.

1.2 Requirement for Decommissioning Programme(s)

Installation: In accordance with the Petroleum Act 1998, Perenco (UK) Ltd (Perenco) as operator of the Thames field complex and on behalf of the Section 29 notice holders are applying to the Department of Energy and Climate Change (DECC) to obtain approval for decommissioning the Thames complex installations detailed in Section 2 of this document. (See also Section 8 - Partner(s) Letter(s) of Support).

Pipeline(s): In accordance with the Petroleum Act 1998, Perenco as operator of the Thames field complex export line PL370, Bure 'O' PL371, Yare 'C' PL372, Bure West PL1635 and Thurne PL1637 pipelines and Bure 'O' PL374, Yare 'C' PL373, Bure West PL1636 and Thurne PL1638 umbilicals (see Table 2.3) and on behalf of the Section 29 notice holders are applying to DECC to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. (See also Section 8 – Partner(s) Letter(s) of Support).

In conjunction with public, stakeholder and regulatory consultation, the decommissioning programmes are submitted in compliance with national and international regulations and DECC guidelines. The schedule outlined in this document is for a five year decommissioning project plan due to begin in Quarter 3 2014.

1.3 Introduction

The Thames field complex is in Block 49/28 of the Southern North Sea, 80 kilometres North East of the Bacton Terminal off the coast of Norfolk. The co-ordinates of the Thames AP Platform are: Latitude: 53° 05' 02.2214" N, Longitude: 02° 32' 53.4770" E, equivalent UTM co-ordinates are: 5881816.8 North, 469664.2 East. (See table 2.1)

It comprises of five fields surrounding the Thames platform: Thames, Bure Oscar, Bure West, Yare, Wensum and Thurne. Field development began in the 1980s, with first gas from the Thames field (platform wells) in 1986 and subsequent subsea wells tied back and brought online, the last in 2008.

The Deben field was originally part of the Thames complex and installed and commissioned in 1998. Gas was exported back to the Thames platform via the Deben wellhead until 1998.



In 2007 the Deben wellhead was used for the Thurne field and renamed the Thurne subsea well.

All gas from the fields is produced through the Thames three bridge-linked platforms: the wellhead (AW) platform, the processing and quarters (AP) platform and the reception platform (AR). After separation and metering, production is exported through a 24" pipeline to the Perenco gas terminal at Bacton, Norfolk.

Thames Platform Estimated Weights, Tonnes			
	AP	AW	AR
Topsides	6,488	2,035	406
Jacket	1,100	950	600

The Thames complex installation acts as the gathering station for the subsea wells Bure O, Bure West, Gawain, Orwell, Arthur, Yare C, Thurne, Wissey and the Horn and Wren NUI.

The Thames complex installation is a normally attended platform which can accommodate up to 47 personnel onboard.

The Thames complex is approximately 19.5m from LAT to the cellar deck and 43m from LAT to the Helideck. The jacket is in 32.5m water depth.

Following public, stakeholder and regulatory consultation, the decommissioning document for the Thames complex installation is submitted without derogation and in full compliance with DECC guidelines. The decommissioning document explains the principles of the removal activities and is supported by an Environmental Impact Assessment.

The Environmental Impact Assessment covers the whole Thames infrastructure which spans across 13 blocks (48/28-30, 49/26-30, 50/26, 52/3, 53/2-4), the Thames Platforms and the subsea installations Bure O, Bure West, Thurne, Wissey, Yare C, Arthur, Orwell, Gawain and the satellite platform Horne & Wren. This Decommissioning Programme is for the Thames Platforms and subsea installations Bure O, Bure West, Yare C and the Thurne protection frame, flowline and umbilical.

1.4 Overview of Installation(s)/Pipeline(s) Being Decommissioned

1.4.1 Installation(s)

Table 1.1: Installation(s) Being Decommissioned					
Field Name	Thames	Quad/Block	49/28	Number of Platforms	3
Distance from nearest UK coastline (km)	80	Distance to median (km)	230	Platform type	Small Steel Jackets
Number of Subsea Installation(s)	5	Number of Drill Cuttings Pile(s):	None	Topsides Weight (Te): Jacket Weight (Te):	8929 4823
Number of Wells: Platform: Subsea:	5 Platform Wells 4 Subsea Wells (including 1 subsea suspended well under the AW jacket)	Production Type (Oil / Gas / Conde)	Gas	Water Depth (m)	32.5

Note: Jacket weight includes the total weight of the piles @ 2173 Te
Topsides weight includes the weight of the bridges @ 243 Te

Table 1.2 Installation(s) Section 29 Notice Holders Details		
Section 29 Notice Holder(s)	Registration Number	Equity Interest (%)
Perenco UK Ltd	04653066	23.33
Tullow Oil SK Ltd	05287330	66.67
Centrica Resources Limited	02855151	10
GB Gas Holdings	03186121	0
Tullow Oil Plc	03919249	0

1.4.2 Pipeline(s)

Table 1.3: Pipeline(s) Being Decommissioned		
Number of Pipeline(s)/ Umbilical(s)	5/4	(See Table 2.3)

Table 1.4: Pipeline(s) Section 29 Notice Holders Details		
Section 29 Notice Holder(s)	Registration Number	Equity Interest (%)
Perenco UK Ltd.	04653066	23.33
Tullow Oil SK Ltd.	05287330	66.67
Centrica Resources Limited	02855151	10
GB Gas Holdings	03186121	0
Tullow Oil Plc	03919249	0

1.5 Summary of Proposed Decommissioning Programme(s)

Table 1.5: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
1. Topsides		
Complete removal, re-use or recycle	Complies with OSPAR requirements and maximizes recycling of materials.	Decontaminate the topsides and remove the topsides and linking bridges either by HLV or combination of crane vessel and piece small dismantling. Re-use followed by recycle and then landfill will be the prioritised options for the topsides.
2. Jackets		
Complete removal, re-use or recycle	Leaves clean seabed, removes a potential obstruction to fishing operations and maximizes recycling of materials. To comply with OSPAR requirements.	Jacket legs will be removed and dismantled at an onshore location. Re-use followed by recycle and then landfill will be the prioritised options. Piles will be severed at least -3.0m below the seabed. If any practical difficulties are encountered PUK will consult DECC.
3. Subsea Installations		
Wellhead protection frames will be removed by HLV or crane vessel	To remove all seabed structures and leave a clean seabed. To comply with OSPAR requirements.	Wellhead protection frames will be removed along with the top sections of piles. Piles for wellhead protection structures will be severed below the seabed level at such a depth to ensure that any remains are unlikely to become uncovered. Piles will be severed at least -3.0m below the seabed. If any practical difficulties are encountered PUK will consult DECC

Table 1.5: Summary of Decommissioning Programmes – cont'd		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
4. Pipelines, Flowlines & Umbilical		
The 24" export trunk line (PL370) will be pigged, flushed and left buried in situ. Interfield pipelines and umbilicals (see table 2.3 for detailed list) will be flushed and left buried in situ.	Minimal seabed disturbance, lower energy usage, reduced risk to personnel engaged in the activity, pipelines are sufficiently buried and are stable.	The 24" export line along with the interfield flowlines and umbilicals will be left in situ, with the cut ends re-buried below the seabed level at such a depth to ensure that any remains are unlikely to become uncovered. Surveys indicate pipelines and umbilicals will remain buried with flooding. Degradation will occur over a long period within seabed sediment and not expected to represent a hazard to other users of the sea. North Norfolk District Council and Crown Estates will be consulted regarding the decommissioning of the export line from the low water mark to Bacton terminal.
5. Well Abandonment Operations		
Plug and abandoned to comply with the HSEs "Offshore Installations and Wells (Design and Construction, etc) Regulations 1996" and in accordance with O&GUK for the Suspension and Abandonment of Wells.	Meets DECC and HSE regulatory requirements.	A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of works carried out. A PON 5 will also be submitted to DECC for application to abandon the Wells.
6. Drill Cuttings		
Leave in place to degrade naturally	Cuttings were widely dispersed and fall below OSPAR 2006/5 thresholds.	Left undisturbed on seabed
7. Interdependences		
Not applicable.		

1.6 Field Location/Layout and Adjacent Facilities

Figure 1.1: Thames location within Southern North Sea

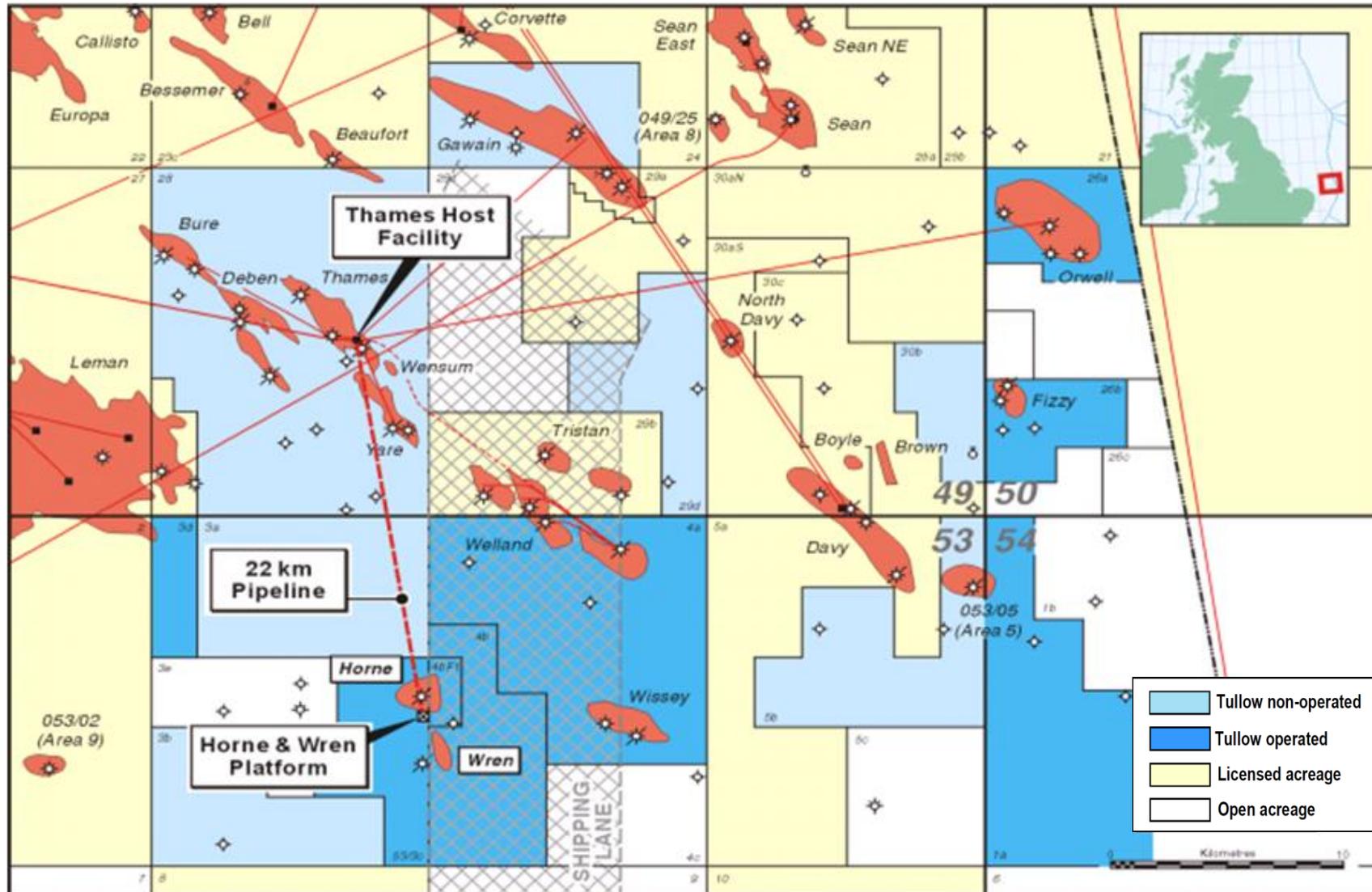
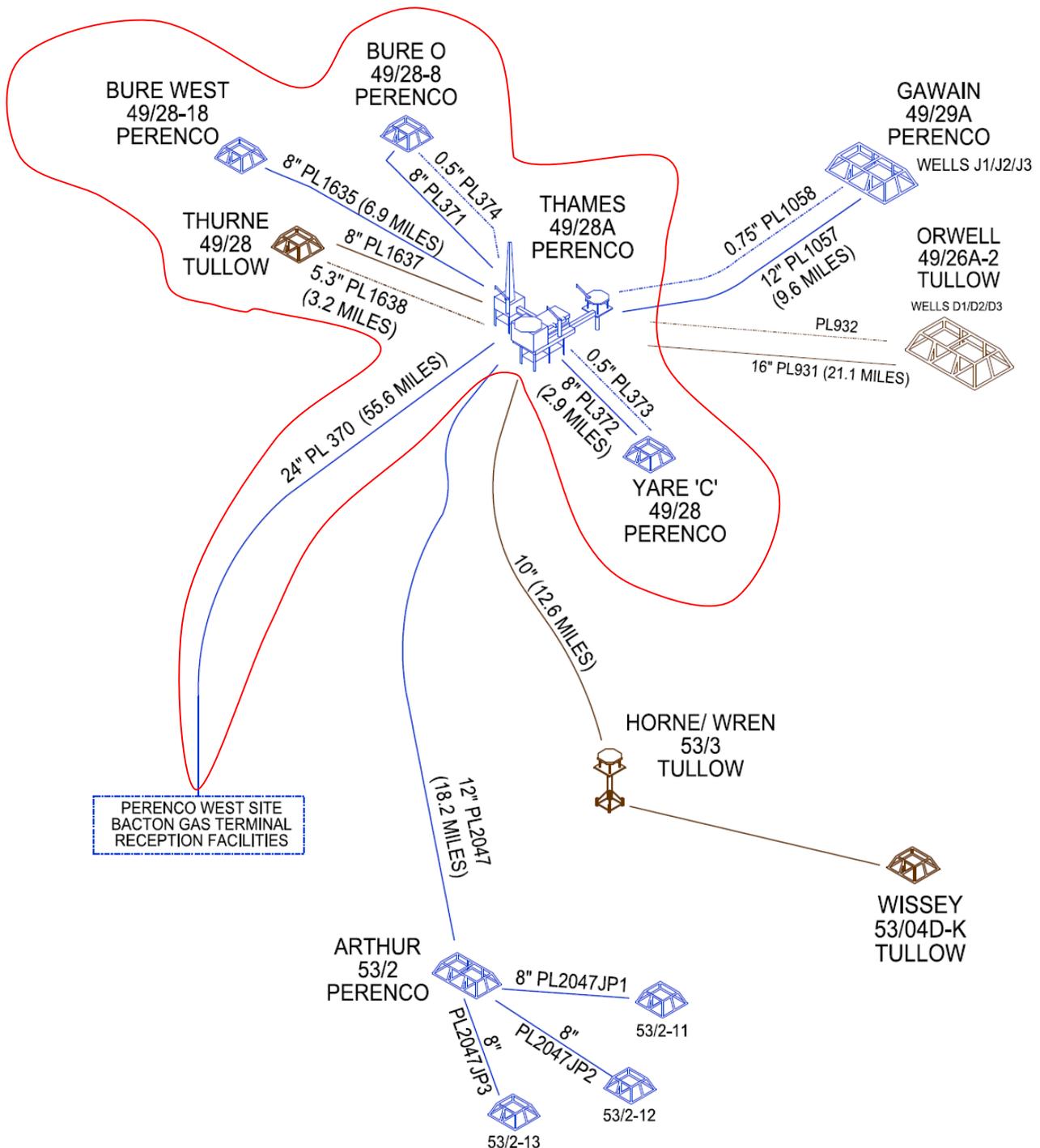


Figure 1.2: Field Layout



Key: Red line indicates the assets affected by this decommissioning programme.

THAMES COMPLEX DECOMMISSIONING PROGRAMMES



Figure 1.3 – Field layout schematic

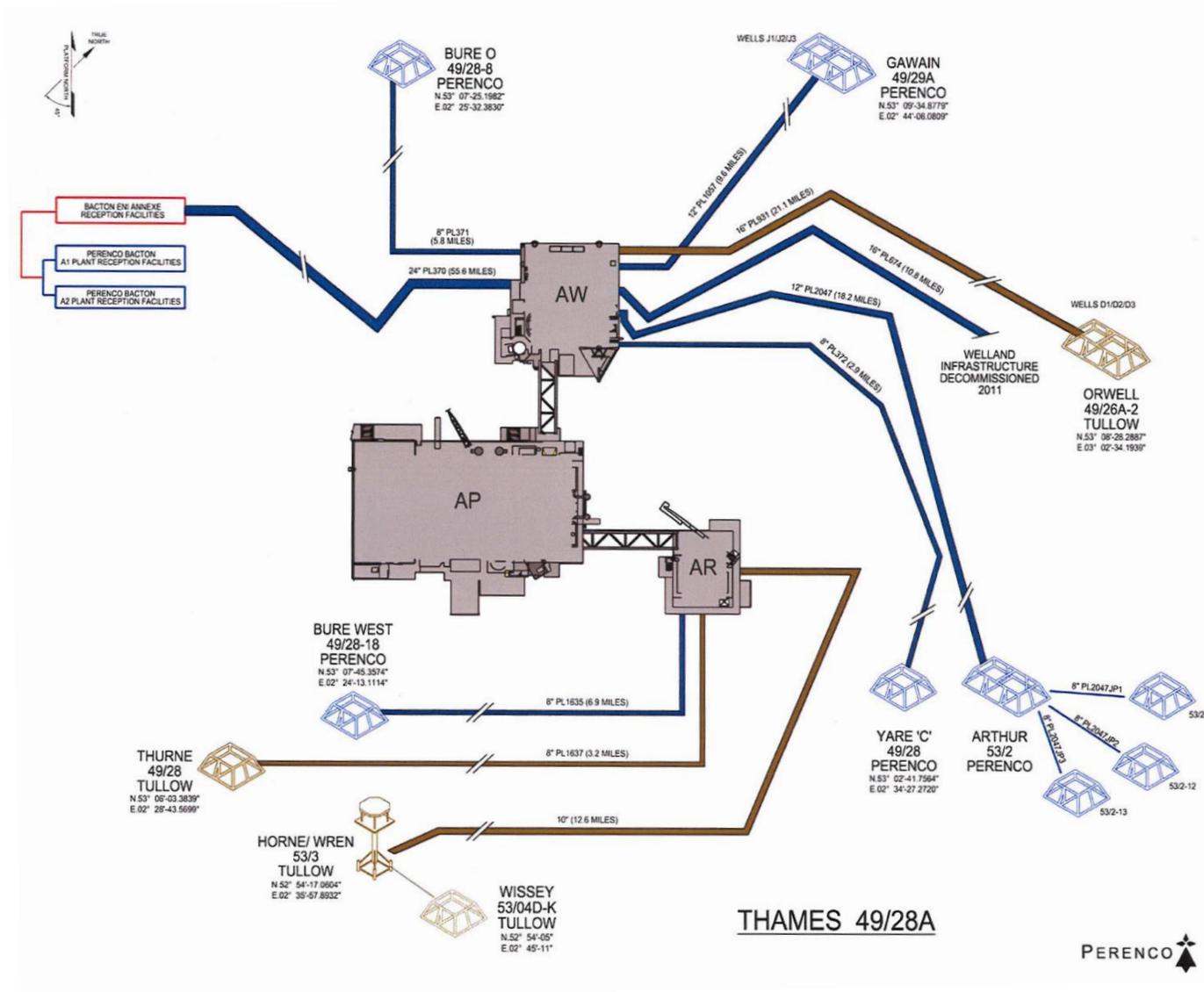
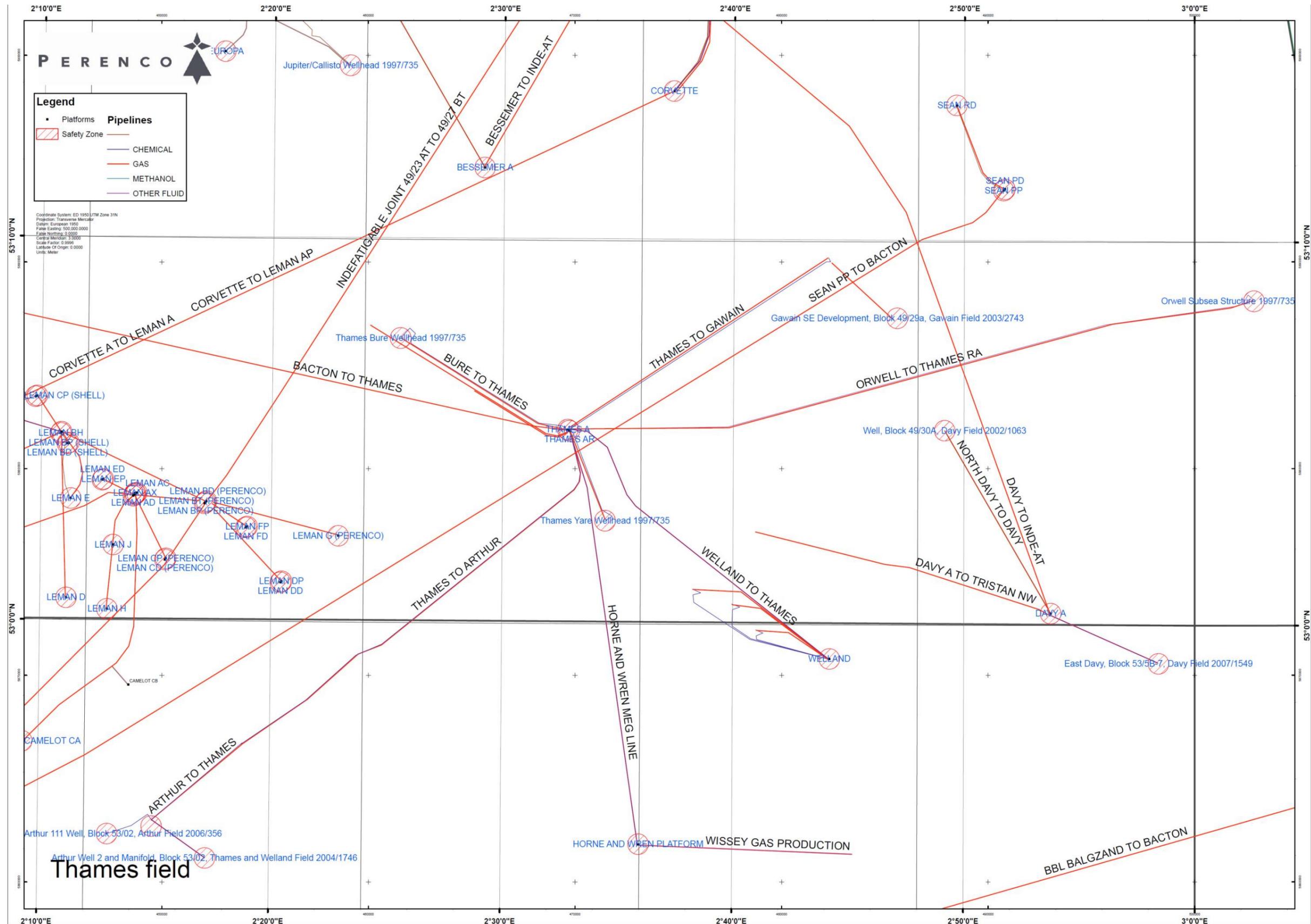


Table 1.6 List of Adjacent Facilities

Owner	Name	Type	Distance/Direction	Information	Status
Perenco	Gawain	Subsea well	From Gawain well to Thames is 15.4km East North East from Thames. 53° 09' 34.8779" North 02° 44' 06.0809" East	Gas production from Gawain subsea wells flows into Thames AW platform	Operational
Tullow	Orwell	Subsea well	From Orwell well to Thames is 34km East from Thames. 53° 08' 28.2887" North 03° 02' 34.1939" East	Gas production from Orwell flows into Thames AW platform	Not Operational
Tullow	Thurne	Subsea well	From Thurne well to Thames is 5.2km North North East from Thames. 53° 06' 03.3839" North 02° 28' 43.5699" East	Gas production from Thurne flows into Thames AR platform	Operational
Tullow	Horne & Wren	NUI	From Horne & Wren to Thames is 20.3km South East of Thames 52° 54 06 North 02° 35 57 East	Gas production from Horn & Wren flows into Thames AR platform	Operational
Tullow	Wissey	Subsea well	From Wissey to Thames is 30.9km South East of Thames 52° 54 05 North 02° 45 11 East	Gas production from Wissey flows into Horn & Wren NUI	Operational
Perenco	Arthur	Subsea well	From Arthur well to Thames is 29.3km South West from Thames. 52° 54' 47.6811" North 02° 14' 56.5181" East	Gas production from Arthur flows into Thames AW platform.	Operational
Perenco	Davy	NUI	From Davy platform to Thames is 22km South East of Thames	Gas production from Davy flows into Inde 23A platform	Operational
Decommissioning of these pipelines will have no impact to adjacent facilities.					

Figure 1.4: Adjacent Facilities and crossings



1.7 Industrial Implications

Pipeline cleaning (base case is to flush and clean from Thames complex back to individual fields. If this is not possible, the uncompleted scopes will be included in the DSV phase). The project includes the following key activities:

- DSV (pipeline severance; decommissioning of stabilisation materials).
- Well Plugging & Abandonment.
- Removal of subsea well heads and well head protection structures.
- Removal of platforms and jackets

The above activities will need to be planned carefully to recognise synergies and efficiencies, however the engineering and planning will be completed to understand the possibilities of potential integration of various activities.

Strategically, suppliers with working vessels and assets on the UKCS will be favoured. All contracts will be competitively tendered or novated to either party.

Current operational contracts for items such as environmental permitting, potential vessel sharing and logistic support will be implemented to support decommissioning activities.

2 DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Surface Facilities (Topsides/Jacket(s)/FPSO etc)

Table 2.1: Surface Facilities Information								
Name	Facility Type*	Location** ED50 Format	Topsides/Facilities		Jacket (if applicable)			
			Weight (Te)	No of modules	Weight (Te)	Number of Legs	Number of piles	Weight of piles (Te)
Thames AP	Fixed steel jacket	53°05'01.8086"N 2°32'49.6117"E	6488	1	1100	6	6	1050
Thames AW	Fixed steel jacket	53°05'03.5788"N 2°32'49.6254"E	2035	1	950	4	4	748
Thames AR	Fixed steel jacket	53°05'02.2214"N 2°32'53.4770"E	406	1	600	4	4	375

Note: Topsides/facilities weights include the bridges

2.2 Subsea Installations and Stabilisation Features

Table 2.2: Subsea Installations and Stabilisation Features				
Subsea installations and Stabilisation Features	Number	Size/Weight (Te)	Location(s) and SD50 Format	Comments/ Status
Wellhead(s)	4	42	Bure West, (53° 07' 45.3574" N 02° 24' 13.1114" E) Bure 'O', (53° 07' 25.1982" N 02° 25' 32.3830" E) Yare 'C', (53° 02' 41.7564" N 02° 34' 27.2720" E) Thames A5 (53°05'03.5788"N 2°32'49.6254"E)	Thames A5 is a suspended subsea well under the AW jacket
Protection Frame(s)	4	360	Bure West, Bure 'O', Yare 'C', Thurne	Piled
Template	1	45	Under Thames AW (53°05'03.5788"N 2°32'49.6254"E)	Attached to a conductor guide
Concrete mattresses	50	506	Within 500m of Thames complex (53°05'01.8086"N 2°32'49.6117"E)	Drawing enclosed
Grout bags	31	0.8	Within 500m of Thames complex (53°05'01.8086"N 2°32'49.6117"E)	Drawing enclosed
Fronnd Mats	40	456	Within 500m of Thames complex (53°05'01.8086"N 2°32'49.6117"E)	Drawing enclosed
Rock Dump	5	13,000	Within 500m of Thames complex (53°05'01.8086"N 2°32'49.6117"E)	Drawing enclosed

2.3 Pipelines / Flowlines / Umbilicals

Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	Pipeline No. (as per PWA)	Diameter (inches)	Length (km)	Composition ¹	Contents ²	From – To End Points	Condition	Status ³	Contents ⁴
Export line	PL370	24	89.5	Steel with concrete coating	Gas	Thames AW to Bacton	Trenched and buried, 7,942.4 meters exposed. Free spans 48. Total length of free spans 412.48 meters	Operational	Hydrocarbons
Bure O flowline	PL371	8	9.3	Steel with concrete coating	Gas	Bure O well to Thames AW	Trenched and buried, 83.51 meters exposed. No free spans	Operational	Hydrocarbons
Yare C flowline	PL372	8	4.8	Steel with concrete coating	Gas	Yare C well to Thames AW	Trenched and buried, 21.44 meters exposed. 1 free span 1.2 meters	Operational	Hydrocarbons
Bure West flowline	PL1635	8	11.2	Steel with concrete coating	Gas	Bure W well to Thames AR	Trenched and buried, 446.59 meters exposed. 6 free spans, total length of free spans 51.16 meters	Operational	Hydrocarbons

Table 2.3: Pipeline/Flowline/Umbilical Information – cont'd									
Description	Pipeline No. (as per PWA)	Diameter (inches)	Length (km)	Composition ¹	Contents ²	From – To End Points	Condition	Status ³	
Yare C Umbilical	PL373	4	4.8	Umbilical	Chemicals	Thames AW to Yare C well	Trenched and buried, 129.87 meters exposed. No free spans.	Operational	Chemicals in line
Bure O Umbilical	PL374	4	9.3	Umbilical	Chemicals	Thames AW to Bure O well	Trenched and buried, 906.14 meters exposed. No free spans	Operational	Chemicals in line
Bure West Umbilical	PL1636	5	11.2	Umbilical	Chemicals	Thurne to Bure West	Trenched and buried, 119.13 meters exposed. 1 free span, 3.52 meters	Operational	Chemicals in line
Thurne flowline	PL1637	8	4.6	Steel with Fusion Bonded Epoxy	Gas	Thames AR to Thurne	Trenched and buried, 86.6 meters exposed. No free spans.	Operational	Hydrocarbons
Thurne Umbilical	PL1638	5	4.5	Umbilical	Chemicals	Thames AR to Thurne (formally known as Deben)	Trenched and buried, 86.6 meters exposed. No free spans.	Operational	Chemicals in line

See Supporting Documents 3 'THAMES PIPELINE SURVEYS - C13021b' for details of pipeline conditions.

¹ e.g. Concrete; Steel; umbilical; Flexible; Bundle

² e.g. Oil; Gas; Water; Chemicals

³ e.g. Operational; Out-of-use; Interim pipeline Regime

⁴ e.g. Cleaned; Flushed; Hydrocarbons and/or Chemicals in line

Table 2.4: Subsea Pipeline Stabilisation Features

Stabilisation Feature	Number	Weight (Te)	Location(s)	Comments/ Status
Concrete mattresses	111	1158	Flowlines to/from Bure West, Bure 'O', Yare 'C', Thurne (Deben), Crossings between Yare 'C' and Shell PL 311, between PL 370 and PL 1610, between Thurne and PL1367, and between PL 370 and PL 1173– outside 500m zone of Thames complex.	See enclosed drawings
Grout bags	306	8	Flowlines to/from Bure West, Bure 'O', Yare 'C', Thurne – outside 500m zone of Thames complex	
Fronnd Mats	30	208	Flowlines to/from Bure West, Bure 'O', Yare 'C', Thurne – outside 500m zone of Thames complex	
Rock Dump	No known rock dump	No known rock dump		No historical data

2.4 Wells

Table 2.5 Well Information			
Platform Wells	Designation 1	Status	Category of Well
49/28-A1 (Well 2)	Gas Production	Producing	PL1-1-1
49/28-A2 (Well 1)	Water Injection	Disposal	PL1-1-1
49/28-A3 (Well 3)	Water Injection	Disposal	PL1-1-1
49/28-A4 (Well 6) WENSUM	Gas Production	Producing	PL1-1-1
49/28-A6 (Well 4)	Gas Production	Suspended	PL1-1-1
Subsea Wells			
49/28-8 BURE O	Gas Production	Producing	SS-3-3-3
49/28-18 BURE WEST	Gas Production	Producing	SS-3-3-3
49/28-13 YARE C	Gas Production	Producing	SS-3-3-3
49/28-A5 THAMES	Dry development	Suspended	ML1

Category of well as per OGUK Guidelines for the suspension and abandonment of wells, Issue 4, July 2012.

2.5 Drill Cuttings

There are no drill cutting piles associated with the Thames Complex installation in the area. Drill cuttings that were generated during drilling activity have been distributed widely during drilling due to the local currents. Although there is no evidence of drill cuttings in the immediate vicinity of the wells, Perenco will be carrying out sea bed sampling to verify the absence of cutting debris that may affect the environment.

Should any evidence of drill cuttings be discovered, Perenco will contact DECC to review findings and extent and agree any necessary remedial actions.

2.6 Inventory Estimates

Figure 2.1a: Pie Chart of Estimated Toppides Inventories (Thames Complex Installations)

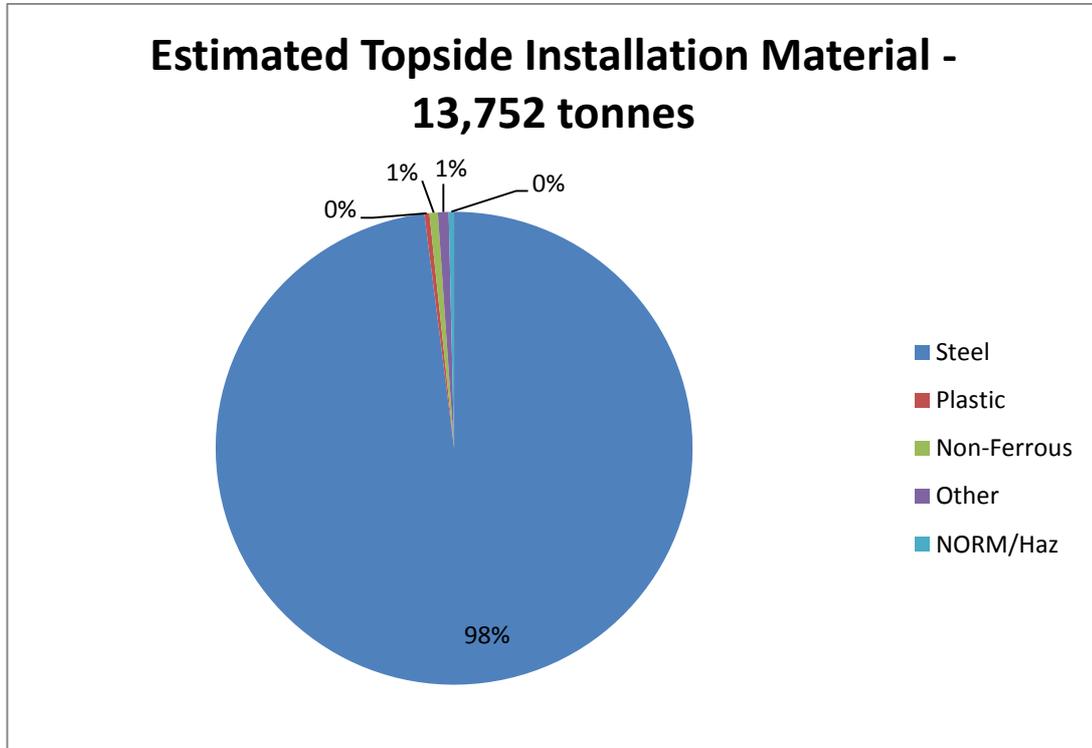


Figure 2.1b: Pie Chart of Estimated Subsea Inventories (Thames Complex Installations)

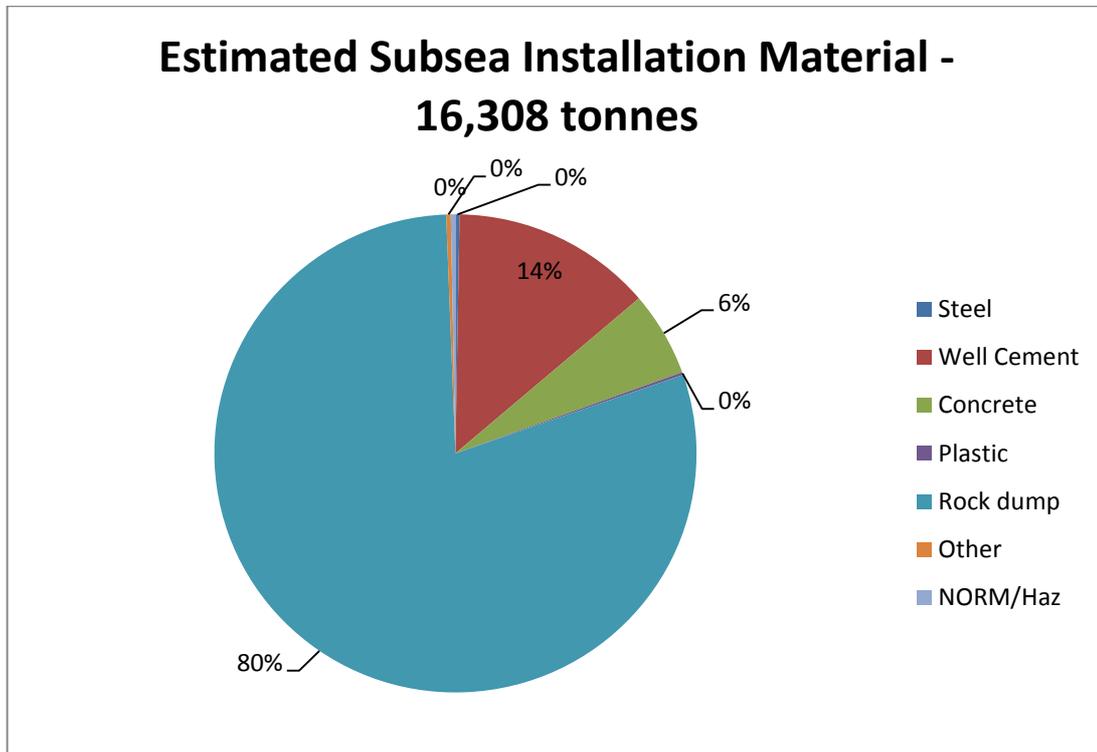
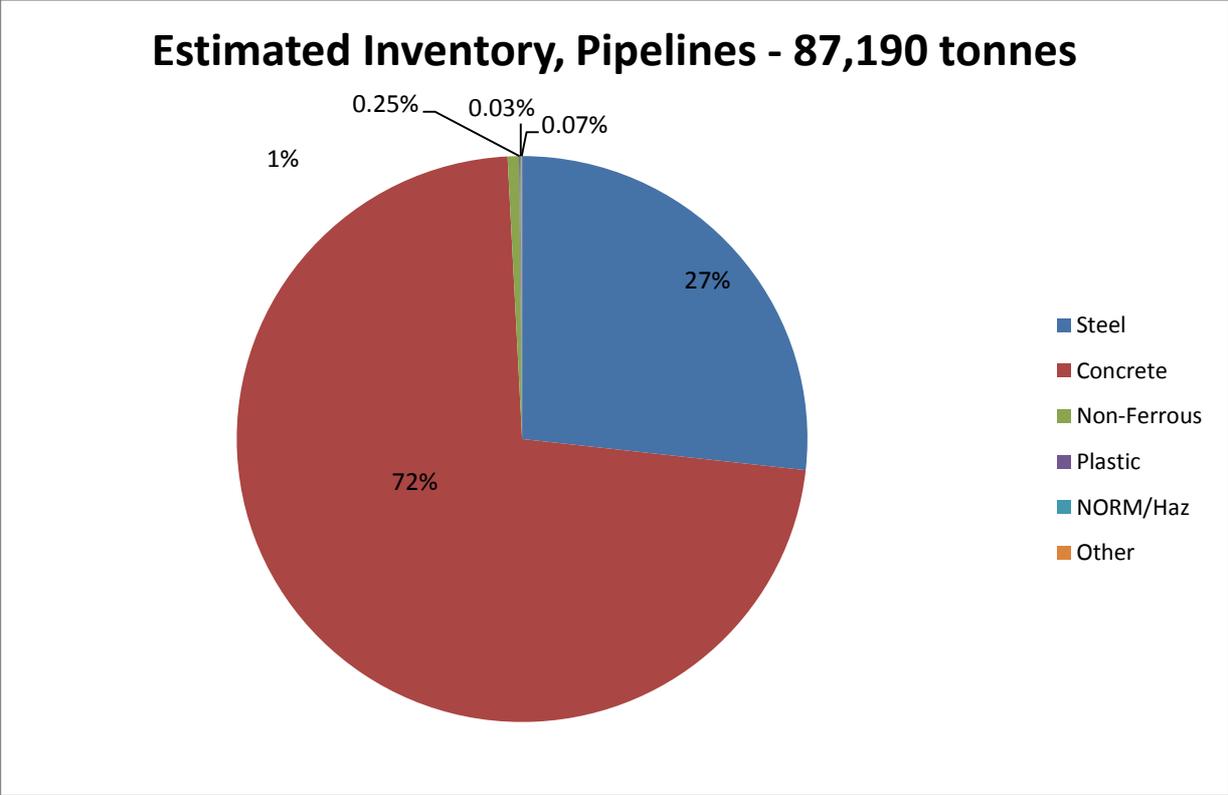


Figure 2.2: Pie Chart of Estimated Inventory (Pipelines)



3. **REMOVAL AND DISPOSAL METHODS**

In line with the waste hierarchy, the re-use of an installation (or parts thereof) was first in the order of preferred decommissioning options for assessment.

The Perenco Section 29 Notice Holders assessed options for extending the producing life of the platform, utilising it as an infrastructure hub for third party tie backs and enhanced recovery programmes, but none proved commercially viable.

The Perenco Section 29 Notice Holders then went onto assess options for the relocation of the platform as a producing asset, but concluded that due to its ageing process technology and the high cost of maintaining the fabric and structural integrity of the platform, no technically viable reuse option was available.

The Perenco Section 29 Notice Holders have reviewed, and will continue to review, the platform's equipment inventories to assess the potential for adding to their existing asset portfolio spares inventory or for resale to the open market.

Recovered material will be landed ashore for disposal by a contractor. It is not possible to forecast the wider reuse market with any accuracy or confidence this far forward. The Perenco Section 29 Notice Holders will continue to track reuse market trends in order to seize reuse opportunities at the appropriate time.

3.1 **Topsides**

Topsides Description: The 49/28 Thames complex installation comprises a series of three bridge-linked platforms which together form a natural gas production and compression installation, located approximately 80 km East North East of Bacton Terminal off the coast of Norfolk in the Southern North Sea.

The Thames complex installation provides facilities for the extraction and conditioning of gas from the subsea reservoirs, prior to export to the Perenco Bacton Terminal via a 24", 89 km long pipeline. Facilities are also provided to receive and treat gas produced by subsea completions in adjacent fields and from the Horn and Wren NUI.

AP Platform – Production platform

The AP platform comprises a six-legged three deck structure (main, mezzanine and cellar decks), supporting the accommodation module, production process, liquid handling equipment compression facilities and associated switch rooms and control room. Above the accommodation module is a Helideck with a D value of 22.2m and maximum takeoff weight of 9.3 Tons. Also on the platform are the main and emergency generators, firewater pumps, air compression equipment, battery room, radio room and store rooms. A pedestal mounted crane is located on the main deck. Access between levels is provided by stairways or ladders. A 6.1m long 78t bridge connects AP to AW and a 9.1m long 55t bridge connects AP to AR.

Weight of the AP Platform: 6,488 t

Dimensions of the AP Platform: 49.5 m x 25 m x 28.8 m high. Height from LAT 47 m.

Note: Two half sections of each bridge weight included in weight of platform.

AW Platform – Wellhead platform

The AW platform comprises a four-legged, three deck structure (main, mezzanine and cellar decks with 2 ESDV decks under), supporting 5 wellheads, reception facilities for export from the Arthur, Orwell, Gawain and Yare and Bure subsea completions. Also on the platform are production facilities for Arthur gas. Also on the platform are MEG, Methanol and Kinetic Hydrate Inhibitor (KHI) storage and injection facilities, production facilities, a single pedestal-mounted crane for general equipment handling and a vent tower. Access between platform levels is provided by stairways or ladders, and a bridge connects the platform to the adjacent production platform. As well as providing passage for personnel, the bridge carries pipework and cabling between the two platforms.

Weight of the AW Platform: 2,035 t

Dimensions of the AW Platform: 30 m x 20 m x 20.7 m high. Height from LAT 39 m.

Note: Half sections of each bridge weight included in weight of platform.

AR Platform – Riser platform

The AR platform comprises a four-legged Vierendeel tower, three deck structure (weather, mezzanine and cellar decks with an ESDV deck under), supporting reception facilities for export from Horne and Wren NUI, Bure West subsea completion and Thurne subsea completion. Also on the platform are production facilities, metering facilities and a Local Equipment Room (LER) which is an alternate muster point should the bridge be impaired. Access between levels is by stairways and ladders and a bridge connects the platform to the adjacent AP platform. As well as providing passage for personnel, the bridge carries pipework and cabling between the two platforms.

Weight of the AR Platform: 406 t

Dimensions of the AR Platform: 12.75 m x 10.6 m x 12.6 m high. Height from LAT 30 m.

Note: Half sections of each bridge weight included in weight of platform.

Preparation/Cleaning:

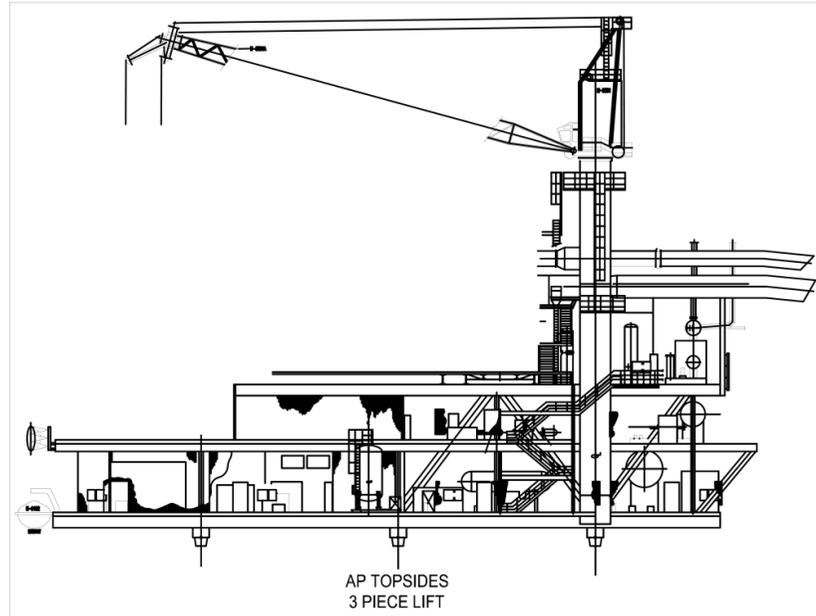
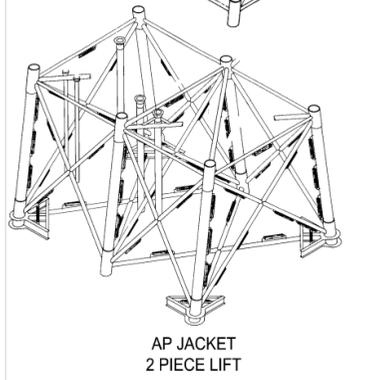
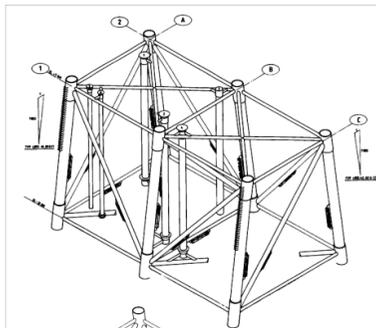
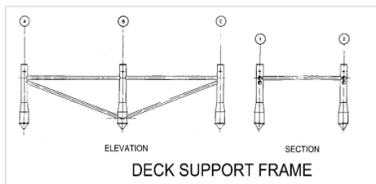
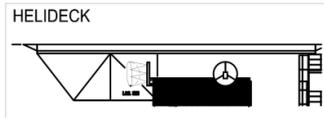
Table 3.1: Cleaning of Topsides for Removal		
Material Type	Detail	Preparatory Activity
Onboard hydrocarbons	Process fluids, fuels and lubricants	Flushed and drained to disposal wells on Thames
Other hazardous materials	NORM, and radioactive material, instruments containing heavy metals, batteries	Transported ashore for re-use/disposal by appropriate methods
Original paint coating	Lead-based paints	May give off toxic fumes/dust if flame-cutting or grinding/blasting is used so appropriate safety measures will be taken
Asbestos and ceramic fibre		Appropriate control and management will be enforced

Removal Methods:

Table 3.2: Topsides Removal Methods	
1) HLV (semi-submersible crane vessel) <input checked="" type="checkbox"/> 2) Mono-hull crane vessel <input checked="" type="checkbox"/> 3) SLV <input checked="" type="checkbox"/> 4) Piece small <input checked="" type="checkbox"/> 5) Other <input type="checkbox"/>	
Method	Description
Single lift removal by SLV/HLV	Removal of topsides as complete units and transportation to shore for re-use of selected equipment, recycling, break up and/or disposal. Single lift dependant on vessel availability.
Modular removal and re-use/recycle by HLV	Removal of parts/modules of topsides for transportation and reuse in alternate location(s) and/or recycling/disposal
Offshore removal 'piece small' for onshore reuse/disposal	Removal of topsides by breaking up offshore and transporting to shore using work barge. Items will then be sorted for re-use, recycling or disposal.
Proposed removal method and disposal route	Topsides will be removed to shore and disposed of at selected disposal yard to comply with relevant legislation and company policy. A final decision on decommissioning method will be made following a commercial tendering process. It is likely that for all 3 topsides, a combination of the above the methods will be deployed to provide the optimum safety/cost solution. The removal method listed below is based on one of the preferred options – exact removing sequence and methodologies will follow the detailed engineering study.

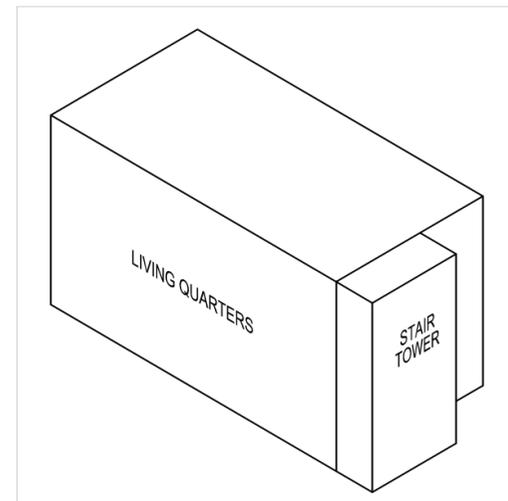
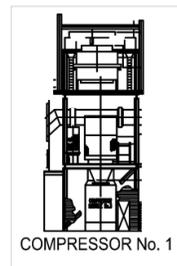
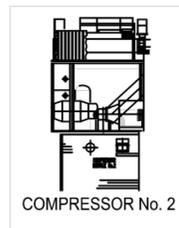
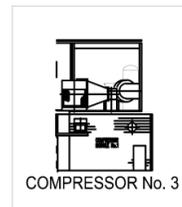
Note: Preliminary studies have indicated that the following methods are likely to be used.

AP Platform – Removal Stages



AP Platform - Removal Stages

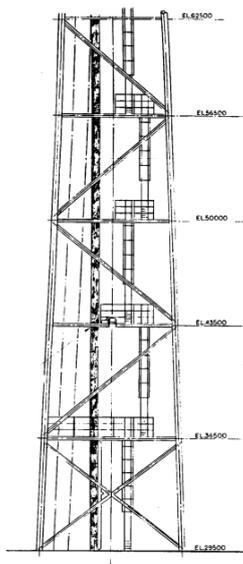
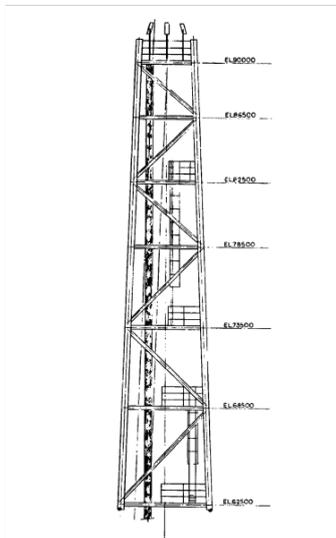
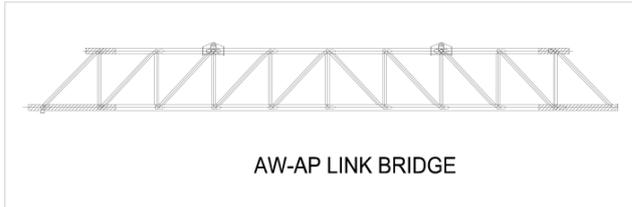
1. Compression Modules 3
2. Helideck
3. Living Quarters
4. AP Topsides (3 piece lift)
5. DSF (single lift)
6. AP Jacket (2 piece lift)



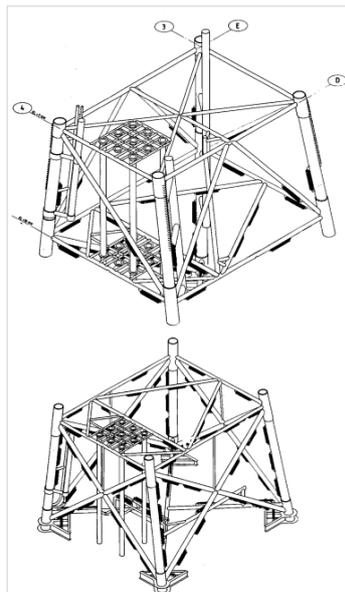
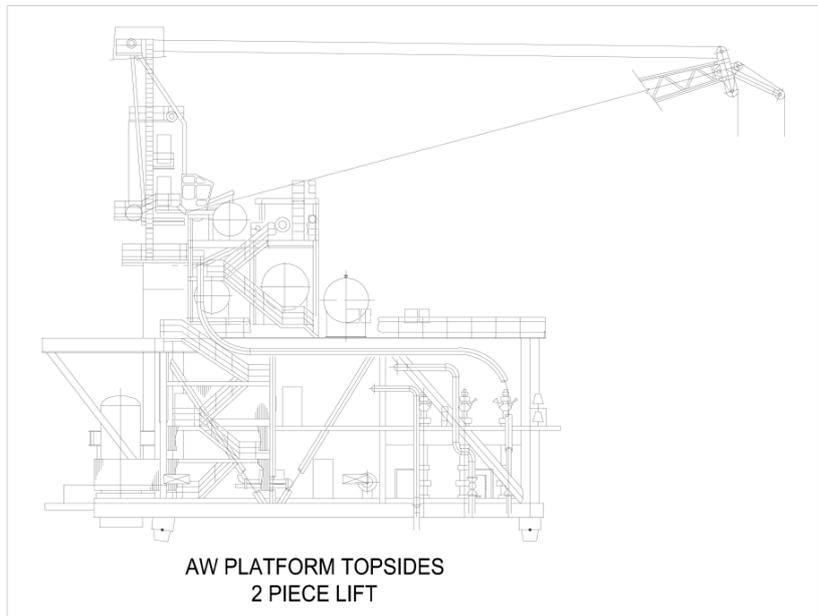
AW Platform – Removal Stages

AW Platform - Removal Stages

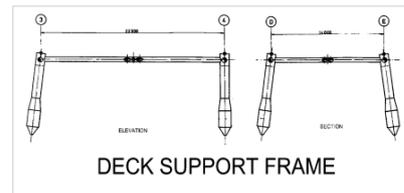
1. Vent Tower (2 piece lift)
2. AW-AP Link Bridge
3. AW Platform Topsides (2 piece lift)
4. DSF (single lift)
5. AW Jacket (2 piece lift)



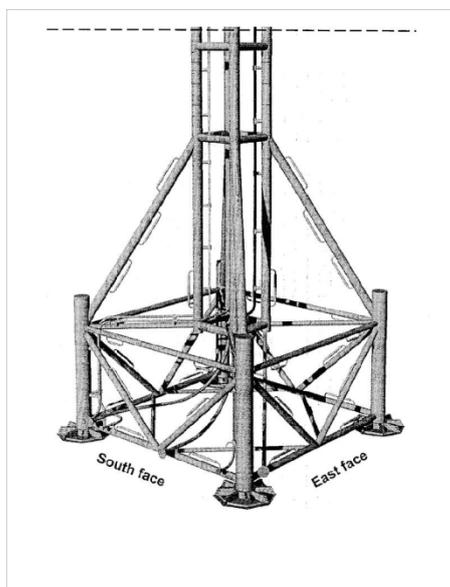
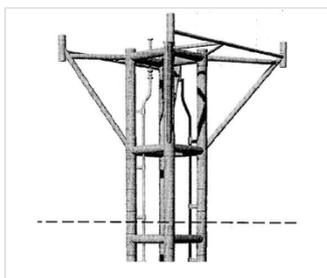
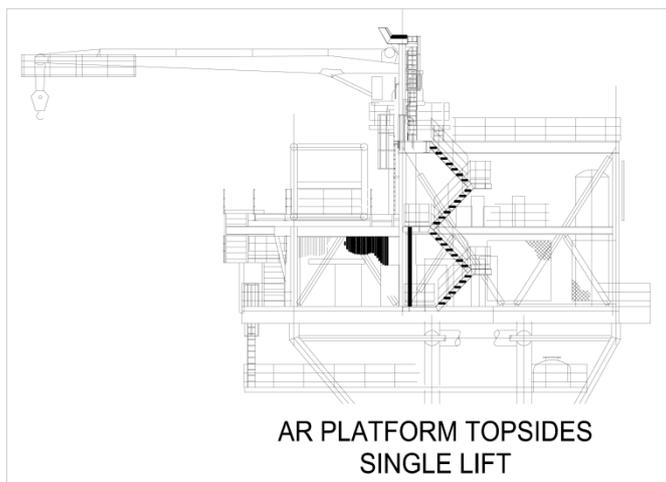
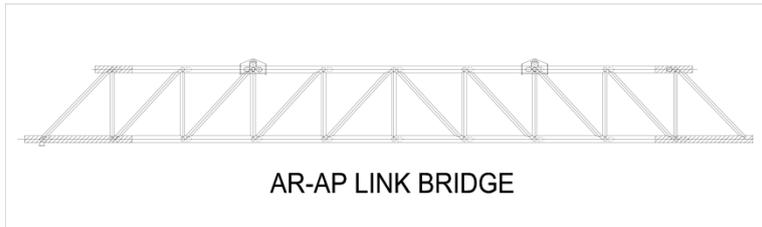
VENT TOWER
2 PIECE LIFT



AW JACKET
2 PIECE LIFT



AR Platform – Removal Stages



AR Platform - Removal Stages

1. AR-AP Link Bridge
2. AR Platform Topsides (single lift)
3. AR Jacket (2 piece lift)

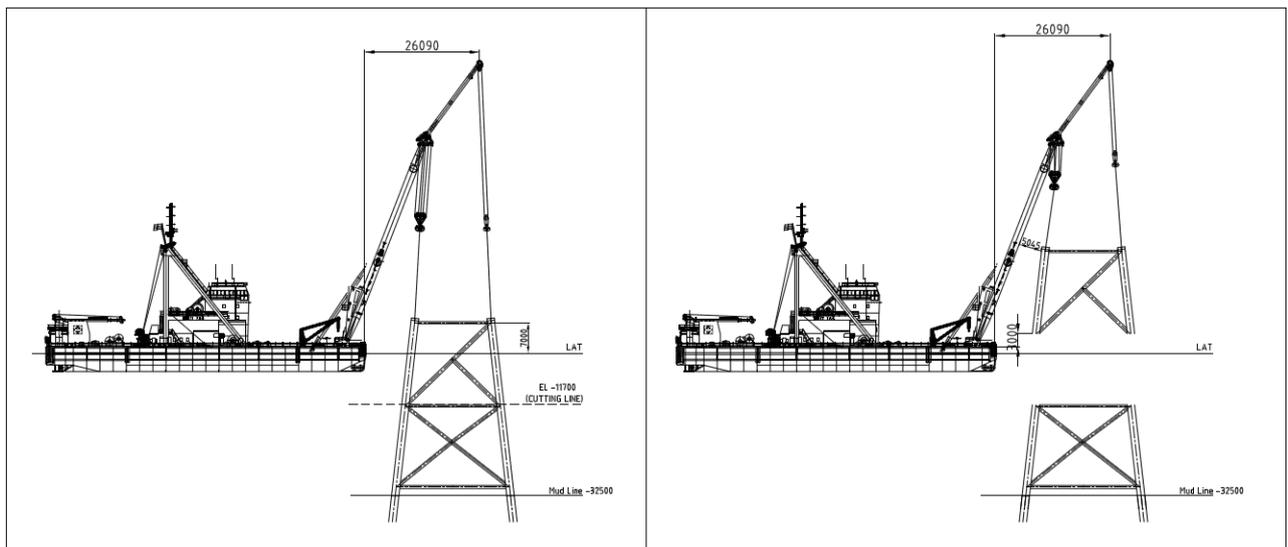
3.2 Jacket(s)

3.2.1 Jacket Decommissioning Overview

All three jackets AP, AW and AW (see drawings below) will be removed to shore for cleaning and disposal. The pile cuts will be made below the seabed level at such a depth to ensure that any remains are unlikely to become uncovered. The means of cutting could be diamond wire, oxyacetylene or high pressure water abrasive. Below the seabed level explosives may also be used as a means of cutting. The drawings below demonstrate one of the preferred removal options and the exact cutting points and removal method are subject to detailed engineering and commercial tendering.

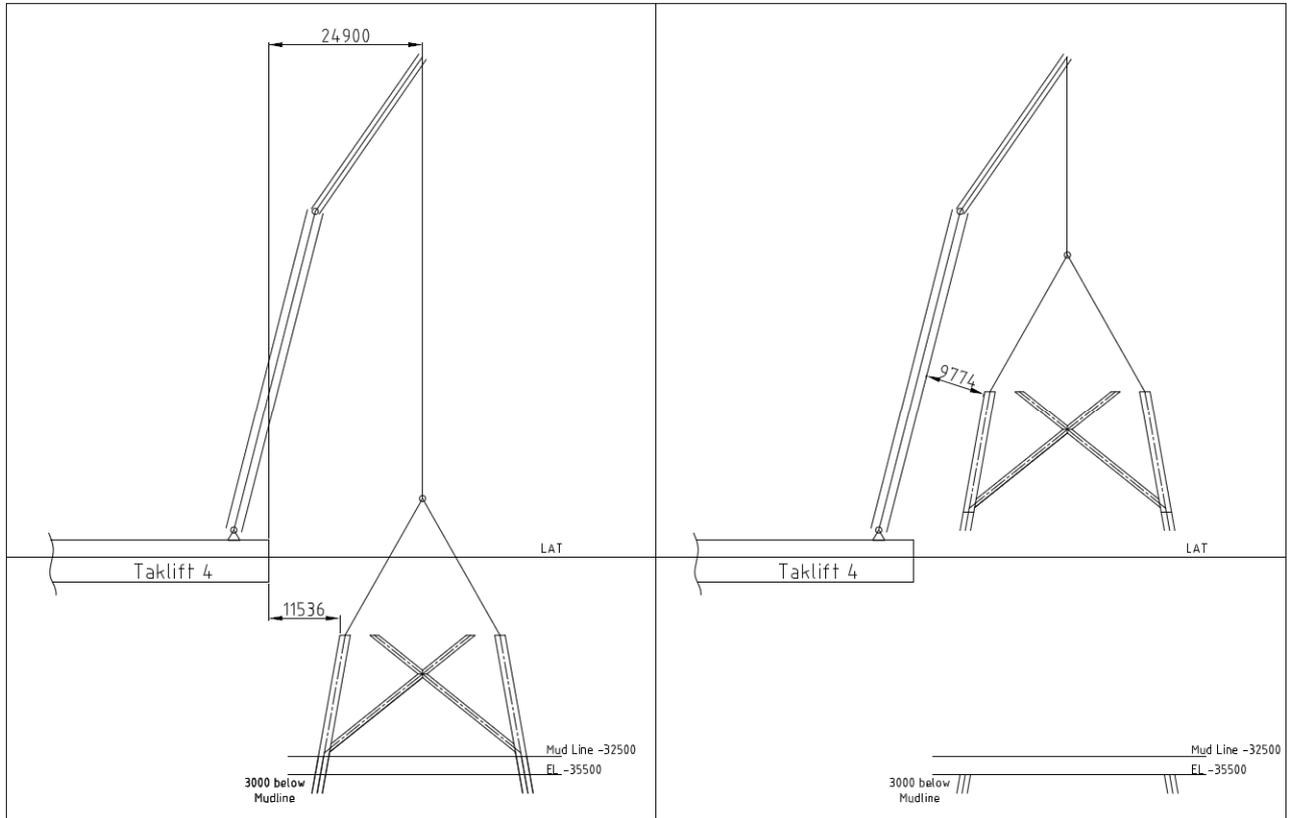
The AP jacket lift weight is 1,697t (including piles) and it is proposed to be removed in one or two lifts. If the jacket is cut in two sections it is proposed the jacket structure would firstly be cut at elevation -11.7m LAT for a lift weight of 691t then further below the seabed level for a lift weight of 1,1,006t. (These cuts/weights are indicative estimates)

Drawing showing the first AP jacket lift

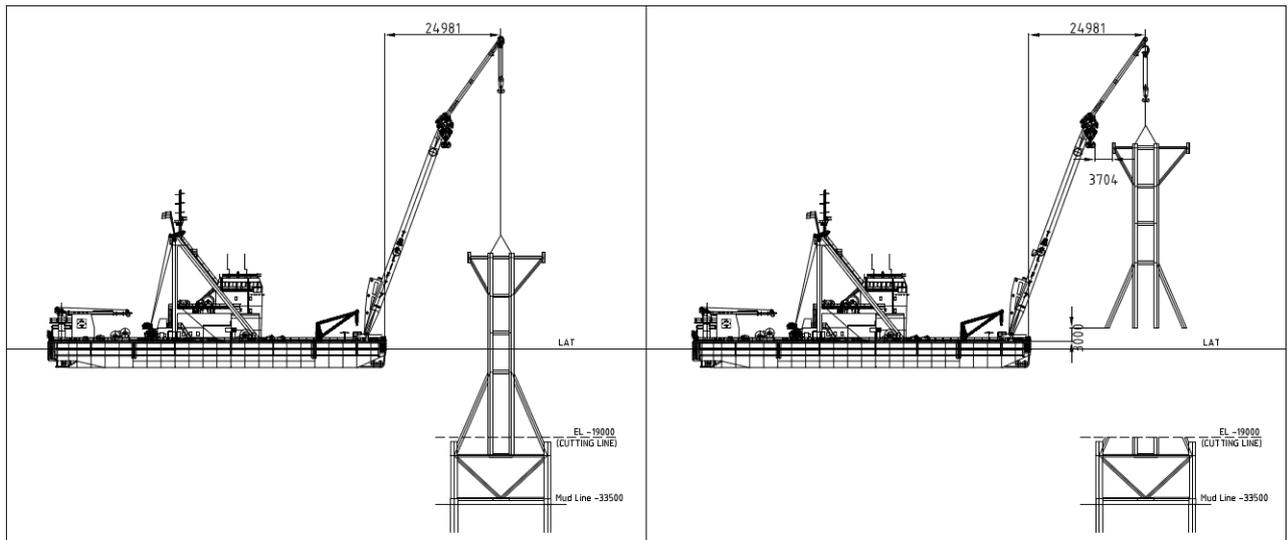


The AW jacket lift weight is 1,532t (including piles) and it is proposed to remove in one or two lifts. If the jacket is cut in two sections it is proposed the jacket structure would firstly be cut at elevation -12.57m LAT for a lift weight of 689t then further cuts below the seabed level for a lift weight of 843t. (These cuts/weights are indicative estimates)

Drawing showing the second AW jacket lift.

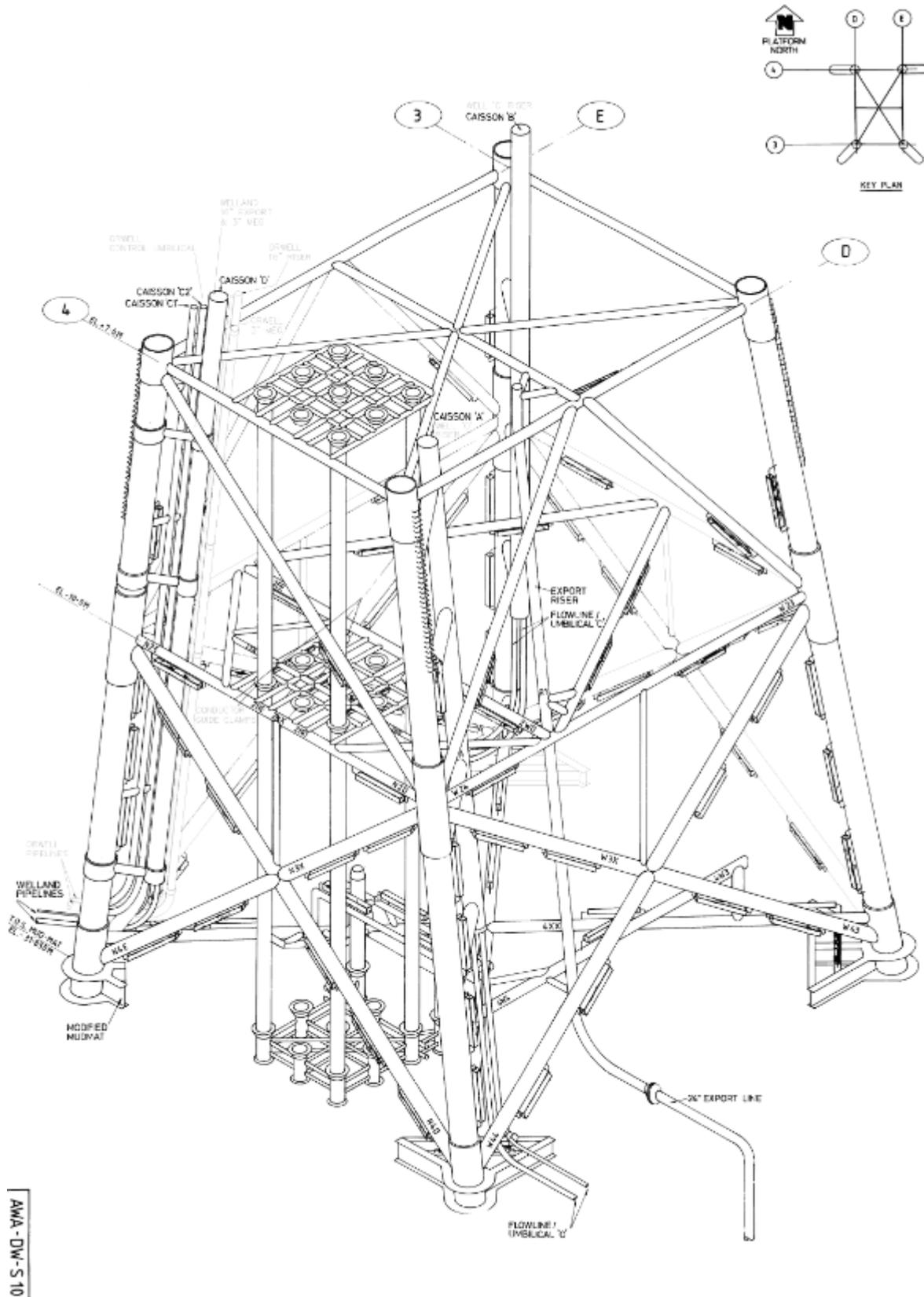


The AR jacket lift weight is 870t and it is proposed to remove in one or two lifts. If the jacket is cut in two sections it is proposed the jacket structure would firstly be cut at elevation -19m LAT for a lift weight of 435t then further cuts at below the seabed level for a lift weight of 435t. (These cuts/weights are indicative estimates)



The engineering study 'Supporting Document 4' 'M0736-REP-10-01200_1000t_Sheerleg_Removal_Method' contains further detail of the removal methodology.

AW Jacket Drawing



AMA - DW - S 10

In line with the waste hierarchy, the re-use of an installation (or parts thereof) was first in the order of preferred decommissioning options for assessment.

The Perenco Section 29 Notice Holders assessed options for extending the producing life of the platform, utilising it as an infrastructure hub for third party tie backs and enhanced recovery programmes, but none proved commercially viable.

The Perenco Section 29 Notice Holders then went onto assess options for the relocation of the platform as a producing asset, but concluded that due to its ageing process technology and the high cost of maintaining the fabric and structural integrity of the platform, no technically viable reuse option was available.

The Perenco Section 29 Notice Holders have reviewed, and will continue to review, the jackets to assess the potential for future use or for resale to the open market.

Recovered jacket material will be landed ashore for disposal by a contractor. It is not possible to forecast the wider reuse market with any accuracy or confidence this far forward. The Perenco Section 29 Notice Holders will continue to track reuse market trends in order to seize reuse opportunities at the appropriate time.

3.2.2 Jacket Removal Methods

Table 3.3: Jacket Decommissioning Methods	
1) HLV (semi-submersible crane vessel) <input checked="" type="checkbox"/>	
2) Monohull crane vessel <input checked="" type="checkbox"/>	
3) SLV <input checked="" type="checkbox"/>	
4) Piece small <input type="checkbox"/>	
5) Other – (describe briefly) <input checked="" type="checkbox"/>	
Method	Description
Onshore disposal using HLV, Monohull crane vessel or SLV	Removal of all the jackets and transport ashore for break up and recycling of steel.
Other	A pull on barge removal method based on a submersible barge which is submerged on one end to the seabed. The jacket will then be pulled on to the barge/vessel by winch.
Proposed removal method and disposal route	Jackets will be removed to shore and disposed off at selected disposal yard to comply with relevant legislation and company policy. The removal method listed in above drawings is one of the preferred options. The exact cutting points and removal methodology will follow the detailed engineering study.

3.3 Subsea Installations and Stabilisation Features

All subsea installations will be removed to shore for disposal. Piles will be severed at least - 3.0m below the seabed. If any practical difficulties are encountered PUK will consult DECC. The means of cutting could be diamond wire, high pressure water jet abrasive cutting or by explosives.

It is intended that the mattresses should be recovered to shore, however in the event of practical difficulties DECC will be consulted and a Comparative Assessment submitted.

Subsea installations and stabilisation	Option	Disposal Route (if applicable)
Wellhead(s)	Remove	Transport ashore for disposal
Protection Frame(s)	Remove	Transport ashore for disposal
Concrete mattresses	It is intended that the mattresses should be recovered to shore, however in the event of practical difficulties DECC will be consulted and a Comparative Assessment submitted.	Transport ashore for disposal
Grout bags	All grout bags will be decommissioned in accordance with the current DECC Guidance notes (Version 6, March 2011).	Transport ashore for disposal
Formwork	Assess integrity and burial depth. If it is buried leave in situ. Otherwise bury & leave in situ	Not applicable.

Table 3.4: Subsea Installation and Stabilisation Features Decommissioning – cont'd		
Subsea installations and stabilisation	Option	Disposal Route (if applicable)
FronD Mats	All frond mats will be decommissioned in accordance with the current DECC Guidance notes (Version 6, March 2011).	Transport ashore for disposal
Rock Dump	Leave in situ	Leave in situ

3.4 Pipelines/Flowlines/Umbilicals

Decommissioning Options:

Table 3.5: Pipeline or Pipeline Groups/Decommissioning Options			
Pipeline or Group (as per PWA)	Status of the line or characteristics of the pipeline group	Decommissioning Options considered	Whole or part of pipeline/group being decommissioned
PL370	Trenched, buried	1,2,3,4,5	Whole pipeline to lower water mark at Bacton
PL371	Trenched, buried	1,2,3,4,5	Whole pipeline
PL372	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1635	Trenched, buried	1,2,3,4,5	Whole pipeline

Table 3.5: Pipeline or Pipeline Groups/Decommissioning Options – cont'd			
Pipeline or Group (as per PWA)	Status of the line or characteristics of the pipeline group	Decommissioning Options considered	Whole or part of pipeline/group being decommissioned
PL373	Trenched, buried	1,2,3,4,5	Whole pipeline
PL374	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1636.1-7	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1637	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1638.1-7	Trenched, buried	1,2,3,4,5	Whole pipeline

*Key to Options

- 1) Completely remove the line(s);
- 2) Trench and bury the exposed / uncovered areas of the line(s);
- 3) Rock dump the line in specific areas where the line is uncovered;
- 4) Partial removal of uncovered sections of the line;
- 5) Leave in situ with monitoring as agreed with DECC.

Comparative Assessment Method:

The Comparative Assessment process involved a multi-disciplinary team participating in a Comparative Assessment workshop and a preliminary Quantitative Risk Assessment (QRA) of the available decommissioning options. At the Comparative Assessment workshop, each decommissioning option has been scored against a set of assessment criteria using categories derived from DECC guidance: 1. Safety; 2. Environmental; 3. Technical; 4. Societal; 5. Commercial. The Comparative Assessment can be found in Section 7, Supporting Documents, Document 2.

The Comparative Assessment concluded the pipelines and umbilical's will be left in situ due to difficulty and cost to remove. They are predominantly trenched and buried. The pipelines will be monitored as agreed with DECC.

Outcome of Comparative Assessment:

Table 3.6: Outcomes of Comparative Assessment		
Pipeline or Group	Recommended Option*	Justification
PL370	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL371	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL372	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL1635	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL373	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL374	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL1636.1-7	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL1637	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.
PL1638	Option 5	Line is buried and will be safe to leave in situ (5). End sections will be removed & exposures/spans rectified as required. Continual monitoring will be performed to confirm pipeline remains buried.

***Key to Options**

- 1) Completely remove the line(s);
- 2) Trench and bury the exposed / uncovered areas of the line(s);
- 3) Rock dump the line in specific areas where the line is uncovered;
- 4) Partial removal of uncovered sections of the line;
- 5) Leave in situ with continuous monitoring.

3.5 Wells

Table 3.7: Well Plug and Abandonment
The wells which remain to be abandoned, as listed in Section 2.4 (Table 2.5) will be plugged and abandoned in accordance with Oil and Gas UK Guidelines for the suspension and abandonment of wells and a PON 5 will be submitted. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) application will be submitted in support of any such work that is to be carried out.

3.6 Drill Cuttings

Drill Cuttings Decommissioning Options: N/A
(Please refer to Section 2.5)

3.7 Waste Streams

Table 3.8: Waste Stream Management Methods	
Waste Stream	Removal and Disposal method
Bulk liquids	Removed from vessels and discharged to disposal wells or sent to Bacton via the export line for disposal. Vessels, pipework and sumps will be drained prior to removal to shore and shipped in accordance with maritime transportation guidelines. Package filtration equipment for disposal of liquids to sea may be utilised and relevant permits will be sought for such operations.
Marine growth	Removed offshore /onshore. Disposed of according to guidelines.
NORM/LSA Scale	Tests for NORM/LSA will occur offshore and will be dealt/disposed with according to guidelines and company policies.
Asbestos	Tests for asbestos will occur offshore and will be dealt/disposed with according to guidelines and company policies.
Other hazardous wastes	Detailed survey for other hazardous wastes will be undertaken offshore and will be dealt/disposed with according to guidelines and company policies.
Onshore Dismantling sites	Appropriate licensed sites will be selected. The chosen facility must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver innovative recycling options.

Table 3.9 Inventory Disposition			
	Total Inventory Tonnage	Planned tonnage to shore	Planned left in situ
Installations	30,060	12,538	17,522
Pipelines	87,190	27	87,163

4 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Environmental Sensitivities

Table 4.1: Environmental Sensitivities	
Environmental Receptor	Main Features
Conservation interests	<p>Marine Protected Areas (MPAs): The Thames Infrastructure overlaps with the boundaries of three MPAs described below:</p> <ul style="list-style-type: none"> • Cromer Shoal Chalk Beds rMCZ (NG2); • Haisborough, Hammond and Winterton cSAC; • North Norfolk Sandbanks and Saturn Reef cSAC. <p>Annex I Habitats: Annex I shallow sandbanks may be present along some of the pipeline routes along with discrete populations of <i>S. spinulosa</i> identified in the side scan sonar mosaic and using seabed imagery. Overall the site survey identified some areas of 'low' to 'moderate reefiness' but no areas of high reefiness which has previously been found at the Saturn Reef to the north of the Thames field (outside of the current working area). Therefore, the survey data indicates that Annex I habitats from <i>S. spinulosa</i> reefs.</p> <p>Annex II Species: The Annex II species that could be present in the vicinity of the Thames Decommissioning Area include:</p> <ul style="list-style-type: none"> • Harbour porpoise (<i>Phocoena phocoena</i>); • Grey seal (<i>Halichoerus grypus</i>); • The harbour (or common) seal (<i>Phoca vitulina</i>).

Table 4.1: Environmental Sensitivities – cont'd

Environmental Receptor	Main Features
Seabed	<p>Seabed imagery found that much of the surveyed area comprised bare sand with some areas of gravel and shell fragments (CMACS, 2013). Side scan sonar data demonstrated that sand waves across large areas of the seabed. This indicates strong seabed and water column currents, and subsequently highly mobile sediments (CMACS, 2013) which is consistent with the southern North Sea in general.</p> <p>The results of the chemical testing indicate that the concentrations of the individual PAH compounds all fall below the laboratory detection limits. Similarly, the aliphatic and aromatic total petroleum hydrocarbon (TPH) compounds also fall beneath lab detection limits, along with the other organic compounds and phenols listed. The organic content of sediments was generally low, ranging from 0.47 per cent to 1.54 per cent, with no discernible trend across the survey area (CMACS, 2013).</p> <p>Of all the metal contaminants, only arsenic was present above Level 1 thresholds (Cefas L1 threshold is 20 ppm) at the majority of stations. Elevated levels of arsenic can occur following geological inputs and/or industrial discharge (CMACS, 2013). Cadmium was the only other metal found at concentration above the Level 1 threshold with 0.4 ppm. Barium was detectable at all stations sampled with levels of between 6 and 36 ppm across the sites and no evidence of any 'hotspots' of barium concentration (CMACS, 2013).</p>
Fish	<p>There are potential fish spawning area in ICES rectangles 34F1, 34F2, 35F, 35F2 and 35F3 for cod (<i>Gadus morhua</i>), herring (<i>Clupea harengus</i>), lemon sole (<i>Microstomus kitt</i>), mackerel (<i>Scomber scombrus</i>), <i>Nephrops</i>, plaice (<i>Pleuronectes platessa</i>), sandeels (<i>Ammodytidae</i>), sole (<i>Solea solea</i>), sprat (<i>Sprattus sprattus</i>) and whiting (<i>Merlangius merlangus</i>) (Coull et al., 1998; Ellis et al., 2012).</p> <p>In addition to the spawning grounds described above, the waters of ICES rectangles 34F1, 34F2, 35F1, 35F2 and 35F3 also act as nursery areas for cod, herring, horse mackerel (<i>Trachurus trachurus</i>), lemon sole, mackerel, <i>Nephrops</i>, plaice, sandeels, sole, sprat, thornback ray (<i>Raja clavata</i>), tope shark (<i>Galeorhinus galeus</i>) and whiting (Coull et al., 1998; Ellis et al., 2012).</p>

Table 4.1: Environmental Sensitivities – cont'd

Environmental Receptor	Main Features
Fisheries	<p>Specific fishing effort and landings data for ICES Rectangles 34F1, 34F2, 35F1, 35F2 and 35F3 indicated that annual fish landings were greatest in 2010 for ICES Rectangle 35F3 (328.5 tonnes), 2011 for ICES Rectangles 34F1 (2,527.3 tonnes), 34F2 (411.1 tonnes), and 35F2 (217.8 tonnes) and in 2012 for ICES Rectangles 35F1 (886.8 tonnes). Conversely, annual fishing catches by tonnage were lowest during 2009 in ICES Rectangles 34F1 (93.3 tonnes) and 35F1 (326.6 tonnes), during 2008 in ICES Rectangle 34F2 (35.4 tonnes) and during 2012 in ICES Rectangles 35F2 (36.4 tonnes) and 35F3 (53.7 tonnes) (<i>Marine Scotland, 2013</i>).</p> <p>On the whole, fishing activity for this area is low throughout the year. When averaged, catches by weight (tonnes) between 2008 and 2012 were highest during March and April in ICES Rectangle 34F1, December in ICES Rectangle 34F2, March to July in ICES Rectangle 35F1, January in ICES Rectangle 35F2 and January and November in ICES Rectangle 35F3.</p> <p>Species which were routinely caught in higher quantities (tonnes) during 2012 in ICES Rectangle 34F1 were whelks (38%) and crabs (C.P. mixed sexes; 27%), in ICES Rectangle 34F2 were sprats (83%), in ICES Rectangle 35F1 were whelks (81%), in ICES Rectangle 35F2 were plaice (63%) and in ICES Rectangle 35F3 were plaice (59%) and sole (23%).</p>
Marine Mammals	<p>According to Reid et al. (2003) three species have been previously been sighted in the area around the Blocks of Interest. Harbour porpoise, White-beaked dolphins and minke whale.</p>
Birds	<p>Within these Blocks, seabird vulnerability generally peaks to high (2 out of 4 on the JNCC scale) during February, March and December. The Blocks containing only pipeline follow a similar trend. The highest seabird vulnerability on the JNCC ranked scale (1 out of 4) only occurs in Blocks 48/28 and 52/3 during October.</p>
Onshore Communities	<p>All waste produced during the Thames Area Decommissioning will be transferred to an onshore decommissioning and waste facility for processing. Perenco will ensure the chosen facility is fully regulated and licensed with current legislation.</p>

Table 4.1: Environmental Sensitivities – cont'd	
Environmental Receptor	Main Features
Other Users of the Sea	<p>Shipping: Shipping movements in the vicinity of Blocks of Interest are regarded as very high to low throughout the year. Blocks 49/29, 49/30 and 53/4 lie within a deep water route.</p> <p>Oil & Gas: Previously, there has been significant oil and gas activity within and around the Blocks of Interest;</p> <p>Military Activity: The Blocks of Interest do not lie within any marine military exercise areas. However, part of the pipeline PL370 does within a military low flying zone.</p> <p>Dredging and Dumping Activity: There are no offshore dredging sites within the Blocks of Interest. The nearest offshore dredging site is the Lowestoft Extension Aggregates Application site approximately 31 kilometres to the southwest of the Arthur 2 wellhead.</p> <p>Wind Farms: There are no active windfarms in close proximity to the Blocks of Interest. The nearest active wind farm site is the Round 2, Dudgeon East site approximately 32 kilometres to the north west of the Thames to Bacton (PL370) pipeline (Crown Estates, 2013). This site is in the consent/authorisation phase (4COffshore, 2013).</p> <p>Archaeology: There are two charted wreck sites located within the Blocks of Interest.</p>
Atmosphere	<p>Atmospherics emissions will be generated during the Thames Area Decommissioning operations. However, it is expected that the emissions will be localised to the area of release.</p>

4.2 Potential Environmental Impacts and their Management

The Environmental Impact Assessment provides a review of the key features of the environment in the proposed Thames Decommissioning Programme Area which is located across thirteen (13) UKCS Blocks (48/28-30, 49/26-30, 50/26, 52/3, 53/2-4) in the southern North Sea (SNS).

A key consideration when planning and finalising the decommissioning of the Thames field infrastructure is a clear understanding of the surrounding environment. In order to understand the potential for the project to interact with the environment, so that appropriate controls can be adopted to mitigate negative impacts, the physical, biological and socio-economic environments have been assessed.

The assessment has been conducted on two different levels: from within the UKCS Blocks 48/28-30, 49/26-30, 50/26, 52/3, 53/2-4 and in the surrounding area encompassing them, including along the adjacent coastline of the east coast of England.

It is largely based on data provided in published information sources, including:

- The DECC (formerly DTI) Offshore Strategic Environmental Assessment (SEA) Reports (2002-2011);
- The UK Digital Marine Atlas (*UKDMAP, 1998*);
- Fisheries Sensitivity Maps in British Waters (*Coull et al., 1998*);
- Spawning and Nursery Grounds of Selected Fish Species in UK waters (*Ellis et al., 2012*);
- The JNCC Cetacean Atlas of Cetacean distribution in north-west European waters (*Reid et al., 2003*);
- Scientific Advice on Matters Related to the Management of Seal Populations by the Special Committee on Seals (*SCOS, 2012*);
- SCANS-II 2008 data (in *DECC, 2009*);
- Seabird Vulnerability in UK Waters (*JNCC, 1999*); and
- Fishing Effort and Quantity and Value of Landings by ICES Rectangle (Marine Scotland, *2008-2013*);
- UK-DEAL (2012).

In addition to the above, Perenco has undertaken site specific geophysical, geotechnical and environmental (including Annex I habitat assessment) surveys within the proposed Thames Decommissioning Programme area (*Osiris Projects, 2013*), the results of which are discussed, where relevant, throughout this section of the ES.

Environmental Impact Assessment Summary:

Decommissioning project activities with the potential to cause environmental impacts were identified from discussions with the Perenco / Tullow project team, an informal scoping exercise with key stakeholders and from the EIA team's previous oil and gas EIA project experience.

Impacts associated with the Thames Area Decommissioning project have been grouped within the EIA under the following headings:

- Physical Presence;
- Seabed Impacts;
- Noise;
- Atmospheric Emissions;
- Marine Discharges;
- Unplanned Releases;
- Solid Wastes;
- Trans boundary Impacts;
- Cumulative Impacts.

Any relevant social-economic issues have been assessed within these sections.

In summary, all residual impacts are considered to be of minor significance, provided the proposed mitigation and management measures, as identified within the ES, are implemented during the Thames Area Decommissioning.

The exception to this is in the event of an accidental spill, where there would be a release of condensate from the pipeline or diesel fuel loss from the drilling rig / SLV; here the residual impact has been assessed as moderate. In addition, the assessment of potential cumulative impacts indicated that there would be no significant impacts and no significant trans boundary impacts are expected to occur as a result of the decommissioning operations.

Overview:

Table 4.2 Environmental Impact Assessment Summary		
Activity	Main Impacts	Management
Topsides Removal	<p>Energy use and atmospheric emissions</p> <p>Dropped object</p> <p>Accidental hydrocarbon release</p> <p>Production of waste</p> <p>Shipping and other users of the sea</p>	<p>Vessels will be audited as part of selection and pre-mobilisation.</p> <p>Work programmes will be planned to optimise vessel time in the field.</p> <p>A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP Perenco have specialist oil spill response services provided by Oil Spill Response Ltd. (OSRL).</p> <p>Materials are reused and recycled where possible.</p> <p>Compliance with UK waste legislation and duty of care.</p>

Table 4.2 Environmental Impact Assessment Summary – cont'd

Activity	Main Impacts	Management
Jackets Removal	<p>Energy use and atmospheric emissions</p> <p>Underwater noise</p> <p>Dropped object</p> <p>Accidental hydrocarbon release</p> <p>Production of waste</p> <p>Damage or loss of fishing gear</p> <p>Disturbance to the Seabed</p> <p>Shipping and other users of the sea</p>	<p>Vessels will be audited as part of selection and pre-mobilisation.</p> <p>Work programmes will be planned to optimise vessel time in the field.</p> <p>Offshore vessels will avoid concentrations of marine mammals.</p> <p>A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP Perenco will have specialist oil spill response services provided by Oil Spill Response Ltd. (OSRL).</p> <p>Materials are reused and recycled where possible.</p> <p>Compliance with UK waste legislation and duty of care.</p> <p>Underwater cutting could be a potential source of sound, the operation of well-maintained equipment during decommissioning will ensure noise of operating machinery is kept as low as possible.</p> <p>Use of explosives underwater is expected to cause a significant source of sound. Consultation with JNCC and DECC will occur before agreement on any operation. Perenco will also conform to 'JNCC guidelines for minimising the risk of injury to marine mammals from using explosives.'</p> <p>An MMO will be on-board the vessel during cutting and/or explosive operation.</p> <p>UK Hydrographical Office and Kingfisher will be informed of all activities.</p>

Table 4.2 Environmental Impact Assessment Summary – cont'd

Activity	Main Impacts	Management
Subsea Installations Removal	<p>Energy use and atmospheric emissions</p> <p>Underwater noise</p> <p>Dropped object</p> <p>Accidental hydrocarbon release Production of Waste</p> <p>Damage or loss of fishing gear</p> <p>Disturbance to the Seabed</p> <p>Shipping and other users of the sea</p>	<p>Vessels will be audited as part of selection and pre-mobilisation.</p> <p>Work programmes will be planned to optimise vessel time in the field.</p> <p>Offshore vessels will avoid concentrations of marine mammals. A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP Perenco will have specialist oil spill response services provided by Oil Spill Response Ltd. (OSRL).</p> <p>Materials are reused and recycled where possible.</p> <p>Compliance with UK waste legislation and duty of care.</p> <p>Underwater cutting could be a potential source of sound, the operation of well-maintained equipment during decommissioning will ensure noise of operating machinery is kept as low as possible.</p> <p>Use of explosives underwater is expected to cause a significant source of sound. Use of explosives underwater is expected to cause a significant source of sound. Consultation with JNCC and DECC will occur before agreement on any operation. Perenco will also conform to 'JNCC guidelines for minimising the risk of injury to marine mammals from using explosives.'</p> <p>An MMO will be onboard the vessel during cutting and/or explosive operation.</p> <p>UK Hydrographical Office and Kingfisher will be informed of all activities.</p>

Table 4.2 Environmental Impact Assessment Summary – cont'd

Activity	Main Impacts	Management
Decommissioning Pipelines (left in situ)	<p>Energy use and atmospheric Emissions</p> <p>Underwater noise</p> <p>Damage or loss of fishing gear</p> <p>Disturbance to Seabed</p> <p>Dropped object</p> <p>Accidental hydrocarbon release</p> <p>Shipping and other users of the sea</p>	<p>Pipelines have been pre-flushed with seawater and risk assessments will indicate the potential for any environmental impact.</p> <p>Pipeline ends and exposed areas will be buried in situ preventing the release of pipeline contents into the marine environment</p> <p>Rock placement will be deposited from a dedicated rock placement vessel. This will be applied for under a DEPCON application.</p> <p>Perenco will apply for a Marine Licence to cover the potential disturbance of the seabed. Perenco will ensure that disturbance is kept to a minimum during the operations.</p> <p>A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP Perenco will have specialist oil spill response services provided by Oil Spill Response Ltd. (OSRL).</p> <p>Underwater cutting could be a potential source of sound, the operation of well-maintained equipment during decommissioning will ensure noise of operating machinery is kept as low as possible.</p> <p>An MMO will be on-board the vessel during cutting and/or explosive operation.</p> <p>UK Hydrographical Office and Kingfisher will be informed of all activities.</p>

Table 4.2 Environmental Impact Assessment Summary – cont'd

Activity	Main Impacts	Management
Decommissioning Stabilisation Features	<p>Energy use and atmospheric Emissions</p> <p>Underwater noise</p> <p>Damage or loss of fishing gear</p> <p>Disturbance to Seabed</p> <p>Dropped object</p> <p>Accidental hydrocarbon release</p> <p>Shipping and other users of the sea</p>	<p>It is intended that the mattresses should be recovered to shore, however in the event of practical difficulties DECC will be consulted and a Comparative Assessment submitted.</p>
Decommissioning Drill Cuttings	<p>Long-term presence of hydrocarbons in sediments</p> <p>Leaching of hydrocarbons into the surrounding sediments and water column</p>	<p>There are no drill cutting piles associated with the Thames Complex installation in the area. Should any evidence of drill cuttings be discovered, Perenco will contact DECC to review findings and extent and agree any necessary remedial actions.</p>

5 INTERESTED PARTY CONSULTATIONS

Consultations Summary:

Who	Comment	Response
INFORMAL CONSULTATIONS		
N/A	N/A	
STATUTORY CONSULTATIONS		
NFFO	The dismantling process or partially dismantled structures and associated equipment presents an ongoing danger to fishermen, therefore we would request Perenco ensure an arrangement is in place which constantly updates risk assessments based upon potential threat to other users, until the area has been deemed safe and free from any debris. Perenco UK to give consideration to providing a guard vessel at the location of the free span on pipeline PL 370 until it is rectified.	Perenco UK have previously notified Kingfisher / Fish Safe of this free span in accordance with their requirements. Perenco UK will keep the NFFO informed of any planned operations.
SFF	Given the location of the infrastructure and pipelines (southern North Sea), SFF would be in agreement with any comments and recommendations made on this decommissioning project by the National Federation of Fishermen's Organisation (NFFO).	Perenco UK will keep the SFF informed of any planned operations.
NIFPO	The field is outside the main area of operation for our members and as such we have no comment to make on the proposals.	NA.
Global Marine Systems	We don't have any specific comments on the programme of works itself as no cables should be directly affected in the immediate vicinity, and if any interaction was found to be necessary in the course of engineering the project, then Perenco UK should liaise with specific cable owners. Contact details and general cable information for any systems affected can be found using KIS-ORCA cable awareness charts/interactive map http://www.kis-orca.eu/map#.VPmDJHZFDIU . Global Marine Systems would recommend that when notice to mariners is arranged for the offshore works, then the Kingfisher fortnightly bulletin be updated to include details of the work, to inform sea users as well as notifying the relevant authorities and UKHO.	Perenco UK will keep Kingfisher informed of any planned operations.
Public	No concerns or objections were raised.	NA.

6 PROGRAMME MANAGEMENT

6.1 Project Management and Verification

A Perenco Project Management team will be appointed to manage suitable sub-contractors for the execution of the Thames Complex Decommissioning Programmes work scopes. Perenco standard procedures for operational control and hazard identification and management will be used. Where possible the work will be coordinated with other decommissioning operations in the SNS. Perenco will monitor and track the process of consents and the consultations required as part of this process. Any changes in detail to the offshore removal programme will be discussed with DECC.

6.2 Post-Decommissioning Debris Clearance and Verification

A post decommissioning site survey will be carried out around 500m radius of Thames complex installation sites, 500m radius of subsea installation sites and a 200m corridor along each existing pipeline route. Oil and gas seabed debris will be recovered for onshore disposal or recycling in line with existing disposal methods. Independent verification of seabed state will be obtained by trawling the platform area. This will be followed by a statement of clearance to all relevant governmental departments and non-governmental organisations.

6.3 Schedule

Project Plan:

Figure 6.1: Gantt Chart of Project Plan

	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Pre-engineering / planning / resourcing / normal ops	█	█	█	█	█	█	█	█												
Develop Decomm Prog & Dismantling SC & EIA	█	█	█																	
Subsea wells kill & clean interfield pipelines			█	█																
Flush / pig / clean export pipeline to Bacton			█	█																
Topsides engineering-down / piece-small		█	█	█	█	█	█	█												
DSV pipelines disconnection			█	█																
Subsea wells P&A campaign									█	█			█	█						
Platform wells P&A rigless			█	█	█															
Heavy lift removal bridges, topsides & jackets					█	█	█	█	█	█	█	█	█	█						
Remove remaining subsea protection frames																█	█			
Site clearance & post-activity surveys and close out report completion																			█	█

The current Thames Decommissioning Project is a 5 year plan. The availability of the key vessels including the heavy lift vessel and rig for wells plugging and abandonment drives the completion dates of the overall project.

6.4 Costs

Table 6.1 – Provisional Decommissioning Programme(s) costs	
Item	Estimated Cost (£m)
Platform(s) /Jacket(s) - Preparation / Removal and Disposal	43
Pipeline(s) and Umbilical(s) Infrastructure Decommissioning	6.6
Subsea Installation(s) and Stabilisation Feature(s)	6
Well Abandonment	40
Continuing Liability – Future Pipeline and Environmental Survey Requirements	0.5
TOTAL	96.1

6.5 Close Out

In accordance with the DECC Guidelines, a close out report will be submitted to DECC explaining any variations, from the Decommissioning Programme (normally within 4 months of the completion of the offshore decommissioning scope) including debris removal and independent verification of seabed clearance and the first post-decommissioning environmental survey.

6.6 Post-Decommissioning Monitoring and Evaluation

A post decommissioning environmental seabed survey, centred around sites of the wellheads and Thames complex installation, will be carried out. The survey will focus on chemical and physical disturbances of the decommissioning area and be compared with the pre-decommissioning survey which will be carried out before decommissioning commences. Results of this survey will be available once the work is complete, with a copy forwarded to DECC. All pipeline routes and structure sites will be the subject of surveys when decommissioning activity has concluded. The survey will include the 200m corridor along the pipeline routes, the complex 500m zone, wellheads and installation 500m radius zones. After the surveys have been sent to DECC and reviewed, the post-decommissioning monitoring regime to be discussed and agreed with DECC

7 SUPPORTING DOCUMENTS

Table 7.1: Supporting Documents	
Document Number	Title
1	Environmental Impact Assessment
2	Comparative Assessment
3	THAMES PIPELINE SURVEYS - C13021b
4	M0736-REP-10-012-00_1000t_Sheerleg_Removal_Method' contains further detail of the removal methodology

8. **PARTNER(S) LETTER(S) OF SUPPORT**

Tullow Oil plc

9, Chiswick Park, 566 Chiswick High Road, London, W4 5XT
Tel: +44 (0)203 249 9000 Fax: +44 (0)203 249 8801



Department of Energy & Climate Change
Offshore Decommissioning Unit
3rd Floor
Atholl House
86 -88 Guild Street
Aberdeen
AB11 6AR

F.A.O. Alex Mateo, Decommissioning Manager

16 October 2015

RE: THAMES COMPLEX DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your letter dated 14 October 2015 with reference 12.04.06.06/09c.

We, Tullow Oil plc, confirm that we authorise Perenco UK Limited to submit on our behalf the Final Decommissioning Programme for the Thames Complex facilities dated 15 October 2015, as directed by the Secretary of State on 14 October 2015.

We confirm that we support the proposals detailed in the Final Thames Complex Decommissioning Programme dated 15 October 2015, which will be submitted by Perenco UK Limited as required by section 29 of the Petroleum Act 1998.

Yours faithfully,

For and on behalf of Tullow Oil plc

Signed..... *A. Graham Martin*
Name: GRAHAM MARTIN
Title: DIRECTOR

Tullow Oil SK Limited

9, Chiswick Park, 566 Chiswick High Road, London, W4 5XT
Tel: +44 (0)203 249 9000 Fax: +44 (0)203 249 8801



Department of Energy & Climate Change
Offshore Decommissioning Unit
3rd Floor
Atholl House
86 -88 Guild Street
Aberdeen
AB11 6AR

F.A.O. Alex Mateo, Decommissioning Manager

16 October 2015

RE: THAMES COMPLEX DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your letter dated 14 October 2015 with reference 12.04.06.06/09c.

We, Tullow Oil SK Limited, confirm that we authorise Perenco UK Limited to submit on our behalf the Final Decommissioning Programme for the Thames Complex facilities dated 15 October 2015, as directed by the Secretary of State on 14 October 2015.

We confirm that we support the proposals detailed in the Final Thames Complex Decommissioning Programme dated 15 October 2015, which will be submitted by Perenco UK Limited as required by section 29 of the Petroleum Act 1998.

Yours faithfully,

For and on behalf of Tullow Oil SK Limited

Signed


Name: GRAHAM MARTIN

Title: DIRECTOR

Perenco UK Limited
Decommissioning Team
3 Central Avenue,
St Andrews Business Park,
Norwich, Norfolk,
NR7 0HR

RE: THAMES COMPLEX DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your decommissioning programme for the Thames Complex facilities.

We, Centrica Resources Limited, as a licensee in Licence P.037 Block 49/28a REST, which contains the Thames Complex Field and Block 49/28a A, which contains the Thurne Deben Field, confirm that we approve the Thames Complex decommissioning programme dated *15th October* 2015 (the "Decommissioning Programme"), and authorise Perenco UK Limited, as Operator of Licence P.037 Block 49/28a REST and Block 49/28a A, to submit the Decommissioning Programme to the Secretary of State for Energy and Climate Change for approval under the Petroleum Act 1998.

Yours faithfully,



Colette Cohen
Director

Dated: *16 October 2015*

For and on behalf of Centrica Resources Limited

GB Gas Holdings Limited

Millstream
Maidenhead Road
Windsor
Berkshire
SL4 5GD

Perenco UK Limited
Decommissioning Team
3 Central Avenue,
St Andrews Business Park,
Norwich, Norfolk,
NR7 0HR

RE: THAMES COMPLEX DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your decommissioning programme for the Thames Complex facilities.

We, GB Gas Holdings Limited, as a section 29 holder, confirm that we approve the Thames Complex decommissioning programme dated *15th October* 2015 (the "Decommissioning Programme") and authorise Perenco UK Limited, as Operator of Licence P.037 Block 49/28a REST, which contains the Thames Complex Field and Block 49/28a A which contains the Thurne Deben Field, to submit the Decommissioning Programme to the Secretary of State for Energy and Climate Change for approval under the Petroleum Act 1998.

Yours faithfully,



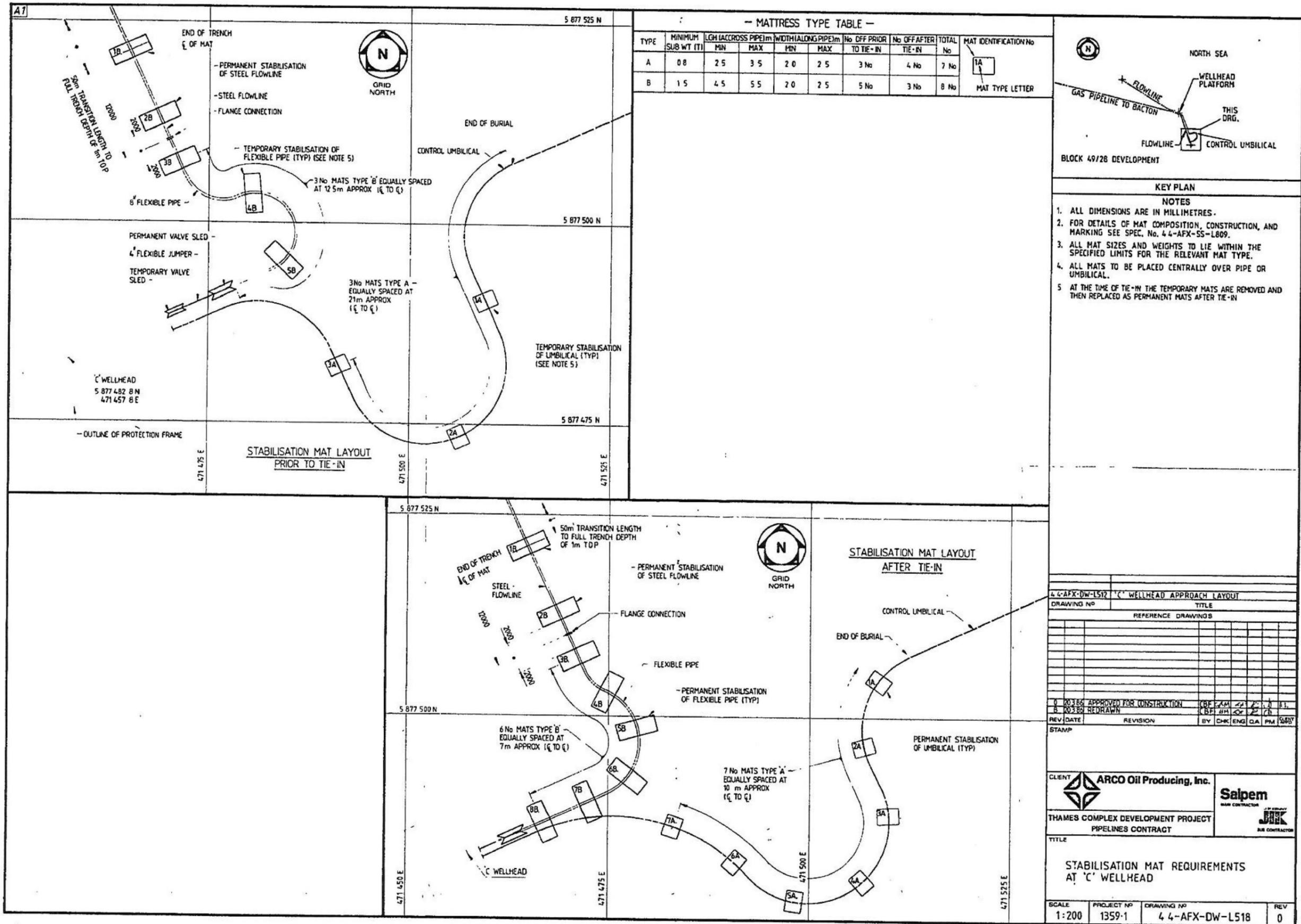
Jeff Bell
Director

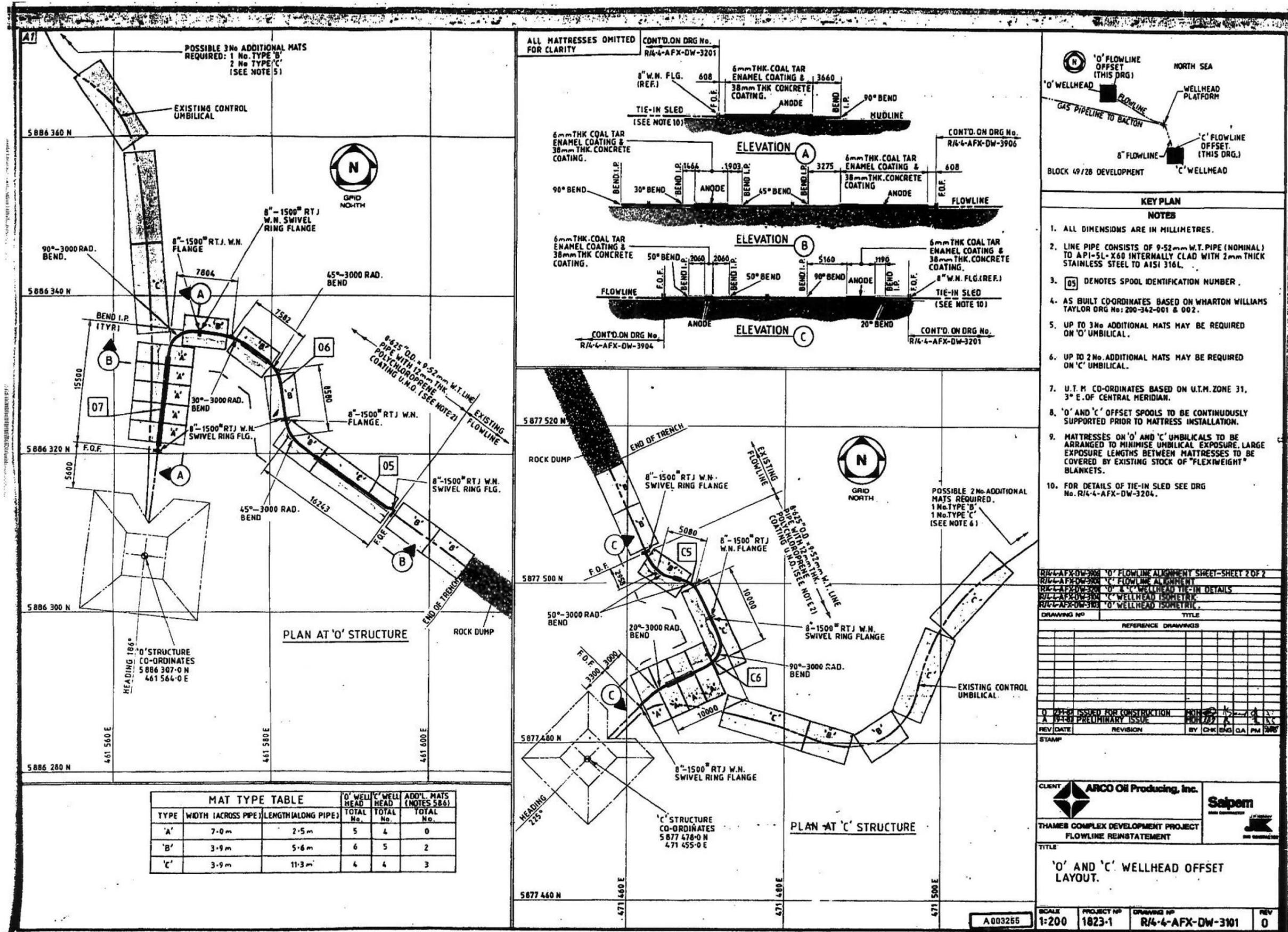
Dated: *16 October 2015*

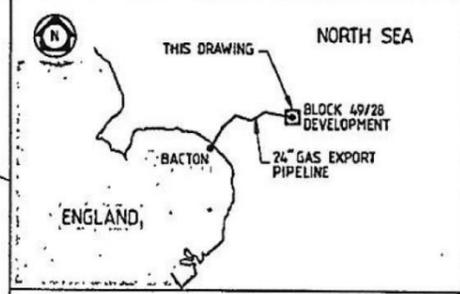
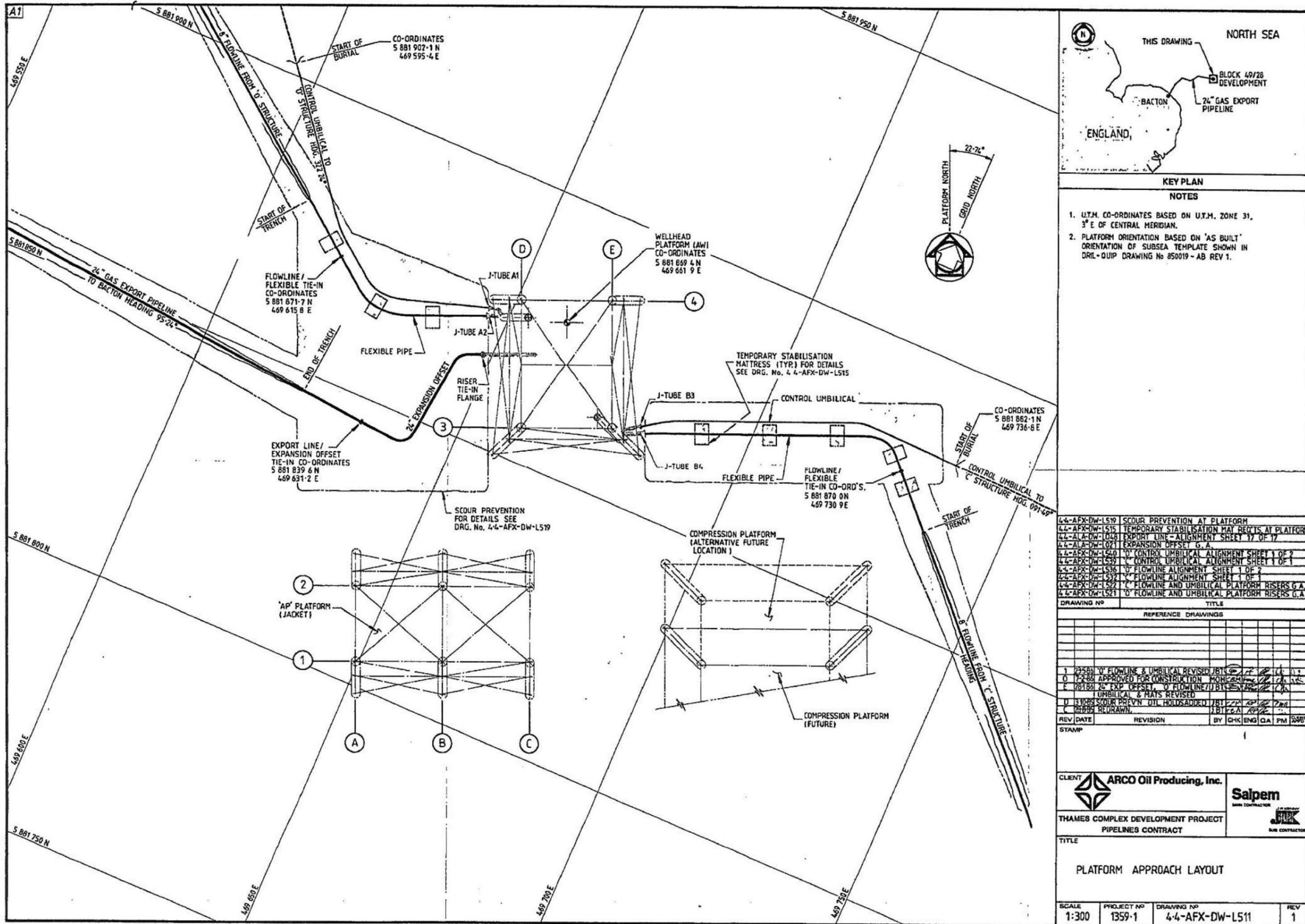
For and on behalf of GB Gas Holdings Limited

8. **APPENDIX**

Thames Mattress Drawings







NOTES

1. U.T.M. CO-ORDINATES BASED ON U.T.M. ZONE 31, 3° E OF CENTRAL MERIDIAN.
2. PLATFORM ORIENTATION BASED ON 'AS BUILT' ORIENTATION OF SUBSEA TEMPLATE SHOWN IN DRILL-OUP DRAWING No 850019 - AB REV 1.

DRAWING NO	TITLE
4-4-AFX-DW-1519	SCOUR PREVENTION AT PLATFORM
4-4-AFX-DW-1515	TEMPORARY STABILISATION MAT REQTS AT PLATFORM
4-4-ALA-DW-1048	EXPORT LINE - ALIGNMENT SHEET 17 OF 17
4-4-ALA-DW-1071	EXPANSION OFFSET G.A.
4-4-AFX-DW-1540	'O' CONTROL UMBILICAL ALIGNMENT SHEET 1 OF 2
4-4-AFX-DW-1539	'C' CONTROL UMBILICAL ALIGNMENT SHEET 1 OF 1
4-4-AFX-DW-1536	'O' FLOWLINE ALIGNMENT SHEET 1 OF 2
4-4-AFX-DW-1537	'C' FLOWLINE ALIGNMENT SHEET 1 OF 1
4-4-AFX-DW-1527	'C' FLOWLINE AND UMBILICAL PLATFORM RISERS G.A.
4-4-AFX-DW-1521	'O' FLOWLINE AND UMBILICAL PLATFORM RISERS G.A.

REV	DATE	REVISION	BY	CHK	ENG	QA	PM	SSR
1	25/01/07	FLOWLINE & UMBILICAL REVISED	JBL	CP	CP	CP	CP	CP
0	17/08/06	APPROVED FOR CONSTRUCTION MONITORING	JBL	CP	CP	CP	CP	CP
1	20/08/06	EXP OFFSET 'O' FLOWLINE/UMBILICAL	JBL	CP	CP	CP	CP	CP
2	01/09/06	UMBILICAL & MATS REVISED	JBL	CP	CP	CP	CP	CP
3	03/09/06	SCOUR PREVN DTL HOLD/ADDED	JBL	CP	CP	CP	CP	CP
4	04/09/06	RE-DRAWN	JBL	CP	CP	CP	CP	CP

CLIENT: **ARCO Oil Producing, Inc.**
Salpem MAIN CONTRACTOR
THAMES COMPLEX DEVELOPMENT PROJECT
PIPELINES CONTRACT

TITLE: **PLATFORM APPROACH LAYOUT**

SCALE: 1:300	PROJECT NO: 1359-1	DRAWING NO: 4-4-AFX-DW-1511	REV: 1
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