GAWAIN FIELD

DECOMMISSIONING

PROGRAMMES

DOCUMENT CONTROL

Approvals

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Revision Control

Revision No	Reference	Changes/Comments	Issue Date
0	Develop outline programme		
1	First draft		19th Feb., 2014
2	ODU comments updated		11th July 2014
3	Final draft		17th July 2014
4	Final Draft	DECC comments incorporated	5th Sept 2014

Distribution List

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A. TABLE OF TERMS AND ABBREVIATIONS

Abbreviation	Explanation
DECC	Department of Energy and Climate Change
ES	Environmental Statement
DP	Decommissioning Programmes
DSV	Diving Support Vessel
ESDV	Emergency Shutdown Valve
FPSO	Floating Production, Storage and Offloading System
HLV	Heavy Lift Vessel
NUI	Normally Unattended Installation
OGUK	Oil & Gas UK
OSPAR	Oslo and Paris Convention
P & A	Plug and Abandonment
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) A single Gawain subsea installation and (2) the one Gawain pipeline. 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, the Section 29 notice holders of Gawain field in the Block 49/24 and 49/29 field (see Table 1.2) are applying to the Department of Energy and Climate Change to obtain approval for decommissioning the installations detailed in Section 2 of this programme. (See also Section 8 - Partner(s) Letter(s) of Support).

Pipeline(s): In accordance with the Petroleum Act 1998, Perenco as operator of the Gawain pipeline PL1057 and PL1058.1-2, PL1059.1-2 (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 Gawain Field (Blocks 49/24a and 49/29a) became the fourth field to export gas to the Thames Field via 9.4 miles of 12” pipeline in September 1995.

The Gawain field is located in the Southern North Sea approximately 86km off the coast of Norfolk, northeast of Bacton and 18km south east of Inde field. The Gawain flowline delivers untreated wet gas to the Thames AW platform. The Gawain field is produced by three subsea wells. The three wells were drilled through a subsea manifold and produced gas is piped by a flowline to the Thames platform.

Perenco UK ("PUK") PUK operates the Gawain field (Block 49/29a, Licence P105; Block 49/24a, Licence P016)), which it has a 50% equity in. The remaining equity is held by TOSK.

PUK have explored all avenues for continuing production, this include the addition of offshore compression, greater liquid handling and subsea well stimulation.

No other additional field developments have been identified as economical to extend the life of the Thames complex.

Following public, stakeholder and regulatory consultation, the decommissioning programme for the installation is submitted without derogation and in full compliance with DECC guidelines. The decommissioning programme explains the principles of the removal activities and is supported by an environmental impact assessment.

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

1.4.1 Installation(s)

Table 1.1: Installation(s) Being Decommissioned					
Field Name	Gawain	Quad/Block	49/29A	Number of Platforms	None
Distance from nearest UK coastline (km)	86	Distance to median (km)	230	Platform type	N/A
Number of Subsea Installation(s)	1	Number of Drill Cuttings Pile(s):	None	Topsides Weight (Te): Jacket Weight (Te):	N/A
Number of Wells: Platform: Subsea:	3 Subsea wells	Production Type (Oil / Gas /Conde)	Gas	Water Depth (m)	N/A

Table 1.2 Installation(s) Section 29 Notice Holders Details		
Section 29 Notice Holder(s)	**Registration Number**	**Equity Interest (%)**
Perenco UK Ltd	04653066	50
Tullow Oil SK Ltd.	05287330	50
Tullow Oil PLC	03919249	0

1.4.2 Pipeline(s)

Table 1.3: Pipeline(s) Being Decommissioned		
Number of Pipeline(s)/ Umbilical(s)	1/1	(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	50
Tullow Oil SK Ltd.	05287330	50
Tullow Oil PLC	03919249	0

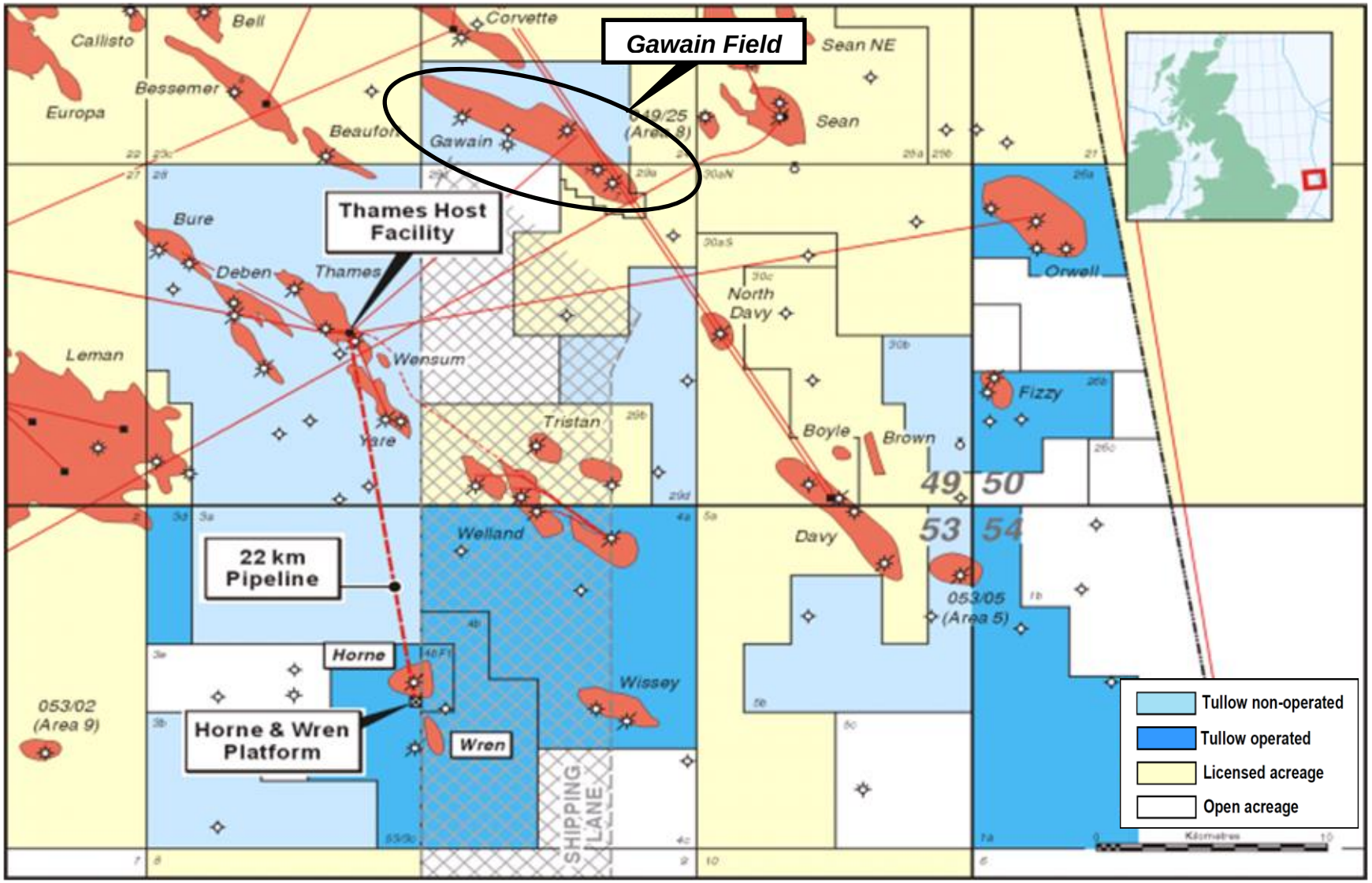
1.5 Summary of Proposed Decommissioning Programme(s)

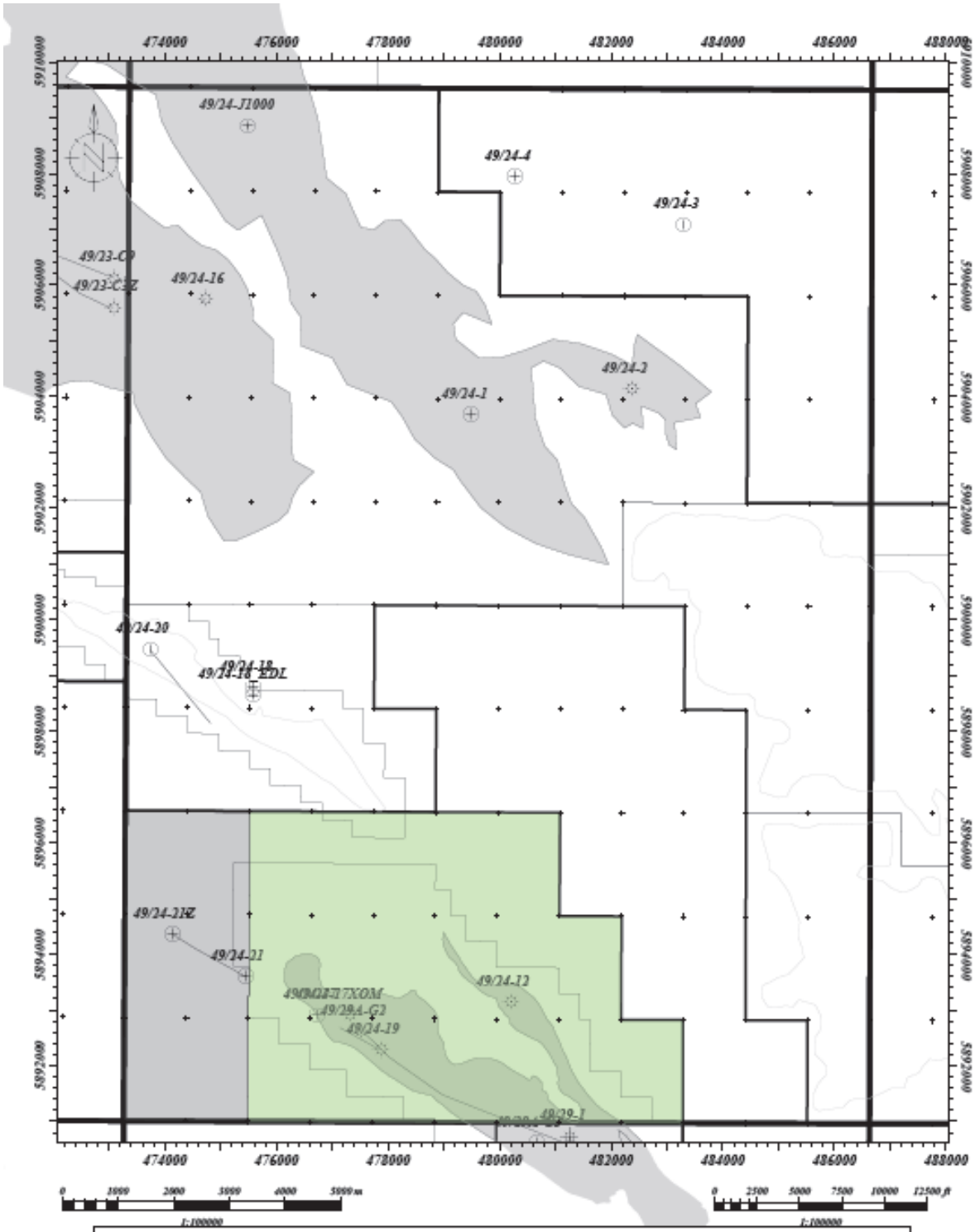
Table 1.5: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
1. Topsides		
N/A		
2. Jackets		
N/A		
3. Subsea Installations		
Wellhead protection frames will be removed by HLV or crane vessel	To remove all seabed structures and leave a clean 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
4. Flowlines & Umbilicals		
Flush and leave buried in situ (for detailed list of pipeline and umbilicals please refer to Table 2.3)	Minimal seabed disturbance, lower energy usage, reduced risk to personnel engaged in the activity, pipelines are sufficiently buried and are stable.	The flowline PL1057 and umbilical PL1058.1-2 as well as PL1059.1-2 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.
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

Table 1.5: Summary of Decommissioning Programmes – cont'd		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
7. Interdependences		
Not applicable.		

1.6 Field Location/Layout and Adjacent Facilities

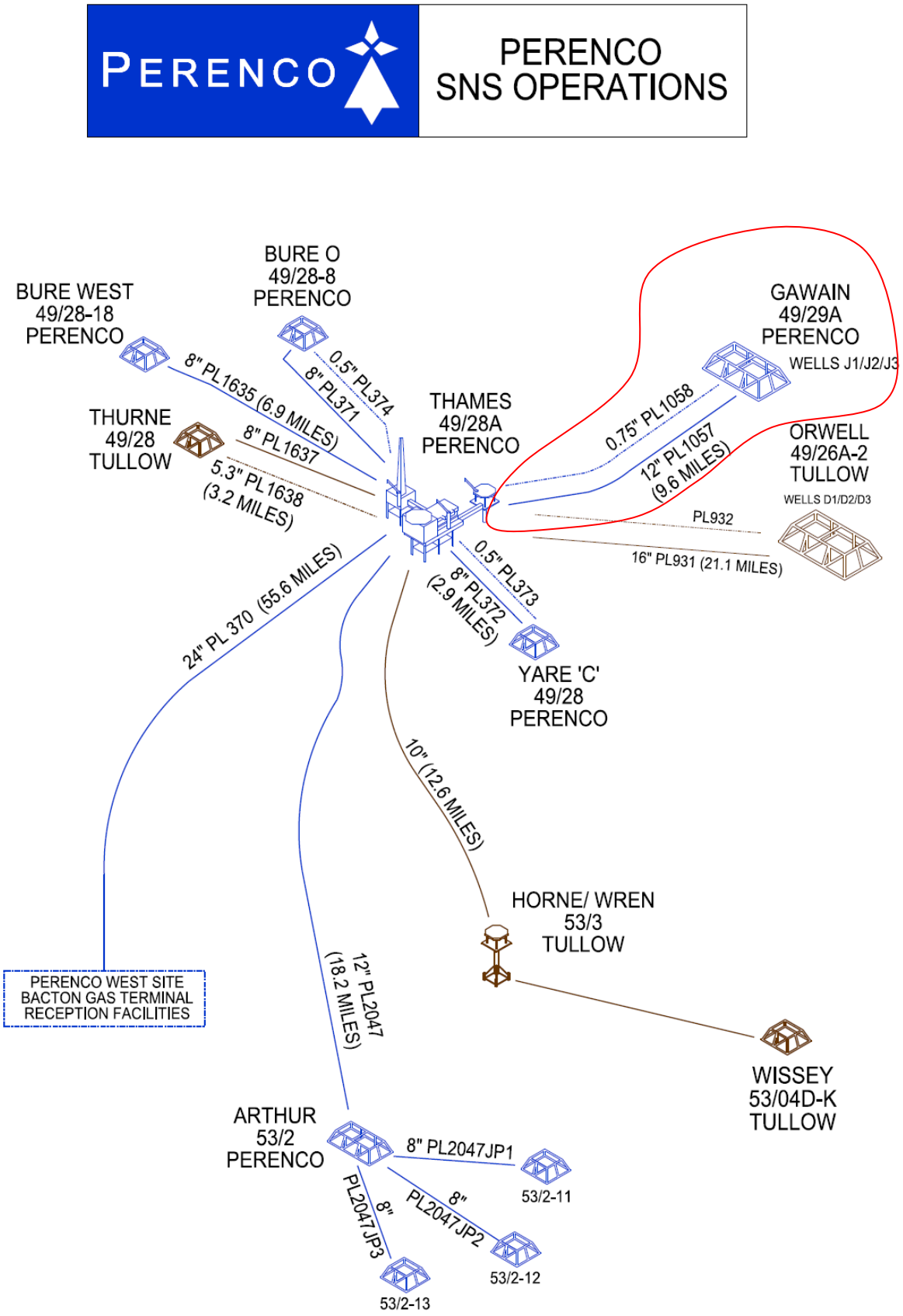
Figure 1.1: Field Location in UKCS





UKSNS Block 49/24 (Gawain)	
49/24a P.007 Gawain (non-operated) - light green	Scale 1:100000
49/24a P.007 relinquished 2007 - light gray	Date 15/09/2008

Figure 1.2: Field Layout

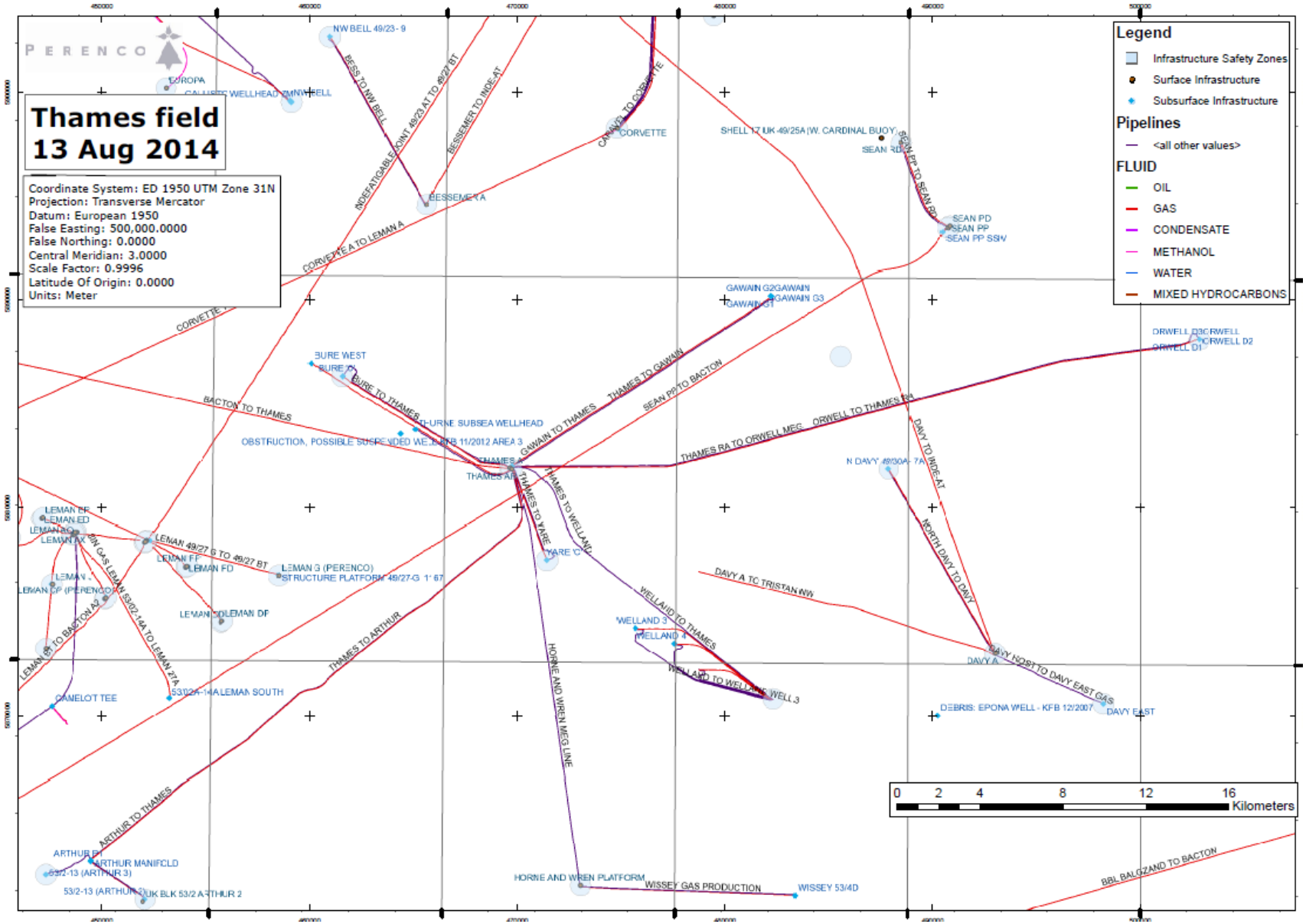


Key: Red line indicates the assets affected by this decommissioning programme

Note: Adjacent facilities refer to those potentially impacted by this programme (see DECC Guidance Notes for Industry: Version 6).

Table 1.6 List of Adjacent Facilities					
Owner	**Name**	**Type**	**Distance/Direction**	**Information**	**Status**
Perenco	Thames	Platforms	From Gawain well to Thames is 15.4km South West. 53° 05' 02.2214" N 02° 32' 53.4770" E	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" N 03° 02' 34.1939" E	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" N 02° 28' 43.5699" E	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 N 02˚ 35 57 E	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 N 02˚ 45 11 E	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" N 02° 14' 56.5181" E	Gas production from Arthur flows into Thames AW platform	Operational
Perenco	Davy	NUI	From Davy platform to Thames is about 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 1.3: 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 novatated 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)
N/A								

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)	Comments/ Status
Wellhead(s)	3	51	Gawain wells: J1, N 53° 09' 34.87" E 02° 44' 06.02" J2 N 53° 09' 34.87" E 02° 44' 06.02" and J3 N 53° 09' 34.87" E 02° 44' 06.02"	
Manifolds(s)	1	25	Within the protective structure next to the wellheads N 53° 09' 34.87" E 02° 44' 06.02"	
Template(s)	1	30	Below wellheads	
Protection Frame(s)	1	89	Around manifold and 3 wells	Piled
Concrete mattresses	21	149	Within 500m of manifold	Drawing attached
Grout bags	352	8.8	Within 500m of manifold	Estimated
Frond Mats	27	366	Within 500m of manifold	Drawing attached
Rock Dump	0	N/A	N/A	No known rock dump

The above locations data is the most relevant information PUK has.

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]**
Gawain flowline	PL1057	12	19.8	Steel with concrete coating	Gas	Gawain well to Thames AW	Trenched and buried, 152.84 meters exposed. Free spans 2. Total length of free spans 13.9 meters	Operational	Hydrocarbons
Gawain Umbilical	PL1058.1-2	5	19.9	Umbilical	Chemicals	Thames AW to Gawain well	Trenched and buried, No exposures.	Operational	Chemicals in line
Gawain jumper lines	PL1059.1-2	8	0.1	Steel	Gas	Gawain subsea wells to manifold	Underneath the manifold	Operational	Hydrocarbons

[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	43	456	Outside 500m zone of manifold	Drawing attached
Grout bags	225	5.6	Umbilical protection at Thames	Estimated
Frond Mats	0	0	Outside 500m zone of manifold	
Rock Dump	0	N/A		No known rock dump

2.4 Wells

Table 2.5 Well Information			
Platform Wells	**Designation 1**	**Status**	**Category of Well**
N/A			
Subsea Wells			
49/29a-G1 (J2)	Production	Producing	SS-3-3-3
49/29a-G2 (J3)	Production	Shut in	SS-3-3-3
49/29a-G3 (J1)	Production	Producing	SS-3-3-3

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

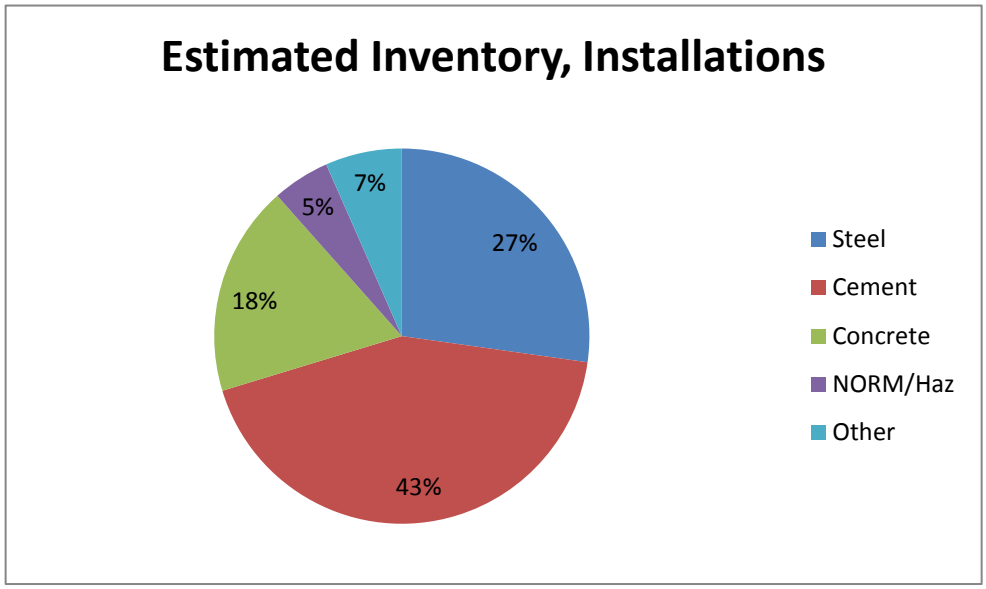
2.5 Drill Cuttings

There are no drill cuttings piles associated with the installation in the area. Drill cuttings that were generated during drilling activity have been disturbed 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.

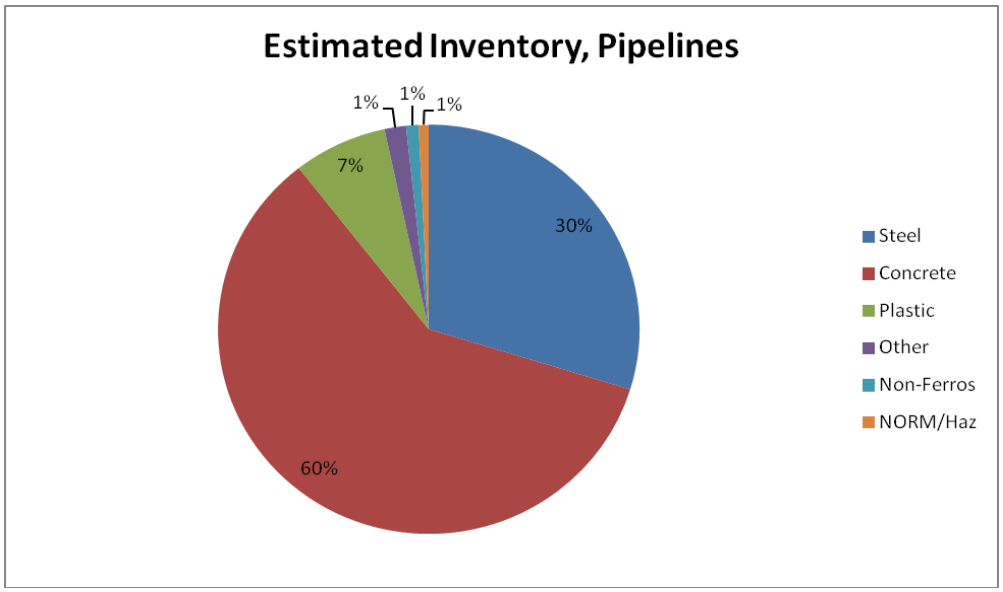
2.6 Inventory Estimates

Figure 2.1: Pie Chart of Estimated Inventories (Installations)



Total tonnes: 536

Figure 2.2: Pie Chart of Estimated Inventory (Pipelines)



Total tonnes: 7,720

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

N/A

3.2 Jacket(s)

N/A

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.

All mattresses will be decommissioned in accordance with the current DECC Guidance notes (Version 6 , March 2011).

Table 3.1: Subsea Installation and Stabilisation Features Decommissioning		
Subsea installations and stabilisation features	**Option**	**Disposal Route (if applicable)**
Wellhead(s)	Remove	Transport ashore for disposal
Manifold(s)	Remove	Transport ashore for disposal
Template(s)	Remove	Transport ashore for disposal
Protection Frame(s)	Remove	Transport ashore for disposal
Concrete mattresses	All mattresses will be decommissioned in accordance with the current DECC Guidance notes (Version 6 , March 2011)	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	Not applicable	Not 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 3.2: 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**
PL1057	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1058.1-2	Trenched, buried	1,2,3,4,5	Whole pipeline
PL1059.1-2	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 continuous monitoring

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 umbilicals 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 3.3: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option***	**Justification**
PL1057	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
PL1058.1-2	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
PL1059.1-2	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

*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 3.4: 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)

Comparative Assessment Method: N / A

Outcome of Comparative Assessment: N / A

3.7 Waste Streams

Table 3.5: Waste Stream Management Methods	
Waste Stream	**Removal and Disposal method**
Bulk liquids	Removed and discharged to disposal wells or sent to Bacton via the export line for disposal.
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	N/A
Other hazardous wastes	Non identified
Onshore Dismantling sites	Appropriate licensed sites will be selected. 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 3.6 Inventory Disposition			
	Total Inventory Tonnage	**Planned tonnage to shore**	**Planned left in situ**
Installations	371	195	176
Pipelines	7720	5	7,715

4 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Environmental Sensitivities

Table 4.1: Environmental Sensitivities	
Environmental Receptor	**Main Features**
Conservation interests	**Marine Protected Areas (MPAs):** The Thames Infrastructure overlaps with the boundaries of three MPAs described below: • Cromer Shoal Chalk Beds rMCZ (NG2); • Haisborough, Hammond and Winterton cSAC; • North Norfolk Sandbanks and Saturn Reef cSAC. **Annex I Habitats:** Annex I shallow sandbanks may be present along some of the pipeline routes along with discrete populations of *S. spinulosa* 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 *S. spinulosa* reefs. **Annex II Species:** The Annex II species that could be present in the vicinity of the Thames Decommissioning Area include: • Harbour porpoise (*Phocoena phocoena*); • Grey seal (*Halichoerus grypus*); • The harbour (or common) seal (*Phoca vitulina*).

Table 4.1: Environmental Sensitivities – cont'd	
Environmental Receptor	**Main Features**
Seabed	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. 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*). 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).*
Fish	There are potential fish spawning area in ICES rectangles 34F1, 34F2, 35F, 35F2 and 35F3 for cod (*Gadus morhua*), herring (*Clupea harengus*), lemon sole (*Microstomus kitt*), mackerel (*Scomber scombrus*), *Nephrops*, plaice (*Pleuronectes platessa*), sandeels (*Ammodytidae*), sole (*Solea solea*), sprat (*Sprattus sprattus*) and whiting (*Merlangius merlangus*) (*Coull et al., 1998; Ellis et al., 2012*). 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 (*Trachurus trachurus*), lemon sole, mackerel, *Nephrops*, plaice, sandeels, sole, sprat, thornback ray (*Raja clavata*), tope shark (*Galeorhinus galeus*) and whiting (*Coull et al., 1998; Ellis et al., 2012*).

Table 4.1: Environmental Sensitivities – cont'd	
Environmental Receptor	**Main Features**
Fisheries	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) (*Marine Scotland, 2013*). 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. 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%).
Marine Mammals	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.
Birds	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.
Onshore Communities	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.

Table 4.1: Environmental Sensitivities – cont'd	
Environmental Receptor	**Main Features**
Other Users of the Sea	**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. **Oil & Gas:** Previously, there has been significant oil and gas activity within and around the Blocks of Interest; **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. **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. **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). **Archaeology:** There are two charted wreck sites located within the Blocks of Interest.
Atmosphere	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.

4.2 Potential Environmental Impacts and their Management

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 Gawain 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;
- Transboundary 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 transboundary 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	Not applicable	Not applicable
Jackets Removal	Not applicable	Not applicable

Table 4.2 Environmental Impact Assessment Summary – cont'd		
Activity	**Main Impacts**	**Management**
Subsea Installations Removal	Energy use and atmospheric emissions Underwater noise Dropped object Accidental hydrocarbon release Production of Waste Damage or loss of fishing gear Disturbance to the Seabed	Vessels will be audited as part of selection and pre-mobilisation. Work programmes will be planned to optimise vessel time in the field. 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). Materials are reused and recycled where possible. Compliance with UK waste legislation and duty of care. 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. 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.' An MMO will be onboard the vessel during cutting and/or explosive operation. UK Hydrographical Office and Kingfisher will be informed of all activities.

Table 4.2 Environmental Impact Assessment Summary – cont'd		
Activity	**Main Impacts**	**Management**
Decommissioning Pipelines (left in situ)	Energy use and atmospheric Emissions Underwater noise Damage or loss of fishing gear Disturbance to Seabed Dropped object Accidental hydrocarbon release	Pipelines have been pre-flushed with seawater and risk assessments will indicate the potential for any environmental impact. Pipeline ends and exposed areas will be buried in situ preventing the release of pipeline contents into the marine environment Rock placement will be deposited from a dedicated rock placement vessel. This will be applied for under a DEPCON application. 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. 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). 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. An MMO will be onboard the vessel during cutting and/or explosive operation. UK Hydrographical Office and Kingfisher will be informed of all activities.

Table 4.2 Environmental Impact Assessment Summary – cont'd		
Activity	**Main Impacts**	**Management**
Decommissioning Stabilisation Features	Energy use and atmospheric Emissions Underwater noise Damage or loss of fishing gear Disturbance to Seabed Dropped object Accidental hydrocarbon release	All mattresses will be decommissioned in accordance with the current DECC Guidance notes (Version 6 , March 2011)
Decommissioning Drill Cuttings	Long-term presence of hydrocarbons in sediments Leaching of hydrocarbons into the surrounding sediments and water column	There are no drill cutting piles associated with the Gawain 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

5 INTERESTED PARTY CONSULTATIONS

Consultations Summary:
(This section will be updated when the consultation phase is completed).

Table 5.1 Summary of Consultee Comments		
Who	**Comment**	**Response**
INFORMAL CONSULTATIONS		
TBA		
TBA		
TBA		
STATUTORY CONSULTATIONS		
NFFO		
SFF		
NIFPO		
Global Marine Systems		

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 Gawain 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

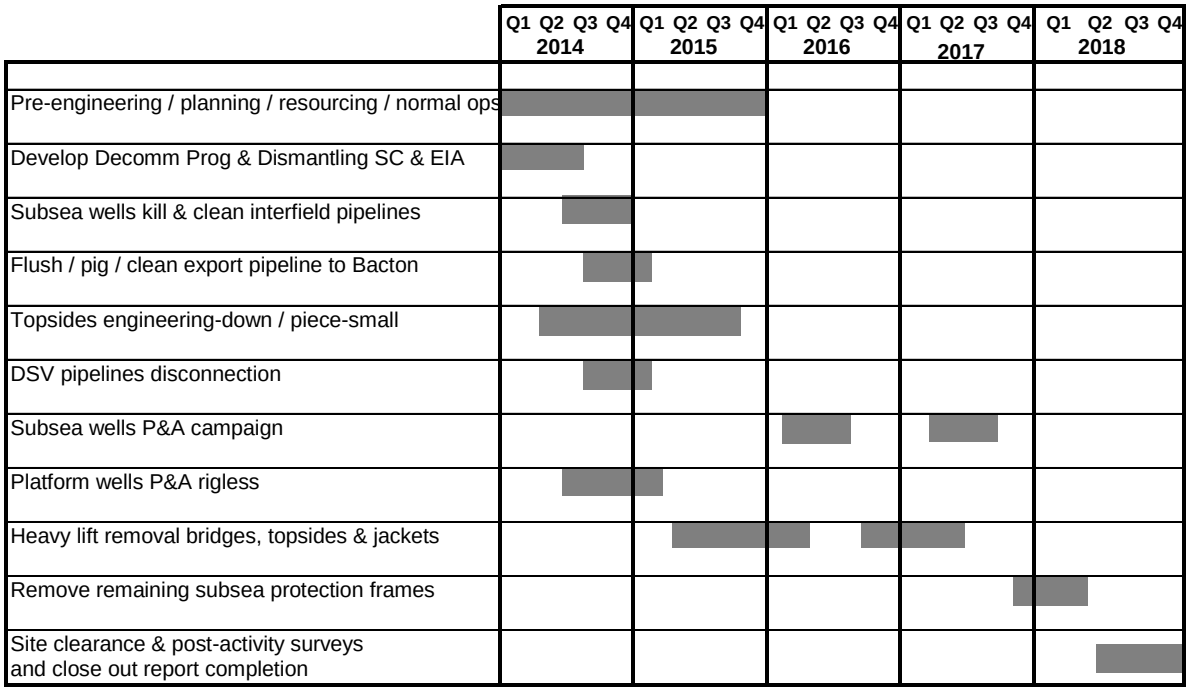
A post decommissioning site survey will be carried out around 500m radius of installation sites and a 200m corridor along each existing pipeline route. Oil and gas seabed debris will be recovered for onshore disposal or recycling in line with existing disposal methods. Independent verification of seabed 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

The current Gawain Decommissioning Project is a 5 year plan. The availability of the key vessels including the heavy lift vessel for removing Thames platforms 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	N/A
Pipeline(s) and Umbilical(s) Infrastructure Decommissioning	1.7
Subsea Installation(s) and Stabilisation Feature(s)	4.6
Well Abandonment	25
Continuing Liability – Future Pipeline and Environmental Survey Requirements	0.5
TOTAL	**31.8**

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 Gawain subsea installation, will be carried out. The survey will focus on chemical and physical disturbances of the decommissioning and compared with the pre-decommissioning survey. 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 and 500m radius around the wellheads. 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

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

Tullow Oil plc – **Gawain Field**

Tullow Oil SK Ltd – **Gawain Field**

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

Perenco (UK) Decommissioning Team
Thames House
Thamesfield Way,
Gt Yarmouth
Norfolk NR31 0DN

9 April 2014

RE: GAWAIN FIELD DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your decommissioning programme for the Gawain Field facilities.

We, Tullow Oil Plc confirm that we support the proposals detailed in the Gawain Field decommissioning programme dated 19th February 2014 which will be submitted to DECC by Perenco on behalf of Perenco and Partners under the requirement of section 29 of the Petroleum Act 1998.

Yours faithfully,
Mohamed Ayad

For and on behalf of Tullow Oil Plc

Registered in England and Wales: Number 3919249
Registered Office as above

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

Perenco (UK) Decommissioning Team
Thames House
Thamesfield Way,
Gt Yarmouth
Norfolk NR31 0DN

3rd April 2014

RE: GAWAIN FIELD DECOMMISSIONING PROGRAMME

Dear Sir/Madam,

We acknowledge receipt of your decommissioning programme for the Gawain Field facilities.

We, Tullow Oil SK Limited confirm that we support the proposals detailed in the Gawain Field decommissioning programme dated 19th February 2014 which will be submitted to DECC by Perenco on behalf of Perenco and Partners under the requirement of section 29 of the Petroleum Act 1998.

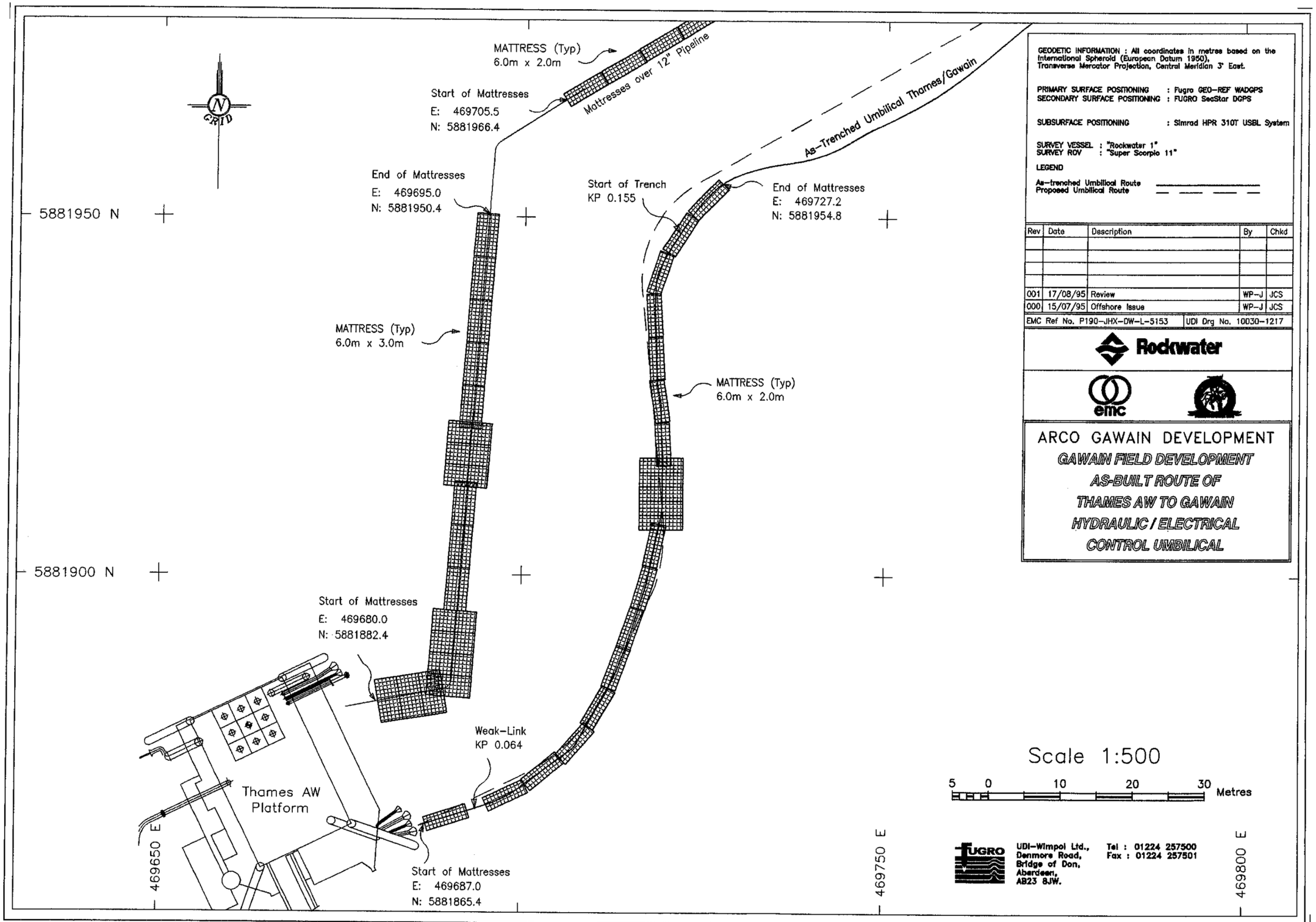
Yours faithfully,
Mohamed Ayad

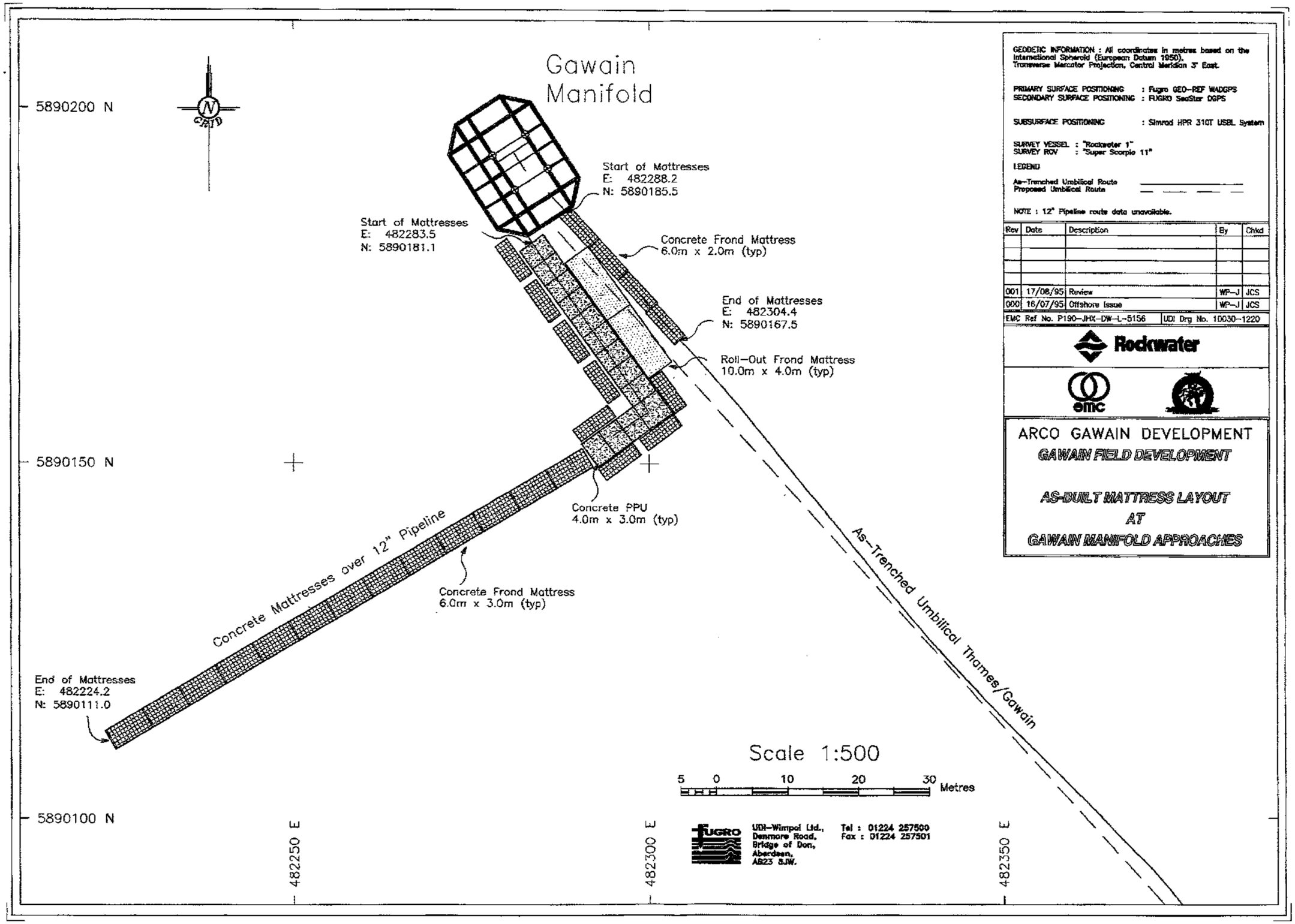
For and on behalf of Tullow Oil SK Limited

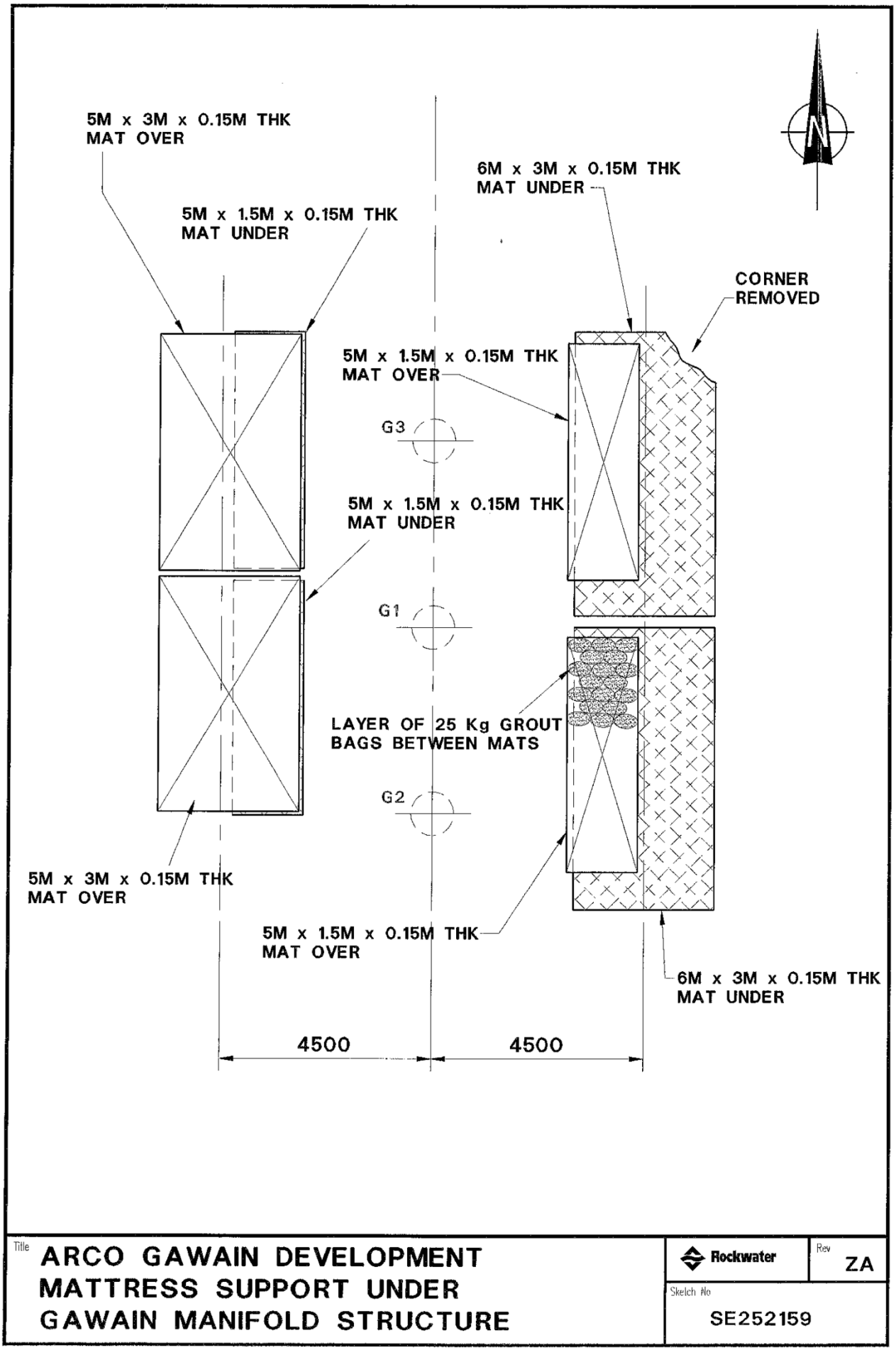
Registered in England: Number 5287330
Registered Office as above

9. APPENDIX

Gawain Mattress Drawings


GRID
5881950 N
5881900 N
469650 E
469750 E
469800 E
MATTRESS (Typ)
6.0m x 2.0m
Mattresses over 12" Pipeline
Start of Mattresses
E: 469705.5
N: 5881966.4
End of Mattresses
E: 469695.0
N: 5881950.4
MATTRESS (Typ)
6.0m x 3.0m
As-Trenched Umbilical Thames/Gawain
Start of Trench
KP 0.155
End of Mattresses
E: 469727.2
N: 5881954.8
MATTRESS (Typ)
6.0m x 2.0m
Start of Mattresses
E: 469680.0
N: 5881882.4
Weak-Link
KP 0.064
Thames AW
Platform
Start of Mattresses
E: 469687.0
N: 5881865.4
GEODETIC INFORMATION : All coordinates in metres based on the International Spheroid (European Datum 1950), Transverse Mercator Projection, Central Meridian 3° East.
PRIMARY SURFACE POSITIONING : Fugro GEO-REF WADGPS
SECONDARY SURFACE POSITIONING : FUGRO SeaStar DGPS
SUBSURFACE POSITIONING : Simrad HPR 310T USBL System
SURVEY VESSEL : "Rockwater 1"
SURVEY ROV : "Super Scorpio 11"
LEGEND
As-trenched Umbilical Route
Proposed Umbilical Route
Rev | Date | Description | By | Chkd
001 | 17/08/95 | Review | WP-J | JCS
000 | 15/07/95 | Offshore Issue | WP-J | JCS
EMC Ref No. P190-JHX-DW-L-5153
UDI Drg No. 10030-1217
Rockwater
emc
ARCO GAWAIN DEVELOPMENT
GAWAIN FIELD DEVELOPMENT
AS-BUILT ROUTE OF
THAMES AW TO GAWAIN
HYDRAULIC / ELECTRICAL
CONTROL UMBILICAL
Scale 1:500
5 0 10 20 30 Metres
UGRO
UDI-Wimpol Ltd.,
Denmore Road,
Bridge of Don,
Aberdeen,
AB23 8JW.
Tel : 01224 257500
Fax : 01224 257501


Gawain
Manifold
5890200 N
5890150 N
5890100 N
482250 E
482300 E
482350 E
Start of Mattresses
E: 482288.2
N: 5890185.5
Start of Mattresses
E: 482283.5
N: 5890181.1
Concrete Frond Mattress
6.0m x 2.0m (typ)
End of Mattresses
E: 482304.4
N: 5890167.5
Roll-Out Frond Mattress
10.0m x 4.0m (typ)
Concrete PPU
4.0m x 3.0m (typ)
Concrete Mattresses over 12" Pipeline
Concrete Frond Mattress
6.0m x 3.0m (typ)
End of Mattresses
E: 482224.2
N: 5890111.0
As-Trenched Umbilical Thames/Gawain
Scale 1:500
5 0 10 20 30 Metres
GEODETIC INFORMATION : All coordinates in metres based on the International Spheroid (European Datum 1950), Transverse Mercator Projection, Central Meridian 3° East.
PRIMARY SURFACE POSITIONING : Fugro GEO-REF WADGPS
SECONDARY SURFACE POSITIONING : FUGRO SeaStar DGPS
SUBSURFACE POSITIONING : Simrad HPR 310T USBL System
SURVEY VESSEL : "Rockwater 1"
SURVEY ROV : "Super Scorpio 11"
LEGEND
As-Trenched Umbilical Route
Proposed Umbilical Route
NOTE : 12" Pipeline route data unavailable.
Rev | Date | Description | By | Chkd
001 | 17/08/95 | Review | WP-J | JCS
000 | 16/07/95 | Offshore Issue | WP-J | JCS
EMC Ref No. P190-JHX-DW-L-5156 | UDI Drg No. 10030-1220
Rockwater
emc
ARCO GAWAIN DEVELOPMENT
GAWAIN FIELD DEVELOPMENT
AS-BUILT MATTRESS LAYOUT
AT
GAWAIN MANIFOLD APPROACHES
FUGRO
UDI-Wimpol Ltd., Denmore Road, Bridge of Don, Aberdeen, AB23 8JW.
Tel : 01224 257500
Fax : 01224 257501


5M x 3M x 0.15M THK
MAT OVER
5M x 1.5M x 0.15M THK
MAT UNDER
6M x 3M x 0.15M THK
MAT UNDER
CORNER
REMOVED
5M x 1.5M x 0.15M THK
MAT OVER
G3
5M x 1.5M x 0.15M THK
MAT UNDER
G1
LAYER OF 25 Kg GROUT
BAGS BETWEEN MATS
G2
5M x 3M x 0.15M THK
MAT OVER
5M x 1.5M x 0.15M THK
MAT OVER
6M x 3M x 0.15M THK
MAT UNDER
4500
4500
N
Title
ARCO GAWAIN DEVELOPMENT
MATTRESS SUPPORT UNDER
GAWAIN MANIFOLD STRUCTURE
Rockwater
Rev
ZA
Sketch No
SE252159