

**Offshore Decommissioning Unit**

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FAO: Alex Mateo, Decommissioning Manager

16 October 2015

**RE: GAWAIN FIELD DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998**

Dear Sir,

We, Perenco UK Limited, hereby submit an abandonment programme dated 15 October 2015 relating to the Gawain Field as directed by you on behalf of the Secretary of State on 14 October 2015.

The Gawain Field Decommissioning Programme is submitted on behalf of Section 29 Notice holders 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

# **GAWAIN FIELD DECOMMISSIONING PROGRAMME**



## **DOCUMENT CONTROL**

### **Approvals**

	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Prepared by</b>	Andrew Wilson		15 <sup>th</sup> Oct 2015
<b>Reviewed by</b>	Ying Wang Xavier		15 <sup>th</sup> Oct 2015
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### **Revision Control**

<b>Revision No</b>	<b>Reference</b>	<b>Changes/Comments</b>	<b>Issue Date</b>
0	Develop outline programme		
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6	Final	Final submission	15 <sup>th</sup> Oct 2015

### **Distribution List**

<b>Name</b>	<b>Company</b>	<b>No of Copies</b>
Frederic De Meo	Perenco UK Ltd.	1
Dinesh Nathan	Tullow Oil SK Ltd.	1
Alex Mateo	DECC	6

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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 standalone 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

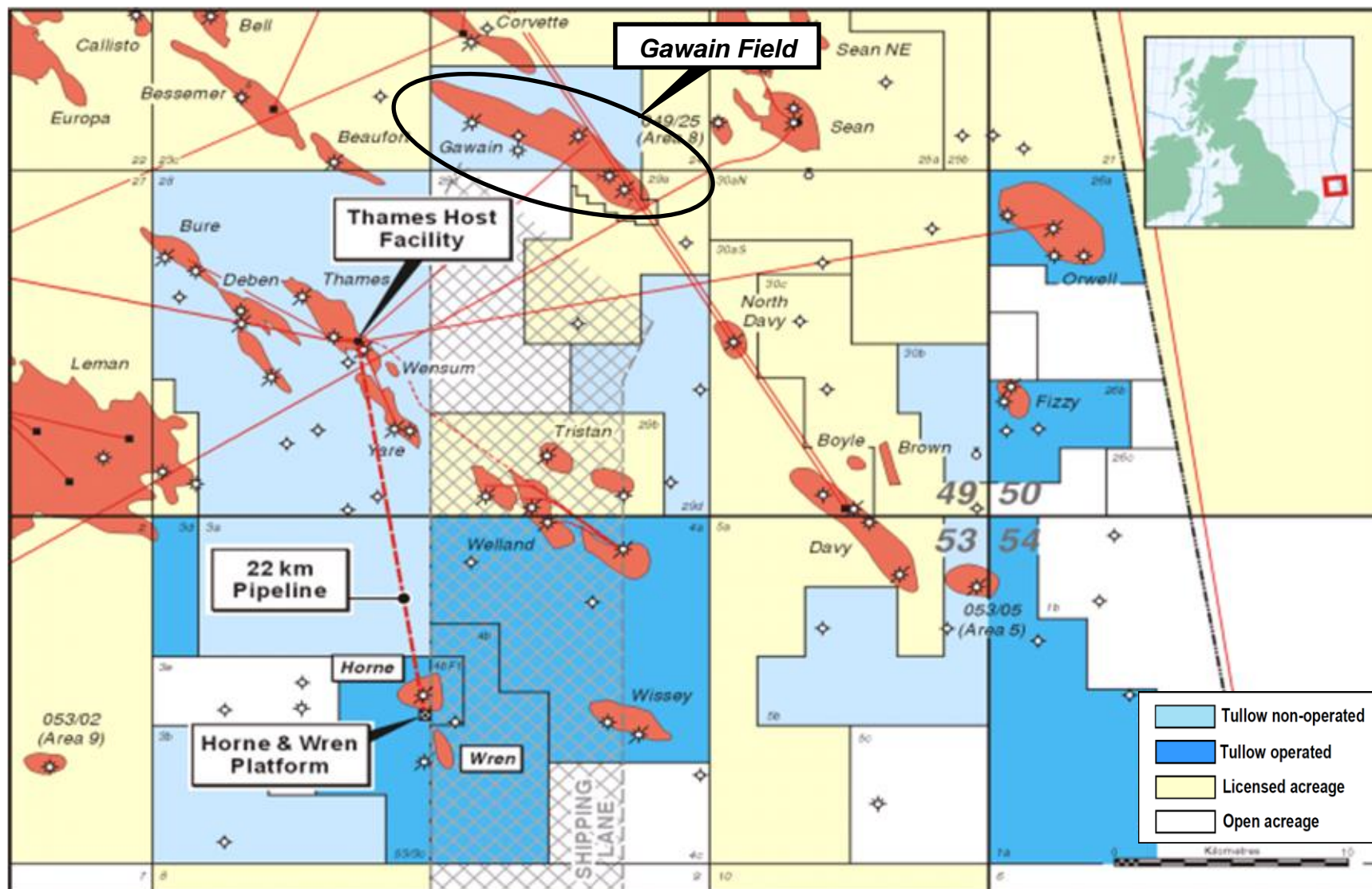
## 1.5 Summary of Proposed Decommissioning Programme(s)

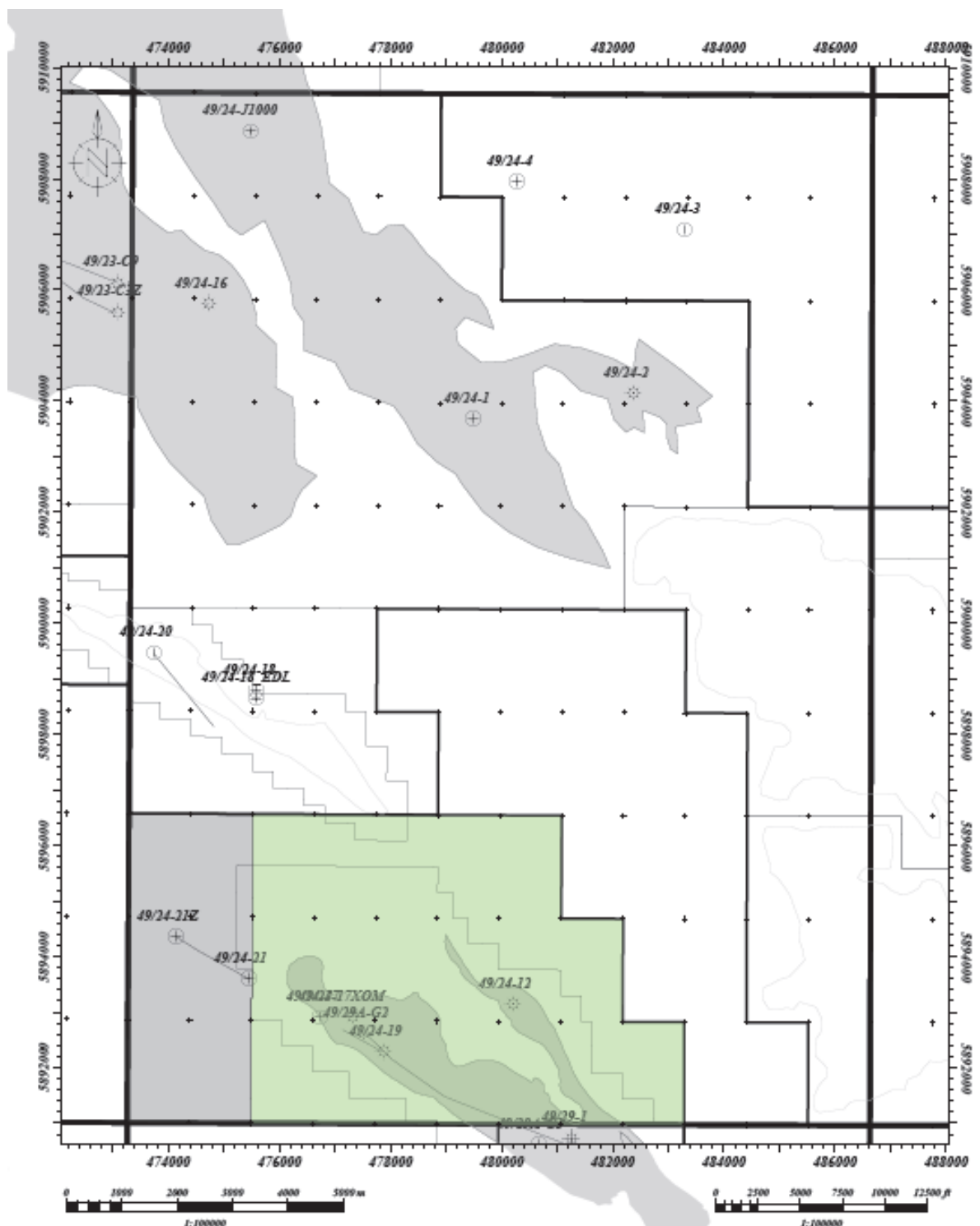
Table 1.5: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
<b>1. Topsides</b>		
N/A		
<b>2. Jackets</b>		
N/A		
<b>3. Subsea Installations</b>		
Wellhead protection frames will be removed by HLV or crane vessel	To remove all seabed structures 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
<b>4. Flowlines &amp; Umbilical's</b>		
Flush and leave buried in situ (for detailed list of pipeline and umbilical's 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 umbilical's 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.
<b>5. Well Abandonment Operations</b>		
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.
<b>6. Drill Cuttings</b>		
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
<b>7. Interdependences</b>		
Not applicable.		

## 1.6 Field Location/Layout and Adjacent Facilities

Figure 1.1: Field Location in UKCS





**UKSNS Block 49/24 (Gawain)**

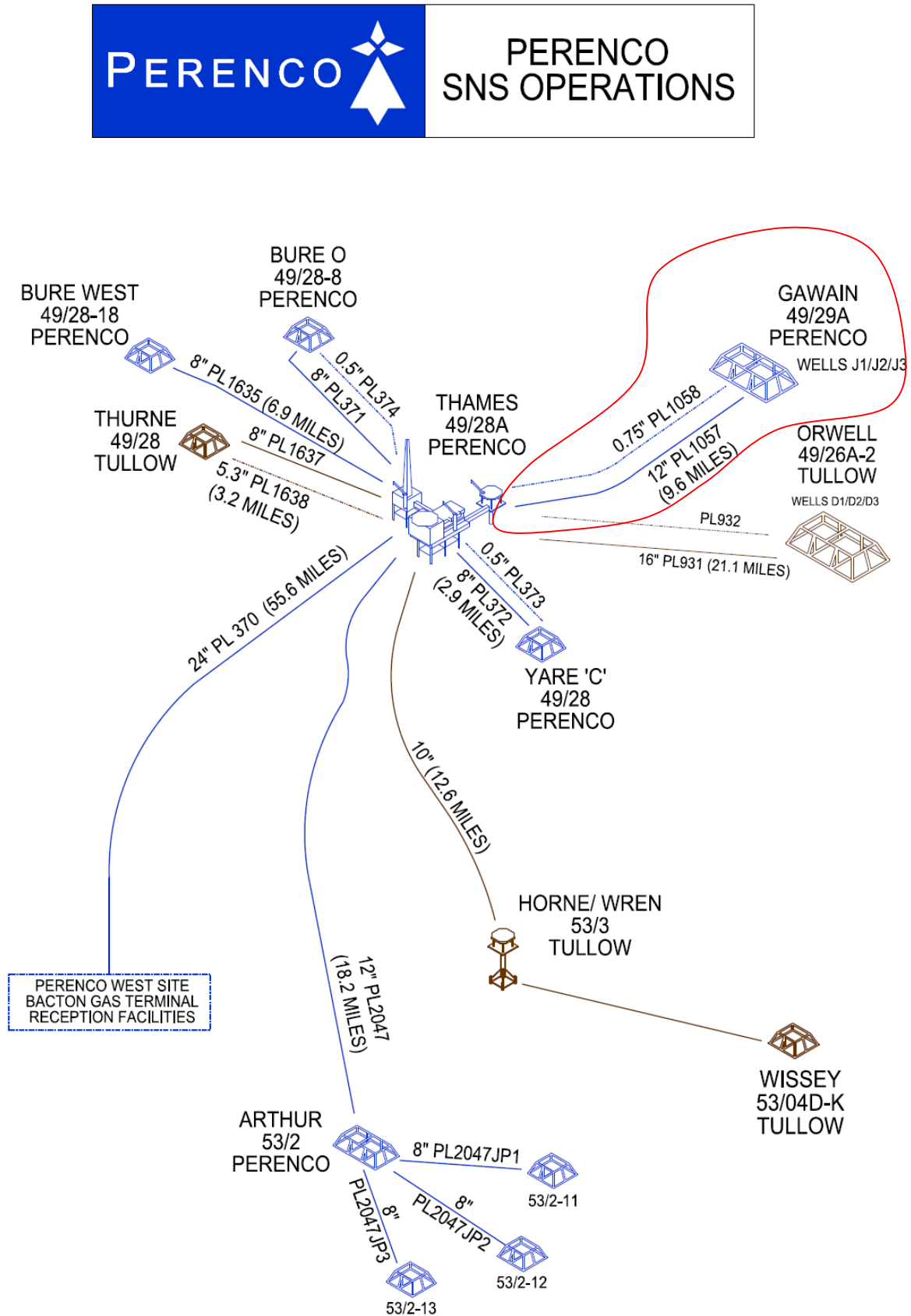
49/24a P.007 Gawain (non-operated) - light green

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.					



**Thames field**  
13 Aug 2014

Coordinate System: ED 1950 UTM Zone 31N  
Projection: Transverse Mercator  
Datum: European 1950  
False Easting: 500,000.0000  
False Northing: 0.0000  
Central Meridian: 3.0000  
Scale Factor: 0.9996  
Latitude Of Origin: 0.0000  
Units: Meter

**Legend**

- Infrastructure Safety Zones
- Surface Infrastructure
- Subsurface Infrastructure

**Pipelines**

- <all other values>

**FLUID**

- OIL
- GAS
- CONDENSATE
- METHANOL
- WATER
- MIXED HYDROCARBONS

The map displays the Thames field with various infrastructure elements and pipelines. Key features include:

- Infrastructure Safety Zones:** Indicated by light blue shaded areas.
- Surface Infrastructure:** Represented by black dots.
- Subsurface Infrastructure:** Represented by blue dots.
- Pipelines:** Shown as colored lines connecting different infrastructure points. The legend indicates that the color represents the fluid type (Oil, Gas, Condensate, Methanol, Water, Mixed Hydrocarbons).
- Fluid Types:** Labeled on the map include OIL, GAS, CONDENSATE, METHANOL, WATER, and MIXED HYDROCARBONS.
- Scale:** A scale bar at the bottom right indicates distances in Kilometers (0, 2, 4, 8, 12, 16).
- Coordinates:** The map uses a coordinate system with Easting (480000 to 500000) and Northing (500000 to 520000) values.



## 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)
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
Froned 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 <sup>1</sup>	Contents <sup>2</sup>	From – To End Points	Condition	Status <sup>3</sup>	Contents <sup>4</sup>
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

<sup>1</sup> e.g. Concrete; Steel; umbilical; Flexible; Bundle

<sup>2</sup> e.g. Oil; Gas; Water; Chemicals

<sup>3</sup> e.g. Operational; Out-of-use; Interim pipeline Regime

<sup>4</sup> 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.

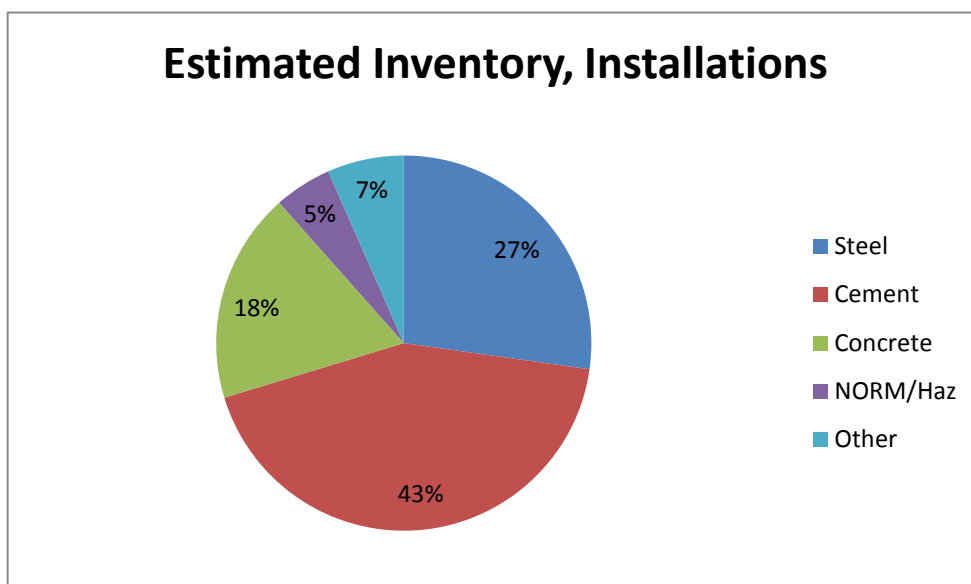
## 2.5 Drill Cuttings

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.

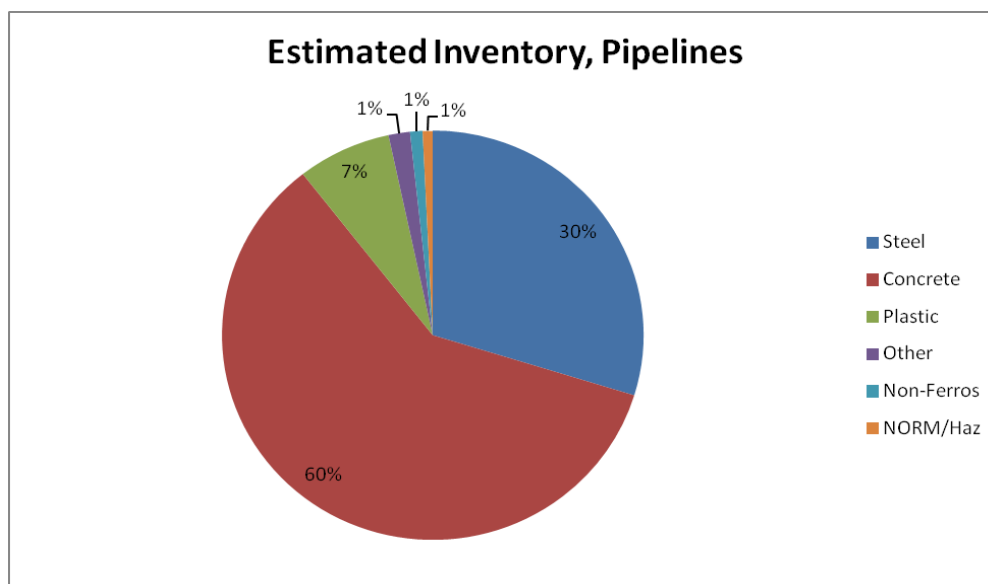
## 2.6 Inventory Estimates

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.

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.

**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	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	Not applicable	Not applicable
Fronnd 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/Umbilical's

#### 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 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 3.3: 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	<p><b>Marine Protected Areas (MPAs):</b> The Thames Infrastructure overlaps with the boundaries of three MPAs described below:</p> <ul style="list-style-type: none"> <li>• Cromer Shoal Chalk Beds rMCZ (NG2);</li> <li>• Haisborough, Hammond and Winterton cSAC;</li> <li>• North Norfolk Sandbanks and Saturn Reef cSAC.</li> </ul> <p><b>Annex I Habitats:</b> 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><b>Annex II Species:</b> The Annex II species that could be present in the vicinity of the Thames Decommissioning Area include:</p> <ul style="list-style-type: none"> <li>• Harbour porpoise (<i>Phocoena phocoena</i>);</li> <li>• Grey seal (<i>Halichoerus grypus</i>);</li> <li>• The harbour (or common) seal (<i>Phoca vitulina</i>).</li> </ul>

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).</p> <p>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.</p> <p>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><b>Shipping:</b> 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><b>Oil &amp; Gas:</b> Previously, there has been significant oil and gas activity within and around the Blocks of Interest;</p> <p><b>Military Activity:</b> 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><b>Dredging and Dumping Activity:</b> 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><b>Wind Farms:</b> 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><b>Archaeology:</b> 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**

### 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;
- 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	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	<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>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>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 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 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>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 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</p>

## 5 **INTERESTED PARTY CONSULTATIONS**

Consultations Summary:

Who	Comment	Response
<b>INFORMAL CONSULTATIONS</b>		
N/A	N/A	
<b>STATUTORY CONSULTATIONS</b>		
<b>NFFO</b>	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.
<b>SFF</b>	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.
<b>NIFPO</b>	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.
<b>Global Marine Systems</b>	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 <a href="http://www.kis-orca.eu/map#.VPmDJHZFDIU">http://www.kis-orca.eu/map#.VPmDJHZFDIU</a> . 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.
<b>Public</b>	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 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.

	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																				

#### 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
<b>TOTAL</b>	<b>31.8</b>

#### 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

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  
3<sup>rd</sup> Floor  
Atholl House  
86 -88 Guild Street  
Aberdeen  
AB11 6AR

F.A.O. Alex Mateo, Decommissioning Manager

16 October 2015

### RE: GAWAIN FIELD DECOMMISSIONING PROGRAMME

Dear Sir/Madam,


We acknowledge receipt of your letter dated 14 October 2015 with reference 12.04.06.06/13c.

We, Tullow Oil plc, confirm that we authorise Perenco UK Limited to submit on our behalf the Final Decommissioning Programme for the Gawain Field 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 Gawain Field 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:   
Name: GRAHAM MARTIN  
Title: DIRECTOR

## Tullow Oil SK Limited

9, Chiswick Park, 566 Chiswick High Road, London, W4 5XT  
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3<sup>rd</sup> Floor  
Atholl House  
86 -88 Guild Street  
Aberdeen  
AB11 6AR

F.A.O. Alex Mateo, Decommissioning Manager

16 October 2015

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Dear Sir/Madam,


We acknowledge receipt of your letter dated 14 October 2015 with reference 12.04.06.06/13c.

We, Tullow Oil SK Limited, confirm that we authorise Perenco UK Limited to submit on our behalf the Final Decommissioning Programme for the Gawain Field 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 Gawain Field 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

9. **APPENDIX**

Gawain Mattress Drawings

