Cavendish Decommissioning Programmes

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INEOS UK SNS Limited

CONTROLLED DOCUMENT

Title:

Cavendish Decommissioning Programmes

Notes:

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Contents

Terms and Abbreviations

Abbreviation	Explanation
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CO_2	Carbon Dioxide
COP	Cessation of Production
EA	Environmental Appraisal
FPAL	First Point Assessment (a supply chain database tool)
HLV	Heavy Lift Vessel
HSE	Health and Safety Executive
JNCC	Joint Nature Conservation Committee
Km	kilometres
LAT	Lowest Astronomical Tide
LSA	Low Specific Activity
m	Metres
MAT	Master Application Template
MCV	Monohull Crane Vessel
MCZ	Marine Conservation Zone
MoD	Ministry of Defence
NORM	Naturally Occurring Radioactive Material
NUI	Normally Unmanned Installation
OGA	Oil and Gas Authority
OGUK	Oil and Gas UK
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo/Paris Convention (for the Protection of the Marine Environment in the North-East Atlantic)
P&A	Plug and Abandonment
PON	Petroleum Operations Notice
SAC	Special Area of Conservation
SAT	Subsidiary Application Template
SLV	Shear Leg Vessel
SNS	Southern North Sea
te	tonnes
UKCS	United Kingdom Continental Shelf

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Appendices

1 Executive Summary

1.1 Combined Decommissioning Programmes

This document contains two decommissioning programmes for one installation and two pipelines. There is a separate decommissioning programme for each set of associated notices served under Section 29 of the Petroleum Act 1998. The Decommissioning Programmes are for:

- The Cavendish Installation (Cavendish platform); and
- The Cavendish Pipelines (PL2284, PL2285 and PL4612).

1.2 Requirement for Decommissioning Programmes

Installation
In accordance with the Petroleum Act 1998, and on behalf of the Section 29 notice holders of the Cavendish installation (see Table 1-2), INEOS UK SNS Limited is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installation detailed in Section 2 of this document. (See also Section 8 – Partner Letters of Support).

Pipelines
In accordance with the Petroleum Act 1998, and on behalf of the Section 29 notice holders of the Cavendish Pipelines (see Table 1-4), INEOS UK SNS Limited is applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. (See also Section 8 – Partner Letters of Support).

In conjunction with public, stakeholder and regulatory consultation, the decommissioning programmes are submitted in compliance with national and international regulations and OPRED guidelines. The schedule outlined in this document is for a 5 year decommissioning project (including planning phase) with offshore works due to begin in 2019.

1.3 Introduction

The operator of the Cavendish field is INEOS UK SNS Limited, hereafter referred to as 'INEOS'.

The Cavendish Field is located approximately 125km east of the UK coastline at Flamborough Head and 65km west of the UK-Netherlands median line, with a water depth of 18 metres. The Cavendish NUI is tied back to the Murdoch MD platform, 44km to the south-east. The Cavendish NUI comprises a piled steel jacket supporting topsides of five decks, plus a helideck. A facilities building extends over two decks. The topsides weighs 546 Te and the jacket weighs 508 Te.

Produced gas and condensate, from three wells, at Cavendish was exported via a 47.35km long 10.75" export pipeline, to Murdoch. A 2.37" methanol line is piggybacked onto the 10.75" export pipeline which supplied methanol from the Murdoch platform back to Cavendish. A 1.25" fibre optic cable is also laid in the same trench as the pipeline bundle.

Cavendish production ceased in August 2018 due to the closure of the export route to shore via Murdoch. The two pipelines are out of use and reside in a cleaned, water-filled condition.

Field layout of the Cavendish facilities is shown in Figure 1-2.

Following public, stakeholder and regulatory consultation, the decommissioning programmes are submitted without derogation and in full compliance with OPRED guidelines. The decommissioning programmes explain the principles of the removal activities and are supported by an environmental

appraisal. The decommissioning programme for the pipelines is supported by a comparative assessment.

The proposed activities are summarised as follows.

- Wells will be plugged and abandoned in accordance with Oil & Gas UK guidelines;
- Topsides and jacket will be removed and recycled or disposed of onshore;
- The gas export pipeline, piggybacked methanol line and fibre optic cable will be partially removed. The tie-in spools will be removed and recycled or disposed onshore. The exposed sections at both ends will be removed or lowered to achieve adequate depth of coverage. The existing buried sections of pipeline will be left *in situ*; and
- On completion of the decommissioning programmes a seabed survey will be undertaken to identify and recover debris within the platform 500m zone and a 100m wide corridor along each pipeline route.

It is currently envisaged that the decommissioning activities at Cavendish will commence in 2019 and last for a period of up to 5 years, depending on availability of contractor vessels and equipment.

1.4 Overview of Installation & Pipelines Being Decommissioned

Table 1-1 Installation Being Decommissioned

Installation Being Decommissioned			
Field(s):	**Cavendish**	**Production Type (Oil/Gas/Condensate)**	**Gas/Condensate**
Water Depth (m)	**18 m**	**UKCS block**	**43/19a**
Surface Installation(s)			
Number	**Type**	**Topsides Weight (Te)**	**Jacket Weight (Te)**
One	Fixed Steel Jacket/NUI	546	508
Subsea Installation(s)		**Number of Wells**	
Number	**Type**	**Platform**	**Subsea**
None	-	Three	None
Drill Cuttings pile(s)		**Distance to median**	**Distance from nearest UK coastline**
Number of Piles	**Total Estimated volume (m^3)**	**km**	**km**
None	None	65 to UK-Netherlands Median Line	125km E of Flamborough Head

Table 1-2 Installation Section 29 Notice Holders Details

Installation Section 29 Notice Holders Details		
Section 29 Notice Holder(s)	**Registration Number**	**Equity Interest (%)**
INEOS UK SNS Limited	01021338	50
Dana Petroleum (E&P) Limited	02294746	50
Dana Petroleum Limited	03456891	-
INEOS UK E&P Holdings Limited	SC200459	-

Table 1-3 Pipelines Being Decommissioned

Pipelines Being Decommissioned		
Number of Pipelines	3	**(See Table 2.3)**

Table 1-4 Pipelines Section 29 Notice Holders Details

Pipeline Section 29 Notice Holders Details		
Section 29 Notice Holder(s)	**Registration Number**	**Equity Interest (%)**
INEOS UK SNS Limited	01021338	50
Dana Petroleum (E&P) Limited	02294746	50
Dana Petroleum Limited	03456891	-
INEOS UK E&P Holdings Limited	SC200459	-

1.5 Summary of Proposed Decommissioning Programmes

Table 1-5 Summary of Decommissioning Programmes

Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
1. Topsides		
Complete removal for re-use and recycling.	To remove all structures and leave a clean seabed. To comply with OSPAR requirements.	Cleaned equipment refurbished for re-use where possible. Equipment which cannot be re-used will be recycled or go to other disposal routes as appropriate.
2. Jacket		
Complete removal for re-use and recycling.	To remove all structures and leave a clean seabed. To comply with OSPAR requirements.	Recovered materials will be recycled or go to other disposal routes as appropriate.
3. Subsea Installation(s)		
n/a	n/a	n/a

Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
4. Pipelines, Flowlines & Umbilicals		
The gas pipeline, piggybacked methanol line and fibre optic cable will be partially removed. The two lines have been flushed and cleaned. Buried sections of pipeline, methanol line and fibre optic cable will be left buried *in situ*.	The pipelines were subject to a qualitative comparative assessment from which remedial pipeline end burial was selected on the basis of minimal seabed disturbance, lower energy use and reduced risk to personnel. The pipeline is sufficiently buried and stable, posing no hazard to marine users.	The pipelines have been cleaned. The buried sections will be left *in situ*. The exposed sections at both platform ends will be removed or lowered to at least 0.6m. The tie-in spools will be removed and returned to shore for recycling or disposal. Based on surveys undertaken in 2009, 2012 and 2015, our findings are that the pipeline will remain buried. Degradation will occur over a long time period within seabed sediment, and this is not expected to represent a hazard to other users of the sea.
5. Wells		
Plugged and abandoned in accordance with HSE "Offshore Installations and Wells DCR 1996" and Oil & Gas UK Guidelines for the Suspension and Abandonment of wells (Issue 6, June 2018).	Meets HSE regulatory requirements.	The wells have been plugged and abandoned to comply with HSE "Offshore Installations and Wells DCR 1996" and in accordance with OGUK Guidelines for the "Suspension and Abandonment of Wells" (Issue 6, June 2018) as it meets OGA and HSE requirements. A Master Application Template (MAT) and the supporting Subsidiary Application Templates (SAT) were submitted in support of works carried out. A PON5 was also submitted to OPRED for application to plug and abandon the wells.
6. Drill Cuttings		
n/a	No cuttings piles exist at the Cavendish platform location, as confirmed in environmental surveys undertaken around the platform and pipelines in 2012.	n/a
7. Interdependencies		
Flushing/cleaning of the pipeline and methanol line was dependent on activities that had to be aligned with the Murdoch platform. Mattresses and grout bags will be removed as part of the partial pipelines removal activities.		

1.6 Field Location Including Field Layout and Adjacent Facilities

Figure 1-1 Field Location

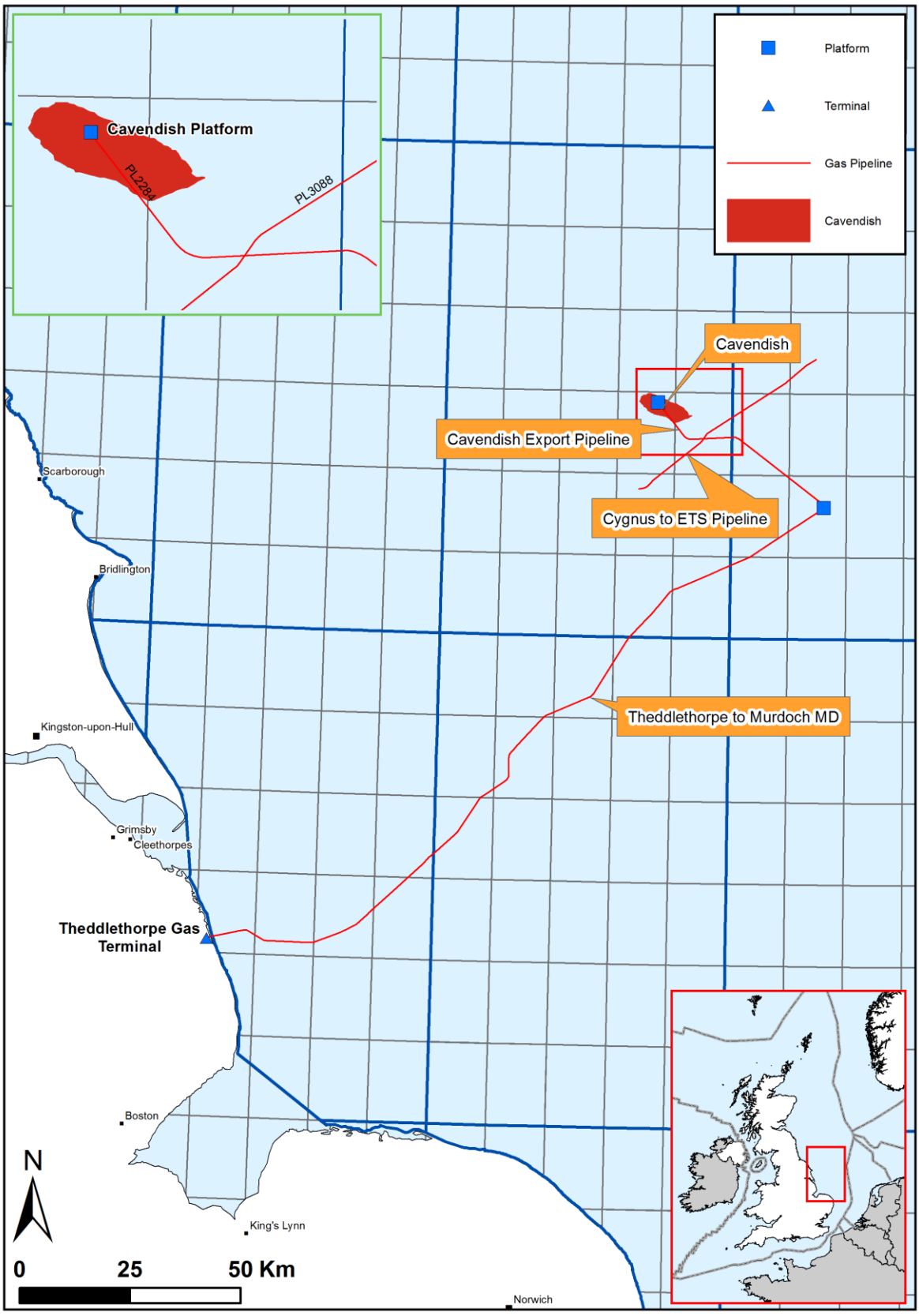


Figure 1-2 Field Layout

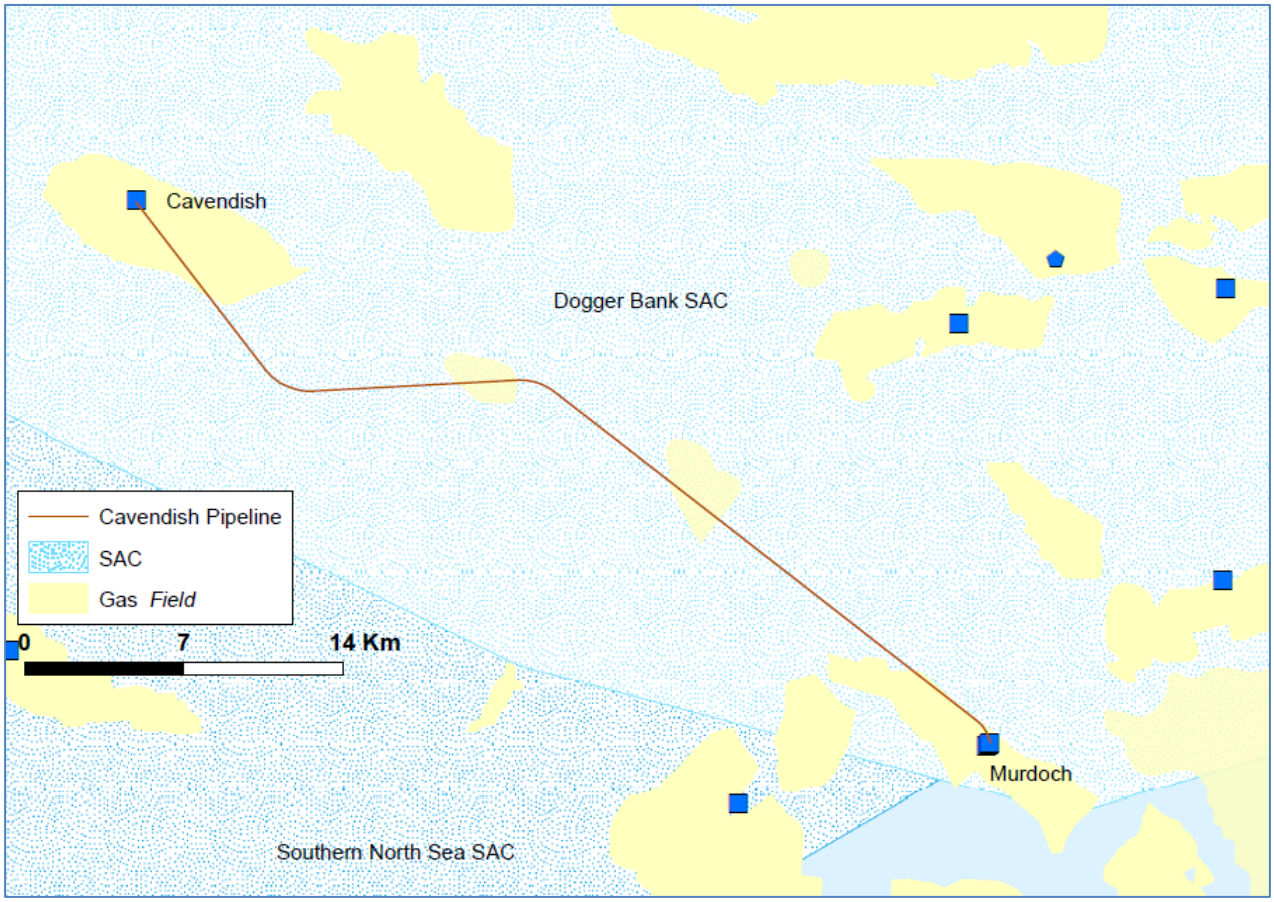
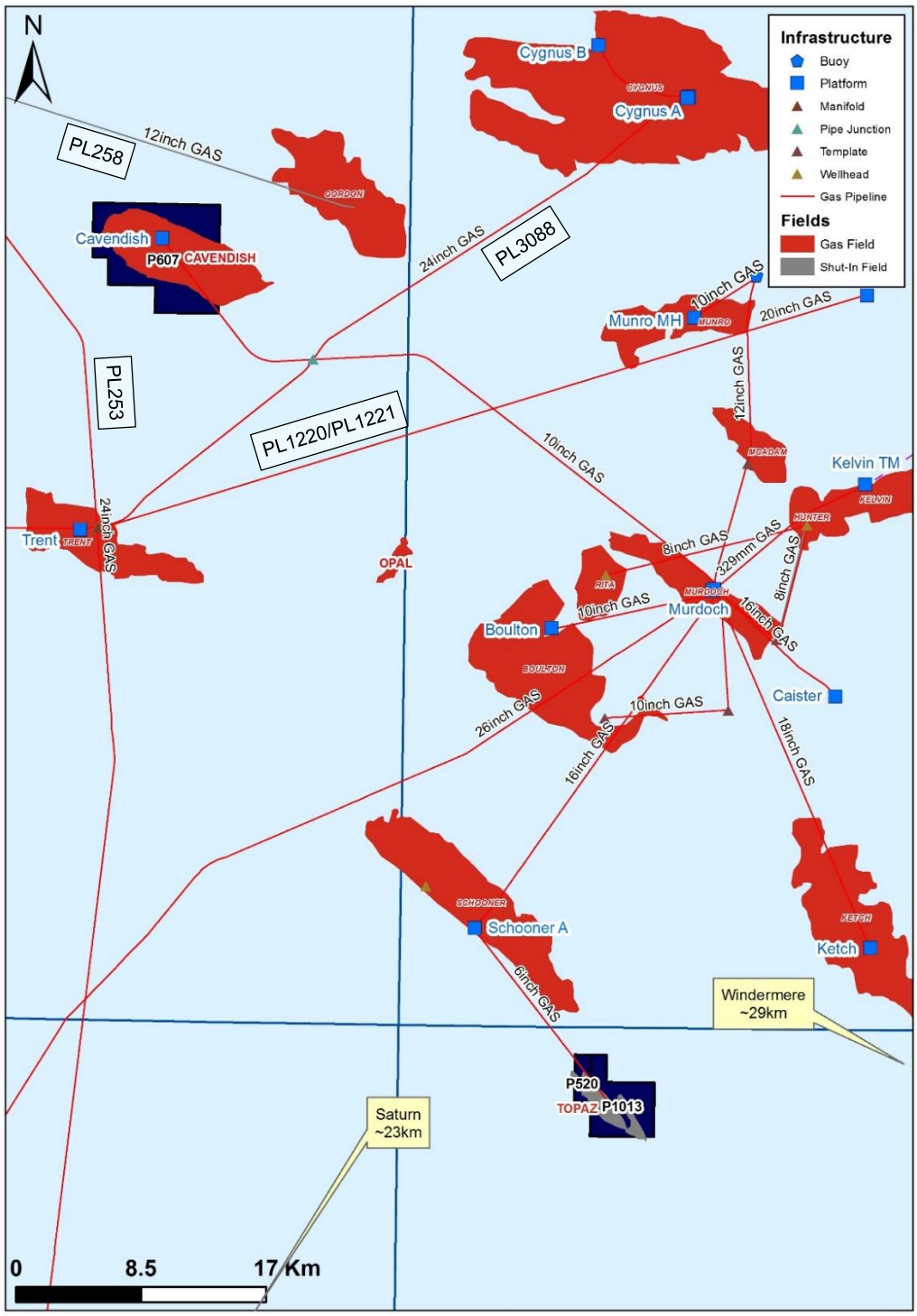


Table 1-6 Adjacent Facilities

Adjacent Facilities (See Figure 1.3 overleaf)					
Operator	**Name**	**Type**	**Distance / Direction**	**Information**	**Status**
BHP Billiton Petroleum Limited	Gordon to Esmond BP 12" Gas line (PL258)	Gas Pipeline	6km NNE	-	Abandoned
Perenco UK Limited	Esmond to Bacton 24" Gas Export Line (PL253)	Gas Pipeline	8.4km SW	-	Active
Neptune E&P UK Limited	Cygnus to ETS Pipeline (PL3088)	Gas Pipeline	13km SE	-	Active
Neptune E&P UK Limited	Cygnus A Crossing	Pipe Junction	13.2km SE	-	Active
Perenco UK Limited	Tyne to Trent (PL1220/PL1221)	Gas Pipeline	17.8km S	-	Active
Perenco UK Limited	Trent	Platform	20.6km SSW	-	Active
Shell UK Limited	Shearwater to Bacton (SEAL) (PL1570)	Gas Pipeline	20.8km W	-	Active
Impacts of Decommissioning Proposals					
No impacts at the adjacent facilities. Pipeline flushing/cleaning works were undertaken in co-operation with the Murdoch complex.					

Figure 1-3 Adjacent Facilities



1.7 Industrial Implications

In planning and preparing for executing the Cavendish decommissioning strategy, INEOS as operator of the Cavendish field, on behalf of the Section 29 Notice Holders, shall undertake to develop a contract strategy that will result in an efficient and cost effective execution of the decommissioning works.

INEOS will work with the OGA and Supply Chain teams during this period to ensure effective technical solutions are selected that are environmentally acceptable and safe.

2 Description of Facilities to be Decommissioned

2.1 Installation: Surface Facilities (Topsides/Jacket)

Table 2-1 Surface Facilities Information

Surface Facilities Information									
Name	Facility Type	Location		Topsides/Facilities		Jacket			
				Weight (Te)	No of modules	Weight (Te)	No. of legs	No. of piles	Weight of piles (Te)
Cavendish	Fixed Platform (NUI)	WGS84 Decimal	N 54.467 E 01.733	546	1	508	4	4	322
		WGS84 Decimal Minute	N 54°28.72' E 01°44.42'						

2.2 Installation: Subsea including Stabilisation Features

Table 2-2 Subsea including Stabilisation Features

Subsea Installation and Stabilisation Features				
Subsea Installations including Stabilisation Features	Number	Size/Weight (Te)	Location	Comments/ Status
Wellhead(s)	n/a	n/a	n/a	n/a
Manifold(s)	n/a	n/a	n/a	n/a
Protection Frame(s)	n/a	n/a	n/a	n/a
Concrete Mattresses	n/a	n/a	n/a	n/a
Grout Bags	n/a	n/a	n/a	n/a
Formwork	n/a	n/a	n/a	n/a
Frond Mats	n/a	n/a	n/a	n/a
Rock Dump	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a	n/a

2.3 Pipelines Including Stabilisation Features

Table 2-3 Pipeline / Flowline / Umbilical Information

Pipeline / Flowline / Umbilical Information									
Description	Pipeline No. (as per PWA)	Diameter (inches)	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Contents
Export line (Cavendish to Murdoch)	PL2284	10.75"	47.35	Steel	Gas	Cavendish Platform Pig Launcher to Murdoch Pigging Skid (tie-in flange)	Trenched and Buried	Operational	Out of use – water filled
2" Methanol line	PL2285	2.37"	47.35	Steel	Methanol	Murdoch Pigging Skid to Cavendish Platform	Trenched and Buried	Operational	Out of use – water filled
Fibre Optic Cable	PL4612	1.25"	47.34	Fibre/ Polyethylene	Data	Cavendish to Murdoch	Trenched and Buried	Operational	Fibre Optic

Note: A Steel Tubular Protection Frame is present on the line at the Keplar Tee. It is buried and weighs 1.37 tonnes.

Table 2-4 Subsea Pipeline Stabilisation Features

Subsea Pipeline Stabilisation Features				
Stabilisation Feature	Total Number	Weight (te)	Location(s)	Exposed/Buried/Condition
Concrete mattresses*	105*	5.75 tonnes each	PL2284 & PL2285	Exposed
Grout Bags	n/a	n/a	n/a	n/a
Formwork	n/a	n/a	n/a	n/a
Frond Mats	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a	n/a

*This is the total number of mattresses including the Cavendish Platform approach, the Trent pipeline crossing and the Murdoch approach.

2.4 Wells

Table 2-5 Well Information

Well Information			
Platform Wells	**Designation**	**Status**	**Category of Well (O&GUK guidelines)**
43/19a-C1	Gas Production	Shut-In	PL 1.1.1
43/19a – C2y	Gas Production	Shut-In	PL 1.1.1
43/19a – C3	Gas Production	Shut-In	PL 1.1.1

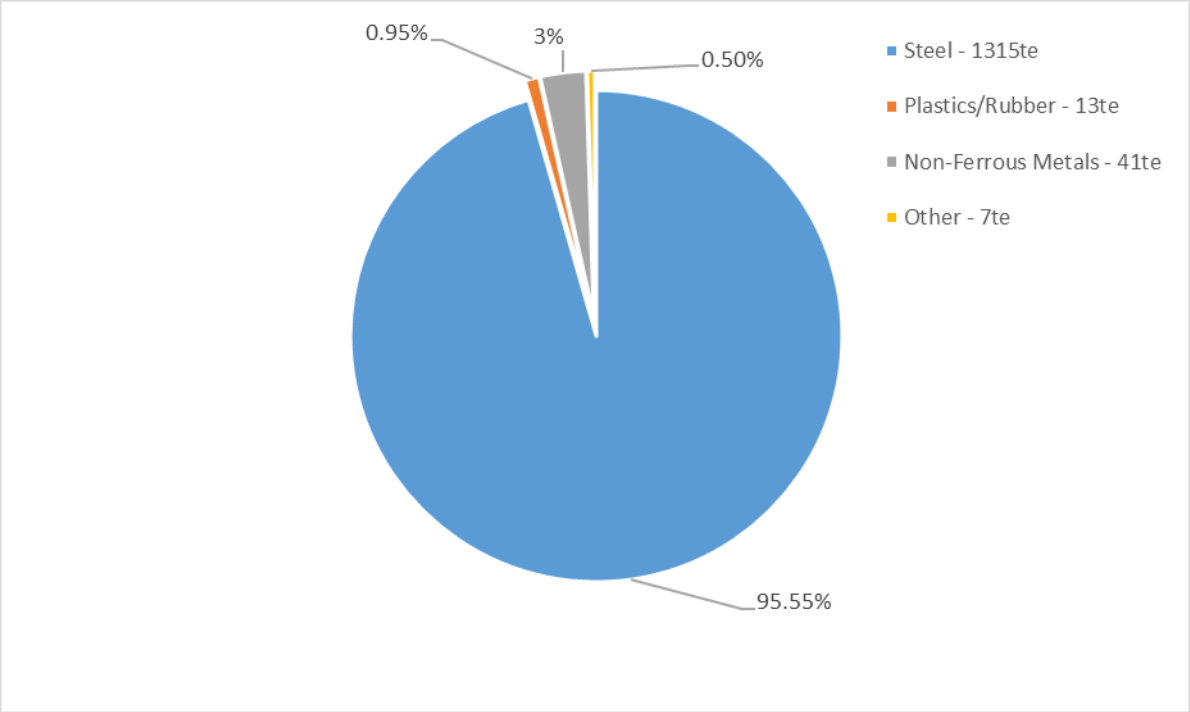
For details of well categorisations see OGUK Guidelines for the Suspension or Abandonment of Wells. Issue 6, June 2018.

2.5 Drill Cuttings

Drill Cuttings piles are not present at the Cavendish platform location.

2.6 Inventory Estimates

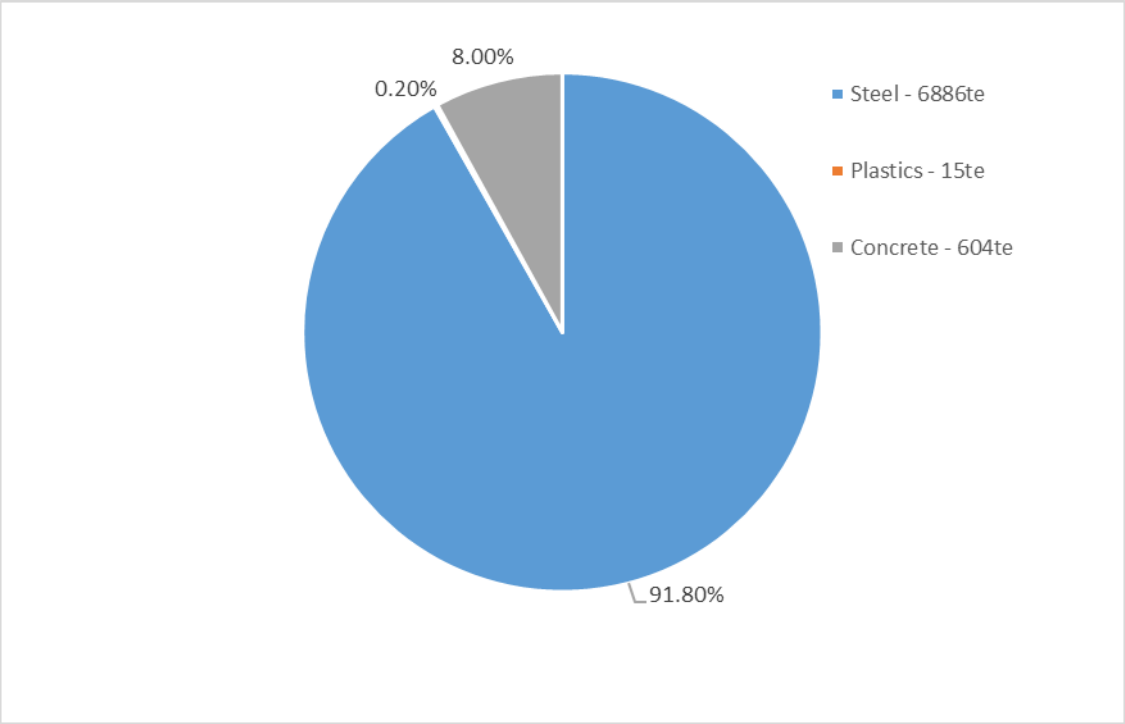
Figure 2-1 Estimated Inventory (Installation Including Piles)



Total Mass = 1,376 Te

(Refer to the Environmental Appraisal for detailed data on inventory of materials and the handling /management of NORM and hazardous waste)

Figure 2-2 Estimated Inventory (Total Pipelines & Associated Stabilisation Materials)



Includes pipelines and associated stabilisation materials

Total Mass = 7,505 Te

(Refer to the Environmental Appraisal for detailed data on inventory of materials and the handling /management of NORM and hazardous waste)

3 Removal and Disposal Methods

Waste will be dealt with in accordance with the Waste Framework Directive. The reuse of this installation and pipelines (or parts thereof) is first in the order of preferred waste management options. Options for the reuse of installations or pipelines (or parts thereof) are currently under investigation. Waste generated during decommissioning will be segregated by type and periodically transported to shore in an auditable manner through licensed waste contractors. Steel and other recyclable metals are estimated to account for the greatest proportion of the materials inventory.

Alternative uses for the Cavendish facilities for renewable power generation and CO_2 sequestration were considered but were not found to be viable.

The platform equipment inventory will be assessed for use as spares for INEOS's asset portfolio.

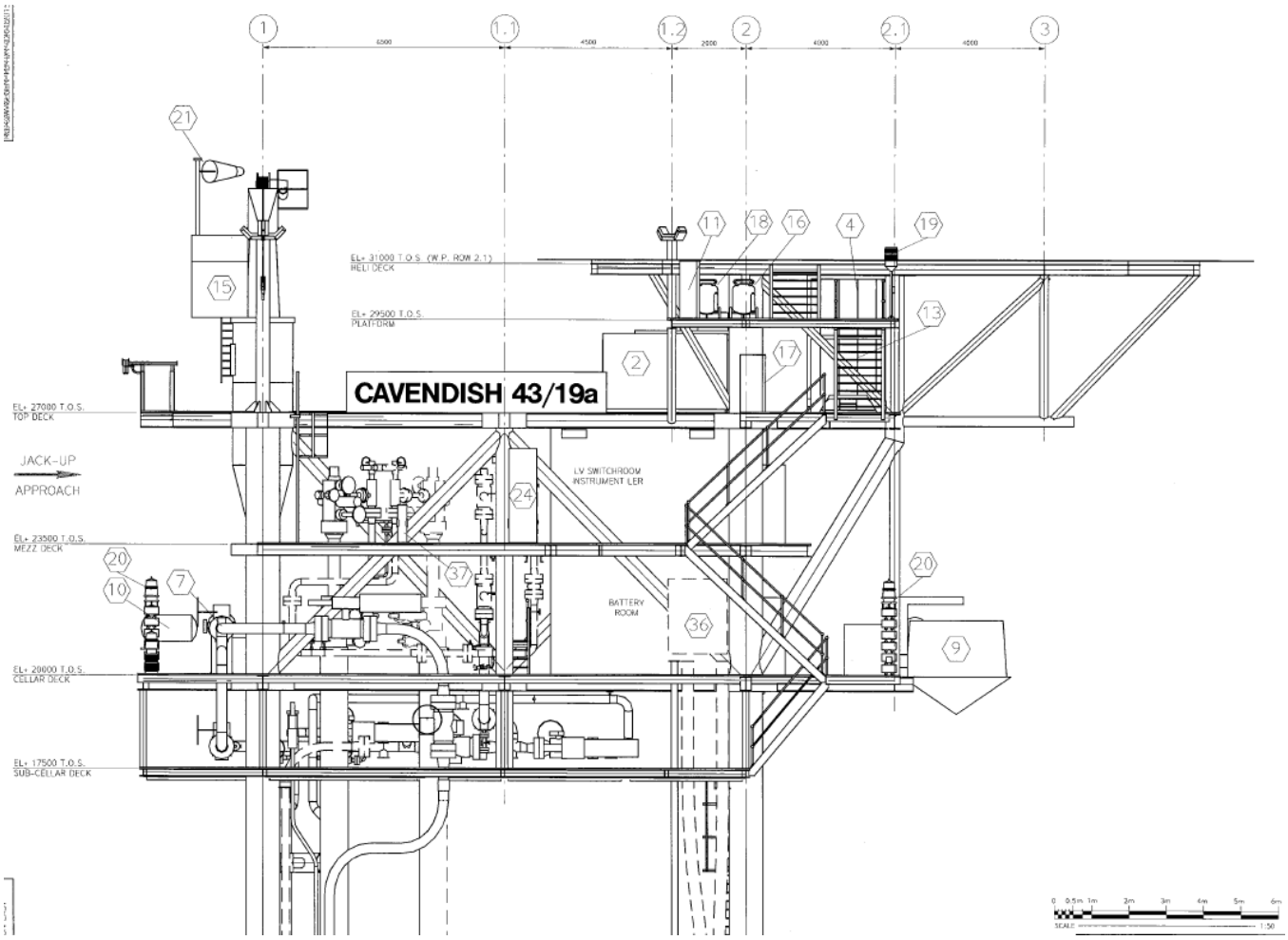
3.1 Topsides

Topsides Description: The Cavendish structure weighs approximately 546 te. It consists of: the Sub-Cellar Deck (+17.5m above LAT), Cellar deck (+20.0m above LAT); the mezzanine deck (+23.5m above LAT); the weather deck (+27.0m above LAT); a helideck located at the upper level

(+31m LAT). The platform is 17m x 10m, with the wellheads set above the cellar deck and the Xmas trees above the mezzanine deck.

Methodology: the topsides will be completely removed and returned to shore. Possible methods are described in Table 3-2 (on page 18). A final decision on decommissioning methods will be made following a commercial tendering process.

Figure 3-1 Diagram of Topsides – Elevation Looking East



Preparation / Cleaning: Table 3-1 below describes the methods that will be used to flush, purge or clean the topsides offshore, prior to removal to shore.

Table 3-1 Cleaning of Topsides for Removal

Cleaning of Topsides for Removal		
Waste Type	**Composition of Waste**	**Disposal Route**
On-board hydrocarbons	Process fluids, fuels and lubricants.	Flushing of bulk hydrocarbons will be conducted offshore. Fuels and lubricants will be drained onshore for re-use/disposal.
Other hazardous materials	Any evidence of NORM will be identified.	NORM, if present, will be disposed of under an appropriate permit.
Original paint coating	Zinc Silicate primer, Tie-Coat, Aluminium epoxy resin, High Build Epoxy, polyurethane topcoat.	Painted items will be disposed of onshore with consideration given to any toxic components.
Asbestos and ceramic fibre	Asbestos is not present.	

Removal Methods: topsides will be completely removed and returned to shore. Possible methods are outlined in Table 3-2 below.

Table 3-2 Topsides Removal Methods

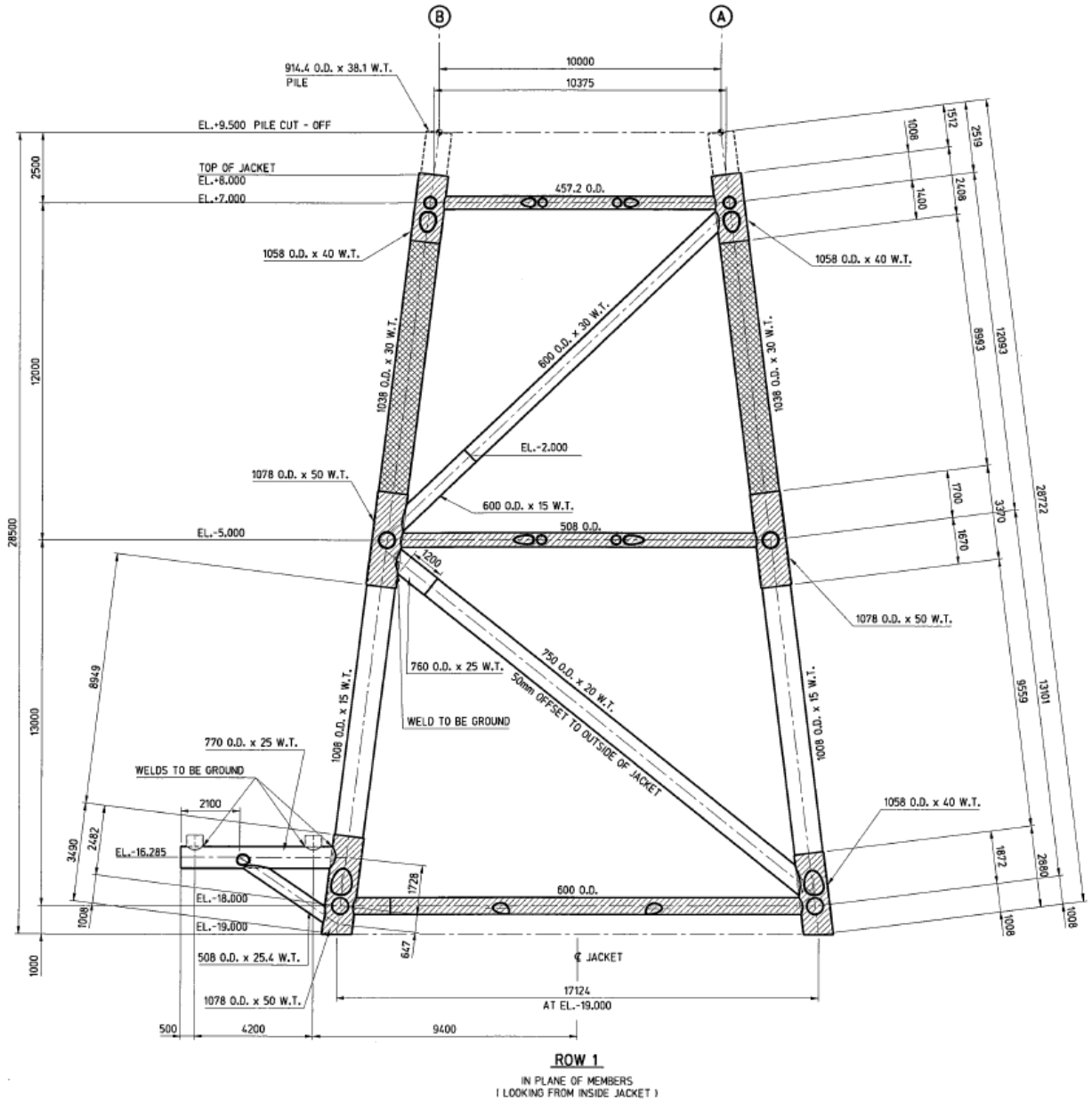
Topsides Removal Methods	
1) Heavy Lift Vessel (HLV) ☑ 2) Monohull Crane Vessel (MCV) ☑ 3) Shear Leg Vessel (SLV) ☑ 4) Piece small ☐ 5) Other (Complete with Jacket, Jack-Up) ☑	
Method	**Description**
Single lift removal by HLV / MCV / SLV	Removal of topsides as complete unit and transportation to shore for re-use of selected equipment, recycling, break up, and / or disposal
Single lift removal with Jacket by HLV / MCV / SLV	Removal of topsides and jacket as a single unit and transportation to shore on the HLV/MCV/SLV slings for re-use of selected equipment, recycling, break up, and / or disposal
Single lift removal by Jack-up	Removal of topsides as complete unit by jack-up used for well P&A and transportation to shore for re-use of selected equipment, recycling, break up, and / or disposal
Proposed removal method and disposal route	**Removal of topsides as complete unit by small HLV and transportation to shore for re-use of selected equipment, recycling, break up, and / or disposal. Should the topsides be taken out with the UKCS, an application under the Transfrontier Shipment of Waste Regulations shall be made to the Environment Agency. A final decision on the decommissioning method will be made following a commercial tendering process and OPRED notified.**

3.2 Jacket

3.2.1 Jacket Decommissioning Overview

The jacket dry weight is approximately 508 tonnes. The jacket legs will be cut at an appropriate elevation and new aids created[1] for the complete removal of the jacket in a single lift, see Figure 3-2 below. The piles will be cut 3m below the sea bed before the jacket is returned to shore for recycling.

Figure 3-2 Jacket Elevation



[1] Subject to detailed engineering. However, the current expectation is that new lift points will be drilled into the jacket legs to enable lifting bars to be installed.

3.2.2 Jacket Removal Methods

Table 3-3 Jacket Decommissioning Methods

Jacket Decommissioning Methods	
1) HLV (semi-submersible crane vessel) ☑ 2) Monohull crane vessel ☑ 3) SLV ☑ 4) Piece small ☐ 5) Other (Complete with Jacket, Jack-Up) ☑	
Method	**Description**
Single lift removal by HLV / MCV / SLV	Removal of jacket as complete unit and transportation to shore for recycling
Single lift removal with Jacket by SLV	Removal of topsides and jacket as a single unit and transportation to shore on the SLV slings for recycling
Single lift removal by Jack-up	Removal of jacket as complete unit by jack-up used for well P&A and transportation to shore recycling
Proposed removal method and disposal route	**Removal of jacket as complete unit by small HLV and transportation to shore for recycling. Should the topsides be taken out with the UKCS, an application under the Transfrontier Shipment of Waste Regulations shall be made to the Environment Agency. A final decision on the decommissioning method will be made following a commercial tendering process and OPRED notified.**

Note: If there is a delay between jacket and the topsides removal activities, appropriate navigational aids shall be in place, as per Consent to Locate requirements.

3.3 Subsea Installations and Stabilisation Features

Table 3-4 Subsea Installations and Stabilisation Features

Subsea Installation and Stabilisation Features			
Subsea installation and stabilisation features	**Number**	**Option**	**Disposal Route**
Wellhead(s)	n/a	n/a	n/a
Manifold(s)	n/a	n/a	n/a
Protection Frame(s)	n/a	n/a	n/a
Concrete Mattresses	n/a	n/a	n/a
Grout Bags	n/a	n/a	n/a
Formwork	n/a	n/a	n/a
Frond Mats	n/a	n/a	n/a
Rock Dump	n/a	n/a	n/a
Other	n/a	n/a	n/a

3.4 Pipelines

Decommissioning Options:

*Key to Options:

1) Remove - reverse reeling	2) Remove - Reverse S lay	3) Trench and bury
4) Remedial removal	5) Remedial trenching	6) Partial Removal
7) Leave in place	8) Other (Cut and lift)	9) Remedial rock-dump

Table 3-5 Pipeline or Pipeline Groups/Decommissioning Options

Pipeline or Pipeline Groups/Decommissioning Options			
Pipeline or Group (as per PWA)	**Condition of line/group**	**Whole or part of pipeline/group**	**Decommissioning Options* considered**
PL2284 & PL2285 & PL4612	Buried	Whole	1, 6, 7, 8

Comparative Assessment [Ref 2]:

The purpose of the Comparative Assessment was to provide an assessment of the decommissioning options available for the Cavendish 10.75" pipeline (PL2284) and piggybacked 2.37" methanol line (PL2285) and 1.25" Fibre Optic Cable (PL4612) against a set of assessment criteria. These criteria were defined in line with OPRED guidance and previous similar studies, identifying the different risks to be considered during and after the decommissioning of the asset. Each option was considered, based on the likelihood and impact of each risk/criteria considered. This process allowed an overall comparison of the options against each other. Burial profiles for the pipeline and umbilical are provided in Appendix B.

The comparative assessment is summarised as follows:

- The pipeline, piggybacked methanol line and fibre optic cable:
  - Are stable and buried throughout (apart from at each platform end); the most recent pipeline survey shows an average of depth of >1m.
  - Do not have a viable re-use potential.
  - Will be cleaned and flushed (gas export line and methanol line).
  - Will be partially removed (i.e. at the two platform ends), with exposed sections of the pipelines/fibre optic cable removed or lowered and left with the pipe ends open.
  - The two pipeline ends will be trenched and buried (i.e. at each platform end).
  - The majority of the pipelines will be left *in situ* as this has the least impact on the sea bed environment.

Table 3-6 Outcome of Comparative Assessment

Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option***	**Justification**
PL2284	Remove mattresses and tie-in spools. Trench and bury pipeline ends and leave *in situ*	The pipeline is stable and buried and leaving *in situ* represents the least impact to the sea bed.
PL2285	Remove mattresses at the two platform ends. Trench and bury umbilical ends and leave *in-situ.*	The umbilical is stable and buried and leaving *in situ* represents the least impact to the sea bed. A small section of 12m of exposed line will be lowered/re-buried.
PL4612	Remove the unburied sections of fibre optic cable at the two platform ends.	The fibre optic cable is stable and buried along the majority of the route and leaving *in situ* represents the least impact to the sea bed.

*Depending on how much of the unburied pipeline is removed.

3.5 Pipeline Stabilisation Features

Table 3-7 Pipeline Stabilisation Features

Pipeline Stabilisation Feature(s)			
Stabilisation feature(s)	**Number**	**Option**	**Disposal Route (if applicable)**
Concrete mattresses over pipeline and umbilical	105	Remove to shore.	Recover to shore for re-use, recycling or disposal.
Grout Bags	n/a	n/a	n/a
Rock Dump	n/a	n/a	n/a
Formwork	n/a	n/a	n/a
Frond Mats	n/a	n/a	n/a

3.6 Wells

Table 3-8 Well Plug and Abandonment

Well Plug and Abandonment
The wells which as listed in Section 2.4 (Table 2.5), have been plugged and abandoned in accordance with Oil and Gas UK Guidelines for the Suspension and Abandonment of Wells, Version 6, June 2018. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) were submitted in support of works carried out. A PON5 was submitted to OPRED for application to abandon wells. In all three wells, the Carboniferous sandstone reservoir was abandoned with a single 250m (800ft) combination cement plug displaced through the production tubing. In addition a surface cement plug in all three wells was set. The total well steel removed to shore, including tubing strings and well casings down to 3m below seabed, was approximately 140 tonnes.

3.7 Drill Cuttings

It is believed that any cuttings discharged during the drilling of wells at the Cavendish platform location are likely to have dispersed as there were no drill cuttings piles observed around the platform during the period platform inspections surveys that have been undertaken throughout the life of Cavendish.

3.8 Waste Streams

Table 3-9 Waste Stream Management Methods

Waste Stream Management Methods	
Waste Stream	**Removal and Disposal method**
Bulk liquids	There are no bulk liquids on Cavendish. All flowlines have been cleaned to a defined level of cleanliness. The pipelines are flushed and flooded and are cleaned to a defined level of cleanliness.
Marine growth	Some limited quantities of marine growth may be removed offshore to facilitate access to key parts of the structure, although the majority will be removed at the onshore disposal site. Disposal options will be managed through a Decommissioning Environmental Management Plan.
NORM/LSA Scale	NORM has not been identified at the Cavendish facilities. Where any product containing, or suspected to contain, NORM materials are recovered, they will be taken onshore with the infrastructure identified for removal and decontamination at the appropriately permitted disposal yard.
Asbestos	Asbestos is not present.
Other hazardous wastes	No other hazardous wastes have been identified with the remaining Cavendish facilities. In the event that any hazardous wastes are identified, they will be taken onshore and disposed of at an appropriately permitted disposal yard.
Onshore Dismantling sites	Appropriate licensed sites will be nominated by the platform removal contractor. The nominated facility will demonstrate a proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver innovative recycling options.

Table 3-10 Inventory Disposition

Inventory Disposition			
	Total Inventory Tonnage	**Planned tonnage to shore**	**Planned left *in situ***
Installations	1,376* Te	1,188 Te	188 Te
Pipelines	6,901 Te	40 Te	6,861 Te
Concrete Mattresses	604 Te	604 Te	0 Te
Grout Bags	0 Te	0 Te	0 Te
Rock Dump	0 Te	0 Te	0 Te

* Inc. piles

Selected equipment present on the platform may be considered for re-use.

As much as possible of the installation, spools and concrete mattresses weight will be recycled, depending on the capacities of the selected disposal contractor. The remaining weight of the materials recovered to shore will be disposed of to landfill.

INEOS has set a project target for recycling as much as possible of the material recovered to shore. It is planned to recycle 100% of recovered concrete, greater than 95% non-ferrous metals, greater

than 90% steel and greater than 85% of plastics/rubber recovered to shore during the dismantling works.

Additional details of materials recovered to shore that will be reused, recycled or disposed of to landfill are presented in the Environmental Appraisal [Ref 3].

4 Environmental Appraisal

4.1 Environmental Sensitivities (Summary)

Table 4-1 Environmental Sensitivities

Environmental Sensitivities	
Environmental Receptor	**Main Features**
Conservation interests	Cavendish is located within the Dogger Bank Special Area of Conservation (SAC) and the Southern North Sea SAC
Seabed	Benthos is typical of fine sand and muddy sand sublittoral sediments. Dominated by polychaetes and amphipods. Lack of diversity and low taxonomic and individual abundance.
Fish	Six species use the area to spawn and nurse (including Atlantic cod, whiting, sandeel and lemon sole). European plaice uses the area as a spawning ground only and six species use the area as nursing grounds only, including herring, blue whiting, link, hake and Atlantic mackerel.
Fisheries	Cavendish is located in ICES rectangle 37F1. 58 species are caught within this area and include plaice, sandeel, *Nephrops* and crabs. Sole, cod, turbot and lemon sole are the species of the highest value caught in the area. Between 2008 and 2017 landings per year average 607 tonnes with an average value of £896,400 per year. This is 0.13% of the value of all fish caught in this time.
Marine Mammals	White-beaked dolphin and harbour porpoise are considered as regularly occurring throughout most of the year with highest densities of white-beaked dolphin occurring in April, May and December. Harbour porpoise is present in moderate to low densities in February and between April and December. Minke whales, bottlenose dolphin, common dolphin and white-sided dolphin are seasonal visitors. Grey seal density is estimated to be between 1 and 5 individuals per 5km^2
Birds	Common seabird species in this area include: common guillemots, northern fulmars, black-legged kittiwakes, northern gannets, European herring gulls, great black-backed gulls and little auks. Seabird sensitivity is highest in July (rated extremely high), with a sensitivity of very high in August and December. June and September are considered to have high sensitivity with March having low sensitivity.
Onshore Communities	Production has already ceased at Cavendish and therefore there is limited employment associated it. Decommissioning will provide short-term employment for project teams, and on and offshore contractors including waste handling. There may be an increase in traffic associated with movement of waste from the receiving port, however this will be temporary and unlikely to be significant in relation to existing traffic movements. Waste will be directed to

Environmental Sensitivities	
Environmental Receptor	**Main Features**
	appropriate destinations in order to minimise the impact on the environment.
Other Users of the Sea	Shipping is moderate within Block 43/19 and there are approximately 12 shipping routes that pass within 10nm of the Cavendish platform. The distance of Cavendish from the shoreline indicates recreational vessels will be unlikely. Dogger Bank windfarm is located 23km to the north of Cavendish and it is not currently intended that it will be in construction when decommissioning commences.
Atmosphere	Fuel consumption by the vessels associated with the decommissioning is estimated to be approximately 5,250 tonnes which will release approximately 3,686 tonnes of CO_2. Planned activities will account for approximately 0.04% of 2016 equivalent emissions of CO_2 generated by UK oil and gas and shipping. Emissions are expected to disperse rapidly and approach background levels within a few tens of metres of the source.

4.2 Potential Environmental Impacts and their Management

Although there is expected to be some environmental impact during the decommissioning of the Cavendish development, long term impacts from the decommissioning operations are expected to be negligible. In addition, incremental cumulative impacts and transboundary effects associated with the planned decommissioning operations are expected to be negligible.

The main environmental impacts associated with decommissioning each of the facilities and management of each aspect are summarised in Table 4-2.

Table 4-2 Environmental Impact Management

Environmental Impact Management		
Activity	**Main Impacts**	**Management**
Topsides Removal	• Energy use and atmospheric emissions • Underwater noise (marine mammals) • Dropped object • Accidental hydrocarbon release (marine spread) • Seabed disturbance • Water quality • Benthic flora and fauna • Land use	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. Specialist oil spill response services will be provided. Removal methods will be assessed, with a view to implement the removal method, with the least impact to the seabed, water quality and benthos. INEOS will actively seek to minimise the amount of material required for stabilisation, if required. An effective waste management plan will be put in place prior to decommissioning activities commencing. INEOS will actively seek to minimise the amount of recovered materials that are sent to landfill.
Removal of Subsea Infrastructure (including jacket and platform wells)	• Energy use and atmospheric emissions • Underwater noise (marine mammals) • Dropped object • Accidental hydrocarbon release (marine spread) • Seabed disturbance • Water quality • Benthic flora and fauna • Land use	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. Specialist oil spill response services will be provided. Removal methods will be assessed, with a view to implement the removal method, with the least impact to the seabed, water quality and benthos. INEOS will actively seek to minimise the amount of material required for stabilisation, if required.

Environmental Impact Management		
Activity	**Main Impacts**	**Management**
		An effective waste management plan will be put in place prior to decommissioning activities commencing. INEOS will actively seek to minimise the amount of recovered materials that are sent to landfill. Underwater cutting is expected to be the highest source of sound, the operation of well-maintained equipment during decommissioning will ensure noise of operating machinery is kept as low as possible. INEOS will seek to conform to the JNCC protocol for minimising the risk of disturbance and injury to marine mammals from underwater noise throughout operations.
Decommissioning Pipelines	• Energy use and atmospheric emissions • Underwater noise (marine mammals) • Dropped object • Accidental hydrocarbon release • Seabed disturbance • Water quality • Benthic flora and fauna • Damage or loss of fishing gear	Pipeline remedial work will ensure the site is over-trawlable for fishing activities. UK Hydrographical Office and Kingfisher will be informed of all activities and any structures left in place. INEOS will establish lines of communication to inform other sea users, including fishermen, of vessel operations during decommissioning. 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. Specialist oil spill response services will be provided. Removal methods will be assessed, with a view to implement the removal method, with the least impact to the seabed, water quality and benthos. INEOS will actively seek to minimise the amount of material required for stabilisation, if required. An effective waste management plan will be put in place prior to decommissioning activities commencing.

Environmental Impact Management		
Activity	**Main Impacts**	**Management**
		INEOS will actively seek to minimise the amount of recovered materials that are sent to landfill.
Decommissioning Stabilisation Features	• Energy use and atmospheric emissions • Underwater noise (marine mammals) • Dropped object • Accidental hydrocarbon release • Seabed disturbance • Water quality • Benthic flora and fauna • Damage or loss of fishing gear	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. Specialist oil spill response services will be provided. Removal methods will be assessed, with a view to implement the removal method, with the least impact to the seabed, water quality and benthos. INEOS will actively seek to minimise the amount of material required for stabilisation, if required. An effective waste management plan will be put in place prior to decommissioning activities commencing. INEOS will actively seek to minimise the amount of recovered materials that are sent to landfill.
Decommissioning Drill Cuttings	n/a	n/a

5 Interested Party Consultations

Table 5-1 Summary of Stakeholder Comments

Summary of Stakeholder Comments		
Stakeholder	**Comment**	**Response**
Informal Consultations		
Global Marine Systems	None	-
CEFAS	None	-
Crown Estate	None	-
MoD	None	-
JNCC	None	-
Statutory Consultations		
National Federation of Fishermen's Organisations	None	-
Scottish Fishermen's Federation	None	-
Northern Irish Fish Producer's Organisation	None	-
Global Marine Systems	None	-
Public	None	-

6 Programme Management

6.1 Project Management and Verification

The project management team resource will be provided from INEOS internal resource and by using external resources such as consultants, engineers and contractors.

A small, focused team of key personnel will be maintained within INEOS that will be responsible for leading a number of specialist contracting groups for the engineering, procurement, decommissioning and well P&A as well as for interfacing with the regulatory bodies.

An Independent Verification Body will be appointed for the duration of the execute phase of the project.

Any changes in detail to the offshore removal programme will be discussed and agreed with OPRED.

6.2 Post-Decommissioning Debris Clearance and Verification

A post decommissioning site survey will be carried out in 500m radius of the Cavendish installation site and a 100m corridor along the 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. Whilst the worst-case seabed disturbance from overtrawl has been assessed, it is recognised that the decommissioning activities are occurring in the Dogger Bank SAC/SCI and MPA protected site, therefore different methods of determining debris clearance and snag risk may be required. The methods used will therefore be discussed and finalised with the regulator. This will be followed by a statement of clearance to all relevant governmental departments and non-governmental organisations.

6.3 Schedule

Figure 6-1 Gantt Chart of Project Plan – Main Offshore Activities

Activity Windows	2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Engineering/Cost Review																				
Well P&A																				
Platform & Topsides Removal																				
Subsea Scope (Pipelines & Umbilical)																				
Over Trawl Surveys																				
Env. Survey Window																				
Env. Survey Window																				

6.4 Costs

Programme costs will be provided to OPRED separately.

6.5 Close-Out

In accordance with the OPRED guidelines, a close out report will be submitted to OPRED explaining any variations from the Decommissioning Programmes normally within 12 months of completion of the offshore decommissioning scope. The report will include 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 installation, will be carried out. The survey will focus on physical disturbances of the decommissioning. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED. All pipeline routes and structure sites, including cut piles, will be the subject of surveys when decommissioning activity has concluded. After the surveys have been sent to OPRED and reviewed, a post monitoring survey regime will be discussed and agreed by both parties, which is likely to consist of a minimum of two post decommissioning environmental surveys and structural pipeline surveys.

6.7 Residual Liability

INEOS recognises that it will continue to retain ownership of, and residual liability for, all decommissioned items allowed to remain in place through acceptance of the results of the comparative assessment process in Section 3. INEOS undertakes:

- to contact OPRED in advance, in the event that any parties to the programmes will no longer have a presence in the UK, to provide the details of the organisation or individual who will act in their place;
- to notify OPRED of any organisation/individual that will engage with OPRED on future legacy and liability matters;
- to notify OPRED of any organisation/individual that will be the contact point for any future third party claims for damage caused by pipelines left in place;
- to ensure that any alternative organisation/individual will have appropriate authority for and knowledge of the DPs, to engage with OPRED;
- to ensure that any alternative organisation/individual will have access to appropriate funding to carry out any actions relating to the residual legacy and liability as outlined in the approved DPs.

7 Supporting Documents

Table 7-1 Supporting Documents

Supporting Documents		
Ref	**Document Number**	**Title**
[1]	RD-CAV-ZPL005	Comparative Assessment Report
[2]	RD-CAV-ZPL006	Environmental Appraisal

8 Partner Letters of Support

Dana Petroleum (E&P) Limited
King's Close
62 Huntly Street
Aberdeen
AB10 1RS
United Kingdom

t: +44 (0) 1224 616 000Error!
No document variable supplied
f: +44 (0) 1224 616 001
www.dana-petroleum.com

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

Attn. Ms Debbie Taylor

12th May 2020

Dear Ms Taylor,

Cavendish Field Decommissioning Programmes for Installation and Pipelines – Petroleum Act 1998

We, Dana Petroleum (E&P) Limited (company number 02294746), as a holder of section 29 notices relative to the Cavendish field, confirm that we hereby authorise INEOS SNS UK Limited (company number 01021338), to submit on our behalf abandonment programmes relating to the Cavendish Field Installation and the Cavendish Pipelines, together the 'Decommissioning Programmes' as directed by the Secretary of State 22nd April 2020.

We confirm that we support the proposals detailed in the Cavendish Decommissioning Programmes, dated 1st May 2020, which were submitted by INEOS SNS UK Limited in so far as they relate to those facilities and pipelines in respect of which we are required to submit abandonment programmes under section 29 of the Petroleum Act 1998.

Yours sincerely,
Dana Petroleum (E&P) Limited

Ms L. Hutchison

Digitally signed by Laura Hutchison
DN: cn=Laura Hutchison, o=Dana Petroleum, ou, email=laura.hutchison@dana-petroleum.com, c=GB
Date: 2020.05.22 13:44:58 +01'00'

Laura Hutchison
Chief Financial Officer

Registered in England and Wales, Company No. 02294746
Registered Office: 78 Cannon Street, London EC4N 6AF

Dana Petroleum Limited
King's Close
62 Huntly Street
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United Kingdom

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www.dana-petroleum.com

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

Attn. Ms Debbie Taylor

12th May 2020

Dear Ms Taylor,

Cavendish Field Decommissioning Programmes for Installation and Pipelines – Petroleum Act 1998

We, Dana Petroleum Limited (company number 03456891), as a holder of section 29 notices relative to the Cavendish field, confirm that we hereby authorise INEOS SNS UK Limited (company number 01021338), to submit on our behalf abandonment programmes relating to the Cavendish Field Installation and the Cavendish Pipelines, together the 'Decommissioning Programmes' as directed by the Secretary of State 22nd April 2020.

We confirm that we support the proposals detailed in the Cavendish Decommissioning Programmes, dated 1st May 2020, which were submitted by INEOS SNS UK Limited in so far as they relate to those facilities and pipelines in respect of which we are required to submit abandonment programmes under section 29 of the Petroleum Act 1998.

Yours sincerely,
Dana Petroleum Limited

Ms L. Hutchison

Digitally signed by Laura Hutchison
DN: cn=Laura Hutchison, o=Dana Petroleum, ou, email=laura.hutchison@dana-petroleum.com, c=GB
Date: 2020.05.22 12:42:26 +01'00'

Laura Hutchison
Chief Financial Officer

INEOS UK E&P Holdings Limited
Anchor House
15-19 Britten Street
London
SW3 3TY
United Kingdom

Tel: 44 (0) 20 3935 5355
Fax: 44 (0) 20 3935 5350

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

Attn: Ms Debbie Taylor

26 May 2020

Dear Ms Taylor,

CAVENDISH FIELD DECOMMISSIONING PROGRAMMES - PETROLEUM ACT 1998

We, INEOS UK E&P Holdings Limited (company number SC200459), as a holder of a Section 29 Notice relative to the Cavendish field, confirm that we authorise INEOS SNS UK Limited to submit the abandonment programmes relating to the Cavendish Field Installation and Cavendish Pipelines, together the 'Decommissioning Programmes' as directed by the Secretary of State 22nd April 2020.

We confirm that we have no objections to the proposals detailed in the Cavendish Decommissioning Programmes dated May 2020, which were submitted by INEOS SNS UK Limited in so far as they relate to those facilities and pipelines in respect of which we are required to submit abandonment programmes under section 29 of the Petroleum Act 1998.

Yours sincerely

Dougie Scott
Decommissioning, Wells, Operations & Projects Director

For and on behalf of INEOS UK E&P Holdings Limited

Registered in England
Registered Office: Anchor House, 15-19 Britten Street
London SW3 3TY
Company number: SC 200459
VAT Registration Number: 756 4981 82

Appendix A - Copy of Public Notice

PUBLIC NOTICE

The Petroleum Act 1998

CAVENDISH FIELD

INEOS UK SNS Limited has submitted, for the consideration of the Secretary of State for Business, Energy and Industrial Strategy, draft Decommissioning Programmes for the Cavendish Platform and Pipelines in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The items/facilities covered by the Decommissioning Programmes are the Cavendish wells, platform and pipelines. The Cavendish platform is located in the southern basin of the United Kingdom continental Shelf in license block 43/19a.

INEOS UK SNS Limited hereby gives notice that a summary of the Cavendish Decommissioning Programmes can be viewed at the internet address:

https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines

Alternatively a hard copy of the Decommissioning Programmes may be inspected at the following location(s) during office hours:

INEOS UK SNS Limited
Anchor House
15-19 Britten Street
London
SW3 3TY

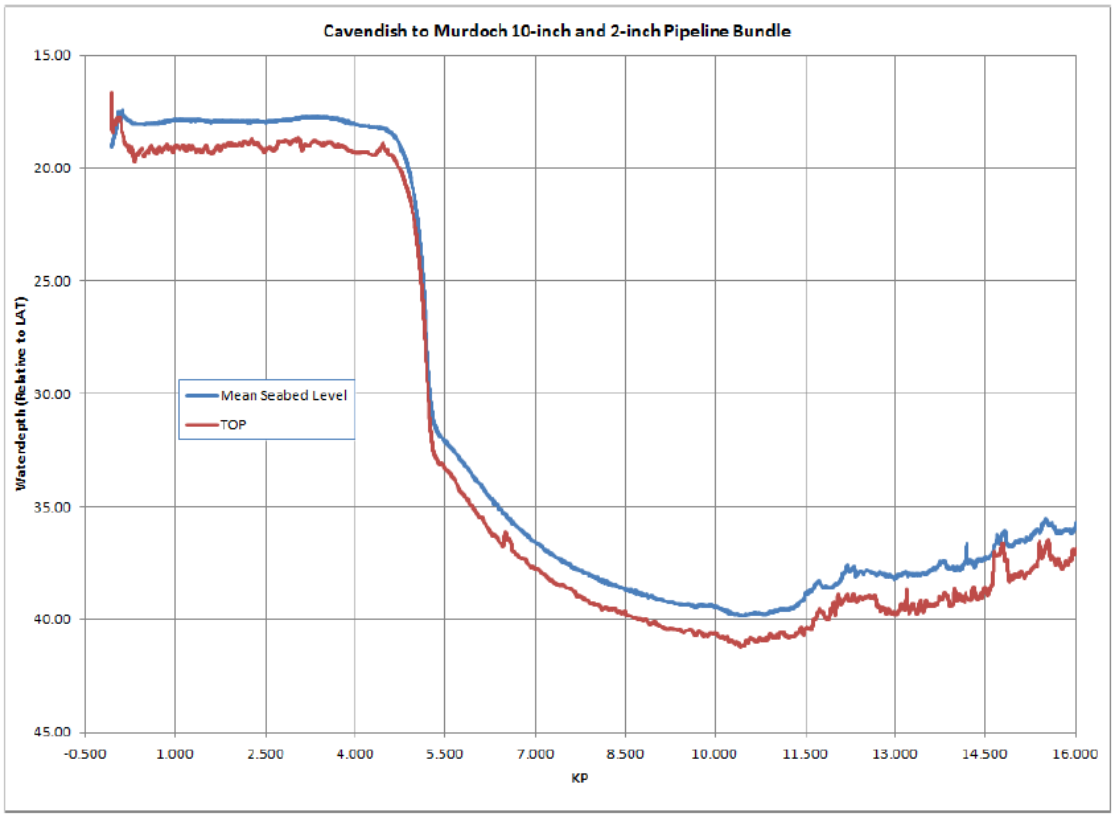
Representations regarding the Cavendish Decommissioning Programme should be submitted in writing to Mr Phillip Jones at INEOS UK SNS Limited, Anchor House, 15-19 Britten Street, London, SW3 3TY where they should be received by 8th December 2019 and should state the grounds upon which any representations are being made.

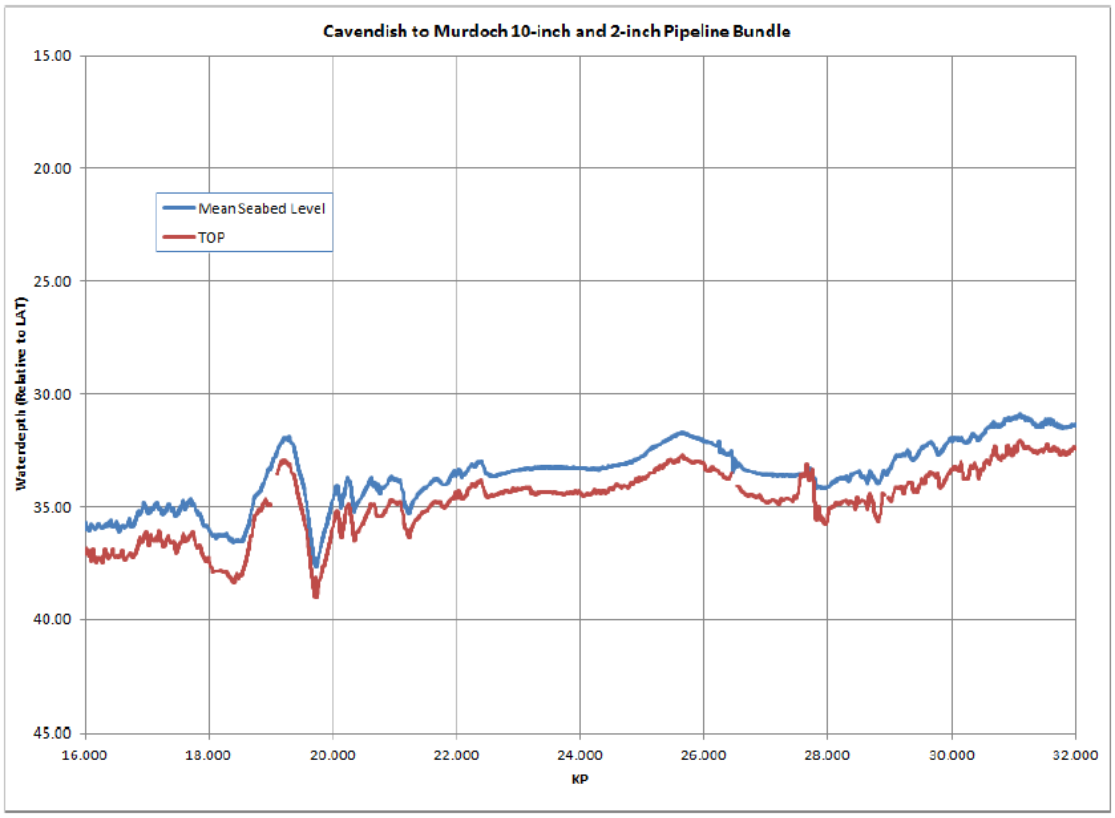
Date: 8th November 2019

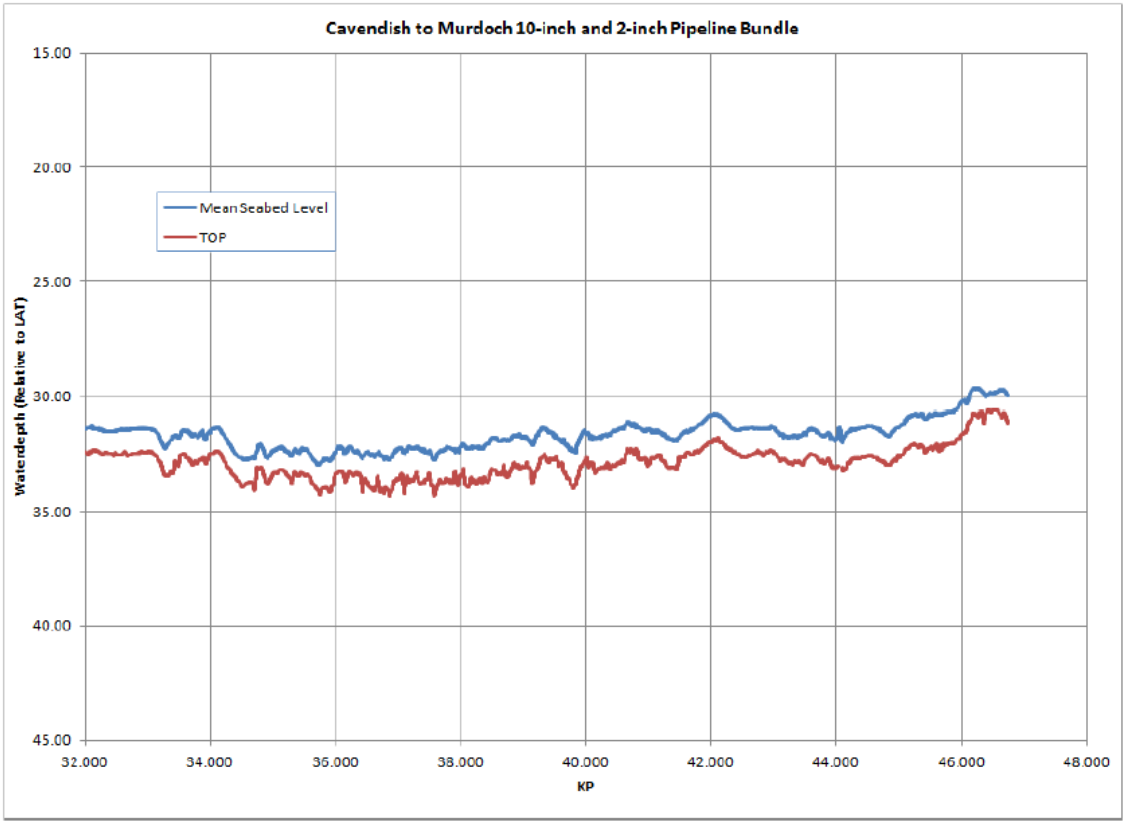
INEOS UK SNS Limited
Anchor House
15-19 Britten Street
London
SW3 3TY

Dougie Scott
Operations Director

Appendix B - Pipeline Burial Charts (2015 Pipeline Inspection Surveys)






Cavendish to Murdoch 10-inch and 2-inch Pipeline Bundle
15.00
20.00
25.00
30.00
35.00
40.00
45.00
Waterdepth (Relative to LAT)
Mean Seabed Level
TOP
32.000
34.000
36.000
38.000
40.000
42.000
44.000
46.000
48.000
KP