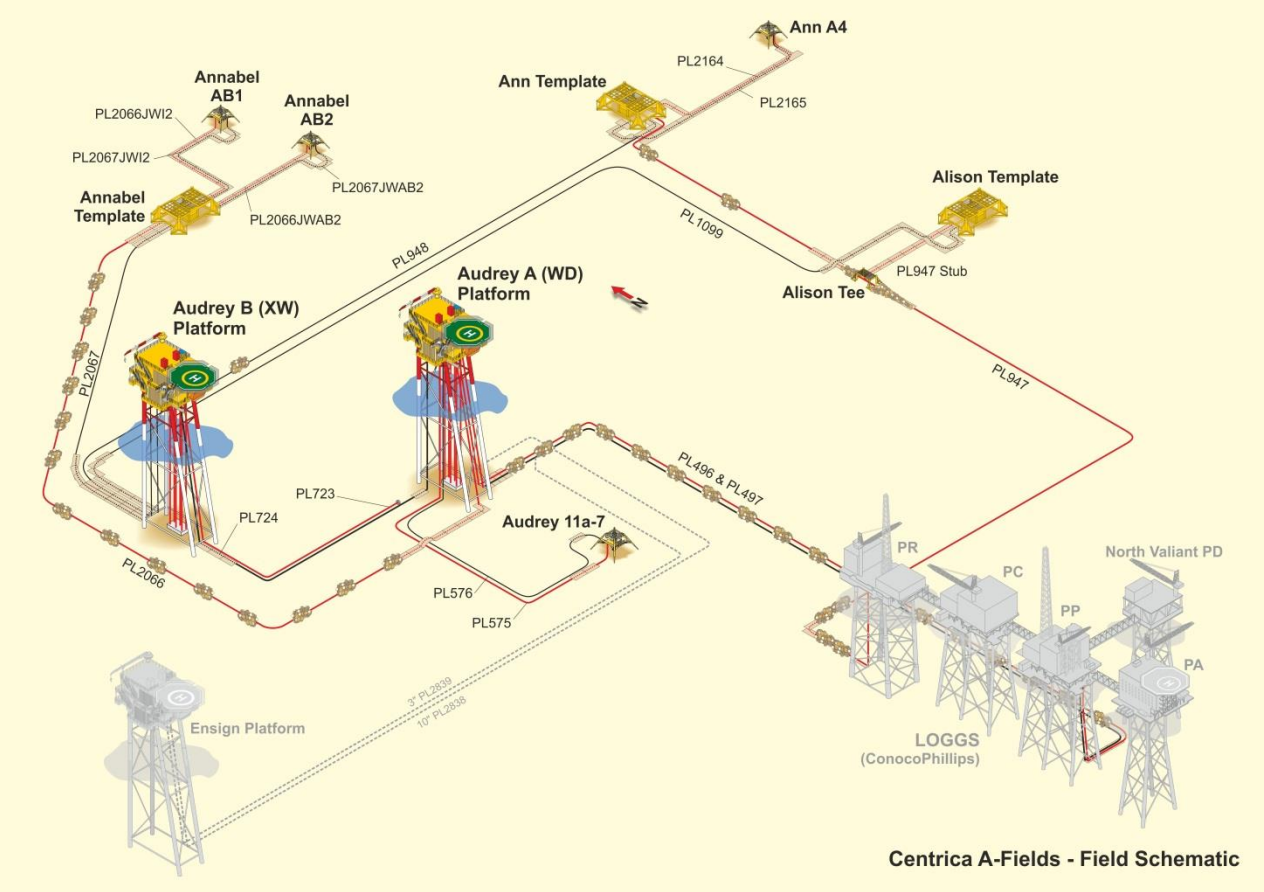
centrica

Audrey
Decommissioning Programmes



Centrica A-Fields - Field Schematic

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TERMS AND ABBREVIATIONS

ABBREVIATION	EXPLANATION
Annabel	Two well subsea development tied back to Audrey A (WD) installation via PL2066.
Audrey (A) (WD)	Four leg conventional piled steel jacket. Fixed normally unattended installation. Gas is exported to LOGGS PP via PL496.
Audrey (B) (XW)	Four leg conventional piled steel jacket. Fixed normally unattended installation, product was exported via PL723 to the Audrey A (WD) facility and via PL496 to the LOGGS complex.
BEIS	Department for Business, Energy and Industrial Strategy
Centrica	Centrica North Sea Limited
CPUK	ConocoPhillips (U.K.) Limited
CSV	Construction Support Vessel
DCA	Decommissioning Operations (Master Application Template)
DOC	The blue line on the burial profiles shows the profile of cover. The area between the blue line (DOB) and maroon line (DOL) shows the backfill
DOL	Pipeline trench profile; depth of lowering (to top of pipe)
DSV	Diving Support Vessel
EIA	Environmental Impact Assessment
ESDV	Emergency Shutdown Valve
HSE	Health and Safety Executive
“	Inch; 25.4 millimetres
JNCC	Joint Nature Conservation Committee
JUWB	Jack Up Work Barge
km	Kilometre
KP	Kilometre Post (Distance along pipeline from point of origin)
LAT	Lowest Astronomical Tide
LOGGS	Lincolnshire Offshore Gas Gathering System
LOGGS PP	LOGGS PP Production Platform
m	metre
MAT, SAT	Master Application Template, Supplementary Application Template
MCV	Monohull Crane Vessel
MSV	Multipurpose Support Vessel
N,S,E,W	North, South, East, West
n/a	Not Applicable
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NNE	North North East
NORM	Naturally Occurring Radioactive Material
NUI	Normally Unattended Installation

ABBREVIATION	EXPLANATION
OPEP	Oil Pollution Emergency Plan
OSPAR	Oslo-Paris Convention
Piggybacked	Smaller pipeline is adjacent and clamped to a larger pipeline throughout its length
Platform	Installation comprising topsides and jacket
PL	Pipeline Identification numbers (UK)
PLA	Pipeline Operations as defined in MAT Operation Types
PON	Petroleum Operations Notice
PWA	Pipeline Works Authorisation
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SFF	Scottish Fishermen's Federation
SLV	Shear Leg Vessel
SSCV	Semi-Submersible Crane Vessel
tba	To be arranged
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
WGS84	World Geodetic System 1984
WHPS	Wellhead Protection Structure

1. EXECUTIVE SUMMARY

1.1 Combined Decommissioning Programmes

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

- The Audrey installations, comprising:
  - Audrey A (WD) installation (a steel jacket and topsides);
  - Audrey B (XW) installation (a steel jacket and topsides); and,
  - Audrey 11a-7 installation (a wellhead protection structure).
- The associated six pipelines.

Although decommissioning of the Audrey installations and pipelines is being treated in this document as a standalone project, the operational phase is being carried out as part of a wider decommissioning campaign in the A Fields area. We will also continue to explore cost saving synergies with other projects.

1.2 Requirement for Decommissioning Programmes

Installations: In accordance with the Petroleum Act 1998, Centrica North Sea Limited (Centrica) as operator of the Audrey field, and on behalf of the Section 29 notice holders (Table 1.2), is applying to the Department for Business, Energy and Industrial Strategy (BEIS) to obtain approval for decommissioning the installations detailed in Section 2 of this document.

Pipelines: In accordance with the Petroleum Act 1998, Centrica North Sea Limited as operator of the Audrey pipelines, and on behalf of the Section 29 notice holders (Table 1.4), is applying to BEIS to obtain approval for decommissioning the pipelines detailed in Section 2 of this document.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and BEIS guidance notes. The schedule outlined in this document is for a seven-year period due to begin in 2017.

1.3 Introduction

The Audrey field lies within the main Southern North Sea (SNS) Gas Province straddling the boundary between UK Blocks 49/11a and 48/15a. The fields lie approximately 95 miles due East of the mouth of the Humber and 55 miles North East of the North Norfolk coast in water depths of 24-30m.

The Audrey gas field was developed using two platforms - Audrey A (WD) and Audrey B (XW), and a single well subsea tie-back (Audrey 11a-7). The field achieved first production in 1988. The Audrey installations and pipelines are wholly owned by Centrica. The Audrey A (WD) and B (XW) installations are both normally unattended installations (NUI) supported by four-legged conventional piled steel jackets. Gas from Audrey 11a-7 and Audrey B (XW) used to be exported to LOGGS PP Production Platform via Audrey A (WD) and a 20” concrete coated pipeline, 16.9km long. Audrey A (WD) provides power, control and chemicals to Audrey 11a-7 and Audrey B (XW). Audrey 11a-7 is wholly contained within the current Audrey A (WD) 500m safety zone. The Cessation of Production justification for Audrey was approved by the Oil and Gas Authority on 05 September 2016.

The Audrey installations used to export gas from Annabel as well as provide power, controls and chemicals to Ann, Alison and Annabel. These assets are also owned by Centrica. The Ann, Alison and Annabel installations and pipelines are addressed by separate Decommissioning Programmes submitted independently by Centrica.

The Ensign installation is located approximately 17km North East of the Audrey A (WD) installation and its production uses the same export route as Audrey and Annabel. Investigations are currently underway to explore alternative options for exporting the gas from Ensign. Should alternative export options prove unviable, the Ensign installation and pipelines will be subject to a Cessation of Production justification and the installation and pipelines will be addressed by separate Decommissioning Programmes submitted independently by Centrica.

Following public, stakeholder and regulatory consultation, the Decommissioning Programmes will be submitted without derogation and in full compliance with the BEIS guidance notes. The Decommissioning Programmes explain the principles of the removal activities and are supported by an environmental impact assessment. The Decommissioning Programme for the pipelines is also supported by a comparative assessment.

1.4 Overview of Installation/Pipelines Being Decommissioned

1.4.1 Installations

Table 1.1: Installations Being Decommissioned			
Field(s):	Audrey	**Production Type**	Gas
Water Depth (m)	Approx. 29m	**UKCS Block**	48/15a, 49/11a
Surface Installations			
Number	Type	Topsides Weight (Te)	Jacket Weight (Te)
2	Steel jacket	2,574	1,928
Subsea Installation(s)		**Number of Wells**	
Number	Type	Platform	Subsea
1	WHPS	n/a	1
2	Drilling Templates	14	n/a
Drill Cuttings piles		**Distance to median**	**Distance from nearest UK coastline**
Number of Piles	Total Estimated volume (m^3)	km	km
1	500	64	84km NNE of Bacton

Table 1.2: Installation Section 29 Notice Holders Details		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Centrica North Sea Limited	04594558	100%
Centrica North Sea Gas Limited	SC182822	0%
Centrica Resources (UK) Limited	06791610	0%
GB Gas Holdings Limited	03186121	0%

1.4.2 Pipelines

Table 1.3: Pipelines Being Decommissioned		
Number of Pipelines / Umbilicals	6	See Table 2.3

Table 1.4: Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
Centrica North Sea Limited	04594558	100%
Centrica North Sea Gas Limited	SC182822	0%
Centrica Resources (UK) Limited	06791610	0%
GB Gas Holdings Limited	03186121	0%

1.5 Summary of Proposed Decommissioning Programmes

Table 1.5: Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
1. Topsides		
Complete removal and recycling	Allows jacket to be removed and maximises recycling of materials	The topsides will be removed and recovered to shore and recycled unless alternative options are meantime found to be viable and more appropriate. Any permit applications required for work associated with removal of the topsides (DCA MAT) will be submitted.
2. Jacket/Floating Facility (FPSO etc.)		
Complete removal and recycling	To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials	The leg piles will be cut 3.0m below seabed and the jacket will be removed and recovered to shore for recycling. Any permit applications required for work associated with removal of the topsides (MAT) will be submitted.
3. Subsea Installation		
Complete removal and recycling	To comply with OSPAR requirements leaving unobstructed seabed. Removes a potential obstruction to fishing operations and maximises recycling of materials	The Audrey 11a-7 installation will be completely removed from the seabed. The seabed is stable near the installation so we propose to cut the piles at least 600mm below seabed as this is consistent with a typically acceptable pipeline depth of burial. Any permit applications required for work associated with removal of the subsea installation (DCA MAT) will be submitted.
4. Pipelines, Flowlines & Umbilicals		
PL496, PL497, PL723 and PL724 will be flushed and left buried *in situ*.	Outside the 500m safety zones the pipelines are already exposed to fishing activity. All pipelines are	The pipelines will be left *in situ.* The pipeline ends will be excavated locally to the cut location to ensure that the ends remain buried. Surveys indicate that both pipelines will remain buried with flooding. Degradation will

Table 1.5: Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
	sufficiently buried and stable, posing no hazard to marine users. Minimal seabed disturbance, lower energy usage, reduced risk to personnel engaged in the activity.	occur over a long period within the seabed sediment, not expected to represent a hazard to other users of the sea. Any permit applications required for work associated with pipeline pigging, flushing, cutting and removal (PLA MAT) will be submitted.
PL575, PL576 will be completely removed	Both pipelines are relatively short and are exposed mid-length. As they are inside the 500m safety zone, historically these pipelines have not been exposed to fishing activities.	Both pipelines will be completely removed. Any permit applications required for work associated with pipeline pigging, flushing, cutting and removal (PLA MAT) will be submitted.
5. Wells		
Wells will be plugged and abandoned to comply with HSE "Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996" and in accordance with Oil & Gas UK Guidelines for the Abandonment of Wells (Issue 5, July 2015).	Meets the BEIS and HSE regulatory requirements.	The wells will be abandoned from the installation with support from a Jack Up Drilling Rig. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of activities carried out. A PON5 will also be submitted to BEIS for application to abandon the wells.
6. Drill Cuttings		
Leave *in situ* for natural degradation	In alignment with OSPAR Recommendation 2006/5.	One area of anthropogenic rock deposited at each installation shows elevated levels of hydrocarbons and other contaminants associated with drill cuttings. Survey data and sample analysis shows both areas to be below the OSPAR thresholds. In accordance with OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings if survey data and sampling analysis from areas contaminated with drill cuttings shows the area and contamination level to be below the two criteria for oil loss and area of the seabed. Leaving *in situ* for natural degradation is the best environmental strategy.
7. Interdependencies		
The whole of the Audrey A (WD) and Audrey B (XW) jackets and single well WHPS can be removed. The jackets and WHPS piles can be cut with small amounts of seabed sediment being displaced to allow access for cutting. Annabel is connected to both Audrey A (WD) and Audrey B (XW) platforms. Ensign is connected to Audrey A (WD) platform as well as connected to pipeline PL497. Audrey A (WD) is connected to LOGGS PP Production Platform. There are numerous third party pipeline crossings, but none of these outside of any 500m safety zone will be disturbed because of these decommissioning proposals. Pipeline stabilisation features such as concrete mattresses and grout bags will be removed as part of the pipeline decommissioning activities, but deposited rock will remain *in situ*. The LOGGS complex is owned by CPUK.		

1.6 Field Location including Field Layout and Adjacent Facilities

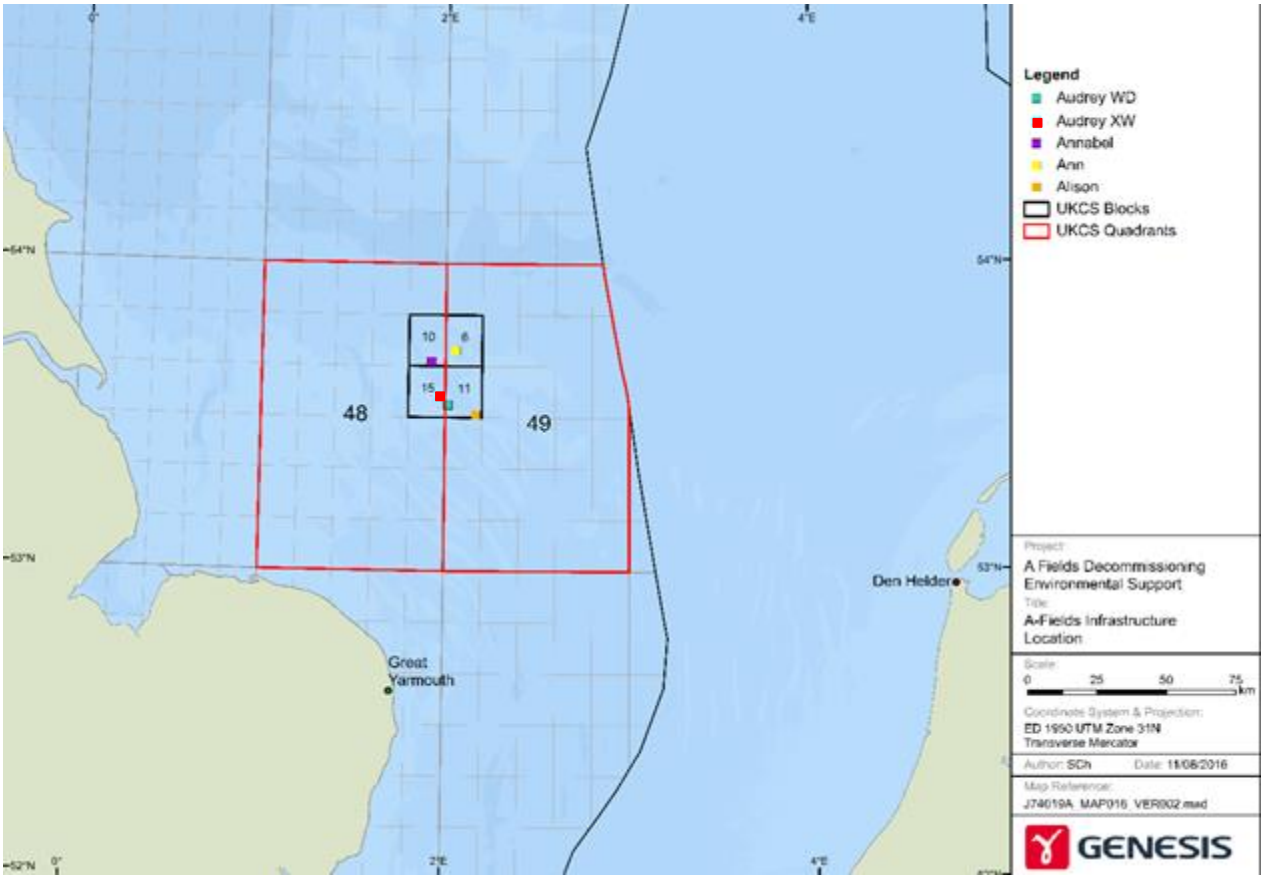


Figure 1.1: Field Location in UKCS

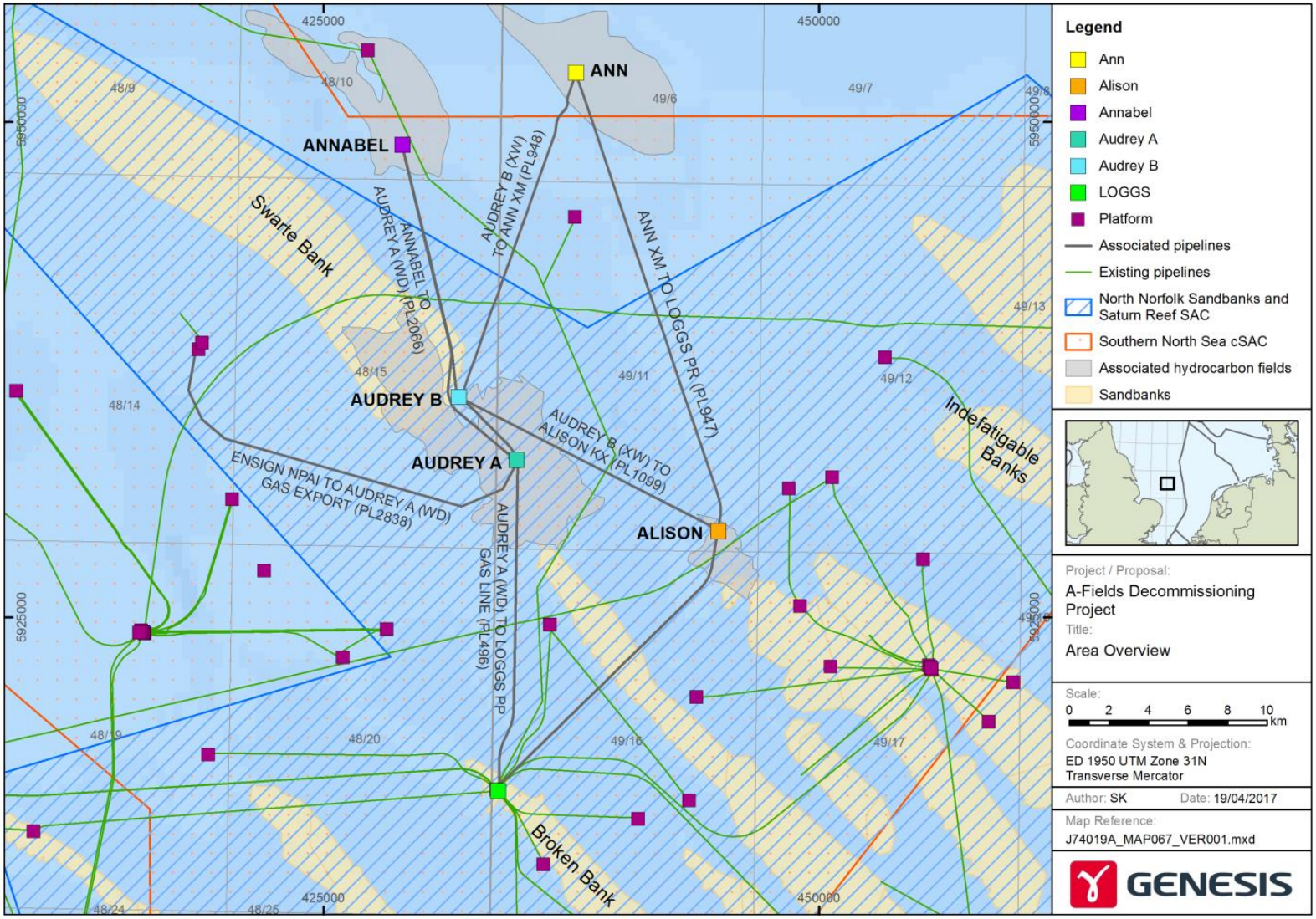


Figure 1.2: Audrey Adjacent Facilities

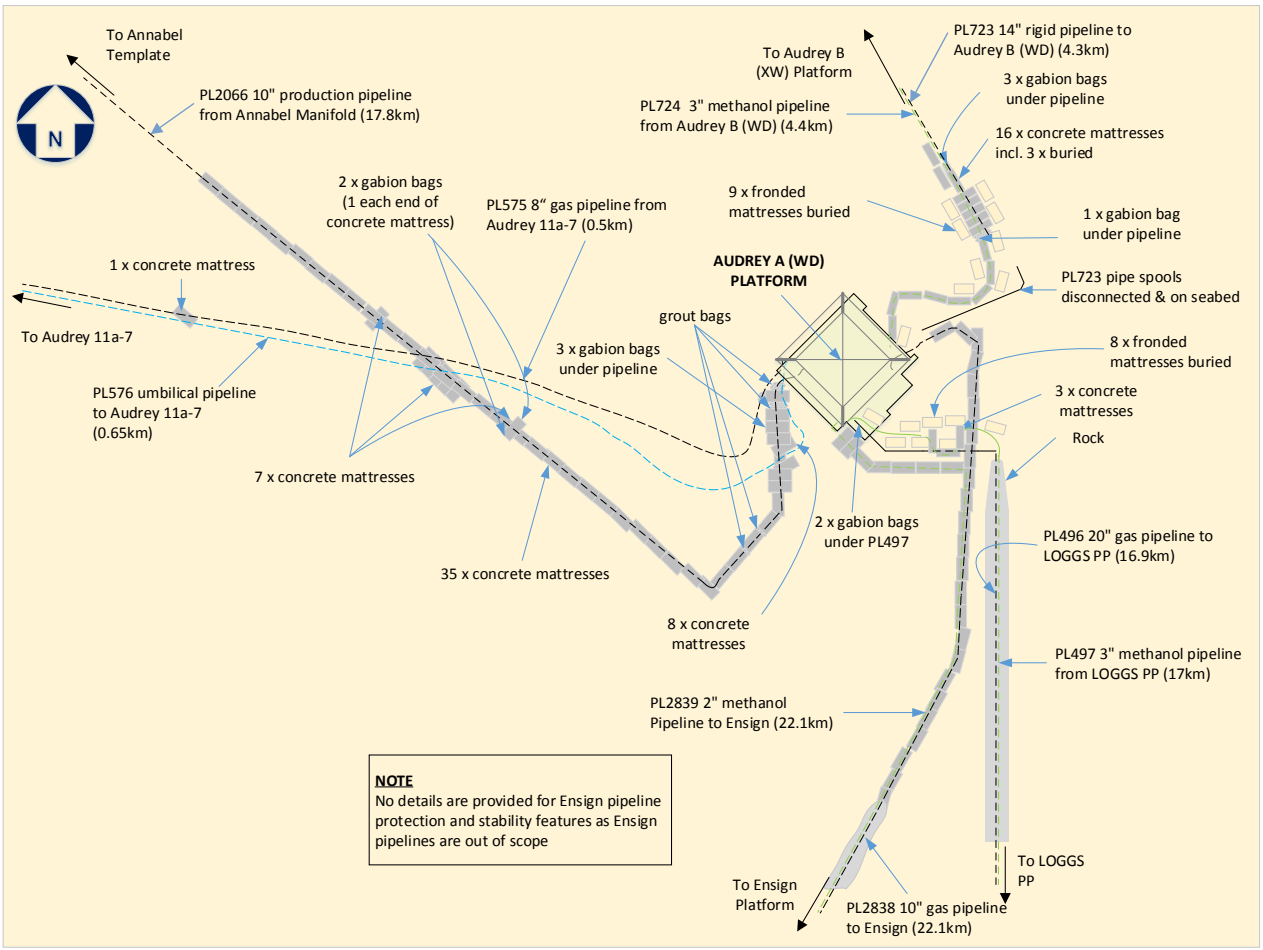


Figure 1.3: Overview of Audrey A (WD) Approaches

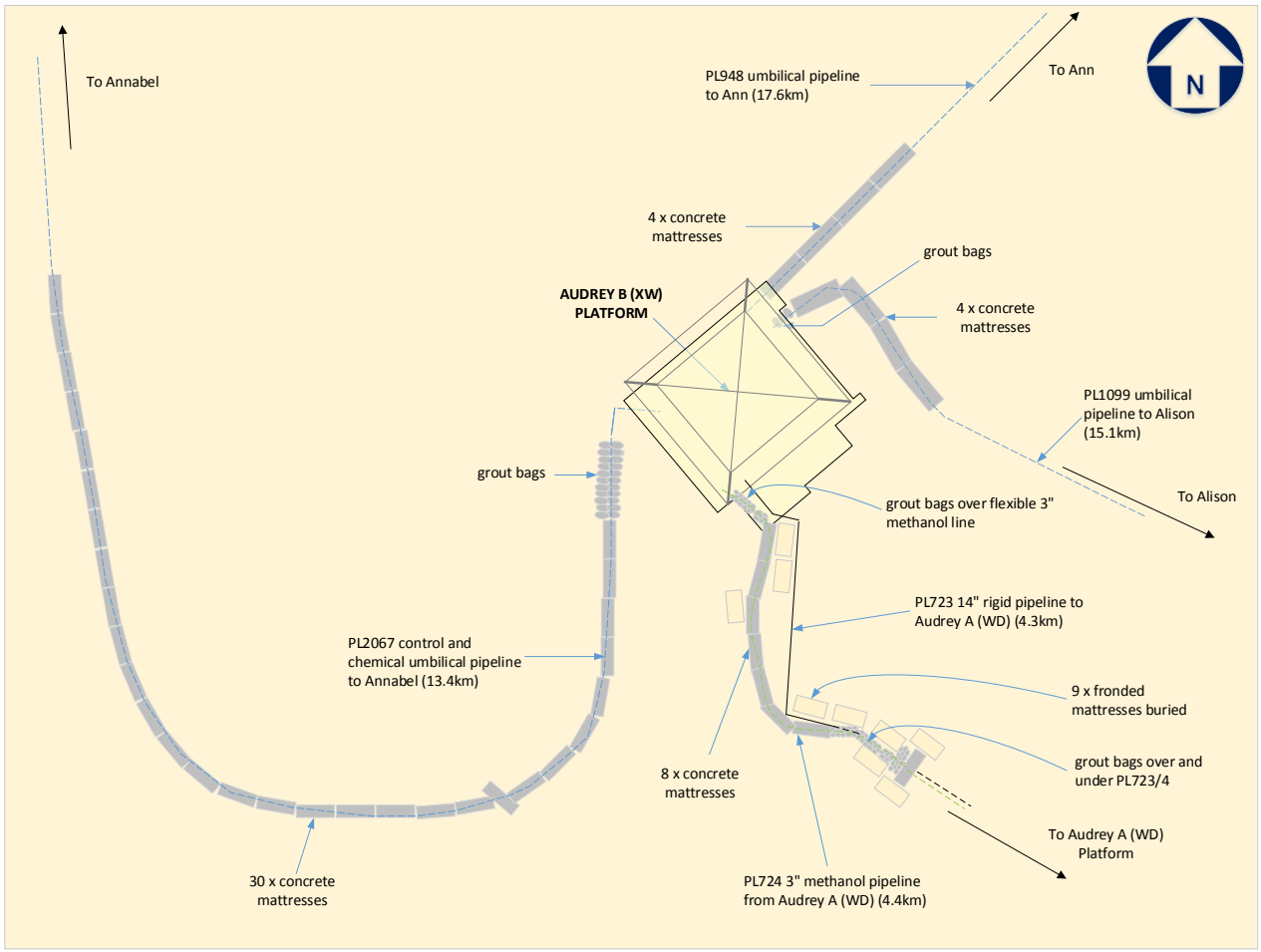


Figure 1.4: Overview of Audrey B (XW) Approaches

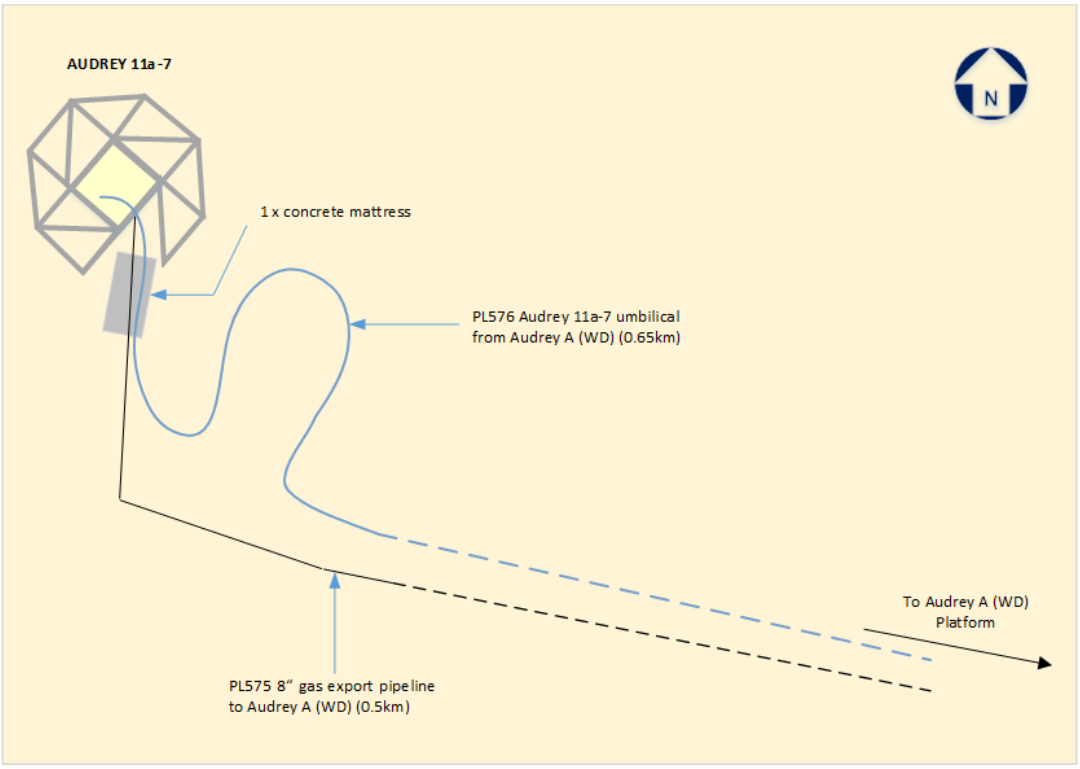


Figure 1.5: Overview of Audrey 11a-7 Approaches

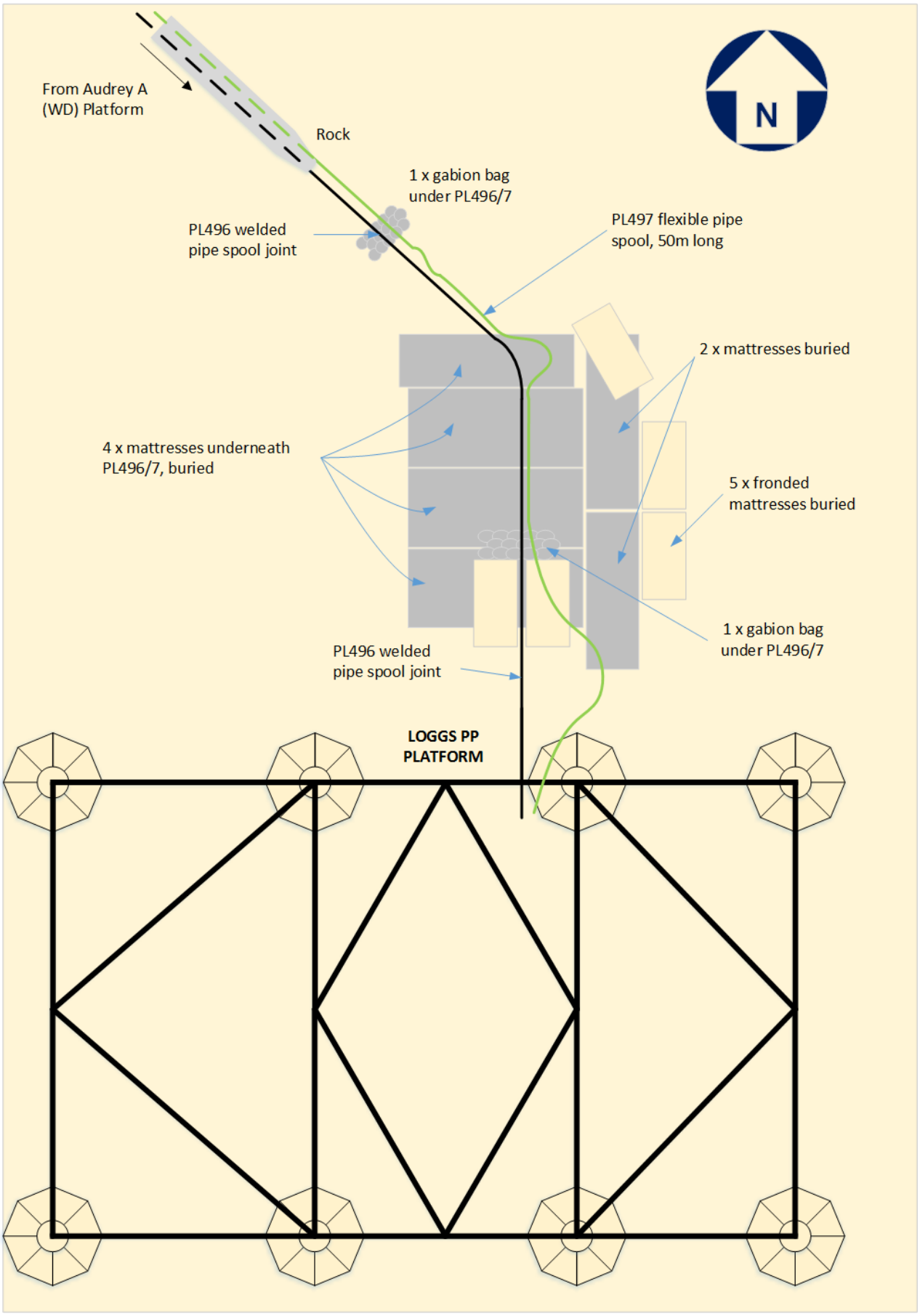


Figure 1.6: Overview of LOGGS PP Approach

Table 1.6: Adjacent Facilities					
Owner	**Name**	**Type**	**Distance/Direction**	**Information[1]**	**Status**
Centrica	Ensign	NUI	Approx. 17km North East of Audrey A (WD)	Ensign exports gas via PL2838 to the LOGGS complex via the Audrey A (WD) installation.	Operational
CPUK	LOGGS	Production platform.	Approx. 16.7km south of Audrey A (WD)	Reception for PL496; origin for PL497.	Operational
CPUK	LOGGS	Platform complex.	Approx. 16.7km south of Audrey A (WD)	Comprises four platforms: PR, PC, PP and PA. North Valiant PD platform is also adjacent	Operational
CPUK	PL27	28” gas pipeline	Viking A to Theddlethorpe Terminal	Crosses under PL496/7 (KP8.95)	Out of use
CPUK	PL161	3” methanol pipeline	Theddlethorpe Terminal to Viking A		Out of use
Centrica	PL947	12” gas pipeline	Ann template to LOGGS PR	Crosses over PL496/7 (KP16.54)	Operational
CPUK	PL1093	18” gas pipeline	Ganymede ZD platform to LOGGS	Crosses over PL496/7 (KP16.62)	Operational
CPUK	PL1094	3” methanol pipeline	LOGGS to Ganymede ZD		Operational
CPUK	PL1692	12” gas pipeline	Vampire to LOGGS	Crosses over PL496/7 (KP16.44)	Operational
CPUK	PL1693	3” methanol pipeline	LOGGS to Vampire		Operational
CPUK	PL2107	14” gas pipeline	Saturn to LOGGS	Crosses over PL496/7 (KP16.22)	Operational
CPUK	PL2108	3” methanol pipeline	Saturn to LOGGS		Operational
BT	Weybourne to Fano cable	Cable	Weybourne to Fano (Dead)	Cable not found; no physical crossing	Out of use
CPUK	PL2643	12” gas pipeline	Viking to LOGGS	Cross over PL496/7 (KP16.58)	Operational
CPUK	PL2644	3” methanol pipeline	LOGGS to Viking		Operational
Centrica	PL2838	10” gas pipeline	Ensign to Audrey A (WD)	Crosses over PL496/7 (KP-0.02)	Operational

[1] Where pipelines share a crossing, the KP refers to the gas pipeline, not the methanol pipeline or the umbilical pipeline

Table 1.6: Adjacent Facilities					
Owner	**Name**	**Type**	**Distance/Direction**	**Information[1]**	**Status**
Unknown	Cable	Cable	Mundersley to Nordeney (Dead)	Crosses under PL496/7	Out of use
Centrica	PL2066	10” gas pipeline	Annabel to Audrey A (WD)	Crosses over PL575 & PL576	Operational
Impacts of Decommissioning Proposals					
There are no direct impacts on adjacent facilities from the associated decommissioning works outside the LOGGS complex. Timing of works within the LOGGS 500m zone will be agreed with the LOGGS owner. Where crossings are overlain with rock, it is proposed to decommission the rock and the infrastructure beneath by leaving *in situ.* As part of the environmental assessment we have considered potential in combination or cumulative effect of activities in the area, including decommissioning and aggregate extraction. This has been done using data that are publicly available. However, operational windows tend to include a degree of flexibility so it is not possible to be precise. However, as part of the operational phase any potential impacts will be mitigated in two ways. The first is via direct communication with the parties involved, and the other is via submission of the MATs and SATs.					

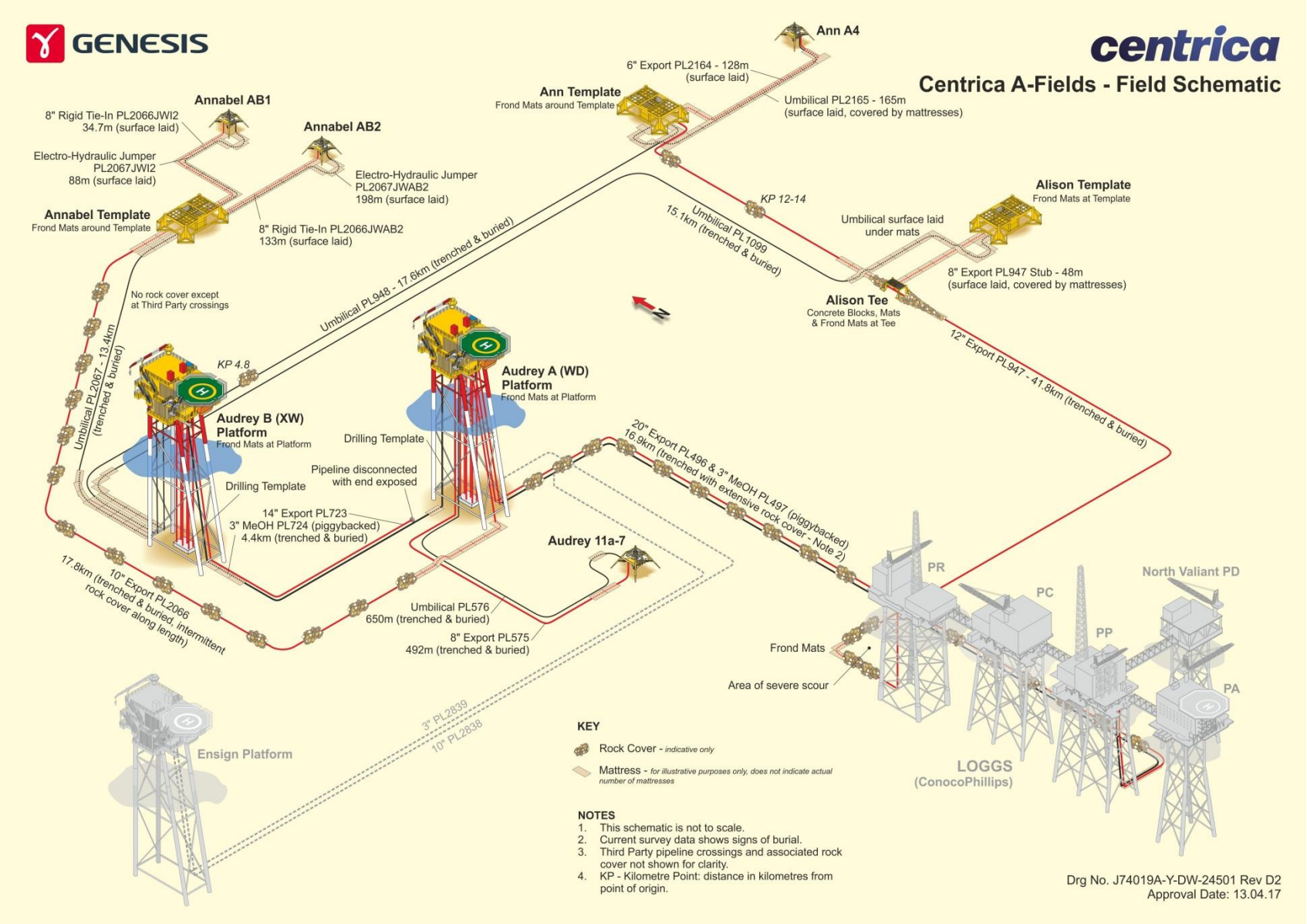


Figure 1.7: Audrey Adjacent Facilities

1.7 Industrial Implications

The platform well and subsea well abandonments will be completed using a jack-up drilling rig. Some preparatory work for Audrey 11a-7 will be undertaken by a combination of a light well intervention vessel and a Diving Support Vessel (DSV) as it is a subsea well.

The activities to decommission the installations and pipelines will be completed using a crane vessel and a DSV, Construction Support Vessel (CSV) or Multi Support Vessel (MSV).

It is Centrica's intention to develop a contract strategy that will result in an efficient and cost effective execution of the decommissioning works. Where appropriate existing framework agreements may be used for decommissioning of the pipelines and pipeline stabilisation features. Audrey decommissioning activities are being carried out as part of a programme of works associated with the wider A Fields, but Centrica will also try to combine Audrey decommissioning activities with other development or decommissioning activities to reduce mobilisation costs should the opportunity arise. The decommissioning schedule is extended to allow flexibility for when decommissioning operations are carried out and completed.

2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Installation: Surface Facilities

Table 2.1: Surface Facilities Information

Name	Facility Type	Location		Topsides/ Facilities		Jacket (if applicable)			
				Weight (Te)	No of modules	Weight (Te)	Number of legs	Number of piles	Weight of piles (Te)[2]
Audrey A (WD) platform	Small fixed steel	WGS84 Decimal	53.539635°N 02.014384°E	1,276	1	1,063	4	4	104
		WGS84 Decimal Minute	53° 32.37809"N 02° 00.86304"E						
Audrey B (XW) platform	Small fixed steel	WGS84 Decimal	53.567796°N 01.969440°E	1,298	1	865	4	4	74
		WGS84 Decimal Minute	53° 34.06775"N 01° 58.16642"E						

[2] This weight reflects the length that has penetrated the seabed. The remaining pile is included in the jacket weight. Although the jackets are similar, Audrey A (WD) has longer piles contained within the legs.

2.2 Installations: Subsea including Stabilisation Features

Table 2.2: Installations: Subsea including Stabilisation Features					
Subsea installations including Stabilisation Features	**Number**	**Size/ Weight (Te)**	**Location**		**Comments/Status**
Wellhead (11a-7)	1	15	WGS84 Decimal	53.540422° N 02.007618° E	Well is being abandoned (April 2017).
			WGS84 Decimal Minute	53° 32.42530" N 02° 00.45707" E	
Tree	1	30	As per wellhead 11a-7		Tree is located on top of wellhead 11a-7.
WHPS (including piles)	1	49.5	As per wellhead 11a-7		Secured with four steel piles.
Drilling templates (on seabed inside jackets) including piles	2	99	One each located under Audrey A (WD) and Audrey B (XW)		Each secured with four steel piles.
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
Deposited rock	n/a	n/a	n/a		n/a
Other (describe briefly)	n/a	n/a	n/a		n/a

2.3 Pipelines including stabilisation features

Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	**Pipeline Number (as per PWA)**	**Diameter (NB) (inches)**	**Length (km)[1]**	**Description of Component Parts**	**Product Conveyed**	**From – To End Points**	**Burial Status**	**Pipeline Status**	**Current Content**
Gas pipeline	PL496	20"	16.89	Concrete and coal tar enamel coated steel pipeline	Natural gas, condensate, water	Wellhead pig launcher at Audrey A (WD) to ESD Ball Valve at LOGGS	Partially trenched with extensive covering with deposited rock	Operational	Natural gas, condensate, water
Methanol pipeline	PL497	3"	16.96	Fusion bonded epoxy coated steel pipeline, flexible tie-in spools	Methanol and corrosion inhibitor	Methanol riser tie-in point LOGGS to methanol riser tie-in point at Audrey A (WD)	As PL496	Operational	Methanol and corrosion inhibitor
Gas pipeline	PL575	8"	0.492	Fusion bonded epoxy coated steel pipeline	Produced gas, water, methanol inhibitor	Tie-in spool at Audrey 11a-7 to pipeline tie-in point at Audrey A (WD)	Trenched and buried	Out of use	Seawater
Umbilical pipeline	PL576	4"	0.65	Umbilical consisting of hydraulic hoses and electrical cables	Methanol, corrosion inhibitor & hydraulic oil	Tie-in point at Audrey A (WD) to tie-in point at Audrey 11a-7	Trenched and buried	Out of use	Inhibited seawater

Table 2.3: Pipeline/Flowline/Umbilical Information									
Description	**Pipeline Number (as per PWA)**	**Diameter (NB) (inches)**	**Length (km)[1]**	**Description of Component Parts**	**Product Conveyed**	**From – To End Points**	**Burial Status**	**Pipeline Status**	**Current Content**
Rigid pipeline	PL723	14"	4.34	Steel pipeline, concrete coated steel tie-in spool	Gas	Pipeline riser ESDV flange at Audrey B(XW) to Audrey A (WD) disconnected at seabed, capped	Trenched and buried	Out of use	Treated seawater
Methanol pipeline	PL724	3"	4.42	Steel pipeline, flexible tie-in spools	Methanol & corrosion inhibitor	Methanol pipeline tie-in point at Audrey A(WD) to Shutdown valve at Audrey B(XW)	Trenched and buried	Operational	Methanol and corrosion inhibitor

Note

1. Different pipeline lengths are recorded in some of the original PWAs because these are based on 'design data'. The dimensions presented in this table are based on 'as-built' data. For completeness, according to the original PWAs the pipeline lengths are as follows PL575 – 0.479km, PL576 – 0.479km, PL723 4.378km, PL724 4.490km; we could find no details in the PWAs for PL496 and PL497.

Table 2.4: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number[3]**	**Total Weight (Te)**	**Location(s)**	**Exposed/Buried/Condition**
Concrete mattresses	30	69.6	PL496/7 3 in vicinity of Audrey A (WD); PL496/7 6 in vicinity of LOGGS PP; PL496/7 21 at pipeline crossing over PL27 & PL161; Refer Figure 1.3 and Figure 1.6.	Survey data suggests that all concrete mattresses in vicinity of Audrey A (WD) are exposed. The mattresses at LOGGS are buried as they are not visible, and the mattresses at the pipeline crossing are buried under deposited rock.
	3	8.3	PL575 3 in vicinity of Audrey 11a-7; Refer Figure 1.5.	Survey data suggests that all mattresses are largely exposed.
	28	77.5	PL723/4 16 in vicinity of Audrey A (WD); PL723/4 12 in vicinity of Audrey B (XW); Refer Figure 1.3 and Figure 1.4.	Survey data suggests that all mattresses are largely exposed.
Grout bags	4x1Te 100x25kg	6.5	PL496/7 2x1Te Audrey A (WD) (Gabion bags); PL496/7 2x1Te LOGGS PP (Gabion bags); PL496/7 100x25kg LOGGS PP; Refer Figure 1.3 and Figure 1.6.	It is assumed that their burial status is as per mattresses although no specific survey data is available. Burial status of Gabion bags and grout bags at LOGGS PP is not known and will need to be determined at time of decommissioning.
	4x1Te 200x25kg	9.0	PL723/4 4x1Te Audrey A (WD) (Gabion bags); PL723/4 200x25kg Audrey B (XW); Refer Figure 1.3 and Figure 1.4.	Survey data suggests that all mattresses are largely exposed, in which case it is assumed that the grout bags will also be largely exposed.
Rock emplacement	n/a	69,516	Refer Figure 2.1	Largely exposed.

[3] The number of grout bags has been estimated using available data including sketches, as-built drawings; and video footage. There is a degree of uncertainty associated with the exact numbers quoted.

Table 2.4: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number[3]**	**Total Weight (Te)**	**Location(s)**	**Exposed/Buried/Condition**
Formwork	n/a	n/a	n/a	n/a
Frond Mats	5	3.75	PL496/7 5 in vicinity of LOGGS PP.	Not visible and appear to be buried.
	26	19.5	PL723/4 17 in vicinity of Audrey A (WD); PL723/4 9 in vicinity of Audrey B (XW).	Not visible and appear to be buried.
Other (describe briefly)	n/a	n/a	n/a	n/a

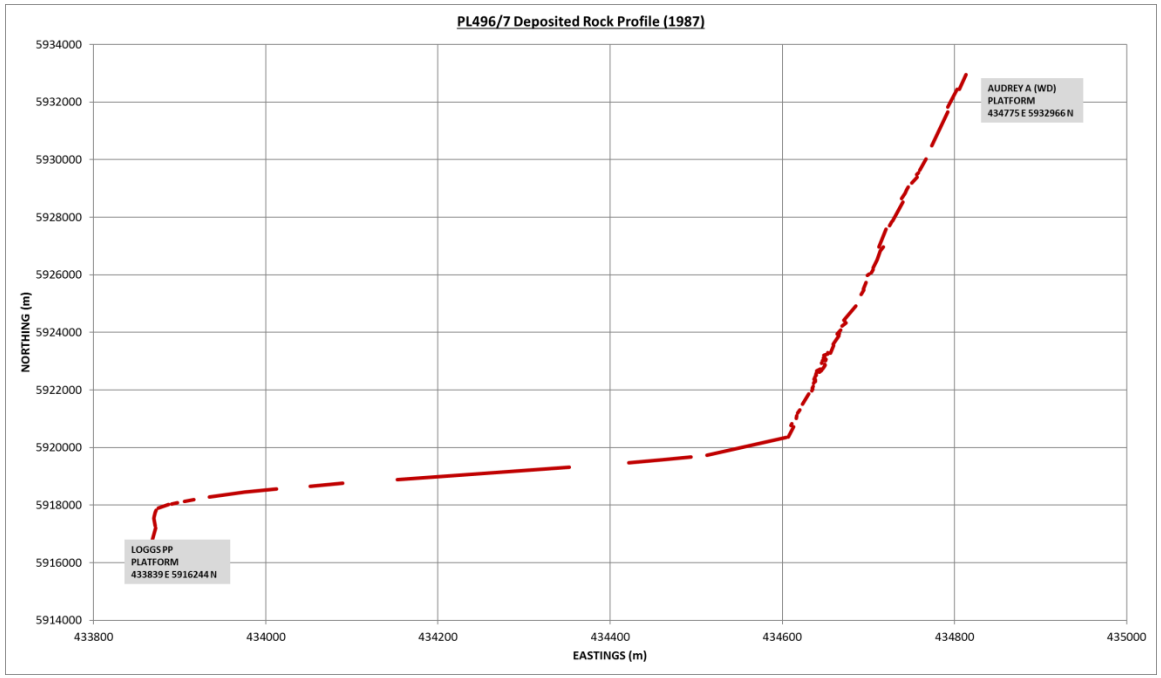


Figure 2.1: PL496/7 Original 'As-Built' Profile of Deposited Rock

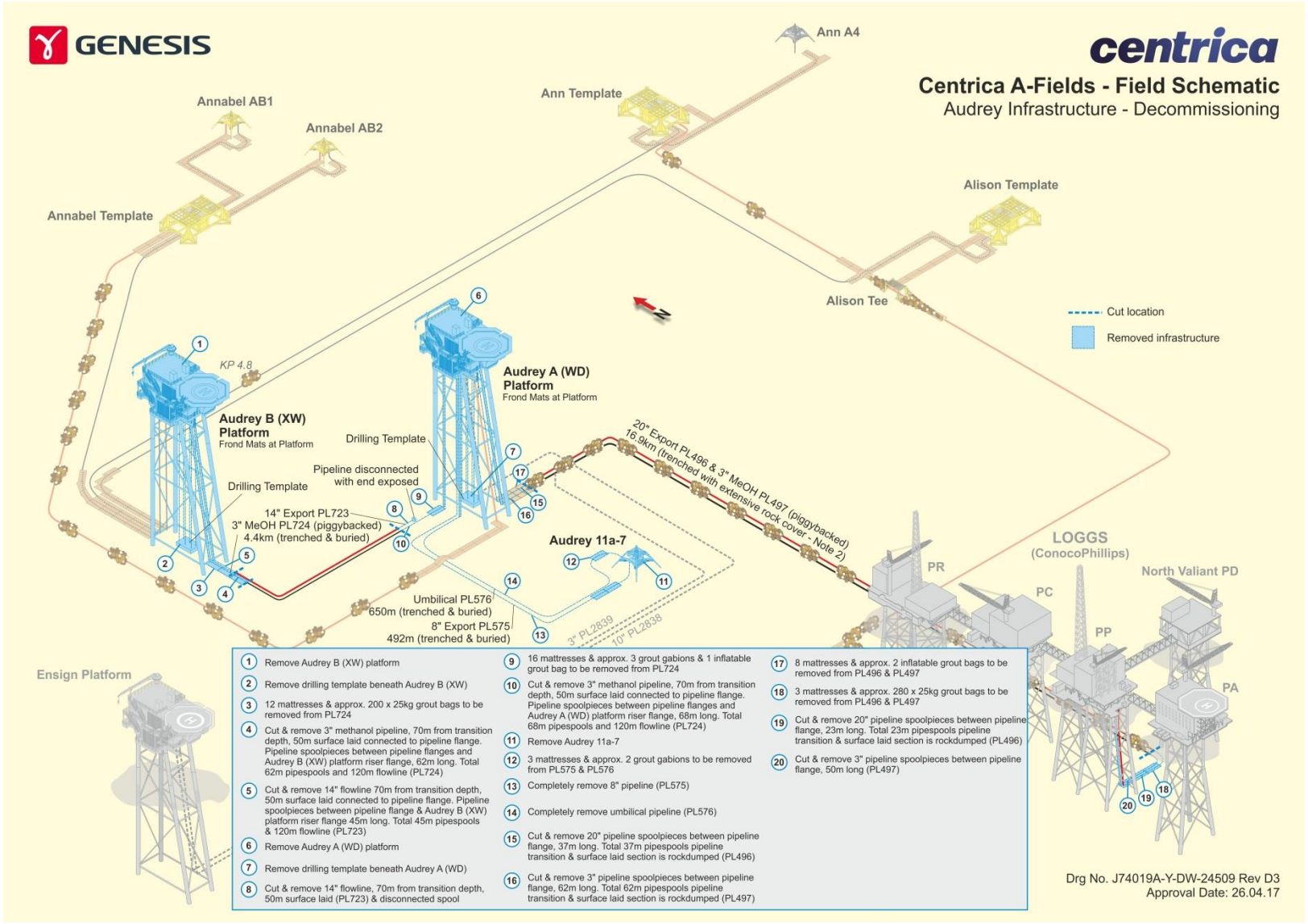


Figure 2.2: Overview of Audrey decommissioning proposals

2.4 Wells

Table 2.5: Well Information			
Well ID	**Designation**	**Status**	**Category of Well**
49/11a-A1	Gas production	Shut in	PL 3-3-3
49/11a-A2	Gas production	Shut in	PL 3-3-3
49/11a-A3	Gas production	Shut in	PL 4-4-3
49/11a-A4	Gas production	Shut in	PL 4-4-3
49/11a-A5	Gas production	Shut in	PL 3-3-3
49/11a-A6	Gas production	Shut in	PL 4-3-3
49/11a-A7	Gas production	Shut in	PL 4-4-3
49/11a-A8	Gas production	Shut in	PL 4-3-3
49/11a-A9	Gas production	Shut in	PL 3-3-3
49/11a-A10	Gas production	Shut in	PL 3-3-3
48/15a-B1Z	Gas production	Shut in	PL 3-3-3
48/15a-B2	Gas production	Shut in	PL 3-3-3
48/15a-B3	Gas production	Shut in	PL 3-3-3
48/15a-B4	Gas production	Shut in	PL 3-3-3
49/11a-7	Gas production	Shut in	SS-4-3-3

For details of well categorisation see the Oil & Gas UK Guidelines for the Abandonment of Wells. Issue 5, July 2015, Appendix D.

2.5 Drill Cuttings

Table 2.6: Drill Cuttings Pile Information		
Location of Pile Centre (Latitude/Longitude)	**Seabed Area (m^2)**	**Estimated volume of cuttings (m^3)**
437743.0 / 5933043.0.	3,270	500

Refer section 3.7 for further information.

2.6 Inventory Estimates

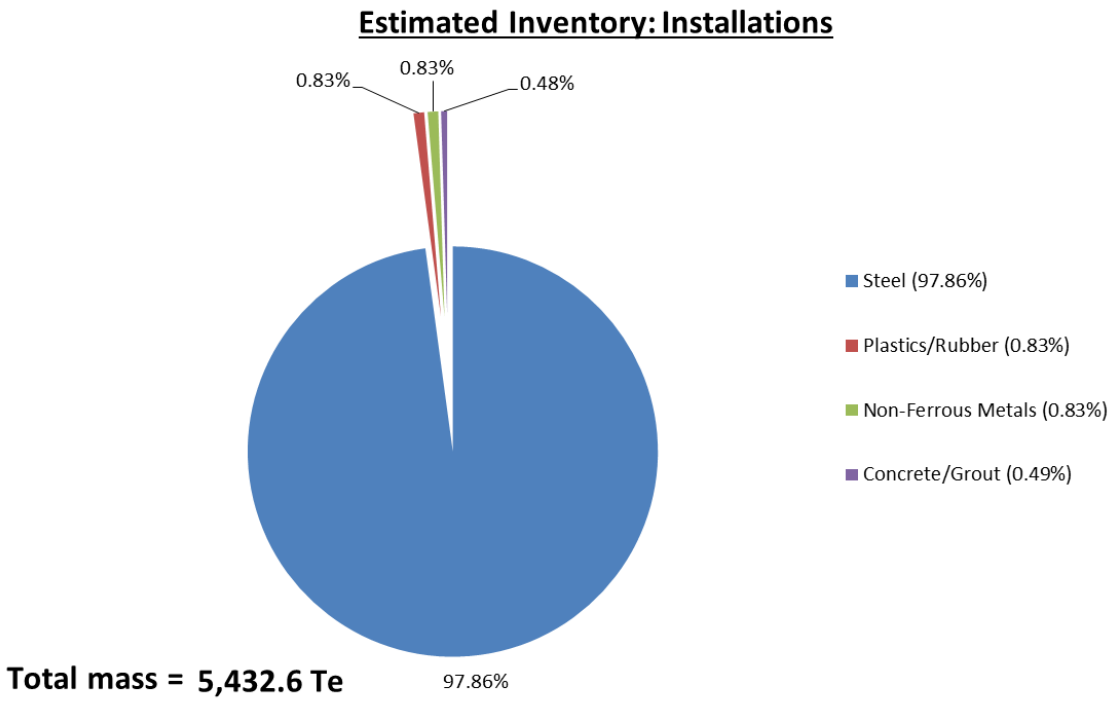


Figure 2.3: Pie chart of estimated installation inventory

Refer to section 6.6 of the Environmental Impact Assessment [4] for further details.

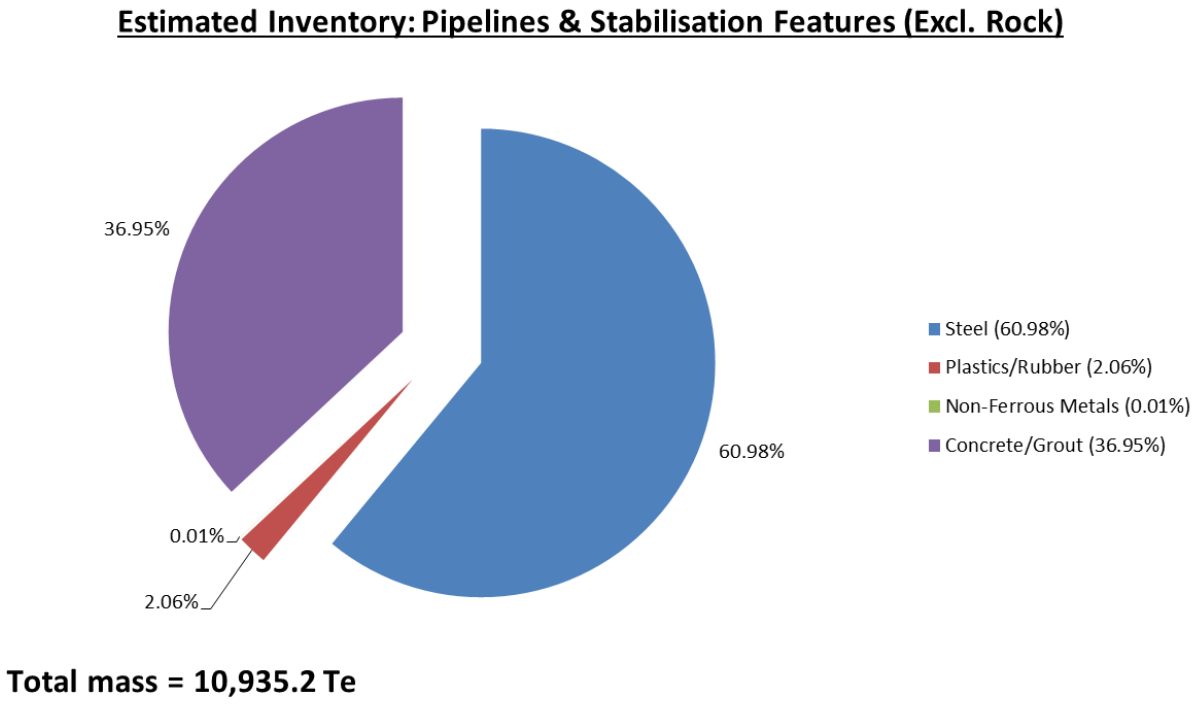


Figure 2.4: Pie chart of estimated pipeline inventory

Refer to section 6.6 of the Environmental Impact Assessment [4] for further details.

3. REMOVAL AND DISPOSAL METHODS

Waste will be dealt with in accordance with the Waste Framework Directive. The reuse of an installation or pipelines (or parts thereof) is first in the order of preferred decommissioning options. 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 metal are estimated to account for the greatest proportion of the materials inventory. Refer to section 6.6 of the Environmental Impact Assessment [4] for further details concerning disposal of waste.

3.1 Topsides

3.1.1 Topsides Decommissioning Overview

Topsides description: Both Audrey A (WD) and B (XW) topsides structures comprise of a main deck, cellar deck, spider deck and helideck. The main deck on each platform is for control and utilities with the cellar deck used for gas production, well test, separation, dewatering and metering. The cellar deck on Audrey A (WD) contains a methanol booster package and an additional cantilevered platform containing a dewatering package.

Removal method: the topsides will be completely removed and recovered to shore. Possible methods are described in Table 3.2.

A final decision on removal methods will be made following a commercial tendering process.

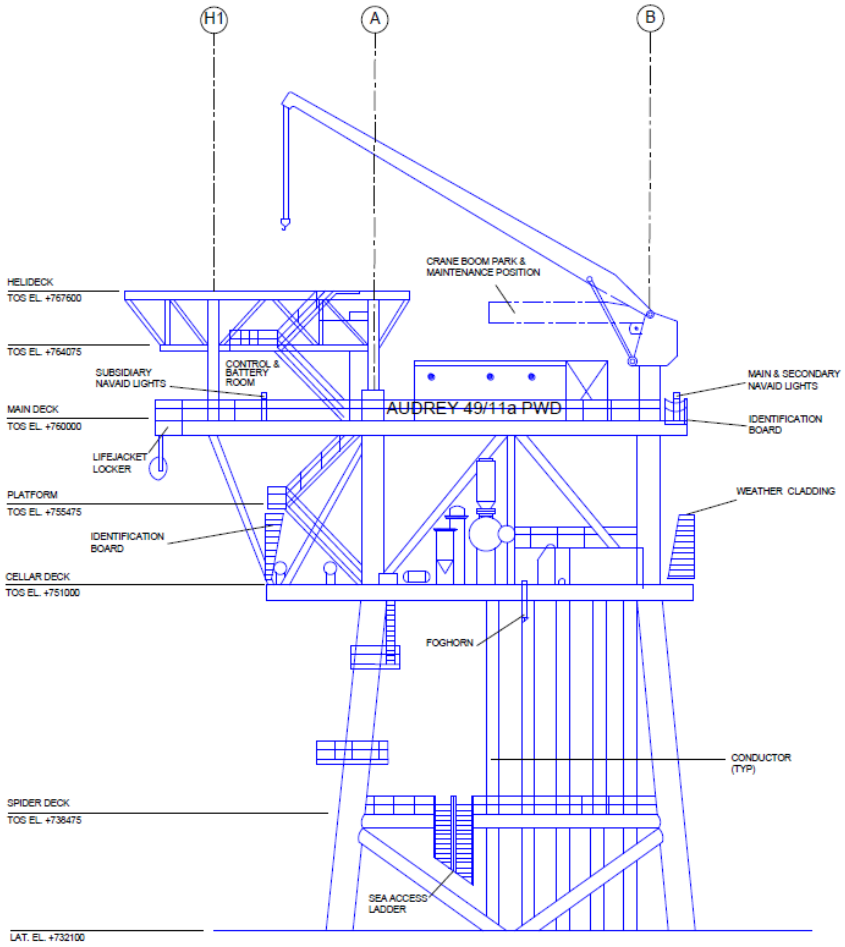


Figure 3.1: Audrey A (WD) Looking West

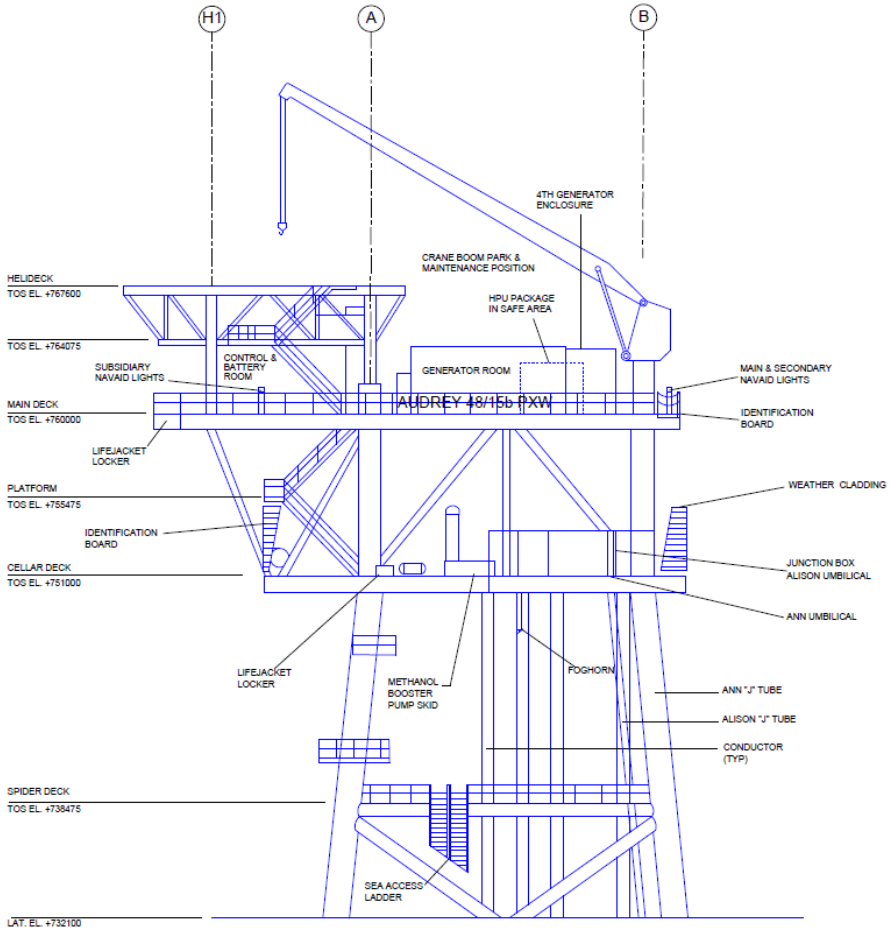


Figure 3.2: Audrey B (XW) Looking West

Preparation and cleaning: The methods that will be used to flush, purge and clean the topsides prior to removal to shore are summarised in Table 3.1.

Table 3.1: Cleaning of topsides for removal		
Waste type	**Composition of Waste**	**Disposal Route**
On-board hydrocarbons	Full recovery	Where possible, on-board hydrocarbons will be pumped into a donor well. Should this approach be unsuccessful, on-board hydrocarbons will be returned to shore for separation and use.
Other hazardous materials	The presence of NORM will be identified.	NORM, if present, will be disposed of in accordance with the appropriate permit.
Original paint coating	The presence of lead based paints will be identified.	May give off toxic fumes / dust if flame-cutting or grinding / blasting is used so appropriate safety measures will be taken. Painted items will be disposed of onshore with consideration given to any toxic components.
Asbestos and ceramic fibre	Very small quantities of asbestos are present on the installation and it's possible that small quantities are present in pipeline gaskets.	Asbestos will be disposed of via an appropriately licenced waste management contractor.

Table 3.2: Topside Removal Methods	
1) Semi-Submersible Crane Vessel ☑; 2) Monohull Crane Vessel ☑; 3) Shear Leg Vessel ☑; 4) Jack up Work barge ☑; 5) Piece small or large ☑; 6) Complete with jacket ☑;	
Method	**Description**
Single lift removal by SSCV / MCV / SLV	Removal of topsides and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
Single lift removal with jacket by SSCV / MCV / SLV	Removal of topsides as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
Piece-small or piece-large removal using JUWB	Removal of topsides in a series of smaller sub-units making use of the JUWB used for the well decommissioning activities, followed by recovery to shore for a programme of re-use, recycling or disposal as appropriate.
Proposed removal method and disposal route	**Removal of both topsides and jacket followed by recovery to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method will be made following a commercial tendering process.**

3.2 Jacket

3.2.1 Jacket Decommissioning Overview

The Audrey A (WD) and Audrey B (XW) jackets weigh approximately 1,063Te and 865Te respectively. The legs will be cut at an appropriate elevation to allow the lift aids to be installed, and the jacket will most likely be removed in a single lift[4] (Figure 3.3). The piles will be cut 3.0m below the sea bed unless any difficulties are encountered and an external excavation is required to access the piles. The jackets will be returned to shore for recycling.

The Audrey A (WD) and Audrey B (XW) jackets were installed over drilling templates and these are also secured with piles. The drilling template piles will be cut 3.0m below the seabed unless any difficulties are encountered and an external excavation is required to access the piles. The templates will be returned to shore for recycling.

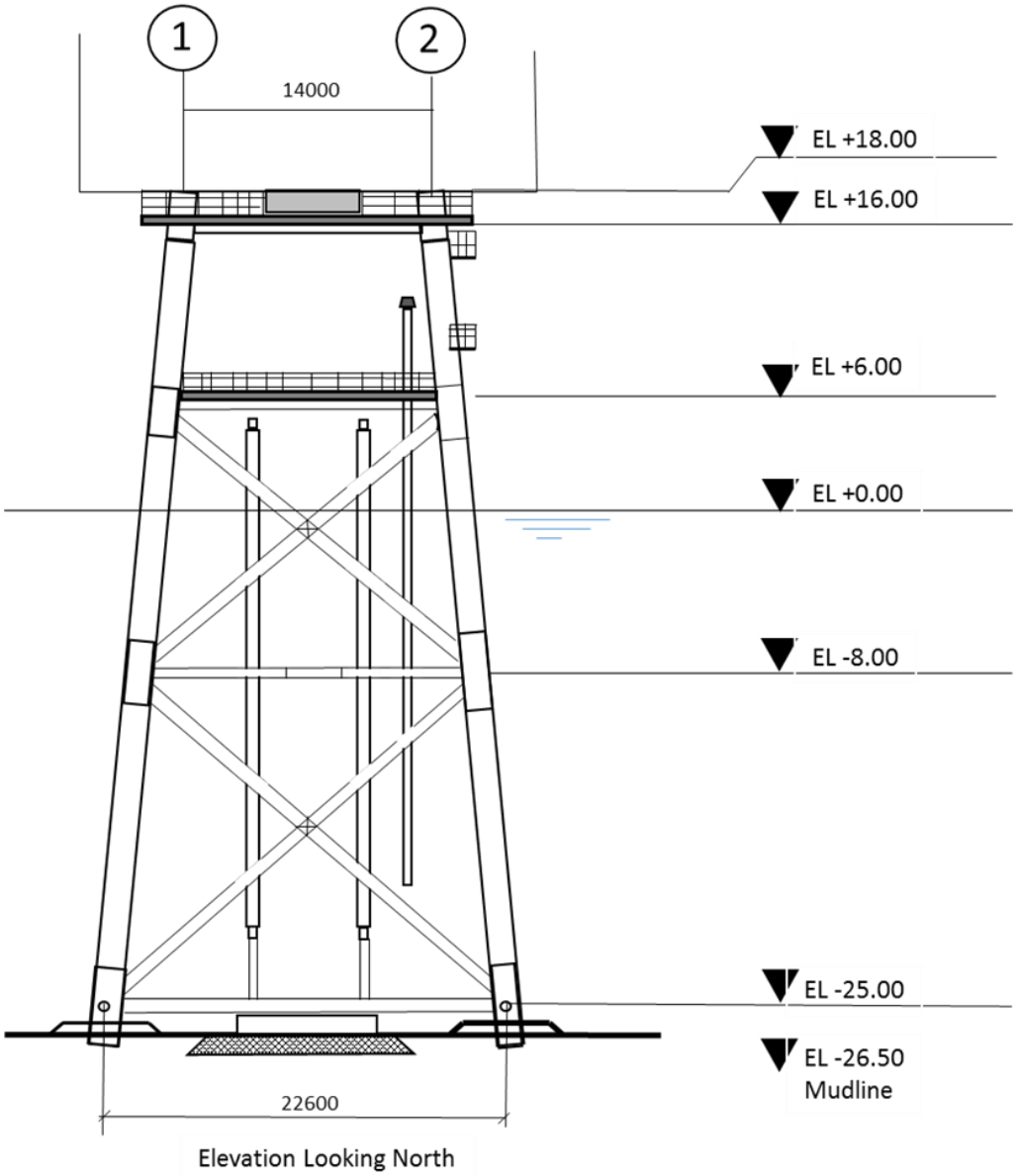


Figure 3.3: Typical Elevation on Jacket Looking North

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

Table 3.3: Jacket Decommissioning Methods	
1) Semi-Submersible Crane Vessel ☑; 2) Monohull Crane Vessel ☑; 3) Shear Leg Vessel ☑; 4) Jack up Work barge ☑; 5) Complete with topsides ☑	
Method	**Description**
Single lift removal by SSCV / MCV / SLV	Removal of each platform topsides and jacket as a complete unit followed by recovery to shore for re-use, recycling, and disposal as appropriate.
Single lift removal with jacket by SSCV / MCV / SLV	Removal of each jacket as a single unit followed by recovery to shore for re-use, recycling, disposal as appropriate.
Proposed removal method and disposal route	**Removal of jackets each as a single unit followed by recovery to shore for re-use, recycling, and final disposal to landfill as appropriate. A final decision on the decommissioning method will be made following a commercial tendering process.**

3.3 Subsea Installations and Stabilisation Features

Table 3.4: Subsea Installations and Stabilisation Features			
Subsea installations and stabilisation features	**Number**	**Option**	**Disposal Route (if applicable)**
Wellhead & tree	1	Complete removal following well abandonment	Recovery to shore for re-use or recycling
Manifold	n/a	n/a	n/a
Drilling template	2	Complete removal	Recovery to shore for re-use or recycling
Wellhead protection structure	1	Complete removal	Recovery to shore for re-use or recycling
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	n/a	n/a	n/a
Other (describe briefly)	n/a	n/a	n/a

3.4 Pipelines

Decommissioning Options:

All pipeline transitions at the ends (namely at the Audrey A (WD) and Audrey B (XW) platforms) will be completely removed.

The following options considered (and identified in terms of applicability to the pipelines in Table 3.5) are:

1) Complete removal;

2) Partial removal or remediation of exposures, and;

3) Leave *in situ*, making pipeline ends safe.

Table 3.5: Pipeline or Pipeline Groups Decommissioning Options

Pipeline or Group (as per PWA)	Condition of line/group (Surface laid/Trenched/ Buried/ Spanning)	Whole or part of pipeline/group	Decommissioning options considered
PL496 & PL497	Partially trenched and buried with emplaced rock	Whole 20" gas pipeline and piggybacked 3" methanol pipeline; section within LOGGS 500m zone may be decommissioned at a later date.	1, 2 & 3
PL575	Trenched and naturally backfilled	Whole 8" gas pipeline.	1, 2 & 3
PL576	Trenched and naturally back filled	Whole umbilical pipeline.	1, 2 & 3
PL723 & PL724	Trenched and naturally backfilled	Whole 14" gas pipeline and piggybacked 3" methanol pipeline.	1, 2 & 3

3.4.1 Comparative Assessment Method

A comparative assessment of the decommissioning options was performed in accordance with the Centrica Guidance for Comparative Assessments for Decommissioning. Each decommissioning option was qualitatively assessed against Safety, Environment, Technical and Societal and Cost. Refer [3] in Section 7 for details.

3.4.2 Outcome of Comparative Assessment:

Table 3.6: Outcomes of Comparative Assessment

Pipeline or Group	Recommended Option	Justification
PL496/7	Leave most of the pipeline *in situ*. At Audrey A (WD) completely remove 20" pipeline pipe spools (37.3m long), 3" methanol pipe spools (62m long) connected to the base of their respective risers complete with length to trench depth (100m each). Total to be removed approx. 137.3m (PL496) & 162m (PL497) at Audrey A (WD). At LOGGS PP completely remove exposed 20" pipeline pipe spools (up to 23m long) and	The pipelines are buried underneath rock for most of their length and are stable. Therefore, we propose to leave most of the pipelines *in situ* except for exposed ends. This will result in minimal seabed disturbance, lower energy usage, and reduced risk to personnel and lower cost; all contribute to the proposed

Table 3.6: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
	3" methanol pipe spools (50m long) up to deposited rock. Total to be removed approx. 23m (PL496) & 50m (PL497). Also remove 3" x 50m long flexible. Leave buried pipeline lengths *in situ*.	recommendation. Refer Appendix A.1 for pipeline burial profile. No pipeline crossings will be disturbed. Monitoring to confirm the pipeline remains buried will be completed to a schedule agreed with BEIS.
PL575	Complete removal.	The pipeline is short (493m long) and is exposed mid-line and at the ends. The area within the Audrey A (WD) Platform has not been subject to fishing activity and unless remediated the exposed lengths would pose a potential snagging hazard. Therefore, we propose to remove this pipeline in its entirety. This will result in some seabed disturbance, but will mean that no future pipeline burial surveys will be required. These contribute to the proposed recommendation. PL2066 pipeline ends will need to be removed before PL575 can be removed. Refer Appendix A.2 for pipeline burial profile.
PL576	Complete removal.	The umbilical pipeline is short (650m long) and is exposed mid-line and at the ends. The area within the Audrey A (WD) Platform been not been subject to fishing activity and unless remediated the exposed lengths would pose a potential snagging hazard. Therefore, we propose to remove this pipeline in its entirety. This will result in some seabed disturbance, but will mean that no future pipeline burial surveys will be required. These contribute to the proposed recommendation. Refer Appendix A.3 for pipeline burial profile.
PL723 & PL724	Leave most of the pipeline *in situ*. At Audrey B (XW) completely remove 14" pipeline pipe spools (45.1m long) and 3" methanol pipeline pipe spools (62m) connected to the base of their respective risers complete with approx. 70m pipeline length through transition to trench depth. Total to be removed approx. 115m (PL723) and 132m	Both pipelines are buried and stable for their entire length except for the ends. Therefore, we propose to leave most of the pipelines *in situ* except for exposed ends. This will result in minimal seabed disturbance, lower energy usage, and reduced risk to personnel and lower cost; all

Table 3.6: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
	(PL724). At Audrey A (WD) completely remove 14" pipeline pipe spools (45.1m[5] long, wet stored on seabed) and 3" methanol pipe spools (68m long) complete with length of pipeline to transition depth, approx. 70m for each pipeline. Total to be removed approx. 138m (PL723/4). Also remove 3" x 50m long flexible pipeline on seabed at Audrey A (WD).	contribute to the proposed recommendation. PL2838 will need to be isolated and partially removed before the PL723/4 pipeline ends at Audrey A (WD) can be removed. Refer Appendix A.4 for pipeline burial profile. Monitoring to confirm the pipeline remains buried will be completed to a schedule agreed with BEIS.

3.5 Pipeline Stabilisation Features

All concrete mattresses and grout bags will be recovered to shore unless noted otherwise.

Table 3.7: Pipeline Stabilisation Features			
Stabilisation features	**Number**	**Option**	**Disposal Route (if applicable)**
Concrete mattresses (underneath pipeline crossings, underneath or on top pipeline spools and over lengths of pipeline on seabed and pipeline transition sections)	61	6 inside LOGGS 500m zone, leave *in situ*; 21 at pipeline crossing leave *in situ*; 34 At Audrey A (WD), Audrey B (XW) and Audrey 11a-7 complete removal.	Recover to shore for re-use, recycling or disposal unless left *in situ*.
Grout bags, commonly placed adjacent to or over concrete mattresses	8x1Te 200x25kg	6x1Te Audrey A (WD) complete removal; 2x1Te at LOGGS PP leave *in situ;* 100x25kg at LOGGS PP leave *in situ;* 50x25kg Audrey A (WD) complete removal; 50x25kg Audrey B (XW) complete removal.	Recover to shore for re-use, recycling or disposal unless left *in situ*.
Rock	69,516Te	Leave *in situ*.	n/a
Formwork	n/a	n/a	n/a
Frond Mats	33	Leave *in situ*.	n/a
Other (describe briefly)	n/a	n/a	n/a

[5] The pipespools @ Audrey A (WD) have already been removed to accommodate Ensign gas export pipeline. The Ensign pipelines PL2838 and PL2839 will need to be disconnected before Audrey A (WD) platform can be removed

3.6 Wells

Table 3.8: Well Plug and Abandonment
The Audrey field consists of fifteen production wells (49/11a-A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, B1Z, B2, B3, B4, & 11a-7). The wells listed in Section 2.4 (Table 2.5) will be abandoned in accordance with latest version of the Oil & Gas UK Guidelines for the Abandonment of Wells (Issue 5, July 2015). A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of works carried out. A PON5 will also be submitted to BEIS for application to abandon the wells. Well abandonment is scheduled to occur ~2017-19.

3.7 Drill Cuttings

The 2016 survey data shows that there is an area of approximately 3,270m^2 with a volume of 500m^3 of deposited rock and accumulated drill cuttings to the North of Audrey A (WD). This has been defined as an existing drill cuttings pile associated with Audrey installations. This conclusion is supported by the 2016 survey data. Refer [5] for further details.

3.8 Waste Streams

Table 3.9: Waste Stream Management Methods	
Waste Stream	**Removal and Disposal method**
Bulk liquids	Residual hydrocarbons will be removed from topsides and any associated bulk seawater from topsides will be cleaned and disposed overboard under permit. The various pipelines pigged, flushed and left filled with seawater. The corrosion inhibitor and methanol will be removed from the smaller methanol lines and umbilical pipelines prior to the start of the decommissioning activities. Any residual fluids from within these pipelines will be released to marine environment under permit prior to removal to shore. Further cleaning and decontamination will take place onshore prior to re-use or recycling.
Marine growth	Where necessary and practicable to allow access some marine growth will be removed offshore. The remainder will be brought to shore and disposed of according to guidelines and company policies.
NORM	Tests for NORM will be undertaken offshore by the Radiation Protection Adviser and any NORM encountered will be dealt with and disposed of in accordance with guidelines and company policies and under appropriate permit.
Asbestos	Small quantities of asbestos have been documented topsides and in pipeline gaskets. The final disposal route will depend on the quantities found, but will be dealt with and disposed of in accordance with guidelines and company policies.
Other hazardous wastes	Will be recovered to shore and disposed of according to guidelines and company policies and under appropriate permit.
Onshore Dismantling sites	Appropriate licensed sites will be selected. The dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver innovative re-use and recycling options.

	Table 3.10: Inventory Disposition		
Inventory	**Total Inventory Tonnage**	**Planned tonnage to shore**	**Planned tonnage decommissioned *in situ***
Installations	5,433	4,774	659
Pipelines	10,935	773	10,162

All recovered material will be transported onshore for re-use, recycling or disposal. It is not possible to predict the market for reusable materials with any confidence; so the figures in Table 3.11 are aspirational.

Table 3.11: Re-use, Recycle & Disposal Aspirations for Recovered Material			
Inventory	**Re-use**	**Recycle**	**Disposal**
Installations	<5%	>95%	<5%
Pipelines	<5%	>95%	<5%

Refer to [4] for further details.

4. ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Environmental Sensitivities

Table 4.1: Environmental Sensitivities [4]	
Environmental Receptor	**Main Features**
Conservation interests	No Annex I habitats have been identified in any surveys undertaken within or adjacent to the Audrey A (WD), Audrey B (XW) or along the pipelines. LOGGS is on one of the sandbanks for which the North Norfolk Sandbanks was designated. As the area is within a Harbour Porpoise Possible SAC, there is potential for a number of Annex II species to be present within the vicinity. However, the nature of the activities being undertaken is anticipated to have low impact significance upon these species. The infrastructure is within the North Norfolk Sandbank SCI; however the activities are not anticipated to have any impacts upon the site due to the relatively small scale of the activities. In the event of a large hydrocarbon release, a proportion of the hydrocarbon could be captured within the seabed sediment. However, the possibility of such an event and the low concentrations that would be recorded within the sediment (comparable to background concentrations) mean the significance of the impact is considered low.
Seabed	The seabed at the Audrey A (WD) comprises sand. The natural seabed is smooth with low bedforms with areas of megaripples and sandwaves to the north west. To the north there is an area of disturbed seabed, a thin layer (max 20cm deep) of accumulated drill cuttings and deposited rock of approximately 500m^3 over 3,270m^2. The seabed at Audrey B (XW) comprises sand, slightly gravelly sand and gravelly sand. Audrey B (XW) lies in the trough between two sandwaves. To the northeast there is an area of deposited rock. The seabed in the LOGGS area comprises sand with shells and shell fragments with sand waves and ripples indicating a mobile sandy seabed. In general, the marine habitats and their associated species depend on the available substrate and sediment composition. Multivariate comparison of the survey data concluded that the macrofaunal community at Audrey A (WD), Audrey B (XW) and LOGGS survey areas were characterised mainly according to natural variation in sediment composition (rather than contaminants). The macrofaunal community at the small area of drill cuttings north of Audrey A (WD) was distinct from the other survey area. No infrastructure is within this area and therefore no removal activity will occur in this area. The removal of installations, pipe spools, pipeline ends and protection features from the seabed will impact the seabed. Sensitive marine habitats are likely to be damaged as a result of seabed disturbance and the temporary placement of materials on the seabed. In addition, there is potential for re-suspended sediment to settle on sensitive habitat and species smothering them. However, the extent of the disturbance is likely to be minimal in comparison to the area of available habitat. The habitat observed is not unique to the area and represents a small proportion to that available within the wider southern North Sea. In the event of a large hydrocarbon release, it was found that a proportion of the hydrocarbon could be captured within the sediment. However, given the likelihood of such an event and the low concentrations that would be recorded within the sediment (comparable to background concentrations) the significance of the impact is considered low.
Atmosphere	In general, offshore meteorological conditions will lead to rapid

Table 4.1: Environmental Sensitivities [4]	
Environmental Receptor	**Main Features**
	dispersion and dilution of atmospheric emissions. Impacts arising because of emissions (largely comprising combustion gases) are therefore likely to be short-term and highly localised and are assessed as of low significance. The emission of combustion gases will contribute to global effects (e.g. global warming). However, given the relatively small volume of gases to be emitted and the control and mitigation measures that will be implemented the significance of the impact is low.
Birds	The greatest risk to birds from the activities would be the accidental occurrence of a large hydrocarbon release. The Audrey area has a moderate annual vulnerability, with high or very high vulnerability of seabirds to surface pollution in February, March, April, August, October and November. The LOGGS area has a moderate or high vulnerability of seabirds to surface pollution (only March and November is of very high vulnerability). Although birds could be affected by the diesel release, given the relatively short duration of the activities and the relatively short duration it would be expected to remain on the sea surface (therefore being available to oil birds' feathers) the potential impact is assessed as of low significance.
Fish	Fish populations in the area could be affected by seabed disturbance, the generation of underwater noise and chemical / hydrocarbon releases associated with activities. It is not anticipated that large amounts of turbidity will be generated which could impact fish themselves, however even a small amount of turbidity or disturbance of the seabed itself could have impacts to spawning and nursery grounds. Several species are known to use the seabed in the area around the Audrey Platforms and LOGGS as spawning and nursery grounds. Different species spawn at different times; therefore, it is likely that whenever the activities are undertaken they could coincide with a spawning period. However, information regarding spawning grounds and nursery grounds covers large areas, the seabed is representative the wider area and therefore the significance of any impact has been assessed as low. The same is the case for nursery grounds. The levels of noise generated are not anticipated to have any physiological impact to fish. It is likely that the activities will result in a startled response, moving fish away from the area.
Marine mammals	Given the existing background noise levels and the relatively short duration of the activities, the underwater noise levels generated by vessels are unlikely to lead to physiological damage to marine mammals. White beaked dolphin and harbour porpoise (an Annex II (Habitats Directive) species) have been recorded in the area. The locally resident or transiting populations of marine mammals may be disturbed by noise in the immediate vicinity, but any such disturbance is expected to be short-term and the impact has been assessed as of low significance.
Fishing industry	Impacts on fishing industry have been assessed as of low significance as the decommissioning activities will be relatively short-term and within the 500m exclusion zones around the installations. The area is predominantly targeted for demersal species.
Other Users of the Sea	There will be a relatively short period when vessels will be operating around the installations and there will be a higher than normal level of shipping activity. The associated effects will be short-term. There are no planned wind farm developments or aggregate extraction licenses at the

Table 4.1: Environmental Sensitivities [4]	
Environmental Receptor	**Main Features**
	site, although there is an aggregate area to the north of the site. The activities are not anticipated to impact on the aggregate area.
Onshore Communities	The impact of the disposal of waste on onshore communities would be slightly beneficial as it will contribute to the continuation of jobs. However this is expected to be small as the disposal sites already exist and the volume of waste is relatively small.

4.2 Potential Environmental Impacts and their Management

Environmental Impact Assessment Summary:

There will be some planned and unplanned environmental impacts arising from decommissioning of the Audrey infrastructure (48/15a, 49/11a). Long-term environmental impacts from the decommissioning operations are expected to be low. Incremental cumulative impacts and trans-boundary effects associated with the planned decommissioning operations are also expected to be low. There will be a requirement for a new environmental management protection plan to be produced and submitted to BEIS should the Decommissioning Programmes change.

Overview:

Table 4.2: Environmental Impact Management [4]

Activity	Main Impacts	Management
Topsides removal	Decommissioning of the topsides will require cutting of the facilities at the surface and lifting activities using large lift vessels that are potentially anchored. The removal may lead to discharges of residual fluids from the topsides, including drainage spaces. The principle impacts will include: • physical presence of vessels and equipment • energy use and atmospheric emissions • underwater noise from vessels, • surface noise from cutting • discharges to the marine environment from vessels and residues from topsides • disturbance of the seabed from anchors • production of waste materials Risks of additional impact will include: • disturbance to the seabed from potential dropped objects • large and small hydrocarbon and chemical releases to the marine environment	All planned impacts are expected to be short-term and localised and of low significance provided the proposed mitigation measures are implemented when carrying out the topside decommissioning activities. The exception to this is the risk of a large hydrocarbon releases which could have the potential to have a moderate significant impact. The assessment of potential cumulative impacts concludes that no significant impacts are expected to occur as a result of decommissioning operations. Activities will be planned to be executed as efficiently as possible, minimising cutting in order to reduce the potential noise impacts. The contractors' capability, processes and procedures will be subject to audit and evaluation as part of the selection process and their vessels will be audited as part of selection and pre-mobilisation and the marine assurance standard adhered to. Vessels will be managed to minimise the durations required and associated discharge. In addition, on board operational practices will address fuel efficiency, noise management and minimise waste. Anchoring procedures will be developed. Risk assessments will be undertaken for the work at key stages

Table 4.2: Environmental Impact Management [4]		
Activity	**Main Impacts**	**Management**
	• disruption to fishing activities	throughout planning and execution. The waste hierarchy will be followed with material being segregated and re-used where practicable, and recycling where possible. Only if other options are not possible will waste material be sent to landfill. Centrica will continue to monitor the performance of the contractor throughout via our offshore representatives. Compliance with EU and UK waste legislation and duty of care. A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP, specialist oil spill management and response services will be in place, to minimise impacts from potential releases to the marine environment.
Jacket removal	Decommissioning of the jackets will require cutting of the facilities at the seabed and lifting activities using large lift vessels that are potentially anchored. The piles will be cut below the seabed which may require local water jetting of sediments and temporary placement of equipment and components. The principle impacts will include: • physical presence of vessels and equipment • energy use and atmospheric emissions • underwater noise from vessels, cutting and excavation operations • discharges to the marine environment from vessels • disturbance of the seabed • production of waste materials Risks of additional impact will include: • disturbance to the seabed from potential	All planned impacts are expected to be short-term and localised and of low significance provided the proposed mitigation measures are implemented when carrying out the jacket decommissioning activities. The exception to this is the risk of a large hydrocarbon releases which could have the potential to have a moderate significant impact. The assessment of potential cumulative impacts concludes that no significant impacts are expected to occur as a result of decommissioning operations. Activities will be planned to be executed as efficiently as possible, minimising cutting and disturbance of the seabed in order to reduce the potential for impact on the area around the jacket. The contractors' capability, processes and procedures will be subject to audit and evaluation as part of the selection process and their vessels will be audited as part of selection and pre-mobilisation and the marine assurance standard adhered to. Vessels will be managed to minimise the durations required and associated discharge. In addition, on board operational practices

Table 4.2: Environmental Impact Management [4]		
Activity	**Main Impacts**	**Management**
	dropped objects • large and small hydrocarbon and chemical releases to the marine environment • disruption to fishing activities	will address fuel efficiency, noise management and minimise waste. Anchoring procedures will be developed. Risk assessments will be undertaken for the work at key stages throughout planning and execution. The waste hierarchy will be followed with material being segregated and re-used where practicable and by recycling where possible. Only if other options are not possible then waste material will be sent to landfill. Centrica will continue to monitor the performance of the contractor throughout via our offshore representatives. Compliance with EU and UK waste legislation and duty of care. A post decommissioning debris survey will be conducted and any debris recovered. As part of the OPEP specialist oil spill management and response services will be in place, to minimise impacts from potential releases to the marine environment.
Subsea installation removal	For decommissioning and removal of the installations the impacts are disturbance of the seabed by lifting, temporary placement on seabed if required, noise from vessels and cutting and operational discharges from vessels. Impacts are expected to be short-term and localised and of low significance.	Activities will be planned to be executed as efficiently as possible, minimising cutting and disturbance of the seabed in order to reduce the potential for impact on the area around the installations. Vessels will be managed to minimise the durations required and associated discharge. In addition, on board operational practices will address fuel efficiency, noise management and minimise waste.
Decommissioning pipelines	Decommissioning of the pipelines *in situ* will require activities such as local water-jetting of sediments, cutting and temporary placement of equipment or components. Any exposed pipeline ends will be cut back at the buried location. Removed components will be lifted from the seabed by DSV. Principal impacts will	Activities will be planned to be executed as efficiently as possible, minimising disturbance of the seabed in order to reduce the potential for impact on the area around the pipelines. Consideration will be given where equipment and/or components should be temporarily placed on the seabed prior to removal, seeking to minimise the requirement wherever possible. Vessels will be managed to minimise the durations required and

Table 4.2: Environmental Impact Management [4]		
Activity	**Main Impacts**	**Management**
	include • disturbance of the seabed from cutting and removal activities • noise from removal and cutting activities and operational support vessels • operational discharges from vessels • production of waste material These effects are expected to be short-term and localised. The seabed and associated ecosystem is expected to recover rapidly once activities cease.	associated discharges. In addition, on board operational practices will address fuel efficiency, noise management and minimise waste.
Decommissioning stabilisation features	The Decommissioning Programmes include the removal of existing concrete mattresses and sand bags. Mattresses and sand bags will be lifted from the seabed by DSV. Impacts will include disturbance of the seabed and noise from vessels. These effects are expected to be short-term and localised. The seabed and associated ecosystem is expected to recover rapidly once activities cease.	Activities will be planned to be executed as efficiently as possible, minimising disturbance of the seabed in order to reduce the potential for impact. Consideration will be given to how the work is to be conducted seeking to minimise the requirement wherever possible. Vessels will be managed to minimise the durations required and associated discharges. In addition on board operational practices will address fuel efficiency, noise management and minimise waste, in accordance with the marine assurance standard.
Decommissioning Drill Cuttings	No decommissioning activities will be undertaken on the cuttings pile. In accordance with OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings the pile will be left *in situ* for natural degradation.	Future survey requirements and methods will be agreed with BEIS at the time of the surveys, if required.

5. INTERESTED PARTY CONSULTATIONS

Table 5.1: Summary of Stakeholder Comments		
Who	**Comment**	**Response**
INFORMAL CONSULTATIONS		
CPUK	We are in constant dialogue with CPUK in terms of examining collaboration opportunities for decommissioning operations in the LOGGS complex area.	
JNCC	We presented the decommissioning proposals for Annabel and Audrey (as well as Ann and Alison), including our proposals for limiting overtrawl sweeps to within 500m zones and any areas subject to physical decommissioning operations outside these areas in a meeting with two representatives from JNCC 02 May 2017.	The decommissioning proposals were acceptable. In particular the following items were raised as the main discussion points. • Cumulative effects are of particular interest to JNCC and it was suggested that we take into account the marine aggregate industry within the EIA. • JNCC commented that rock dumping is a concern. However, none is planned for the Annabel and Audrey decommissioning. • JNCC welcomed the proposals to curtail the overtrawl activities to areas within the 500m zones.
NFFO	We discussed the decommissioning proposals with NFFO via teleconference 27 June 2017. The NFFO have confirmed that to meet BEIS requirements they can only provide a Clear Seabed Certificate for areas that have been subject to over-trawl.	The decommissioning proposals were acceptable.
STATUTORY CONSULTATIONS		
National Federation of Fishermen's Organisation		
Scottish Fishermen's Federation		
Northern Irish Fish Producers Organisation		
Global Marine Systems		
Public		

6. PROGRAMME MANAGEMENT

6.1 Project Management and Verification

A Centrica project management team will manage the operations of competent contractors selected for all decommissioning activities. The team will ensure the decommissioning is executed safely, in accordance with legislation and Centrica Health and Safety principles. Changes to the Decommissioning Programmes will be discussed with BEIS with any necessary approvals sought.

6.2 Post-Decommissioning Debris Clearance and Verification

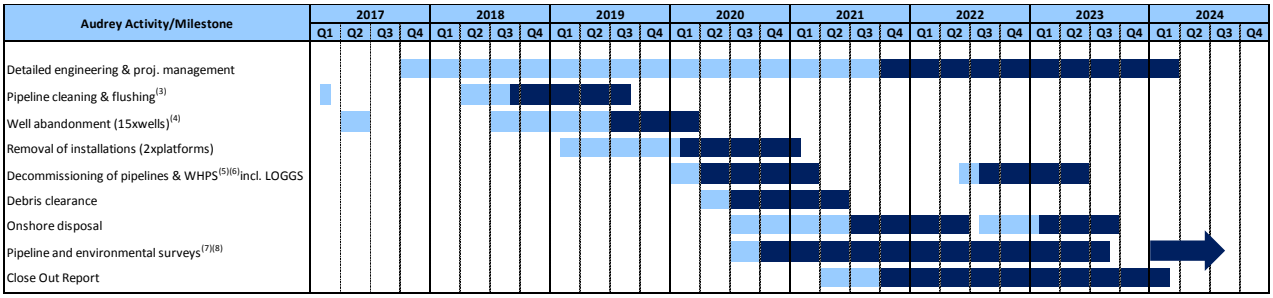
The Audrey installation sites and the 500m safety zones will be subject to debris and trawlability surveys when decommissioning activities have concluded. Although obliged to carry out trawlability surveys along a 200m wide corridor along all decommissioned pipelines, due to the sensitive nature of the North Norfolk Sandbanks and surrounding area, we would prefer not to carry out trawlability surveys over pipeline areas that have not been subject to decommissioning activities. Given the burial status of the pipelines we would hope that we can agree a practical compromise that satisfies the requirements of the stakeholders concerned.

Any seabed oil and gas 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 jacket and pipeline area and this will be supported by a Certificate of Clearance. This will be included in the Close Out Report, and sent to the Seabed Data Centre (Offshore Installations) at the Hydrographic Office. Both Centrica and CPUK own pipelines in the LOGGS complex area, but the expectation is that subject to commercial terms the debris clearance and verification can be executed by either party. This will remain a work in progress while the details of the decommissioning programmes are finalised.

6.3 Schedule

A proposed schedule is provided in Figure 6.1. The activities are subject to the acceptance of the Decommissioning Programmes presented in this document and any unavoidable constraints (e.g. vessel availability) that may be encountered while executing the decommissioning activities. Therefore, activity schedule windows have been included to account for this uncertainty.

The commencement of offshore decommissioning activities will depend on commercial agreements and commitments.



Notes / Key

1. Earliest potential activity
2. Activity window to allow commercial flexibility associated with well abandonment, installation and pipeline decommissioning activities
3. Audrey 11a-7 pipeline flushing in 2017 campaign, remaining pipelines in second campaign
4. Audrey 11a-7 subsea well in 2017 campaign, platform wells in second campaign
5. Decommissioning of pipelines subject to Comparative Assessment and in same subsea campaign as removal of WHPS
6. There may be an opportunity to decommission the pipeline ends at LOGGS concurrently with other decommissioning works, subject to agreement
7. Post decommissioning survey and environmental survey; timing of any future surveys to be agreed with BEIS
8. Timing and any synergistic opportunities to be explored for post-decomissioning survey at LOGGS if completion of activities as a whole are delayed

Figure 6.1: Gantt Chart of Project Plan

6.4 Costs

Table 6.1: Provisional Decommissioning Programme Costs

Item	Estimated Cost (£mm)
Operator project management	tba
Facility running/owner costs	tba
Well plugging and abandonment	tba
Facilities/pipelines making safe	tba
Topsides preparation	tba
Substructure removal (incl. subsea installations)	tba
Topsides and substructure onshore recycling	tba
Subsea infrastructure (pipelines, umbilical lines)	tba
Site remediation	tba
Monitoring	tba
TOTAL	**tba**

6.5 Close Out

A close out report will be submitted to BEIS within four months of the completion of the offshore work, including debris clearance and post-decommissioning surveys, as required in BEIS guidelines. The report will explain any variance from the Decommissioning Programmes.

6.6 Post-Decommissioning Liability, Monitoring and Evaluation

After decommissioning has been completed, pipeline status surveys and environmental surveys will be completed with the findings being sent to BEIS in the Close Out report. The frequency of future surveys will be agreed with BEIS and supported with a risk assessment. Residual liability will remain with the Section 29 holders identified in Table 1.2 and Table 1.4. Unless agreed otherwise in advance with BEIS, Centrica North Sea Limited will remain the focal point for such matters, such as any change in ownership, for example.

The requirement for legacy and liability management will be described in more detail in the Close Out report.

7. SUPPORTING DOCUMENTS

Table 7.1: Supporting Documents

Item	Document Number	Document Title
[1]	CEU-DCM-SNS0096-REP-0001	Ann A4 Decommissioning Programme, Jan 2017
[2]	CEU-DCM-SNS0096-REP-0005	Ann and Alison Decommissioning Programmes, April 2017
[3]	CEU-DCM-SNS0096-REP-0008	Annabel and Audrey Decommissioning Comparative Assessment for Pipelines, April 2017
[4]	CEU-DCM-SNS0096-REP-0009	Audrey and Annabel Fields Decommissioning Environmental Impact Assessment, May 2017
[5]	10786.4	Audrey Pre-Decommissioning Survey, Gardline, Geosurvey Limited, March 2017

APPENDIX A BURIAL PROFILES

Appendix A.1 PL496/7 Burial Profile

PL496 is the 20” gas export pipeline that is approximately 16.8km long, and that it is piggybacked with PL497 (17.0km long). That is, PL497 is connected to PL496 using clamps. PL496 is routed from the Audrey A (WD) platform to the LOGGS PP platform. We believe that attempts to trench the pipeline during the original installation operations were not entirely successful, and that deposited rock was used to backfill the trench and stabilise the pipeline.

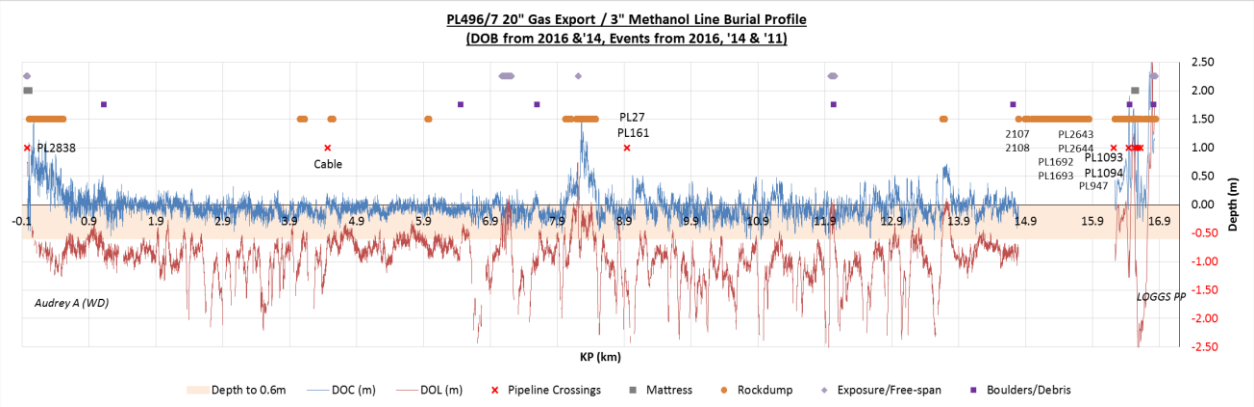


Figure A.1: PL496/7 Burial Profile

Appendix A.2 PL575 Burial Profile

PL575 is an 8” gas export pipeline that is approximately 498m long and routed from the Audrey 11a-7 subsea tie-back to Audrey A (WD). Ostensibly PL575 shares the same trench as PL576 and is fully contained within the current Audrey A (WD) 500m safety zone.

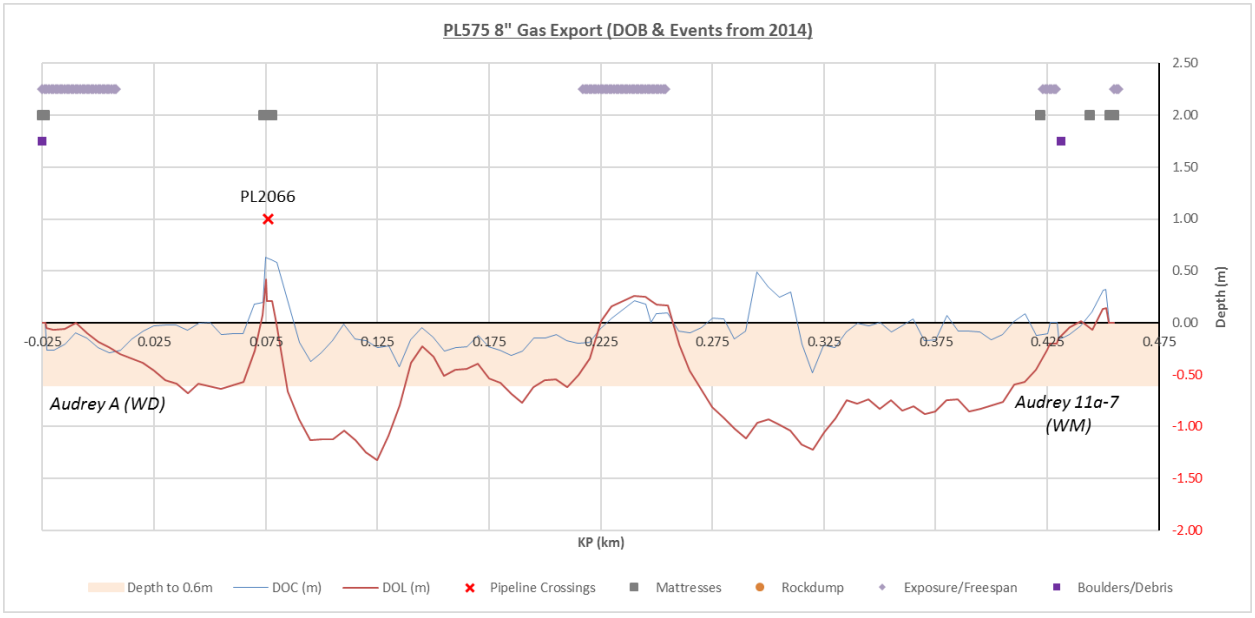


Figure A.2: PL575[6] Burial Profile

[6] In this instance the KP start at the end of the pipeline – Audrey A (WD) rather than the point of origin, Audrey 11a-7

Appendix A.3 PL576 Burial Profile

PL576 is an umbilical line that provides power, control and chemicals to Audrey 11a-7. It is approximately 650m long and routed from the Audrey A (WD) platform to Audrey 11a-7. Ostensibly PL576 shares the same trench as PL575.

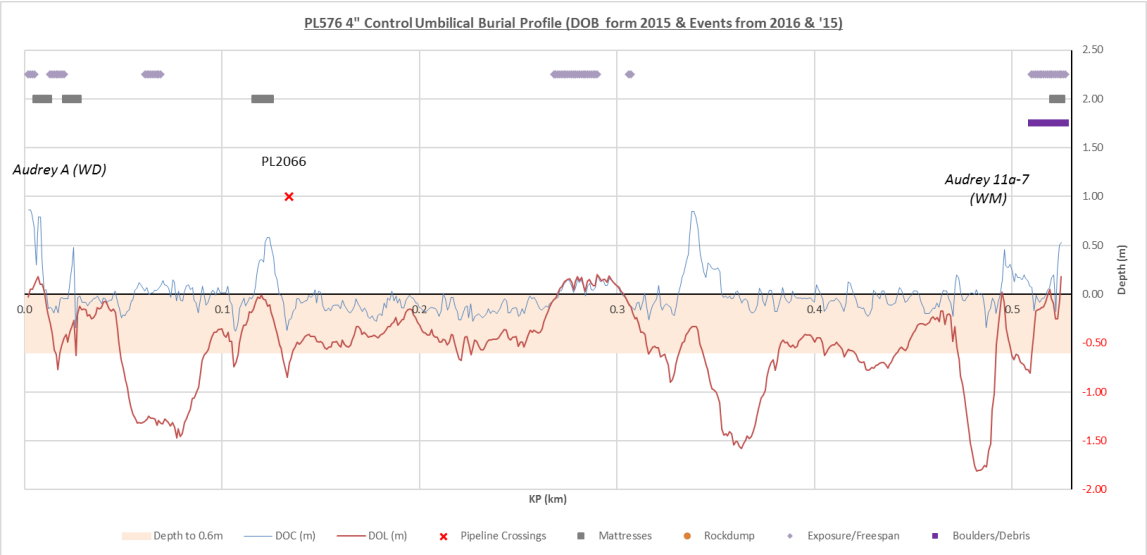


Figure A.3: PL576 Burial Profile[7]

Appendix A.4 PL723/4 Burial Profile

PL723 is the 14" gas export pipeline that is approximately 4.4km long, and that it is piggybacked with PL724. PL724 is a 3" methanol line that exports methanol from Audrey A (WD) to Audrey B (XW). PL724 is connected to PL723 using clamps. PL723 is routed from the Audrey B (XW) to the Audrey A (WD) platform but is no longer used and has been disconnected from the base of the Audrey A (WD) riser.

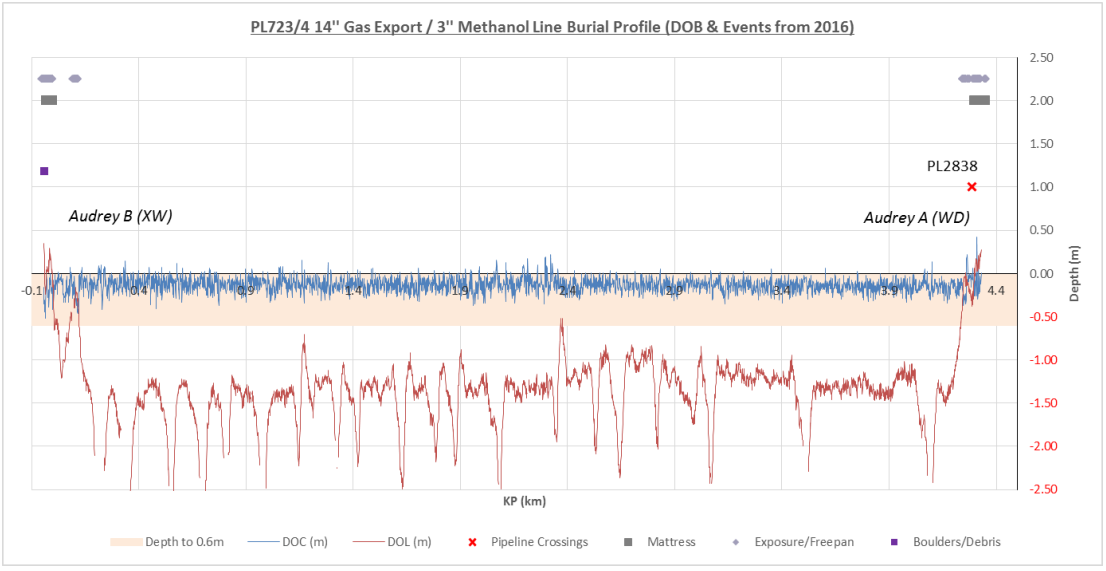


Figure A.4: PL723/4 Burial Profile

[7] Although the burial chart suggests that the umbilical is approx. 520m long, the 'as-built' drawings indicate that the umbilical is 650m long; the difference arises because the umbilical follows a wide loop near Audrey 11a-7 and the Audrey A (WD) platform, and these are not captured on the burial survey.

APPENDIX B PUBLIC NOTICE & CONSULTEE CORRESPONDENCE

Appendix B.1 Public Notices

HOLD

Appendix B.2 Correspondence

HOLD