

## BRENDA

# Decommissioning Programmes

FINAL VERSION – 11 January 2021

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### **Terms and Abbreviations**

<b>Abbreviation</b>	<b>Explanation</b>
CA	Comparative Assessment
CoP	Cessation of Production
Dia	Diameter
DP	Decommissioning Programmes
DSV	Diving Support Vessel
E	East
EA	Environmental Appraisal
EMT	Environmental Management Team
ENE	East-Northeast
ES	Environmental Statement
EU	European Union
FFS	Fishing Friendly Structure
FPF	Floating Production Facility
FPV	Floating Production Vessel
FSU	Floating Storage Unit
GVI	General Visual Inspection
HSE	Health & Safety Executive
HSES	Health, Safety, Environment & Security
ICES	International Council for the Exploration of the Seas
in	Inch
JNCC	Joint Nature Conservation Committee
KCl	Potassium Chloride
Km	Kilometre
LSA	Low Specific Activity Scale
m	Metre
MCA	Maritime and Coastguard Agency
MCDA	Multi Criteria Decision Analysis
mg/kg	Milligrams per kilogram
mm	Millimetre
MPA	Marine Protected Areas
MS	Marine Scotland
n/a	Not Applicable
N	North
NCMPA	Nature Conservation Marine Protected Areas
NE	Northeast
NNE	North-Northeast
NORM	Naturally Occurring Radioactive Material
NSP	Norwegian Boundary Sediment Plain
NW	Northwest

Abbreviation	Explanation
OBM	Oil Base Mud
ODU	Offshore Decommissioning Unit
OEI	Offshore Environmental Inspectorate
OGA	Oil & Gas Authority
OGUK	Oil & Gas UK
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OPF	Organic-Phase Drilling Fluids
OSPAR	Oslo Paris Convention – Convention for the Protection of the Marine Environment of the North East Atlantic
OIW	Oil in Water
P&A	Plug and Abandon (Wells)
PL	Pipeline
PON	Petroleum Operations Notice
Premier Oil	Premier Oil E&P UK Limited
PWA	Pipeline Works Authorisation
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SCAP	Supply Chain Action Plan
SE	Southeast
SEPA	Scottish Environmental Protection Agency
SFF	Scottish Fishermen's Federation
SIMOPS	Simultaneous Operations
SPA	Special Protection Area
Te	Tonne
TFSW	Trans Frontier Shipment of Waste
THC	Total Hydrocarbon Concentration
UKCS	United Kingdom Continental Shelf
Umb	Umbilical
WBM	Water Base Mud
WONS	Well Operations Notification System

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## **1 EXECUTIVE SUMMARY**

### **1.1 Decommissioning Programmes**

This document contains the Decommissioning Programmes for the Brenda Field subsea installations and pipelines.

Note that the Brenda Field decommissioning is part of a programme of decommissioning activities for the Greater Balmoral Area. Each field comprising the Greater Balmoral Area has its own Decommissioning Programmes.

### **1.2 Requirement for Decommissioning Programmes**

#### **Installations:**

In accordance with the Petroleum Act 1998, the Section 29 notice holders of the Brenda subsea installations (see Table 1.2) are applying to the Offshore Petroleum Regulator for Environment & Decommissioning (OPRED) to obtain approval for decommissioning the subsea installations detailed in Section 2.1 and 2.2 of this programme.

#### **Pipelines:**

In accordance with the Petroleum Act 1998, the Section 29 notice holders of the Brenda pipelines (see Table 1.4) are applying to the OPRED to obtain approval for decommissioning the pipelines detailed in Section 2.3 of this programme.

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and the OPRED guidelines. The schedule outlined in this document is for an eight year decommissioning project plan due to begin in 2021.

### **1.3 Introduction**

The Decommissioning Programmes have been prepared to support the decommissioning of the Brenda Field, which is part of a wider suite of Decommissioning Programmes for the Greater Balmoral Area.

The licensees have submitted to the Oil & Gas Authority (OGA) for consideration a Cessation of Production document which demonstrates that all economic development opportunities have been pursued for; the field and associated infrastructure, current and future development opportunities, and consideration of access to current infrastructure.

A Cessation of Production application for the field has been discussed with and submitted to the Oil and Gas Authority, and was approved on the 23<sup>rd</sup> April 2018.

The Greater Balmoral Area consists of the Premier Oil operated subsea Fields; Balmoral, Brenda, Nicol, Stirling and Glamis, all of which are tied-back to the Balmoral Floating Production Vessel (FPV). Two further subsea Fields, Burghley and Beaully, which are operated by Repsol Sinopec North Sea Limited, are also tied-back to the Balmoral FPV. Repsol Sinopec North Sea Limited, as operator, will submit Decommissioning Programmes for Burghley and Beaully.

The Brenda Field is located approximately 225km to the northeast of Aberdeen in UKCS Block 15/25b, where the water depth is approximately 150m at LAT. Brenda lies approximately 8.5km to the southwest of the Balmoral FPV, and production came online during June 2007. The Balmoral FPV is the processing



centre for the produced fluids from the Brenda Field, and hydrocarbons are exported via pipeline to the Forties Pipeline System.

The main components of the Brenda subsea field consist of; five production wells, two E&A wells, a production manifold structure, and several pipelines tied-back to the Balmoral FPV by flexible riser systems, which comprise a riser base and midwater arch.

Following public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted without derogation and in full compliance with OPRED and Oil & Gas UK guidelines. The Decommissioning Programmes explain the principles of the decommissioning activities and is supported by a Comparative Assessment (CA) of decommissioning options and an Environmental Appraisal (EA).

## 1.4 Overview of Installations/Pipelines Being Decommissioned

### 1.4.1 Installations

Table 1.1: Installations Being Decommissioned			
<b>Field:</b>	Brenda	<b>Production Type (Oil/Gas/Condensate)</b>	Oil/Gas
<b>Water Depth (m)</b>	150	<b>UKCS blocks</b>	15/25b
Surface Installation(s)			
<b>Number</b>	<b>Type</b>	<b>Topsides Weight (Te)</b>	<b>Jacket Weight (Te)</b>
N/A	N/A	N/A	N/A
Subsea Installations		Number of Wells	
<b>Number</b>	<b>Type</b>	<b>Platform</b>	<b>Subsea</b>
10	5 x WHPS 1 x Brenda Production Manifold 1 x Riser Base 1 x Mid- Water Arch 1 x Umbilical Hold-back Assembly 1 x Template Manifold	N/A	7
Drill Cuttings pile(s)		Distance to median	Distance from nearest UK coastline
<b>Number of Piles</b>	<b>Total Estimated volume (m<sup>3</sup>)</b>	<b>km</b>	<b>km</b>
Please refer to Section 3.7 Drill cuttings		39.8 (UK/NOR median)	178.1

Table 1.2 Installations Section 29 Notice Holders Details		
Section 29 Notice Holders	Registration Number	Equity Interest (%)
Premier Oil E&P UK Limited	02671032	100 %
Premier Oil PLC	SC234781	0 %
Premier Oil UK Limited	SC048705	Exited

#### 1.4.2 Pipelines

Table 1.3: Pipelines Being Decommissioned		
Number of Pipelines	<b>12</b>	(See Table 2.3)
Number of Umbilicals	<b>9</b>	(See Table 2.3)

Table 1.4: Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holders	Registration Number	Equity Interest (%)
Premier Oil E&P UK Limited	02671032	100 %
Premier Oil PLC	SC234781	0 %
Premier Oil UK Limited	SC048705	Exited

## 1.5 Summary of Proposed Decommissioning Programmes

Table 1.5 Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
<b>1. Topsides</b>		
n/a	n/a	n/a
<b>2. Floating Facility</b>		
n/a	n/a	n/a
<b>3. Subsea Installations</b>		
Group 12*: Small Subsea Installations: Brenda Production Manifold, Riser Base, Mid-water arch, umbilical hold-back assembly and template manifold. Full removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
<b>4. Pipelines, Flowlines &amp; Umbilicals</b>		
Group 2*: Trenched but not backfilled Umbilicals. Full Removal.	Assessed under Group 4	
Group 3*: Trenched & Buried Rigid Flowlines. Leave in-situ.	Comparatively assessed as preferred option. The rigid flowlines are sufficiently trenched and buried and stable posing no risk to marine users. Minimal seabed disturbance, lower energy use, reduced risk to personnel engaged in the activity.	Leave in-situ. Exposed ends & areas of exposure to be removed & returned to shore for recycling or other waste treatment as appropriate. Local rock placement to mitigate snag hazard from cut ends.
Group 4*: Trenched & Buried Flexible Flowlines & Umbilicals. Full Removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
Group 5*: Flexible Jumpers. Full Removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
Group 7*: Rigid Spool pieces. Full Removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
Group 9*: Control & Chemical Jumpers. Full Removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
Group 13*: Subsea Mattresses – flexible concrete mattresses with polypropylene rope. Full Removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.
Group 16: : Flexible Risers Full removal.	Leaves a clear seabed and meets regulations.	Full Removal. Returned to shore for recycling or appropriate treatment and disposal.

Table 1.5 Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
<b>5. Wells</b>		
Wells will be plugged and abandoned to Premier Oil E&P UK Limited standards which comply with “Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996” and align with Oil & Gas UK Guidelines for the Suspension and Abandonment of Wells (Issue 6, June 2018).	Meets HSE regulatory requirements in accordance with O&G UK and OGA guidelines.	A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of activities carried out. Applications to abandon the wells will be submitted through the Well Operations Notification System (WONS). Additionally, planned work will be reviewed by a well examiner to Premier Oil E&P UK Limited standards, then submitted to the HSE for review.
<b>6. Drill Cuttings</b>		
Screening of cuttings requirements based on desktop exercise and pre-decommissioning environmental survey data.	Compliance with OSPAR Recommendation 2006/5 requirements.	Given lack of OBM discharges, other sources of contamination and physical cuttings pile, any cuttings should be left to degrade naturally.
<b>7. Interdependencies</b>		
Subsea infrastructure flushing and cleaning to be completed prior to removal of the Balmoral FPV, and prior to commencement of subsea decommissioning operations. Decommissioning activities to be coordinated to minimise simultaneous operations (SIMOPS).		

\* Refers to the Inventory Group Categories as defined in the Comparative Assessment Report

## 1.6 Field Location Including Field Layout and Adjacent Facilities

Figure 1.1: Field Location in UKCS

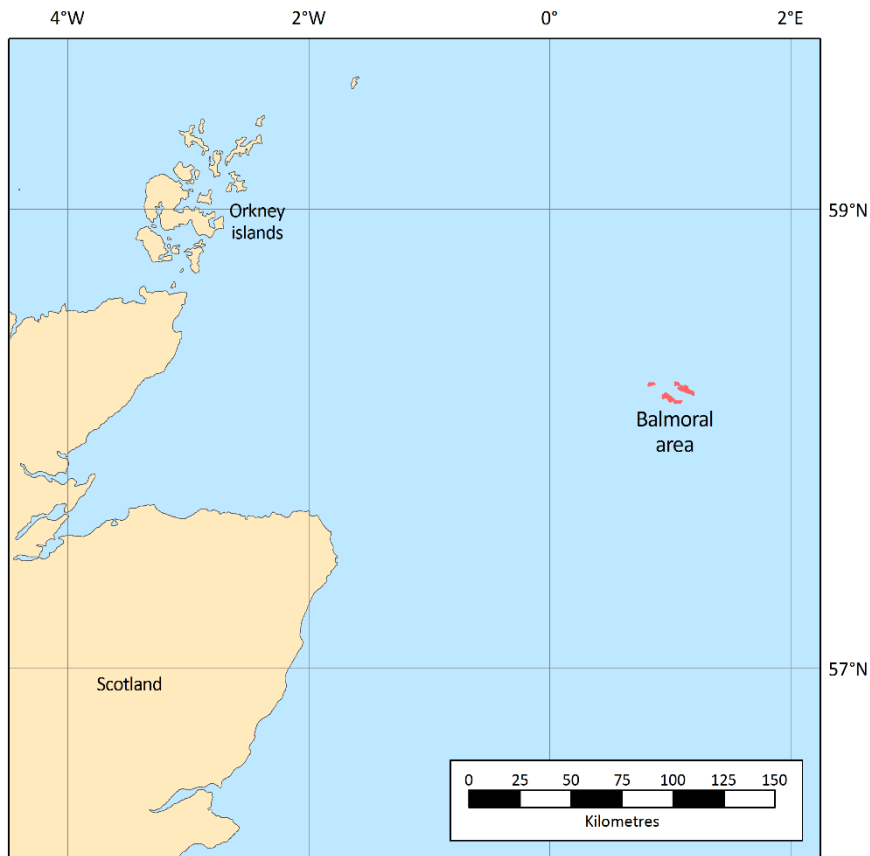


Figure 1.2: Field Layout

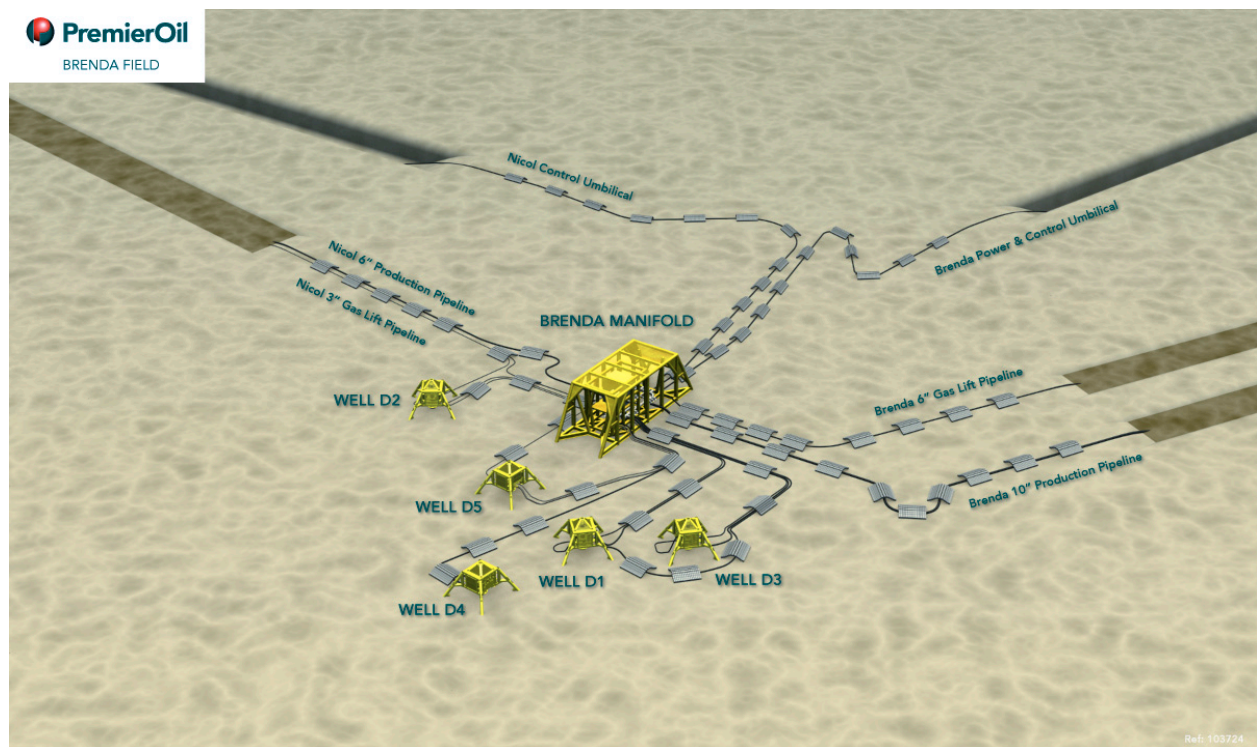
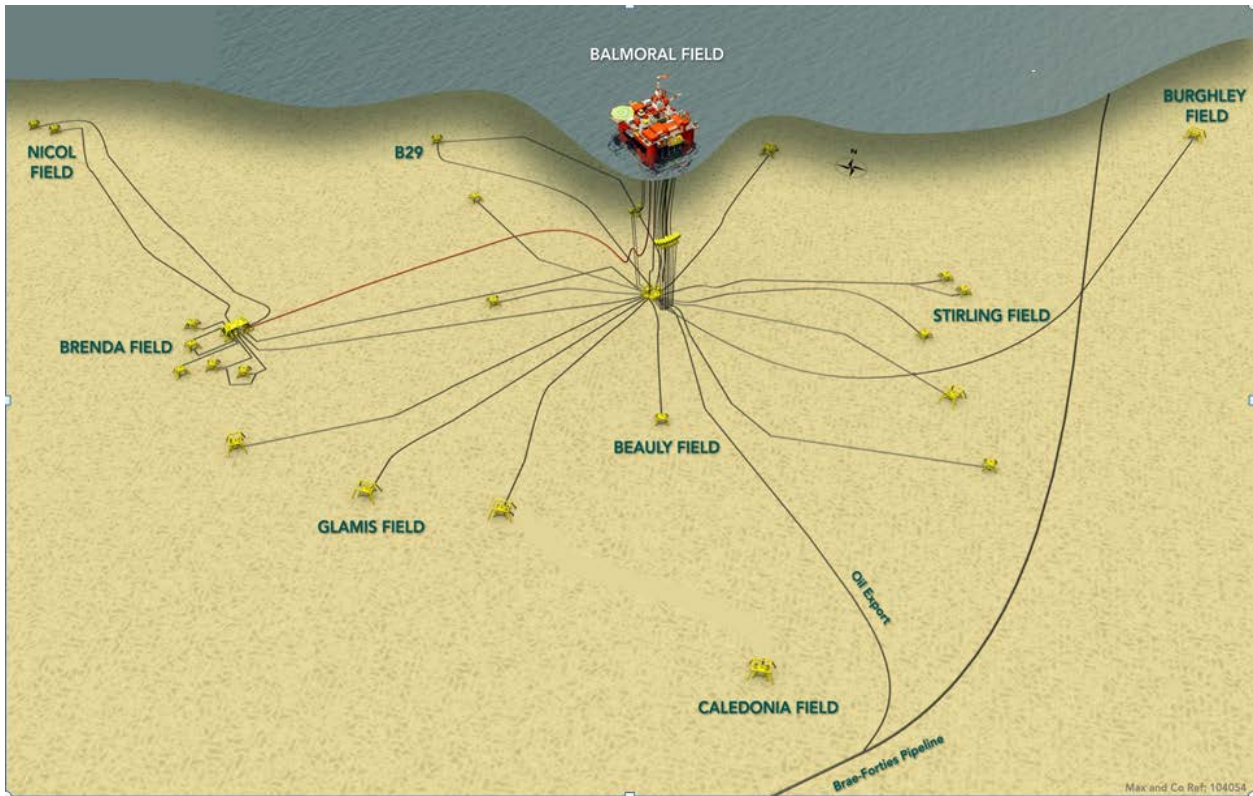
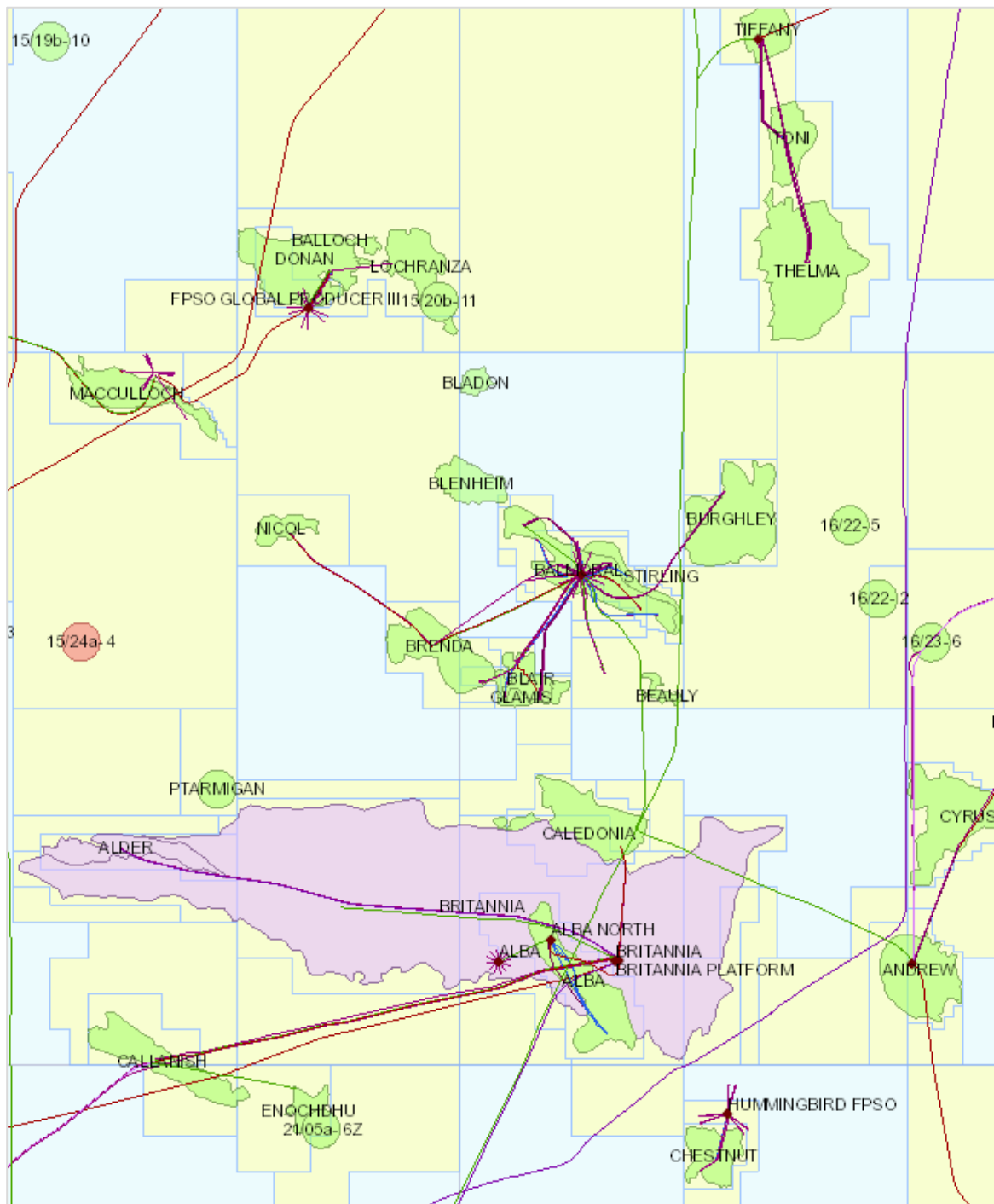


Table 1.6 Adjacent Facilities					
Operator	Name	Type	Distance, Direction	Information	Status
Premier Oil E&P UK Limited	Nicol	Subsea	9.5 km, NW 310°	Oil & gas production co-mingled with Brenda	Operational
Premier Oil E&P UK Limited	Balmoral	FPV	8.8 km, ENE 67°	Oil & gas production tied back to Balmoral FPV	Operational
Premier Oil E&P UK Limited	Balmoral	Subsea	8.8 km, ENE 67°	Oil & gas production tied back to Balmoral FPV	Operational
Premier Oil E&P UK Limited	Glamis	Subsea	4.7 km, SE 125°	Oil & gas production tied back to Balmoral FPV	Shut-in
Premier Oil E&P UK Limited	Stirling	Subsea	11.1 km, ENE 76°	Oil & gas production tied back to Balmoral FPV	Operational
Premier Oil UK Limited	Caledonia	Subsea	14.5 km, SE 138°	Oil & gas production tied back to Britannia platform	Shut-In
Repsol Sinopec North Sea Limited	Beaully	Subsea	9.3 km, E 100°	Oil & gas production tied back to Balmoral FPV	Operational
Repsol Sinopec North Sea Limited	Burghley	Subsea	17.3 km, ENE 64°	Oil & gas production tied back to Balmoral FPV	Operational
Impacts of Decommissioning Proposals					
<p>The Brenda field will be decommissioned in a programme of activities comprising the Balmoral, Glamis, Nicol and Stirling Fields. Decommissioning activities are planned so they will not affect the decommissioning of other fields or the operation of other developments in the area. The environmental appraisal will consider the potential cumulative implications of decommissioning activities in context of the other activities in the area including oil and gas and other industry.</p>					

Note: Adjacent facilities refer to those potentially impacted by this programme.

Figure 1.3: Adjacent Facilities





## 1.7 Industrial Implications

The Brenda decommissioning activities are part of the Balmoral Area Decommissioning Project which will be managed by Premier Oil in Aberdeen. All decommissioning activities will be planned to realise synergies and efficiencies in offshore execution.

A Supply Chain Action Plan (SCAP) has been produced for these decommissioning programmes in accordance with OGA guidance. The SCAP has been submitted to and approved by the OGA. Premier Oil have some pre-existing Master Service agreements with specialist contractors, which were the result of previous tender exercises. These contractors will be asked to quote for services to support the decommissioning activity in the first instance. Other specialist services will be competitively tendered or novated. Suppliers' offers will be assessed along many criterions, among which are capacity to execute the work safely; the commercial offer and experience of carrying out this type of operation on the UKCS.

## 2 DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

### 2.1 Installation: Surface Facilities (Balmoral FPV)

The Brenda subsea field is tied back to the Balmoral FPV. The Balmoral Decommissioning Programmes are separate Decommissioning Programmes, and are not included in this document.

### 2.2 Installations: Subsea including Stabilisation Features

Table 2.1: Subsea Installations and Stabilisation Features					
Subsea installations	Number	Size (m)/ Weight (Te)	Location		Comments/Status
Xmas Trees & Fishing Friendly Structures (FFS)	5	D1 9.8m x 9.1m x 5.7m 52.7 Te	WGS84 Decimal	58.19512 0.97167	FFS integrated with Xmas tree
			WGS84 Decimal Minute	58° 11.707' N 00° 58.300' E	
		D2 9.8m x 9.1m x 5.7m 52.7 Te	WGS84 Decimal	58.19555 0.97139	FFS integrated with Xmas tree
			WGS84 Decimal Minute	58° 11.733' N 00° 58.284' E	
		D3 9.8m x 9.1m x 5.7m 52.7 Te	WGS84 Decimal	58.19514 0.97193	FFS integrated with Xmas tree
			WGS84 Decimal Minute	58° 11.708' N 00° 58.316' E	
	D4 9.8m x 9.1m x 5.7m 52.7 Te	WGS84 Decimal	58.19499 0.97318	FFS integrated with Xmas tree	
		WGS84 Decimal Minute	58° 11.699' N 00° 58.391' E		

Table 2.1: Subsea Installations and Stabilisation Features					
Subsea installations	Number	Size (m)/ Weight (Te)	Location		Comments/Status
		D5 9.8m x 9.1m x 5.7m 52.7 Te	WGS84 Decimal	58.19525 0.97143	FFS integrated with Xmas tree
			WGS84 Decimal Minute	58° 11.715' N 00° 58.286' E	
Brenda Production Manifold	1	L29mxW10mxH6m 230 Te	WGS84 Decimal	58.19548 0.97190	Incorporates mud mats. Not piled. Cassette 110 Te and Protection Structure 109 Te
			WGS84 Decimal Minute	58° 11.729' N 00° 58.314' E	
Riser Base	1	L9mxW8mxH2.5m 56.4 Te	WGS84 Decimal	58.22817 1.10889	
			WGS84 Decimal Minute	58° 13.690' N 01° 06.534' E	
Mid-Water Arch	1	L8mxW4.75mxH7m 33.93 Te	WGS84 Decimal	58.22817 1.10889	
			WGS84 Decimal Minute	58° 13.690' N 01° 06.534' E	
Umbilical Hold- Back Assembly	1	L8.7mxL3.2mxH1.5m 28.5 Te	WGS84 Decimal	58.23005 1.10545	Installation incorporates a holdback collar, clump weight skid and 2 clump weights.
			WGS84 Decimal Minute	58° 13.803' N 01° 6.327' E	
Template Manifold (inc. valves & pipework)	1	L2.5mxW2.5mxH4m 14.3 Te	WGS84 Decimal	58.22867 1.10700	Co-ordinates represent the centre of slot 2 on the Balmoral Template.
			WGS84 Decimal Minute	58° 13.720' N 01° 6.420' E	

## 2.3 Pipelines Including Stabilisation Features

Table 2.2: Pipeline / Flowline / Umbilical Information									
Description	Pipeline No. (as per PWA)	Dia. (in)	Length (km)	Description of component parts	Product Conveyed	End Points From To	Burial Status	Pipeline Status	Current Contents
Production Flowline	PL2329	10.75"	9.272	Steel	Produced Fluids	Brenda Manifold To Balmoral QC/DC	Trenched & buried	Operational	Hydrocarbons
Flexible Jumper	PL2329J1	4"	0.043	Composite Flexible	Produced Fluids	Well D1Z To Brenda Manifold	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2329J2	4"	0.0455	Composite Flexible	Produced Fluids	Well D2 To Brenda Manifold	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2329J3	4"	0.027	Composite Flexible	Produced Fluids	Well D3Y To Brenda Manifold	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2329J4	4"	0.06	Composite Flexible	Produced Fluids	Well D4 To Brenda Manifold	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2329J5	4"	0.061	Composite Flexible	Produced Fluids	Well D5 To Brenda Manifold	Surface Laid	Operational	Hydrocarbons
Gas Lift Flowline	PL2330	6.6"	9.272	Steel	Dry gas	Balmoral QC/DC To Brenda Manifold	Trenched & buried	Operational	Hydrocarbons
Flexible Jumper	PL2330J1	2.5"	0.044	Composite Flexible	Dry gas	Brenda Manifold To Well D1Z	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2330J2	4"	0.045	Composite Flexible	Dry gas	Brenda Manifold To Well D2	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2330J3	4"	0.0285	Composite Flexible	Dry gas	Brenda Manifold To Well D3Y	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2330J4	2.5"	0.06	Composite Flexible	Dry gas	Brenda Manifold To Well D4	Surface Laid	Operational	Hydrocarbons
Flexible Jumper	PL2330J5	2.5"	0.05	Composite Flexible	Dry gas	Brenda Manifold To Well D5	Surface Laid	Operational	Hydrocarbons
Umbilical	PLU2328	Static 6" Dynamic 7.5"	9.67	Umbilical	Various	Balmoral PFP To Brenda Manifold	Trenched Not Backfilled	Operational	HW540 and Methanol

**Table 2.2: Pipeline / Flowline / Umbilical Information**

Description	Pipeline No. (as per PWA)	Dia. (in)	Length (km)	Description of component parts	Product Conveyed	End Points From To	Burial Status	Pipeline Status	Current Contents
Umbilical Jumper	PLU2328J1	0.63" 0.63" 0.63"	0.041	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Brenda Manifold To Well D1Z	Surface Laid	Out of Use	Seawater
Umbilical Jumper	PLU2328J2	0.63" 0.63" 0.63"	0.042	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Brenda Manifold To Well D2	Surface Laid	Out of Use	Seawater
Umbilical Jumper	PLU2328J3	0.63" 0.63" 0.63"	0.025	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Brenda Manifold To Well D3Y	Surface Laid	Out of Use	Seawater
Umbilical Jumper	PLU2328J4	0.37" 0.37" 0.49"	0.09	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Brenda Manifold To Well D4	Surface Laid	Operational	HW443R and Methanol
Umbilical Jumper	PLU2328J5	0.37" 0.37" 0.49"	0.09	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Brenda Manifold To Well D5	Surface Laid	Operational	HW443R and Methanol
Umbilical Jumper	PLU2983	0.63"	0.09	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Well D1 To Brenda Manifold	Surface Laid	Operational	HW443R and Methanol
Umbilical Jumper	PLU2984	0.63"	0.09	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Well D2 To Brenda Manifold	Surface Laid	Operational	HW443R and Methanol
Umbilical Jumper	PLU2985	0.63"	0.05	1 HP Hydraulic Hose 6 LP Hydraulic Hose 1 Methanol Hose	Various	Well D3 To Brenda Manifold	Surface Laid	Operational	HW443R and Methanol

**Table 2.3: Subsea Pipeline Stabilisation Features**

Stabilisation Feature	Total Number	Weight (Te)	Locations	Exposed/Buried/Condition
Bend Shoe	1	15	Brenda umbilical at Balmoral template	Exposed, in good condition
Concrete mattresses	128	497	PLU2328, PLU2328J2, PL2329, PL2330, PL2329J1, PL2329J2, PL2329J3, PL2329J4, PL2330J1, PL2330J3, PL2330J4	Exposed, in good condition
Grout bags*	560	14	All pipelines and jumpers	Exposed, in good condition
Rock Dump	n/a	3,560	PL2329, PL2330	Exposed

\*Estimated using GVI footage and as-built drawings.

## 2.4 Wells

Table 2.4 Well Information					
Platform Wells		Designation	License	Status	Category of Well
n/a		n/a	n/a	n/a	n/a
Subsea Wells					
WONS Name Current bore	Premier Oil Well Name	Designation	License	Status	Category of Well
15/25b-D1y	15/25b-D1y	Production	P1042	Operating	SS 3-3-3
15/25b-D2	15/25b-D2	Production	P1042	Operating	SS 3-3-3
15/25b-D3y	15/25b-D3y	Production	P1042	Operating	SS 3-3-3
15/25b-D4z	15/25b-D4z	Production	P1042	Operating	SS 3-3-3
15/25b-D5s	15/25b-D5s	Production	P1042	Operating	SS 3-3-3
15/25b-6	15/25b-6	E&A	P1042	Abandoned – Phase 1	SS 0-3-1
15/25b-10	15/25b-10	E&A	P1042	Abandoned – Phase 1	SS 0-3-1

The well categories are indicative and require to be evaluated in accordance with the OGUK Well Decommissioning Guidelines, Issue 6, June 2018. This work is ongoing at the time of submission.

## 2.5 Drill Cuttings

(See Section 3.7 for further information)

Table 2.5: Drill Cuttings Pile(s) Information		
Location of Pile Centre (Latitude/Longitude)	Seabed Area (m <sup>2</sup> )	Estimated volume of cuttings (m <sup>3</sup> )
n/a	n/a	n/a

## 2.6 Inventory Estimates

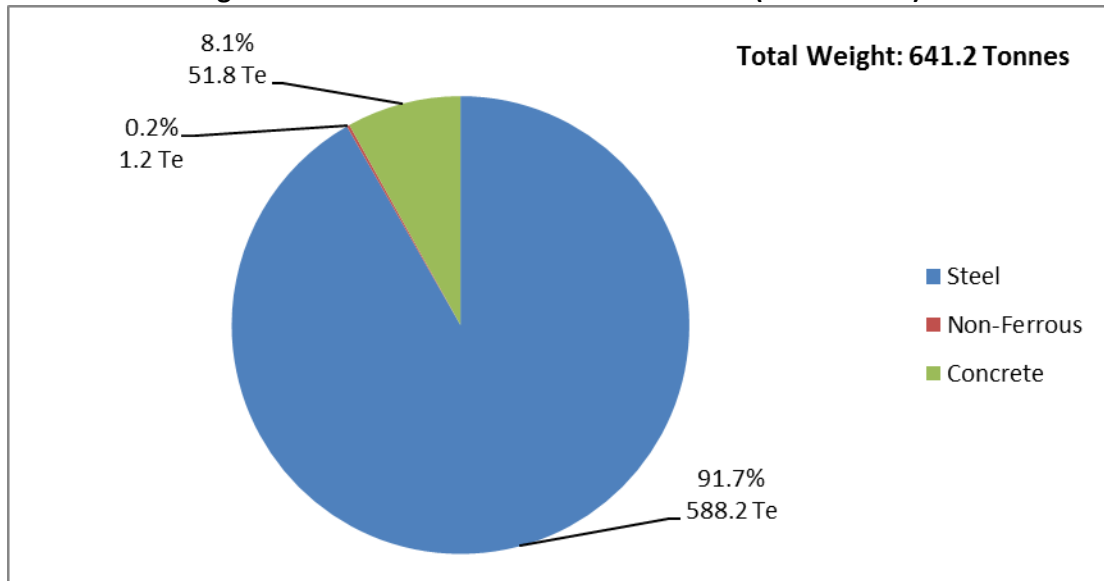
Table 2.6 and 2.7 provides an estimate of the total weight of materials associated with the Brenda installations and pipelines, including approximately 40 tonnes of steel associated with each of the Brenda Xmas trees.

A further breakdown of the inventory estimates for the subsea installations and pipelines is provided in Figure 2.1 and Figure 2.2 respectively.

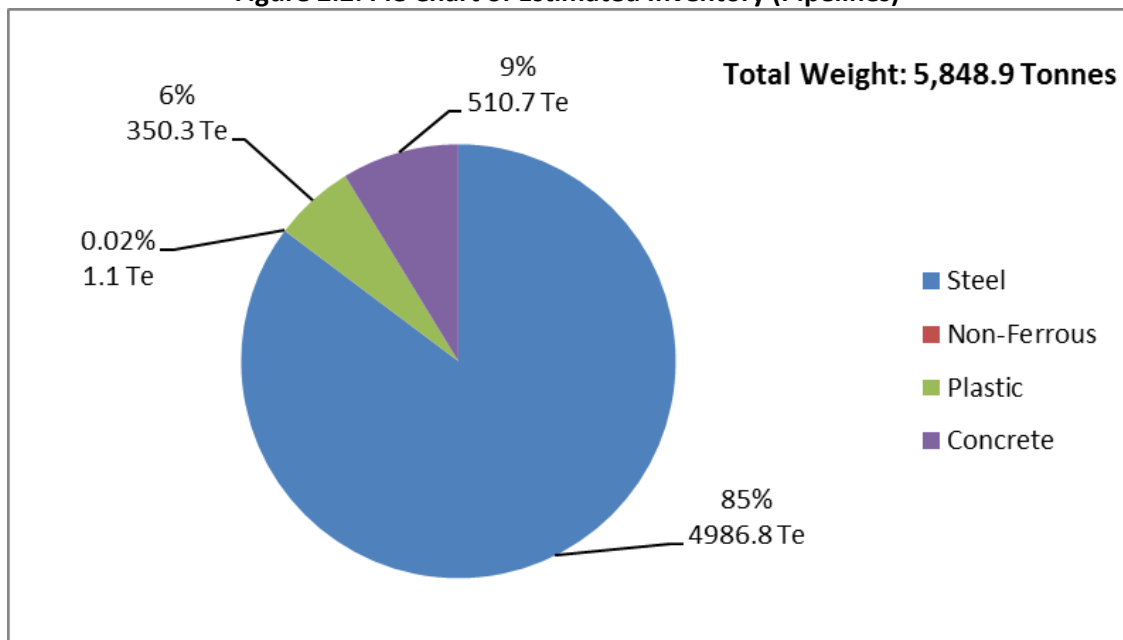
Table 2.6: Inventory of material associated with Brenda installations		
Item	Description	Weight Te
Metals	Ferrous (steel - all grades)	588.2
	Non-Ferrous (copper, aluminium, etc.)	1.2
Concrete	Aggregates (mattresses, grout bags)	51.8
Plastic	Rubbers, polymers	0
Hazardous	Residual fluids (hydrocarbons, chemicals)	0
	NORM scale	0
<b>Total (Tonnes)</b>		<b>641.2</b>

Table 2.7: Inventory of material associated with Brenda pipelines		
Item	Description	Weight Te
Metals	Ferrous (steel - all grades)	4986.8
	Non-Ferrous (copper, aluminium, etc.)	1.1
Concrete	Aggregates (mattresses)	510.7
Plastic	Rubbers, polymers	350.3
Hazardous	Residual fluids (hydrocarbons, chemicals)	trace
	NORM scale	trace
<b>Total (Tonnes)</b>		<b>5,848.9</b>

**Figure 2.1: Pie Chart of Estimated Inventories (Installations)**



**Figure 2.2: Pie Chart of Estimated Inventory (Pipelines)**

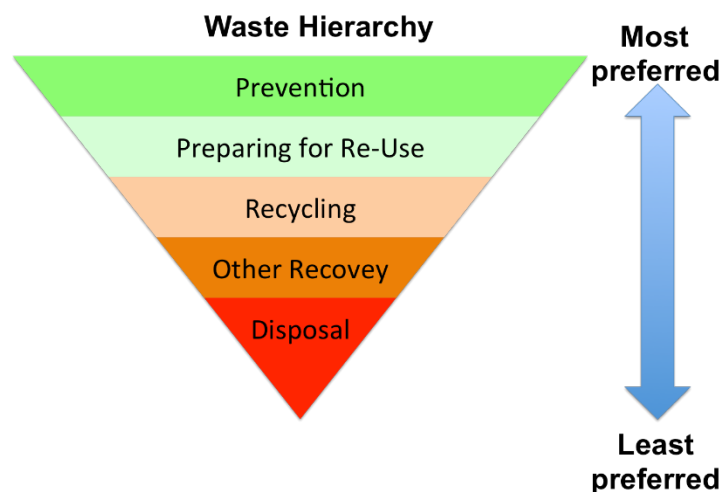


Please refer to Greater Balmoral Area Decommissioning Environmental Appraisal for further details.



### **3 REMOVAL AND DISPOSAL METHODS**

Decommissioning of the Brenda field will generate a quantity of waste. Premier Oil is committed to establishing and maintaining environmentally acceptable methods for managing wastes in line with the Waste Framework Directive and principles of the waste hierarchy:



Recovered infrastructure will be returned to shore and transferred to a suitably licenced waste treatment facility. It is expected that the recovered infrastructure, i.e. manifolds, flowlines, umbilicals, jumpers and risers will be cleaned before being largely recycled.

Concrete mattresses and grout bags that are recovered, will be cleaned of marine growth if required, and either reused, recovered as aggregate for infrastructure projects or disposed of in landfill sites.

An appropriately licensed waste management company and yard will be identified through a selection process that will ensure that the chosen facility demonstrates a proven track record of waste stream management throughout the deconstruction process, the ability to deliver innovative reuse / recycling options, and ensure the aims of the waste hierarchy are achieved.

Geographic locations of potential disposal yard options may require the consideration of Trans Frontier Shipment of Waste (TFSW), including hazardous materials. Early engagement with the relevant waste regulatory authorities will ensure that any issues with TFSW are addressed.

Premier Oil will engage with other companies and industries to identify potential reuse opportunities. However Premier Oil believes that such opportunities are best achieved through the tendering and selection of a waste management contractor with the expert knowledge and experience in this area.

#### **3.1 Floating Production Vessel (FPV)**

Not applicable to Brenda Field Decommissioning Programmes.

The decommissioning of the Balmoral Field, including the Balmoral FPV, are separate Decommissioning Programmes.

### 3.2 Jacket(s)

Not applicable to Brenda subsea field decommissioning.

### 3.3 Subsea Installations and Stabilisation Features

Table 3.1: Subsea Installations and Stabilisation Features			
Subsea Installations and Stabilisation Features	Number	Option	Disposal Route (if Applicable)
Xmas Trees & Fishing Friendly Structures (FFS)	5	Full recovery as part of decommissioning campaign	Return to shore for recycling
Brenda Production Manifold	1	Full recovery as part of decommissioning campaign	Return to shore for recycling
Riser Base	1	Full recovery as part of decommissioning campaign	Return to shore for recycling
Midwater Arch	1	Full recovery as part of decommissioning campaign	Return to shore for recycling
Umbilical hold-back skid	1	Full recovery as part of decommissioning campaign	Return to shore for recycling
Template Manifold	1	Full recovery as part of decommissioning campaign	Return to shore for recycling

### 3.4 Pipelines

#### Decommissioning Options:

1A - Leave as-is	2A – Remove Exposed Ends/Exposures & Rock Placement	3A – Disconnect & Retrench Entire Line	5B – Reverse Reel No Deburial
1B - Remove Exposed Ends & Local Rock Placement	2B – Remove Exposed Ends/Exposures & Burial	3B – Disconnect & Full Rock Placement	5C – Deburial & Cut and Lift
1C - Remove Exposed Ends & Trench/Bury	2C – Trench/Bury Ends & Exposures	4 – Re-use in New Development	5D – Deburial Lift & Cut on Vessel
1D - Accelerated Decomposition	2D – Rock Placement Ends & Exposures	5A – Deburial & Reverse Reel	5E – Lift & Cut on Vessel

Table 3.2: 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
Group 3: Trenched & Buried Rigid Flowlines PL2329, PL2330	Trenched & Buried (See burial profiles in appendix II)	Whole	1B, 2A, 3A, 3B and 5C
Group 4: Trench & Buried Flexible Flowlines & Umbilicals PLU2328	Trenched & Buried	Whole	1B, 2A, 3A, 3B, 5A and 5C
Group 5: Flexible Jumpers PL2329, PL2330 PL2329J1, J2, J3, J4, J5 PL2330J1, J2, J3, J4, J5	Surface Laid	Whole	Full Removal
Group 7: Rigid spoolpieces PL2329, PL2330 PL2329J1, J2, J3, J4, J5 PL2330J1, J2, J3, J4, J5	Surface Laid	Whole	Full Removal
Group 9: Control & Chemical Jumpers PLU2328J1, J2, J3, J4, J5, PLU2983, PLU2984, PLU2985	Surface Laid	Whole	Full Removal
Group 16: Flexible Risers PLU2328, PL2329, PL2330	Surface Laid	Whole	Full Removal

### **Comparative Assessment Method:**

Comparative Assessment is integral to the overall planning and approval of decommissioning options. Premier Oil's strategy for the Comparative Assessment process is aligned with the Oil & Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes and OPRED Guidance Notes for the Decommissioning of Offshore Oil & Gas Installations and Pipelines.

Premier Oil has scoped all of the infrastructure into logical groupings. All feasible decommissioning options for each of the infrastructure groups have been identified, assessed, ranked and screened, utilising the OPRED Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines to carry forward credible decommissioning options to be assessed through the comparative assessment process.

The comparative assessment process uses five assessment criteria, which are; Safety, Environment, Technical, Societal and Economic to compare the relative merits of each credible decommissioning option for each group of infrastructure. The assessment criteria are equally weighted to balance and represent the views of the each of the stakeholders.

An independent consultancy utilising its bespoke Multi Criteria Decision Analysis (MCDA) process was employed to facilitate comparative assessment workshops. The workshops were attended by specialists from the Operator, Field Partners and representatives from key stakeholders namely:

- Scottish Fishermen's Federation
- Joint Nature Conservation Committee
- Marine Scotland
- Oil and Gas Authority
- OPRED EMT
- OPRED ODU (observers)
- Premier Oil E&P UK Limited
- Repsol Sinopec North Sea Limited
- Rockrose UKCS4 Limited
- ConocoPhillips (U.K.) Limited now Chrysaor Production (U.K.) Limited

At each workshop, each decommissioning option for each infrastructure grouping was assessed against each of the assessment criteria utilising a pairwise comparison system. The relative importance of each of the criteria was assessed in a qualitative way, supported by quantification where appropriate.

The process provides for differentiation between decommissioning options in each infrastructure group taking account of stakeholder views.

**Outcome of Comparative Assessment:**

Table 3.3: Outcomes of Comparative Assessment		
Pipeline or Group	Recommended Option	Justification
Group 3: Trenched & Buried Rigid Flowlines PL2329, PL2330	Leave <i>in-situ</i> and remedial rock dump	Overall, options 1B and 2A are assessed as the most preferred options. The scores obtained are so close it is impossible to separate them. They have been assessed as the equal most preferred option against the Environmental, Technical, Societal and Economic criteria. Overall given that option 2A eliminates exposures as well as exposed ends, this will form the decommissioning option for this group.
Group 4: Trench & Buried Flexible Flowlines & Umbilicals PLU2328	Full Removal	Overall, Option 5A is assessed as the most preferred option. It has been assessed as the equal most preferred option against the Technical, Societal and Economic criteria. Whilst overall it is only marginally preferred to options 1B and 2A, given that option 5A is a full removal option, this will form the decommissioning option for this group.
Group 5: Flexible Jumpers PL2329, PL2330 PL2329J1, J2, J3, J4, J5 PL2330J1, J2, J3, J4, J5	Full Removal	Items are surface laid and recoverable
Group 7: Rigid spoolpieces PL2329, PL2330 PL2329J1, J2, J3, J4, J5 PL2330J1, J2, J3, J4, J5	Full Removal	Items are surface laid and recoverable
Group 9: Control & Chemical Jumpers PLU2328J1, J2, J3, J4, J5, PLU2983, PLU2984, PLU2985	Full Removal	Items are surface laid and recoverable
Group 16: Flexible Risers PLU2328, PL2329, PL2330	Full Removal	Items are surface laid and recoverable

### 3.5 Pipeline Stabilisation Features

Table 3.4: Pipeline Stabilisation Features			
Stabilisation Features	Number	Option	Disposal Route (if Applicable)
Bend shoe	1	Full removal	Recover and transport ashore for recycling or other waste treatment as appropriate.
Concrete Mattresses (6m x 3m x 0.15m)	128	Full Removal - It is intended that the mattresses be recovered to shore, however, in the event of practical difficulties OPRED will be consulted.	Recover and transport ashore for recycling or other waste treatment as appropriate.
Rockdump	3,560 Te	To remain in place.	n/a
Grout bags	560	Full removal is intended with an option to reuse on location.*	Recover and transport ashore for recycling or other waste treatment as appropriate

\* A number of grout bags may be redeployed/repurposed locally as snagging hazard mitigation.

### 3.6 Wells

Table 3.5: Well Plug and Abandonment
<p>The wells for the Field covered by this Decommissioning Programmes will be plugged and abandoned, as listed in Section 2.4 (Table 2.4), in accordance with the Oil &amp; Gas UK Well Decommissioning Guidelines, Issue 6, June 2018.</p> <p>A WONS application update will be submitted along with an appropriate suite of permit applications, via the UK Energy Portal, in support of each well abandonment.</p>

### 3.7 Drill Cuttings

#### Drill Cuttings Decommissioning Options:

Table 3.6 Drill Cuttings Decommissioning Options				
How many drill cuttings piles are present? n/a				See below for further details
Tick options examined: <input type="checkbox"/> Remove and re-inject <input checked="" type="checkbox"/> Leave in place <input type="checkbox"/> Cover <input type="checkbox"/> Relocate on seabed <input type="checkbox"/> Remove and treat onshore <input type="checkbox"/> Remove and treat offshore <input type="checkbox"/> Other				
Review of Pile characteristics	Pile 1	Pile 2	Pile 3	Pile 4
How has the cuttings pile been screened? See below for further details.	Y	n/a	n/a	n/a
Dates of sampling (if applicable)	2016			
Sampling to be included in pre-decommissioning survey?	Y			
Does it fall below both OSPAR thresholds?	Y			
Will the drill cuttings pile have to be displaced in order to remove the jacket?	n/a			
What quantity (m <sup>3</sup> ) would have to be displaced/removed?	n/a			
Will the drill cuttings pile have to be displaced in order to remove any pipelines?	n/a			
What quantity (m <sup>3</sup> ) would have to be displaced/removed?	n/a			
Have you carried out a Comparative Assessment of options for the Cuttings Pile?	n/a			

#### Comparative Assessment Method:

No comparative assessment is required under Stage 2 of OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings Piles in relation to decommissioning of the Brenda field, as discussed further below.

There are five production wells clustered together in this satellite development. These were drilled over the period 2006 to 2008, after the prohibition of oil base mud discharge to sea under OSPAR Decision 2000/3 on the Use of Organic-Phase Drilling Fluids (OPF) and the Discharge of OPF-Contaminated Cuttings. The riserless tophole sections of these wells were originally drilled with seawater and sweeps (spud mud). While some of the deeper well sections were drilled with KCL water base mud (WBM), most were drilled with oil base mud (OBM). Given the time of drilling, all cuttings generated and associated OBM were contained on the rig and shipped to shore for disposal. All other wells in the field consist of isolated exploration or appraisal wells.

Environmental seabed sampling around the Brenda well cluster was undertaken in 2016, as part of a pre-decommissioning environmental baseline survey of the Balmoral development. Analysis of the samples

collected observed that the mean total hydrocarbon concentration (THC) was below the general OSPAR environmental effects threshold (50 mg/kg) cited in OSPAR Recommendation 2006/5 and heavy metal concentrations were all below the OSPAR effects range low thresholds. A pre-decommissioning habitat assessment survey was also undertaken over the Balmoral development in 2016. Subsea imagery gathered around the Brenda wells during observed possible drill cuttings, but these were deposited in a thin layer rather than as a discrete pile.

In accordance with OSPAR Recommendation 2006/5, as only WBM cuttings were discharged to sea in association with the wells and sampling indicates that there is no other significant contamination of the cuttings discharged, no further investigation is necessary. Therefore, no further sampling-based evaluation of pile characteristics or comparison of potential management regimes for cuttings is required and any cuttings present can be allowed to degrade naturally. As stated above, seabed imagery has not observed any notable cuttings accumulation.

**Outcome of Comparative Assessment:**

Not applicable - see above for details.

**3.8 Waste Streams**

The Premier Oil Waste Management Strategy specifies the requirements for the contractor waste management plan. The waste management plan will be developed once the contract has been awarded during the project execution phase. The plans shall adhere to the waste stream licensee conditions and controlled accordingly. Discussion with the regulator will ensure that all relevant permits and consents are in place.

Table 3.7: Waste Stream Management Methods	
Waste Stream	Removal and Disposal method
Bulk liquids	Bulk flushing/de-oiling by either round-trip flushing from/to the Balmoral FPV or utilising DSVs to flush to the Balmoral FPV. Waste fluids will be processed by the Balmoral FPV and may be discharged to sea under appropriate permit.
Marine growth	Some marine growth may be removed offshore. Onshore disposal will be managed by the selected waste management contractor.
NORM/LSA Scale	NORM contaminated material may be removed and discharged offshore under appropriate permit, or, returned to shore to be disposed of by the selected onshore waste management contractor.
Asbestos	n/a
Other hazardous wastes	Will be recovered to shore and will be managed by the selected waste management contractor and disposed of under appropriate permit. The inventory of hazardous materials will identify hazardous materials present and Premier Oil's risk management process will be used to prevent spills offshore.
Onshore Dismantling sites	Appropriate licenced contractor and sites will be selected. Facility selected must demonstrate competence and proven disposal track record and waste stream management & traceability throughout the deconstruction process and demonstrate their ability to deliver innovative recycling options.



Table 3.8 Inventory Disposition			
	Total Inventory Tonnage (Te)	Planned tonnage to shore (Te)	Planned left <i>in situ</i> (Te)
Subsea Pipelines	5,554	4,426	1,128
Subsea Umbilicals	295	295	0
Subsea Installations	641	641	0

All recovered material will be brought 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 3.9 are disposal aspirations.

Table 3.9 Recovered Inventory Reuse, Recycle, Disposal Aspirations			
	Reuse	Recycle	Disposal
Pipelines	<5%	>95%	<5%
Subsea Umbilical	<5%	>95%	<5%
Subsea Installations	<5%	>95%	<5%

Please refer to the Greater Balmoral Area Decommissioning Environmental Appraisal for further details.

## 4 ENVIRONMENTAL APPRAISAL

### 4.1 Environmental Sensitivities (Summary)

Table 4.1: Environmental Sensitivities	
Environmental Receptor	Main Features
Conservation interests	The project area is located outside of any conservation sites, and the nearest such sites are the Scanner Pockmark SAC (9 km) and the Norwegian Boundary Sediment Plain MPA (29 km). Both of these conservation sites have been designated for the protection of seabed habitats and features: submarine structures formed by leaking gases and ocean quahog habitat and aggregations, respectively. Whilst there was evidence of some pockmark features and ocean quahog ( <i>Arctica islandica</i> ) presence from the site specific environmental survey data, there was no evidence of submarine structures associated with leaking gases or aggregations of ocean quahog which would constitute OSPAR or Annex I protected features. The closest known such ocean quahog aggregation is approximately 24 km west of the project area.
Seabed Habitats and Fauna	<p>The water depths across Balmoral fall between roughly 138 m to 152 m LAT (Fugro, 2018a). The seabed generally comprises poorly sorted coarse to medium silt with moderate carbonate and low organic content. Hydrocarbon levels showed a similar distribution across the survey area and was considered typical of low level weathered petroleum residues commonly found in CNS sediments.</p> <p>The majority of the survey area was characterised as the European Nature Information Systems (EUNIS) biotype complex, 'Circalittoral fine mud (A5.35)' (Fugro, 2017b). The Scottish Priority Marine Feature (PMF) 'Burrowed mud' and its component habitat 'Seapens and burrowing megafauna in circalittoral fine mud' were prevalent throughout the project area (Fugro, 2018b).</p> <p>There are numerous seabed depressions present across the area, although none of the more than 40 depressions investigated in the Fugro (2018a) and Gardline (2005) surveys were found to support Methane-Derived Authigenic Carbonate (MDAC) or associated communities that could classify these depressions as the Annex I habitat 'Submarine structures made by leaking gases'. Assessment for the presence of the OPSAR protected/threatened habitat, 'Seapen and burrowing megafauna communities,' suggested that the seabed surrounding the project area is a strong example of this habitat and burrows generated by megafauna were 'abundant' (on the SACFOR scale) during the 24 transects run within the survey area. These burrows could possibly be attributed to Norwegian lobster (<i>N. norvegicus</i>), however, no individuals were observed during the surveys and thus the presence of such megafauna cannot be confirmed.</p>

	<p>Equally, other burrowing crustaceans or polychaetes could have generated the burrows; burrowing prawns (<i>C. subterranea</i>) were recorded during the surveys for example (Fugro, 2018a).</p> <p>Juvenile ocean quahog were found in low numbers across the majority of stations (the maximum in any single sample was seven individuals). However, no adults were identified nor any aggregations of the quahog, indicating the survey area is not of particular importance to this species (Fugro, 2018b). No other protected habitats or fauna were identified during the surveys.</p>
Fish	<p>The Greater Balmoral Area is located within the spawning and nursery grounds of cod, mackerel, Nephrops and Norway pout (Coull et al., 1998; Ellis et al., 2012). Additionally, the following species are likely to have nursery grounds near or within the project area: anglerfish, blue whiting, European hake, haddock, herring, ling, sandeel, spotted ray, spurdog and whiting (Coull et al., 1998; Ellis et al., 2012). However, fisheries sensitivity maps indicate that the probability of significant aggregations of juveniles of these species in the offshore project area is low (Ellis et al., 2012).</p> <p>Aires et al. (2014) provides modelled spatial representations of the predicted distribution of 0 age group fish. The modelling indicates the presence of juvenile fish (less than one year old) for multiple species: anglerfish, blue whiting, European hake, haddock, herring, mackerel, horse mackerel, Norway pout, plaice, sprat, and whiting. However, the probability of juvenile fish aggregations occurring across the Greater Balmoral Area is low to very low (&lt; 0.2) for all species.</p>
Marine Mammals	<p>Harbour porpoise (<i>Phocoena phocoena</i>), white-beaked dolphin (<i>Lagenorhynchus albirostris</i>), white-sided dolphin (<i>Lagenorhynchus acutus</i>), and minke whale (<i>Balaenoptera acutorostrata</i>) are known to regularly occur in the waters surrounding the project area, either as residents or regular visitors (Hammond et al., 2017; Reid et al., 2003). Harbour and grey seal densities are very low across the region comprising Balmoral due to its distance from shore (SMRU and Marine Scotland, 2017).</p>
Seabirds	<p>The seabird species most commonly observed in the waters surrounding the project area include: northern fulmar (<i>Fulmarus glacialis</i>), Manx shearwater (<i>Puffinus puffinus</i>), European storm-petrel (<i>Hydrobates pelagicus</i>), northern gannet (<i>Morus bassanus</i>), Arctic skua (<i>Stercorarius parasiticus</i>), great skua (<i>Stercorarius skua</i>), black-legged kittiwake (<i>Rissa tridactyla</i>), Arctic tern (<i>Sterna paradisaea</i>), common guillemot (<i>Uria aalge</i>), razorbill (<i>Alca torda</i>), little auk (<i>Alle alle</i>) Atlantic puffin (<i>Fratercula arctica</i>) and pomarine skua (<i>Stercorarius pomarinus</i>). Herring gulls (<i>Larus argentatus</i>), common gulls (<i>Larus canus</i>), and great and lesser black-backed gulls (<i>Larus marinus</i> and <i>Larus fuscus</i>, respectively) also use the area in winter (Kober et al., 2010).</p> <p>The Seabird Oil Sensitivity Index (SOSI) identifies areas at sea where seabirds are likely to be most sensitive to surface pollution; the SOSI values in Blocks 15/25 and 16/21 are classed as low throughout the year, with an increase to medium in Block 15/25 in June (Webb et al., 2016). No SOSI data is available during the months of November or December for this region.</p>

<p>Commercial Fisheries</p>	<p>Balmoral is located in International Council for the Exploration of the Seas (ICES) rectangle 45F1 (Scottish Government, 2019). Commercial fishing effort and landings were dramatically higher to the west of the project area than in 45F1, when considering totals and averages for the five most recent fishing years (2014-2018; Scottish Government, 2019). Within this time period, pelagic species comprised the greatest total and average live weight and shellfish made up the largest total and average value of landings for UK and foreign vessels landing into the UK (Scottish Government, 2019).</p> <p>According to fishing data from the Scottish Government (2019), the waters comprising the Greater Balmoral Area are fished for a variety of species by both UK and foreign vessels. ICES rectangle 45F1 is predominantly targeted for deep-water demersal and pelagic species, whilst the adjacent ICES rectangle 45F0 experiences a much greater amount of pelagic fishing. For the last five fishing years, the total landings value was greater in ICES rectangle 45F0 than 45F1 by nearly £6.4M, and the live weight of those landings were greater by approximately 10,000 Te because of this discrepancy. Trawls (both pelagic and demersal) were the most utilised gear in rectangle 45F1 and was attributable to more than 99% of total fishing effort in the ICES rectangle 45F1, with &lt;1% of fishing effort comprising seine nets (Scottish Government, 2019). Based on the low to moderate levels of demersal trawling across the pipelines associated with Balmoral (Rouse et al., 2018), it is likely that these data primarily characterise midwater trawling effort targeting pelagic and some demersal species.</p>
<p>Other Users of the Sea</p>	<p>Across the region comprising Balmoral, sea users other than commercial fisheries mainly relate to offshore Oil and Gas. There are nine surface installations located within 40 km of the Balmoral FPV, the closest of which is the Alba North platform located 19 km to the southwest. Shipping density across the project area is very low and consists mainly of cargo and supply vessels.</p> <p>The closest submarine cable to the Greater Balmoral Area is the TAMPNET CNSFTC cable, which is located 40 km to the south of the project area (KIS-ORCA, 2019). The NorthConnect power cable, a subsea HVAC power cable connecting Long Haven Bay, Scotland (near Peterhead) to Norway will be located several kms north of the project area. Construction works for this North Sea spanning cable are due to take place between 2021 and 2024. As cable installation will be on a prescribed route outwith the project area, there is minimal potential for interactions with the proposed decommissioning activities within the Greater Balmoral Area.</p> <p>There are two unknown wrecks in the vicinity of the project area, approximately 5km southeast and 4 km northwest of the project area; additionally, there is one named wreck (Elhanan T) located approximately 8 km from the project area. This wreck is classified as a non-dangerous wreck (NMPi, 2019).</p> <p>There are no military restrictions or known military or renewables activities within the vicinity of the project area.</p>
<p>Atmosphere</p>	<p>The majority of atmospheric emissions for the decommissioning of the five fields and FPV associated with the Greater Balmoral Area are attributable to vessel use or are associated with the recycling of material returned to shore. The worst case estimate for total CO2 emissions generated by the decommissioning activities for all of the assets in the Greater Balmoral Area is 83,380 Te, of which 50,757 Te</p>

	is related to vessel emissions. This equates to 0.65% of the total annual UKCS vessel emissions (excluding fishing vessels) when considering 2017 data (7,800,000 Te; BEIS, 2019). The remaining 32,623 Te CO2 will be generated through the life cycle of the project materials; those recovered and not reused or left in situ.
Onshore Communities	Waste generated during decommissioning will be transported to shore in an auditable manner through licensed waste contractors, as managed under the Balmoral Late Life Project (BLLP) waste management plan. Wastes will be treated using the principles of the waste hierarchy, as defined in the BLLP, focusing on the reuse and recycling of wastes where possible. Raw materials will be returned to shore with the expectation to recycle the majority of the returned material. There may be instances where infrastructure returned to shore is contaminated (e.g. by NORM, hazardous, and/or special wastes) and cannot be recycled. In these instances, the materials will require disposal. However, the weight and/or volume of such material is not expected to result in substantial landfill use.

## 4.2 Potential Environmental Impacts and their Management

### Environmental Appraisal Summary:

The EA addresses potential environmental and societal impacts by characterising the likelihood and significance of interactions between the proposed decommissioning activities and the local environment, whilst considering stakeholder response. The EA also details mitigation measures designed to abate potential impacts in accordance with Premier’s Environmental Management System (EMS) and Health, Safety, Environment and Security (HSES) Policy. Key potential environmental and societal impacts which were considered to be ‘potentially significant’, and thus requiring further assessment, were identified through an environmental issues identification (ENVID) workshop; they include: impacts to water quality; seabed impacts; and impacts to commercial fisheries. These potential impacts have undergone detailed assessment within the EA. The following environmental and societal impacts were screened out from further assessment due to existing controls limiting the likelihood of potential significant impacts: emissions to air; vessel presence; underwater noise emissions; resource use; onshore activities; waste; and unplanned events. The justifications for screening out these impact pathways are detailed in the accompanying EA.

The EA concludes that the recommended options to decommission the Brenda Field subsea installations and pipelines can be completed without causing significant impact to environmental or societal receptors.

### Overview:

Table 4.2 describes the potential impact pathways identified from the relevant infrastructure to be decommissioned, alongside the proposed management measures in place to mitigate against them.

Table 4.2: Environmental Impact Management

Activity	Main Impacts	Management
Small Subsea Installations Removal (incl. Stabilisation Features)	<p>Seabed impacts from:</p> <ul style="list-style-type: none"> <li>cutting of piles below the seabed;</li> <li>cut and lift removal; and</li> <li>removal of grout bags and stabilisation materials.</li> </ul> <p>Impacts to commercial fisheries from project activities excluding access to fishing grounds.</p>	<p>Vessel use will be optimised/minimised for the decommissioning activities and managed per Premier’s existing vessel management procedures, including a vessel work programme.</p> <p>The 50 m safety exclusion zone will remain in operation during the decommissioning activities reducing risk of non-project related vessels entering into the area where decommissioning activities are taking place. This safety exclusion zone will be removed following the completion of the relevant decommissioning activities enabling fisheries to regain access to grounds. Fishing activities have the potential to increase in the area once the 500 m safety zones surrounding the existing substructures are re-assessed.</p> <p>Use of established contractors with appropriate capability, licences and maintenance procedures will be selected and audited. Other sea users will be notified in advance of activities occurring and Premier keeps manned bridges.</p> <p>The infrastructure is currently shown on Admiralty Charts and the FishSafe system. When decommissioning activity has been completed, updated information will be made available to update Admiralty Charts and FishSafe system.</p> <p>All pipeline routes and installation sites will be the subject of oilfield debris clearance and as-left verification surveys when decommissioning activity has concluded.</p>
Decommissioning Rigid Flowlines (incl. Stabilisation Features)	<p>Seabed impacts from decommissioning of rigid flowlines <i>in situ</i>:</p> <ul style="list-style-type: none"> <li>cutting ends and recovery of lengths of flowlines;</li> <li>deposition of new rock armour to protect ends and previously cut exposures (where required); and</li> </ul>	<p>Operations will be conducted as carefully as possible to minimise sediment disturbance, avoiding dragging of items on the seabed where possible.</p> <p>Rock dumping will be carefully managed, e.g. through use of an ROV to limit the areas covered (reducing unnecessary spreading) and depth of coverage to that required to ensure no snagging hazards remain.</p> <p>The infrastructure is currently shown on Admiralty Charts and the FishSafe system. When decommissioning activity has been completed, updated information will be made available to update Admiralty Charts and FishSafe system.</p>

	<ul style="list-style-type: none"> <li>• clear seabed verification which may require direct intervention (e.g. overtrawling).</li> </ul> <p>Snagging risk associated with pipelines decommissioned <i>in situ</i>.</p>	<p>Any snagging risk to other sea users will be minimised by continual monitoring of degrading structures or free spans (type and frequency to be determined through a risk-based approach but will be agreed with OPRED).</p> <p>All pipeline routes and installation sites will be the subject of oilfield debris clearance and as-left verification surveys when decommissioning activity has concluded.</p>
<p>Decommissioning Surface-laid and Buried Flexible Flowlines and Umbilicals (incl. Stabilisation Features)</p>	<p>Seabed impacts from:</p> <ul style="list-style-type: none"> <li>• removal of surface laid flexible flowlines, umbilicals and jumpers, rigid spoolpieces and flexible risers;</li> <li>• reverse-reeling of buried flexible flowlines;</li> <li>• removal of stabilisation features; and</li> <li>• clear seabed verification which may require direct intervention (e.g. overtrawling).</li> </ul> <p>Impacts to commercial fisheries from project activities excluding access to fishing grounds.</p>	<p>Operations will be conducted as carefully as possible to minimise sediment disturbance, avoiding dragging of items on the seabed where possible.</p> <p>Excavated areas remediated and any berms created profiled to mitigate snagging risks to other sea users.</p> <p>Vessel use will be optimised/minimised for the decommissioning activities and managed per Premier’s existing vessel management procedures, including a vessel work programme.</p> <p>The 500 m safety exclusion zone will remain in operation during the decommissioning activities reducing risk of non-project related vessels entering into the area where decommissioning activities are taking place. This safety exclusion zone will be removed following the completion of the relevant decommissioning activities enabling fisheries to gain access to grounds.</p> <p>Use of established contractors with appropriate capability, licences and maintenance procedures will be selected and audited. Other sea users will be notified in advance of activities occurring and Premier keeps manned bridges.</p> <p>The infrastructure is currently shown on Admiralty Charts and the FishSafe system. When decommissioning activity has been completed, updated information will be made available to update Admiralty Charts and FishSafe system.</p> <p>All pipeline routes and installation sites will be the subject of oilfield debris clearance and as-left verification surveys when decommissioning activity has concluded.</p>

## 5 INTERESTED PARTY CONSULTATIONS

### Consultations Summary:

Table 5.1 Summary of Stakeholder Comments		
Who	Comment	Response
<b>Informal Consultations</b>		
<b>Various Stakeholders</b>	<p>Premier Oil has engaged with interested parties and stakeholders who participated in comparative assessment workshops, held 16<sup>th</sup> November 2017, including:</p> <p>Scottish Fishermen’s Federation (SFF), Joint Nature Conservation Committee, Marine Scotland, Oil and Gas UK, OPRED EMT, OPRED ODU (observers), Repsol Sinopec North Sea Limited, Rockrose UKSC4 Ltd, Chrysaor Production (U.K.) Limited, Premier Oil E&amp;P UK Ltd.</p> <p>In addition, meetings were held with SEPA and the SFF.</p>	N/A
<b>Statutory Consultations</b>		
<b>Various Statutory Consultees</b>	<p>Following statutory consultation (21<sup>st</sup> September – 8<sup>th</sup> November 2020), Premier received a number of guidance notes, questions and actions relating to the five Greater Balmoral Area Decommissioning Programmes and supporting documents from the consultees.</p>	<p>All consultee comments have been satisfactorily addressed throughout OPRED’s process and minor updates to the Decommissioning Programmes and supporting documents have been implemented where appropriate.</p>
<b>Public</b>	No comments received.	N/A



## 6 PROGRAMME MANAGEMENT

### 6.1 Project Management and Verification

A Project Management team will be appointed to manage suitable contractors for the decommissioning of the Brenda subsea infrastructure. Standard procedures for operational control and hazard identification and management will be used. The work will be coordinated with other decommissioning operations in the Greater Balmoral Area. The Project Management team will monitor and track the process of consents and the consultations required as part of this process. Any changes in detail to the offshore removal programme will be controlled by the Premier Oil Management of Change processes and discussed and agreed with OPRED.

### 6.2 Post-Decommissioning Debris Clearance and Verification

During site clearance activities, reasonable endeavours will be made to recover any dropped objects and items subject to any outstanding Petroleum Operations Notices. All recovered seabed debris related to offshore oil and gas activities will be returned for onshore disposal or recycling in line with existing disposal arrangements. A post decommissioning site survey, to verify decommissioning activities have been completed, will be carried out across the designated 500m safety zones of installation sites and 100m corridor (50m either side) along each pipeline over its length.

The clear seabed will be validated by an independent verification trawl over the installation sites and pipeline corridors, non over-trawl techniques such as Side Scan Sonar (SSS) / ROV or by the post decommissioning survey. A dialogue will be opened with OPRED at the appropriate time to establish the most suitable method for completing this task.

### 6.3 Schedule

#### Project Plan:

The high level Gantt chart Figure 6.1 provides the overall schedule for the Greater Balmoral programme of decommissioning activities, which includes the following Fields operated by Premier Oil; Brenda, Nicol, Glamis, Stirling, and Balmoral.

Prior to the removal of the FPV, Premier Oil will also flush the subsea pipelines associated with the Repsol Sinopec North Sea Limited operated Burghley and Beauley fields.

Activity	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Decommissioning Planning & Surveys	■										
Detailed Engineering			■								
Cessation of Production			▼								
Subsea Flushing / Disconnection			■	■							
FPV Make Safe / Disconnect / Removal			■	■							
FPV Disposal / Recycling				■							
Site Monitoring				▨							
Subsea Decommissioning					■						
Wells Plug & Abandonment						■					
Environmental Surveys & Debris Clearance										■	
Closeout Reports											■

Figure 6.1: Gantt Chart of Project Plan

### 6.4 Costs

An overall cost estimate following UK Oil & Gas Guidelines on Decommissioning Cost Estimation (Issue 3, October 2013) will be provided to OPRED.

## 6.5 Close Out

In accordance with the OPRED Guideline Notes, a close out report will be submitted to OPRED and posted on the Premier Oil website, reconciling any variations from the Decommissioning Programmes within one year of the completion of the offshore decommissioning scope. This includes debris removal and, where applicable 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 the well locations, will be carried out. The survey will focus on chemical, physical and biological changes disturbances and be compared with the pre decommissioning survey. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED.

All pipeline routes and installation sites will be the subject of oilfield debris clearance and as-left verification surveys when decommissioning activity has concluded. All snag hazards created by drilling and/or production related activities will be removed or mitigated as part of the execution of the Decommissioning Programmes.

The main risk from infrastructure remaining in situ is the potential for interaction with other users of the sea, specifically from fishing related activities. Where the infrastructure is trenched below seabed level or trenched & buried below, the effect of interaction with other users of the sea is considered to be negligible.

The infrastructure is currently shown on Admiralty Charts and the FishSafe system. When decommissioning activity has been completed, updated information will be made available to update Admiralty Charts and FishSafe system.

When decommissioning activities have been completed, and where applicable, the designated safety zones around offshore infrastructure will be removed.

The licence holders recognise their commitment to undertake post-decommissioning monitoring of infrastructure left in situ. After the post-decommissioning survey reports have been submitted to OPRED and reviewed, a post-decommissioning monitoring survey regime, scope and frequency, will be agreed with OPRED.

## 7 SUPPORTING DOCUMENTS

Table 7.1: Supporting Documents	
Document Number	Title
AB-BL-XGL-LL-SE-RP-0001	Greater Balmoral Area Decommissioning Environmental Appraisal
AB-BL-XGL-LL-ZZ-RP-0004	Greater Balmoral Area Decommissioning Comparative Assessment Report

## 8 PARTNER LETTER(S) OF SUPPORT

### *Premier Oil PLC*

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Upper Denburn House  
Prime Four Business Park  
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Aberdeen AB15 8PU

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**Email** [premier@premier-oil.com](mailto:premier@premier-oil.com)  
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Offshore Petroleum Regulator for Environment and Decommissioning  
Department for Business, Energy and Industrial Strategy  
Crimon Place  
Aberdeen  
AB10 1BJ

FAO: Mrs. Debbie Taylor

15 January 2021

Dear Sirs,

#### **Letter of Support: Brenda Decommissioning Programmes**

Premier Oil PLC hereby confirm that Premier Oil E&P UK Limited ("Premier") is authorised to submit, on our behalf, the abandonment programmes relating to the Brenda Field subsea installations and pipelines, as detailed in document no. AB-BL-PMO-LL-PM-PG-0002 revision B05, dated January 2021 and titled "Brenda Decommissioning Programmes", as directed by the Secretary of State in your letters of 8 January 2021.

We confirm our agreement to the proposals detailed in the Brenda Decommissioning Programmes dated 11 January 2021, which is to be submitted by Premier, in so far as they relate to those facilities in respect of which we are instructed to submit a programme under Section 29 of the Petroleum Act 1998.

Yours faithfully

DocuSigned by:  
  
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Richard Rose  
Director  
Premier Oil PLC

**Premier Oil UK Limited**

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Offshore Petroleum Regulator for Environment and Decommissioning  
Department for Business, Energy and Industrial Strategy  
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FAO: Mrs. Debbie Taylor

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Yours faithfully

DocuSigned by:  
  
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Gareth Webster  
Director  
Premier Oil UK Limited

## APPENDIX I – COPIES OF THE PUBLIC NOTICES

*The Press and Journal:*

**PUBLIC NOTICE**

The Petroleum Act 1998

**Decommissioning Programmes for the Balmoral Area installations and pipelines**

In accordance with the provisions of the Petroleum Act 1998, Premier Oil E&P UK Limited (Premier) has submitted, for the consideration of the Secretary of State for Business, Energy & Industrial Strategy, the draft Decommissioning Programmes for the installations and pipelines associated with the Balmoral, Glamis, Stirling, Brenda and Nicol Fields (the "Balmoral Area Fields"). It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The Balmoral Area Fields are located in blocks 15/25a, 15/25b, 16/21a and 16/21b of the Central North Sea, approximately 225km northeast of Aberdeen. The Balmoral Area Fields were developed as subsea tiebacks to a Floating Production Vessel (FPV), with produced oil exported to shore via the Forties Pipeline System.

The facilities covered by the five Balmoral Area Decommissioning Programmes are:

- The Balmoral FPV facility,
- All subsea installations, and
- All subsea pipelines associated with the Balmoral, Glamis, Stirling, Brenda and Nicol Fields.

Premier hereby gives notice that the Decommissioning Programmes for the Balmoral Area Fields are available on its website at [www.premier-oil.com](http://www.premier-oil.com), or alternatively a hard copy of the documents may be requested by contacting Premier during office hours on 01224 618900.

Representations regarding these Decommissioning Programmes should be submitted in writing to the person named at the address below, or via email to [abzdecommissioning@premier-oil.com](mailto:abzdecommissioning@premier-oil.com), by the consultation closing date of 1st November 2020. Submissions should state the grounds upon which any representations are being made.

Date: 21st September 2020  
Pieter voor de Poorte  
Premier Oil,  
Upper Denburn House,  
Prime Four Business Park,  
Kingswells Causeway, Kingswells,  
Aberdeen, AB15 8PU

*The Daily Telegraph:*

**PUBLIC NOTICE**

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**Date: 21st September 2020**

**Pieter voor de Poorte**  
**Premier Oil,**  
**Upper Denburn House, Prime Four Business Park,**  
**Kingswells Causeway, Kingswells,**  
**Aberdeen, AB15 8PU**

## APPENDIX II – DEPTH OF BURIAL PROFILES

