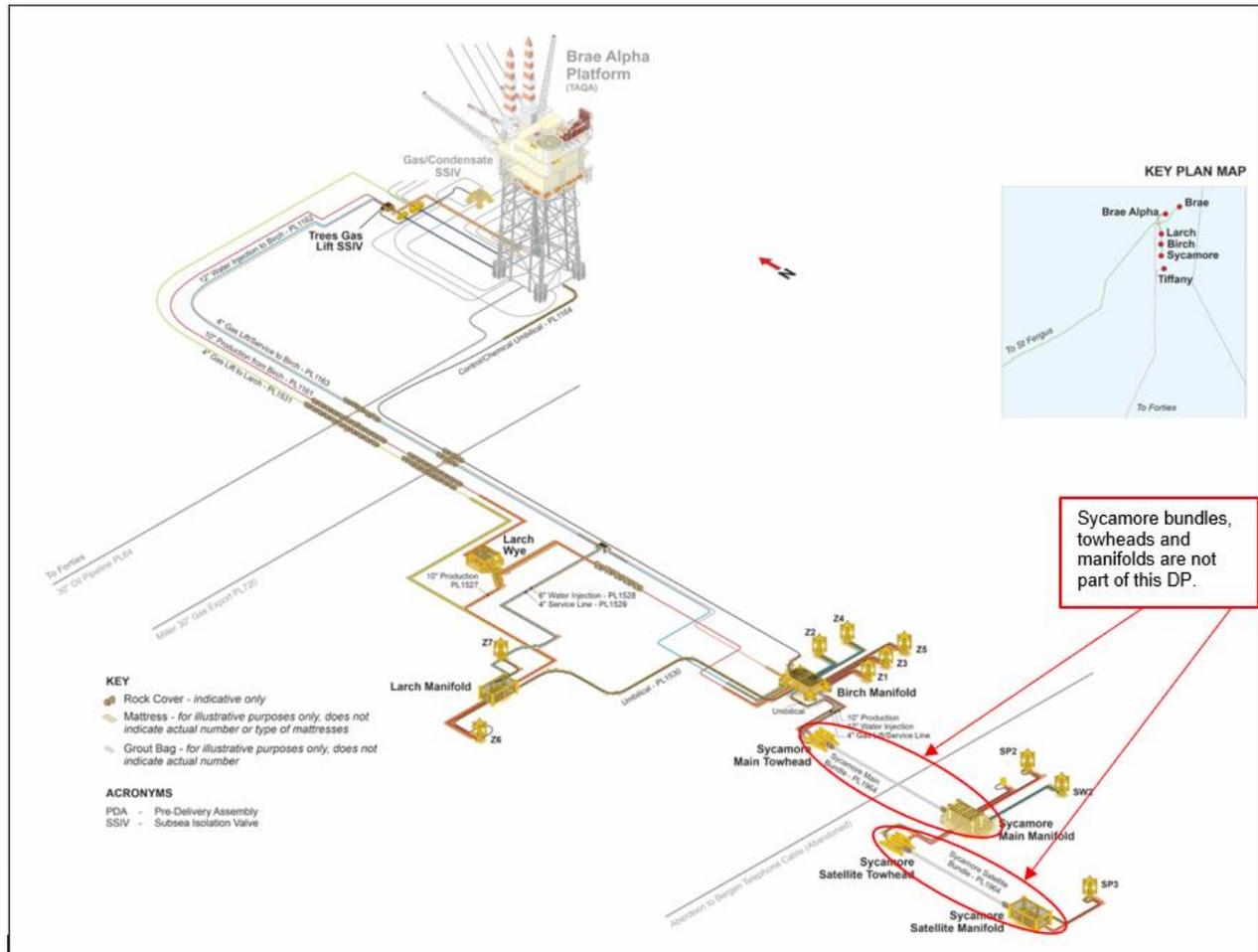


Trees Decommissioning Programmes (Birch, Larch and Sycamore)



September 2024

Consultation Draft

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B4	28/06/2022	OPRED ODU Comments addressed
B5	22/07/2022	Spirit Energy further comments addressed
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B9	23/10/2023	Wellheads & integral protection cages removed, as now part of separate DP
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TABLE OF TERMS AND ABBREVIATIONS

ABBREVIATION	EXPLANATION
~	Approximately
Brae Alpha	TAQA Operated Brae Alpha platform that Birch, Larch & Sycamore are tied-back to
Brae Group	Consists of TAQA Bratani Limited, TAQA Bratani LNS Limited, Spirit Energy Resources Limited and NEO Energy Petroleum Limited
CA	Comparative Assessment
CoP	Cessation of Production
CSV	Construction Support Vessel
c/w	Complete with
DP	Decommissioning Programme
DSV	Diving Support Vessel
EMOBF	Enhanced Mineral Oil Based Fluid
ESDV	Emergency Shut Down Valve
FPSO	Floating, Production, Storage, Offloading (Vessel)
GMG	Global Marine Group
HSE	Health and Safety Executive
in	Inch; 25.4 millimetres
INST	Ticked if applicable to Installations in the Table of Contents
IPR	Interim Pipeline Regime
JNCC	Joint Nature Conservation Committee
kg	Kilogramme
km	Kilometre
LTOBF	Low Toxicity Oil Based Fluid
m	Metre(s)
MAT	Master Application Template
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
NORM	Naturally Occurring Radioactive Material
NSTA	North Sea Transition Authority
ODU	Offshore Decommissioning Unit
OEUK	Offshore Energies UK
OPF	Organic Phase Fluids
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
P/L	Ticked if applicable to pipelines in the Table of Contents
PAO	Polyalphaolefin Based Fluid
PDi	Project Development International Limited
PL, PLU	Pipeline (or Umbilical) Identification numbers (UK)
PWA	Pipeline Works Authorisation
ROV	Remote Operated (Underwater) Vehicle
ROVSV	Remote Operated Vehicle Support Vessel
SAE	Society of Automobile Engineers
SAT	Subsidiary Application Template
SBF	Synthetic Based Fluid
SCANS III	Small Cetaceans in European Atlantic Waters and the North Sea
SFF	Scottish Fishermen's Federation
SMM	Sycamore Main Manifold
SMT	Sycamore Main Towhead
SP#, SW#, Z#	Production & Water Injection Well Identifier
Spirit Energy	Spirit Energy North Sea Oil Limited
SSIV	Subsea Isolation Valve
SSM	Sycamore Satellite Manifold
SST	Sycamore Satellite Towhead
SSV	Subsea Support Vessel
TAQA	TAQA Bratani Limited
Te	Metric Tonne
TFSW	Trans Frontier Shipment of Waste
TUTU	Topsides Umbilical Termination Unit

ABBREVIATION	EXPLANATION
UHB	Upheaval Buckling
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
WGS84	World Geodetic System 1984
WONS	Well Operations Notification System
WHPS	Wellhead Protection Structure
x	Number of (e.g., 16 x = 16 in Number)
XT	Xmas Tree

HOLDS LIST

HOLD No.	DESCRIPTION
1	Appendix A - S29 Notice Holder Letter(s) of Support
2	Appendix B – Public Notice

1. EXECUTIVE SUMMARY

1.1 Combined Decommissioning Programmes

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

- The Birch installation (1 x Manifold)
- The twenty-seven associated pipelines/umbilicals for Birch
- The Larch installation (1 x Manifold)
- The gas lift pipeline (PL1531) for Larch
- The nine remaining pipelines/umbilicals for Larch
- The Sycamore installation (1 x wellhead & flowbase at well SW1 (formerly known as Well SP1))
- The seventeen pipeline and umbilical jumpers associated with the Sycamore installations and bundles.

The two Sycamore pipeline bundles along with the associated towheads / manifolds will be covered under a separate DP.

All XTs and associated protection cages (except for Sycamore Well SW1 listed above) are covered under a separate Decommissioning Programme which was approved on 1st September 2023 [5].

Although decommissioning of the installations and pipelines are being treated in this document as a standalone project, Spirit Energy North Sea Oil Limited (Spirit Energy) will continue to explore cost saving synergies with other projects.

1.2 Requirement for Decommissioning Programmes

Installations: In accordance with the Petroleum Act 1998, Spirit Energy as operator of the Birch, Larch and Sycamore installations/fields, and on behalf of the Section 29 notice holders (see Table 1.4.2 and Table 1.5.2) are applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installations as detailed in Section 2 of this document. '(See also Appendix A – Section 29 Notice Holder Letter(s) of Support).

Pipelines: In accordance with the Petroleum Act 1998, Spirit Energy as operator of the Birch, Larch and Sycamore pipelines, and on behalf of the Section 29 notice holders (see Table 1.4.4, Table 1.5.4 & Table 1.6.4), are applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the pipelines detailed in Section 2 of this document. '(See also Appendix A – Section 29 Notice Holder Letter(s) of Support).

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programmes are submitted in compliance with national and international regulations and OPRED Guidance Notes. The schedule outlined in this document is for a ten-year project plan, which commenced in 2021 with the Engineering and Project Management phase.

1.3 Introduction

1.3.1 General

The Trees development is owned and operated by Spirit Energy and is located in UK Central North Sea block 16/12a (Licence P.212), approximately 215km Northeast of Peterhead in water depths around 125m. The development comprises of Birch, Larch, Sycamore Central and Sycamore South.



The Birch installation is served by a solitary subsea manifold structure with three production wells and two water injection wells. Birch is tied back to the TAQA Bratani Limited (TAQA) operated Brae Alpha platform (hereafter referred to as Brae Alpha) via a 13.5km 10" production pipeline, 12" water injection pipeline, 4" gas lift/service line and control umbilical.

The 10" production pipeline between Birch and Brae Alpha has a Wye piece connection 2.39km downstream of the Birch Manifold which allows the Larch Installation to direct production fluids back to Brae Alpha. The Birch 12" water injection and 4" gas lift/services pipelines also have T-piece connections that allow for Larch installation connection. Rigid spools connect the pipelines and wells to the manifold and Brae Alpha. Production from Birch commenced in 1995.

The Larch field has been developed with single production and water injection wells. The production well is tied-back via a 2.39km 10" production pipeline to the Larch Wye structure into the Wye connection on the Birch pipeline system whilst the 6" injection water & 4" service pipelines to the injection well are tied-back to Brae Alpha via T-pieces in the Birch Lines close to the Larch Wye location. Gas lift is provided to the production well from Brae Alpha by a separate 12.1km 4" pipeline connected to a T-piece in West Brae Gas Lift line and routed through the Larch Manifold near the wells. Controls and chemicals are supplied by the Larch umbilical via the Larch Manifold connected to the Birch manifold. Rigid spools connect the pipelines and wells to the Larch and Birch manifolds and the Wye. Production from Larch commenced in 1998.

The Sycamore subsea facilities consist of two pipeline bundles; Sycamore Main Bundle, 4.4km long, and Sycamore Satellite Bundle, 800m long – with a manifold at one end and a towhead at the other end of each bundle. The bundles were installed, and production commenced in 2003.

The Sycamore Main Manifold (SMM) provides for the gathering of production fluids from two wells complete with the facility to inject lift gas and other fluids (e.g. scale squeeze) through the gas lift/service line. Water injection facility is provided via one water injection well.

The Sycamore Satellite Manifold (SSM) provides for the collection of production fluids from one well and the facility to inject lift gas and other fluids (e.g. scale squeeze) to the same well through the gas lift/service line. Tie-ins between Birch Manifold to SMT, SSM to SST as well as SMM and SSM to individual wells are affected by rigid spool pieces and power/hydraulic jumpers.

Note: For Sycamore, the bundles and their associated towheads and manifolds are not covered within this DP. The Sycamore facilities which are covered comprise of the spools and jumpers connecting the bundles together and to the wells, plus the SW1 installation comprising of the wellhead & flowbase. The recovery of these items will not affect future decommissioning of the remaining Sycamore facilities.

The Decommissioning Programmes explain the principles of the removal activities and are supported by a Comparative Assessment for the pipelines [1] and an Environmental Appraisal [2].

1.3.2 Reasons for Decommissioning

CoP took place at Birch on 15th November 2020 and at Larch on 24th January 2023. Subsea wells associated with Sycamore have ceased production and are in the process of being plugged and abandoned. One platform based well (South Sycamore) located on Tiffany, operated by CNR International (U.K.) Limited will be subject to future decommissioning plans. Therefore, CoP at Sycamore is currently being discussed with the NSTA and timeline will be confirmed in line with these plans.

The Birch field has had restricted uptime since 2016, largely owing to issues at Brae Alpha and the low arrival temperature of the producing wells. Work has been carried out to assess the potential of reinstating production from existing wells, as well as drilling additional wells, but no economic opportunities have been identified.

The Larch field has had restricted uptime since 2019, largely owing to issues at Brae Alpha and the low arrival temperature of the producing wells. Work has been carried out to assess the

potential of reinstating production from existing wells, as well as drilling additional wells, and separator modifications, however no economic opportunities have been identified.

The Sycamore field has been offline since 2012, largely owing to a decline in oil rates. Work has been carried out to assess the potential of reinstating production from existing wells, as well as drilling additional wells, but no economic opportunities have been identified.

1.4 Birch Field – Overview

1.4.1 Birch Field – Installations

Table 1.4.1: Birch Installations Being Decommissioned			
Field(s):	Birch	Production Type	Oil
Water Depth (m)	127.7	UKCS Block	16/12a
Subsea Installation(s)		Number of Wells	
Number	Type	Platform	Subsea
1	Manifold	n/a	n/a
Drill Cuttings Piles		Distance to Median	Distance from nearest UK coastline
Number of Piles	Total Estimated Volume (m ³)	km	km
1	464	~14km	~210km

Table 1.4.2: Birch Installations Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	Equity Interest (%)
CNR International (U.K.) Limited	00813187	0%
GB Gas Holdings Limited	03186121	0%
Ithaca MA Limited	03947050	0%
Spirit Energy North Sea Oil Limited	SC210361	100%
PRIME AEP Limited	00307812	0%
Equinor WOS Limited	00972618	0%

1.4.2 Birch Field – Pipelines and Pipeline Structures

Table 1.4.3: Birch Pipelines and Pipeline Structures Being Decommissioned		
Number of Pipelines, Cables, Umbilicals	27	See Table 2.1.2
Number of Pipeline Structures		See Table 2.1.4
	1	Crossover Bundle Assembly at Brae Alpha
	2	Crossover Bundle Supports
	1	SSIV Protection Structure
	2	Anode Skids

Table 1.4.4: Birch Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	License Equity Interest (%)
CNR International (U.K.) Limited	00813187	0%
GB Gas Holdings Limited	03186121	0%
Ithaca MA Limited	03947050	0%
Spirit Energy North Sea Oil Limited	SC210361	100%
PRIME AEP Limited	00307812	0%
Equinor WOS Limited	00972618	0%



1.5 Larch Field – Overview

1.5.1 Larch Field – Installations

Table 1.5.1: Larch Installations Being Decommissioned			
Field(s):	Larch	Production Type	Oil
Water Depth (m)	126.5	UKCS Block	16/12a
Subsea Installation(s)		Number of Wells	
Number	Type	Platform	Subsea
1	Manifold	n/a	n/a
Drill Cuttings Piles		Distance to Median	Distance from nearest UK coastline
Number of Piles	Total Estimated Volume (m ³)	km	km
n/a	n/a	~14km	~210km

Table 1.5.2: Larch Installations Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	Equity Interest (%)
CNR International (U.K.) Limited	00813187	0%
GB Gas Holdings Limited	03186121	0%
Ithaca MA Limited	03947050	0%
Spirit Energy North Sea Oil Limited	SC210361	100%
PRIME AEP Limited	00307812	0%
Equinor WOS Limited	00972618	0%

1.5.2 Larch Field – Pipelines and Pipeline Structures

Table 1.5.3: Larch Pipelines and Pipeline Structures Being Decommissioned		
Number of Pipelines, Cables, Umbilicals	10	See Table 2.2.2
Number of Pipeline Structures		See Table 2.2.4
	1	Larch Wye Piece Assembly (Original)
	1	Larch Wye Piece Extension Spool Structure
	1	Larch Wye Piece Assembly (New)

Table 1.5.4: Larch Pipelines Section 29 Notice Holders Details ¹		
Section 29 Notice Holder	Registration Number	License Equity Interest (%)
CNR International (U.K.) Limited	00813187	0%
GB Gas Holdings Limited	03186121	0%
Ithaca MA Limited	03947050	0%
Spirit Energy North Sea Oil Limited	SC210361	100%
PRIME AEP Limited	00307812	0%
Equinor WOS Limited	00972618	0%

¹ This table covers the two S29 notices associated with the Larch pipeline groups, namely **12.04.06.05/55C**: PL1531 only and **12.04.06.05/56C**: PL1527, PL1528, PL1529, PL1530.1 – PL1530.5.

1.6 Sycamore Field – Overview

1.6.1 Sycamore Field – Installations

Table 1.6.1: Sycamore Installations Being Decommissioned			
Field(s):	Sycamore	Production Type	Oil
Water Depth (m)	126.5	UKCS Block	16/12a
Subsea Installation(s)		Number of Wells	
Number	Type	Platform	Subsea
1	Wellhead & flowbase	n/a	1
Drill Cuttings Piles		Distance to Median	Distance from nearest UK coastline
Number of Piles	Total Estimated Volume (m ³)	km	km
1	684	~14km	~210km

Table 1.6.2: Sycamore Installations Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	License Equity Interest (%)
GB Gas Holdings Limited	03186121	0%
Spirit Energy North Sea Oil Limited	SC210361	100%

1.6.2 Sycamore Field – Pipelines

Table 1.6.3: Sycamore Pipelines Being Decommissioned			
Field(s):	Sycamore	Production Type	Oil
Water Depth (m)	126.2	UKCS Block	16/12a
Distance to median (km)	~14km	Distance from nearest UK coastline (km)	~210km
Number of Pipelines and Umbilicals		17	See Table 2.3.2

Table 1.6.4: Sycamore Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holder	Registration Number	License Equity Interest (%)
GB Gas Holdings Limited	03186121	0%
Spirit Energy North Sea Oil Limited	SC210361	100%

1.7 Summary of Proposed Decommissioning Programmes

Table 1.7.1: Summary of Decommissioning Programmes		
Selected Option	Reason for Selection	Proposed Decommissioning Solution
1. Subsea Installation(s)		
Complete removal.	Minimises safety risk to offshore and onshore personnel, minimises vessel emissions and seabed disturbance. Snagging hazards are removed and the seabed is clear for all users of the sea. Maximises recycling of materials.	All subsea manifolds will be completely removed from the seabed and recovered to shore for reuse, recycling or disposal. Piles will be cut to 3m below mean seabed level.
2. Pipelines, Flowlines & Umbilicals		
Trenched and/or buried lines will be decommissioned <i>in situ</i> with remediation of any exposed sections.	Those lines to be decommissioned <i>in situ</i> are expected to be trenched to between 1m – 2m depth with varying levels of natural backfill and so will not affect other users of the sea. As the lines will be flushed to an agreed acceptable cleanliness level, their decommissioning <i>in situ</i> is not expected to have any significant impact on the marine environment.	Sections of Trees (Birch & Larch) pipelines and umbilicals which are protected by rock cover or are trenched to at least 0.6m depth will be decommissioned <i>in situ</i> . All sections left <i>in situ</i> shall be flushed and cleaned to an agreed acceptable level of cleanliness prior to any decommissioning operations.
Surface laid lines that are currently exposed will be recovered and returned to shore.	Minimises safety risk to offshore and onshore personnel, minimises vessel emissions and seabed disturbance. Snagging hazards are removed or remediated and the seabed is left clear for all users of the sea. Maximises recycling of materials.	Surface laid lines and exposed pipeline ends (down to trench depth of at least 0.6m) will be cut and recovered to shore for reuse, recycling or disposal. Cut ends of the pipelines will be protected by the addition of nominal quantities of rock.
Lines in open trenches but not adequately lowered will be decommissioned <i>in situ</i> , with remediation of any exposed sections.	Minimises safety risk to offshore and onshore personnel, minimises vessel emissions and seabed disturbance. Snagging hazards are removed or remediated and the seabed is left clear for all users of the sea.	Remedial work will be carried out on sections of pipeline of insufficient trench depth (<0.6m depth). The lines will be decommissioned <i>in-situ</i> by dredging / trenching to provide the required level of cover (the preferred option) or by covering the pipe with rock. The other remediation option of cut and recovery, with remaining pipeline ends protected using nominal quantities of rock, will also be addressed within the EA and during Supply Chain engagement and shall be subject to consultation with OPRED.
Surface laid jumpers and Tie-in Spools will be fully removed.	Removes all potential obstructions, leaving seabed clear for all users of the sea. Maximises recycling of materials.	Surface laid jumpers and tie-in spools will be fully removed from the seabed and recovered to shore for reuse, recycling or disposal.
3. Pipeline Stabilisation Features		
Stabilisation Features will be fully removed where exposed on the seabed. Stabilisation features within trenches and below seabed level will be left <i>in-situ</i> .	Removes potential obstructions, leaving seabed clear for all users of the sea. Satisfies regulatory requirements.	Full removal and transport ashore for reuse, recycling or disposal. Where mattresses / grout bags cannot be safely recovered, Spirit Energy will consult with OPRED before any alternative option is executed.

Table 1.7.1: Summary of Decommissioning Programmes

Selected Option	Reason for Selection	Proposed Decommissioning Solution
4. Pipeline Structure(s)		
Pipeline Structures will be fully removed.	Removes all seabed structures, leaving seabed clear for all users of the sea and maximises recycling of materials.	All pipeline structures (Larch Wye pieces, SSIV, etc) will be removed from the seabed and recovered to shore for reuse, recycling or disposal. Piles will be cut to 3m below mean seabed level.
5. Wells		
The well SW1 (formerly known as SP1) will be decommissioned to comply with HSE "Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996" and in accordance with the latest edition of OEUK Guidelines for the Abandonment of Wells.	The SW1 (formerly SP1) well has already been Phase 1 & 2 abandoned, with only the wellhead and flowbase remaining. Meets the NSTA and HSE regulatory requirements.	Full recovery, with conductor cut to 3m below mean seabed level. A Master Application Template (MAT) and the supporting Subsidiary Application Template (SAT) will be submitted in support of activities carried out. Additionally, planned work will be reviewed by a well examiner then submitted to the HSE for review.
6. Drill Cuttings		
Leave in place to degrade naturally.	Drill cuttings are below the OSPAR 2006/5 thresholds.	Minimal quantities will be disturbed during removal of spoolpieces, wellheads and the Birch manifold. See the supporting Environmental Appraisal [2] for further details.
7. Interdependencies		
<p>Two third-party pipe crossings exist within the Trees field, 30" Miller gas export pipeline (PL720) & 30" Forties oil export pipeline (PL64) crossed by PL1531, PL1161, PL1162 and PL1163, with PL1164 crossing only the Miller line. Concrete mattresses have been used to achieve pipeline separation at the crossing locations with rock cover over the crossings to mitigate risk to fishing operations. These pipeline sections shall be decommissioned <i>in situ</i> continuing to pose no risk to fishing operations or other users of the sea. Spirit Energy have notified the owners of the third-party pipelines that the DP is being prepared and further engagement will take place in a timely manner.</p> <p>Decommissioning responsibility limits for the subsea facilities at Brae Alpha operated by TAQA, have been discussed with the Brae Group. Certain Spirit Energy facilities will remain <i>in-situ</i> until the decommissioning of the Brae Alpha facilities. These facilities are described in 8. Deferred Recovery below.</p>		
8. Deferred Recovery		
<p>The recovery of the items listed below will be deferred until Brae Alpha is decommissioned in accordance with the Brae Group discussions, to minimise operational impacts and the potential risk of damage to operational infrastructure.</p> <p>Pipelines and Umbilicals</p> <ul style="list-style-type: none"> - PL1161, PL1162 & PL1163 risers. - PL1164 Control / Chemical Injection Umbilical within J-Tube (Cut at seabed). - PL1163 Birch Gas Lift spools from Gas Lift SSIV to Enoch riser. <p>Pipeline Structures</p> <ul style="list-style-type: none"> - Crossover Bundle Assembly and associated 2 x support structures. - Birch Gas Lift SSIV and protection structure. <p>Mattresses and Grout Bags</p> <ul style="list-style-type: none"> - 13 No. mattresses. - 40 No. grout bags. <p>Spirit Energy is fully committed to recovering this remaining infrastructure at the time of the Brae Alpha decommissioning and are in regular communication with TAQA to ensure that schedules are understood and aligned. An agreed monitoring regime will be discussed with OPRED and will continue until all decommissioning activities have been completed.</p>		

1.8 Field Locations including Field Layout and Adjacent Facilities

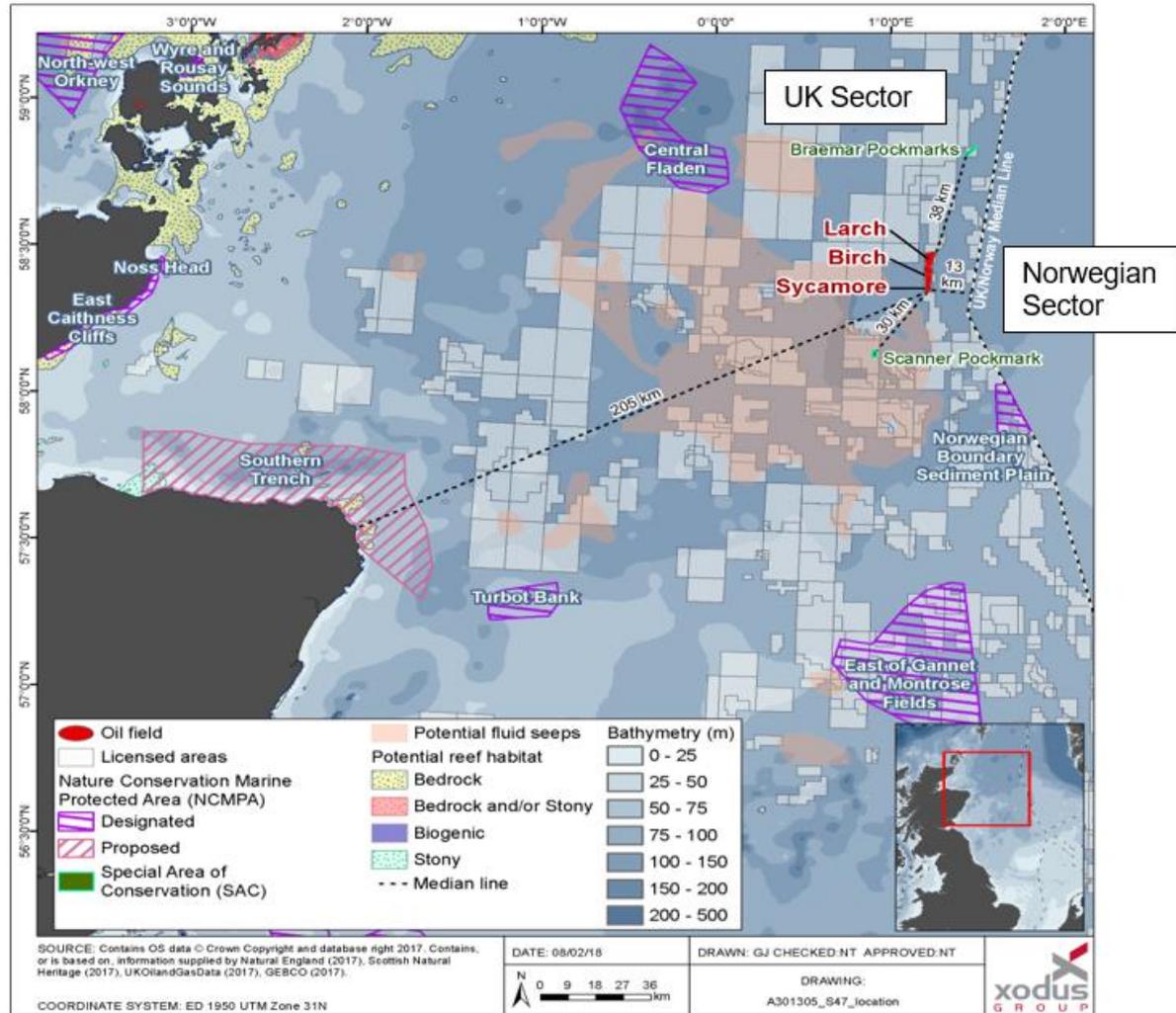


Figure 1.8.1: Field Location in UKCS

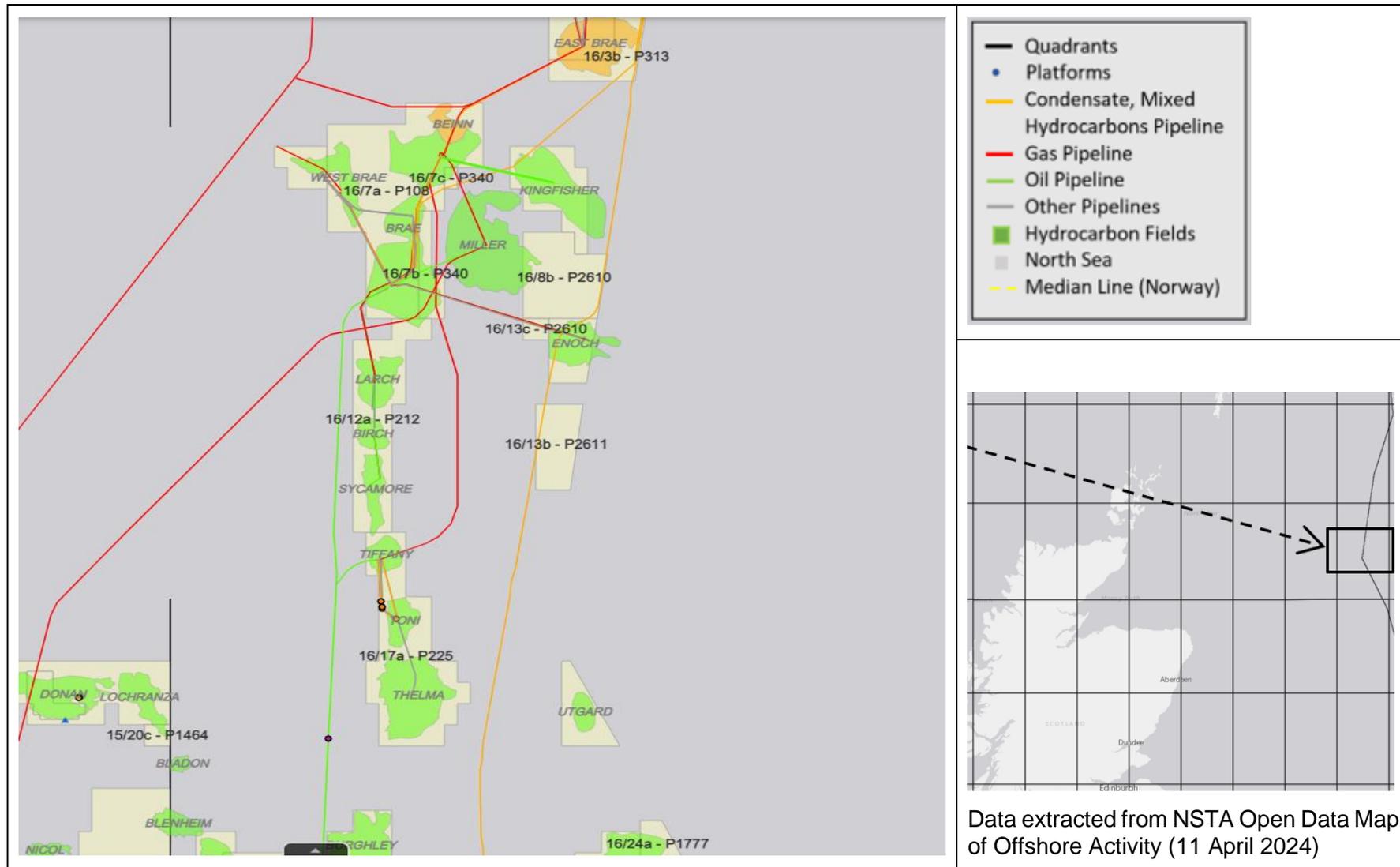


Figure 1.8.2: Trees Fields Adjacent Facilities (see Table 1.8.1)

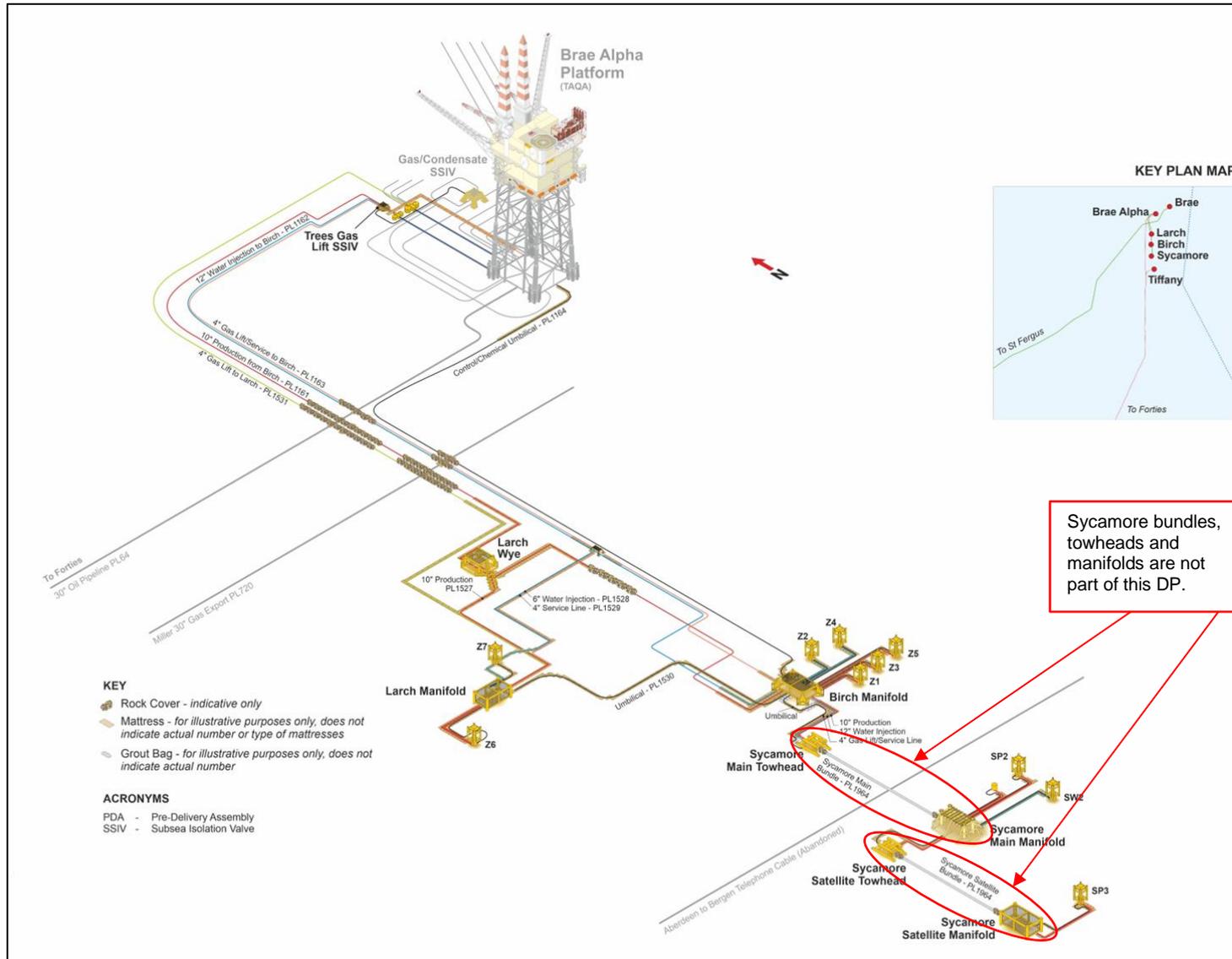


Figure 1.8.3: Trees Fields Prior to Decommissioning Activity

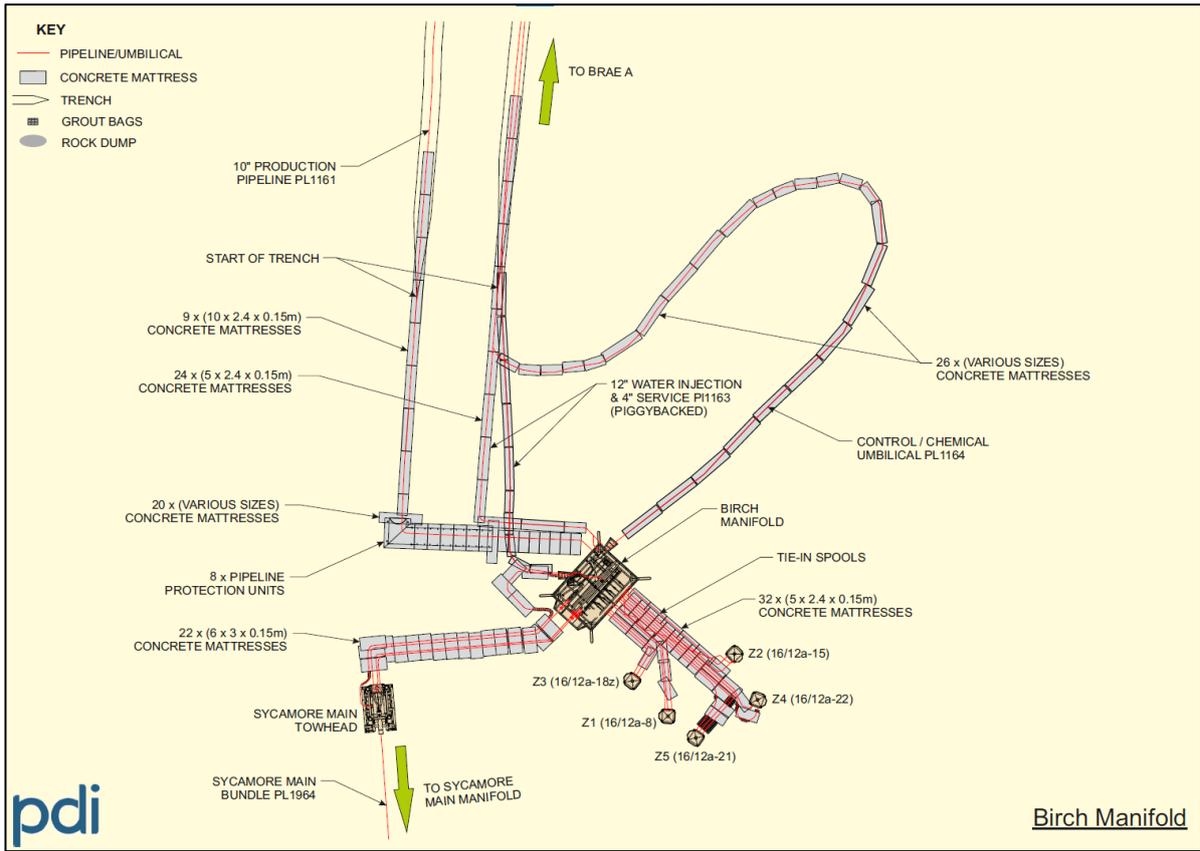


Figure 1.8.4: Birch Manifold & Wells

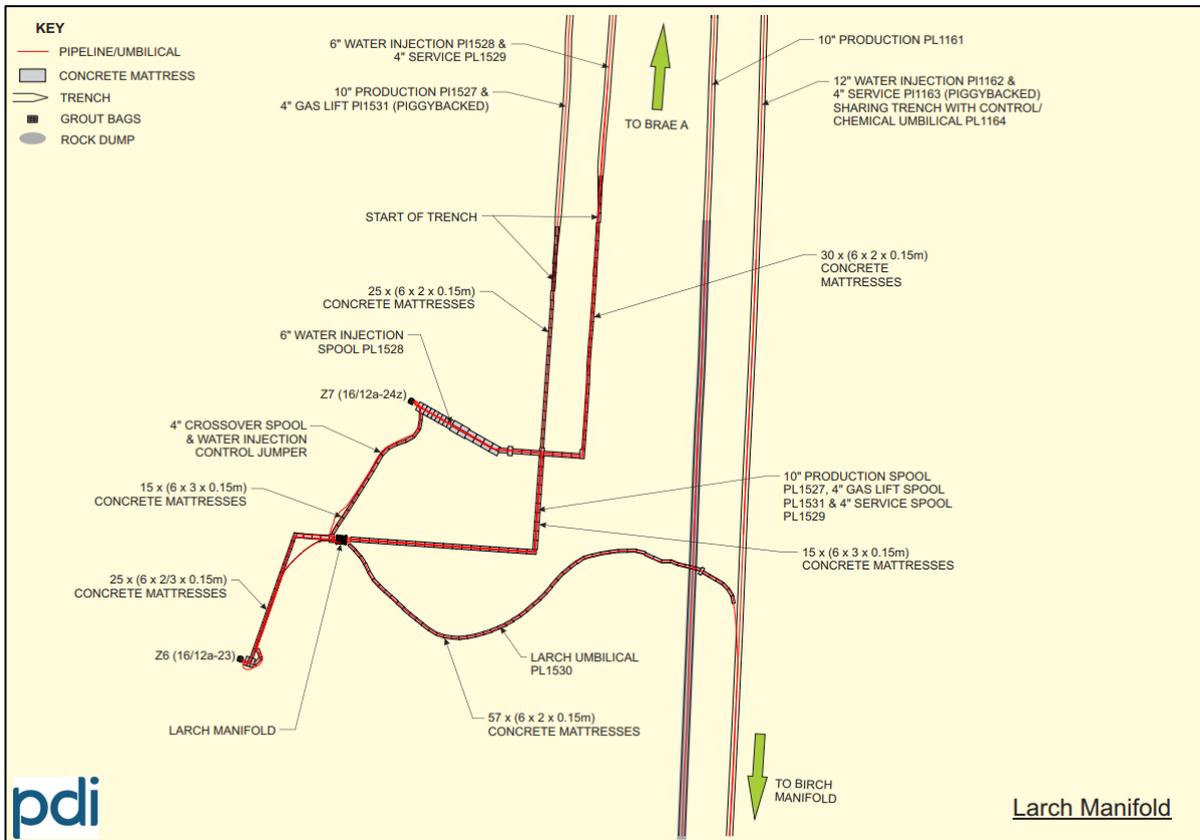


Figure 1.8.5: Larch Gas Lift (& Production) Manifold & Wells

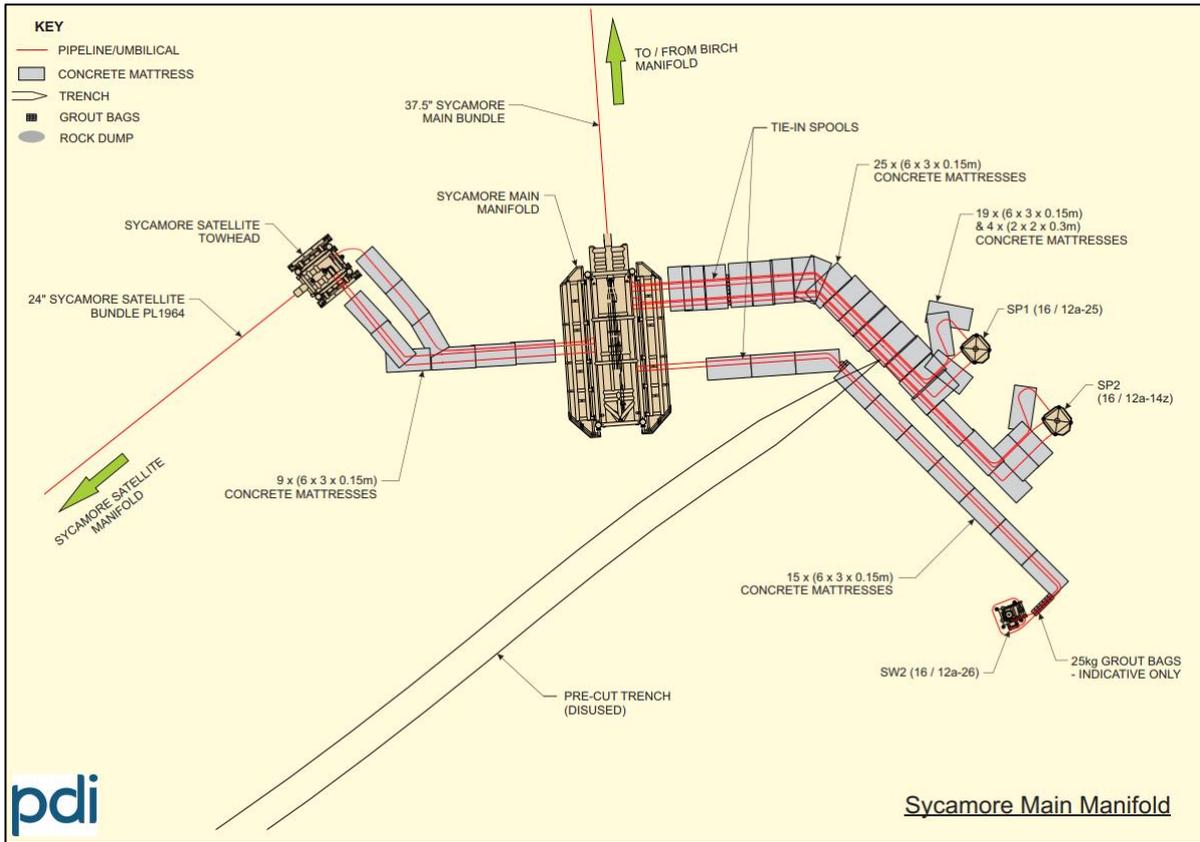


Figure 1.8.6: Sycamore Main Manifold & Wells

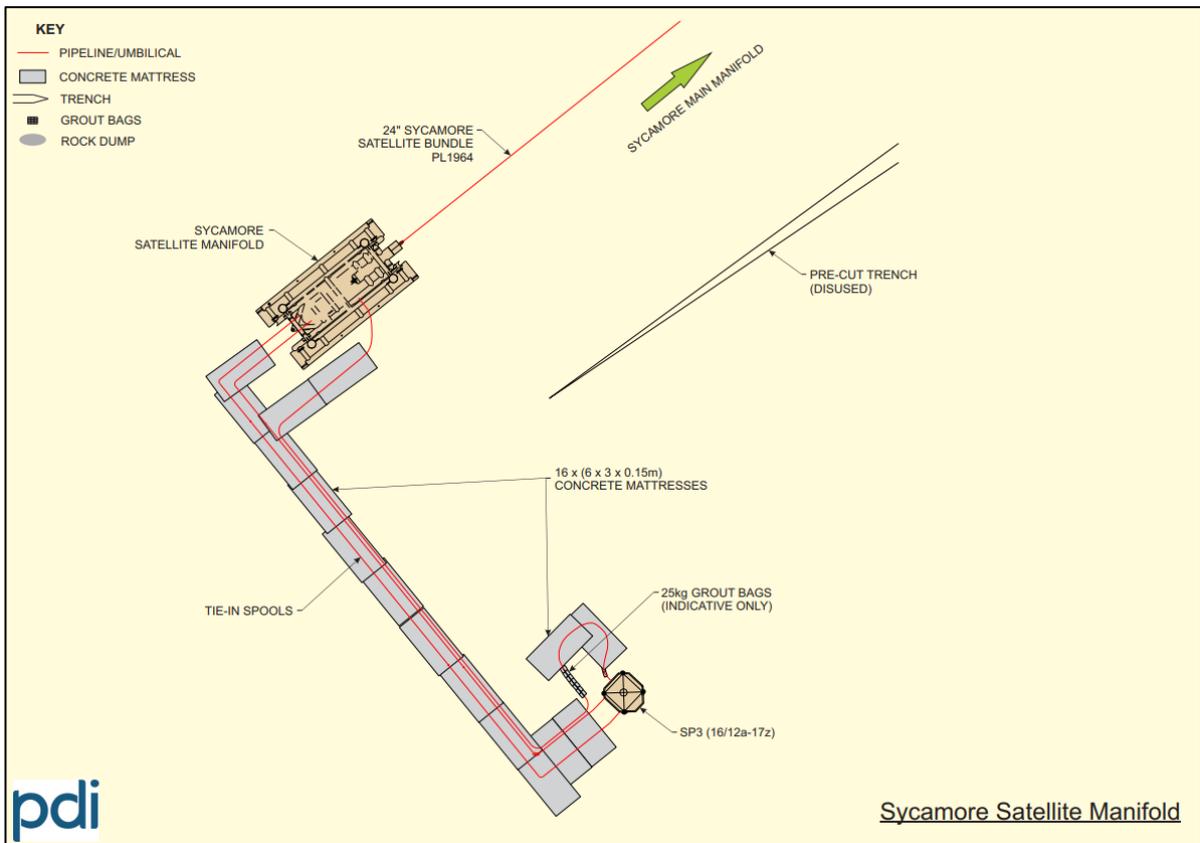


Figure 1.8.7: Sycamore Satellite Manifold & Wells

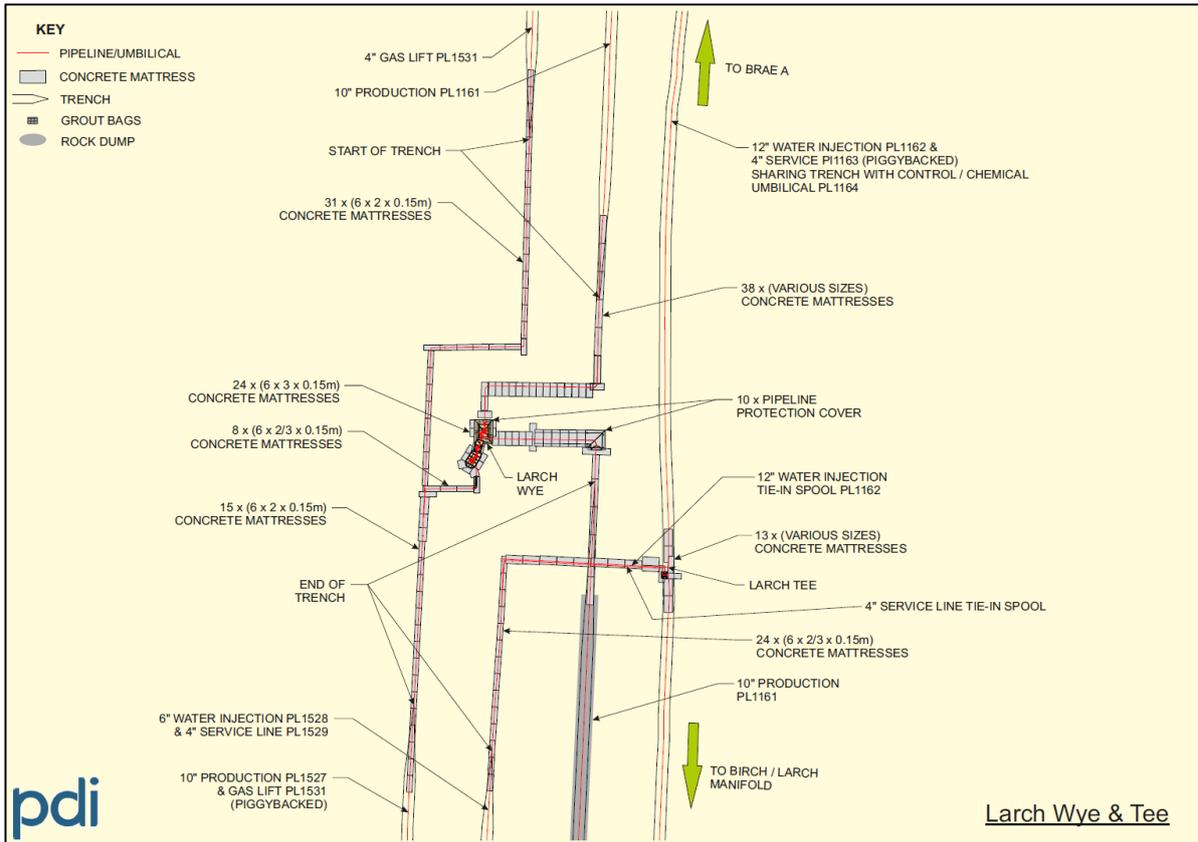


Figure 1.8.8: Larch Wye & T-piece Infrastructure

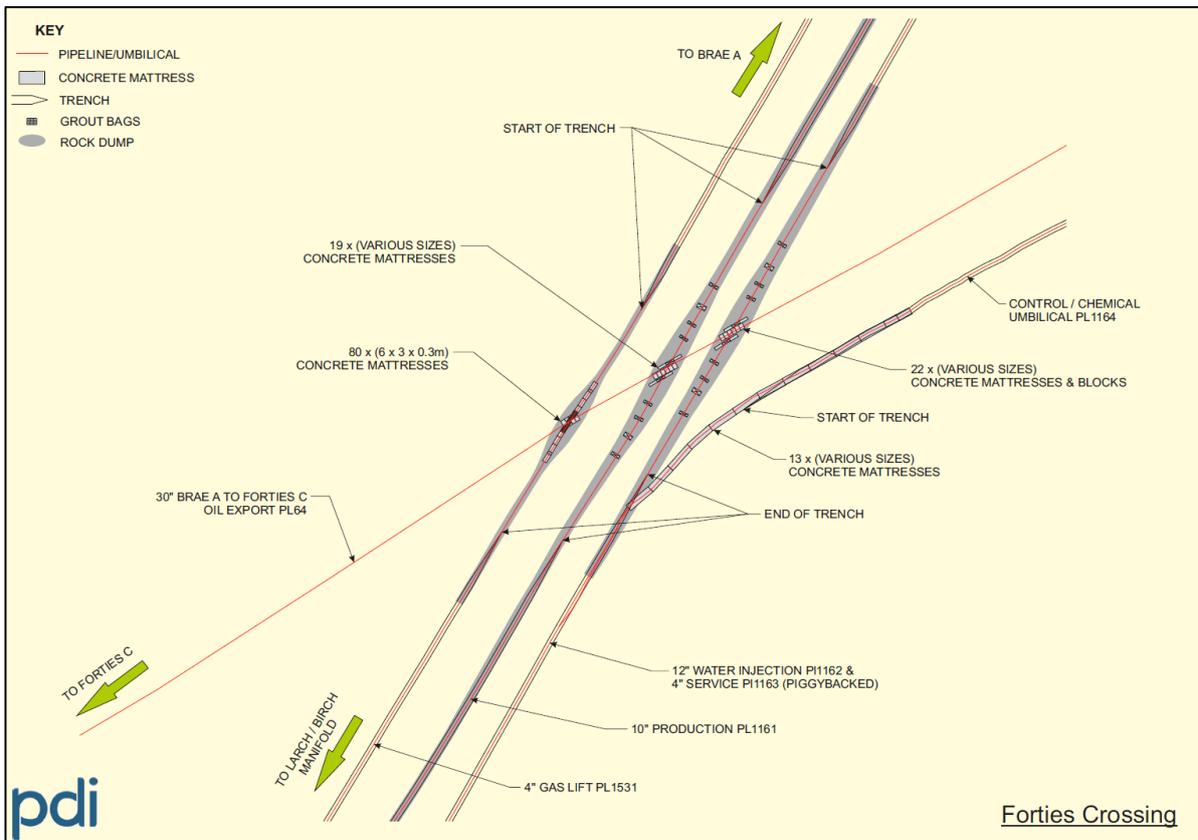


Figure 1.8.9: Brae Alpha to Forties Charlie Oil Export Line PL64 Crossing

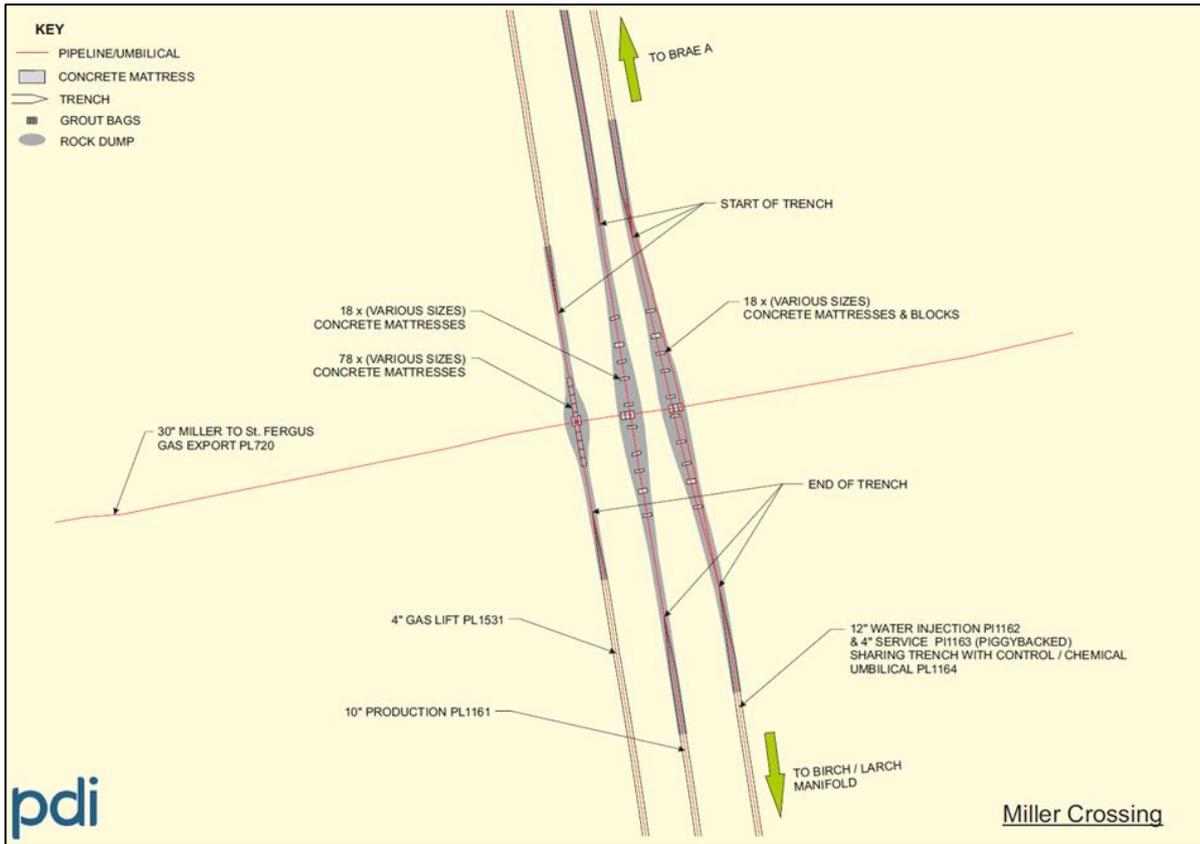


Figure 1.8.10: Miller to St. Fergus Gas Export Line PL720 Crossing

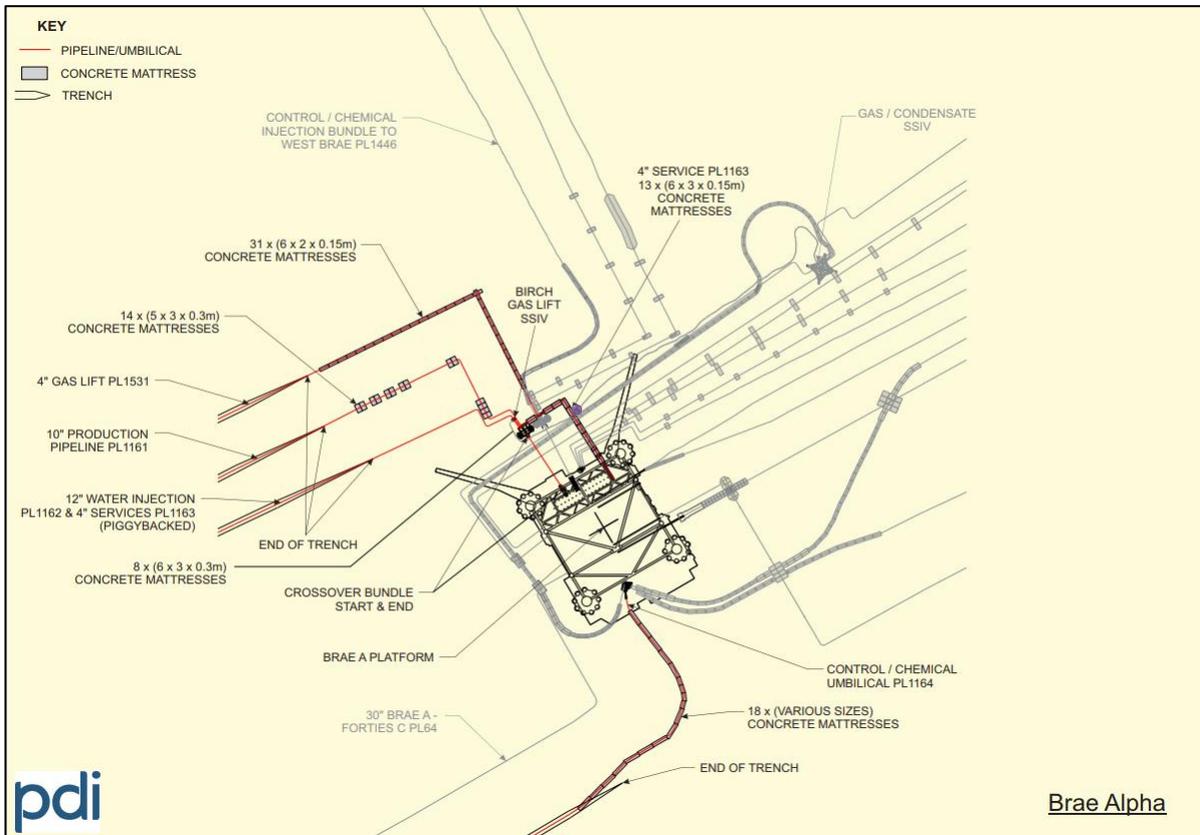


Figure 1.8.11: Brae Alpha

Table 1.8.1: Adjacent Facilities [1]

Operator	Name	Type	Distance / Direction	Information	Status
BP Exploration (Alpha) Limited	Miller	Steel Jacket Footings	14.5km, NE	DP Approved Dec 2013	Decommissioned
TAQA Bratani Limited	West Brae	Subsea Manifold	16.7km, N	DP Submitted for Consultation June 2017	Operational
TAQA Bratani Limited	Brae Alpha	Steel Jacket	8.9km, N	DP Submitted for Consultation June 2017	Operational
TAQA Bratani Limited	Brae Bravo	Steel Jacket	20.3km, NNE	DP Submitted for Consultation June 2017	Operational
TAQA Bratani Limited	Central Brae	Subsea Template	15km, NNE	DP Submitted for Consultation June 2017	Operational
Shell U.K Limited	Kingfisher	Subsea Manifold & WHPS	22.1km, NNE	DP Approved June 2021	Out of Use
Repsol Sinopec North Sea Limited	Enoch	WHPS	16.7km, ENE	Tied back to Brae Alpha	Operational
CNR International (U.K.) Limited	Tiffany	Steel Jacket	6.5km, S	Oil Producing Platform Exporting on to Forties Pipeline	Operational
CNR International (U.K.) Limited	Toni	Water Injection Manifold & WHPS	11.8km, S	Tied back to the Tiffany Platform	Operational
CNR International (U.K.) Limited	Thelma	Water Injection Manifold & WHPS	18.3km, S	Tied back to the Tiffany Platform	Operational
Neo Energy Production UK Limited	Lochranza	Subsea Manifolds	25.9km, SW	Tied back to Global Producer III FPSO	Out of Use
CNR International (U.K.) Limited	PL872	Pipeline	6.3km, E	Tiffany to Brae Subsea T-piece	Operational
BP Exploration Operating Company Limited	PL720	Pipeline	5.4km, NW	Miller to St. Fergus Trunkline	Out of Use
TAQA Bratani Limited	PL64	Pipeline	2.5km, E	Brae Alpha to Forties Charlie	Operational

Impacts of Decommissioning Proposals

There are no direct impacts on adjacent facilities from the decommissioning and removal of the integral protection cages. Short term environmental impacts associated with this activity are detailed in Section 4.

[1] See Figure 1.8.2 for diagram showing the adjacent facilities.

1.9 Industrial Implications

Well abandonment activities will be completed using a drilling rig and / or well intervention vessel. Precursory decommissioning work may be carried out by a Dive Support Vessel (DSV). Execution of the pipelines and subsea infrastructure decommissioning activities shall be completed using one or a combination of vessels including ROV Support Vessel (ROVSV), Construction Support Vessel (CSV), Multi Support Vessel (MSV) and Subsea Support Vessel (SSV). A survey vessel may be utilised for post-decommissioning surveying.

Spirit Energy has developed a contract strategy and Supply Chain Action Plan 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. Spirit Energy will seek to combine the 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 Birch Field

2.1.1 Installations: Subsea Including Stabilisation Features

Table 2.1.1: Birch Subsea Installations and Stabilisation Features					
Subsea Installations Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Birch Manifold	1	109	58.582326N 1.260898E	58°34.9396' N 01°15.6539' E	Gravity Based Structure
		20 x 16 x 3.5			

NOTES:

1. No stabilisation features such as concrete mattresses, grout bags, or deposited rock are associated with the item listed above.

2.1.2 Birch Field Pipelines Including Stabilisation and Other Features

Table 2.1.2: Birch Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁴	Pipeline Status	Current Content
Production Pipeline ²	PL1161	10"	14.26	Steel pipeline with 38.5mm thick coating	Hydrocarbons	Birch Manifold to ESDV	Open Trenched, Rock covered sections	Out of Use	Hydrocarbon
Production Jumper ²	PL6171	5"	0.04	Coated steel tie-in spool	Hydrocarbons	Adjacent to Well 16/12a-21 (disconnected) to Adjacent to Birch Manifold (disconnected)	Surface Laid	Disconnected - Out of Use	Seawater
Production Jumper ²	PL6177	5"	0.04	Coated steel tie-in spool	Hydrocarbons	Adjacent to Well 16/12a-8 (disconnected) to Adjacent to Birch Manifold (disconnected)	Surface Laid	Disconnected - Out of Use	Seawater
Production Jumper ²	PL6178	5"	0.02	Coated steel tie-in spool	Hydrocarbons	Adjacent to Well 16/12a-18z (disconnected) to Adjacent to Birch Manifold (disconnected)	Surface Laid	Disconnected - Out of Use	Seawater
Water Injection Pipeline ²	PL1162	12"	13.92	Coated steel pipeline	Water injection fluid	Brae A ESDV to Birch Manifold	Open Trenched	Out of Use	Water injection fluid
Water Injection Jumper ²	PL6169	6"	0.034	Coated steel tie-in spool	Water injection fluid	Adjacent to Birch Manifold (disconnected) to Adjacent to WI Well 16/12a-15 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Water Injection Jumper ²	PL6170	6"	0.043	Coated steel tie-in spool	Water injection fluid	Adjacent to Birch Manifold (disconnected) to Adjacent to WI Well 16/12a-22 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater

Table 2.1.2: Birch Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁴	Pipeline Status	Current Content
Gas Lift Pipeline ²	PL1163	4"	13.91	Coated steel pipeline	Scale squeeze, gas lift, methanol, asphaltene solvents and scale dissolvers	Brae A ESDV to Birch Manifold	Open Trenched	Out of Use	As product conveyed
Gas Lift Jumper ²	PL6172	3"	0.017	Coated steel tie-in spool	Scale squeeze, gas lift, methanol, asphaltene solvents and scale dissolvers	Adjacent to Birch Manifold (disconnected) to Adjacent to Well 16/12a-18z (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Gas Lift Jumper ²	PL6173	3"	0.023	Coated steel tie-in spool	Scale squeeze, gas lift, methanol, asphaltene solvents and scale dissolvers	Adjacent to Birch Manifold (disconnected) to Adjacent to Well 16/12a-21 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Gas Lift Jumper ²	PL6176	3"	0.023	Coated steel tie-in spool	Scale squeeze, gas lift, methanol, asphaltene solvents and scale dissolvers	Adjacent to Birch Manifold (disconnected) to Adjacent to Well 16/12a-8 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Umbilical ³	PL1164.1	9.5mm	13.91	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Brae A TUTU to Birch Manifold	Open Trenched	Out of Use	Scale Inhibitor
Umbilical ³	PL1164.1A	9.5mm	0.05	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Disconnected and laid down at Birch Manifold to Disconnected and laid down at Production Well Z1	Surface Laid	Disconnected - IPR	Seawater



Table 2.1.2: Birch Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁴	Pipeline Status	Current Content
Umbilical ³	PL1164.2	9.5mm	13.91	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Brae A TUTU to Birch Manifold	Open Trenched	Out of Use	As product conveyed
Umbilical ³	PL1164.2A	9.5mm	0.05	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Disconnected and laid down at Birch Manifold to Disconnected and laid down at Production Well Z3	Surface Laid	Disconnected - Out of Use	Seawater
Services Umbilical ²	PL1164.3	8.48mm	13.91	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Brae A Topsides Termination Box to Birch Manifold	Open Trenched	Out of Use	Scale Inhibitor
Chemical Jumper ²	PL6174	8.48mm	0.05	SAE J343 composite non-metal hose, short sections of steel tubing	Scale inhibitor	Adjacent to Birch Manifold (disconnected) to Adjacent to Well 16/12@-18z (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Control Umbilical	PL1164.4	9.5mm	13.89	SAE J343 composite non-metal hose	Scale inhibitor	Brae A to Birch Manifold	Open Trenched	Out of Use	Scale Inhibitor
Control Umbilical	PL1164.5	9.5mm	13.91	SAE J343 composite non-metal hose, a short section of steel tubing	Wax Inhibitor	Brae A to Birch Manifold	Open Trenched	Out of Use	Wax Inhibitor
Control Umbilical	PL1164.6	9.5mm	13.91	SAE J343 composite non-metal hose and a valve	Demulsifier	Brae A to Birch Manifold	Open Trenched	Out of Use	Demulsifier
Control Umbilical	PL1164.7	12.5mm	13.91	SAE J343 composite non-metal hose and a short section of steel tubing	Methanol or wax inhibitor	Brae A to Birch Manifold	Open Trenched	Out of Use	As product conveyed



Table 2.1.2: Birch Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁴	Pipeline Status	Current Content
Control Umbilical	PL1164.8	12.7mm	13.89	SAE J343 composite non-metal hose	Spare for Scale Inhibitor, Wax Inhibitor, Methanol, Control Fluid	Brae A to Birch Manifold	Open Trenched	Out of Use	As product conveyed
Control Umbilical	PL1164.9	19.0mm	13.89	SAE J343 composite non-metal hose	Spare for Scale Inhibitor, Wax Inhibitor, Methanol, Control Fluid	Brae A to Birch Manifold	Open Trenched	Out of Use	As product conveyed
Services Umbilical ²	PL1164.10	25.4mm	13.90	SAE J343 composite non-metal hose with small lengths of steel tubing	Methanol	Brae A Topsides Termination Box to Birch Manifold	Open Trenched	Out of Use	As product conveyed
Chemical Jumper ²	PL6175	40.9mm	0.002	SAE J343 composite non-metal hose with small lengths of steel tubing	Methanol	Adjacent to Birch Manifold (disconnected) to Adjacent to Well 16/12a-21 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Umbilical ³	PL1164.10A	25.4mm	0.04	SAE J343 composite non-metal hose with small lengths of steel tubing	Methanol	Disconnected and laid down at Birch Manifold to Disconnected at Production Well (Z3)	Surface Laid	Disconnected - out of use	Seawater
Umbilical ³	PL1164.10B	25.4mm	0.05	SAE J343 composite non-metal hose with small lengths of steel tubing	Methanol	Disconnected and laid down at Birch Manifold to Disconnected at Production Well (Z1)	Surface Laid	Disconnected - IPR	Seawater

NOTES:

1. If diameter is expressed in mm it refers to internal diameter of umbilical core.
2. Ref PWA 310/V/22 – Pipelines re-numbered due to them being taken out of use. These are sections PL6171, PL6177 and PL6178 (previously part of PL1161), PL6169 and PL6170 (previously part of PL1162), PL6172, PL6173 and PL6176 (previously part of PL1163), PL6174 (previously part of PL1164.3) and PL6175 (previously part of PL1164.10).
3. Ref PWA 282/V/18 - Pipelines re-numbered due to them being taken out of use. PL1164.1 has been modified by taking a section out of use and renumbering it PL1164.1A, PL1164.2 has been modified by taking a section out of use and renumbering it PL1164.2A, PL1164.10 has been modified by taking sections out of use and renumbering them PL1164.10A and PL1164.10B.
4. All trenched sections >0.6m depth below seabed unless otherwise stated. See Ref [3] for full details of pipelines burial status.



Table 2.1.3: Birch Pipeline Protection & Stabilisation Features

Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition ³
BIRCH 500M ZONE (MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (52 x 2.71Te / 5 x 2.4 x 0.15, 35 x 4.7Te / 6 x 3 x 0.15, 36 x 5.42Te / 10 x 2.4 x 0.15)	123	500	In and around the Birch Manifold. For details refer schematic Figure 1.8.4	Exposed, except in trench transition locations where some coverage is expected.
Grout bags ² (25kg)	500	13	In and around the Birch Manifold (see Figure 1.8.4). Used at spool tie-in locations and to fill in gaps between mattresses.	Mostly exposed, some beneath spools and in trench transitions.
BRAE ALPHA (BIRCH MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (4 x 2.71Te / 5 x 2.4 x 0.15), (14 x 6.8Te / 5 x 3 x 0.3), (14 x 5.42Te / 10 x 2.4 x 0.15), (8 x 8.1Te / 6 x 3 x 0.3)	40	247	PL1161 & PL1164, on approach to Brae Alpha. For details refer schematic Figure 1.8.11	Exposed, except in trench transition locations where some coverage is expected.
Grout bags ² (25kg)	500	13	On approach to Brae Alpha (see Figure 1.8.11)	Mostly exposed, some beneath spools and in trench transitions.
PROTECTION COVERS (NEAR BIRCH MANIFOLD)				
Protection covers: (6 x 11.5Te / 6 x 3 x 1.75m) & (2 x 15.5 Te / 7 x 7 x 1.75m)	8	100	In and around the Birch Manifold, over PL1161. For details refer schematic Figure 1.8.4	Exposed, except in trench transition locations where some coverage is expected.
Grout bags ² (25kg)	500	13	In and around the protection covers associated with PL1161 (see Figure 1.8.4)	Exposed
BIRCH-MILLER PL720 CROSSING (MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (8 x 3.4Te / 5 x 3 x 0.15m), (8 x 2.7Te / 6 x 2 x 0.15m), (4 x 12.2Te / 6 x 3 x 0.45m), (2 x 11.9Te / 6 x 1.8 x 0.85m), (2 x 13Te / 6 x 1.8 x 1.15m) & (4 x 14Te / 6 x 1.8 x 1.45m).	28	203	At the Birch-Miller pipeline crossing, supporting and protecting PL1161, PL1162, PL1163 & PL1164. For details refer schematic Figure 1.8.10	Buried under deposited rock. Some mattresses may be partially exposed out with the rock cover.



Table 2.1.3: Birch Pipeline Protection & Stabilisation Features

Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition ³
Grout bags ² (25kg)	2000	50		
Concrete blocks of various sizes: (2 x 11.9Te / 6 x 1.8 x 0.85m), (2 x 13Te / 6 x 1.8 x 1.15m) & (4 x 14Te / 6 x 1.8 x 1.45m)	8	106		
BIRCH-FORTIES PL64 CROSSING (MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes (16 x 3.4Te / 5 x 3 x 0.15m), (8 x 2.7Te / 6 x 2 x 0.15m), (3 x 12.2Te / 6 x 3 x 0.45m), (1 x 11.9Te / 6 x 1.8 x 0.85m), (1 x 13Te / 6 x 1.8 x 1.15m) & (4 x 14Te / 6 x 1.8 x 1.45m).	33	193	At the Birch-Forties pipeline crossing supporting and protecting PL1161, PL1162, & PL1163. For details refer schematic Figure 1.8.9	Buried under deposited rock. Some mattresses may be partially exposed out with the rock cover.
Concrete blocks of various sizes (2 x 11.9Te / 6 x 1.8 x 0.85m), (2 x 13Te / 6 x 1.8 x 1.15m) & (4 x 14Te / 6 x 1.8 x 1.45m)	8	106		
Grout bags ² (25kg)	2000	50		
Concrete mattresses: (13 x 2.7Te / 6 x 2 x 0.15m)	13	35	PL1164, adjacent to the Birch-Forties pipeline crossing. For details refer schematic Figure 1.8.9	Within trench.
Deposited Rock 7.887 KM LG	n/a	35,118	Birch PL1161 from Birch Manifold to Brae Alpha (Stability & Cover) 7.887 KM LG. Also, Birch PL1162, PL1163 & PL1164 between KP8.5 and 8.9 and PL1164 between KP11.2 and 11.3).	n/a
LARCH WYE PIECE & LARCH TEE (BIRCH PIPELINE MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (25 x 2.71Te / 5 x 2.4 x 0.15), (7 x 2.7Te / 6 x 2 x 0.15) & (20 x 5.42Te / 10 x 2.4 x 0.15)	52	195	PL1161, PL1162 & PL1163 approaches to and around the Larch Wye Piece and Larch Tee (see Figure 1.8.8).	Exposed



Table 2.1.3: Birch Pipeline Protection & Stabilisation Features

Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition ³
Grout bags ² (25kg)	500	13	At approaches to and around the Larch Wye Piece and Birch Tee (see Figure 1.8.8). Used at spool tie-in locations and to fill in gaps between mattresses.	Mostly exposed, some beneath spools and in trench transitions.
PROTECTION ALONG PIPELINE ROUTES (BIRCH PIPELINE MATTRESSES & GROUT BAGS)				
Concrete mattresses: (27 x 2.7Te / 6 x 2 x 0.15)	27	73	PL1162 & PL1163, at approx. KP10.8 to KP11.0 providing stabilisation and protection within the trench	Within trenches.
Grout bags ² (25kg)	200	5	Between and around mattresses.	Within trenches.

NOTES:

1. Mattress weights are based on supplier data where available and pro-rated where not available.
2. The numbers of grout bags are estimated from available data and engineering judgement. For the purposes of the inventory, and excluding grout bags under rock at crossing locations, it is assumed that ~20% of the remainder are buried and hence ~80% are recovered.
3. Burial status will be confirmed when decommissioning activities are being carried out. Fully exposed is assumed where not under rock cover for the purposes of the inventory.

Table 2.1.4: Birch Subsea Pipeline Structure Information

Subsea Pipeline Structures Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Crossover Bundle Inboard Support at Brae Alpha	1	95	58.694490N 1.280912E	58°41.6694' N 01°16.8547' E	Pipeline structure at end of crossover bundle at Brae Alpha Pipeline, Structure is secured to seabed by one steel pile.
Crossover Bundle	1	37.5 x 8 x 8	58.694320N 1.281132E	58°41.6592' N 01°16.8679' E	The bundle spans between inboard and outboard supports; ~37m long
Crossover Bundle Outboard Support	1		58.694150N 1.281352E	58°41.6490' N 01°16.8811' E	Pipeline structure at end of crossover bundle near Brae Alpha, Structure is secured to seabed by two steel piles.
Birch SSIV Protection Structure	1	1 1.7 x 1 x 1.9	58.694224N 1.281221E	58°41.6534' N 01°16.8732' E	Pipeline structure on approach to crossover bundle support at Brae Alpha.
Birch Gas Lift Anode Skid 1	1	0.1 1 x 1.4 x 0.1	58.694222N 1.281399E	58°41.6533' N 01°16.8839' E	At Brae Alpha Jacket near the Outboard Crossover Bundle Support
Birch Gas Lift Anode Skid 2	1	0.1 1 x 1.4 x 0.1	58.694392N 1.281179E	58°41.6635' N 01°16.8707' E	At Brae Alpha Jacket near Slot OO and Slot WW
NOTES: 1. No stabilisation features such as concrete mattresses, grout bags, or deposited rock are associated with the items listed above.					

2.1.3 Birch Field Pipelines Crossing

Table 2.1.5: Birch Pipeline crossing information		
Pipeline, umbilical or cable description	Location(s)	Protection
INFIELD – BETWEEN BIRCH AND BRAE ALPHA 500M ZONES		
PL1161 over PL720 Miller to St. Fergus 30in pipeline (out of use)	~KP8.75	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.10
PL1162 & PL1163 over PL720 Miller to St. Fergus 30in pipeline (out of use)	~KP8.80	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.10
PL1164 over PL720 Miller to St. Fergus 30in pipeline (out of use)	~KP8.80	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.10
PL1161 over PL64 Brae Alpha to Forties Charlie 30in pipeline (active)	~KP11.32	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.9
PL1162 & PL1163 over PL64 Brae Alpha to Forties Charlie 30in pipeline (active)	~KP11.27	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.9
INSIDE BRAE ALPHA 500M ZONE		
PL1161, PL1162, PL1163 over PL360, PL361 and Control Umbilical for SSIV; adjacent to Brae A.	Approx. 20m NNE of Brae Alpha	Crossover bundle, piled. No additional protection. Refer Figure 1.8.11

2.1.4 Birch Field Drill Cuttings Piles

Table 2.1.6: Birch Field Drill Cutting(s) Pile Information		
Location of Pile Centre (WGS84 Decimal Degrees)	Seabed Area (m²)	Estimated Volume of drill Cuttings (m³)
58.581920N 1.261275E	3,980	464

2.1.5 Birch Field Inventory Estimates

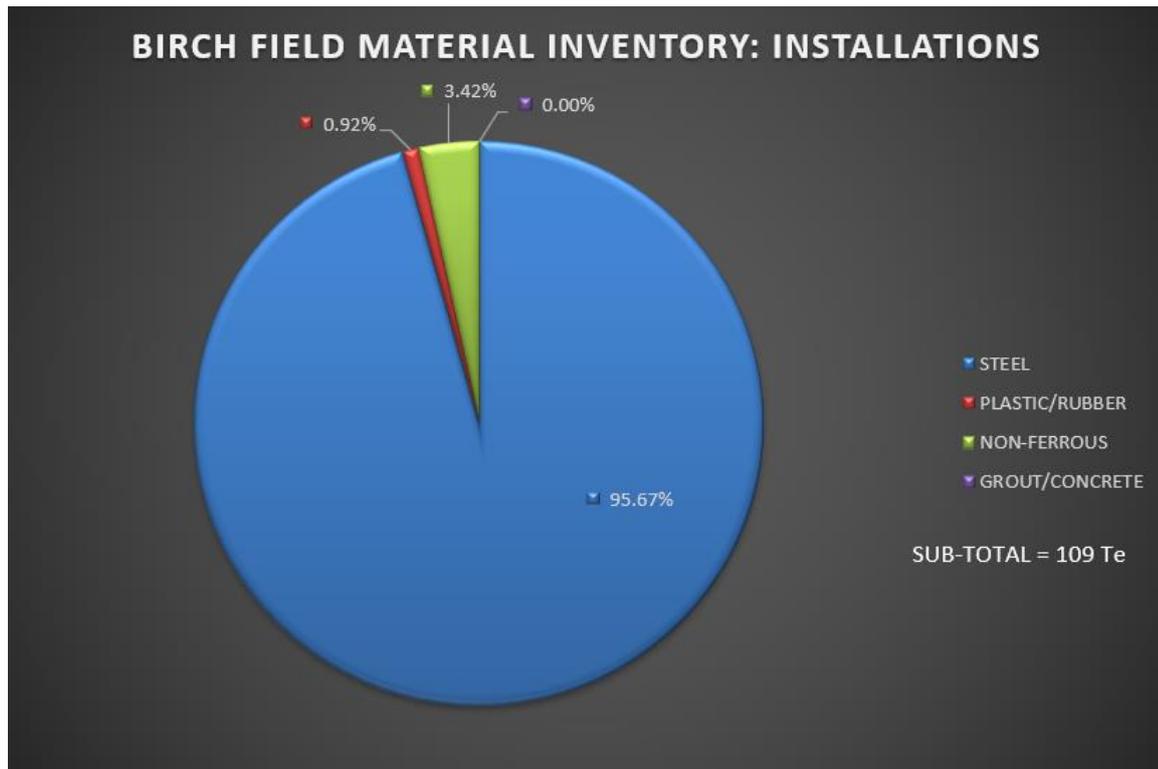


Figure 2.1.1: Birch Inventory Estimate (Installations)

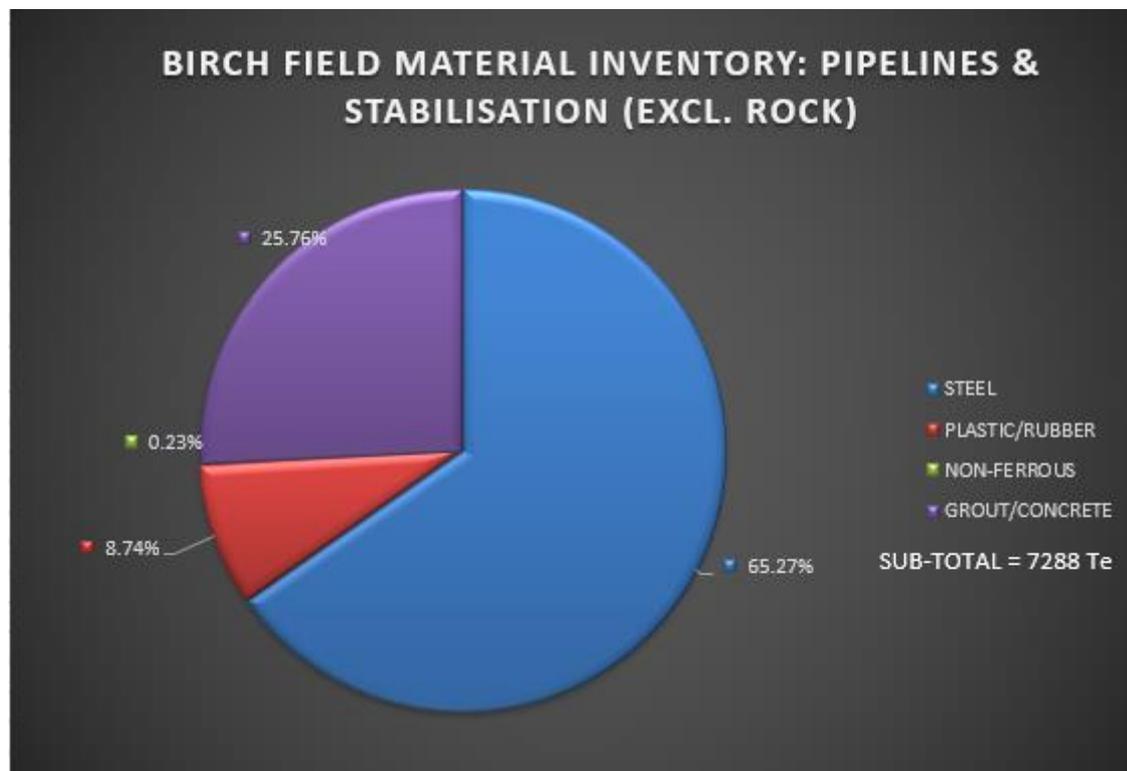


Figure 2.1.2: Birch Inventory Estimate (Pipelines)

2.2 Larch Field

2.2.1 Larch Field Installations: Subsea Including Stabilisation Features

Table 2.2.1: Larch Subsea Installations and Stabilisation Features					
Subsea Installations Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Larch Gas Lift (& Production) Manifold	1	63	58.617041N 1.261765E	58°37.0224' N 01°15.7059' E	Structure is secured to the seabed using four steel piles, which will be cut to 3m below mean seabed level.
		12 x 11.5 x 3			

NOTES:
1. No stabilisation features such as concrete mattresses, grout bags, or deposited rock are associated with the items listed above.

2.2.2 Larch Field Pipelines Including Stabilisation Features

Table 2.2.2: Larch Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁵	Pipeline Status	Current Content
Production Pipeline	PL1527	10"	2.39	Polyurethane insulated steel pipe	Hydrocarbons	Production Well 16/12a-23 to Larch Y-Assembly	Trenched primarily to a depth >1.0m but for an exposed section with depth <0.6m over a length of approx. 40m. Limited natural backfill. Rock covered sections	Out of Use	Seawater
Water Injection Pipeline	PL1528	6"	2.17	Coated steel pipeline	Injection water	Adjacent to Well 16/12a-24 (disconnected) to Birch Pipeline Tee Assembly	Open trenched.	Out of Use	Water injection fluid
Gas Lift Pipeline ⁶	PL1529	4"	2.41	Coated steel pipeline	Lift Gas, Scale Squeeze, Chemicals	Birch Pipeline Tee Assembly to Production Well 16/12a-23	Open trenched.	Out of Use	Seawater
Gas Lift Jumper ⁶	PL6151	4"	0.2	Coated steel spool	Lift Gas, Scale Squeeze, Chemicals	Adjacent to Gas Lift Manifold (disconnected) to Adjacent to Water Injection Well 16/12a-24 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Control Umbilical 1 Pipeline ²	PL1530.1	19.1mm & 25.4mm	1.80	Umbilical line c/w jumpers and tubing (2x19.1mm)	Methanol	Birch Manifold to Production Well 16/12a-23	Trenched - limited natural backfill.	Out of use	Seawater
Control Umbilical 2 Pipeline	PL1530.2	9.5mm	1.80	Umbilical line c/w jumpers and tubing	Scale inhibitor	Birch Manifold to Production Well 16/12a-23	Trenched - limited natural backfill.	Out of Use	Seawater
Control Umbilical 3 Pipeline	PL1530.3	12.7mm	1.80	Umbilical line c/w jumpers and tubing	Wax inhibitor	Birch Manifold to Production Well 16/12a-23	Trenched - limited natural backfill.	Out of Use	Seawater
Control Umbilical 4 Pipeline	PL1530.4	9.5mm	1.80	Umbilical line c/w jumpers and tubing	Demulsifier (spare)	Birch Manifold to Production Well 16/12a-23	Trenched - limited natural backfill.	Out of Use	Seawater



Table 2.2.2: Larch Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status ⁵	Pipeline Status	Current Content
Spare umbilical pipeline	PL1530.5	12.7mm & 25.4mm	1.80	Umbilical line c/w jumpers and tubing	Methanol	Birch Manifold to Production Well 16/12a-23	Trenched - limited natural backfill.	Out of Use	Seawater
Gas lift pipeline	PL1531	4"	12.10	Coated steel pipeline	Hydrocarbons	Gas Lift Manifold to West Brae Gas Lift Pipeline Tee Assembly ³	Trenched - Limited natural backfill. Rock covered sections. ⁴	Out of Use	Seawater

1. If diameter is expressed in mm it refers to internal diameter of the umbilical core.
 2. PL1530.1 Ident 2 items replaced by PL1530.5 Ident 2 items in 2001 following failure.
 3. Extent of decommissioning within the 'Trees' Decommissioning Programme for PL1531 includes the gas lift valve immediately upstream of the West Brae Gas Lift T-piece tie-in flange.
 4. Two third party pipeline crossings (30" Miller Pipeline PL720 & 30" Forties pipeline PL64)
 5. All trenched sections >0.6m depth below seabed unless otherwise stated (PL1527 is the only anomaly). See Ref [3] for full details of pipelines burial status.
 6. The pipeline section between the gas lift manifold and WI well 16/12a-24 (previously identified as PL1529 idents 8 & 9) has been taken out of use, disconnected and given a new PL number PL6151.

Table 2.2.3: Larch Pipeline Protection & Stabilisation Features				
Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition
BRAE ALPHA (LARCH MATTRESSES & GROUT BAGS)				
Concrete mattresses: (31 x 2.7Te / 6 x 2 x 0.15m)	31	84	PL1531, on approach to the Brae Alpha Bridge Bundle. For details refer schematic Figure 1.8.11	Exposed, except in trench transition locations where some coverage is expected.
Grout bags (25kg)	500	13		Mostly exposed, some beneath spoils and in trench transitions.
LARCH (GAS LIFT / PRODUCTION) MANIFOLD (MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (124 x 2.7Te / 6 x 2 x 0.15m) & (43 x 4.7Te / 6 x 3 x 0.15m)	167	533	PL1527, PL1528, PL1529, PL1530 & PL1531, In and around the Larch Gas Lift & Production Manifold, for details refer schematic Figure 1.8.5	Exposed, except in trench transition locations where some coverage is expected.



Table 2.2.3: Larch Pipeline Protection & Stabilisation Features

Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition
Grout bags (25kg)	500	13	PL1527, PL1528, PL1529, PL1530 & PL1531, In and around the Larch Gas Lift & Production Manifold, for details refer schematic Figure 1.8.5	Mostly exposed, some beneath spools and in trench transitions.
LARCH TO BIRCH (INFIELD BETWEEN 500M ZONES) (MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (15 x 2.7Te / 6 x 2 x 0.15m), (12 x 4.7Te / 6 x 3 x 0.15m) & (9 x 1.2Te / 2 x 1 x 0.5)	36	108	Infield between the Birch and Larch 500m zones. UHB Mitigation and Free span rectification.	Exposed, except in trench transition locations where some coverage is expected.
Grout bags (25kg)	500	13		Mostly exposed, some beneath spools and in trench transitions.
PROTECTION COVERS (NEAR LARCH WYE ASSEMBLY)				
Protection covers (6 x 3 x 1.75m) & (7 x 7 x 1.75m)	10	101	Over PL1527 tie-in spools at the Larch Wye Piece Assembly. For details refer schematic Figure 1.8.8	Exposed
Grout bag (25kg)	500	13		Exposed
WEST BRAE PL1446 CROSSING (LARCH MATTRESSES & GROUT BAGS)				
Concrete mattresses: (2 x 8.1Te / 6 x 3 x 0.3m)	2	16	PL1531, on approach to Brae Alpha. For details refer schematic Figure 1.8.11.	Exposed
Grout bags (25kg)	500	13		Exposed
LARCH-FORTIES PL64 CROSSING (MATTRESSES & GROUT BAGS)				
Concrete mattresses: (80 x 8.1Te / 6 x 3 x 0.3m)	80	648	PL1531 at the Larch-Forties pipeline crossing. For details refer schematic Figure 1.8.9	Buried under deposited rock. Some mattresses blocks may be exposed out with the rock cover.
Grout bags (25kg)	500	13		Buried
LARCH-MILLER P720 CROSSING (MATTRESSES & GROUT BAGS)				
Concrete mattresses: (78 x 8.1Te / 6 x 3 x 0.3m)	78	632	PL1531 at the Larch-Miller pipeline crossing. For details refer schematic Figure 1.8.10	Buried under deposited rock. Some mattresses blocks may be exposed out with the rock cover.
Grout bags (25kg)	500	13		Buried
LARCH WYE PIECE & BIRCH TEE (LARCH PIPELINE MATTRESSES & GROUT BAGS)				
Concrete mattresses of various sizes: (65 x 2.7Te / 6 x 2 x 0.15) & (13 x 4.7Te / 6 x 3 x 0.15)	78	237	PL1527, PL1528 & PL1531 approaches to and around the Larch Wye Piece and Birch Tee (see Figure 1.8.8).	Exposed



Table 2.2.3: Larch Pipeline Protection & Stabilisation Features				
Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location(s)	Exposed/Buried/Condition
Grout bags ² (25kg)	500	13	At approaches to and around the Larch Wye Piece and Birch Tee (see Figure 1.8.8). Used at spool tie-in locations and to fill in gaps between mattresses.	Mostly exposed, some beneath spools and in trench transitions.
DEPOSITED ROCK (LARCH)				
Deposited Rock 0.687 KM LG	n/a	3050	Larch PL1527 & PL1531 from Larch Manifold to Brae Alpha (UHB Mitigation) 0.687 KM LG.	n/a
NOTES:				
1. Mattress weights are based on supplier data where available and pro-rated where not available.				
2. The numbers of grout bags are estimated from available data and engineering judgement and will be confirmed during decommissioning activities.				
3. All accessible grout bags will be recovered to shore for recycling & disposal. Where buried, grout bags will be left in place. For the purposes of the inventory, and excluding grout bags under rock at crossing locations, it is assumed that ~20% of the remainder are buried and hence ~80% are recovered.				
4. Burial status will be confirmed when decommissioning activities are being carried out. Fully exposed is assumed where not under rock cover for the purposes of the inventory.				

Table 2.2.4: Larch Subsea Pipeline Structures and Stabilisation Features					
Subsea Pipeline Structures Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Larch Wye Piece Assembly (Original)	1	71	58.617521 1.260608	58°37.0513' N 01°15.6365' E	Original Wye Piece Assembly
		8.4 x 6.5 x 2			
Larch Wye Piece Extension Spool Protection Structure	1	12	58.617485 1.260575	58°37.0491' N 01°15.6345' E	Connected to Wye Piece Assembly
		4.5 x 3 x 2			
Larch Wye Piece Assembly (New)	1	24	58.617457 1.260542	58°37.0474' N 01°15.6325' E	Connected to Wye Piece Extension Spool Protection Structure
		6.5 x 3.8 x 2.3			
Concrete mattresses	8	38	n/a	n/a	Underneath Larch Wye Piece Assembly (Original)
		6 x 3 x 0.15			



Table 2.2.4: Larch Subsea Pipeline Structures and Stabilisation Features

Subsea Pipeline Structures Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Concrete mattresses	4	19	n/a	n/a	Underneath Larch Wye Piece Assembly Extension Spool Protection Frame
		6 x 3 x 0.15			
Concrete mattresses	7	33	n/a	n/a	Underneath Larch Wye Piece Assembly (New)
		6 x 3 x 0.15			
Concrete mattresses	5	41	n/a	n/a	On top of Larch Wye Piece Assembly
		12 x 3 x 0.15			
Grout bags (25kg)	500	13	n/a	n/a	Grout bags (around structures)

NOTES:

1. Mattress weights are based on supplier data where available and pro-rated where not available.
2. The numbers of grout bags are estimated from available data and engineering judgement and will be confirmed during decommissioning activities.
3. All accessible grout bags will be recovered to shore for recycling & disposal. Where buried, grout bags will be left in place. It is assumed ~20% are buried and hence ~80% are recovered
4. Burial status will be confirmed when decommissioning activities are being carried out. Fully exposed is assumed where not under rock cover for the purposes of the inventory.

2.2.3 Larch Field Pipelines Crossing

Table 2.2.5: Larch Pipeline crossing information		
Pipeline, umbilical or cable description	Location	Protection
PL1531 over PL1446 West Brae Control & Chemical Injection Umbilical	Approx. 18m downstream of crossover bundle outboard support	Concrete mattresses.
PL1531 over PL720 Miller to St. Fergus 30in pipeline (out of use)	~KP7.20	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.10
PL1531 over PL64 Brae Alpha to Forties Charlie 30in pipeline (active)	~KP9.75	Concrete mattress/block supports under the pipeline, covered by rock protection. Refer Figure 1.8.9

2.2.4 Larch Field Drill Cuttings Piles

There are no drill cuttings piles associated with the Larch Field.

2.2.5 Larch Field Inventory Estimates

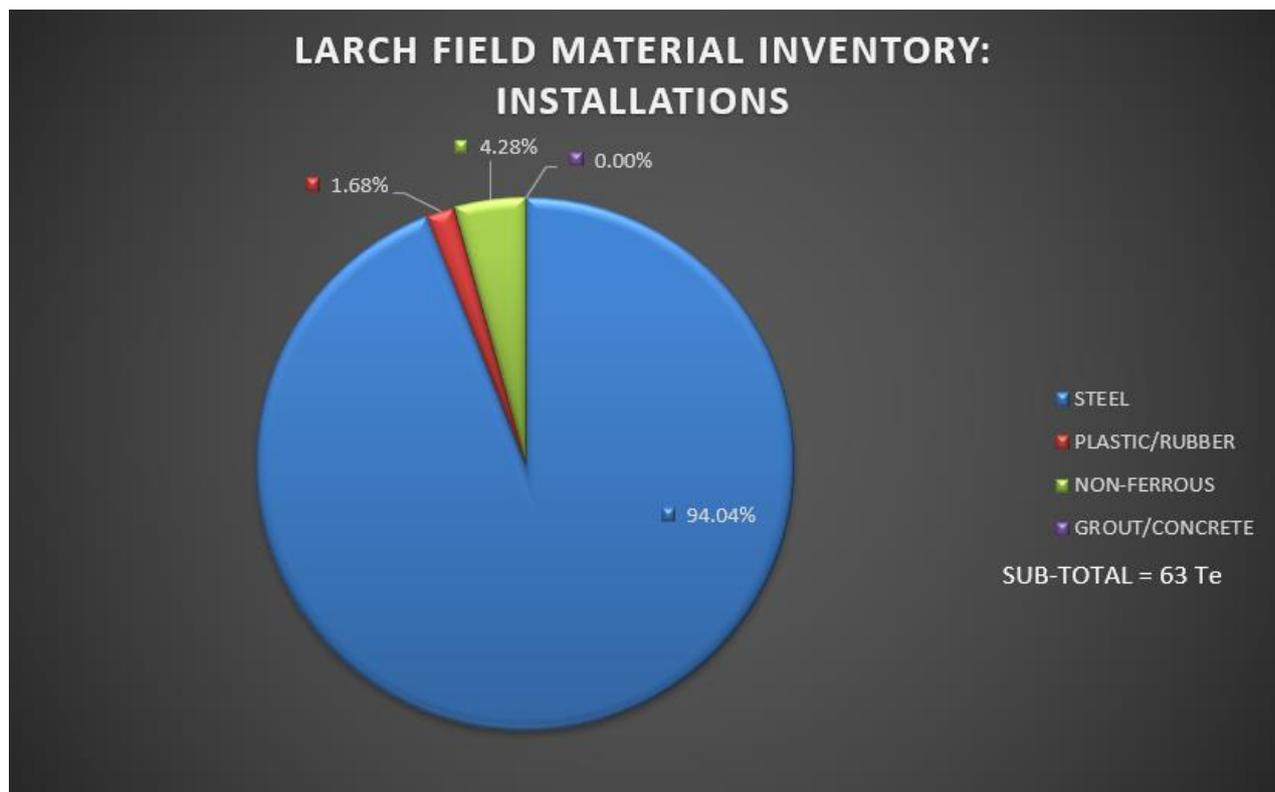


Figure 2.2.1: Larch Inventory Estimate (Installations)

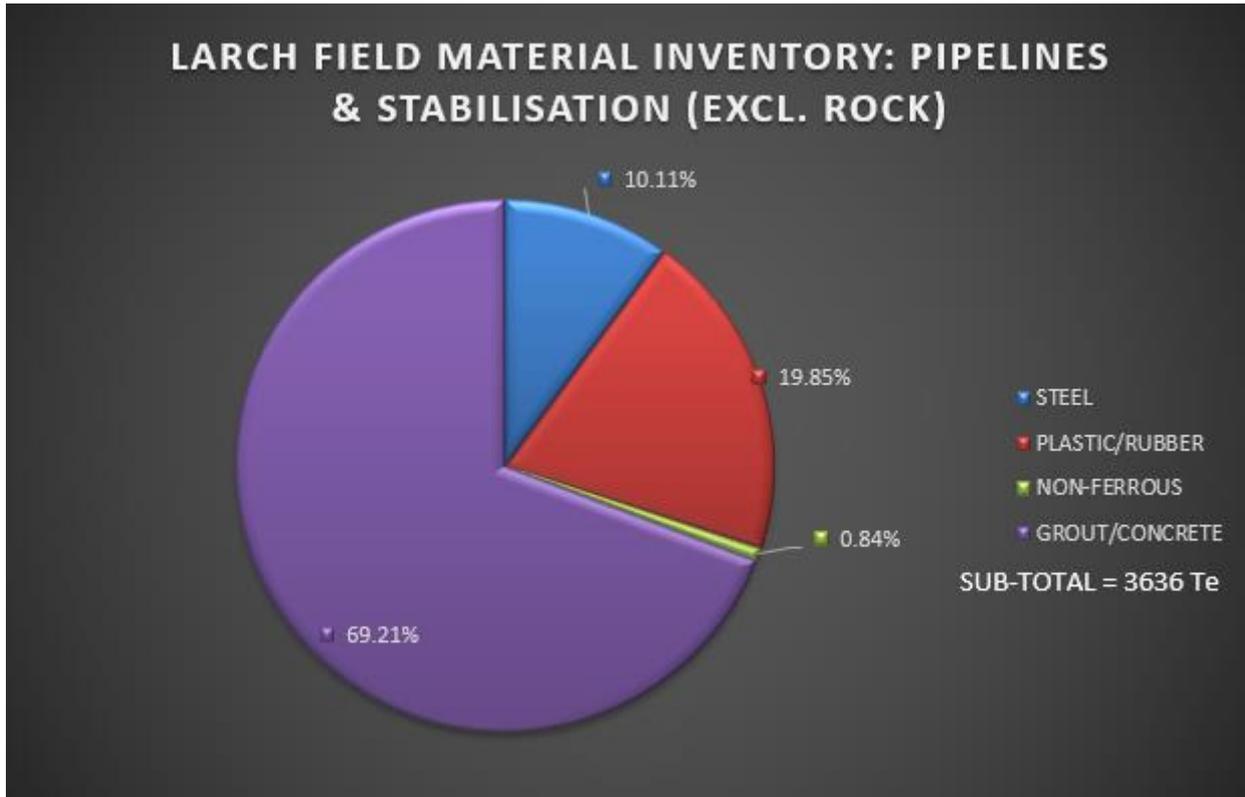


Figure 2.2.2: Larch Inventory Estimate (Pipelines)

2.3 Sycamore Field

2.3.1 Sycamore Field Installations: Subsea Including Stabilisation Features

Table 2.3.1: Sycamore Subsea Installation Features					
Subsea Installations Including Stabilisation Features	No.	Mass (Te)	Location		Comments/ Status
		Size (m)	WGS84 Decimal	WGS84 Decimal Minute	
Well SW1 (formerly known as SP1)	1	10	58.542822N 1.268341E	58°32.5693' N 01°16.1005' E	Abandoned, never produced from. Wellhead and flowbase to be recovered and conductor to be cut to 3m below mean seabed level.
		4.0 x 3.5 x 1.5			

NOTES:
1. No stabilisation features such as concrete mattresses, grout bags, or deposited rock are associated with the items listed above.

2.3.2 Sycamore Field Pipelines Including Stabilisation Features

Table 2.3.2: Sycamore Pipeline/Flowline/Umbilical Information									
Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
JUMPERS BETWEEN WELL SW1 (FORMERLY WELL SP1) AND SYCAMORE MAIN MANIFOLD⁵									
Production jumper	PL1964.1(J)SP1	5"	0.07	Pipeline spoolpiece	Reservoir fluids	Well SW1 (formerly SP1) to Sycamore Main Manifold	Surface laid	Out of use – never connected to well	Seawater
Gas lift & service jumper	PL1964.2(J)SP1	4"	0.07	Pipeline spoolpiece	Lift gas, scale squeeze chemicals	Sycamore Main Manifold to Well SP1	Surface Laid	Out of use – never connected to well	Seawater
Chemical injection jumper	PLU1964.3(J)SP1	1/2", 3/8", 1"	0.08	Pipeline jumper	Methanol, wax inhibitor, demulsifier, spare	Sycamore Main Manifold to Well SP1	Surface Laid	Disconnected - IPR	Seawater
JUMPERS BETWEEN WELL SP2 AND SYCAMORE MAIN MANIFOLD									
Production jumper ³	PL1964.1(J)SP2	5"	0.08	Pipeline spoolpiece	Reservoir fluids	Adjacent to Well SP2 (disconnected) to Adjacent to Sycamore Main Manifold (disconnected)	Surface laid	Disconnected – Out of Use	Seawater
Gas lift & service jumper ³	PL1964.2(J)SP2	4"	0.08	Pipeline spoolpiece	Lift gas, scale squeeze chemicals	Adjacent to Sycamore Main Manifold (disconnected) to Adjacent to Well SP2 (disconnected)	Surface Laid	Disconnected – out of use	Seawater
Chemical injection jumper	PLU1964.3(J)SP2	1/2", 3/8", 1"	0.09	Pipeline jumper	Methanol, wax inhibitor, demulsifier, spare	Sycamore Main Manifold to Well SP2	Surface Laid	Disconnected - IPR	Seawater
JUMPERS BETWEEN SYCAMORE WELL SP3 AND SYCAMORE SATELLITE MANIFOLD									
Production jumper ³	PL1964.1(J)SP3	5"	0.05	Pipeline spoolpiece	Reservoir fluids	Adjacent to Well SP3 (disconnected) to Adjacent to Sycamore Satellite Manifold (disconnected)	Surface Laid	Disconnected - Out of Use	Seawater



Table 2.3.2: Sycamore Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Gas lift & service jumper ³	PL1964.2(J)SP3	4"	0.05	Pipeline spoolpiece	Lift gas, scale squeeze chemicals	Adjacent to Sycamore Satellite Manifold (disconnected) to Adjacent to Well SP3 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
Chemical injection jumper	PLU1964.3(J)SP3	1/4", 1/2", 3/8"	0.06	Pipeline jumper	Methanol, wax inhibitor, demulsifier	Sycamore Satellite Manifold to Well SP3	Surface Laid	Disconnected -. IPR	Seawater
JUMPER BETWEEN SW2 WELL AND SYCAMORE MAIN MANIFOLD									
Water injection jumper ³	PL1964.4(J)SW2	6"	0.09	Pipeline spoolpiece	Injection water	Adjacent to Sycamore Main Manifold (disconnected) to Adjacent to Well SW2 (disconnected)	Surface Laid	Disconnected – Out of Use	Seawater
JUMPERS BETWEEN BIRCH MANIFOLD AND SYCAMORE MAIN TOWHEAD									
Production jumper	PL1964.1(J)BM	11"	0.06	Pipeline spoolpiece	Reservoir fluids	Sycamore Main Towhead to Birch Manifold	Surface Laid	Out of Use	As product conveyed
Gas lift & service jumper	PL1964.2(J)BM	4"	0.06	Pipeline spoolpiece	Lift gas, scale squeeze chemicals	Birch Manifold to Sycamore Main Towhead	Surface Laid	Out of Use	As product conveyed
Chemical injection jumper	PLU1964.3(J)BM	1/4", 1/2", 3/8"	0.10	Pipeline jumper	Methanol, wax inhibitor, hydraulic, power & signal	Birch Manifold to Sycamore Main Towhead	Surface Laid	Out of Use	As product conveyed
Water injection jumper	PL1964.4(J)BM	12"	0.06	Pipeline spoolpiece	Injection water	Birch Manifold to Sycamore Main Towhead	Surface Laid	Out of Use	As product conveyed
JUMPERS BETWEEN SYCAMORE SATELLITE TOWHEAD AND SYCAMORE MAIN MANIFOLD									
Production jumper	PL1964.1(J)SST	5"	0.05	Pipeline spoolpiece	Reservoir fluids	Sycamore Satellite Towhead to Sycamore Main manifold	Surface Laid	Out of Use	As product conveyed
Gas lift & service jumper	PL1964.2(J)SST	4"	0.05	Pipeline spoolpiece	Lift gas, scale squeeze chemicals	Sycamore Main Manifold to Sycamore Satellite Towhead	Surface Laid	Out of Use	As product conveyed



Table 2.3.2: Sycamore Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (NB) (inches) ¹	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Chemical injection jumper	PLU1964.3(J)SST	1/4", 1/2", 3/8"	0.06	Pipeline jumper	Methanol, wax inhibitor, hydraulic, power & signal	Sycamore Main Manifold to Sycamore Satellite Towhead	Surface Laid	Out of Use	As product conveyed

NOTES:

1. If diameter is expressed in mm it refers to outside diameter of umbilical core
2. Reference Pipeline Works Authorisations 21-W-02 & 296-V-18.
3. Reference Pipeline Works Authorisation 308/V/22
4. Jumpers to well SP4 (PL1964.1(J)SP4, PL1964.2(J)SP4, PLU1964.3(J)SP4) and well SW3 (PL1964.4(J)SW3) have been omitted since the wells and associated jumpers were never installed. This differs from the info in the PWAs and variations referenced in notes 2 & 3 above.
5. This well was originally going to be a production well but was changed to a water injection well. The associated production and gas lift jumpers (PL1964.1(J)SP1 and PL1964.2(J)SP1) were installed but never connected to the well. Jumper PL1964.4(J)SW1 was never installed. This information differs from the info in the PWAs referenced in notes 2 & 3 above.

Table 2.3.3: Sycamore Pipeline Protection & Stabilisation features

Stabilisation/Protection Feature	Total Number	Total Mass (Te)	Location	Exposed/Buried/Condition ⁴
SYCAMORE 500M ZONE (MATTRESSES & GROUT BAGS)				
Concrete mattresses: (68 x 4.7Te / 6 x 3 x 0.15m) & (4 x 1.8Te / 2 x 2 x 0.3m)	72	327	Inside the Sycamore 500m zone over jumpers between SMM, SST and wells SW1 (SP1), SP2 & SW2. For details refer Figure 1.8.6.	Exposed
Concrete mattresses: (16 x 4.7Te / 6 x 3 x 0.15m)	16	75	Inside the Sycamore 500m zone, jumpers between SSM and well SP3. For details refer Figure 1.8.7	Exposed
Grout bags (25kg)	500	13	Around tie-in spools	Exposed

NOTES:

1. Mattress weights are based on supplier data where available and pro-rated where not available.
2. The numbers of grout bags are estimated from available data and engineering judgement and will be confirmed during decommissioning activities.
3. All accessible grout bags will be recovered to shore for recycling & disposal. Where buried, grout bags will be left in place. It is assumed ~20% are buried and hence ~80% are recovered.
4. Burial status will be confirmed when decommissioning activities are being carried out. Fully exposed is assumed where not under rock cover for the purposes of the inventory.



2.3.3 Sycamore Field Wells

Table 2.3.4: Sycamore Field Well Information			
Well ID	Designation	Status	Category of Well
16/12a-25 SW1 (formerly known as SP1)	Producer – Oil	Abandoned ³	SS 0/01

NOTES

- For details of well categorisation please refer the latest version of the OEUK Guidelines for the Decommissioning of Wells.
- NSTA guideline: <https://www.nstauthority.co.uk/media/5108/oga-suspended-wells-guidance.pdf>
- This well was never produced from, and abandonment was completed Q4 2022. The wellhead and flowbase will be recovered and are not subject to notices under Section 29.

2.3.4 Sycamore Field Drill Cuttings Piles

Table 2.3.5: Sycamore Field Drill Cutting(s) Pile Information		
Location of Pile Centre (WGS84 Decimal)	Seabed Area (m ²)	Estimated Volume of drill Cuttings (m ³)
58.542920N 1.268850E	4,317	684

2.3.5 Sycamore Field Inventory Estimates

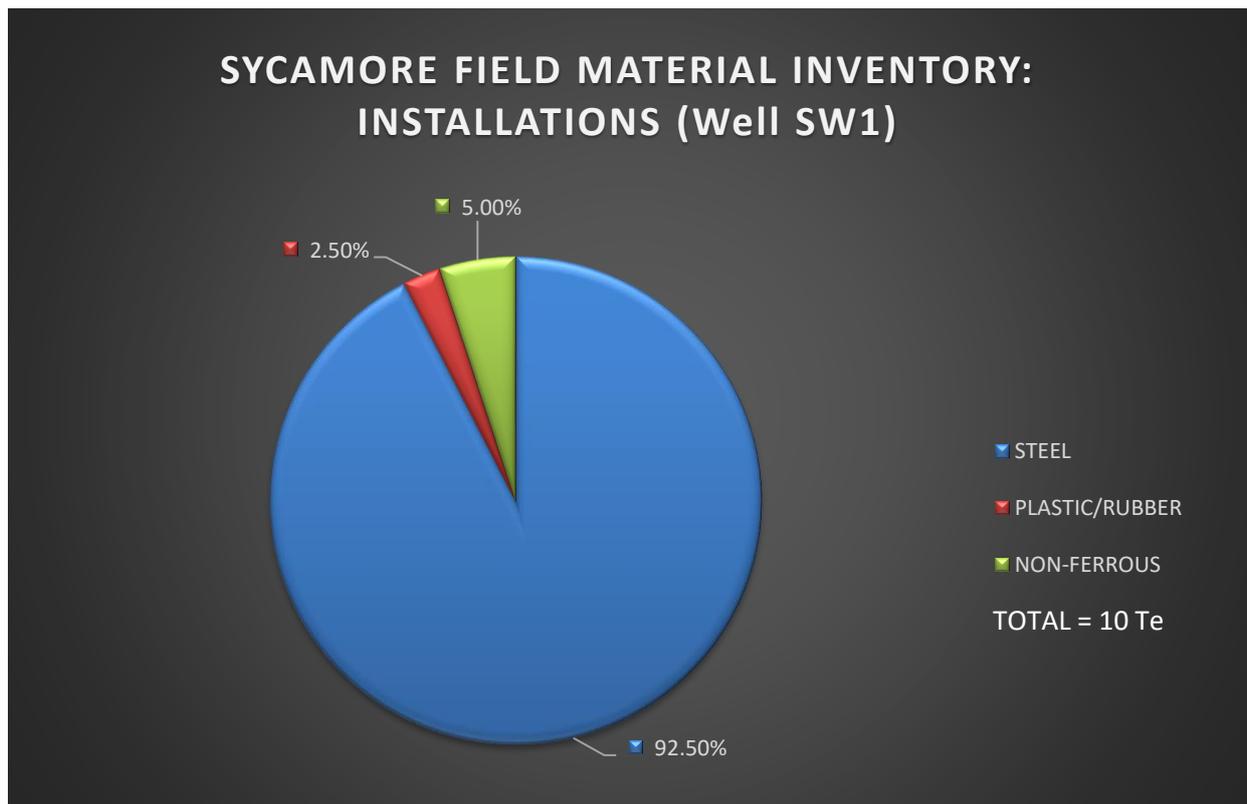


Figure 2.3.1: Sycamore Inventory Estimate (Installations)

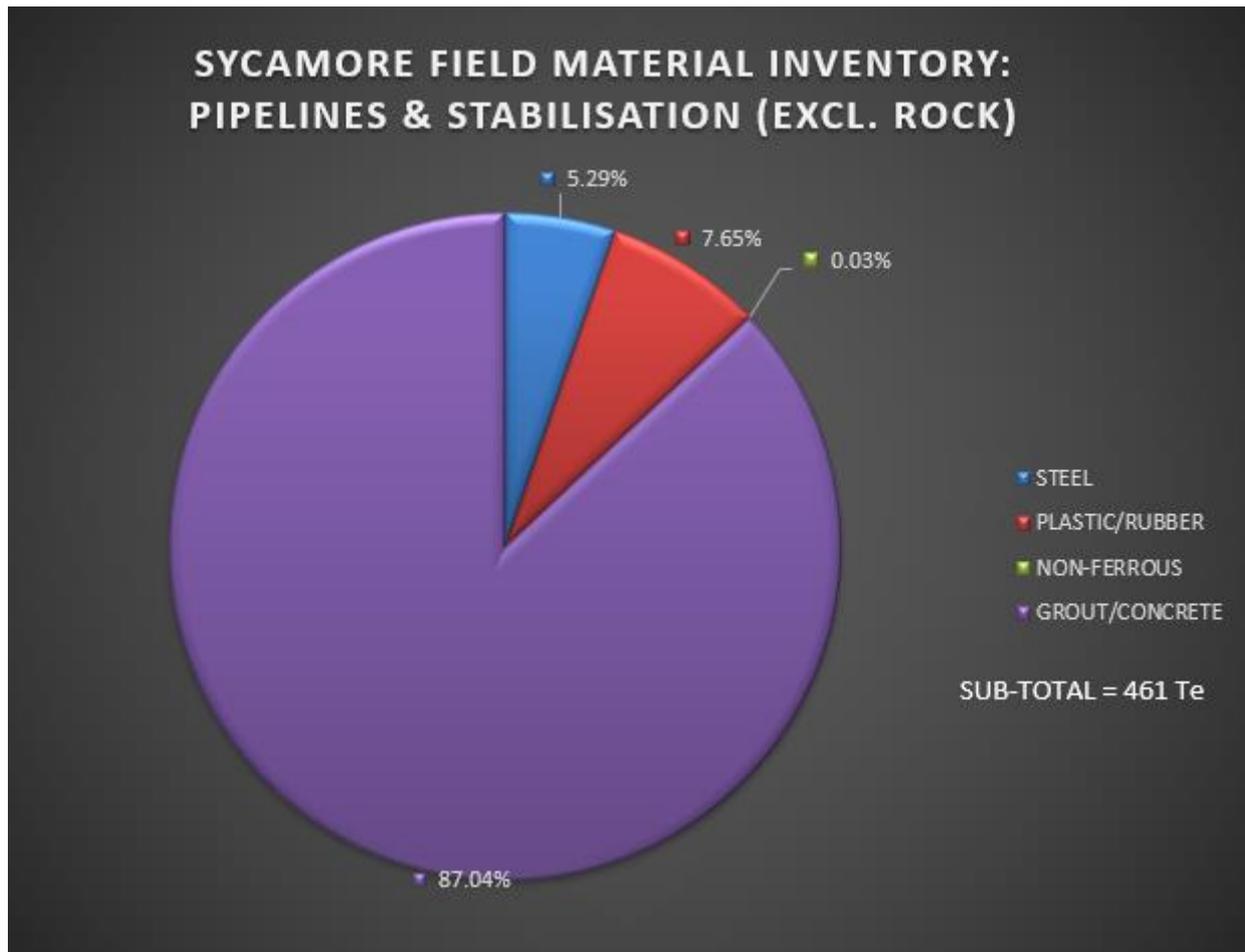


Figure 2.3.2: Sycamore Inventory Estimate (Pipelines & Stabilisation)

3. REMOVAL AND DISPOSAL METHODS

Waste will be dealt with in accordance with the Waste Framework Directive. The re-use of an installation, pipeline, or umbilical pipeline or parts thereof, is first in the order of preferred decommissioning options and such options are currently under investigation. Waste generated during decommissioning will be segregated by type and periodically transported to shore in an auditable manner through licensed waste contractors. Steel and other recyclable metals are estimated to account for the greatest proportion of the materials inventory.

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.

Materials for which no re-use or recycling opportunities are available will be tracked through to final disposal.

3.1 Subsea Installations & Stabilisation Features

Table 3.1.1: Subsea Installations and Stabilisation Features Decommissioning Options			
Subsea installations and stabilisation features	Quantity	Option	Disposal Route (if applicable)
Wellheads	1	Full recovery	Return to shore for reuse, recycling or disposal.
Manifolds (Birch Manifold, Larch Gas Lift Manifold)	2	Full recovery. Piles will be cut 3m below seabed.	Return to shore for reuse, recycling or disposal.

3.2 Pipelines/Flowlines/Umbilicals

Decommissioning Options

In accordance with the regulatory requirements, all risers, spools and surface laid items will be subject to full removal and hence have not been assessed with in the CA. These items to be fully removed are as follows:

Table 3.2.1: Pipelines Decommissioning Options – Full Removal	
Pipeline or Group (as per PWA)	Condition of line/group (Surface laid/Trenched/Buried/ Spanning)
PL1161 – All spools, crossover bundle assembly and riser at Brae Alpha ¹	Surface laid, matted.
PL1162 – All spools, crossover bundle assembly and riser at Brae Alpha ¹	Surface laid, matted.
PL1163 – All spools and riser at Brae Alpha	Surface laid, matted.
PL1527 – All spools	Surface laid, matted.
PL1528 – All spools	Surface laid, matted
PL1529 – All spools	Surface laid, matted
PL1531 – All spools	Surface laid, matted
PL1964.1 to PL1964.4 – All spools and jumpers	Surface laid, matted
PL1964.1 to PLU1964.3 – All spools and jumpers	Surface laid, matted
PL6151 – All spools and jumpers	Surface laid, matted
PL6169 to PL6178 (incl) – All spools and jumpers	Surface laid, matted

3.2.1 Comparative Assessment Method

A comparative assessment of the decommissioning options was executed in line with the OPRED Guidance Notes and the Spirit Energy Guidance for Comparative Assessments for Decommissioning. Full details of the process and findings are included within [1].

Prior to the CA, a decommissioning options pre-screening workshop was held with Technical and Project representatives from Spirit Energy and PDi. The purpose of the pre-screening workshop was to assess potential options for the decommissioning of the Trees pipelines and filter out those identified to be unfeasible or unrealistic. Options were developed based on past projects and current technologies.

At the workshop, attended by Spirit Energy and PDi, the methodologies for each option were presented, discussed and evaluated. All parties then reviewed and agreed the viable options to be taken forward to the CA. The selected options were then developed in more detail for the purposes of the CA.

The CA session followed a similar format to the Pre-screening/scoping session and commenced with a presentation of each option followed by a discussion and scoring of the option by the session attendees comprising Spirit Energy and PDi personnel. Where applicable, comments were added to the options worksheets to record any pertinent reasons for the scoring, or any follow-up actions required. The CA report was then prepared by PDi, reviewed and subsequently approved by Spirit Energy project team.

An initial list of 9 No pipeline decommissioning options identified were narrowed down to the following 3 No options for the CA.

- 3) Complete removal (cut entire pipeline into sections and recover to vessel)
- 5) Partial removal (cut trenched sections and exposed ends only and recover to vessel, rock covered sections remain *in situ*)
- 6) Partial removal (cut and recover exposed ends to trench transitions, trenched and rock covered sections remain *in situ*)

Pipeline or Group (as per PWA)	Condition of line/group (Surface laid/Trenched/Buried/ Spanning)	Whole or part of pipeline/group	Decommissioning Options* considered
PL1161	Trenched and spot rock cover with concrete mattresses at manifold, Wye Pieces and platform approaches.	Whole 10" Production Pipeline	3, 5, 6
PL1162 & PL1163	Trenched with concrete mattresses at manifold and platform approaches. Mattresses also between ~KP10.8 – KP11.1, within trench, along pipeline route.	Whole 12" Water Injection Pipeline and piggybacked 4" Gas Lift Pipeline	3, 5, 6
PL1164.1 to PL1164.10	Trenched with concrete mattresses at manifold and platform approach.	Whole Control Umbilical	3, 5, 6
PL1527	Trenched & spot rock cover with concrete mattresses at manifold and Wye approach.	Whole 10" Production Pipeline	3, 5, 6
PL1528 & PL1529	Trenched with concrete mattresses at manifold and T-piece approach	Whole 6" Water Injection Pipeline and piggybacked 4" Service Line	3, 5, 6
PL1530.1 to PL1530.5	Trenched with concrete mattresses at manifold approaches.	Whole Control Umbilical	3, 5, 6
PL1531	Piggybacked to PL1527 for ~2.3km. Trenched with spot rock cover.	Whole 4" Gas Lift Pipeline	3, 5, 6

Table 3.2.2: Pipelines 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
	Concrete mattresses at manifold, Wye and platform approaches.		

3.2.2 Outcome of Comparative Assessment

Table 3.2.3: Pipeline Decommissioning Proposals		
Pipeline or Group (as per PWA)	Recommended Option	Justification
<p>PL1161</p> <p>PL1162 & piggybacked PL1163</p> <p>PL1164.1 to PL1164.10</p> <p>PL1527</p> <p>PL1528 & piggybacked PL1529</p> <p>PL1530.1 to PL1530.5</p> <p>PL1531</p>	<p>6. Partial removal – recover exposed ends.</p> <p>Pipelines are trenched predominantly to a depth >0.6m with limited natural backfill and these sections will be decommissioned <i>in situ</i>. Approaches and transitions from trenching occur adjacent to Birch Manifold, Larch Manifold, Brae Alpha, Larch Wye and Larch T-piece. It is proposed that these pipeline transition sections will be cut and recovered to the vessel where the pipeline is trenched less than the approved depth (0.6m).</p> <p>Cut ends of the pipelines will be protected by the addition of nominal quantities of rock to ensure that they are not a snagging hazard.</p> <p>Third-party pipeline crossings (30" Miller pipeline PL720 & 30" Forties pipeline PL64) consisting of mattresses, concrete blocks and protected with rock berms will be left <i>in situ</i>. Spot rock placement has been performed for protection, stabilisation, or UHB mitigation on pipelines PL1527, PL1531 & PL1161 which will also be left <i>in situ</i>.</p> <p>Shallow trenching (<0.6m trench depth) on a 37m section of the PL1527 pipeline will require remedial work. The line will be decommissioned <i>in-situ</i> by dredging / trenching to provide the required level of cover (the preferred option), or by covering the pipe with rock. The other remediation option of cut and recovery, with remaining pipeline ends protected using nominal quantities of rock, will also be addressed within the EA and during Supply Chain engagement and shall be subject to consultation with OPRED.</p>	<p>The pipelines are trenched for the majority of their route. Upon remedial work being conducted on the 37m shallow section of PL1527, the trenching depth will continuously be >0.6m below the seabed. In such a condition the pipelines will not be a snagging hazard and thus trenched sections remain safe <i>in situ</i>. Rock covered sections do not currently pose a snagging hazard. No third-party pipeline crossings would be disturbed.</p> <p>This option minimises the safety risk to offshore and onshore personnel, minimises vessel emissions and minimises seabed disturbance. The pipelines will be cleaned and flushed to an agreed acceptable cleanliness level prior to decommissioning activities and so will not have a significant impact on the marine environment. The option also had a lower cost impact than the others considered.</p> <p>Ongoing monitoring to confirm the pipelines remain adequately protected and do not become a snagging hazard will be completed to a schedule agreed with OPRED.</p>

3.3 Pipeline Structures and Stabilisation Features

Table 3.3.1: Pipeline Structures and Stabilisation Features Decommissioning Options			
Pipeline Structures and Stabilisation Features	Quantity (No.)	Option	Disposal route (if applicable) ¹
Pipeline Structures Crossover Bundle Assembly at Brae Alpha, Crossover Bundle Supports (x 2), SSIV Protection Structure, Anode Skids (x 2), Larch Wye Piece Assembly (Original), Larch Wye Piece Extension Spool Structure, Larch Wye Piece Assembly (New).	9	Full recovery. Any piles will be cut 3m below seabed.	Recover to shore for reuse, recycling or disposal.
Exposed concrete mattresses	568	Full recovery. It is intended that the mattresses will be recovered to shore, however in the event of practical difficulties during the removal execution, OPRED will be consulted, and an alternative method of decommissioning will be examined through a comparative assessment.	Recover to shore for reuse, recycling or disposal.
Exposed Grout bags (25kg each)	5,300	Full recovery.	Recover to shore for reuse, recycling or disposal.
Exposed Protection Covers	18	Full recovery	Recover to shore for reuse, recycling or disposal.
Deposited Rock (Te)	38,168	Leave <i>in-situ</i>	n/a
Notes:			
1. No feasible reuse opportunities have been identified to date.			

3.4 Wells

Table 3.4.1: Well Decommissioning
<p>The Trees Field contains a total of seven production wells and four water injection wells. (Birch:16/12a-8, 16/12a-15, 16/12a-18z, 16/12a-22 and 16/12a-21 Larch:16/12a-23 and 16/12a-24z Sycamore: 16/12a-25, 16/12a-14z, 16/12a-17z, and 16/12a-26). All wells will be decommissioned in accordance with latest version of the OEUK Well Decommissioning Guidelines. Conductors will be severed 3m below seabed.</p> <p>Ten of the wells have integral protection cages and have been addressed in a separate Decommissioning Programme Ref. [5]. The remaining well (Sycamore 16/12a-25 (SW1)) only is covered here.</p> <p>A Master Application Template and the supporting Supplementary Application Template will be submitted in support of works carried out. An application to decommission the wells will be made via the online Well Operations Notification System (WONS) on the NSTA Energy Portal. Well decommissioning will be scheduled in accordance with the outline schedule presented in section 6.3, with SW1 well decommissioning scheduled to take place in 2024.</p>

3.5 Drill Cuttings

Table 3.5.1: Drill Cuttings Decommissioning Options		
How many drill cuttings piles are present?	2	
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	Birch	Sycamore
How has the cuttings pile been screened? (desktop exercise/actual samples taken)	Samples and assessment	Samples and assessment
Dates of sampling (if applicable)	2022	2022
Sampling to be included in pre-decommissioning survey?	Yes - done	Yes – done
Does it fall below both OSPAR thresholds?	Yes	Yes
Will the drill cuttings pile have to be displaced in order to remove the installation?	No ¹	No ¹
What quantity (m ³) would have to be displaced/removed?	n/a	n/a
Will the drill cuttings piles have to be displaced in order to remove any pipelines?	No ¹	No ¹
What quantity (m ³) would have to be displaced/removed?	n/a	n/a
Have you carried out a Comparative Assessment of options for the cuttings pile?	Not required as below OSPAR threshold	Not required as below OSPAR threshold
Notes: 1. Drill cuttings piles will be disturbed during recovery of the spools, wellheads and Birch manifold. Disturbance is however expected to be relatively small (See Ref. [2] for further details.)		

The Birch, Larch and Sycamore fields were developed between 1985 and 1997 and in the absence of drilling records it is assumed that oil-based muds and organic phase fluids (OPF) were used in some hole sections with cuttings discharged at all wells drilled prior to the ban on such discharges coming into place. Samples from the drill cuttings piles indicate the presence of low toxicity oil-based fluid (LTOBF), synthetic based fluids (SBF), Polyalphaolefin based fluid (PAO) and enhanced mineral oil-based fluid (EMOBF) in the cuttings.

Drill cuttings assessment has been performed and the cuttings piles have been found to be under the OSPAR thresholds (Refs. [2] and [4]).

Comparative Assessment Method:

N/A

Outcome of Comparative Assessment:

N/A

3.6 Waste Streams

3.6.1 Waste Stream Management Methods

Table 3.6.1: Waste Stream Management Methods	
Waste Stream	Removal and Disposal method
Bulk liquids	Pipelines will be flushed to an appropriate cleanliness level agreed with regulators prior to decommissioning activity and then filled with seawater. The corrosion inhibitor and methanol will be removed from the associated chemical lines prior to the start of the decommissioning activities. Any residual fluids from within the sections of pipeline, umbilical lines or pipeline bundles will be released to marine environment under permit prior to removal to shore. Any further cleaning and decontamination required will take place onshore prior to recycling or re-use.
Marine growth	Where required and reasonable, potentially to allow access, some marine growth will be removed offshore during decommissioning activity. Due to the Trees Field water depth, there is less marine growth than typically found in shallower fields. Remnant growth will be brought to shore and subsequently disposed of under the appropriate permit and managed in accordance with guidelines and company policies.
NORM	Tests for NORM will be performed offshore and any NORM encountered will be dealt with and disposed of under the appropriate permit and managed in accordance with guidelines and company policies.
Asbestos	No known asbestos is associated with the Trees Fields. However, any such material found 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.
Onshore Dismantling sites	Appropriate licensed sites will be selected. Dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver reuse and recycling options. OPRED will be informed once the site has been selected.

Table 3.6.2: Trees Fields Inventory Disposition			
Inventory	Total inventory (Te)	Planned tonnage to shore (Te)	Planned left <i>in situ</i> (Te)
Subsea Installations	182	169	13 ¹
Pipelines	11,385	3,145	8,144
NOTES:			
1. Planned installation tonnage left <i>in-situ</i> are piles. All piles shall be severed 3m below the natural seabed.			

Table 3.6.3: Re-use, Recycle & Disposal Aspirations for Recovered Material			
Inventory	Re-use	Recycle	Disposal (e.g., Landfill)
Subsea Installations	<5%	>95%	<5%
Flowline & Umbilicals	<5%	>95%	<5%

All recovered material will be transported onshore for reuse, recycling, or disposal. The expectation is that any synthetic materials associated with the pipelines will be incinerated with the resultant heat being used for energy. It is not possible to predict the market for reusable materials with any confidence so the figures in Table 3.6.3 are aspirational.

4. ENVIRONMENTAL APPRAISAL OVERVIEW

4.1 Environmental Sensitivities (Summary)

Table 4.1.1:: Environmental and Societal Sensitivities	
Physical Environment	<p>Water depths range from ca.110m at Brae Alpha, to ca. 129m at Sycamore Main and Sycamore Satellite. Water depths at Larch and Birch range from 125m to a maximum depth of 129m with localised variations. A thermocline develops during summer, and generally breaks up with the onset of autumnal gales. Winds are variable, although predominantly from the south-west and north east. Annual mean significant wave height is ca. 2.1-2.4m, varying seasonally. Tidal currents are generally weak and readily influenced by other factors (e.g. winds and density driven circulation). Surface water temperatures typically range between 6.5-7°C in winter and 13.5-14°C in summer; bottom temperatures are similar to winter, but typically 7-8°C in summer.</p>
Conservation Interest	<p>The Trees infrastructure does not lie within a designated area, the closest of these being two Special Areas of Conservation (SACs), the Scanner Pockmark SAC and the Braemar Pockmarks SAC, located more than 30km away. The closest Nature Conservation Marine Protected Area (NCMPA) are the Norwegian Boundary Sediment Plain and Central Fladen sites, ca. 42km and 69km away respectively. The pre-decommissioning survey identified the presence of sea pens (<i>Pennatula phosphorea</i> and <i>Virgularia</i> sp.), and burrows, although mounds were not recorded. The report concluded that sea pens and burrows occurred in sufficient density to comprise the OSPAR listed threatened and/or declining habitat 'sea pen and burrowing megafauna communities'. It should be noted however, that the Trees area is not located within or near (closest site more than 60km away) any designated site for this habitat.</p> <p>Significant environmental effects on any conservation interest are not considered likely from decommissioning activities.</p>
Seabed	<p>The seabed is relatively flat, with localised variations. Throughout the area there are scattered semi-circular depressions, some up to 40m wide and 0.9m deep; there was no evidence on the seabed or within shallow soils of soft clays or gas seepages. Seabed sediments comprise sandy mud or muddy sand and are classified as 'circalittoral muddy sand', 'deep circalittoral sand' and 'deep circalittoral mud', with occasional accumulations of shell and coarse material present. The main habitat in the area was identified as 'deep circalittoral mud'. Anchor scars and anchor pull outs were also identified as present. There is evidence of historic drill cuttings at Birch and Sycamore, cuttings present do not exceed the OSPAR thresholds.</p> <p>Seabed disturbance from decommissioning activities, all of which will be temporary, with the exception of rock deposits, was assessed and significant effects from physical disturbance are not expected.</p>
Fish	<p>The Trees area overlap with reported spawning grounds of 5 commercially important fish and shellfish species (cod, mackerel, Norway pout, saithe and <i>Nephrops</i>), all of which are Priority Marine Features, with the exception of <i>Nephrops</i>. The area is also within reported nursery grounds for these species (except saithe) and a further 9 species (ling, anglerfish, blue whiting, haddock, European hake, herring, sandeel, spotted ray, spurdog and whiting).</p> <p>Significant environmental effects on fish spawning/nursery areas are not considered likely from decommissioning activities.</p>
Fisheries	<p>Trees are located within ICES rectangle 46F1, and the area is dominated by demersal (in terms of landings by weight), with shellfish dominating by value. In comparison with UK total landings, landings from 46F1 (weight and value) are relatively small, typically less than 1%. Fishing effort in the area is considered low to moderate, and while fishing activity can occur throughout the year, fishing effort (days at sea) typically peaked in spring and summer months, although in 2021, higher numbers has also been seen towards the latter part of the year.</p> <p>Significant environmental effects on fisheries are not considered likely from decommissioning activities.</p>
Marine mammals	<p>The central North Sea has a moderate to high density of cetaceans, with a general trend of increasing diversity and abundance. Seven species can be considered regular visitors to waters around the Trees area, harbour porpoise, white-sided dolphin, white-beaked dolphin, minke whale, killer whale, Risso's dolphin, and bottlenose dolphin, only three of these (harbour porpoise, white-sided dolphin and minke whale) were recorded in the area from the SCANS-III survey (blocks 16/12 and 16/07 are within SCANS III survey strata 'U'). Significant environmental effects on marine mammals are not considered likely from decommissioning activities.</p>

Table 4.1.1:: Environmental and Societal Sensitivities	
Birds	<p>The area can be considered of relatively low importance to seabirds in the context of the North Sea as a whole – this is related to the distance from breeding colonies and the availability of prey; Trees is more than 200km from the Scottish mainland and 190km from Fair Isle, which is beyond the maximum foraging distance for most species breeding on these coastlines. Species present offshore vary seasonally and being far offshore, birds present will predominately be those transiting through the area during migration, non-breeding juveniles and post breeding dispersion from colonies.</p> <p>The Seabird Oil Sensitivity Index (SOSI) has been used in conjunction with JNCC 2017 guidance to determine seabird sensitivity within the Trees area; sensitivity is generally low, and for block 16/12 only two months remain with no coverage in either block.</p> <p>Significant environmental effects birds are not considered likely from decommissioning activities.</p>
Other users of the sea	<p>Trees is within a mature area of the North Sea for oil and gas activity where development has been extensive, evident by the number of installations/FPSOs within 40km of the Trees area. In terms of renewable development, INTOG area NE-d is located within 2 km of the Larch field and the closest Crown Estate lease area is that of Marram Wind which is approximately 105 km away. Trees is relatively close (ca. 3km) to the CNS Area 1, an area offered in the North Sea Transition Authority (NSTA) carbon storage licensing round. There are no operational telecommunication cables in the vicinity; the TAMPNET 3 part 7 cable passes ca. 20km to the east. There are no military interests, dredging areas, or marine disposal sites or any designated wrecks, in the vicinity. Shipping density data shows block 16/12 as having moderate and block 16/07 has having low levels of shipping; typical vessels being oil and gas supply and support vessels.</p> <p>Significant environmental effects on other users of the sea are not considered likely from decommissioning activities.</p>
Atmosphere	<p>The sources of emissions assessed are from the combustion of diesel by vessels including construction and heavy lift vessels, along with rock installation vessels and vessels to be used in the post decommissioning and ongoing monitoring of the decommissioned area. The decommissioning activities are estimated to represent an increment of 0.0009% on those emitted from all UK sources in 2019, or 0.03% of those from installations on the UKCS 2018 and, as such, are not considered to result in a significant impact.</p> <p>Once fully decommissioned, there will be no more atmospheric emissions associated with the fields, with the exception of future periodic inspection surveys of material decommissioned <i>in situ</i>.</p>

4.2 Potential Environmental Impacts and their Management.

The environmental impacts and risks (potential impacts) associated with each element of the project activities were assessed and commitments and actions for these (i.e. their management) are described in Table 4.2.1.

Table 4.2.1:: Commitments and Actions	
Overall Project	
Lessons learned from previous decommissioning scopes will be reviewed and implemented; ensure indicators and targets for the Trees fields decommissioning project are consistent with Spirit Energy policy and established for the main decommissioning activities, monitor and review performance against indicators and targets, ensuring remedial action is instigated where necessary. Existing processes will be used for contractor management to assure and manage environmental impacts and risks; Spirit Energy's management of change process will be followed should changes in scope be required. Conduct a post project review to assess accuracy of EA assessment in the context of actual impacts.	
Vessels and Atmospheric Emissions	
The vessels' work programme will be optimised to minimise vessel use; vessel synergies and work scopes aggregated where possible; vessels will be managed in accordance with Spirit Energy's Marine Assurance Standard. Spirit Energy will also develop decommissioning emissions key performance indicators.	
Seabed Disturbance	
All activities resulting in seabed disturbance will be planned, managed and implemented in such a way as to minimise disturbance as far as practicable; where remediation of exposed ends is required, the use of excavated material will be used where possible, with rock deposits minimised as far as practicable, the use of non-invasive post-decommissioning survey method will also be considered.	
Waste Production and Disposal	
Waste production will be minimised as far as practicable and managed through a waste management plan; re-use and recycle applied as far as practicable, and the selected receiving port and waste handling facility will be able to demonstrate a proven disposal track record and waste stream management throughout the process.	

The outcome of the Environmental Appraisal found there to be:

- No significant environmental or adverse effects on benthic habitats or faunal communities in the area as a result of decommissioning operations.
- No significant environmental or adverse effects expected from estimated atmospheric emissions as a result of decommissioning operations.
- No significant environmental, or adverse effects on other users of the sea expected from the planned activities associated with the decommissioning operations.
 - Some Trees fields infrastructure is to be decommissioned *in-situ*, however, this will be monitored on a basis to be agreed with OPRED to ensure this does not become a hazard for other users and periodic reviews will be conducted by Spirit Energy of new and emerging technologies for safe removal
- No impacts on conservation interests expected.
- No specific, additional controls were considered necessary for activities beyond application of regulatory requirements, established Spirit Energy management processes, operational controls and following industry guidelines and best practice where applicable.
- A range of environmental management commitments and actions have been identified and will be carried forward through the detailed planning and execution phase of the decommissioning project to further avoid, or minimise adverse environmental impacts, as far as technically feasible.

5. INTERESTED PARTY CONSULTATIONS

5.1 Consultation Summary

Table 5.1.1: Summary of Stakeholder Comments		
Who	Comment	Response
INFORMAL CONSULTATIONS		
SFF	Meeting held on 11 th August 2022 and 30 th May 2024, covering both Chestnut and Trees Decommissioning Programmes. For Trees DP the following actions for Spirit Energy were noted: 1. Confirm if there are spans within the open trenched areas i.e. areas where there is little or no backfill. 2. Ensure that there are no snaggable areas remaining on the pipeline bundles.	Spirit Energy response: 1. No spans have been identified within the open trenches. This will be reconfirmed during the agreed survey regime and remedial action will be proposed if necessary. 2. Any potential snag hazards will be removed/remediated as part of the decommissioning process.
Crossing Parties	Spirit Energy have notified the owners of the third-party pipeline crossings that the DP is being prepared and further engagement will take place in a timely manner.	
STATUTORY CONSULTATIONS		
NSTA		
GMG		
NFFO		
SFF		
NIFPO		
OTHER CONSULTATIONS		
Public		

6. PROGRAMME MANAGEMENT

6.1 Project Management and Verification

A Spirit Energy 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 Spirit Energy Health & Safety principles. Changes to the Decommissioning Programmes will be discussed and agreed with OPRED, with any necessary approvals sought.

6.2 Post-Decommissioning Debris Clearance and Verification

A post decommissioning site survey will be carried out around a 500m radius of installation sites and a 100m corridor (50m either side) along each existing pipeline route to identify any debris.

Any seabed debris related to offshore oil and gas activities will be recovered for onshore disposal or recycling in line with existing disposal methods. Verification of clear seabed may be confirmed via overtrawl or non-intrusive methods and this will be discussed and agreed with OPRED at the time. This will be followed by a statement of clearance to all relevant governmental departments and non-governmental organisations.

6.3 Schedule

The proposed schedule is provided in Figure 6.3.1.

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 & commitments and timelines for TAQA operated Brae Alpha CoP / decommissioning operations. Spirit Energy will also examine the possibility of including the offshore work in a wider campaign of subsea works to reduce costs.

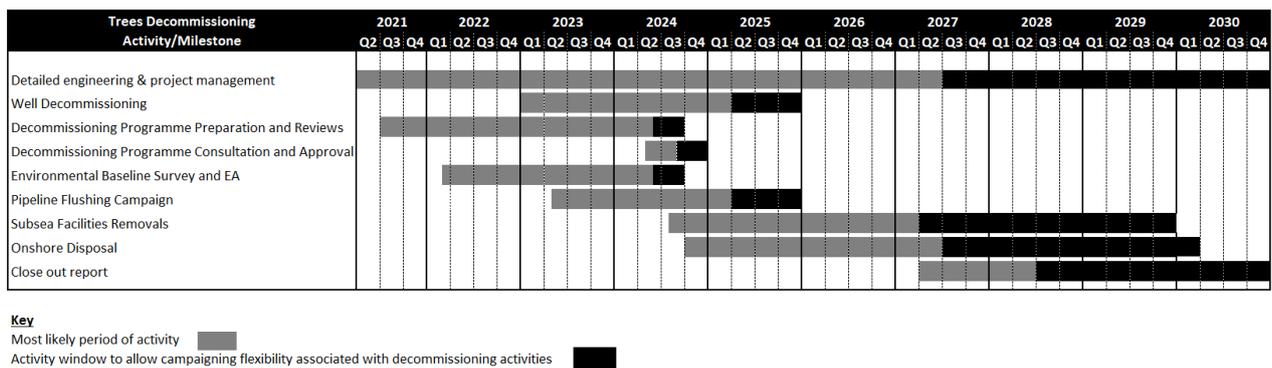


Figure 6.3.1: Gantt Chart of Project Plan

6.4 Costs

Decommissioning costs will be provided separately to OPRED.

6.5 Close Out

In accordance with the OPRED Guidelines, a close out report will be submitted to OPRED within 12 months of the completion of the offshore decommissioning scope including debris clearance, verification of seabed clearance and the first post-decommissioning environmental survey. The report will detail the outcomes of surveys as well as explain any major variances from the programme.

6.6 Post-Decommissioning Monitoring and Evaluation

Following the completion of all offshore decommissioning work, pipeline status surveys and environmental surveys will be completed with the findings being sent to OPRED in the close out report. The frequency of future surveys will be agreed with OPRED and supported with a risk assessment.

Residual liability for the facilities will remain with the Section 29 holders. Unless agreed otherwise in advance with OPRED, Spirit Energy will remain the focal point for this including any change in ownership, for example.

7. SUPPORTING DOCUMENTS

- [1] Trees Pipelines Decommissioning Comparative Assessment (Birch, Larch and Sycamore), TREEDC-SPT-Y-0000-REP-0001 Rev C8
- [2] Trees Decommissioning Environmental Appraisal (Birch, Larch and Sycamore), TREEDC-PDI-S-0000-REP-0001 Rev C3
- [3] Trees Pipeline Burial Profiles, 2715-PDi-PE-TN-002 Rev C1
- [4] Trees Fields Decommissioning – Drill Cuttings Screening Assessment. Hartley Anderson Limited Report No.: J-PDI-492, April 2023
- [5] Trees Protection Cages Decommissioning Programmes (Birch, Larch and Sycamore) TREEDC-SPT-F-0000-PRG-0002, Rev C1

APPENDIX A SECTION 29 NOTICE HOLDER LETTER(S) OF SUPPORT

APPENDIX B PUBLIC NOTICE