MARATHON BRAE

Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure Decommissioning Programmes

July 2018 Final Version

Marathon Oil

9010-MIP-99-PM-RP-00008-000, I02
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www.marathonoil.com/braedecom

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Document Control

Approvals

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Revision Control

Revision No	Reference	Changes/Comments	Issue Date
01	First Draft	In consultation with OPRED, Brae Bravo topsides, flare bridge, flare tower and flare jacket/sub-structure separated from Brae Alpha, Brae Bravo, Central Brae, West Brae and Sedgwick post consultation decommissioning programmes [3] to form the current document, which contains no material change to any decommissioning proposals.	June 2018
02	Final Version	Minor changes to text	27 July 2018

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Terms and Abbreviations

BTA	Buoyancy Tank Assembly
CNR	Canadian Natural Resources
CoP	Cessation of Production
DECC	Department of Energy and Climate Change (Role now performed by OPRED)
EIA	Environmental Impact Assessment
ES	Environmental Statement
FPAL	First Point Assessment Limited
GJ	Giga Joules
HAZ	Hazardous (waste)
HLV	Heavy Lift Vessel
HSE	Health and Safety Executive
JNCC	Joint Nature Conservation Committee
LLC	Limited Liability Corporation
MARPOL	International Convention for the Prevention of Pollution from Ships
MCAA	Marine & Coastal Access Act 2009
MSF	Module Support Frame
N/A	Not Applicable
NORM	Naturally Occurring Radioactive Material
OGA	Oil and Gas Authority
OPEP	Oil Pollution Emergency Plan
OPRED	Department of Business, Energy and Industrial Strategy Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
PL	Pipe Line (as in PL Number)
PMS	Power Management System
SAGE	Scottish Area Gas Evacuation (Gas export system)
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SLV	Single Lift Vessel
SSIV	Subsea Isolation Valve
Te	Tonnes
UK	United Kingdom
UKCS	UK Continental Shelf
WGS84	World Geodetic System 1984
WWF	World Wide Fund for Nature

1. Executive Summary

Marathon Oil has identified an opportunity to bring forward dismantling of the Brae Bravo Topsides, Flare Bridge, Flare Tower, and Flare Jacket/Sub-structure to 2019/2020. This has two advantages;

- It minimises the period between cessation of production and removal of the facilities. This has safety and environmental benefits, as it reduces the length of time for which effort must be expended to maintain the facilities in a safe condition for dismantling
- Early decommissioning will exploit a predicted lull in offshore decommissioning activity in 2019 – 2021. This means that a greater selection of decommissioning vessels, etc. is likely to be available to Marathon Oil in this period. This in turn leads to a wider choice of technical approaches and leads to lower costs.

To support earlier removal of the Brae Bravo facilities, Marathon Oil, in consultation with OPRED, has reorganised the decommissioning programmes for the Brae Alpha, Brae Bravo and associated subsea facilities into two documents. The reorganised decommissioning programmes are presented in:

1. This document, the Brae Bravo Topsides, Flare Bridge, Flare Tower, and Flare Jacket/Sub-structure Decommissioning Programmes, 9010-MIP-99-PM-RP-00008-000, which covers the Brae Bravo facilities that will be removed early, and
2. The Brae Alpha, Brae Bravo, Central Brae, West Brae and Sedgwick Combined Decommissioning Programmes, 9000-MIP-99-PM-RP-00003-000, which covers the Brae Bravo main platform jacket/sub-structure, and the Brae Alpha, Central Brae, West Brae, and Sedgwick facilities [3].

The decommissioning proposals for the Brae Area facilities contained in these documents are the same as those set out in the previous versions of the decommissioning programmes, with the sole exception of the change to the scheduling of Brae Bravo Topsides, Flare Bridge, Flare tower and Flare Jacket / Sub-structure removal.

1.1 Decommissioning Programmes

This document contains the decommissioning programmes for components of two installations; the Brae Bravo and the Brae Bravo Flare. The components covered by the decommissioning programmes are the Brae Bravo topsides, and the Brae Bravo Flare installation in its entirety, comprising the flare bridge, flare tower, and flare jacket/sub-structure. The scope of the decommissioning programmes is shown in Figure1.1

As required by the Petroleum Act 1998, amended by the Energy Act 2008, this document contains the decommissioning programmes for the following facilities:

1. Brae Fields Section 29 Notice:
   - Brae Bravo platform topsides
   - Brae Bravo flare bridge, flare tower and flare jacket/sub-structure.

The facilities in the scope of these decommissioning programmes are illustrated in Figure 1.1.

1.2 Requirement for Decommissioning Programmes

1.2.1 Installations

In accordance with the Petroleum Act 1998, as amended, Marathon Oil UK LLC (Marathon Oil) as operator of the Brae Bravo platform and Brae Bravo Flare and on behalf of the Section 29 Notice Holders (see Table 1.2) is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the components of the Brae Bravo installations detailed in Section 2.1 of this document. (See also Section 8 – Partners' Letters of Support).

1.3 Introduction

The Brae Bravo installation lies within UKCS Block 16/7a. The platform stands in 99m of water, approximately 269km north-east of Aberdeen.

The Brae Bravo platform facilities include modular topsides and a steel jacket/sub-structure. The Brae Bravo flare consists of a second steel jacket/sub-structure, the flare tower and a steel connecting bridge to the Brae Bravo platform.

Brae Bravo started production in 1988. Marathon Oil has extended the life of the Brae Field beyond initial projections. Other hydrocarbon opportunities have been evaluated and considered non-viable, therefore Marathon Oil made a CoP (Cessation of Production) application for Brae Bravo to the OGA in 2015. This was approved in 2016. Brae Bravo is scheduled to cease production and processing in July 2018.

1.3.1 Scope of Decommissioning Programmes

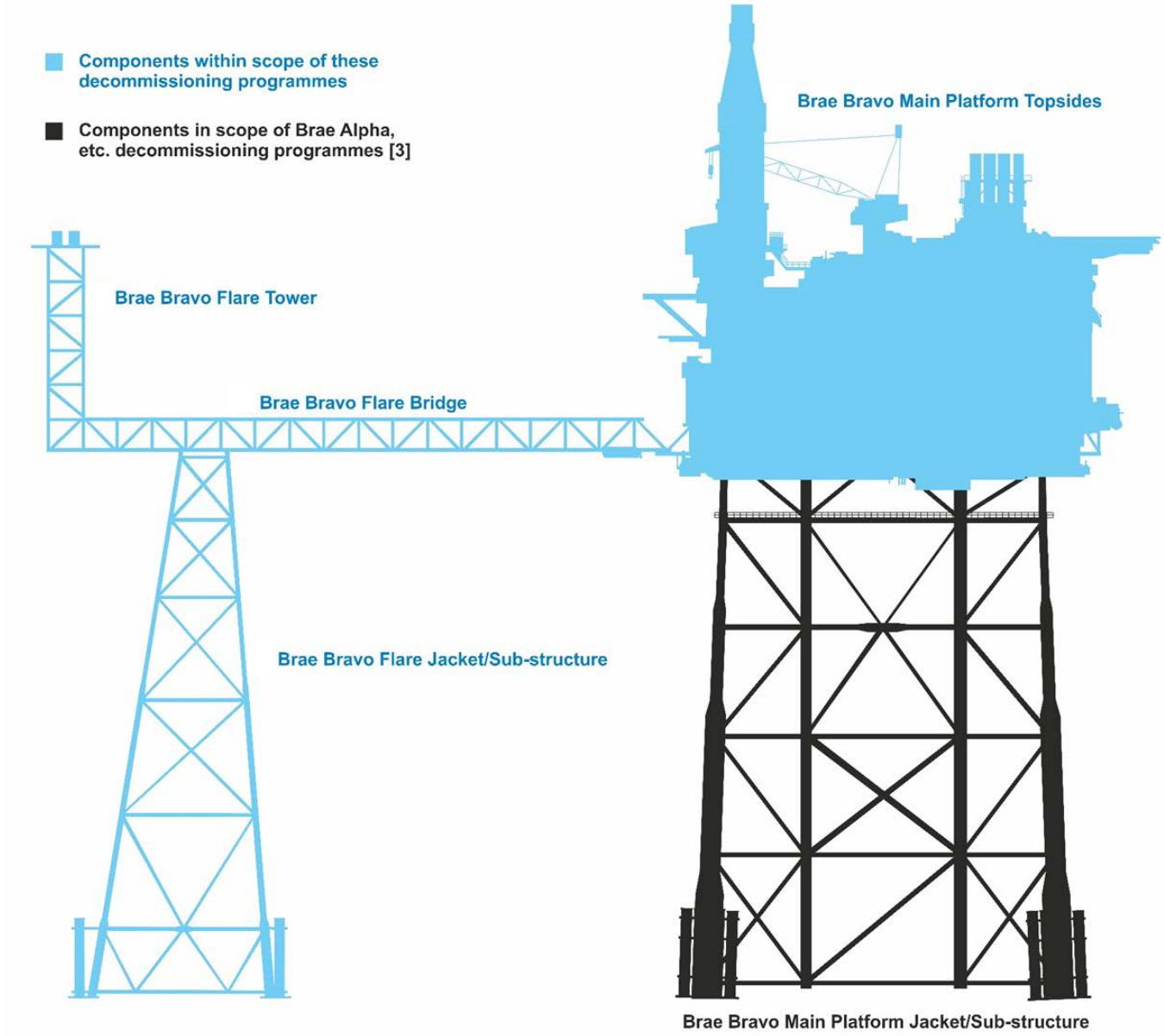
The decommissioning programmes contained in this document cover the following facilities:

- The Brae Bravo platform topsides
- The Brae Bravo flare bridge, flare tower and flare jacket/sub-structure.

The scope of the facilities covered by these decommissioning programmes is shown in Figure 1.1.

The jacket/sub-structure of the main Brae Bravo large steel platform is outside the scope of these decommissioning programmes. It is included in a separate decommissioning programme [3], and subject to a derogation application process under OSPAR Decision 98/3.

Figure 1.1: Brae Bravo Facilities to be Decommissioned



1.3.2 Decommissioning Programmes Outline

1. The Brae Bravo platform wells have been permanently abandoned by placing verified barriers to isolate rock formations that have flow potential from the surface, to meet OGA and HSE requirements.
2. All topsides process equipment will be flushed and cleaned to an appropriate standard prior to decommissioning.
3. The Brae Bravo platform topside modules, and the Brae Bravo flare bridge, flare tower and flare jacket/sub-structure, will be removed and returned to shore for reuse, recycling or disposal.
4. Following completion of Brae Area decommissioning, Marathon Oil will conduct a survey to confirm that the Brae Area is left as described in these decommissioning programmes and the Brae Alpha, etc. decommissioning programmes [3].

1.4 Overview of Installations Being Decommissioned

The overall layout of the Brae Area facilities, including Brae Bravo, is shown in Figure 1.3.

1.4.1 Installations

Table 1.1: Installations Being Decommissioned

Field(s)	Brae	**Production Type (Oil/Gas/Condensate)**	Oil/Gas/Condensate
Water Depth	99m	**UKCS Block**	16/7a

Surface Installations

Number	Type	Topside Weight (tonnes)	Sub-structure Weight[1] (tonnes)
1	Fixed Large Steel Jacket (Brae Bravo main platform)	35,000	N/A (Decommissioning of Brae Bravo Main platform jacket/sub-structure is described in [3])
1	Fixed Small Steel Jacket (Brae Bravo Flare)	1,200	1,550

Number of Wells

Platform Wells	Subsea Wells
28	N/A

Drill Cuttings Piles		Distance to Median (km)	Distance From Nearest UK Coastline (km)
Number of Piles	**Total Estimated Volume (m^3)**	4	187
N/A	N/A		

[1] *Recoverable steel weight including recoverable piles, but excluding grout, marine growth and additional weight due to flooded members.*

Table 1.2: Brae Bravo Section 29 Notice Holders		
Section 29 Notice Holders	**Registration Number**	**Equity Interest**
Marathon Oil U.K. LLC	FC009587	40.0%
TAQA Bratani Limited	5975475	41.7%
Spirit Energy Resources Limited	02855151	8.0%
JX Nippon Exploration and Production (U.K.) Limited	3288689	6.3%
TAQA Bratani LNS Limited	6230540	4.0%
BP Exploration Operating Company Limited	305943	0.0%
ENI UKCS Limited	1019748	0.0%
Neptune E&P UK Limited	3386464	0.0%
Marathon Oil North Sea (G.B.) Limited	981126	0.0%
Repsol Sinopec Resources UK Limited	825828	0.0%
Repsol Sinopec LNS Limited	2483161	0.0%

1.4.2 Pipelines

There are no pipelines included in these decommissioning programmes. (For details of the pipelines associated with Brae Bravo see [3]).

1.5 Summary of Proposed Decommissioning Programmes

The selected decommissioning options for the Brae Bravo topsides, flare bridge, flare tower and flare jacket/sub-structure are shown in Table 1.3 below.

Table 1.3: Summary of Decommissioning Programmes

Selected Option	Reason for Selection	Proposed Decommissioning Solution
Topsides		
Complete removal of the Brae Bravo topsides, flare bridge and flare tower for reuse, recycling or appropriate disposal.	Topside removal is mandatory. Marathon Oil will seek to optimise the benefits that accrue from removal of the topsides by maximising reuse and recycling.	Cleaned equipment refurbished for reuse where possible. Equipment that cannot be reused will be recycled or processed via appropriate disposal routes.
Jacket/Sub-structure		
Complete removal of the Brae Bravo flare jacket/sub-structure.	To leave the seabed clear for other users and to meet OSPAR and OPRED requirements.	The Brae Bravo flare jacket/sub-structure will be recycled. Any material that cannot be recycled will be processed via appropriate disposal routes.
Wells		
The Brae Bravo platform wells have been permanently abandoned by placing verified barriers to isolate rock formations that have flow potential from the surface.	Plugging and abandoning the wells leaves the wells in a safe and secure condition. This will protect people and the environment and meet OGA and HSE requirements.	Well equipment that is removed will be returned to shore for reuse, recycling, or disposal.
Drill Cuttings		
The Brae Bravo cuttings pile is outside the scope of these decommissioning programmes. (For details of decommissioning proposals for the cuttings pile, refer to [3]).		
Interdependencies		
None		

1.6 Field Locations Including Field Layouts and Adjacent Facilities

The locations of the Brae Area fields within the UKCS are shown in Figure 1.2. Figure 1.3 shows the Brae Area facilities layout in more detail. The facilities adjacent to the Brae Bravo installation are listed in Table 1.4 and shown in Figure 1.4

Figure 1.2: Brae Area Field Locations within UKCS

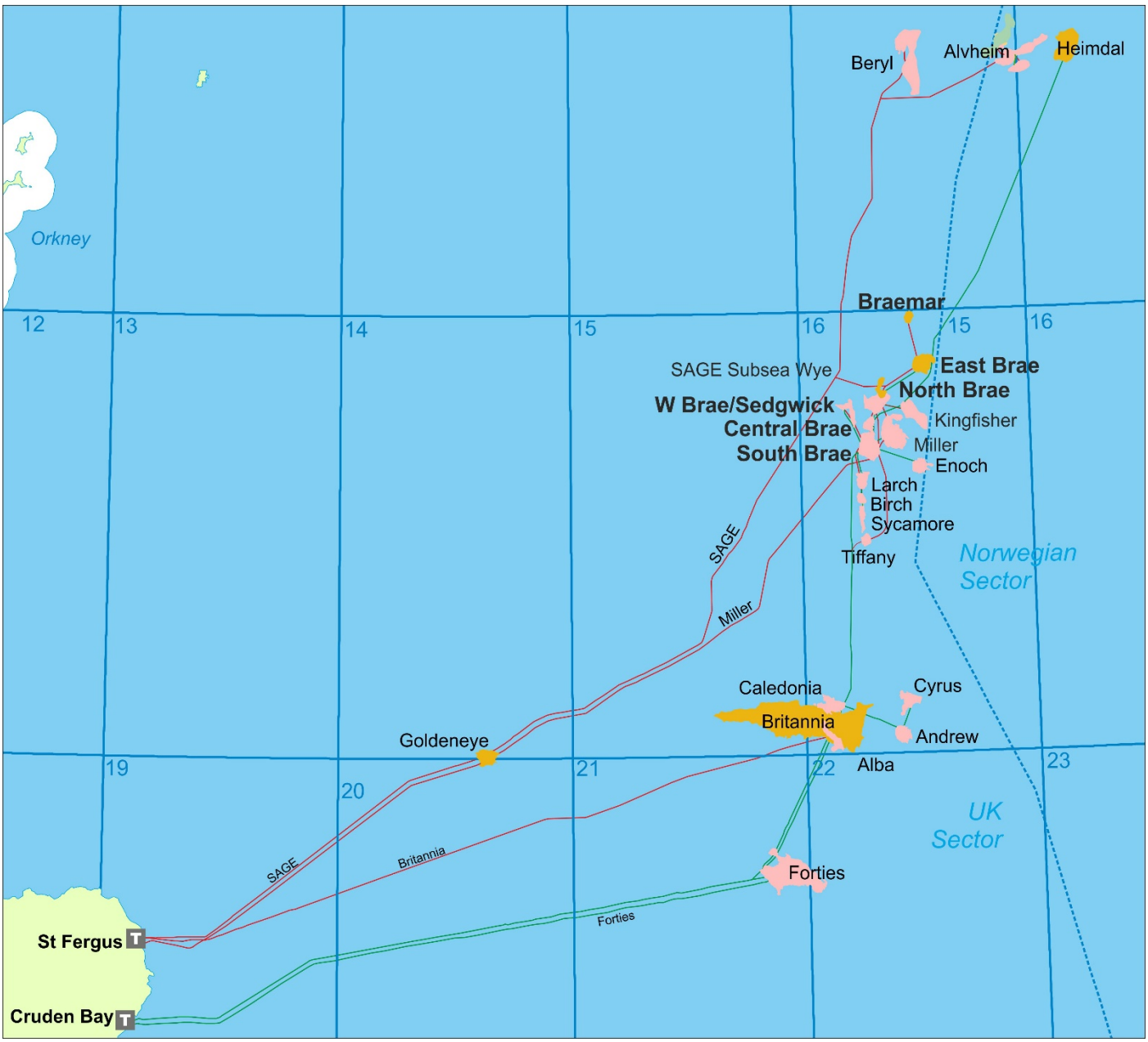
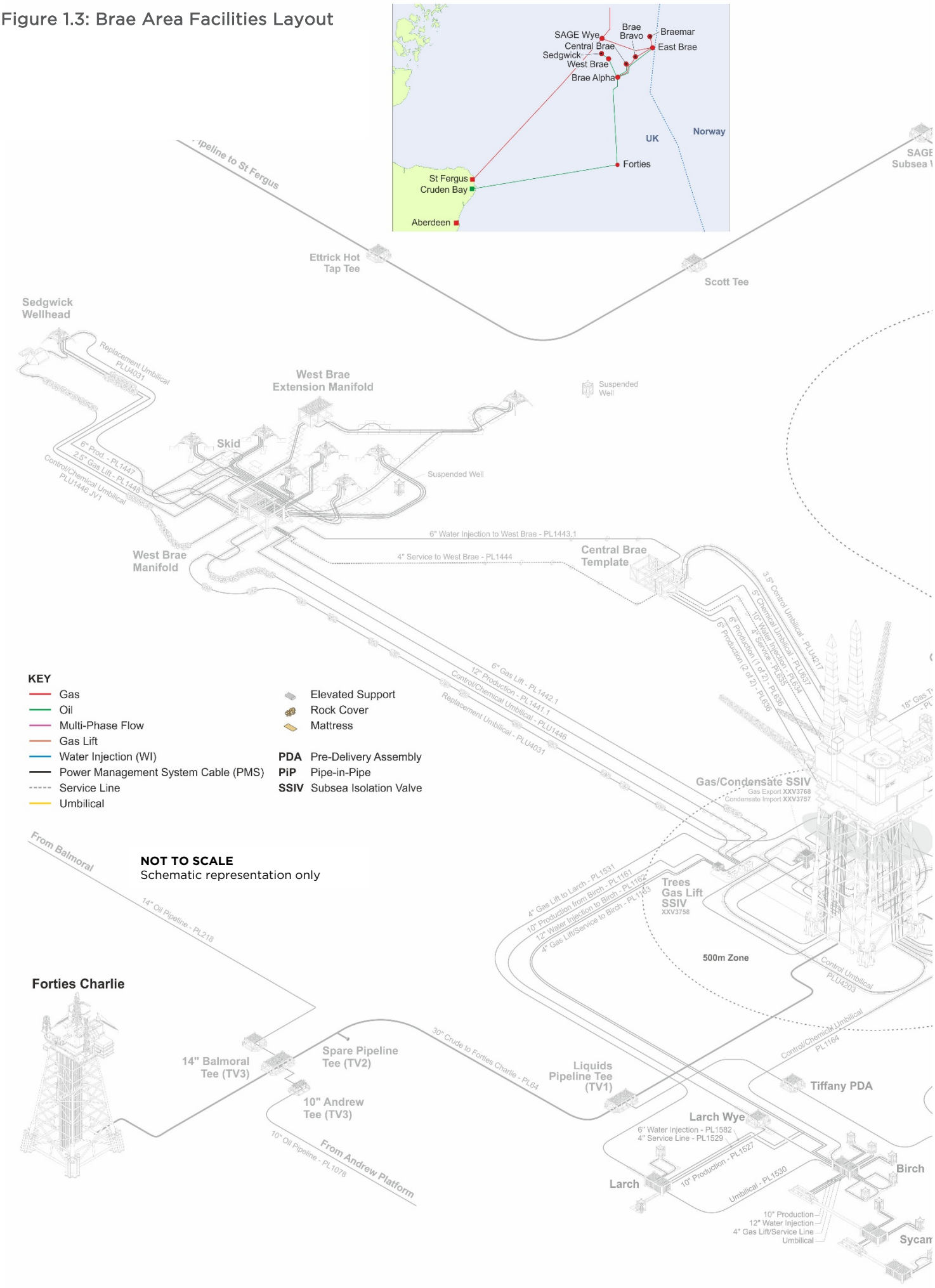


Figure 1.3: Brae Area Facilities Layout



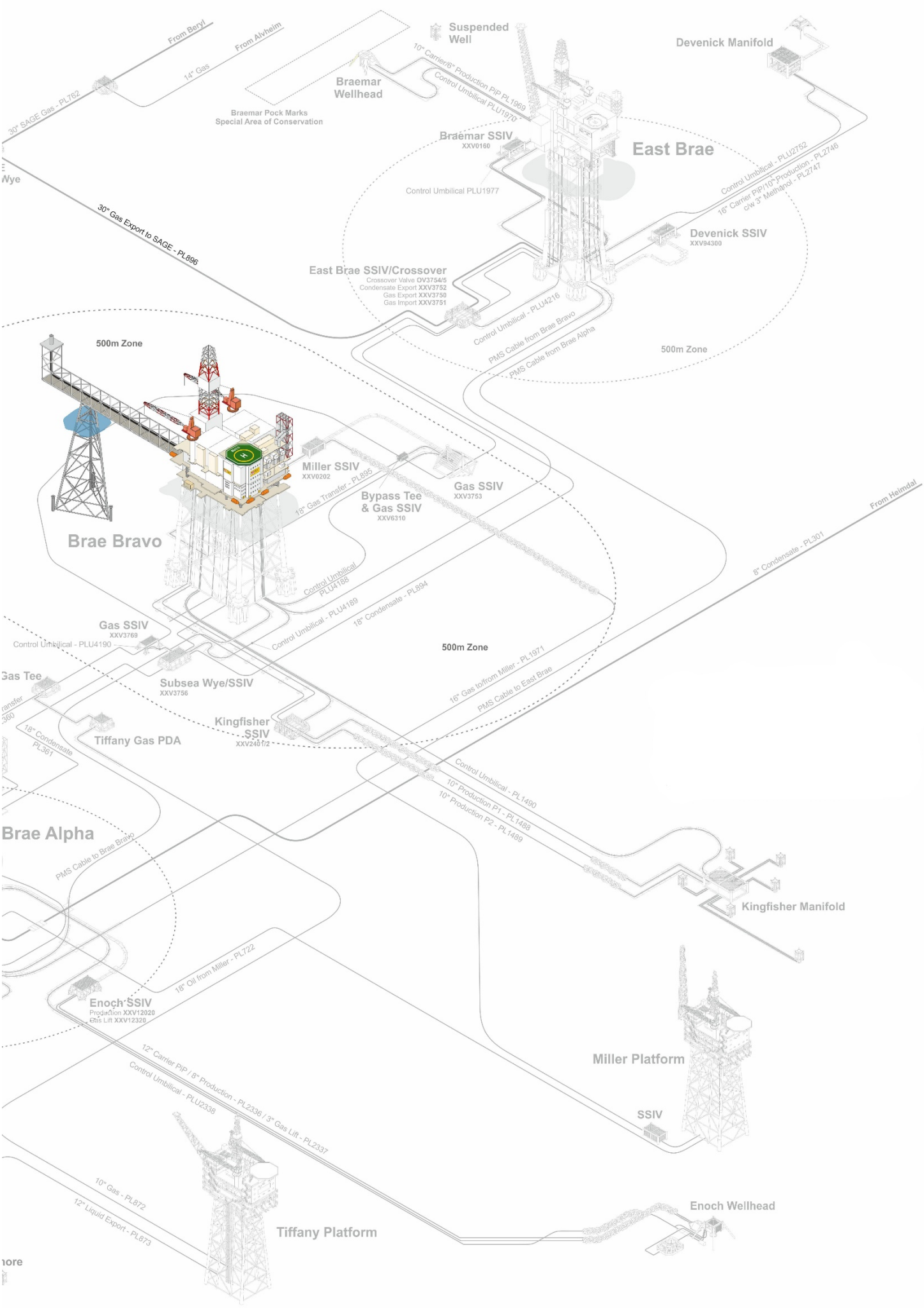

From Beryl
From Alwheim
14" Gas
30" SAGE Gas - PL762
Suspended Well
Braemar Wellhead
10" Carrier/6" Production PiP PL1969
Control Umbilical PLU1970
Braemar Pock Marks Special Area of Conservation
Devenick Manifold
Braemar SSIV
XXV0160
East Brae
Control Umbilical PLU1977
Control Umbilical - PLU2752
16" Carrier PiP/10" Production - PL2746
c/w 3" Methanol - PL2747
Devenick SSIV
XXV94300
Wye
30" Gas Export to SAGE - PL896
East Brae SSIV/Crossover
Crossover Valve OV3754/5
Condensate Export XXV3752
Gas Export XXV3750
Gas Import XXV3751
Control Umbilical - PLU4216
PMS Cable from Brae Bravo
PMS Cable from Brae Alpha
500m Zone
500m Zone
Miller SSIV
XXV0202
Gas SSIV
XXV3753
18" Gas Transfer - PL895
Bypass Tee & Gas SSIV
XXV6310
Brae Bravo
Control Umbilical PLU4188
Control Umbilical - PLU4189
18" Condensate - PL894
From Heimdal
8" Condensate - PL301
Gas SSIV
XXV3769
Control Umbilical - PLU4190
500m Zone
Gas Tee
Subsea Wye/SSIV
XXV3756
16" Gas to/from Miller - PL1971
PMS Cable to East Brae
Kingfisher SSIV
XXV2401/2
Tiffany Gas PDA
18" Condensate PL361
Control Umbilical - PL1490
10" Production P1 - PL1488
10" Production P2 - PL1489
Brae Alpha
PMS Cable to Brae Bravo
Kingfisher Manifold
18" Oil from Miller - PL722
Enoch SSIV
Production XXV12020
Gas Lift XXV12320
Miller Platform
SSIV
12" Carrier PiP / 8" Production - PL2336 / 3" Gas Lift - PL2337
Control Umbilical - PLU2338
10" Gas - PL872
12" Liquid Export - PL873
Tiffany Platform
Enoch Wellhead

Table 1.4: Adjacent Facilities

Owner	Name	Type	Distance/ Direction From Brae Bravo	Information	Status
Marathon Oil	Brae Alpha	Platform	12km South-south-west	Connects to Brae Bravo via PMS cable and pipelines	Operational
Marathon Oil	East Brae	Platform	14km North-east	Connects to Brae Bravo via PMS cable and pipelines	Operational
BP	Miller	Platform	8.4km South-east	Redundant production platform	Being Decommissioned
BP	PL1971 Miller to Brae Bravo	16"Gas Pipeline	-	Redundant pipeline	Suspended
BP	PL722 Miller to Brae Alpha	18" Oil Pipeline	8.4km South-east	Redundant pipeline	Suspended
Repsol Sinopec	Enoch Wellhead	Subsea well	19km South-east	Subsea tie-back to Brae Alpha	Operational
Repsol Sinopec	PL2336 Enoch to Brae Alpha Flowline	8" Flowline in 12" carrier pipe	12km South-south-west	Pipeline	Operational
Repsol Sinopec	PL2337 Brae Alpha to Enoch Gas Lift Line	3" Flowline in 12" carrier pipe	12km South-south-west	Pipeline	Operational
Repsol Sinopec	PLU2338 Brae Alpha to Enoch Control Umbilical	Electro/ Hydraulic Control Umbilical	12km South-south-west	Umbilical	Operational
CNR	Tiffany	Platform	35km South	Production Platform	Operational
CNR	PL872 Tiffany to PL360 Gas Export Line	10" Gas Pipeline	2.5km South-south-west	Pipeline	Operational

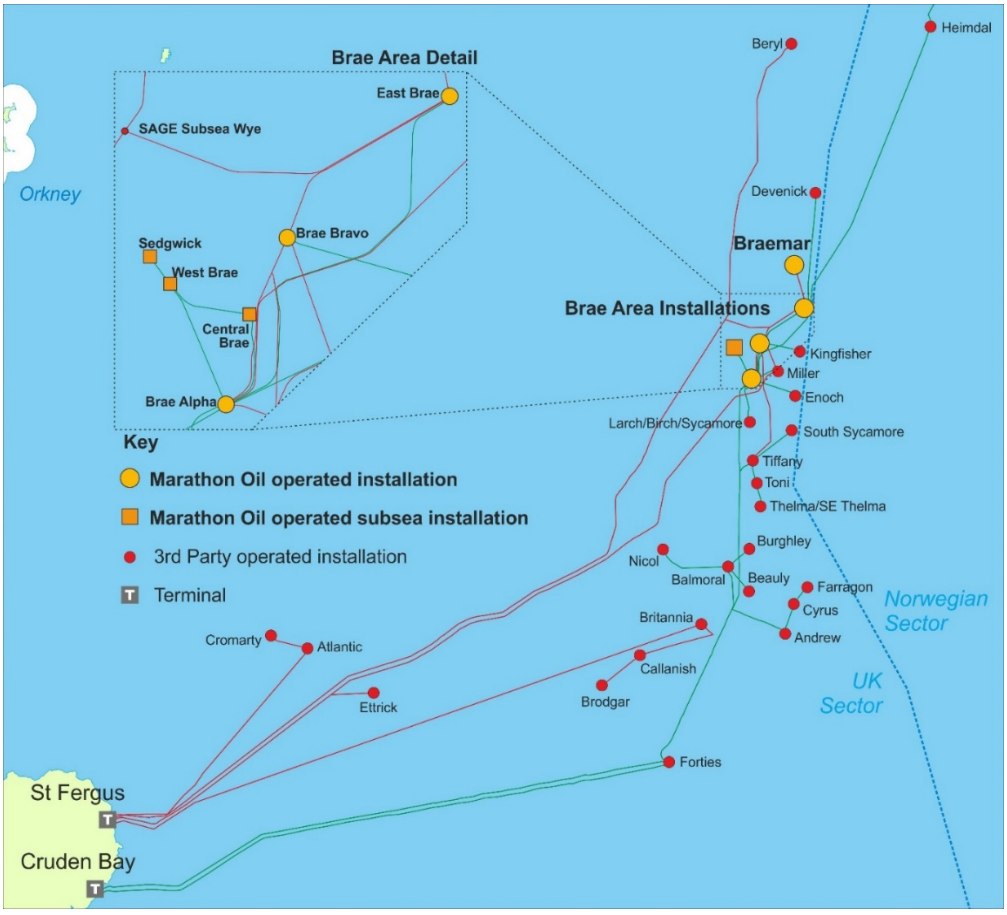
Table 1.4: Adjacent Facilities

Owner	Name	Type	Distance/ Direction From Brae Bravo	Information	Status
CNR	PL873 Tiffany to PL64 Oil Export Line	12" Oil Pipeline	35km South	Pipeline	Operational
Spirit Energy	Birch, Larch, Sycamore	Subsea manifolds and wellheads	28km South	Subsea Production Installation	Operational
Spirit Energy	PL1161 Birch to Brae Alpha	10" Production Pipeline	12km South-south-west	Pipeline	Operational
Spirit Energy	PL1162 Brae Alpha to Birch	12" Water Injection Line	12km South-south-west	Pipeline	Operational
Spirit Energy	PL1531 Brae Alpha to Larch	4" Gas Lift Line	12km South-south-west	Pipeline	Operational
Spirit Energy	PL1163 Brae Alpha to Birch	4" Gas Lift Line	12km South-south-west	Pipeline	Operational
Spirit Energy	PL1527 Larch to Larch WYE	10" Production Line	20km South-south-west	Pipeline	Operational
Spirit Energy	PL1528 Larch WYE to Larch	6" Water Injection Line	20km South-south-west	Pipeline	Operational
Spirit Energy	PL1529 Larch WYE to Larch	4" Service Line	12km South-south-west	Pipeline	Operational
Spirit Energy	PL1530 Larch to Birch	Umbilical	12km South-south-west	Umbilical	Operational
Apache	PL762 SAGE	Pipeline	13km North-west	Connects to East Brae via PL896 and the SSIV/Crossover structure	Operational

Table 1.4: Adjacent Facilities					
Owner	**Name**	**Type**	**Distance/ Direction From Brae Bravo**	**Information**	**Status**
Shell	Kingfisher	Subsea manifold and wells	8.6km East-south-east	Subsea Production Installation	Operational
TAQA	Devenick	Subsea template	44km North-north-east	Subsea Production Installation	Operational

Table 1.4: Adjacent Facilities
Impacts of Decommissioning Proposals
Marathon Oil has been, and will continue to be, in contact with operators and owners of adjacent facilities. The adjacent third party facilities have no known impacts on the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure decommissioning programmes.
All third party facilities that tie-in to, or are supported by, the Brae Bravo facilities are engaged under normal commercial agreements and are part of the CoP application process to OGA.

Figure 1.4: Brae Area Adjacent Facilities



1.7 Industrial Implications

Marathon Oil is developing the Brae Bravo decommissioning contract and procurement strategy on behalf of the Section 29 Notice Holders. Marathon Oil has, and will continue to:

1. Publish Brae Decommissioning project information, including the project schedule, on the Marathon Oil decommissioning website: www.marathonoil.com/braedecom.
2. Publish project information and contact details on the OPRED website.
3. Engage with the OGA and the decommissioning supply chain on issues relating to the Brae Bravo decommissioning programmes and schedule.
4. Use the FPAL database as the primary source for establishing tender lists for contracts and purchases with a value of £250,000 or more.

2. Description of Items to be Decommissioned

2.1 Installations: Surface Facilities – Topsides and Jacket/Sub-structure

Key information regarding the Brae Bravo platform topsides, flare bridge, flare tower, and flare jacket/sub-structure is presented in Table 2.1.

Table 2.1: Surface Facilities Information

				Topsides/Facilities		Jacket/Sub-structure			
Name	Type	Location		Dry Weight (tonnes)	Number of Modules	Weight[2] (tonnes)	Number of Legs	Number of Piles	Weight of Piles (tonnes)
Brae Bravo Platform	Fixed Steel Jacket	WGS84 Decimal	58.792540°N 1.3470857°E	35,000	28	The Brae Bravo main platform jacket/sub-structure does not form part of these decommissioning programmes. (For details of the main platform jacket/sub-structure, see [3]).			
		WGS84 Decimal Minute	58° 47.552'N 1° 20.825'E						
Brae Bravo Flare	Fixed Steel Jacket	WGS84 Decimal	58.792540°N 1.3470857°E	1,200		1,550	3	3	50
		WGS84 Decimal Minute	58° 47.552'N 1° 20.825'E						

2.2 Installations: Subsea Including Stabilisation Features

There are no subsea installations or stabilisation features in the scope of these decommissioning programmes. (For details of the subsea installation associated with the Brae Bravo see [3]).

2.3 Pipelines Including Stabilisation Features

There are no pipelines or stabilisation features in the scope of these decommissioning programmes. (For details of the pipelines and stabilisation features associated with Brae Bravo see [3]).

2.4 Wells

The Brae Bravo wells are listed in Table 2.2. These wells have been permanently abandoned by placing verified barriers to isolate rock formations that have flow potential from the surface, to meet OGA and HSE requirements.

[2] *Recoverable steel weight, including recoverable piles but excluding grout, marine growth, and additional weight due to flooded members*

Table 2.2: Wells Information

Well	Designation	Status	Abandonment Category
Platform Wells (Brae Bravo)			
16/07a-B01 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B02 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B03 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B04 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B05 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B06 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B08 (North Brae)	Gas Injector	P&A'd	PL 0-0-0
16/07a-B09 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B15 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B16Z (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B17 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B18 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B19 (North Brae)	Not Completed	P&A'd	PL 0-0-0
16/07a-B20 (North Brae)	Oil and Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B21 (Beinn)	Oil and Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B22 (North Brae)	Oil and Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B23Z (Beinn)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B24 (Central)	Oil Producer	P&A'd	PL 0-0-0
16/07a-B25 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B26 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B27 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B29 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B30 (Beinn)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B31Z (Central)	Oil Producer	P&A'd	PL 0-0-0
16/07a-B32 (North Brae)	Not Completed	P&A'd	PL 0-0-0
16/07a-B33 (Beinn)	Gas Condensate Producer	P&A'd	PL 0-0-0

Table 2.2: Wells Information

Well	Designation	Status	Abandonment Category
16/07a-B34 (North Brae)	Gas Condensate Producer	P&A'd	PL 0-0-0
16/07a-B35 (Beinn)	Not Completed	P&A'd	PL 0-0-0

2.5 Drill Cuttings

There are no drill cuttings in the scope of these decommissioning programmes. (For details of the Brae Bravo drill cuttings pile see [3]).

2.6 Inventory Estimates

The approximate amounts of key materials used in the make-up of the Brae Bravo, topsides, flare bridge, flare tower and flare jacket/sub-structure has been evaluated. These inventories are listed in Table 2.3. A focused review of the inventories of materials will be conducted during the detailed engineering phase of decommissioning. The level of detail developed and waste coding of materials will be subject to the reuse, recycling or disposal options selected, and the chosen removal method and destination.

Summaries of the material inventories for the Brae Bravo, topsides, flare bridge, flare tower and flare jacket/sub-structure are shown in Figure 2.1.

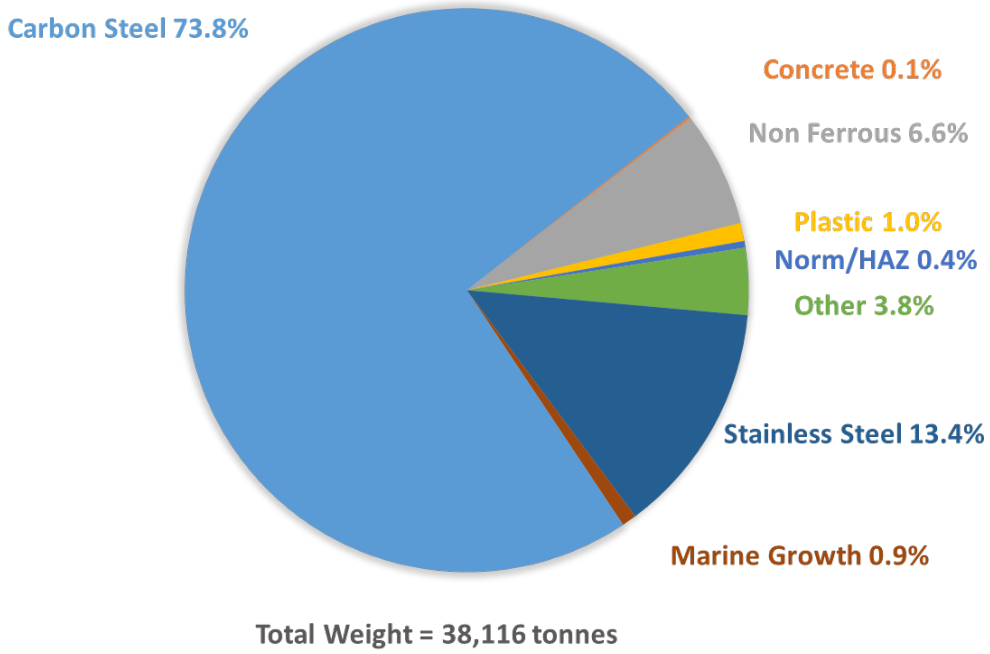
Appendix 2 provides further information on the main waste types on the facilities known at this stage.

Table 2.3: Material And Waste Management

Material	Weight (tonnes)	% of Total
Carbon Steel	28,128	73.8
Concrete	46	0.1
Marine Growth	320	0.8
Non-Ferrous	2,517	6.6
NORM / HAZ	147	0.4
Other	1,461	3.8
Plastic	393	1.00
Stainless Steel	5,104	13.4
Total	**38,116[3]**	**100**

[3] The total weight presented in Table 2.3 is greater than the sum of the weights presented in Table 1.1 and the sum of the weights presented in Table 2.1 as Table 2.3 includes the weights of concrete and marine growth, which are not included in the other tables.

Figure 2.1: Estimated Inventory



3. Removal and Disposal Methods

The reuse of an installation or its constituent parts is the preferred decommissioning option. Marathon Oil carried out a qualitative internal review of options for reusing the Brae Bravo platform as a producing asset and concluded that due to the age of the process technology, and the high cost of maintaining the fabric and structural integrity of the platform, there are no technically viable reuse options.

Alternate uses for the Brae Bravo platform for power generation using wind energy, wave and tidal were also considered but none of these alternative use options are considered economically viable.

The reuse of the Brae Bravo platform and infrastructure, including pipelines, has been considered for carbon capture and storage and in agreement with OGA was the platform was found not to be a suitable candidate.

Marathon Oil will seek to reuse individual items of equipment where practicable. The majority of the balance of the materials and components that make up the Brae Bravo topsides, flare bridge, flare tower and flare jacket/sub-structure will be recycled. For example, a significant proportion of the material making up the facilities is steel, which will be recovered and recycled. The small proportion of materials remaining after reuse and recycling will be disposed of appropriately in accordance with Marathon Oil policies and the relevant regulatory requirements, including waste management, environmental and health and safety expectations.

3.1 Topsides

The Brae Bravo topsides are shown in Figure 3.1. They comprise drilling, production and utilities facilities arranged in three tiers of modules. The lowest tier of modules (57 and 58), make up the MSF (Module Support Frame). The MSF forms the interface between the platform's jacket/sub-structure and the topsides modules, and supports the platform end of the flare bridge (module 59). The second tier of modules consists of the wellheads, production and export facilities, utilities, and accommodation (modules 01 to 09). The third tier of modules (12 to 18, 22 and 32), comprises the rig-skidding module and derrick, the drilling modules, the injection compressor, generators and switchgear, and accommodation. The third tier also supports storage facilities and workshops and the helideck which sits on top of the accommodation modules. The topsides' plan dimensions are approximately 75m by 50m.

Experience from previous projects and studies completed in support of Brae Area decommissioning, indicate that there are a number of technically feasible options for removal of the Brae Bravo topsides. The removal options include Piece Small removal and Piece Medium removal, which are proven techniques. Single Lift is also considered to be a technically feasible technique that may be used by Marathon Oil for removal of the Brae Bravo topsides. Marathon Oil will decide on the technique, or combination of techniques, to be used in consultation with removal contractors taking account of safety, environmental, technical, socio-economic and cost factors. Marathon Oil will continue to consult with stakeholders during the decision-making process.

The Brae Bravo topsides will be returned to shore for reuse, recycling or disposal. Marathon Oil will select recycling and disposal facilities on safety, environmental, socio-economic and cost factors. United Kingdom, European and other international facilities will be considered in this selection process.

Some of the topsides equipment, such as rotating equipment, safety equipment and some electrical or electronic equipment may be suitable for reuse or recycling. Other equipment such as structural steel, steel process vessels and piping, and electrical cables may only be suitable for recycling, and there are some components and materials that are only suitable for disposal, including NORM and other hazardous

wastes. Marathon Oil will dispose of these wastes appropriately and in accordance with the relevant regulatory requirements.

The methods that will be used to clean the Brae Bravo topsides are listed in Table 3.1, and the methods considered for topsides removal are listed in Table 3.2.

Figure 3.1: Brae Bravo Topsides

01 – Wellhead (West)
02 – Wellhead (East)
03 – Separation
04 – Compressor & Oil Export
05 – Refrigeration/NGL
06 – Injection Compressor
07 – Accommodation (Lower)
08 – MCC Room & Utilities
09 – Kingfisher Module
12 – Skidding Module
13 – Drilling Module
14 – Drilling Module
15 – Redundant
16 – Injection Compressor
17 – Accommodation (Upper)
18 – Switchgear & Generators
22 – Drilling Sub-structure
26 – Drilling Annexe (on roof of Module 16)
27 – Helideck & Level 9 Accommodation
28 – Gas Turbines Exhaust Stack
32 – Derrick
36 – Fabrication Workshop (on roof of Module 16)
38 – Workshops (on roof of Module 18)
48 – Catering Warehouse (on roof of Module 18)
57 – Module Support Structure (West)
58 – Module Support Structure (East)
59 – Flare Bridge
81 – Flare Tower (not shown)

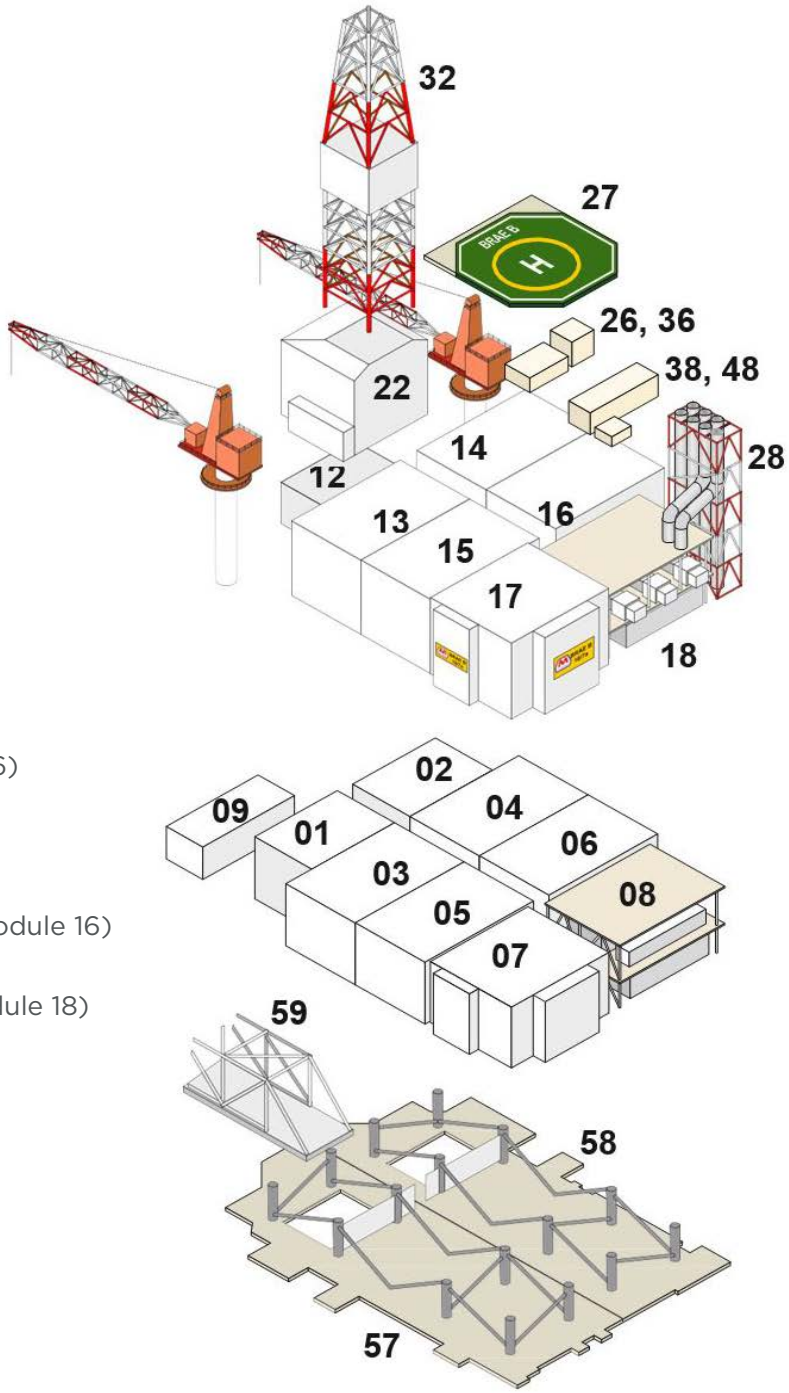


Table 3.1: Topsides Cleaning Methods

Waste Type	Composition of Waste	Disposal Route
On-board hydrocarbons	Process fluids, diesel and lubricants	Equipment will be drained, flushed and cleaned, and the residual effluent will be transported onshore for appropriate reuse, recycling or disposal.
Production and drilling chemicals	Proprietary preparations and bulk chemicals	Equipment will be drained, flushed and cleaned, and the residual effluent will be transported onshore for appropriate reuse, recycling or disposal.
Structural and equipment paint coat	Paints may include hazardous components, e.g. isocyanates	Paint may give off toxic fumes or dust during flame-cutting, abrasive blasting or mechanical cutting. This hazard will be managed by sampling and safe systems of work as appropriate. Paint and coatings will be transported onshore for appropriate licensed disposal.
Other hazardous materials	NORM, mercury, radioactive instruments, heavy metals, batteries, etc.	Equipment will be made safe and transported onshore for appropriate licensed reuse, recycling or disposal.
Seals, gaskets and insulation	Asbestos and ceramic fibres	Equipment will be made safe and transported onshore for appropriate licensed recycling or disposal.

Table 3.2: Topsides Removal Methods

Topsides Removal Methods

1) HLV Cut and Lift	✓
2) Monohull crane vessel[4]	
3) SLV	✓
4) Piece Small	✓
5) Other	A Hybrid option (combination of *Piece Small* and *Cut and Lift)* is feasible, and for the purpose of these decommissioning programmes is considered to be captured within the *Cut and Lift* and *Piece Small* methods.

Method	Description
Single lift removal by SLV	Removal of the topsides in one unit by an SLV. In this case, the topsides will be taken to a suitable onshore decommissioning facility to be broken up for reuse, recycling or disposal.
HLV Cut and Lift	Removal of the topsides in several large modules, e.g., the drilling derrick and drilling sub-structure, etc. These modules will then be taken to an onshore decommissioning facility to be broken up for reuse, recycling or disposal.
Piece Small	Breaking up the topsides offshore using manual labour or excavators fitted with hydraulic shears, etc. The residue will be transported to shore by ship or barge and sorted at an onshore decommissioning facility. Equipment items that are suitable for reuse will be removed as units and shipped to shore.
Proposed removal method and disposal route	**Marathon Oil will select removal methods following a commercial tendering process taking account of safety, environmental, socio-economic, technical feasibility and cost factors. The potential removal methods are; single lift, piece large, piece medium, piece small or a hybrid technique. The evaluation of environmental and socio-economic factors will address materials management issues including trans-frontier shipment. All waste materials will be handled in accordance with United Kingdom and relevant international legislation. Marathon Oil and the selected decommissioning contractor(s) will address any trans-frontier shipment of waste to ensure that the associated issues are appropriately managed.**

[4] The HLV Cut and Lift evaluation has assumed a semi-submersible type lift vessel as data exists for the installation of the platforms with such a vessel. However, the selection of actual vessel for decommissioning will ultimately be driven by lift capacity, crane reach and market conditions and does not preclude other vessel types such as a Monohull vessel. Marathon Oil consider the Monohull crane vessel option to be part of the HLV Cut and Lift method.

3.2 Jacket/Sub-structure

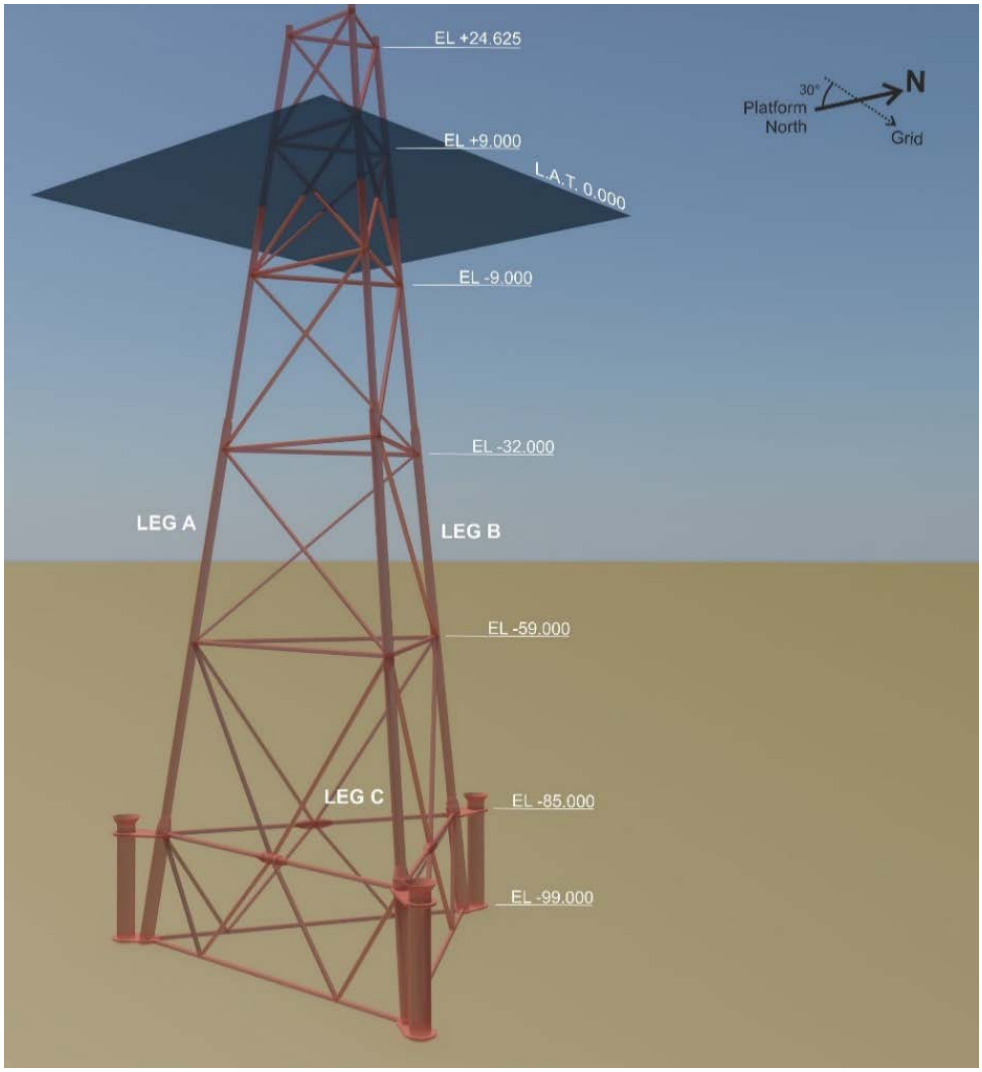
3.2.1 3.2.1 Jacket/Sub-structure Decommissioning Overview

These Decommissioning Programmes include the Brae Bravo flare jacket/sub-structure, which is shown in Figure 3.2. Table 3.3 lists the flare jacket/sub-structure's key attributes.

Table 3.3: Jacket/Sub-structure Attributes

Name of Jacket/Sub-structure	Jacket/Sub-structure weight (tonnes)	Date Installed	Seeking Derogation from OSPAR Decision 98/3
Brae Bravo Flare	1,550	1986	No

Figure 3.2: Brae Bravo Flare Jacket/Sub-structure



The Brae Bravo flare jacket/sub-structure will be removed to shore for recycling.

3.2.2 Jacket/Sub-structure Removal Methods

The decommissioning methods considered by Marathon Oil for the Brae Bravo flare jacket/sub-structure are listed in Table 3.4.

Table 3.4: Jacket/Sub-structure Decommissioning Methods	
1) HLV (Semi-submersible Heavy Lift Vessel) Cut and Lift	✓
2) Monohull crane vessel	
3) SLV (Single Lift Vessel)	✓
4) Piece Small – included as part of HLV Cut and Lift assessment	
5) Other; BTA (Buoyancy Tank Assembly)	✓

Brae Bravo Flare Jacket/Sub-structure (Small Steel)		
Removal to shore	SLV or HLV	The Brae Bravo flare jacket/sub-structure is not considered suitable for reuse because of both its specialised nature and its age. The jacket/sub-structure will be recovered by an SLV or HLV as one component in a single lift, or in several pieces. The foundation piles will be cut at an appropriate depth below the seabed. Any depressions in the seabed will be remediated. The jacket/sub-structure will be returned to shore for recycling.
Proposed removal method and disposal route		**A final decision on removal method will be made following a commercial tendering process. The tender evaluation will consider safety, environmental, socio-economic and technical metrics as well as cost. Irrespective of the method that is ultimately selected, the Brae Bravo flare jacket/sub-structure will be taken ashore for recycling or disposal.** **Tenderers for the Brae Bravo flare jacket/sub-structure removal will be asked to nominate onshore reception facilities, in the United Kingdom, Europe or internationally, that are compatible with the tenderers' proposed removal methods.** **All of the viable removal methods identified above for removal of the Brae Bravo flare jacket/sub-structure will be carried forward into the tender process, unless assessment shows that a method does not meet minimum safety expectations. The potential removal methods are; single lift, piece large, piece medium, piece small or a hybrid technique. All options will be assessed to ensure risks are kept to a level that is as low as reasonably practicable.** **Marathon Oil and the selected decommissioning contractor(s) will address any trans-frontier shipment of waste to ensure that the associated issues are appropriately managed.**

3.2.3 Jacket/Sub-structure Removal Comparative Assessment

The Brae Bravo flare jacket/sub-structure will be completely removed. Therefore there is no comparative assessment associated with these decommissioning programmes.

3.3 Subsea Installations and Stabilisation Features

There are no subsea installations and stabilisation features associated with these decommissioning programmes.

3.4 Pipelines

There are no pipelines associated with these decommissioning programmes.

3.5 Pipeline Stabilisation Features

There are no pipeline stabilisation features associated with these decommissioning programmes.

3.6 Wells

Table 3.5: Well Plug and Abandonment

The Brae Bravo wells listed in Table 2.2 in Section 2.4 have been permanently abandoned by placing verified barriers to isolate rock formations that have flow potential from the surface, to meet OGA and HSE requirements for the suspension and abandonment of wells.

Cement plugs were installed deep in each well to ensure that the reservoir is completely sealed off and that each borehole is isolated from the surface.

3.7 Drill Cuttings

There are no drill cuttings piles associated with these decommissioning programmes.

3.8 Waste Streams

The methods for managing the waste streams from Brae Bravo topsides, flare bridge, flare tower and flare jacket/sub-structure are listed in Table 3.6. The ultimate disposition of the waste materials is described in Table 3.7, and the proportions of materials that Marathon Oil envisages reusing, recycling or disposing of are given Table 3.8. Onshore cleaning and disposal of equipment will be carried out at appropriately licensed sites, in accordance with relevant legislation. Any cleaning and flushing activities conducted whilst the platform is in operation will be completed under the current permitting regime. Likely discharges are discussed in Technical Appendix 4.1 of the Environmental Statement [2].

Table 3.6: Waste Stream Management Methods

Waste Stream	Removal and Disposal Method
Bulk Liquids	As far as possible, bulk hydrocarbon liquids will be exported from the platform via the export pipeline. The process equipment will be cleaned and flushed to an appropriate standard prior to decommissioning. Discharges offshore will be managed and risk assessed under the existing permitting regime. Any effluent will be shipped to shore for treatment and disposal in accordance with maritime transportation guidelines. Equipment will be further checked onshore and any residual contamination will be removed from the equipment prior to its reuse, recycling or ultimate disposal.

Table 3.6: Waste Stream Management Methods	
Marine Growth	The disposal of marine growth will depend on the decommissioning option selected and the techniques used. Therefore, marine growth may be disposed of either offshore or onshore. Notwithstanding, marine growth will be disposed of in accordance with relevant regulations and guidelines.
NORM	NORM may be disposed of either offshore or onshore. In either case, disposal will be in accordance with the relevant guidelines and authorisations.
Asbestos	Any asbestos that is present on Brae Bravo topsides or the flare, will be contained and taken onshore for disposal in accordance with regulations.
Other Hazardous Wastes	Where no further options are available for the waste stream the waste will be taken onshore to an appropriately licensed site for recycling, or disposal.
Onshore Dismantling Sites	An appropriate licenced site will be selected by the removals contractor. Marathon Oil will ensure that the removal contractor has a proven disposal track record, can effectively manage the waste streams throughout the deconstruction process and demonstrates an ability to deliver innovative recycling options. Marathon Oil will carry out audits on disposal yards to provide assurance that they are compliant with legislation.

Table 3.7: Inventory Disposition			
	Total Inventory (tonnes)	**Planned Tonnage to Shore (tonnes)**	**Planned Tonnage Left In-Situ (tonnes)**
Installations	38,116	38,116	0

Table 3.8: Reuse, Recycling and Disposal of Material Returned to Shore (By Weight)			
	Reuse	**Recycle**	**Disposal**
Installations	10%	85-90%	<5%

Marathon Oil's intent is to maximise the reuse and recycling of materials that are returned to shore, and thereby minimise the quantity of material that is disposed of to landfill. The reuse and recycling rates listed in Table 3.8 are provisional.

It is recognised that there will be large quantities of material returned to shore for reuse, recycling and disposal. Regardless of ultimate destination, there will be sufficient notice provided to ensure that there is suitable capacity for the processing of landed material (taking cognisance of destination handling capacity and availability) and to allow all applicable regulatory bodies, stakeholders and contractors to be engaged appropriately.

4. Environmental Impact Assessment

4.1 Environmental Sensitivities (Summary)

The environmental sensitivities in the Brae Bravo area and the potential environmental impacts of decommissioning operations are listed in Table 4.1 and Table 4.2 respectively.

Table 4.1: Environmental Sensitivities Summary

Environmental Receptor	Main Features
Conservation Interests	The Braemar Pockmarks Special Area of Conservation (SAC) is approximately 23km from Brae Bravo. A Marine Life Study of the Brae Area infrastructure has not identified the presence of the cold water coral (*Lophelia pertusa*).
Seabed	The seabed community in the Brae Area is classed as representative of the Central North Sea and is dominated by the bristle worm (*Paramphinome jeffreysii)*, with other species such as *Spiophanes bombyx*, *Galathowenia oculata*, *Tharyx killariensis* and *Pholoe assimilis* also present.
Fish	Several fish species are present in the Brae Area and use the area for spawning and/or nursery grounds; these include Norway pout, Nephrops, mackerel, haddock and blue whiting. The basking shark, tope, porbeagle, common skate and angel shark may also be present in low numbers.
Fisheries	Commercial fishing in the Brae Area is dominated by demersal and shellfish fisheries, with fishing effort peaking during spring and autumn. Gear types used are trawlers and seine nets. Peterhead is the main landing port for the area.
Marine Mammals	The seven most commonly sighted species of cetacean in the Brae Area are the harbour porpoise, Atlantic white-sided dolphin, white-beaked dolphin, Risso's dolphin, killer whale, minke whale and long-finned pilot whale. Grey and harbour seals have also been recorded.
Birds	Seabirds are present in the central North Sea throughout the year, though densities in the Brae Area tend to be lower due to the distance from coastal colonies. Seabird densities in the Brae Area are at their lowest in late spring and early summer during the breeding season. After this, diversity and density of seabirds offshore increases. Seabirds are particularly vulnerable to surface pollutants during moulting (July) when the birds are flightless.
Onshore Communities	Onshore communities are potentially sensitive to disturbance from cleaning, dismantling and disposal activities. Marathon Oil will select onshore decommissioning facilities that comply with all regulatory requirements to ensure that potential impacts are appropriately controlled.
Other Users of the Sea	There are no ferry routes and no known military uses in the vicinity of the Brae Area. Recreation activity offshore in the North Sea is limited to the occasional yachts in passage. Telecommunications cables are charted to the north of the Brae platforms. No designated wreck sites or marine archaeological features are located within the area.

Table 4.1: Environmental Sensitivities Summary	
Environmental Receptor	**Main Features**
Atmosphere	The primary source of atmospheric emissions will be from vessel activity during decommissioning activities.

4.2 Potential Environmental Impacts and their Management

The Environmental Impact Assessment (EIA) process has considered the potential for significant environmental effects as a result of interactions between the proposed decommissioning activities and sensitive environmental receptors. The EIA has been developed by means of a multi stage scoping process with the aim of delivering a focused and proportionate EIA and ES. The process was developed in consultation with key stakeholders including, OPRED, JNCC, Marine Scotland and SEPA.

Following the scoping stage, the key issues identified for further detailed assessment were:

- Seabed disturbance effects
- Underwater noise effects
- Cumulative and transboundary effects

The ES [2] and Table 4.2 provide a summary of the environmental effects.

The environmental assessment has not identified any significant residual environmental effects as a result of activities described within these decommissioning programmes, however Marathon Oil has set out a schedule of environmental management commitments within the ES to further reduce the potential for environmental effects.

Table 4.2: Environmental Impacts and Management		
Activity	**Main Impacts**	**Management**
Topsides Removal	Energy and Emissions	All vessels will comply with MARPOL 73/78 Annex VI on air pollution and machinery will be maintained in an efficient state.
	Underwater Noise	A noise assessment has been undertaken to identify the potential impacts of noise on marine mammals. The results are documented in the Environmental Statement [2]. Procedures for vessel operations and cutting will incorporate mitigation measures identified by the noise study.
	Accidental Events	The potential for spills, dropped objects or other contaminants to impact the ecosystem has been assessed. This is documented in the Environmental Statement [2]. The Brae Bravo Oil OPEP (Oil Pollution Emergency Plan) will be revised to incorporate decommissioning activities. Topsides will be drained down and cleaned prior to any removal activities.
	Energy and Emissions	All vessels will comply with MARPOL 73/78 Annex VI on air pollution and machinery will be maintained in an efficient state.

Table 4.2: Environmental Impacts and Management

Activity	Main Impacts	Management
Jacket/Sub-structure Removal	Underwater Noise	Noise modelling has been conducted to identify the impacts of noise on marine mammals and potential mitigation measures. The results are documented within the Environmental Statement [2]. Procedures for vessel operations and underwater cutting will incorporate mitigation measures identified by the noise study. There are no plans to use explosives at this time. However, should the use of explosives be necessary Marathon Oil will complete appropriate evaluations and consultations.
	Seabed Disturbance	Seabed disturbance and subsequent resettlement is considered within the Environmental Statement [2]. Activities will be risk assessed and permitted under MCAA (Marine and Coastal Access Act).
	Accidental Events	The potential for spills, dropped objects or other contaminants to impact the ecosystem has been assessed. This assessment is documented in the Environmental Statement [2]. The Brae Bravo OPEP will be revised to incorporate decommissioning activities.

5. Interested Party Consultations

Marathon Oil has consulted a wide range of interested parties during the decommissioning planning stages, preparation of the comparative assessments and environmental statements, and compilation of the decommissioning programmes. These include:

- OPRED Environmental Management Team
- OPRED Offshore Decommissioning Unit
- Greenpeace
- HSE
- Joint Nature Conservation Committee
- Marine Conservation Society
- Marine Scotland
- National Federation of Fishermen's Organisations
- Oil and Gas Authority
- OSPAR
- Scottish Environment Protection Authority
- Scottish Fishermen's Federation
- WWF

Marathon Oil has also made information regarding decommissioning of the Brae Area available to other interested parties and the general public via Marathon Oil Brae Decommissioning website, www.marathonoil.com/braedecom.

Table 5.1 summarises comments received from stakeholders, and Marathon Oil's responses.

Table 5.1: Summary of Stakeholder Comments

UK

Stakeholder	Comment	Response
The National Federation of Fishermen's Organisations	No comments received	-
Scottish Fishermen's Federation	The SFF sent its comments to Marathon Oil in a letter dated July 17th 2017. The letter acknowledged Marathon Oil's engagement with the SFF regarding decommissioning of the Brae Area facilities. The SFF reiterated its overarching principal of return to clean seabed.	All of the facilities covered by these decommissioning programmes will be removed and returned to shore. Therefore, the SFF's overarching principal will be met.
Northern Irish Fish Producers' Organisation	No comments received	-
Global Marine Systems Limited	No comments received	-
Public	No comments received	-

6. Overall Programme Management

6.1 Project Management and Verification

Marathon Oil, on behalf of the Section 29 Notice Holders, has appointed a project management team to manage the planning and execution of the Brae Area decommissioning programmes. Marathon Oil health, environmental and safety management principles will govern operational controls, hazard identification and risk management. The work will be coordinated with due regard to interfaces with other operators' oil and gas assets and with other users of the sea. Marathon Oil will control and manage the progress of all permits, licences, authorisations, notices, consents and consultations required. Any significant changes to the decommissioning programmes will be discussed and agreed with OPRED.

6.2 Post-decommissioning Debris Clearance and Verification

Following completion of the Brae Bravo decommissioning activities detailed in this document and the wider Brae Area activities described in the associated decommissioning programmes [3], post-decommissioning site surveys will be carried out within a 500m radius of all installation sites and a 100m corridor along each pipeline route. Any oilfield-related seabed debris that is found will be recovered and returned to shore for recycling or appropriate disposal.

Independent verification of the state of the seabed will be obtained by trawling the pipeline corridors and within the safety zones. Following verification Marathon Oil will issue a statement of clearance to all relevant governmental departments and non-governmental organisations.

The post-decommissioning survey results will be notified to the UK Fisheries Offshore Oil and Gas Legacy Trust Fund Ltd for inclusion in their FishSAFE system, and to the United Kingdom Hydrographic Office for notification and marking on Admiralty charts and notices to mariners as required.

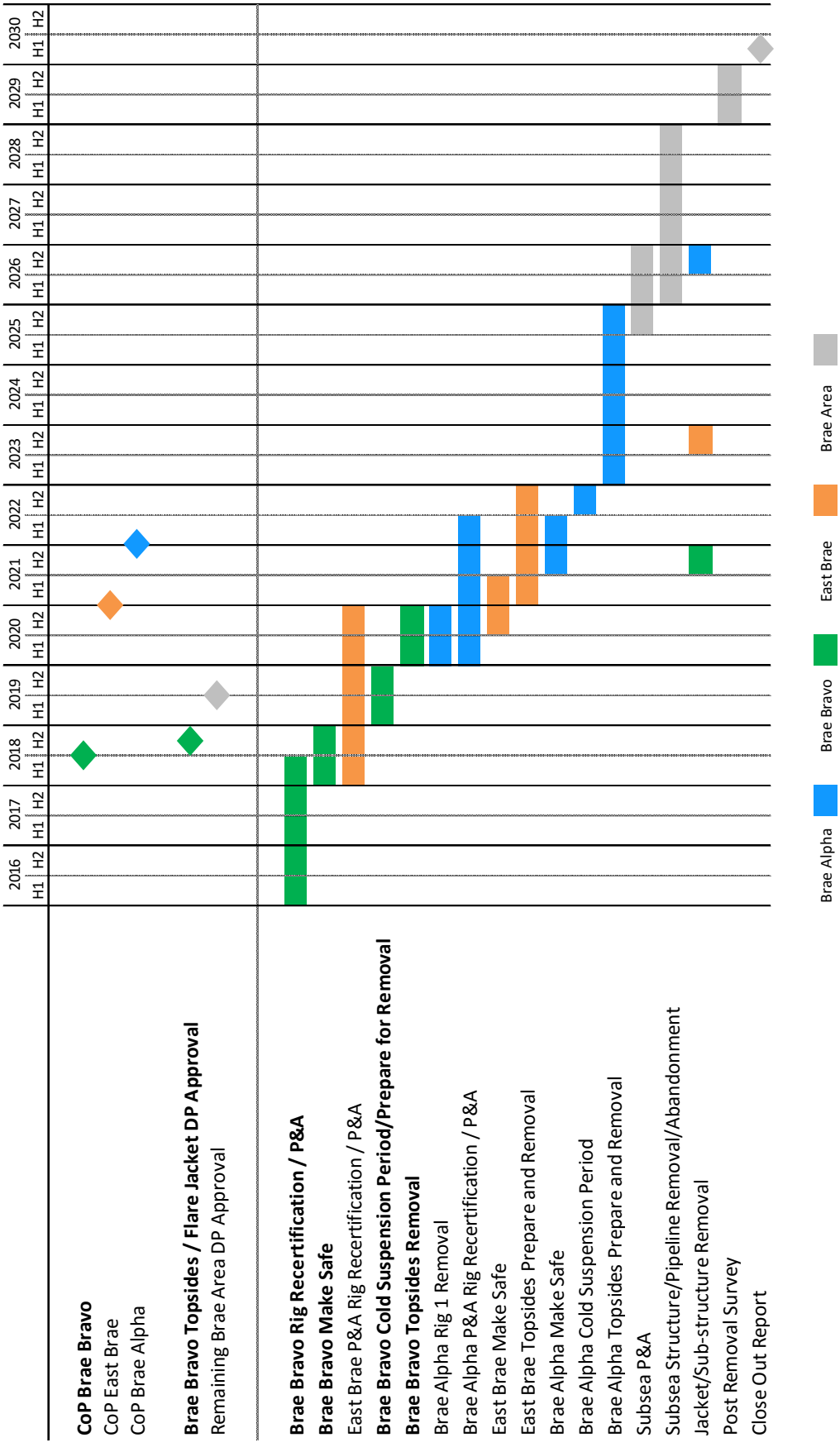
6.3 Schedule

The main milestones in the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure decommissioning process are anticipated to be:

- Brae Bravo Rig Recertification/Wells Plug and Abandon: Complete
- Brae Bravo Cessation of Production: 2018
- Brae Bravo Make Safe: 2018
- Brae Bravo Cold Suspension: 2018
- Brae Bravo Topsides and Flare Dismantling: 2019 – 2020
- Post Removal Survey 2029
- Close Out Report 2030

This schedule may change to maximise economic recovery, or to exploit opportunities to minimise decommissioning impacts by combining Brae Area decommissioning activities into campaigns, or by combining Brae Area decommissioning operations with third-party decommissioning. The Brae Area overall decommissioning schedule is illustrated in Figure 6.1.

Figure 6.1: Overall Brae Area Decommissioning Schedule



6.4 Long Term Facilities Management

The decommissioning of the Brae Area is planned to be over an extended period. Throughout this period, the assets and infrastructure will be in various stages of dismantlement and remediation. At all times, the facilities will be maintained to a standard that enables completion of the decommissioning programmes safely and in compliance with regulations and Marathon Oil's corporate standards.

Following removal of the Brae Bravo platform topsides, there will be a period of time prior to jacket/sub-structure removal where the jacket/sub-structure remains above sea level. At this time the existing 500m safety zone will remain in place. The Brae Bravo Consent to Locate will be revised to reflect the change in structure and appropriate navigational aids will be fitted in accordance with requirements of the amended Consent to Locate. During any period when the Brae Bravo jacket/sub-structure projects above the sea surface all requirements of the amended Consent to Locate will be adhered to and a guard vessel will be assigned to the area as necessary.

6.5 Costs

Marathon Oil has used the Oil and Gas UK work breakdown structure presented in Table 6.1 to develop cost estimates for the Brae Bravo, topsides, flare bridge, flare tower and flare jacket/sub-structure decommissioning programmes. The provisional estimated costs have been provided to OPRED in confidence.

Table 6.1: Provisional Decommissioning Costs

Item	Estimated Cost (£m)
Operator Project Management	Provided to OPRED in confidence
Facility Running/Owner Costs	
Well Plugging and Abandonment	
Facilities Making Safe	
Topsides Preparation	
Topsides Removal	
Jacket/Sub-structure Removal	
Topsides and Jacket/Sub-structure Onshore Recycling	
Site Remediation	
Monitoring	

6.6 Close Out

A close out report will be submitted to OPRED within one year of the completion of all the Brae Area offshore decommissioning scopes, including debris removal and independent verification of seabed clearance and the first post-decommissioning environmental survey.

Any variances from the approved decommissioning programmes will be explained in the close out report.

6.7 Post-Decommissioning Monitoring and Evaluations

Marathon Oil will carry out a Brae Area post-decommissioning environmental seabed survey. This will include the Brae Bravo site.

A copy of the survey results will be forwarded to OPRED. After the survey results have been sent to OPRED and reviewed, a post monitoring survey regime will be agreed by both parties and take account of ongoing liability, the status and findings of previous surveys and a risk based approach to the frequency and scope of further surveys.

6.8 Management of Residual Liability

There is no residual liability associated with the Brae Bravo topsides, flare bridge, flare tower, and flare jacket/sub-structure as these facilities will be entirely removed to shore for recycling or disposal.

Marathon Oil recognises that the parties to the decommissioning programmes will retain ownership of, and liability for, the plugged and abandoned Brae Bravo wells. Marathon Oil will engage with OPRED on all future legacy and liability matters and requirements relating to these wells.

7. Supporting Documents

[1] Guidance Notes Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998, Version 6, DECC March 2011.

[2] Brae Alpha, Brae Bravo, Central Brae, West Brae and Sedgwick Combined Decommissioning Programmes – Environmental Statement, 9000-MIP-99-EV-RT-00001-000, Marathon Oil Decommissioning Services.

[3] Brae Alpha, Brae Bravo Jacket/Sub-structure, Central Brae, West Brae and Sedgwick Combined Decommissioning Programmes 9000-MIP-99-PM-RP-00003-000, Marathon Oil Decommissioning Services.

8. Partners' Letters of Support

Marathon Oil North Sea (G.B.) Limited
91 Wimpole Street,
London, W1G 0EF
Telephone +44 (0)20 7298 2500

Marathon Oil

Offshore Petroleum Regulator for Environmental and Decommissioning
AB1 Building (Wing C)
Crimon Place
Aberdeen
AB10 1BJ

Date 27 July 2018

Dear Sir or Madam

PETROLEUM ACT 1998
BRAE BRAVO TOPSIDES, FLARE BRIDGE, FLARE TOWER AND FLARE JACKET/SUB-STRUCTURE DECOMMISSIONING PROGRAMMES
PETROLEUM ACT 1998

We acknowledge receipt of your letter 20 July 2018

We, Marathon Oil North Sea (G.B.) Limited confirm that we authorize Marathon Oil U.K. LLC to submit on our behalf abandonment programmes relating to the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-Structure as directed by Secretary of State on 20 July 2018.

We confirm that we support the proposals detailed in the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub Structure Decommissioning Programme Dated 27 July 2018, which are to be submitted by Marathon Oil U.K. LLC in so far as they relate to those facilities in respect of which we are required to submit abandonment programmes under Section 29 of the Petroleum Act 1998.

Yours faithfully

James A Edens
Director
For and on behalf of Marathon Oil North Sea (G.B.) Limited

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27 July 2018

Offshore Petroleum Regulator for Environment and Decommissioning
AB1 Building (Wing C)
Crimon Place
Aberdeen
AB10 1BJ

Dear Sir or Madam

BRAE BRAVO TOPSIDES, FLARE BRIDGE, FLARE TOWER AND FLARE JACKET/SUB-STRUCTURE DECOMMISSIONING PROGRAMMES
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 20 July 2018.

We, TAQA Bratani Limited confirm that we authorise Marathon Oil U.K. LLC to submit on our behalf abandonment programmes relating to the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure as directed by the Secretary of State on 20 July 2018.

We confirm that we support the proposals detailed in the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jackets/Sub-structure Decommissioning Programme dated 27 July 2018, which are to be submitted by Marathon Oil U.K. LLC in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under Section 29 of the Petroleum Act 1998.

Yours faithfully

Sandy Hutchison
Legal, Commercial and Business Services Director
For and on behalf of TAQA Bratani Limited

Registered in England and Wales No 05975475
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27 July 2018

Offshore Petroleum Regulator for Environment and Decommissioning
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Dear Sir or Madam

BRAE BRAVO TOPSIDES, FLARE BRIDGE, FLARE TOWER AND FLARE JACKET/SUB-STRUCTURE DECOMMISSIONING PROGRAMMES
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 20 July 2018.

We, TAQA Bratani LNS Limited confirm that we authorise Marathon Oil U.K. LLC to submit on our behalf abandonment programmes relating to the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure as directed by the Secretary of State on 20 July 2018.

We confirm that we support the proposals detailed in the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jackets/Sub Structure Decommissioning Programme dated 27 July 2018, which are to be submitted by Marathon Oil U.K. LLC in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under Section 29 of the Petroleum Act 1998.

Yours faithfully

Sandy Hutchison
Legal, Commercial and Business Services Director
For and on behalf of TAQA Bratani LNS Limited

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Offshore Petroleum Regulator for Environment and Decommissioning
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Date: 27 July 2018

Dear Sir or Madam

PETROLEUM ACT 1998
BRAE BRAVO TOPSIDES, FLARE BRIDGE, FLARE TOWER AND FLARE JACKET/SUB-STRUCTURE DECOMMISSIONING PROGRAMMES
PETROLEUM ACT 1998

We acknowledge receipt of your letter 20 July 2018.

We, Spirit Energy Resources Limited confirm that we authorise Marathon Oil U.K. LLC to submit on our behalf abandonment programmes relating to the Brae Brave Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-Structure as directed by Secretary of State on 20 July 2018.

We confirm that we support the proposals detailed in the Brae Brave Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-Structure Decommissioning Programme dated 27 July 2018, which are to be submitted by Marathon Oil U.K. LLC in so far as they relate to those facilities in respect of which we are required to submit abandonment programmes under Section 29 of the Petroleum Act 1998.

Yours faithfully

Andrew Le Poidevin
Director
For and on behalf of Spirit Energy Resources Limited

JX Nippon Exploration and Production (U.K.) Limited
Octagon Point, 2nd Floor, 5 Cheapside, London EC2V 6AA

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

27th July 2018

Dear Sir or Madam

BRAE BRAVO TOPSIDES, FLARE BRIDGE, FLARE TOWER AND FLARE JACKET/SUB-STRUCTURE DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 20 July 2018.

We, JX Nippon Exploration & Production (U.K.) Ltd confirm that we authorise Marathon Oil UK LLC to submit on our behalf an abandonment programme relating to the Brae Bravo platform facilities as directed by the Secretary of State on 20 July 2018.

We confirm that we support the proposals detailed in the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jackets/Sub Structure Decommissioning Programme dated 27 July 2018, which is to be submitted by Marathon Oil UK LLC in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Naoyoshi Kaneko
General Manager
For and on behalf of JX Nippon Exploration & Production (U.K.) Ltd.

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Appendix 1 Statutory Consultees Correspondence

Marathon Oil did not receive any substantive correspondence from consultees in respect of decommissioning the Brae Bravo Topsides, Flare Bridge, Flare Tower and Flare Jacket/Sub-structure.

The comments that were received are summarised in Table 5.1.

Appendix 2 Estimated Material Inventory

Table A2.1 lists a breakdown of the inventory that may be present on the Brae Bravo topsides, flare bridge, flare tower, and flare jacket/sub-structure.

Marathon Oil's main objective in breaking down the inventory in this way is to ensure that potentially harmful substances that may be present are identified so that risks to personnel and the environment can be effectively managed.

The list identifies bulk fluids and other substances that may be present, such as hydrocarbon fluids and cement powder. These bulk substances will be removed from the platform in the final stages of the operational phase. Therefore, only traces of these substances will be present at the decommissioning phase.

Table A2.1: Estimated Material Inventory

Material	Present?	Quantity	Location
ABS	Yes	To be quantified	Topsides, precise locations unknown at this time.
Ac 228	Yes (To be confirmed)	To be quantified	Present in NORM scale potentially present in topsides piping and equipment.
Alloy Steel	Yes	To be quantified	Topsides
Aluminium	Yes	Estimated 455 Te	Topsides
Aluminium Bronze	Yes (To be confirmed)	To be quantified	Topsides
Americium	Yes (To be confirmed)	To be quantified	Topsides in some smoke detectors.
Anodes (total)	Yes	Estimated 38 Te	Flare jacket/sub-structure,
Asbestos Blue Asbestos White/Brown	Yes (To be confirmed)	Estimated 0.52 Te	Potentially present in topsides partitions and gaskets.
Batteries:	Yes (To be confirmed)	Estimated 8.8 Te Lead Acid 14.5 Te NiCad	Topsides.
Biocides by type (including TBT)	Yes (To be confirmed)	Trace	Topsides.
Brass	Yes	Estimated 19.5 Te	Topsides
Bronze	Yes (To be confirmed)	To be quantified	Topsides
Buna	Yes (To be confirmed)	Estimated 2.5 Te	Topsides

Table A2.1: Estimated Material Inventory			
Material	**Present?**	**Quantity**	**Location**
Butyl Rubber	Yes (To be confirmed)	Estimated 2.5 Te	Topsides
Carbon Steel	Yes	Estimated 29,263 Te	Topsides
Cement Powder	Yes	Trace	Bulk bins in topsides drilling service modules
Concrete Mattresses	No		
Concrete	Yes	Estimated 46Te	Flare jacket/sub-structure grout
Ceramics (all types)	Yes	Estimated 689Te	Topsides
CFC/HCFC	Yes (To be confirmed)	Estimated 2.6Te	Topsides
Chartek/fire protection	Yes	Estimated 29Te	Topsides
Chloroparaffins	No (To be confirmed)	To be quantified	Topsides
Chromium	Yes	To be quantified	Topsides
Copper	Yes	Estimated 1684Te	Topsides
Copper nickel alloys	Yes	Estimated 182Te	Topsides
Cork	No (To be confirmed)	To be quantified	Topsides
Cotton	Yes	To be quantified	Topsides
Diesel	Yes	Trace	Topsides
Drill Cutting Residues	Yes	Trace	In drilling mud system
EPDM	Yes (To be confirmed)	Estimated 0.6 Te	Topsides
Ethylene / Polypropylene	Yes (To be confirmed)	To be quantified	Topsides
Fire Extinguishers	Yes	Estimated 6.2 Te	Topsides
Fire Foam	Yes	Trace	Topsides
Flame Retardants – Brominated etc.	Yes (To be confirmed)	To be quantified	Topsides
Fluorescent Tubes	Yes	Estimated 1 Te	Topsides
Formica	Yes (To be confirmed)	To be quantified	Topsides
Glass	Yes	To be quantified	Topsides

Table A2.1: Estimated Material Inventory			
Material	**Present?**	**Quantity**	**Location**
Glycol	Yes	Trace	Topsides
GRP	Yes	Estimated 45 Te	Topsides
Graphite/Charcoal	Yes (To be confirmed)	To be quantified	Topsides
Gunmetal	Yes (To be confirmed)	Estimated 4.4 Te	Topsides
Heli-fuel	Yes	Trace	Topsides
Hydrocarbons	Yes	Trace	Topsides
Inconel/Nimonics	Yes (To be confirmed)	Estimated 201 Te	Topsides
Insulation	Yes	To be quantified	Topsides
Iron(cast)	Yes (To be confirmed)	Estimated 11.6 Te	Topsides
Lead	Yes	To be quantified	Topsides
Marine Growth	Yes	Estimated 316 Te	Flare Jacket/Sub-structure
Mercury	Yes (To be confirmed)	To be quantified	Topsides
Methanol	Yes	To be quantified	Topsides
NORM Scale	Yes	Estimated 195 Te	NORM scale potentially present in wells and in topsides piping and equipment.
Neoprene	Yes	To be quantified	Topsides
Ni-Resist	No (To be confirmed)	To be quantified	Topsides
Nylon	Yes (To be confirmed)	To be quantified	Topsides
Organotin	Yes (To be confirmed)	To be quantified	Topsides
Paint – by type containing- e.g. Isocyanates, Polyurethane, Lead, Asbestos, Bitumen etc.	Yes (To be confirmed)	To be quantified	Topsides
Pb-210/226/228	Yes (To be confirmed)	To be quantified	Topsides
PCB	Yes (To be confirmed)	To be quantified	Topsides
PTFE	Yes (To be confirmed)	To be quantified	Topsides
Plastics	Yes	Estimated 1,177 Te	Topsides

Table A2.1: Estimated Material Inventory			
Material	**Present?**	**Quantity**	**Location**
PVC	Yes (To be confirmed)	To be quantified	Topsides
Radium (Ra-226)	Yes (To be confirmed)	To be quantified	Topsides
Radium (Ra-228)	Yes (To be confirmed)	To be quantified	Topsides
Residual HC	Yes	To be quantified	Topsides
Rubber	Yes	To be quantified	Topsides
Sewage	Yes	Trace	Topsides
Smoke Detectors	Yes	To be quantified	Topsides
Stainless Steel	Yes	Estimated 5104 Te	Topsides
Stellite	No (To be confirmed)	To be quantified	Topsides
Tin	Yes (To be confirmed)	To be quantified	Topsides
Titanium	Yes	To be quantified	Topsides
Wood	Yes	To be quantified	Topsides
Zinc	Yes	To be quantified	Topsides

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