Lancaster Field

FPSO Decommissioning Programme

October 2022

HUR-GLA-ASM-REP-0001-1

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Terms and Abbreviations

ALARP	As Low As Reasonably Practicable
CA	Comparative Assessment
CoP	Cessation of Production
DTB	Disconnectable Turret Buoy
EA	Environmental Appraisal
EPS	Early Production System
FDP	Field Development Plan
FPSO	Floating Production Storage and Offloading (vessel)
GOR	Gas Oil Ratio
GVI	General Visual Inspection
ICES	International Council for the Exploration of the Seas
IMO	International Maritime Organization
LSA	Low Specific Activity
MOC	Management Of Change
MPA	Marine Protected Area
NORM	Naturally Occurring Radioactive Material
OGA	Oil and Gas Authority
OPOL	Offshore Pollution Liability Association
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PFML	Petrofac Facilities Management Ltd
PXEA	Practice and Exercise Area
SCSSV	Surface-Controlled Subsurface Safety Valve
SOSI	Seabird Oil Sensitivity Index
SURF	Subsea Umbilicals, Risers & Flowlines
SFF	Scottish Fishermen's Federation
TMS	Turret Mooring System
UKCS	United Kingdom Continental Shelf

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1. Executive Summary

1.1. Decommissioning Programme

This document is the decommissioning programme for the Lancaster Field production host the Aoka Mizu Floating Production Storage and Offloading (FPSO).

The remaining Lancaster Field infrastructure which is listed on the Section 29 Notices will be subject to a separate Wells, Subsea, Pipelines and Mooring System Decommissioning Programme (HUR-GLA-ASM-REP-0002), which will be submitted separately to OPRED.

The Aoka Mizu will be utilised for the initial decommissioning activities, namely the flushing/de-oiling of the subsea infrastructure i.e. manifolds, risers, subsea flowlines and umbilical, and to support with the implementation of positive isolations. The FPSO is then not required to perform any further decommissioning related activities on the subsea infrastructure after completion of the decommissioning activities above, and it is proposed that the vessel is removed thereafter from its current location. Activities associated with subsequent decommissioning stages of the subsea flowlines, umbilical, risers and other subsea infrastructure will require the services provided by other specialist vessels.

The early removal of this Installation will not prejudice any further decommissioning work in the Lancaster Field.

1.2. Requirement for Decommissioning Programme

Installation

In accordance with the Petroleum Act 1998, the Section 29 notice holders of the Lancaster Field's FPSO installation (Table 1-1) are applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the installation detailed in Section 2.1 of this programme. (See also Appendix 1- Partner Letter(s) of Support).

In conjunction with public, stakeholder and regulatory consultation, the Decommissioning Programme is submitted in compliance with national and international regulations and OPRED guidelines. The schedule outlined in this document is for a 23-30 day decommissioning project plan due to begin in 2023, however the timing of the decommissioning programme will depend on reservoir performance, oil price and other factors.

The Lancaster Field Operator (Hurricane Energy PLC), on behalf of the P1368 Central Licensee (Hurricane GLA Limited), has submitted to the Oil and Gas Authority (OGA) a Cessation of Production document which demonstrates, against a backdrop of the Licensee's financial position, that all economic development opportunities have been pursued for the Lancaster Field and associated infrastructure including access to current third-party infrastructure. On 14 December 2021 the OGA confirmed no objection to the CoP document as proposed.

1.3. Introduction

The Lancaster Field is located West of Shetland, approximately 70 kilometres southwest of the Clair Field and approximately 15 kilometres to the southeast of the Foinaven and Schiehallion Fields within Blocks 205/21a, 205/22a and 205/26b in Frontier Licence P1368 Central. The licence is owned by Hurricane GLA Limited with 100% interest. Hurricane GLA Limited is a 100% wholly owned subsidiary of Hurricane Energy PLC. Hurricane Energy PLC operates Frontier Licence P1368 Central and the Lancaster Field on behalf of Hurricane GLA Limited. Hereafter "Hurricane" or "Company" shall be used to reference either one or more of Hurricane Energy PLC and Hurricane GLA Limited, as the context requires.

Field Description

The reservoir at the Lancaster Field is comprised of fractured basement consisting of both igneous and metamorphic rocks of Precambrian age at a depth of approximately 1000 metres below sea level at its shallowest point. This basement reservoir is overlain by a sequence of Mesozoic sediments which onlap onto the flanks of the basement high which are overlain by a thick sequence of late Cretaceous marine shales which act as a regional seal. The Lancaster Field is a 4-way dip structure with hydrocarbon fill controlled by dip spill to the east. The oil present within the reservoir is 38° API with a gas oil ratio (GOR) in the range of 390 - 420 scf/stb based on a single stage flash to stock tank conditions.

Development and Infrastructure

The first phase of the Lancaster Field development was defined by Hurricane as an Early Production System (EPS) and was the subject of the 2017 Lancaster EPS Field Development Plan (FDP).

The Lancaster EPS consists of two horizontal production wells, 205/21a-6 (P6) and 205/21a-7Z (P7Z) tied back to the turret-moored Aoka Mizu FPSO which Hurricane has leased from Bluewater (Aoka Mizu) B.V. and which is operated by Bluewater Lancaster Production (UK) Limited (hereafter individually or collectively referred to as "Bluewater"). The Lancaster EPS development is shown schematically in Figure 1:2.

The two subsea production wells are tied back to the Lancaster Production Manifold that is located approximately 2km due North of the FPSO. Twin surface laid 6"ID flexible flowlines and a continuous dynamic static umbilical connect the FPSO to the manifold. The lines are protected by a single continuous rockdump berm, that terminates approximately 30m from Manifold.

The Lancaster EPS commenced production operations in May 2019 and there has been no additional development of the field since then.

The Aoka Mizu FPSO is moored on location by a Turret Mooring System (TMS). The TMS allows the FPSO to passively weathervane and consists of a Disconnectable Turret Buoy (DTB) moored to the seabed by 12 mooring lines, arranged in 3 clusters of 4.

Following public, stakeholder and regulatory consultation, the Decommissioning Programme for the FPSO is submitted without a request for derogation and in full compliance with OPRED guidelines. This Decommissioning Programme explains the principles of the activities associated with the removal of the FPSO from the Lancaster Field location and is to be supported by environmental permits which will be obtained for the decommissioning activities described in this Decommissioning Programme, as required.

1.4. Overview of Installation being Decommissioned

1.4.1. Installation

Field(s)	Lancaster	**Production Type**	Oil
Water Depth (m)	150	**UKCS block**	205/21a
Distance to median (km)	54	**Distance from nearest UK coastline (km)**	98
Surface Installation(s)			
Number	Type	FPSO Weight (Te)	Jacket Weight (Te)
1	FPSO	33,042	N/A

Table 1-1 - Installation(s) being Decommissioned

Section 29 Notice Holder(s)*	Registration Number	Equity Interest (%)
Hurricane Energy PLC	05245689	0%
Hurricane GLA Limited	10656211	100%
Bluewater (Aoka Mizu) B.V.	Overseas company registration in NETHERLANDS (Reg Ref. NL57513783).	0%

Table 1-2 - Installation (s) Section 29 Notice Holders Details

1.5. Summary of Proposed Decommissioning Programme

Selected Option	Reason for Selection	Proposed Decommissioning Solution
1. FPSO		
Complete removal and re-use	FPSO suitable for re-use	The Aoka Mizu FPSO is under a Lease Contract between Hurricane and the FPSO owner, Bluewater (Aoka Mizu) B.V., until the end of field life is declared by Hurricane. After completion of the operation at its current location, at the discretion of the FPSO owner, the FPSO will transit from the field to a suitable licensed location for preparation for re-use or decommissioning. Following redelivery, the FPSO owner will re-assume full control of and responsibility for the FPSO. The decommissioned waste and FPSO vessel (if not reused) will be recycled or disposed of in compliance with the standards comparable with those set under the applicable laws of the United Kingdom.
2. Disconnectable Turret Buoy (DTB)		
Disconnected and lowered to neutrally buoyant depth	To allow demobilisation of the FPSO, the DTB must be disconnected and lowered to a neutrally buoyant depth.	Addressed under a separate Wells, Subsea, Pipelines and Mooring System Decommissioning Programme HUR-GLA-ASM-REP-0002
3. Pipelines, Flowlines & Umbilicals		
Flushed with water	To ensure cleanliness in preparation for later decommissioning	Addressed under a separate Wells, Subsea, Pipelines and Mooring System Decommissioning Programme HUR-GLA-ASM-REP-0002
4. Interdependencies		
The FPSO can be disconnected and demobilised independent of any decommissioning activities required for the DTB, mooring system and subsea system (covered under a separate Decommissioning Programme). In order to assist decommissioning of the subsea system, flushing of subsea flowlines, jumpers and umbilical chemical cores will be carried out from the FPSO prior to disconnection. Suitable personnel from the FPSO core crew will be retained through the decommissioning programme to undertake sampling and analysis of the returned flushing fluids to ensure the specified cleanliness of the subsea system is achieved.		

Table 1-3 - Summary of Decommissioning Programme(s)

1.6. Field Location including Field Layout and Adjacent Facilities

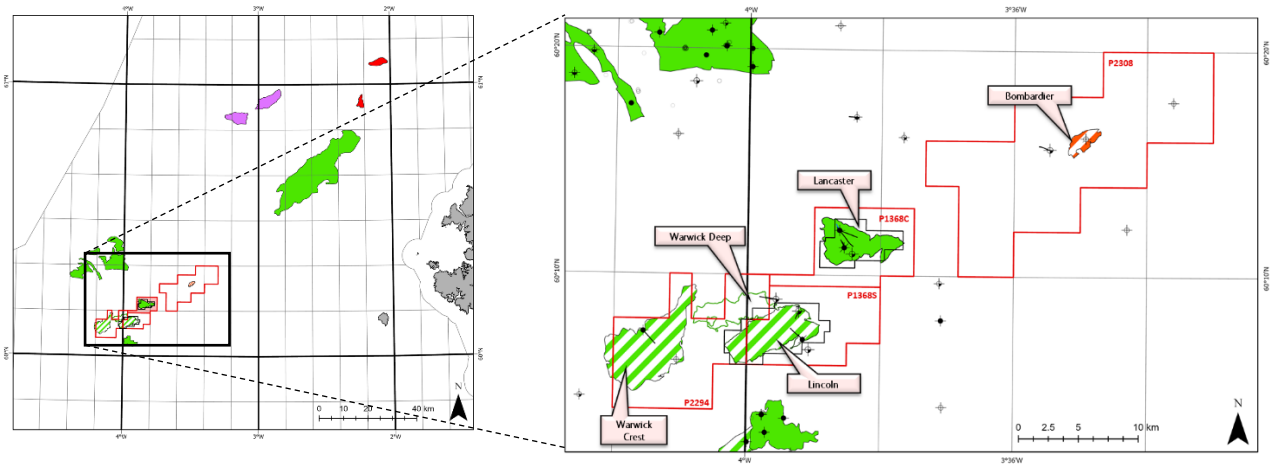

Figure 1:1 - Field Locations in UKCS

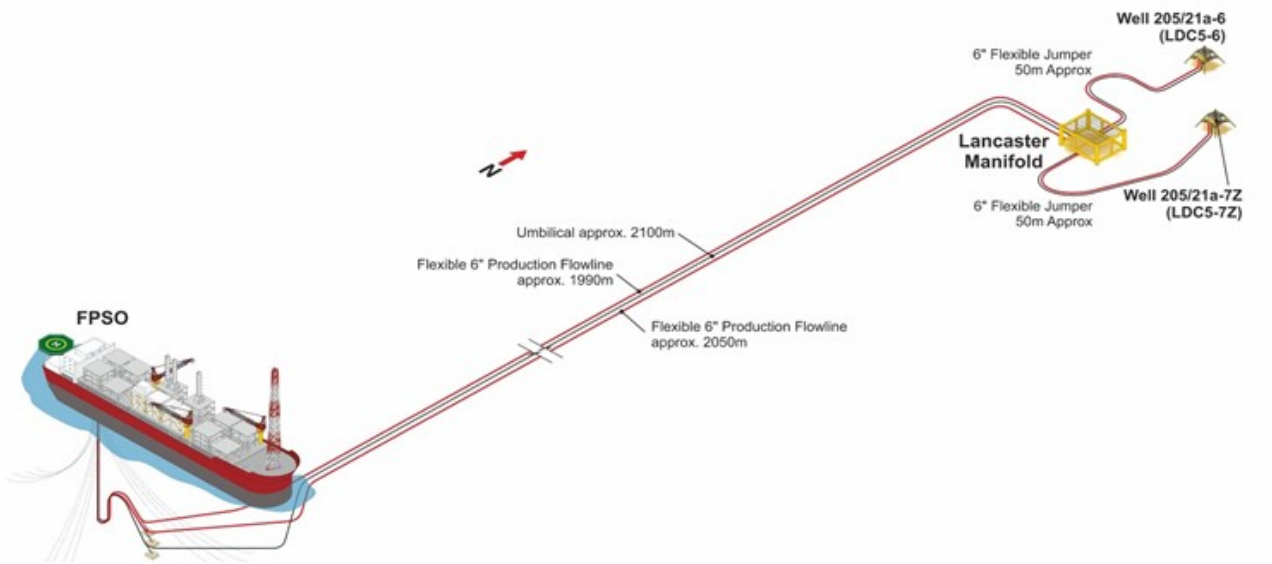

Figure 1:2 - Field Layout

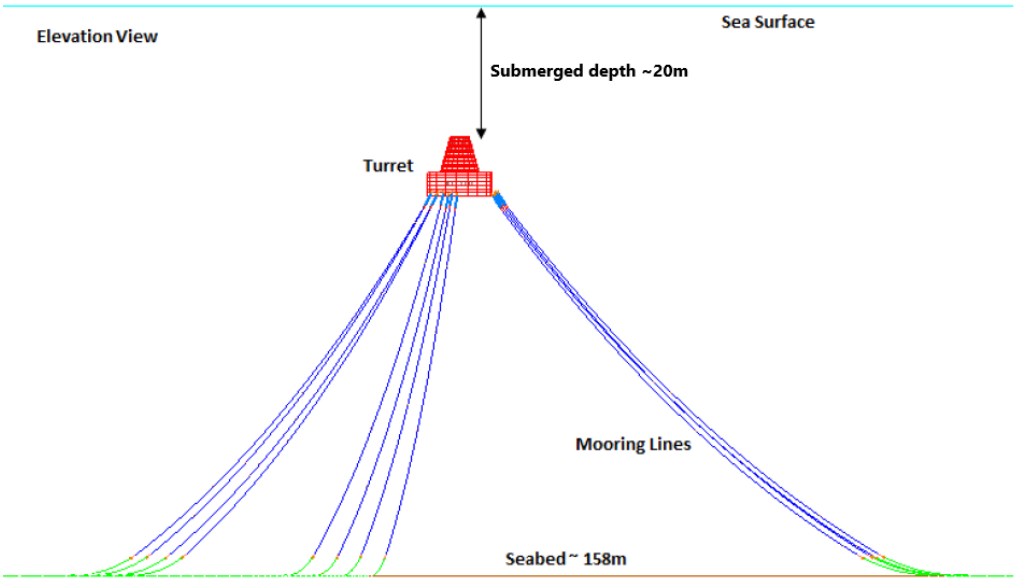

Figure 1:3 - Disconnectable Turret Buoy (DTB) position post FPSO removal

Owner	Name	Type	Distance/Direction	Information	Status
Harbour Energy plc	Solan	Platform	14.3km South West	Gas/liquids processing, oil export via subsea storage tank to shuttle tankers	Operational
Impacts of Decommissioning Proposals					
The decommissioning programme will have no impact on any nearby/adjacent facility.					

Table 1-4 - Adjacent Facilities

1.7. Industrial Implications

Bluewater Lancaster Production (UK) Ltd. will carry out the demobilisation of the Aoka Mizu FPSO under the existing Production, Operation and Services contract with Hurricane GLA Limited.

2. Description of Items to be Decommissioned

2.1. Installation – Surface Facility

Name	Facility Type	Location**		Topsides/Facilities		Jacket (if applicable)			
				Weight (Te)	No of modules	Weight (Te)	Number of legs	Number of piles	Weight of piles (Te)
Aoka Mizu	FPSO	WGS84 Decimal	60.179894 N 3.869937 W	33,042	N/A	N/A	N/A	N/A	N/A
		WGS84 Decimal Minute	60^0 10.793'N 3^0 52.195'W						

Table 2-1 - Surface Facilities Information

2.2. Wells

No wells are included in the scope of this decommissioning programme.

Following removal of the FPSO, there will no longer be pressure monitoring of the Lancaster wells. Prior to FPSO demobilisation, an MOC will be undertaken by Hurricane's Well Operator (PFML) with an accompanying Risk Assessment to determine whether the proposed integrity / suspension status is ALARP, or whether additional measures are required, e.g., downhole isolation plugs, additional monitoring capabilities at surface.
The current mitigations in place are as follows:

- The SCSSV and Xmas Tree valves will be tested in the normal way (Well Operating Practices Document), these integrity tests are valid for 12 months.
- A GVI inspection will be performed, this will be subject to Risk Assessment in terms of requirement to increase the GVI frequency given there will be no further monitoring capability at the wellhead (or downhole).

2.3. Inventory Estimates

As per routine production operations when Lancaster Field is in production:

Crude cargo will be off loaded via shuttle tanker (as part of the preparatory works prior to sail away from the Lancaster Field location).

Produced water and slops water will be cleaned to be with OPOL limits prior to discharge to sea (as part of the preparatory works prior to sail away from the Lancaster Field location). Residual slops will be stored in slops tanks for onshore discharge using an approved hazardous waste contractor.

All other FPSO materials and inventory remain the responsibility of Bluewater. The FPSO will be returned to Bluewater for re-use / redeployment following demobilisation from the Lancaster Field.

Environmental appraisal is not required to support this Decommissioning Programme.

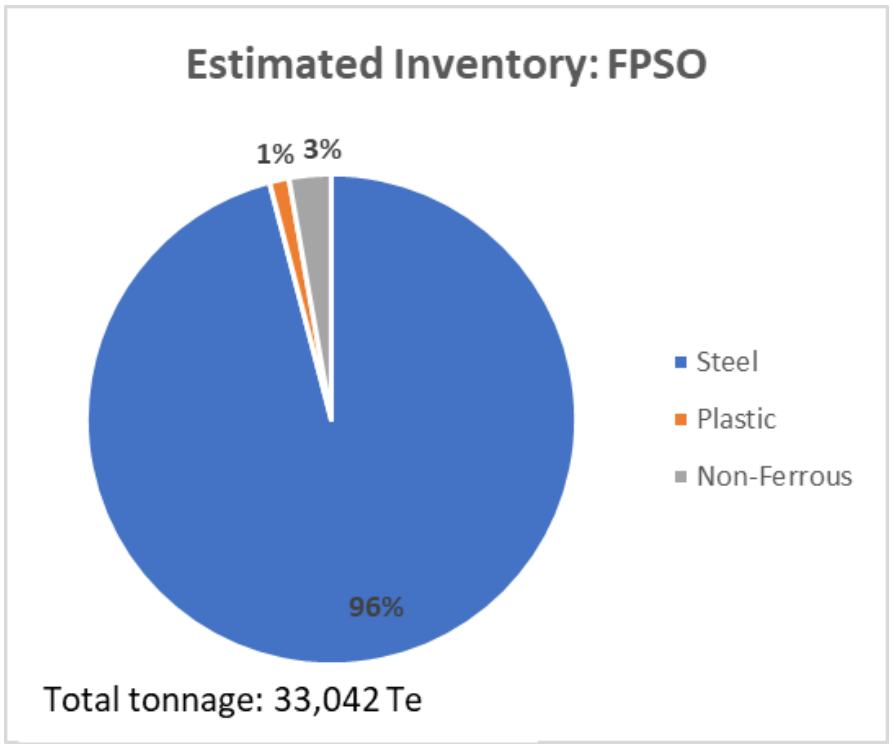

Figure 2:1 - Pie chart of estimated FPSO inventories

3. Removal and Disposal Methods

In line with the waste hierarchy, the re-use of an installation (or parts thereof) is first in the order of preferred decommissioning options. The FPSO will be removed from the Lancaster Field and made available for re-use by its owner Bluewater, in line with the preferred option in the waste hierarchy.

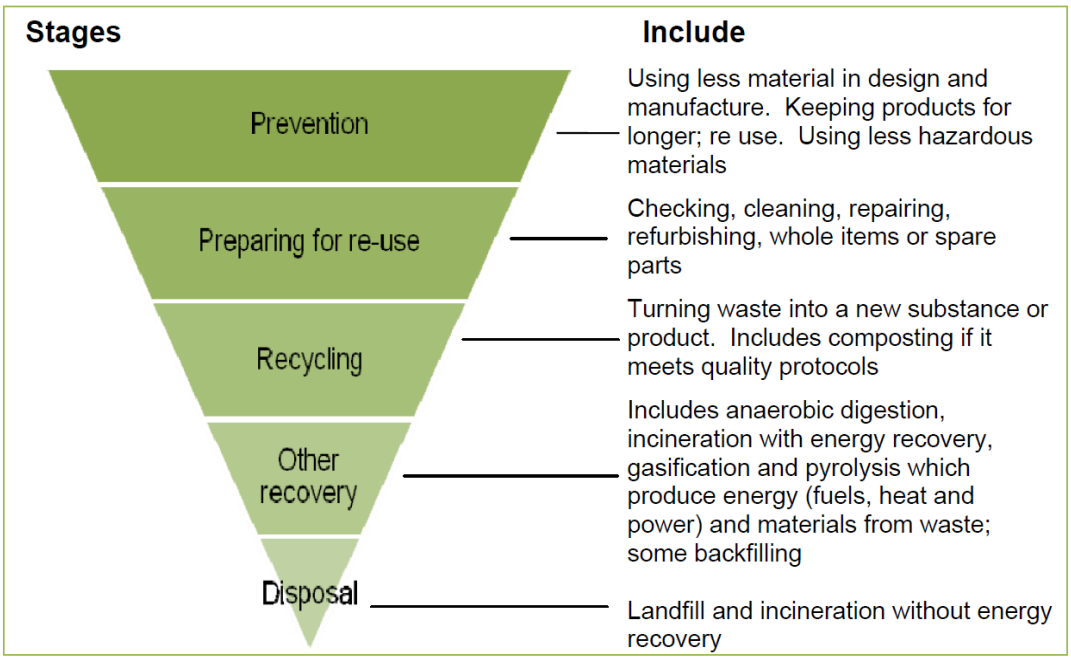

Figure 3:1 - Waste Hierarchy

Decommissioning the Aoka Mizu FPSO will generate a quantity of waste which Hurricane and Bluewater will manage using environmentally acceptable methods for managing wastes in line with the Waste Framework Directive and principles of the waste hierarchy.

3.1. Surface Facility (FPSO)

Surface Facility Description: The Aoka Mizu is a Bluewater designed, owned and operated FPSO. The FPSO was built in 2008, integrating a turret moonpool, a foundation grillage to support process topsides and hull upgrades for higher ultimate strength and fatigue capacity.

The FPSO operated on the Ettrick and Blackbird Fields, UKCS, from 2009 until 2016. Following a period of lay-up in Gdansk (Poland), the FPSO was refurbished and upgraded for redeployment to the Lancaster Field at the Drydock World Dubai shipyard in 2017-2018.

The FPSO is equipped with a DTB, located aft of the accommodation enabling passive weathervaning. The mooring legs are connected to the DTB and are arranged in a 3x4 configuration, optimised with respect to prevailing wind conditions. The Aoka Mizu commenced production from the Lancaster Field in 2019.

The main dimensions of the FPSO are set out in Table 3-1 while a picture of the Aoka Mizu if provided in Figure 3:2.

Dimension	Metres
Length	248.1
Breadth	42.0
Depth	21.2

Table 3-1 - FPSO Dimensions

Figure 3:2 - FPSO Aoka Mizu

Section 2 of this decommissioning programme describes all items and substances relating to the Lancaster FPSO to be removed from the Lancaster Field. No items or substances in the Lancaster Field, other than detailed in Section 2 will be removed at this time and will be the subject of a further decommissioning programme. The decommissioned waste and FPSO vessel (if not reused) will be recycled or disposed of in compliance with the standards comparable with those set under the applicable laws of the United Kingdom.

Figure 3:3 - Disconnectable Turret Buoy (DTB)

Preparation:

Waste Type	Composition of Waste	Disposal Route
Onboard hydrocarbons	Process fluids, fuels and lubricants	Crude inventory will be offloaded to a shuttle tanker for sale. Methanol and other production chemical inventory will be disposed of by bullheading into the Lancaster wells. Produced water that is unable to be overboarded under the oil discharge permit will be stored in slops tanks for onshore discharge using an approved hazardous waste contractor. Fuels and lubricants will remain in their dedicated storage tanks for the FPSO transit, and then disposed of onshore using an approved hazardous waste contractor.
Other hazardous materials	NORM, LSA scale, any radioactive material, instruments containing heavy metals, batteries	Transported onshore for disposal by appropriate means, only minimal quantities expected.

Table 3-2 - Preparation of Surface Facility for Removal

Removal Methods:

1) HLV (semi-submersible crane vessel) ☐ 2) SLV ☐ 3) Piece small ☐ 4) Other ☒	
Method	**Description**
Disconnection and complete removal	Following the flushing, cleaning and disconnection of all risers and umbilical's and putting in place appropriate barriers for retention of hydrocarbons the FPSO using its own systems shall disconnect and lower the DTB from its moonpool. The FPSO will then transit outside the Lancaster Field's FPSO 500m Safety Zone, at which point the FPSO is considered to be redelivered to the owner. The DTB with connected mooring system, risers and umbilical will be at a depth of approximately 20m below mean sea level following disconnection and will remain in this condition pending subsea and mooring system decommissioning.

Table 3-3 - Surface Facility Removal Methods

3.2. Waste Streams

Waste Stream	Removal and Disposal method
Bulk liquids	Prior to the FPSO moving off the Lancaster Field location, any crude inventory in the FPSO cargo tanks will be sold and offloaded to a shuttle tanker for onwards transport to the receiving terminal. Any remaining methanol or production chemical inventory on the FPSO will be disposed of by bull heading into the Lancaster wells. All subsea flowline cleaning chemicals and flushing water will be returned to the FPSO for processing and discharge in line with the permits in place for the operations. Any produced water that is unable to be overboarded under the oil discharge permit will be stored in the FPSO slops tanks for onshore discharge and disposal. The remaining inventory in the slops tanks will be discharged at port, at which point the final FPSO tank cleaning and gas-freeing activities will be carried out. Fuels and lubricants will remain in their dedicated storage tanks for the FPSO transit, and then disposed of onshore.
Marine growth	Marine growth is expected, however will not impact the demobilisation operations.
NORM/LSA Scale	NORM contaminated items will be decontaminated at an approved facility prior to disposal. All NORM materials will be disposed of at a suitably permitted facility.
Asbestos	No asbestos has been identified.
Other hazardous wastes	Any hazardous wastes remaining within the FPSO shall be disposed of onshore under appropriate permits.
Onshore Dismantling sites	Section 2 of this decommissioning programme describes all items and substances relating to the Lancaster FPSO to be removed from the Lancaster Field. No items or substances in the Lancaster Field, other than detailed in Section 2 will be removed at this time and will be the subject of a further decommissioning programme. The decommissioned waste and FPSO vessel (if not reused) will be recycled or disposed of in compliance with the standards comparable with those set under the applicable laws of the United Kingdom.

Table 3-4 - Waste Stream Management Methods

4. Environmental Appraisal Overview

The Environmental Appraisal for the Lancaster Field decommissioning will be submitted with the Wells, Subsea and Mooring System Decommissioning Programme.

A summary of the main sensitivities in the area are given in Table 4-1 below.

All operations described in this Decommissioning Programme will be subject to the relevant environmental permits, consents and approvals and will be managed through a Permits, Licences, Authorisations, Notifications and Consents (PLANC) register jointly developed by Bluewater and Hurricane.

4.1. Environmental Sensitivities

Environmental Receptor	Main Features
Conservation interests	The project area is located outside any conservation sites. The closest marine SPA to the Aoka Mizu FPSO location is the Seas off Foula SPA, roughly 30 km from the FPSO at its nearest point. The Faeroe-Shetland Sponge Belt MPA is approximately 18 km to the north, the West Shetland Shelf MPA is approximately 40 km to the southwest and the North-west Orkney MPA is approximately 60 km to the southeast of the Lancaster Field.
Seabed	The Lancaster Field is situated at the edge of the continental shelf to the west of Shetland. Water depths over the whole of the Lancaster Field range from 134 m to around 180 m, the water depth at the Aoka Mizu FPSO location is approximately 150 m. Lancaster is situated at the upper edge of an area on the continental shelf known as the 'iceberg ploughmark zone'. This area is characterised by the presence of furrows in the seabed caused by the grounding of icebergs in previous glacial periods. The seabed generally comprises of coarse sandy sediments interspersed with more gravelly areas supporting patches of cobbles and boulders.
Fish	The Lancaster Field lies within spawning areas for Norway pout, a species that spawns during the winter and early spring (January to April), and sand eels which spawn from November to February. The Lancaster field is also located within year round nursery grounds for spurdog (high intensity), herring, whiting, blue whiting, ling, hake, monkfish (high intensity), sandeels, mackerel (high intensity) and Norway pout (Coull *et al*, 1998; Ellis *et al*, 2012).
Fisheries	The Lancaster Field lies in ICES rectangle 49E6, fishing effort is moderate compared to other ICES rectangles in Scottish waters. Effort is spread throughout the year but tends to be focused from November to May and in September.
Marine Mammals	The Lancaster Field is situated near the edge of the Faroe-Shetland Channel. The waters of the channel support important and diverse populations of whales, dolphins and porpoises. The area is understood to provide feeding grounds, breeding and nursery areas and migration routes for a range of cetacean species. Certain species are resident in the shallower waters of the shelf where they feed all year round such as minke whales, smallest of the larger filter feeding whales, white beaked dolphins and harbour porpoises. White sided dolphins and larger species such as killer whales and long finned pilot whales preferentially inhabit the deeper waters beyond the continental shelf and are rarer in the shallow waters around the Aoka Mizu FPSO. The Lancaster field is located in the relatively shallow waters of the continental shelf, where minke whales, white-beaked dolphins, and harbour porpoises feed year round.

Environmental Receptor	Main Features
	Two species of seals are resident on Scottish waters, grey and common seals, both are rarely sighted waters as deep as the Aoka Mizu FPSO location.
Birds	Seabirds present within the immediate vicinity of the Aoka Mizu FPSO include Fulmar (*Fulmarus glacialis*), Gannet (*Sula bassana*), Shag (*Phalacrocorax aristotelis*), Arctic Skua (*Stercorarius parasiticus*), Great Skua (*Stercorarius skua*), Great Black-Backed Gull (*Larus marinus*), Kittiwake (*Rissa tridactyla*), Common Tern (*Sterna hirundo*), Arctic Tern (*Sterna paradisea*), Guillemot (*Uria aalge*), Razorbill (*Alca torda*), Black Guillemot (*Cepphus grylle*) and Puffin (*Fratercula arctica*). All these species have breeding populations within the SEA 4 area, which exceed one percent of their European population, with most of these species having major breeding colonies, in terms of their biogeographic population, located on Shetland, Orkney and the north coast of Scotland. The Seabird Oil Sensitivity Index (SOSI) identifies areas at sea where seabirds are likely to be most sensitive to surface pollution; the SOSI values in Block 205/21a is low throughout the year except for periods of high sensitivity in January and November with no data available for this block in December.
Onshore Communities	All onshore facilities used during the decommissioning of the Lancaster EPS FPSO, including offload ports and recycling facilities, will comply with all permitting and legislative requirements.
Other Users of the Sea	The Lancaster Field is in what is described as an open water location and the level of shipping traffic is quite low although there has been an increase in routes since the drilling operations at Lancaster began in 2009. The majority of this traffic is made up of support vessels for the offshore industry. The Lancaster Field does not fall within a Ministry of Defence (MoD) designated Practice and Exercise Area (PXEA), the nearest practice area is approximately 100km to the south. However, licensing conditions relevant to the Lancaster field indicate the requirement to consult with MoD regarding training areas. In addition, an annual multi-disciplinary training and readiness exercise is known to take place in waters west of Scotland (Exercise Joint Warrior).
Atmosphere	Although offshore winds around the FPSO may blow from any direction, southwesterly winds are most prevalent. In spring (March to May), winds are recorded from all directions with those from the southeast slightly more dominant (Met Office, 2009). Gale force winds have been recorded, but winds of 11 to 27 knots are most common. Conditions are more settled during the summer (June to August); winds up to 21 knots are most common at this time. Wind strength increases in autumn (September to November) with gale forces winds from the southwest encountered regularly. Conditions are roughest in winter (December to February) with a significant proportion of winds in excess of 33 knots. The wind regime at this time is dominated by winds from the southwest.

Table 4-1 - Environmental Sensitivities

4.2. Potential Environmental Impacts and their Management

Activity	Main Impacts	Management
Floating Facility Removal	Disconnection and submersion of the DTB to -20m may cause interference with other vessels.	A guard vessel will remain on station to ensure any approaching shipping is made aware of the obstruction and advised to change course if necessary. The earliest opportunity for the subsea decommissioning programme will be the summer season following removal of the FPSO. Therefore, the DTB will remain submerged in the water column for a minimum of one year post removal of the FPSO. The subsea decommissioning programme will be executed in line with OGA Stewardship Expectation 10 Cost Effective Decommissioning, it is expected this will be within 3 years of removal of the FPSO.
Floating Facility Removal	There will be no impact on the seabed from the removal of the FPSO as all infrastructure will remain in the water column attached to the DTB until the subsea and mooring systems are decommissioned.	
Floating Facility Removal	It is anticipated that there will be localised effects on air quality from the project due to increased vessel use but it is not anticipated that there will be a significant impact on air quality on a wider scale.	

Table 4-2 - Environmental Impact Management

5. Interested Party Consultations

Who	Comment	Response
Informal Stakeholder Consultations		
Scottish Fishermen's Federation	Although it is highlighted under Section 1.1 of the Executive Summary that the remaining Lancaster Field will be subject to a separate Decommissioning Programme, we feel that it would be worth mentioning the existence of the Lancaster Manifold under the Development and Infrastructure section (Section 1.3). In the interest of fishermen's safety, we are pleased to note that following FPSO decommissioning, a guard vessel will remain on site to monitor and ensure the safety of the DTB prior to its decommissioning. It is noted that there is no requirement for post decommissioning debris clearance or verification following FPSO removal (an as-left ROV survey of the DTB and moorings will be carried out post demobilisation of the FPSO), but that a full-scale post decommissioning environmental seabed and pipeline survey of the Lancaster field will be carried out following full decommissioning of the field. We would take this opportunity to mentioned that as highlighted and reiterated to OPRED on numerous occasions, given past experiences of both abandoned wellhead and oil & gas fields in the process of being decommissioned, the SFF has serious reservations regarding the use of survey data to verify that an area is safe for fishing activity to resume following decommissioning activity. It is our view that the undertaking of trawl verification sweeps under controlled conditions, which replicated the fishing operations that will be permitted in the area following the decommissioning work, is the best method of establishing that it is safe for fishing to resume in said area.	Description of the manifold, flowlines and umbilical added to Section 1.3 Noted Wording added to clarify that debris clearance and verification will be carried out on completion of the SURF and moorings decommissioning programme.
UK HSE	None.	

Statutory Consultations		
National Federation of Fishermen's Organisations	Due to the geographical area of these assets been in Scottish Waters the National Federation Fishermen's Organisation (NFFO) have no comments regarding the planned decommissioning program, as the Scottish Fishermen's Federation who we work closely with are best placed to comment and raise any concerns if required.	
Scottish Fishermen's Federation	The Scottish Fishermen's Federation (SFF) very much appreciates Hurricane Energy incorporating the SFF's previous comments from our earlier informal consultation in November 2021 and I can advise that we have no additional comments to offer in respect of this latest version of the Lancaster Field FPSO Decommissioning Programme issued for statutory consultation.	
Northern Irish Fish Producers' Organisation	No comments were received.	
Global Marine Systems	As the nearest active telecom cable is SHEFA-2, situated over 13km from the proposed works, I [Global Marine Systems Ltd] have no further comments.	
Public	No comments were received.	

Table 5-1 - Summary of Stakeholders Comments

6. Programme Management

6.1. Project Management and Verification

Hurricane Asset Management Team will manage and liaise with Bluewater for the removal of the FPSO Aoka Mizu from the Lancaster Field. Standard procedures for operational control, hazard identification and management will be used.

Hurricane, together with Bluewater, will monitor and track the process of consents and the consultations required as part of this process. Any changes in detail to the offshore removal programme will be discussed and agreed with OPRED.

6.2. Post Decommissioning Debris Clearance and Verification

There is no requirement for post decommissioning debris clearance or verification following FPSO removal, this will be carried out upon completion of the Wells Subsea, Pipelines and Mooring System Decommissioning Programme.

A full-scale post decommissioning environmental seabed and pipeline survey of the Lancaster field will be carried out following full decommissioning of the field. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED.

6.3. Schedule

A nominal decommissioning schedule is provided in Figure 6:1 based around a nominal cessation of production (CoP) date of Q2 2023. The actual timing of CoP will depend on many factors including production performance, oil price.

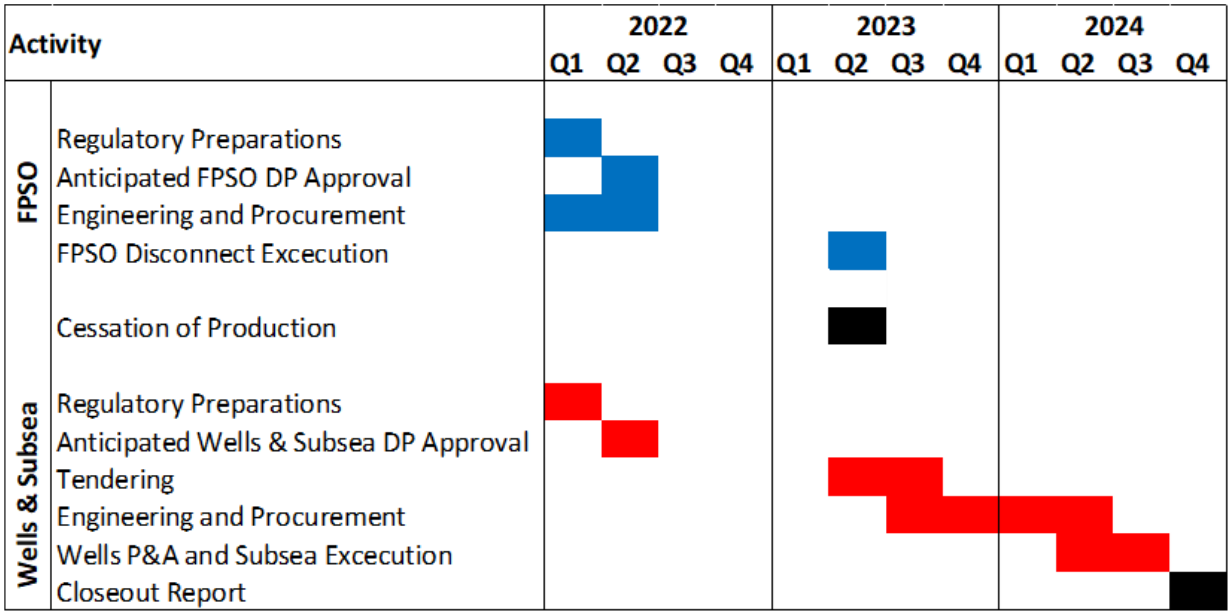

Figure 6:1 - Gantt Chart of Project Plan

6.4. Costs

Item	Estimated Cost (£m)
Surface Facility (FPSO) – Preparation, disconnection and removal	Provided to OPRED
Pipeline(s) Decommissioning	N/A
Subsea Installation(s) and Stabilisation Feature(s)	N/A
Well Abandonment	N/A
Continuing Liability – Future Pipeline and Environmental Survey Requirements	N/A
TOTAL	Provided to OPRED

Table 6-1 - Provisional Decommissioning Programme Costs

6.5. Close Out

In accordance with the OPRED Guidelines, a close out report will be submitted to OPRED within one year of the completion of this FPSO Decommissioning Programme.

The report will detail the scope performed and explain any major variances from the programme.

A full field close out report will be submitted to OPRED within one year of the completion of full field decommissioning.

6.6. Post Decommissioning Monitoring and Evaluation

Following FPSO decommissioning a guard vessel will remain on site to monitor and ensure the safety of the DTB prior to its decommissioning. The guard vessel will remain on station until the DTB is removed from the field. The earliest opportunity for the subsea decommissioning programme will be the summer season following removal of the FPSO. Therefore, the DTB will remain submerged in the water column for a minimum of one year post removal of the FPSO, refer to Appendix 4 TMS Buoy Post FPSO Departure Risk Assessment for the Risk Assessment.

The subsea decommissioning programme will be executed in line with OGA Stewardship Expectation 10 Cost Effective Decommissioning, however it is expected this will be within 3 years of removal of the FPSO.

Post-decommissioning site surveys for the subsea installations and moorings will be covered under the Decommissioning Programme for the subsea infrastructure and wells.

7. Supporting Documents

Not applicable, the FPSO decommissioning does not require support of an environmental appraisal or comparative assessment.

Document Number	*Title*

Table 7-1 - Supporting Documents

Appendix 1 Partner Letter(s) of Support

Hurricane GLA Limited
The Wharf
Abbey Mill Business Park
Lower Eashing
Godalming
Surrey
GU7 2QN

T +44 (0)1483 862820
F +44 (0)1483 862859

www.hurricaneenergy.com
communications@hurricaneenergy.com

29 July 2022

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

Dear Sirs,

RE: Petroleum Act 1998 - Decommissioning of the Lancaster Field, Floating Production, Storage and Offloading Vessel (FPSO)

We, Hurricane GLA Limited, as holder of a notice under Section 29 of the Petroleum Act 1998 relative to the Lancaster Field confirm that we hereby authorize Hurricane Energy PLC, to submit on our behalf abandonment programmes relating to the Lancaster Field and removal of the FPSO as directed by the Secretary of State in your letter dated 11th March 2022.

In this regard, we confirm that we support the proposals detailed in the Lancaster Field FPSO Decommissioning Programme [HUR-GLA-ASM-REP-0001] which has been submitted by Hurricane Energy PLC, 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 sincerely

Richard Chaffe
Chief Financial Officer

bluewater

Bluewater (Aoka Mizu) B.V.
Taurusavenue 46 | 2132 LS Hoofddorp
P.O. Box 3102 | 2130 KC Hoofddorp
The Netherlands

T +31 23 711 55 00

info@bluewater.com
bluewater.com

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

Attn. Mr Stewart Walsh, Senior Decommissioning Manager

Date 02 August 2022

Subject **Petroleum Act 1998**
Decommissioning of the Lancaster Field
Floating Production, Storage and Offloading Vessel (FPSO)

Dear Sir,

We, Bluewater (Aoka Mizu) B.V., as holder of a notice under Section 29 of the Petroleum Act 1998 relative to the Lancaster Field confirm that we hereby authorize Hurricane Energy PLC, to submit on our behalf abandonment programmes relating to the Lancaster field and removal of the FPSO as directed by the Secretary of State in your letter dated [11th March 2022].

In this regard, we confirm that we support the proposals detailed in the Lancaster Field FPSO Decommissioning Programme [HUR-GLA-ASM-REP-0001] which has been submitted by Hurricane Energy PLC, 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,
BLUEWATER (AOKA MIZU) B.V.

A.A. van der Laan
Director

VAT no. NL8094.46.674.B.01
Chamber of Commerce no. 57513783

Appendix 2 Public Notices

Hurricane

THE PETROLEUM ACT 1998
LANCASTER FIELD FPSO
DECOMMISSIONING PROGRAMME

Hurricane Energy PLC has submitted, for the consideration of the Secretary of State for Business, Energy and Industrial Strategy, a draft Decommissioning Programme for the Lancaster Field Floating Production, Storage and Offloading Vessel in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act and related guidance that interested parties be consulted on such decommissioning proposals well in advance of forecast cessation of production operations.

The facilities covered by the Decommissioning Programme(s) are the Bluewater Aoka Mizu FPSO. The Lancaster field is located West of Shetland, approximately 70 kilometres southwest of the Clair Field and approximately 15 kilometres to the southeast of the Foinaven and Schiehallion Fields within Blocks 205/21a, 205/22a and 205/26b in Frontier Licence P1368 Central.

Hurricane Energy PLC hereby gives notice that a summary of the Lancaster Field FPSO Decommissioning Programme can be viewed at the internet address: www.hurricaneenergy.com/assets/lancaster-eps.

Alternatively, a digital copy of the Decommissioning Programme can be requested. Please contact lancasterfpsodecomm@hurricaneenergy.com.

Representations regarding the Lancaster Field FPSO Decommissioning Programme should be submitted in writing to the following address for the attention of Oliver John or Fergus Sweeney where they should be received by the consultation closing date, 09 May 2022 and should state the grounds upon which any representations are being made.

Date: 08 April 2022

Hurricane Energy PLC
The Wharf Abbey Mill Business Park
Lower Eashing
Godalming
Surrey
GU7 2QN

Appendix 3 Statutory Consultee Correspondence

The National Federation of Fishermen's Organisations

Hurricane Energy
The Wharf
Abbey Mill Business Park
Godalming
Surrey
GU7 2QN

13th April 2022.

Attention of: Oliver John
FPSO Development & Engineering Manager.

Hello Oliver
In reference to the Lancaster Floating Production Storage and Off-loading (FPSO) vessel and related infrastructure decommissioning program.

The National Federation Fisherman's Organisation's would like to thank Hurricane Energy for the detailed documentation explaining the planned methodology regarding the decommissioning of this asset and the related infrastructure.

Due to the geographical area of these assets been in Scottish Waters the National Federation Fishermen's Organisation (NFFO) have no comments regarding the planned decommissioning program, as the Scottish Fishermen's Federation who we work closely with are best placed to comment and raise any concerns if required.

Kind Regards
Ian Rowe
NFFO Services General Manager.

The National Federation of Fishermen's Organisations Ltd | 30 Monkgate, York YO31 7PF

Tel: 01904 635430 | Email: nffo@nffo.org.uk | Web: www.nffo.org.uk

From: Riddell, Alex (Global Marine Group)
To: Oliver John
Cc: Fergus Sweeney; Jo Valentine; Lancasterfpsodecomm
Subject: RE: Lancaster Field FPSO Decommissioning Programme
Date: 13 April 2022 14:24:46

CAUTION:This message originated outside of Hurricane Energy, please exercise caution opening attachments or hyperlinks.

Good afternoon,

Thank you for sending through the Lancaster Field decommissioning program.

I have reviewed the content provided and as the nearest active telecom cable is SHEFA-2, situated over 13km from the proposed works, I have no further comments.

Kind regards,

Alex Riddell

From: Steven Alexander
To: Oliver John
Cc: Jo Valentine; Fergus Sweeney; Andrew Third; Lancasterfpsodecomm
Subject: RE: Lancaster Field: FPSO Decommissioning Programme
Date: 27 April 2022 15:57:38

Hi Oliver,

Many thanks for your earlier email and attachment of 11th April 2022.

The Scottish Fishermen's Federation (SFF) very much appreciates Hurricane Energy incorporating the SFF's previous comments from our earlier informal consultation in November 2021 and I can advise that we have no additional comments to offer in respect of this latest version of the Lancaster Field FPSO Decommissioning Programme issued for statutory consultation.

.

Thanks and kind regards,

Steven

Steven Alexander
Offshore Liaison

Scottish Fishermen's Federation
24 Rubislaw Terrace | Aberdeen | AB10 1XE
T: +44 (0) 1224 646944 | M: +44 (0) 7803 894734
E: s.alexander@sff.co.uk | sff.co.uk
Follow us: Facebook | Twitter

Appendix 4 TMS Buoy Post FPSO Departure Risk Assessment

TMS Buoy Post FPSO Departure Risk Assessment

General Information		
Company	Hurricane Energy	**Risk Assessment Attendees:**
Location	Remote – Teams call	Ref. Attendance List
Date of assessment	04.07.2022	**Revision**
Completed by	Ryan Robbins	A0

TMS Buoy Post FPSO Departure Risk Assessment

Hazard	Who / What is at Risk	Initial Risk Rating			Existing Control Measures	Residual Risk Rating			Further Action(s) Required	Action Owner & Due Date	Status/Comments
		L	C	Risk		L	C	Risk			
Task: Routine status – Hazard to other users of the sea of the TMS post FPSO departure											
Submerged Turret Mooring System (TMS) including Buoy and 12 Mooring Legs presenting hazard to other users of the sea	Other users of the sea; fishing vessels, marine traffic	(3)	(5)	Serious	Guard Vessels shall be contracted via the Scottish Fishermens' Federation to guard the TMS post FPSO departure. The guard vessel shall be on location to assume guard vessel duties from the point the FPSO and ERRV leave the field. The TMS buoy has a 500m exclusion zone that is marked on existing Admiralty Charts and navigation packages. Notification of FPSO removal will be provided to UKHO and Kingfisher safety programmes, providing final submerged depth to enable updates to navigational publications. The TMS buoy will be left subsea with the top of the buoy at a minimum depth of -18.5m below MSL. This is sufficiently deep to prevent contact with any passing vessels that may transit through the 500m exclusion zone. The buoy disconnected arrangements are in line with the provisions and mitigations implemented prior to FPSO arrival and hook-up in 2018-2019.	(1)	(5)	Low			
Task: Guard Vessel Crew Change / Guard Vessel change-out											
Submerged Turret Mooring System (TMS) including Buoy and 12 Mooring Legs presenting hazard to	Other users of the sea; fishing vessels, marine traffic	(3)	(5)	Serious	Guard Vessel change-over will take place in field, with attendant vessel not released until replacement vessel is in field and has assumed guard vessel duties. All crew changes on SFF guard vessels shall take place in port. Guard Vessel replacement is planned to avoid the requirement for interim port calls for crew changes.	(1)	(5)	Low			

TMS Buoy Post FPSO Departure Risk Assessment

Hazard	Who / What is at Risk	Initial Risk Rating			Existing Control Measures	Residual Risk Rating			Further Action(s) Required	Action Owner & Due Date	Status/Comments
		L	C	Risk		L	C	Risk			
other users of the sea					Opportunistic crew changes may take place whilst an attendant guard vessel is in port sheltering from adverse weather.						
Task: Guard Vessel sheltering due to extreme adverse weather											
Submerged Turret Mooring System (TMS) including Buoy and 12 Mooring Legs presenting hazard to other users of the sea	Other users of the sea; fishing vessels, marine traffic	(3)	(5)	Serious	In advance of adverse weather that would put the SFF Guard Vessel crew at undue risk, the guard vessel shall leave field seeking shelter. In this scenario the submerged TMS remains infield with no local guard vessel. Guard Vessel would maintain active monitoring via AIS, radar (range limited) and broadcast radio warnings to marine traffic within range. By virtue of the Guard Vessel being an SFF classed vessel, when the metocean conditions necessitate the Guard Vessel leaving the field to shelter, it is highly unlikely that 3rd party vessels would be actively fishing in the locality. The Guard Vessel will return to location upon indication of an improving weather forecast to minimise unavailability at location. The TMS buoy will be left subsea with the top of the buoy at a minimum depth of -18.5m below MSL. This is sufficiently deep to prevent contact with any passing vessels that may transit through the 500m exclusion zone.	(2)	(5)	Medium			
Task: Guard Vessel departing field due to a technical issue / crew welfare											
Submerged Turret Mooring System (TMS)	Other users of the sea; fishing	(3)	(5)	Serious	Should the guard vessel be required to depart field on short notice due to technical or crew safety issues the same protocols as applied during adverse weather will	(2)	(5)	Medium			

TMS Buoy Post FPSO Departure Risk Assessment

Hazard	Who / What is at Risk	Initial Risk Rating			Existing Control Measures	Residual Risk Rating			Further Action(s) Required	Action Owner & Due Date	Status/Comments
		L	C	Risk		L	C	Risk			
including Buoy and 12 Mooring Legs presenting hazard to other users of the sea	vessels, marine traffic				be followed with a replacement guard vessel mobilised as soon as possible. If the Guard Vessel can safely remain infield until the relief guard vessel arrives guard duties would be swapped over infield. The SFF will supply a replacement guard vessel as soon as possible, in line with their contractual obligations.						

Additional Comments
Commencement of Guard Vessel services will be sequenced to align with departure of ERRV from the field, as part of the FPSO and Subsea Decommissioning Programmes. Supporting References:

Written by: **Approved by:**

TMS Buoy Post FPSO Departure Risk Assessment

Position: Subsea Development & Engineering Manager

Name: Ryan Robbins

Signature: Electronic Approval (Via Email)

Date: 04/07/2022

Position: Group HSSEQ Manager

Name: Tom Milne

Signature: Electronic Approval (Via Email)

Date: 08/07/2022

Risk Assessment Review Attendees – (4/7/22)			
Name	**Company**	**Job Title**	**Email**
Ryan Robbins	Hurricane Energy	Subsea Development & Engineering Manager	ryan.robbins@hurricaneenergy.com
Tom Milne	Hurricane Energy	Group HSSEQ Manager	tom.milne@hurricaneenergy.com
Les Mills	Hurricane Energy	Logistics Superintendent	les.mills@hurricaneenergy.com
Oliver John	Hurricane Energy	FPSO Development & Engineering Manager	oliver.john@hurricaneenergy.com

HURRICANE RISK ASSESSMENT MATRIX

			Likelihood					
Inevitable chance of occurrence under current conditions	Likely to occur several times in a 10 year period. (<10^1)	VERY LIKELY (5)		5	10	15	20	25
Probable chance of occurrence with additional factors	Expected to occur at least once in 10 years to 100 years. (10^1 to 10^2)	LIKELY (4)		4	8	12	16	20
Possible chance of occurrence with additional factors	Occurrence considered rare. At least once in 100 years to 1,000 years. (10^2 to 10^3)	POSSIBLE (3)		3	6	9	12	15
Combination of rare factors required	Not expected nor anticipated to occur. At least once in 1,000 years to 100,000 years. (10^3 to 10^5)	UNLIKELY (2)		2	4	6	8	10
Very rare combination of factors	Virtually improbable and unrealistic. Less than once in 100,000 years. (>10^5)	VERY UNLIKELY (1)		1	2	3	4	5
				Consequence				

RISK MANAGEMENT		
CATEGORY	RANGE	%
HIGH	20 - 25	>80%
SERIOUS	13 - 19	>48% <76%
MEDIUM	6 - 12	>20% <48%
LOW	1 - 5	<20%

	NEGLIGIBLE (1)	MINOR (2)	MEDIUM (3)	SERIOUS (4)	MAJOR (5)
Health & Safety	No absence or first aid from injury / event	Minor injury requiring first aid treatment and / or restricted work day	Major injury leading to partial disability and / or lost time incident	Single fatality or serious injury and / or permanent disability	Multiple fatalities
Environment	Slight environmental effect, lasting not more than a few days. Changes are unlikely to be noticed or measurable	Minor environmental impact, of short duration (less than a few weeks)	Change in a localised area (<500m). A short term effect (<2 years), with good potential for recovery	Change over a wider area (>500m). Medium term damage (>2 years), but recovery within 10 years	Change over a large area (>50km) or extending to shore. Long term damage (>10 years) and poor potential recovery
Asset / Cost Impact	Cost impact, or property / equipment damage. <$10,000	Cost impact or property / equipment damage $10,000 to $100,000	Cost impact or property / equipment damage between $100M and $1MM	Cost impact or property / equipment damage between $1MM to $10MM	Cost impact or property / equipment damage> $10MM
Reputation / Compliance	Compliant with Company rules, no media coverage	Non-compliant with Company rules, local media coverage	Non-compliant with legislation, regulator improvement notice, regional media coverage	Non-compliant with legislation, regulator prohibition notice, prosecution, national media coverage	Non-compliant with legislation, regulator prosecution, international media coverage
Production rate	Production disrupted for ≤ 1 day	Production disrupted for > 1 day ≤ 7 days	Production disrupted for > 7 days ≤ 14 days	Production disrupted for > 14 days ≤ 28 days. Data indicates production rates unsustainable from one well long-term due to reservoir behaviour	Production disrupted for > 28 days. Data indicates production rates unsustainable from both wells long-term due to reservoir behaviour
Reserves / Resources	< or equal to 0.1mmboe reduction in reserves/ resources	> 0.1 mmboe but < or equal to 0.5mmboe reduction in reserves/resources	> 0.5 mmboe but < or equal to 2.5mmboe reduction in reserves/ resources	>2.5mmboe but < or equal to 5mmboe reduction in reserves/ resources	> 5 mmboes reduction in reserves/ resources
Subsurface (data acquisition)	Subsurface data obtained and results easily interpreted	Some ambiguity in results due to either data gaps or uncertainty in interpretation of data	Gaps in knowledge as a result of either limited data acquisition or multiple ways to interpret the same dataset	Significant paucity of data resulting in understanding of the reservoir being limited	Severe reduction in data, understanding of reservoir not achieved