



# BW Offshore Catcher (UK) Ltd, 2017 Environmental Statement

This document is part of BW Offshore's Management System, which holds the complete revision history and electronic versions of attachments.

<i>Document Owner:</i> HSE Manager	<i>Approval:</i> Asset Manager
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## ABBREVIATIONS

BEIS	Department of Business Enterprise & Industrial Strategy
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CH <sub>4</sub>	Methane
CHARM	Chemical Hazard and Risk Management
CNS	central North Sea
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
DSV	Dive Support Vessel
EIA	Environmental Impact Assessment
EU ETS	European Union Emissions Trading Scheme
FGL	Fulmar Gas Line
FPSO	Floating Production Storage and Offloading Vessel
FPV	Floating Production Vessel
HSE	Health, Safety and Environment
ISO	International Standards Organisation
LAT	Lowest Astronomical Tide
MODU	Mobile Offshore Drilling Unit
NC	Non Compliance
NO <sub>x</sub>	Nitrous Oxides
OCNS	Offshore Chemical Notification Scheme
OCR	Offshore Chemicals Regulations
ODP	Oil Discharge Permit
OPEPs	Offshore Pollution Emergency Plans
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OIW	Oil in Water
OSD	Offshore Safety Directive
OSPAR	Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
PDN	Permitted Discharge Notification
PLO	Poses Little or No Risk
PLONOR	Poses Little or No Risk
PON	Petroleum Operations Notice
PPC	Pollution, Prevention and Control
SEGAL	Shell Esso Gas and Associated Liquids
SEMS	Safety and Environmental Management System
SO <sub>x</sub>	Sulphur Oxides

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STP	Submerged Turret Production
SUB	Chemicals Rated for Substitution
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
VOCs	Volatile Organic Compounds



## 1 INTRODUCTION

### 1.1 Purpose

BW Offshore has one legal entity currently operating in the United Kingdom Continental Shelf (UKCS), BW Offshore Catcher (UK) Ltd, hereafter referred to as BW Offshore. BW Offshore are the Duty Holder / Operator of the BW Catcher Floating, Production, Storage and Offloading (FPSO) which is currently producing from the Catcher Area Fields (Premier Oil UK are the licence holder for the Catcher Field Area).

Under Recommendation 2003/5 of the Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) requires that all companies operating in the UKCS have systems and procedures in place to identify, monitor and control the environmental aspects associated with offshore activities.

BW Offshore, offshore operations, worldwide operations and offices and onshore services are certified to the international environmental management system standard, ISO 14001. Recertification of the BW Offshore ISO 14001 environmental management system was concluded in August 2017. Surveillance visits are undertaken annually.

This report provides information on BW Offshore's offshore operations and the environmental performance of these operations. For the purpose of this report, this includes all production activities in the UKCS. BW Offshore do not conduct drilling operations in the UKCS. All drilling activities for the Catcher Field Area are conducted by Premier Oil UK as they are the Licence Holder for the field area.

This report has been made available on the BW Offshore website at;

<http://bwoffshore.com/responsibility/hse/>

## 2 Overview of Operations

The Catcher Area Development is located in Block 28/9 of the Central North Sea (CNS) c. 170 km southeast of Aberdeen and c. 100 km from the UK/Norway median line in water depths of c. 85 m Lowest Astronomical Tide (LAT) (Figure 1).

The BW Catcher FPSO has been contracted by Premier Oil UK to produce from three fields: Catcher, Varadero and Burgman. The three fields are tied back to the BW Catcher FPSO vessel located at c. 56°46'12.43" N and 00°42'46.93" E (WGS84) (Figure 2). The principal facilities include subsea facilities and a turret-moored and free weather-vaning FPSO. Oil from the field is exported via shuttle tanker and gas is exported or imported by a new gas export pipeline connected to the existing Fulmar Gas Line (FGL) to St Fergus gas pipeline.

The FPSO is capable of processing up to 60 000 bbls of oil per day and has a maximum cargo storage capacity of 650,000 bbls. Therefore, at maximum capacity the FPSO offloads the processed crude oil to a shuttle tanker approximately once every 10 days. When offloading cargo, tank blanketing will normally use LP fuel gas, with this gas being recovered via the flare gas recovery package. Initially, produced gas will be used for power generation and gas lift, with excess being exported into the Shell Esso Gas and Associated Liquids (SEGAL) system.

In normal operations, Catcher flaring will be restricted to HP flare purge gas only. The LP flare system includes a Vapour Recovery Package to recover purges and vents sent to the LP flare system. The LP flare will be lit, as required, in process upset or ESD conditions only. Produced water will be treated and then either re-injected or discharged under an Oil Discharge Permit (ODP) issued by BEIS.

The ENSCO 100 Mobile Offshore Drilling Unit (MODU) contracted to Premier Oil UK is currently drilling in the field area.

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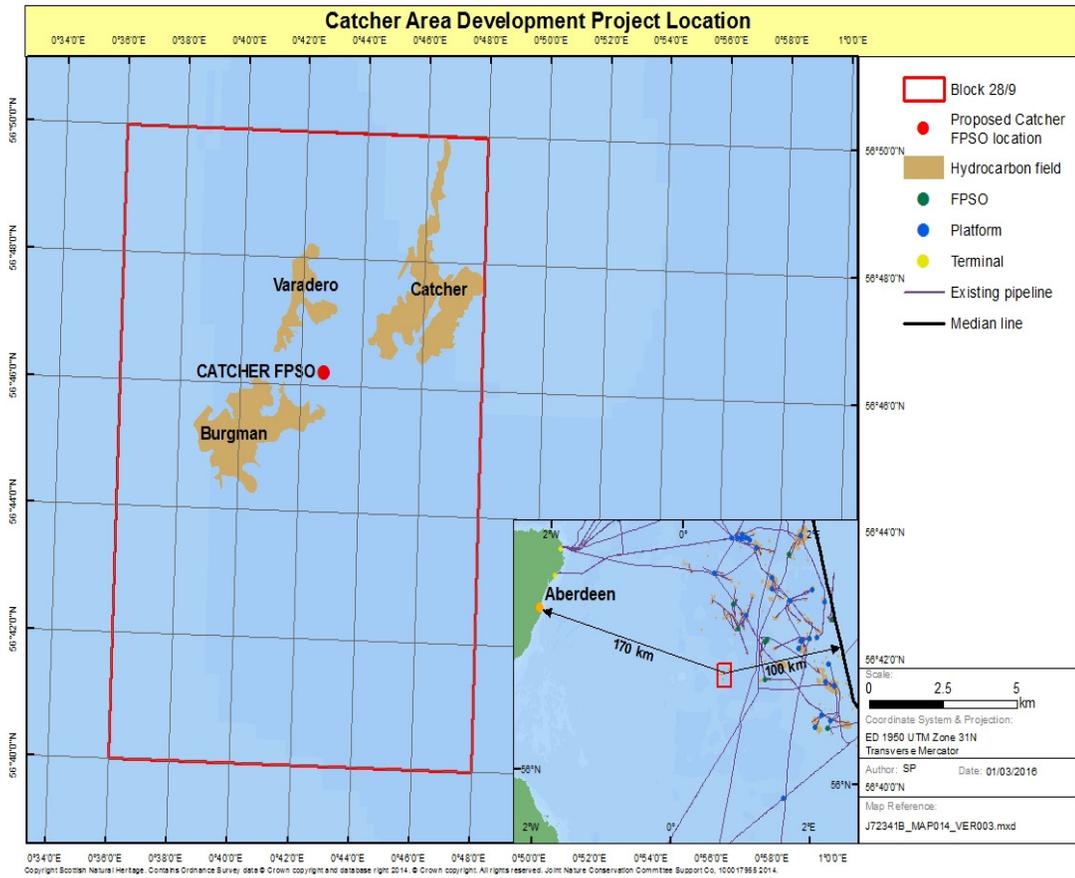


Figure 1: BW Catcher General Location Map

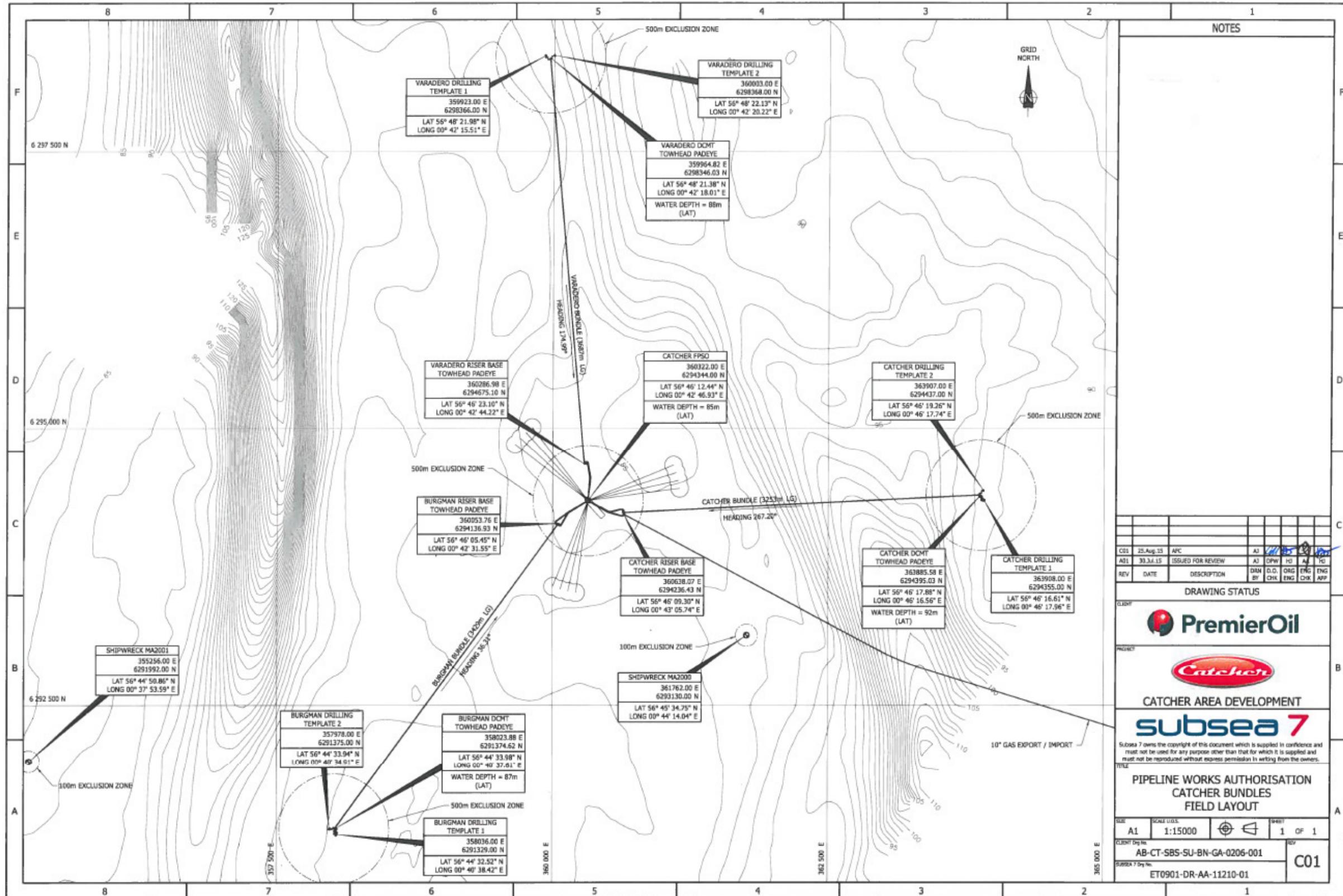


Figure 2: Catcher Area Development

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In August 2017 the BW Catcher FPSO left the Keppel ship yard in Singapore and transited to the UKCS. The FPSO arrived in the UKCS in October 2017 where it stopped off in Nigg for field preparation operations prior to hook-up in the field. The FPSO was hooked up to the Submerged Turret Production (STP) Buoy in the Catcher Field Area on the 19<sup>th</sup> October 2017, at which point the FPSO became an installation. In field commissioning activities commenced and the FPSO achieved First Oil on the 23<sup>rd</sup> December 2017. An interim performance test was successfully completed on the 6<sup>th</sup> January 2018.

## 3 BW HSE Policy UK

BW Offshore is focused on protecting the environment in line with our stated commitment to reduce our impact to a level that is as low as reasonably practicable. This involves ongoing assessment, monitoring and reporting on environmental impacts.

The BW Offshore Safety and Environment Management System (SEMS) exists to provide a systematic approach to the management of HSE issues in order to protect people and the environment and comply with UK legislation.

BW Offshore considers that health, safety and environment have equal status with other primary business objectives and are of strategic importance. Safe working practices and due consideration of environmental impact are vital to the overall efficiency and continued success of the business. The HSE policy forms the basis for the SEMS and is presented below.

### POLICY STATEMENT.

BW Offshore Catcher UK Ltd operations will always prioritize HSE matters and we are committed to the effective management of Occupational Health and Safety, Environmental aspects and impacts and Major Accident Hazards. It is our belief that all incidents resulting in harm to people, the environment, and property can be prevented through robust risk identification and management.

We aim to maintain a strong and active safety culture, which ensures everyone, both employees, and contractors to play an active role in understanding our operational risks, keeping our installations and facilities, safe and rewarding places to work.

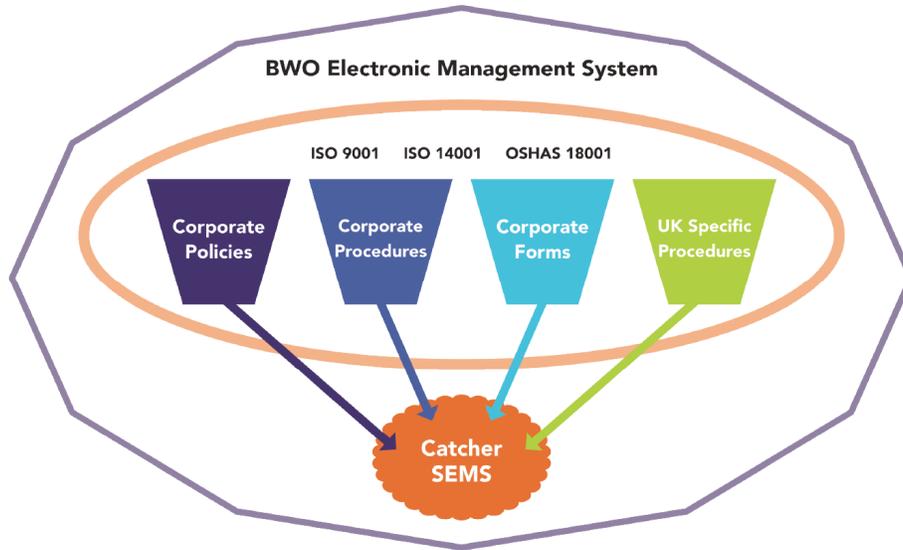
We Will:

- Provide sufficient resources and training to competently support this policy.
- Commit sufficient competent resources to ensure Major Accident Hazards, are effectively managed throughout the life cycle of our assets.
- Ensure a robust risk management process is in place to identify and mitigate all operational risks which is transparent to or Directors, management, Workforce and Stakeholders
- Plan our operations in a way that minimises environmental impact and prevents pollution
- Seek to continuously improve our Occupational Health, Safety and Environmental performance, by setting annual goals for HSE performance, and by measuring and reporting on this performance to all personnel and stakeholders
- Ensure compliance with our C-MAPP, Safety Cases, Management system and all relevant Regulations and Standards
- Ensure *all our people, and our contractors have, the competencies required to undertake their roles and responsibilities*
- Register faithfully all incidents and near misses. Investigate these and implement corrective actions to reduce the likelihood of re-occurrence
- Carry out Health, Safety and Environment compliance audits of all assets both ashore and offshore and establish strong Lessons Learnt process.
- Promote stop and ask without consequence
- Consult with our safety committees, and wider workforce, and review this Policy and its supporting documentation on a regular basis.

These are the Companies commitments to our employees and our wider stakeholders.

The SEMS was developed in order to meet the requirements of The Offshore Installations (Offshore Safety Directive) (Safety Case) Regulations 2015 and Offshore Installations (Safety Case) Regulations 2005, in particular the contents of Schedules 2 and 3.

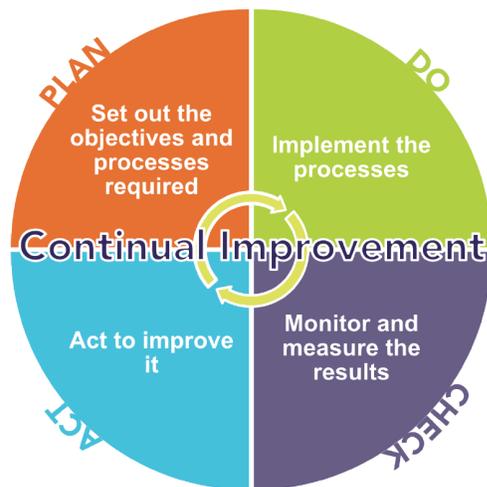
The BW Offshore SEMS uses the existing processes and procedures contained within the BW Offshore Integrated Management System, and is therefore an integral part of the BW Offshore Management System, although specific to the operations of BW Offshore. The processes and procedures, which are required to meet the UK Relevant Statutory Provisions, are contained within the SEMS (Figure 3).



**Figure 3: Inputs to BW Catcher SEMS**

The purpose of the SEMS is to provide a framework for the management of all hazards and associated risks generated through the operation of the BW Catcher FPSO.

The basic principal applied within the SEMS is one of continual improvement in the management of risk, both environmental and health and safety related. In order to achieve this the SEMS utilises the Plan, Do, Check and Act model (Figure 4).



**Figure 4: BW Catcher SEMS Continual Improvement Model**

## 4 Environmental Performance

Environmental performance for the BW Catcher FPSO is detailed below. There is no comparison data available for previous years due to the FPSO only arriving in the field and gaining first oil in 2017. During the commissioning/ start-up phase of operations on a new installation certain permits come into force when the FPSO is hooked up and becomes an installation (Chemical Permit, Consent to Locate, etc) and some only come into force when the FPSO achieves first oil (PPC Combustion Plant Permit, EIA Direction to Commence Production, etc.). The following sections will detail the date at which data has been gathered from (hook-up or first oil) to the end of the year (2017).

### 4.1 Oil in Produced Water

During normal production, water is produced when extracting hydrocarbons from the reservoir.

Despite treatment, produced water still contains traces of oil, and as such, produced water discharge is controlled via a permitting system managed by the UK regulatory authority, OPRED.

The 2017 Oil Discharge Permit held by BW Offshore allows the BW Catcher FPSO to discharge produced water, provided the hydrocarbon concentration is within the limit set out in the permit.

\*Data collected from the date of first oil (23<sup>rd</sup> December 2017).

#### 4.1.1 BW Catcher Produced Water 2017

There was no Produced Water from the Catcher Field Area wells during 2017.

Produced Water may start to be extracted with hydrocarbons during 2018.

### 4.2 Chemical Use and Discharge

Various chemicals are used offshore during production operations.

During production operations, chemicals such as scale solvers, corrosion inhibitors, demulsifiers and biocides are used to assist with the separation of oil and water, prevent damage to infrastructure such as pipelines, and to prevent 'souring' of the reservoir.

Any chemical used to process hydrocarbons offshore must, in line with the Offshore Chemical Regulations 2002, first be approved by the Centre for Environment, Fisheries and Aquatic Sciences (CEFAS). The chemicals are subject to robust environmental risk assessment and once approved, their use is controlled and monitored through a permit granted by OPRED.

Under the Offshore Chemical Notification Scheme (OCNS), chemicals are ranked according to the assessed hazard to the environment and are given a lettered heading E, D, C, B or A, with E representing the lowest and A the highest hazard category.

Using the Chemical Hazard and Risk Management (CHARM) model, a colouring band is used to show which chemicals pose the highest environmental hazard. These bands are Gold, Silver, White, Blue, Orange or Purple with Gold representing the lowest hazard and Purple the highest.

Some chemicals are regarded as PLONOR (PLO), which means that they have been determined to Pose Little Or NO Risk to the environment.

Any chemicals which have been identified as posing potential environmental risks (such as bioaccumulation or slow biodegradation) are subject to controls under which their use must first be approved by OPRED. This is backed up by a detailed justification for use of the chemical. Such chemicals carry a 'substitution warning' (SUB) which aims to encourage the phase out of the use of these chemicals.

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BW Offshore, its contractors and its chemical suppliers work on a continuous basis to find suitable alternatives to replace the products with SUB warnings.

\*Data collected from the date of hook-up (19<sup>th</sup> October 2017).

## 4.2.1 BW Catcher Chemical Use and Discharge 2017

One chemical with a substitution warning (SUB) was permitted for use on BW Catcher in 2017. This chemical was not used during operations in 2017. The chemical is detailed in the table below.

Chemical & OCNS Category	Summary of Change Out Review
EC1389B (Corrosion Inhibitor), Nalco Champion (Nalco Ltd)	Currently no substitution free products have been identified and R&D work is ongoing to develop an alternative.

Figure 5 below details the BW Catcher chemicals permitted for use. Only nine chemicals were used on BW Catcher during 2017. The highest use volumes are accounted for as first fills of subsea and topsides chemical injection umbilicals. Some of these first fills have carried over into 2018 but from 2019 onwards BW Catcher should see a steady state of chemical use that reflects the quantities required to process the hydrocarbons that are produced.

20,722 kgs of chemicals were used and of those 3,275 kgs discharged during commissioning and production operations.

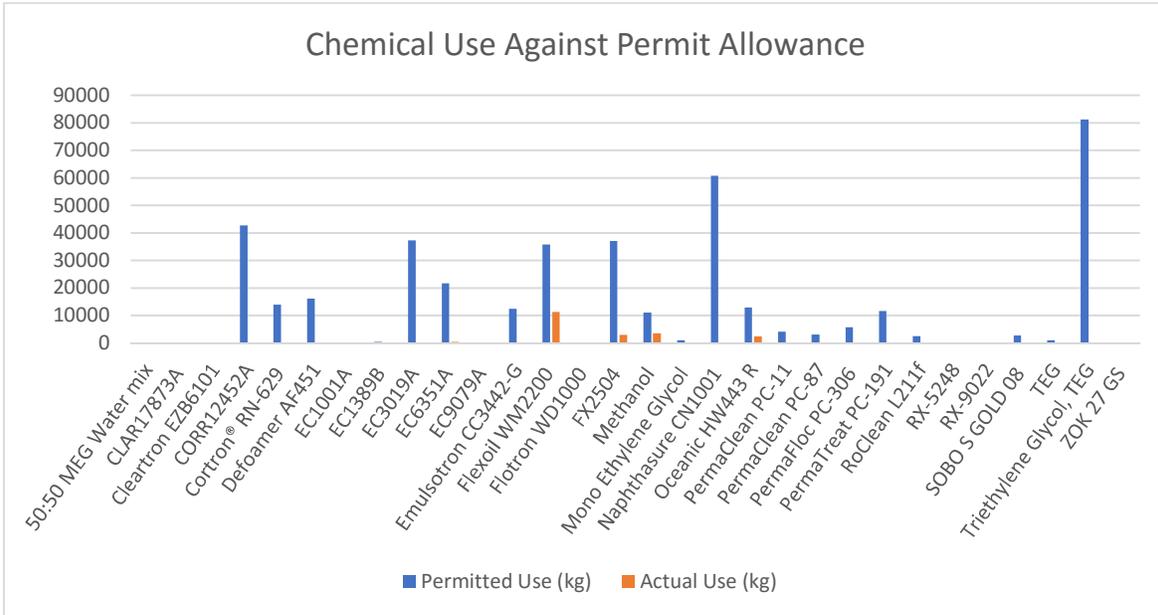


Figure 5: BW Catcher Chemical Permit Allowance vs Actual Use

## 4.3 Waste

Waste is generated from offshore operations and is transported onshore for re-use, recycling, treatment or disposal.

Production installation waste is segregated into categories before back-loading. As much waste as possible is sent for recycling. This includes wood, scrap metals, paper/cardboard, glass and plastics.

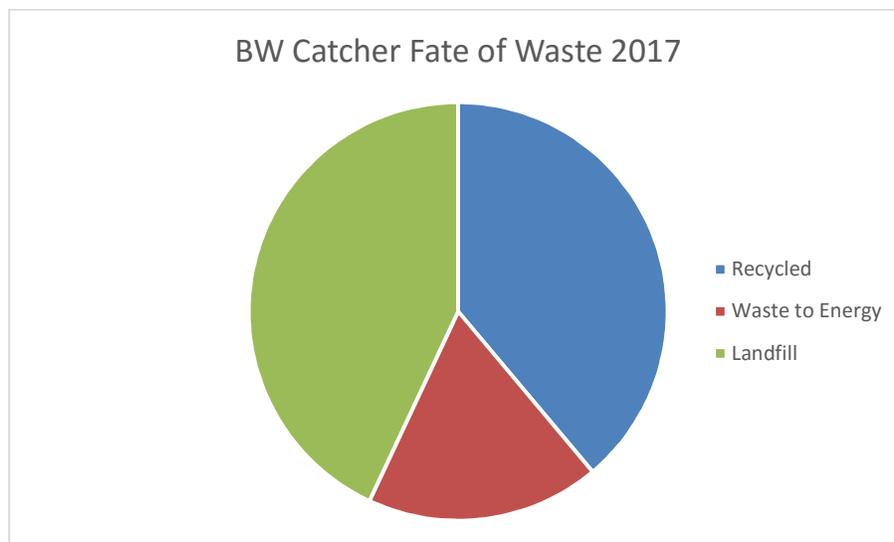
Waste that cannot be recycled is sent to landfill. Certain types of waste that are harmful to the environment (Special Waste) are sent ashore to be processed and disposed of by licensed handlers in accordance with the relevant legislation.

BW Offshore target areas where the amount of waste generated can be further reduced. E-reps are being established and will be actively involved in continuous awareness raising and reduction of waste initiatives.

\*Data collected from date of hook-up (19<sup>th</sup> October 2017).

#### 4.3.1 BW Catcher Waste 2017

A total of 51.19 tonnes of waste was disposed of from the BW Catcher FPSO in 2017. Of the total waste produced, 38.9% was recycled, 18.1% was waste to energy and 43% was landfilled (Figure 6).



**Figure 6: BW Catcher Fate of Waste**

#### 4.4 Atmospheric Emissions

Atmospheric emissions arise during offshore drilling and production operations predominantly as a result of fuel combustion for power generation and gas flaring activities.

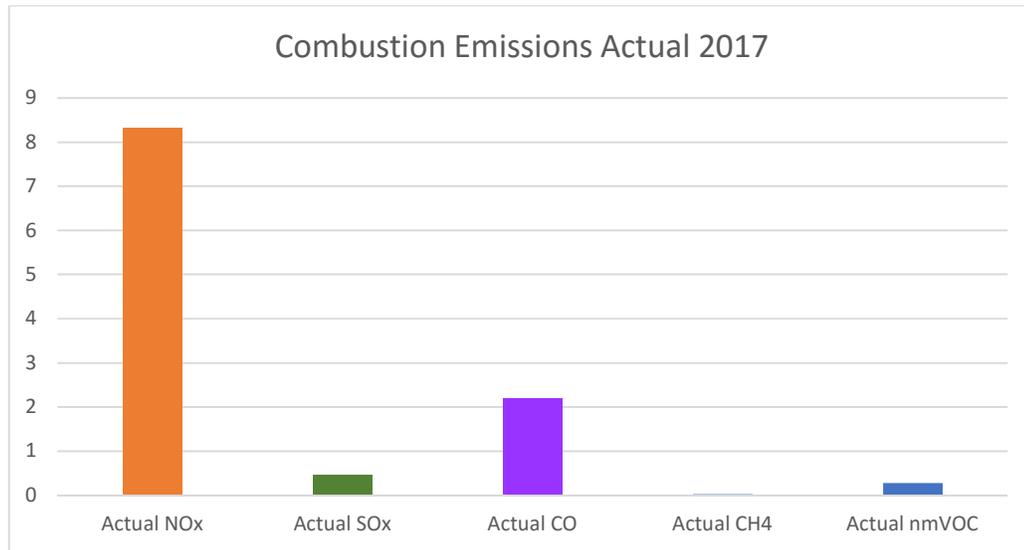
\*PPC data collected from date of First Oil (23<sup>rd</sup> December 2017).

\*EU ETS data collected from date of hook-up (19<sup>th</sup> October 2017).

##### 4.4.1 BW Catcher Atmospheric Emissions 2017

The BW Catcher FPSO is regulated under the Pollution, Prevention and Control (PPC) Regulations as a large combustion installation. As such, the installation has set limits on atmospheric emissions of nitrous oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>), carbon monoxide (CO), methane (CH<sub>4</sub>) and volatile organic compounds (VOCs).

Figure 7 below shows the combustion emissions (excluding CO<sub>2</sub>) for 2017.

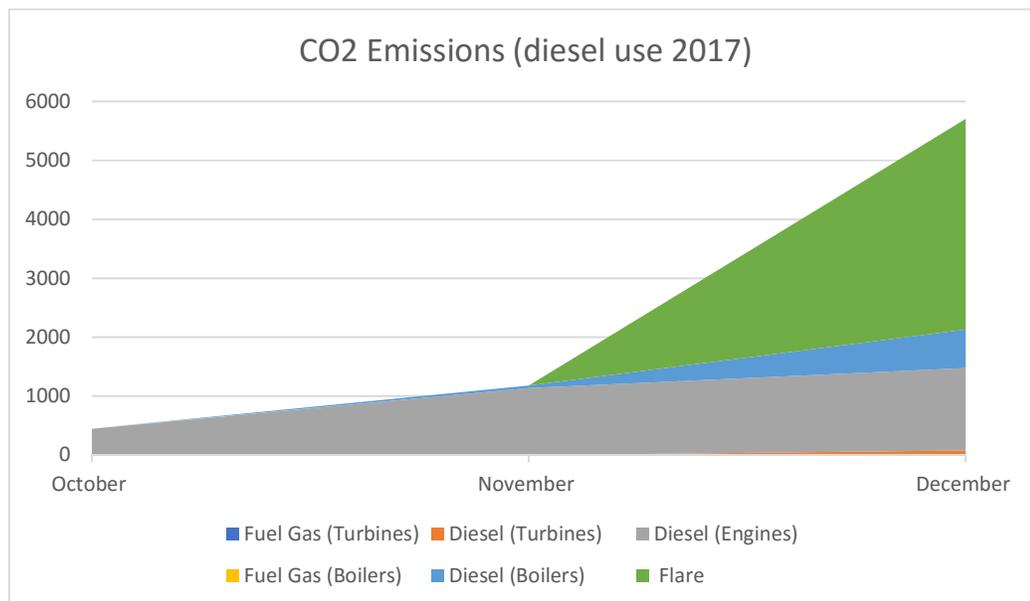


**Figure 7: BW Catcher Combustion Emissions**

All emissions were within limits set by BEIS in the BW Catcher PPC Permit.

BW Catcher is also regulated under the European Union Emission Trading Scheme (EU ETS) Regulations, which regulate CO<sub>2</sub> emissions for combustion sources, such as turbines and flaring. In normal operations on BW Catcher all produced gas would be used as fuel with excess gas being exported. During 2017 fuel gas and gas export were yet to be commissioned and therefore excess gas was flared.

CO<sub>2</sub> emissions as a result of combustion sources are presented in Figure 8.



**Figure 8: BW Catcher CO<sub>2</sub> Emissions**

During 2017, 7,336 tonnes of CO<sub>2</sub> were emitted from combustion and flaring on BW Catcher. Of these emissions, 51.3% were as a result of combustion for power generation and the remaining 48.7% resulted from the flaring of excess gas during offshore commissioning operations.

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During normal operations, BW Catcher runs with two turbines on fuel gas. During 2017 power generation turbines and gas export systems still required commissioning on fuel gas moving into 2018.



## 5 Incidents

BW Offshore strive to prevent the unplanned release of hydrocarbons and chemicals, however, on occasion accidental releases do occur. All unplanned releases of hydrocarbons and chemicals to sea from offshore oil and gas installations and pipelines, regardless of size, are reported to OPRED and other statutory agencies via the Petroleum Operations Notice 1 (PON1) form. Permitted Discharge Notifications (PDN's) are also submitted using PON 1 forms when permitted discharges are in breach of conditions / limits associated with the installations Oil Discharge Permit.

A number of processes are in place to prevent unplanned releases and these include planned maintenance of equipment, asset integrity inspections, activity risk assessment, area inspections, routine audits, procedural controls and training and competency for individuals interacting with process plant. Oil Pollution Emergency Plans (OPEPs) approved by OPRED are in place covering the installation. The plan is exercised on a regular basis and followed in the event that an unplanned release does occur, to ensure that the incident is reported in a timely fashion and that contingency and mitigation measures are in place.

### 5.1 Unplanned Release – PON1

During 2017, one PON1 was submitted to the regulator for an unplanned release from BW Catcher. In addition to this, two PON1s were submitted to the regulator for unplanned releases from the DSV Seven Falcon which was undertaking pipeline operations in the field area. The release from BW Catcher was estimate at 0.01 tonnes. This calculation was based on the appearance of a sheen but the source of the sheen could not be determined.

### 5.2 Regulatory Non-Compliance (NC)

One non-compliance was raised in relation to environmental legislation or permit condition breaches during 2017. This non-compliance was related to navigation lights (PON10) not performing as per design and the standard marking schedule. A solution was identified within 24 hours of the initial non-compliance.

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## REVISION SUMMARY

Rev.	Date	Document owner to summarise key changes in the document
0	29-May-2018	Issued for Use