



**BW Energy Gabon**

# **ESIA Addendum**

Dussafu Block Development, Gabon

Non-technical Summary

80834



# NON-TECHNICAL SUMMARY

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## Introduction

This Non-technical Summary (NTS) presents the key findings of the Environmental and Social Impact Assessment (ESIA) Addendum prepared to complete the appraisal of the environmental and social impacts, required mitigation measures, and proposed environmental and social management plans for the development of the Dussafu offshore oil block in Gabon ('the project') by BW Energy Gabon (BWE) ('the developer').

The Addendum builds on the ESIA's prepared to meet national requirements in Gabon. In particular, the Addendum provides additional information required by international finance institutions (IFIs) to support an application to them by BWE for project funding. The requirements of the IFIs are summarised below in 'Legal and Other Requirements'.

This NTS is being disclosed to assist stakeholders to review and comment on the project. Your comments will be considered by the IFIs before they decide whether to provide funds for the project. Information on how to submit comments is provided at the end of this NTS.

## ESIA Addendum Team

International environmental consultancy RSK Environment (RSK) has been contracted to provide support to help ensure BWE meets the environmental and social requirements of the IFIs and has been responsible for the preparation of the ESIA Addendum document. RSK has been assisted in this work by their local Gabonese partner Terre Environnement Aménagement (TEREA).

## Project Description

The Dussafu Block includes the Ruche Exclusive Exploitation Area (Ruche EEA) that contains six offshore oil fields: Tortue, Hibiscus, Ruche, Ruche North East, Moubenga and Walt Whitman that contain 112 million barrels of oil, based on current development plans (Figure 1).

BWE is focusing its development efforts on the Tortue and Ruche fields. BWE has successfully initiated development activities in the Ruche EEA and reached first oil in October 2018 (Tortue Phase 1). Subsequent phases of the development are Tortue Phase 2 and Ruche Phase 1 (more information provided in Table 1). The full field development consists of multiple wells connected to a Floating Production, Storage and Offloading Unit (the BW Adolo FPSO) with an Offshore Installation (the Hibiscus Alpha OI) between the Hibiscus and Ruche Fields.

At the time of writing (May 2022), BWE has completed the drilling programme and installed the infrastructure required for Tortue Phase 1 and 2. These fields are therefore in operation. The wells are connected by flowline to the BW Adolo FPSO (Figure 2) where the oil is processed and stored and then pumped from the FPSO onto tankers for sale without the need for it to come onshore.

Ruche Phase 1 is under development, with first oil expected end of 2022 / beginning of 2023. Wells will be drilled in both the Ruche and Hibiscus fields in the second half of 2022 and flowlines installed to connect them to the Hibiscus Alpha OI (Figure 3), which will comprise a converted mobile drilling rig. The Hibiscus Alpha OI will carry out initial processing and then the oil stream will be pumped

into a single flowline to the BW Adolo FPSO. The Hibiscus Alpha OI will be sized to accommodate a further six additional wells as part of Ruche Phase 2.

Both the BW Adolo FPSO and Hibiscus Alpha OI are manned installations.



**Figure 1: Dussafu Block, Ruche EEA and fields**

**Table 1: Summary of Dussafu Block development phases**

	Tortue Phase 1	Tortue Phase 2	Ruche Phase 1
No. of wells	Two subsea development wells in Tortue Field (DTM-2H targeting Dentale reservoir and DTM-3H targeting Gamba reservoir) Appraisal well in Ruche NE area	Four additional subsea development wells in Tortue Field (DTM-6H targeting Dentale reservoir and DTM-4H, DTM-5H and DTM-7H targeting Gamba reservoir) Appraisal well in Hibiscus UpDip area	Six production wells in Hibiscus and Ruche Fields (2) Hibiscus Gamba (1) Ruche Gamba (2) Ruche NE Gamba (1) Ruche Dentale

	Tortue Phase 1	Tortue Phase 2	Ruche Phase 1
Supporting infrastructure	Drilled from jack-up rig Subsea wells tied back to manned BW Adolo FPSO Appraisal well plugged and abandoned	Drilled from jack-up rig Subsea wells tied back to manned BW Adolo FPSO Appraisal well plugged and abandoned	Drilled from jack-up rig in the Hibiscus Alpha OI Production wells tied back to manned Hibiscus Alpha OI with ~ 20 km subsea flowline to BW Adolo FPSO
Progress	Production commenced October 2018 Current production 12,500 barrels of oil per day (bopd)	First two wells came on-line in 2020, remaining wells came on-line in 2021 Production expected to peak at 25,000 bopd	Installation of Hibiscus Alpha OI expected mid-2022 Drilling second half of 2022 First oil end of 2022 / beginning of 2023 Anticipated production 40,000 bopd

The Dussafu field development and operations are supported by an existing onshore logistics base at the commercial port of Port Gentil. Key activities at the base include loading and offloading of project supply vessels (transporting materials and waste), equipment storage, temporary small-scale storage of chemicals before they go offshore and waste transfer (no waste treatment is carried out). Facilities at the logistics base include a pipe / storage yard, a quay and a warehouse.

Helicopters fly to and from the existing heliport at Port Gentil and the Ruche EEA to carry out crew changes.

## ESIA Addendum Scope

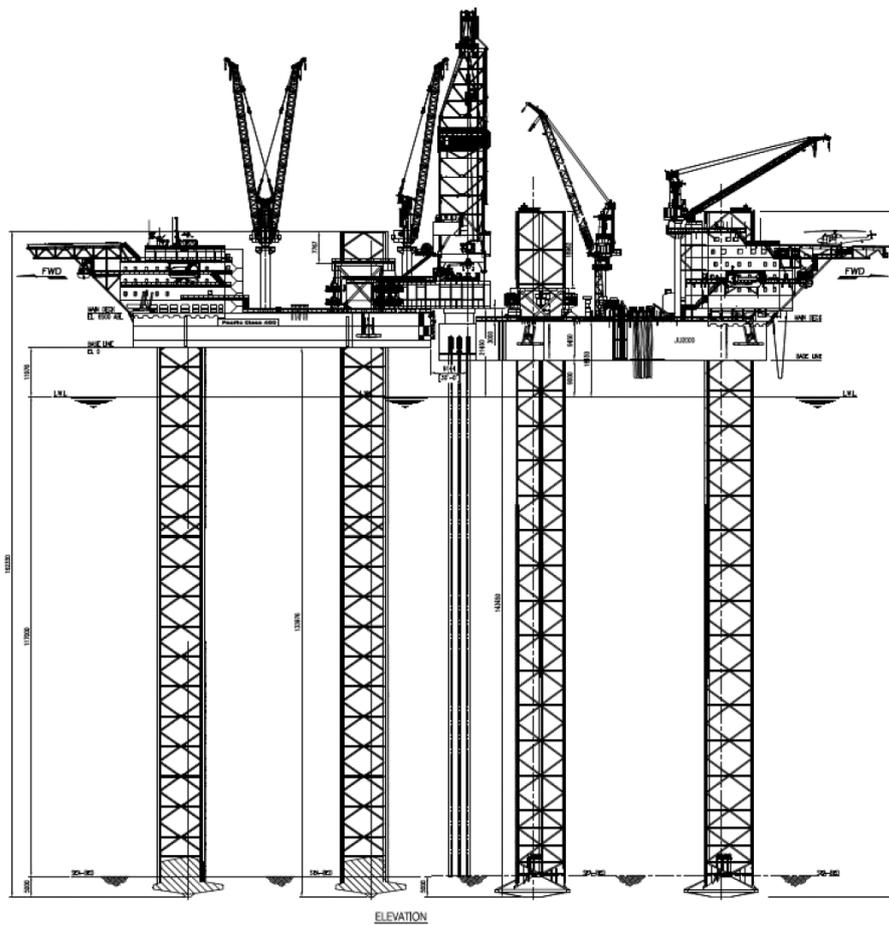
The field development activities covered by this ESIA Addendum are as follows:

- Tortue Phase 1 (currently at operational phase)
- Tortue Phase 2 (currently at operational phase)
- Ruche Phase 1 (currently at execute phase (detailed design and construction / conversion are running in parallel)).

Ruche Phase 2, and transshipment of oil from the FPSO, are outside the scope of the impact assessments, however, they have been considered in the cumulative impact assessment.



Figure Error! No text of specified style in document.: **BW Adolo FPSO**



**Figure 1: Hibiscus Alpha Offshore Installation Schematic**

## Activities / Sources of Environmental and Social Impact

The key planned / routine activities involved in the development and operation of the fields, and the sources of environmental and social impact associated with those activities are described in Table 2.

**Table 2: Overview of activities and key sources of impact**

Activities	Sources of impact
Drilling and installation of the wells (Ruche Phase 1)	Rig installation (disturbance of seabed) and physical presence Discharge of cuttings <sup>1</sup> and water-based drilling fluids <sup>2</sup> (WBDFs) Discharge of cuttings and associated non-aqueous drilling fluids (NADFs) Rig operational discharges – treated sanitary wastewater, macerated food waste, drainage water, cooling water Emissions from power generation Underwater noise Light spill
Installation and operation of Hibiscus Alpha Offshore Installation (Ruche Phase 1)	Installation (disturbance of seabed) and physical presence Discharge of produced water <sup>3</sup> Operational discharges - treated sanitary wastewater, macerated food waste, drainage water, cooling water Emissions from power generation and flaring Underwater noise Light spill
Installation and operation of the subsea flowlines (Tortue Phase 1, 2 and Ruche Phase 1)	Installation and physical disturbance of seabed Abstraction and discharge of seawater for hydrotesting <sup>4</sup> the flowlines Pigging <sup>5</sup> of the flowlines and collection of waxes for onshore treatment and disposal
Operation of BW Adolo FPSO (Tortue Phase 1, 2 and Ruche Phase 1)	Physical presence Discharge of produced water Operational discharges - treated sanitary wastewater, macerated food waste, drainage water, cooling water, ballast water Emissions from power generation and flaring Underwater noise Light spill

<sup>1</sup> Small pieces of rock that break away during drilling from the formation.

<sup>2</sup> Drilling fluids are a mixture of chemicals, with water or oil / synthetic oil, that is circulated around the drill bit to lubricate and cool the bit and flush the rock cuttings to the surface.

<sup>3</sup> Water that comes out of the well with the crude oil during production, it is separated and discharged to sea.

<sup>4</sup> Pressure testing of the flowlines using seawater to test for any leaks.

<sup>5</sup> Pigging is a technique of cleaning a flowline without stopping operation by inserting a device known as a 'pig'.

Activities	Sources of impact
Support / supply vessel and construction vessel operations (Tortue Phase 1, 2 and Ruche Phase 1)	Vessel operational discharges – treated sanitary wastewater, macerated food waste, drainage water, cooling water, ballast water Emissions from vessel exhausts Underwater noise Light spill
Helicopter support activities (Tortue Phase 1, 2 and Ruche Phase 1)	Emissions from helicopter exhausts Airborne noise
Logistics base operation (Tortue Phase 1, 2 and Ruche Phase 1)	Emissions from power generation (limited as connected to electricity grid) Discharge of uncontaminated drainage
Waste management activities (Tortue Phase 1, 2 and Ruche Phase 1)	Onshore treatment and recycling / disposal of wastes
Decommissioning of facilities	Site Abandonment and Rehabilitation Plan will be developed

In addition to routine / planned activities there is a low risk of accidental / unplanned events such as oil spills, vessel collision with fauna / fishing vessels, introduction of alien invasive species (AIS), etc.

## Study Area

The project area of influence (AOI) comprises the area within which impacts from routine / planned project activities may occur and is shown in Figure 4. It includes the Ruche EEA, the logistics base and heliport in Port Gentil, helicopter and supply vessel routes to / from the BWE facilities, and coastal communities adjacent to the Ruche EEA. The area that could be affected by possible oil spills (unplanned / accidental events AOI) is larger, as shown in Figure 5.



Figure 4: Area of influence for routine / planned project activities



Figure 5: Area of influence unplanned / accidental events

## Legal and Other Requirements

Lenders generally require that activities being funded are compliant with the environmental and social requirements stipulated in the following (in addition to applicable national environmental and social laws and regulations):

- International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (2012) (the IFC Performance Standards)
- Equator Principles IV (dated July 2020 and effective 1 October 2020)
- World Bank Group General Environmental, Health and Safety (EHS) Guidelines (April 2007)
- World Bank Group EHS Guidelines for Offshore Oil and Gas Development (June 2015).

These standards, principles and guidelines have therefore been followed when preparing this ESIA Addendum.

## Stakeholder Engagement

Stakeholder engagement is an important part of the ESIA process and a national<sup>6</sup> and international requirement. A Stakeholder Engagement Plan (SEP) was developed for the ESIA Addendum and engagements were undertaken to:

- inform stakeholders in an accessible and appropriate manner about the project and the ESIA Addendum and provide opportunities for them to engage
- ensure that stakeholders understand how they might be affected by the project and their potential role in impact identification and management
- register grievances
- provide opportunities for stakeholders to express their opinions and concerns about the project and ensure that these opinions and concerns are considered in the project impact identification and any related management decisions.

As part of the work carried out for the ESIA Addendum, the field team carried out meetings at government and project affected community (PAC) level between 31 March 2021 and 1 July 2021. In total, 15 meetings were held involving over 225 stakeholders. It should be noted that RSK personnel were unable to attend in person, due to travel restrictions associated with the COVID-19 pandemic. In-country stakeholder engagement was therefore conducted by RSK's local Gabonese partner TERE. The main issues and concerns raised during these meetings revolved around employment, impact on the economy, community development and infrastructure, electricity and medical dispensaries. Other issues raised included fishing restrictions and impact on water-based livelihoods, the stakeholder engagement process, and benefits of the project to the local area.

Stakeholder engagement will continue during the public disclosure phase of the ESIA Addendum and throughout the project lifetime in order to provide stakeholders with project updates and take into account their opinions and concerns. These activities will be described in the project SEP to be implemented by BWE Gabon.

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<sup>6</sup> The national ESIA for the Tortue Phase 1 Development Project makes reference to two meetings: a "public consultation at the Mayumba Prefecture, on 23 October 2017, in the presence of the central authorities involved in the project, the local authorities and local populations" and an "information meeting on the ESIA of the Tortue Phase I development project" which took place on July 13 2017 at BWE headquarters in Libreville. The issues raised included accidental or pernicious oil spills, the use of local labour on the project and requests for support for a range of social projects.

A community Grievance Management Procedure has been introduced and will provide stakeholders with an ongoing means to lodge any project-related grievances and concerns.



**Figure 6: Community meeting with stakeholders in Mayumba, 27 April 2021**



**Figure 7: Community meeting with stakeholders in Tchiole-Ndembe Quarter, Mayumba, 1 May 2021**

## Impact Assessment Methodology

The assessment of potential environmental and social impacts from the project was a systematic process that involved:

- identifying project activities and associated aspects or sources of impact
- identifying related environmental and social receptors
- assessing the significance of the impacts on receptors based on the magnitude of the impact and the sensitivity of the receptors, with negative impacts being assigned a category as follows:
  - negligible
  - minor
  - moderate
  - major.

Mitigation measures were then applied to reduce the magnitude of any moderate or major negative impacts to acceptable levels (negligible or minor), or no more mitigation could be applied and the impacts were judged to be 'as low as reasonably practicable' (ALARP). Measures to enhance positive impacts were also identified, where possible.

A slightly different approach to assessing cumulative impacts was adopted based on IFC guidance on cumulative impact assessment, see 'Cumulative Impact Assessment' below.

## Critical Habitat Assessment

Critical habitats are areas of high biodiversity value where stringent requirements must be met if project activities are to be permitted. Where compliance with these requirements is not possible, project activities should be reconsidered.

A critical habitat assessment (CHA) has been conducted for the project that included:

- identifying the presence and extent of critical habitats of relevance to the project by
  - identifying and screening species of animals and plants to identify those who may be present in sufficient numbers in the area to trigger the designation of the area as critical habitat; this can be because they are rare, only present in a localised area, migrate or congregate (gather)
  - identifying other areas that qualify as critical habitat because they are highly threatened or unique or that contain features of importance for evolutionary and ecological processes
  - conducting stakeholder engagement and a detailed literature review to refine the list of critical habitat-qualifying features to be considered in the CHA
- identifying, assessing and mitigating potential project impacts on critical habitat using the methodology described in 'Impact Assessment Methodology' considering both planned or routine events and unplanned or accidental events.

A total of 14 critical habitat-qualifying fish, dolphin, whale and turtle species were identified leading to the classification of the shallow seawater and deep seawater in the AOI as critical habitat (see Table 3). This area includes the highly threatened and unique ecosystems of the Mayumba Marine Ecologically or Biologically Significant Marine Area (EBSA) and the Equatorial Tuna Production EBSA, the Northwest Continental Shelf EBSA is adjacent. Protected areas and internationally recognised areas include the Mayumba National Park and the Aquatic Reserve of the Grand South of Gabon.

**Table 3: Critical habitat qualifying features**

Critical habitat qualifying species	
African wedgefish	Bonga shad
Blackchin guitarfish	Goby <i>Lesueurigobius koumansi</i>
Daisy stingray	Eel <i>Hemerorhinus opici</i>
Atlantic humpback dolphin	Eel <i>Xyrias guineensis</i>
West African pygmy skate	Eel <i>Uroconger drachi</i>
White skate	Humpback whale
Common guitarfish	Leatherback turtle
Other critical habitat features	
Mayumba National Park and EBSA	
Northwest Continental Shelf EBSA	
Equatorial Tuna Production EBSA	

The key results of the CHA are shown in Table 4. The major potential project impact to critical habitat in the AOI, reducing to moderate after mitigation, is a large-scale accidental release of hydrocarbons (e.g., from a well blowout, or collision with the FPSO). However, it is important to acknowledge that the likelihood of this type of accidental event scenario is deemed to be extremely unlikely given the mitigation measures in place.

The other major potential impact on critical habitat, before mitigation, arises from the risk of introducing alien invasive species (AIS) in vessel ballast water and biofouling. Rigorous application of the mitigation measures proposed, however, should reduce the impact to minor.

The other impacts shown in the table are, while moderate prior to mitigation, reduced to minor following the application of the mitigation measures proposed. All other impacts were either negligible or minor prior to mitigation so are not presented.

The CHA identified that, with the diligent application of preventative / avoidance measures, mitigation measures and spill contingency plans, project-related direct and indirect impacts will not threaten the longevity and viability of the biodiversity features for which the critical habitats were designated.

All the mitigation measures have been included in the Biodiversity Action Management Plan (BAMP), see 'Environmental and Social Management' section.

**Table 4: Summary results of the critical habitat assessment**

Aspect / Impact	Significance (pre-mitigation)	Mitigation measure	Residual impact significance (post-mitigation)
<b>Impacts on critical habitat triggering fish species</b>			
<b>Underwater noise</b>			
Facility installation (large construction vessels) – behavioural effects from underwater noise	Minor / Moderate	No hammered piling will be used to install the Hibiscus Alpha OI (the facility will jack-up from the seabed). Ship engines and thrusters (which are used to turn the ship) will be started-up gradually to allow fish to move away, where possible. Ship engines and generators will be operated and maintained to minimise noise emissions.	Minor
Operation of FPSO and support / supply vessels - behavioural effects from underwater noise	Minor / Moderate	The FPSO is moored so propeller and thruster usage will be low. Support / supply vessel transfers from the logistics base will be optimised. Support / supply vessel speeds will be reduced to minimise underwater noise.	Minor
<b>Discharges to marine environment</b>			
Drill cuttings and drilling fluids discharge – turbidity impacts on adult fish, smothering of benthic eggs	Moderate	The chemicals used in the water-based drilling fluids (WBDF) will pose little or no risk to the environment and will only be discharged to sea after testing to confirm low toxicity. The non-aqueous drilling fluids (NADFs) will contain less than 0.001% Polycyclic Aromatic Hydrocarbons (PAHs). No discharge of whole non-aqueous drilling fluids (NADF) to sea. Cuttings will be treated using a cuttings drier to reduce the amount of oil on cuttings to 3% or lower prior to discharge. Low mercury and cadmium containing barite will be used in the drilling fluids in line with World Bank standards.	Minor
Produced water discharge – impacts from elevated temperature, salinity and chemicals	Moderate	The oil in water content of the produced water will be less than 30 mg/l in line with international good practice. Chemicals will be selected that minimise their effect on the environment and best available techniques (BAT) used to ensure that the environmental risks of added and naturally occurring chemicals in the produced water	Minor

Aspect / Impact	Significance (pre-mitigation)	Mitigation measure	Residual impact significance (post-mitigation)
		discharge is reduced, as far as practicable.	
Hydrotest water discharge – impacts from hydrotest chemicals	Moderate	A hydrotest management plan will be prepared that takes into account requirements in the IFC guidance for offshore oil and gas developments.	Minor
<b>Accidental event scenarios</b>			
Introduction of AIS – competition, alteration of habitats	Major	An AIS Management Plan has been developed for the project which aims to reduce the risk of introduction of alien species in vessel ballast water and biofouling. This will be implemented during all phases of the project.	Minor
Accidental spill, small scale bunkering spill – impacts of hydrocarbon contamination on adult fish and eggs/larvae	Moderate	<p>The risk of spills will be reduced by:</p> <ul style="list-style-type: none"> <li>rigorous monitoring of ship refuelling operations</li> <li>refuelling only in calm seas</li> <li>using certified, pressure tested and inspected fuel transfer hoses and spill free connectors.</li> </ul> <p>Any spills will be managed in accordance with the Shipboard Oil Pollution and Emergency Plan (SOPEP) that will comply with MARPOL (International Convention for Prevention of Pollution from Ships) requirements.</p>	Minor
Accidental spill of large amounts of oil due to well blowout, or collision between ships and FPSO, Hibiscus Alpha OI or drilling rig, leading to contamination of adult fish, fish eggs and larvae	Major	<p>The risk of a well blowout will be reduced by:</p> <ul style="list-style-type: none"> <li>monitoring and testing of well pressure</li> <li>inspection of well cementing operations</li> <li>testing of blowout preventors (equipment that shuts off the well in an emergency)</li> <li>training and certification of critical personnel.</li> </ul> <p>The risk of a collision will be reduced by:</p> <ul style="list-style-type: none"> <li>having safety exclusion zones around the FPSO, Hibiscus Alpha OI and drilling rig – non-authorized vessels not allowed to enter</li> <li>support vessel on site during drilling operations to provide alerts to other ships</li> <li>notices to mariners</li> </ul>	Moderate

Aspect / Impact	Significance (pre-mitigation)	Mitigation measure	Residual impact significance (post-mitigation)
		<ul style="list-style-type: none"> <li>warning lights on facilities and ships.</li> </ul> <p>In the unlikely event of a spill, the Ruche Field Development Oil Spill Contingency Plan will be implemented. BWE has arrangements in place with international spill response companies and associations in the event of a large-scale release.</p> <p>BWE will work with local agencies and environmental groups to identify marine areas sensitive to spills and develop strategies to protect these areas.</p>	
<b>Impacts on critical habitat triggering marine mammal (whales and dolphins) and turtle species</b>			
<b>Underwater noise</b>			
Facility installation (large construction vessels) – physical and behavioural effects on marine mammals and turtles	Moderate	<p>Mitigation measures for impacts of noise on fish are also applicable to cetaceans. In addition:</p> <ul style="list-style-type: none"> <li>a Marine Mammal Observer (MMO) will be deployed on the construction support vessel and works not started if whales, dolphins or turtles are observed close to the work area</li> </ul>	Minor
Operation of FPSO and support / supply vessels - physical and behavioural effects on marine mammals	Moderate	<ul style="list-style-type: none"> <li>project vessels will follow the project-specific 'Vessel Code of Conduct' developed to protect marine mammals and turtles.</li> </ul>	Minor
<b>Light spill</b>			
Light spill from facilities (from lighting and flaring) – attraction of turtles	Moderate	<p>Area lighting limited to that necessary for worker safety. Directional lighting used to minimise light spill onto the sea.</p> <p>When flaring, gas flow rates will be reduced as far as practicable. Any maintenance flaring scheduled outside of turtle hatchling season and the flame shielded to reduce light spill.</p> <p>Seasonal monitoring of potential light attraction effects on turtle hatchlings and other marine life will be done and mitigation measures adjusted if needed.</p>	Minor
<b>Accidental event scenarios</b>			
Project vessel collision with marine fauna – injury / mortality impacts	Moderate	<p>Project vessels will follow the 'Vessel Code of Conduct' developed to protect marine mammals and turtles.</p> <p>BWE will work with local agencies and environmental groups to improve understanding of the</p>	Minor

Aspect / Impact	Significance (pre-mitigation)	Mitigation measure	Residual impact significance (post-mitigation)
		Atlantic humpback dolphins and humpback whales in the area. Any collision will be reported to the National Agency of National Parks.	
Introduction of AIS – reduction in prey species	Major	Mitigation measures are the same as for impacts on fish, see above	Minor
Accidental spill, small scale spill – impacts of hydrocarbon contamination	Moderate		Minor
Accidental spill, large scale release of hydrocarbons – impacts of hydrocarbon contamination	Major		Moderate
<b>Impacts on highly threatened and / or unique ecosystems and protected areas</b>			
<p>Impacts on the species that the EBSAs and protected areas have been designated for could have impacts on the highly threatened and / or unique ecosystems and protected areas as a whole.</p> <p>Ranking of pre and post mitigation impacts has not been undertaken for the ecosystem as impact scoring is covered in detail within the species sections above.</p> <p>The collective impacts described above are not considered to affect the integrity or ecological functioning of the EBSAs and as such only minor residual impacts are likely (with the exception of a large-scale accidental hydrocarbon release the residual impact scoring has been assigned a moderate scoring).</p>			

NB: Impacts that were either negligible or minor prior to mitigation are not presented in this table for summary purposes.

## Social Baseline

A social baseline was compiled based on focus group discussions (FGDs) and key informant interviews (KIIs) with residents in Port-Gentil and a number of coastal villages near the Ruche EEA (Figure 8). Five villages were included in the study. These were sampled based on their geographical position, the level of services provided, their diversity in livelihood strategies and their fishing activities. Data was obtained at village level from women, local leaders, fishers, intertidal gleaners, health personnel, people involved in tourism and natural resource users. Information was collected by the TERE field team between March and July 2021. Existing reports and publicly available information were also used to provide information at regional and national level for the baseline.

The social baseline indicates that the population of Gabon is highly urbanised, including the coastal area with few rural villages. The population is young and there are a number of ethnic groups who co-exist peacefully.

Low educational levels, limited vocational skills, and high unemployment are causing a shortage of skilled people required for the economy of Gabon (including oil and gas) and are contributing to high poverty rates.

Crop farming and fishing are the primary economic activities in the sample villages, livestock rearing, natural resource collection and aquaculture are marginal.

There is a relatively high maritime shipping density along the coast of Gabon, particularly in the vicinity of Port Gentil. Oil and gas are still the mainstay of the Gabonese economy, however due to a decrease in oil prices, economic diversification is increasingly being considered. The tourism sector, in particular nature-based tourism, is earmarked by the government for development.

Malaria, HIV, tuberculosis and diabetes are prevalent diseases in the AOI. There are risks of zoonotic diseases and the number of people with non-contagious diseases is increasing. The health facilities in the sample villages face a number of challenges including disruption of essential drugs, lack of medical diagnostic devices, staff and skill shortages, infrastructure and equipment shortages.

Services and infrastructure are sub-optimal in most coastal villages. Waste management is a challenge in Gabon and was raised as a concern by stakeholders.

Key sensitivities identified in the social baseline include regional importance of small scale/artisanal fisheries; deep sea / industrial fisheries; shipping and navigation; and reliance of vulnerable people (women) on intertidal gleaning.



**Figure 8: Location of villages on coast adjacent to Ruche EEA**



**Figure 9: Wooden canoe equipped with nets in the community of Mambi**



**Figure 10: Health centre in the community of Ndindi**

## Social Impact Assessment

Four socio-economic topics and associated receptors were identified for inclusion in the social impact assessment. Cultural heritage was scoped out as there are no known offshore cultural heritage sites.

**Table 5: Relevant socio-economic topics**

Socio-economic topic	Receptors
Economy and livelihoods	<ul style="list-style-type: none"> <li>• Small scale / artisanal fisheries</li> <li>• Deep sea / industrial fisheries</li> <li>• Recreational fishing (sports fishing)</li> <li>• Natural resource harvesting – intertidal gleaners</li> <li>• Shipping and navigation</li> <li>• Tourism operators and recreation</li> </ul>
Health	<ul style="list-style-type: none"> <li>• Public health</li> </ul>
Infrastructure and services	<ul style="list-style-type: none"> <li>• Infrastructure and services</li> <li>• Port facilities</li> <li>• Heliport</li> <li>• Road network</li> <li>• Waste management facilities</li> </ul>
Community safety, security and welfare	<ul style="list-style-type: none"> <li>• Community safety, security and welfare</li> </ul>

The key results of the social impact assessment are shown in Table 6. The majority of residual negative impacts associated with routine / planned events have been categorised as negligible / minor.

The exception is the potential for increased transmission of communicable disease from foreign project workers interacting with local communities in Libreville and Port Gentil leading to pressure on local health care facilities. Positive impacts have been identified associated with project employment opportunities; provision of goods and services to the project; and from BWE's corporate social investment projects.

In terms of unplanned / accidental events, moderate residual impacts have been identified for the following scenarios: large scale release of hydrocarbons (e.g., collision with FPSO or well blowout); accidental introduction of AIS; road traffic accidents associated with increased road traffic to the logistics base; and accidental project vessel interaction with fishing vessels / gear.

**Table 6: Summary results of social impact assessment**

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation or enhancement measures	Residual impact significance (post-mitigation)
<b>Impacts from support activities (movement of supply vessels and construction vessels)</b>			
Support / supply vessel and construction vessel transfers – disruption to fisheries - small scale / artisanal	Moderate	<p>Project vessels will operate in accordance with the requirements of the Port Authority, which plans and coordinates vessel traffic movements within its jurisdiction.</p> <p>Project vessels will be equipped with navigational aids and communication systems, follow specified routes, and observe speed restrictions.</p> <p>A third-party grievance procedure in place that will be circulated to relevant stakeholders.</p>	Minor
<b>Impacts from helicopter support activities</b>			
Helicopter support activities – disturbance of local communities (potential public health issues)	Moderate	<p>A flight plan for each helicopter transfer will be developed and agreed with the relevant government authority.</p> <p>Low flights directly over communities will be avoided, where it is safe and practical to do so.</p> <p>Helicopter flights will take place during daylight hours to minimise noise disturbance to communities.</p> <p>Helicopter transfers will be optimised as far as possible to reduce the number of flights undertaken.</p>	Minor
<b>Impacts from logistics base operation</b>			
Logistics base operations – impacts from ineffective waste management, indirect impacts from increased pressure on Port Gentil waste management	Moderate	<p>Waste collection and temporary storage will be designed to minimise the risk of escape to the environment. Records of waste volumes, waste transfer manifests, safe disposal certificates will be kept in order to effectively track waste generated by the project.</p> <p>In order to minimise pressure on existing waste management in Port Gentil, waste transferred through the logistics base will be collected and transported by a registered and appropriately licensed waste management contractor (e.g., IEG).</p>	Minor
<b>General impacts (project wide)</b>			
General (Project-wide) – employment opportunities	Positive	Compliance with applicable national labour legislation. Treatment of employees will be consistent with relevant requirements of the International Labour Organisation (ILO).	Positive
General (Project-wide) – provision of goods and services	Positive		Positive

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation or enhancement measures	Residual impact significance (post-mitigation)
		<p>Prioritisation of recruitment of Gabonese nationals and preparation of a Local Employment Plan (or equivalent). Information about recruitment process will be made publicly available.</p> <p>Local procurement of goods and services will be prioritised.</p>	
General (Project-wide) – impacts on community safety, security and wellbeing	Positive	Timely engagement with communities and relevant stakeholders to identify challenges, needs and priorities to inform community social investment activities which will be monitored and evaluated	Positive
General (Project-wide) – increased transmission of communicable disease leading to increased pressure on local health care facilities	Moderate	<p>All employees will undergo pre-employment medical screening and regular health screening and will be educated on disease transmission pathways.</p> <p>A Worker Code of Conduct will be developed for employees that includes rules around interacting with other workers and local communities.</p> <p>The emergence of pandemics will be monitored, and emergency response plans updated.</p> <p>Timely engagement with communities and stakeholders will be undertaken on risks to public health.</p>	Moderate
<b>Unplanned / accidental events</b>			
Impacts from accidental release of hydrocarbons			
Accidental spill, large scale release of hydrocarbons (well blowout / FPSO collision) – impacts on fisheries and natural resource harvesting	Moderate / major	See preventative mitigation in Table 4 that is designed to reduce the likelihood of a spill event. In the unlikely event of a hydrocarbon release the Ruche Field Development Oil Spill Contingency Plan will be implemented.	Moderate
Accidental spill, large scale release of hydrocarbons – impacts on coastal communities	Moderate		Minor
Accidental spill, large scale release of hydrocarbons – impacts on tourism and recreation	Moderate		Minor
Accidental spill, large scale release of hydrocarbons – impacts on shipping and ports	Moderate		Minor
Impacts from accidental release of alien invasive species			

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation or enhancement measures	Residual impact significance (post-mitigation)
Accidental introduction of AIS – potential impacts on fish stocks	Moderate	An AIS Management Plan has been developed for the project which aims to reduce the risk of introduction of alien species in vessel ballast water and biofouling. This will be implemented during all phases of the project.	Minor
Impacts from accidental project vessel interaction with fishing vessels / gear			
Project vessel accidental interaction with fishing vessel / gear – impacts on artisanal fisheries	Moderate	Project vessels will: <ul style="list-style-type: none"> <li>Operate in accordance with the requirements of the relevant government (e.g., port and maritime) authorities.</li> <li>Be equipped with navigational aids and communication systems, follow specified routes, and observe speed restrictions.</li> <li>Spot, monitor and communicate with small vessels / artisanal fishing vessels, as necessary.</li> </ul> A third-party grievance procedure is in place that will be circulated to relevant stakeholders.	Moderate
Project vessel accidental interaction with fishing vessel / gear – impacts on deep sea / industrial fisheries	Moderate		Minor

NB: Impacts that were either negligible or minor prior to mitigation are not presented in this table for summary purposes.

## Ecosystem Services Assessment

Ecosystem services are the benefits that people, including businesses, obtain from natural ecosystems, such as the sea, mangroves and shore. There are two types of ecosystem services:

- Type 1, which is an of ecosystem service that is impacted by the Project, such as commercial fisheries that may be affected by the safety exclusion zones around the project facilities; and
- Type 2, which is an ecosystem service that the Project depends on.

It should be noted that no Type 2 ecosystem services were identified as relevant to the Project, so the assessment focussed on Type 1 services only.

A systematic, detailed, ecosystem services assessment was conducted that comprised:

- identifying the ecosystem services that were relevant to the project and then screening them to identify important (“priority”) ecosystem services (based on the level of impact of the project on the ecosystem service, the importance of the ecosystem service to the beneficiary, and the level of influence that the project has over the ecosystem service)
- collecting baseline data, including interviews with relevant stakeholders
- identifying, assessing and mitigating potential project impacts on the ecosystem service using the methodology described in ‘Impact Assessment Methodology’ considering both planned / routine events and unplanned / accidental events.

The ecosystem service assessment identified eight priority ecosystem services across five marine ecosystems. The marine ecosystems are:

- The shallow seawater column from the shoreline out over the continental shelf – this is a shallow, coastal habitat, which is dominated by phytoplankton, and supports commercially important species including sardinellas, mackerel and shad (small pelagic species).
- The water over the continental slope – this covers various habitats throughout the water column including the top 200 m of open water. This supports commercially important species including tuna (large pelagic species).
- The seabed – the seabed off Gabon is predominantly soft substrate, creating habitat for a variety of species living both on, in, and just above the seabed. This includes commercially important species such as demersal fish and crustaceans (prawns) and squid.
- Mangroves – coastal and estuarine ecosystems which may support nursery, breeding and juvenile foraging habitat for species that spend their adult lives offshore. The Nyunga region supports a small proportion of this ecosystem in Gabon, with mangroves located around the Banio estuary, near Mayumba, and throughout the lagoons along the coast. This ecosystem is only within the accidental events AOI.
- Sandy shores – this covers the majority of the coastline between Mayumba and the border with Congo. Within Gabon this ecosystem provides nesting habitat for sea turtles, including globally important nesting beaches for leatherback turtles. This ecosystem is only within the accidental events AOI.

The eight priority ecosystem services with a definition / description and a list of the ecosystems associated with them are shown in Table 7.

**Table 7: Identified priority ecosystem services**

Priority ecosystem service	Definition / description
<b>Supporting services</b>	<b>The natural processes that maintain the other services - these include habitat and species support, nutrient capture and recycling and primary production</b>
Habitat and species support	Habitats and species themselves provide the support for the other ecosystem services, e.g., habitat for spawning, breeding, feeding or fish for capture fisheries.
Primary production	Primary producers are generally phytoplankton.
<b>Provisioning services</b>	<b>The products people obtain from ecosystems - these may include food, freshwater, timber, fibres and medicinal plants</b>
Capture fisheries	Commercial fisheries including bonga shad, sea bass, emperors, sea bream, sole, red hake, pagora, horse mackerel, sardinellas, mackerels, carangids (false tuna), African sea catfish, meagre, barracudas, shrimp, prawns and crabs offshore and catfish, sea bream, sole, rouge (possibly red hake), barracuda, emperors, sea bass, carp, sardines, prawns, lobster and crabs in the Banio Lagoon.
Wild foods	Turtle eggs (although this activity is technically illegal), oysters and other products from inter-tidal gleaning.
<b>Regulating services</b>	<b>The benefits people obtain from the regulation of ecosystem processes - these may include surface water purification, carbon storage and sequestration, climate regulation and protection from natural hazards</b>

Priority ecosystem service	Definition / description
Air quality regulation	The offshore atmosphere, both air and water, maintains the local air quality through absorption of potential pollutants.
Regional / local climate regulation	The ocean acts as a sink, with seawater absorbing atmospheric gases, particularly carbon dioxide, and thus controlling atmospheric greenhouse gas composition. Phytoplankton also contribute to climate regulation.
Water purification and waste treatment	Mangroves provide water purification and waste treatment services, are an important feature of the Gabonese landscape. Mangroves help to purify the water and provide waste treatment through removal of organic wastes and pollutants.
Natural hazard regulation	Mangroves and sandy shores provide protection from storm surges, waves and flooding.

The key results of the impact assessment are shown in Table 8. There are three major potential impacts prior to mitigation, reducing to moderate after mitigation, on habitat and species support, capture fisheries and wild food all caused by a large-scale accidental release of hydrocarbons (e.g., from a well blowout, or collision with the FPSO). However, it is important to acknowledge that the likelihood of this type of accidental event scenario is extremely unlikely with the mitigation measures in place.

The impacts of routine emissions to air, and emissions from an accidental fire associated with oil spills, are also moderate after mitigation, but the high ability of the offshore environment to absorb air emissions, combined with the proposed mitigation measures should ensure these impacts are as low as reasonably practicable (ALARP).

The other impacts shown in the table are, while moderate prior to mitigation, reduced to minor following the application of the mitigation measures proposed. All other impacts were either minor or negligible prior to mitigation so are not shown in the table.

The assessment confirmed that, with the diligent application of key avoidance, mitigation measures and spill contingency plans, project-related impacts will not threaten the value and use of ecosystem services. As discussed in the critical habitat assessment, a Biodiversity Action Management Plan (BAMP) has been developed that includes measures to ensure project-related activities result in no net loss or a net gain of biodiversity, which will benefit ecosystem services in the project area.

**Table 8: Summary results of ecosystem services impact assessment**

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation measures	Residual impact significance (post-mitigation)
<b>Habitat and species support</b>			
Installation of facilities and their physical presence			
Physical presence of facilities – creation of new habitat	Positive	None	Positive
Discharges to the marine environment			

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation measures	Residual impact significance (post-mitigation)
Drilling discharges – disruption of habitats and species supporting other ecosystem services	Moderate	<p>The chemicals used in the water-based drilling fluids (WBDF) will pose little or no risk to the environment and will only be discharged to sea after testing to confirm low toxicity.</p> <p>The non-aqueous drilling fluids (NADFs) will contain less than 0.001% Polycyclic Aromatic Hydrocarbons (PAHs).</p> <p>No discharge of whole non-aqueous drilling fluids (NADF) to sea. Cuttings will be treated using a cuttings drier to reduce the amount of oil on cuttings to 3% or lower prior to discharge.</p> <p>Low mercury and cadmium containing barite will be used in the drilling fluids in line with World Bank standards.</p>	Minor
Produced water discharges - disruption of habitats and species supporting other ecosystem services	Moderate	<p>The oil in water content of the produced water will be less than 30 mg/l in line with international good practice.</p> <p>Chemicals will be selected that minimise their effect on the environment and best available techniques (BAT) used to ensure that the environmental risks of added and naturally occurring chemicals in the produced water discharge is reduced, as far as practicable.</p>	Minor
Hydrotest water discharges - disruption of habitats and species supporting other ecosystem services	Moderate	A hydrotest management plan will be prepared that takes into account requirements in the IFC guidance for offshore oil and gas developments.	Minor
<b>Underwater noise</b>			
Facility installation (large construction vessels) – behavioural effects on species supporting other ecosystem services	Minor / Moderate	A Marine Mammal Observer (MMO) will be deployed on the construction support vessel and works not started if whales, dolphins or turtles are observed close to the work area	Minor
Operation of FPSO and support / supply vessels - behavioural effects on species supporting other ecosystem services	Moderate	Project vessels will follow the project-specific 'Vessel Code of Conduct' developed to protect fish, marine mammals and turtles.	Minor
<b>Accidental events</b>			
Accidental introduction of AIS - competition, alteration of habitats,	Moderate	An AIS Management Plan has been developed for the project which aims to reduce the risk of introduction of alien species in vessel ballast water and	Minor

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation measures	Residual impact significance (post-mitigation)
disruption to ecosystem services		biofouling. This will be implemented during all phases of the project.	
Accidental release of hydrocarbons – small spills (impacts on habitats and species supporting other ecosystem services)	Moderate	See preventative mitigation in Table 4 that is designed to reduce the likelihood of a spill event. In the unlikely event of a hydrocarbon release the Ruche Field Development Oil Spill Contingency Plan will be implemented.	Minor
Accidental release of hydrocarbons – large-scale spill (disruption of habitats and species supporting other ecosystem services)	Major		Moderate
<b>Primary production</b>			
Accidental events			
Accidental introduction of AIS - competition, alteration of habitats, disruption to planktonic producers	Moderate	See above	Minor
Accidental release of hydrocarbons – large-scale spill (impacts on plankton)	Moderate	See above	Minor
<b>Capture fisheries</b>			
Discharges to the marine environment			
Marine discharges (drilling, operational, produced water, hydrotest water discharges) – bioaccumulation of chemicals and contamination of fish stocks	Moderate	See above	Minor
Accidental events			
Project interaction with fishing gear / artisanal vessels	Minor / Moderate	Project vessels will: <ul style="list-style-type: none"> <li>Operate in accordance with the requirements of the relevant government (e.g., port and maritime) authorities.</li> <li>Be equipped with navigational aids and communication systems, follow specified routes, and observe speed restrictions.</li> <li>Spot, monitor and communicate with small vessels / artisanal fishing vessels, as necessary.</li> </ul>	Negligible / Minor

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation measures	Residual impact significance (post-mitigation)
		A third-party grievance procedure is in place that will be circulated to relevant stakeholders.	
Accidental introduction of AIS - potential for collapse in fish stocks	Minor / Moderate	See above	Negligible / Minor
Accidental release of hydrocarbons – large-scale spill (contamination of fish stocks)	Moderate / Major	See above	Moderate
<b>Wild foods</b>			
Accidental events			
Accidental introduction of AIS – potential for changes to availability of gleaning species	Moderate	See above	Minor
Accidental release of hydrocarbons – large-scale spill (impacts to gleaning species)	Major	See above	Moderate
<b>Air quality regulation and regional / local climate regulation</b>			
Emissions to air			
Emissions to air – changes in air quality and climate regulation	Moderate	<p>Equipment will be well maintained for optimal operational efficiency.</p> <p>The Hibiscus Alpha OI, FPSO and other generators will run at optimal power, instead of full power, for most of the project lifetime.</p> <p>Requirements of MARPOL 73/78 Annex VI (Air Pollution) Convention will be implemented.</p> <p>Fuel consumption of the BWE facilities will be regularly monitored as a check to further ensure the combustion efficiency of all systems.</p> <p>Support / supply vessel transfers from the logistics will be optimised.</p>	Moderate
Accidental events			
Fire associated with a well blowout – changes in air quality and climate regulation	Moderate	Mitigation measures with respect to accidental releases of hydrocarbons are listed above. The emergency relief systems included in the mitigation measures will include firefighting equipment.	Moderate
<b>Water purification and waste treatment and natural hazard regulation</b>			

Aspect / impacts	Impact significance (pre-mitigation)	Mitigation measures	Residual impact significance (post-mitigation)
Accidental events			
Accidental release of hydrocarbons – large-scale spill (impacts on mangroves and sandy shores)	Moderate	See above	Minor

NB: Impacts that were either negligible or minor prior to mitigation are not presented in this table for summary purposes.

## Cumulative Impact Assessment

Cumulative impacts refer to the total impact on the environment when Project-related impacts are added to impacts from other past, existing and planned future projects and activities, including intra-project activities in the Ruche EEA. Intra-project activities are considered to be the Ruche EEA field development as a whole, i.e., Tortue Phase 1 and 2 and Ruche Phase 1 projects and the future Ruche Phase 2 project. It is important, therefore, to undertake a cumulative impact assessment (CIA) to identify and assess cumulative impacts for planned and routine activities. Unplanned or accidental events are not considered in the CIA as it is very unlikely that major accidental events would occur at the same time.

A comprehensive exercise was undertaken to identify other projects and activities that could lead to cumulative impacts with the project and propose mitigation measures, considering the level of control of influence that BWE has on other operators and the contribution of the project to the overall impacts.

The CIA showed that the intra-project activities in the Ruche EEA will be an important contributor to greenhouse gas (GHG) emissions. The total quantity of GHG emissions from the intra-project activities will represent 0.5% of planned total emissions for Gabon in 2025. In particular combustion emissions from the BW Adolo FPSO and Hibiscus Alpha OI comprise 99% of Gabon’s planned fossil fuel combustion for the oil industry in 2025 and flaring on these facilities represents 25% of Gabon’s predicted flaring emissions in 2025. When project emissions are added to GHG emissions from other existing and planned future oil and gas operations in Gabonese waters (if commercially viable), it will make it difficult or impossible for Gabon to achieve its GHG targets, under the Paris Agreement. The project’s most significant GHG emissions are, however, outside of the defined scope of the CIA and occur when the oil is used, typically as refined fuels.

To mitigate these significant cumulative impacts BWE will design and operate its combustion equipment for optimum efficiency and minimise flaring through good oilfield practice. It should be noted that BWE has no direct control over emissions from the end use of the oil and the assessment of these impacts is beyond the remit of the Project. BWE will support any regional studies on GHG impacts coordinated by the Gabonese authorities.

Other cumulative impacts with existing and planned offshore projects and developments are listed below, but in these cases the project is a minor contributor to overall cumulative impacts:

- Cumulative effect of repeated disturbance of marine animals. In particular, there is concern about impacts on humpback whale, from underwater noise generated by project activities, other oil and gas exploration and production operations in the AOI, and shipping along the Gabonese coastline as these are all on the migration route for humpbacks. There is also

potential for indirect impacts on the Mayumba National Park and EBSA, which is established to protect baleen whale migratory pathways. BWE will mitigate underwater noise as described earlier (e.g., presence of Marine Mammal Observers) and will engage with the International Whaling Commission, the conservator of Mayumba National Park, and the Wildlife Conservation Society.

- Cumulative effects of long-term exposure of marine animals, particularly fish, to produced water discharges in the Ruche EEA and from other oil and gas operations in the AOI and along the Gabonese coastline including indirect impacts on the Aquatic Reserve of the Great South of Gabon that is designated for the protection of biodiversity and fish stocks. Mitigation measures with respect to the discharge of produced water have been described earlier. BWE will also support any regional studies on produced water impacts coordinated by the Gabonese authorities.
- Cumulative increased risk of the introduction and spread of AIS from other oil and gas installations and from the international tankers visiting the BW Adolo FPSO. Potential risks on marine animals and ecosystems, and possibly indirect impacts on the Aquatic Reserve of the Great South of Gabon and Mayumba National Park that are designated for the protection of biodiversity. BWE has produced a detailed project-specific Alien Invasive Species Management Plan to reduce the risk and will also support any regional studies on AIS impacts coordinated by the Gabonese authorities.
- Cumulative effects on the fishing industry from the safety exclusion zones for the Ruche EEA, other oil and gas fields and the Aquatic Reserve of the Great South of Gabon and Mayumba National Park. BWE will engage with government authorities, shipping companies, industrial fishing associations to help manage these impacts.

## **Environmental and Social Management**

BWE is developing a project-specific management framework document which integrates all management system policies into an environmental and social management system (ESMS) structure with clear lines of responsibilities between those elements managed by BW Energy, BW Offshore, contractors and subcontractors.

The ESMS includes:

- Legal register and actions matrix
- Biodiversity Action and Management Plan
- Alien Invasive Species Management Plan
- Stakeholder Engagement Plan
- Third-Party Grievance Management Procedure
- Emergency Response Plans
- Social Management Plan
- Social Risk and Impact Management Procedure.

These management plans set out the mitigation measures to be implemented by BWE and its contractors and provide for monitoring and reporting of implementation.



## Submission of Comments

Please submit any questions, comments or concerns about the project to BWE. Your feedback will be considered by the BWE Gabon project going forwards. To report a grievance, please contact a member of BWE's Community Liaison Team on: Tel: +241 77 29 54 03 / +241 77 83 82 82 or email [geraldine.ewomba@bwenergy.no](mailto:geraldine.ewomba@bwenergy.no) / [guy-marcel.ndziame@bwenergy.no](mailto:guy-marcel.ndziame@bwenergy.no)