



2D Seismic Survey in Block AD-10, Offshore Myanmar

Initial Environmental Examination – Executive Summary

02 December 2015

Environmental Resources Management

www.erm.com



The world's leading sustainability consultancy

2D Seismic Survey in Block AD-10, Offshore Myanmar

Initial Environmental Examination - Executive Summary

Environmental Resources Management

ERM-Hong Kong, Limited

16/F, Berkshire House 25 Westlands Road Quarry Bay Hong Kong Telephone: (852) 2271 3000 Facsimile: (852) 2723 5660

http://www.erm.com

Client: Project No: Statoil Myanmar Private Limited 0267094 Summary: Date: 02 December 2015 Approved by: This document presents the Initial Environmental Examination (IEE) - Executive Summary for 2D Seismic Survey in Block AD-10, as required under current Draft Environmental Impact Assessment Procedures Craig A. Reid Partner Addressing MOECAF Comments, Final for MOGE RS CAR CAR 02/12/2015 1 0 Draft Final RS JNG CAR 31/08/2015 Revision Description Checked Approved Date By Distribution \square Internal \bowtie Public Confidential

Document Code: 0267094_Scoping Report_Cover Page.docx

1 EXECUTIVE SUMMARY

1.1 PURPOSE AND EXTENT OF THE IEE REPORT

Statoil Myanmar Pte Ltd (Myanmar Branch) (Statoil) is planning to undertake an exploratory campaign by means of a two-dimensional (2D) seismic survey in Block AD-10, which was awarded to Statoil in 2014 as part of the Myanmar Government's 2013 Offshore Bid Round. This campaign will provide information that will be basis for future decisions on if, and where, to drill exploration wells. Statoil signed the Production Sharing Contract (PSC) with the Myanma Oil and Gas Enterprise (MOGE) on the 30th April 2015. The location of the Block is shown in *Figure 1.1*.

As per the draft Environmental Impact Assessment (EIA) Procedures, the Project requires an Initial Environmental Examination (IEE) as the appropriate level of assessment. Statoil has commissioned **Environmental Resources Management** (ERM), supported by local specialists **Resource and Environment Myanmar** (REM), to undertake the IEE Study. More details on the project overview, justification and purpose are provided in *Chapter 2* of the IEE Report ⁽¹⁾.

A Project Proposal Report was submitted to the Ministry of Environmental Conservation and Forestry (MOECAF) on 3rd October 2014. The Report provided the Screening Study for the Project, including a discussion on the potential impacts and likely mitigation. The Report allowed the MOECAF to determine what type of assessment was required. Under Section 7 of the Environmental Conservation Law (2012) and Articles 52 and 53 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar, it was determined that Statoil is required to undertake an Initial Environmental Examination (IEE) and to obtain an Environmental Compliance Certificate (ECC) in accordance with the *Environmental Impact Assessment (EIA) Procedures ("the Procedures"*).

The Project Proposal Report allowed a Terms of Reference (ToR) to be created for the Project which served as the basis for the determination of the scope of the IEE Report and the Environmental and Social Management Plan (ESMP). The ToR is important to ensure that the Project proponent has allocated sufficient time to conduct the IEE Study. The new *EIA Administrative Guidance* (July 2015) provided by MOECAF to ERM in August 2015 was also followed to create the IEE Report, the Executive Summary and the ESMP.



SUMMARY OF THE ACTIVITIES UNDERTAKEN DURING THE IEE STUDY

The Project commenced with a screening and scoping phase under which the Project identified potentially affected stakeholders, Project Area of Interest ⁽¹⁾, potential impacts and gathered baseline data. The Project also conducted consultations with a number of government bodies, scientific organisations and NGOs in order to collect data. This information fed into the Project Proposal Report. In addition, a Scoping Report was prepared for internal use at Statoil in order to define the study limits and the key potential impacts from the Project.

After the initial screening and scoping phase, the environmental and social impact assessment (ESIA) phase commenced. The ESIA phase included stakeholder consultations in Nay Pyi Taw, Sittwe, Thandwe and Gwa. Thandwe and Gwa were selected for the public consultations as they are the closest townships to the Project. These consultations were undertaken in order to present the Project information, present Statoil, discuss the currently known baseline conditions and potential impacts and gather comments, concerns or queries from stakeholders to be included in the impact assessment and development of mitigation measures for the IEE Report. This also involved a literature review using online resources to help gain understanding of the biological, physical and social environment. This baseline information was then verified to the extent possible through consultations within Rakhine with a variety of stakeholders during the public consultations.

1.3 **PROJECT ALTERNATIVES**

1.2

Consideration of Project alternatives was undertaken as part of the IEE study in order to attempt to avoid or reduce any adverse environmental and social impacts and maximise or enhance any potential project benefits.

The different options included:

- The type of streamer to be used; it was suggested that solid or gel-filled streamers would be preferential as they do not leak when damaged, and are less sensitive to weather and wave noise.
- The project would be located as far as possible from any key sensitive receivers. In this instance, the Project is over 150 km from the coastline of Manaung Island where there are key coastal sensitive habitats (e.g. coral habitat); and
- The navigational safety zone during seismic operations was selected to be mobile (i.e. around the seismic vessels and equipment), instead of covering the whole Block, in order to reduce impacts on other marine users.

⁽¹⁾ The Project Area of Interest was defined as the area within Block AD-10 as well as its immediate surroundings. As the Block is located over 200 km from the mainland coast, the immediate surroundings would not encompass the adjacent nearshore waters and coasts of Rakhine State mainland.

The "No Project" alternative was considered (i.e. no seismic survey would be conducted). This would mean that no further exploration activity could be conducted in this Block; such as drilling exploration wells. This would in turn mean that no further oil and gas development would be able to be undertaken. The exploration for oil and gas in this Block is required to help stimulate the economy of Myanmar. No Project would result in fewer opportunities for gas supply to the domestic market and could lead to less employment opportunities and less economic growth.

A description of the project activities is provided in *Chapter 4* of the IEE Report and is summarised below.

The Selected Project Alternative

Marine geophysical seismic surveys are used to define sub-seabed deposits and geological structures. A specialized seismic survey vessel is used which tows an impulse emitting sound source. High energy low frequency sounds are produced by the sound source and these sound waves bounce off the subsurface rock formations and return to the surface where the seismic energy is collected by an array of receivers (hydrophones) fixed onto streamers behind the vessel. The acquired data is then recorded by on-board computers for subsequent processing to produce profiles of the sub-seabed geology for interpretation by geophysicists. The principles behind marine seismic survey operations are illustrated in *Figure 1.2*.

Vessels

A specialized seismic survey vessel and an appropriate number of chase vessels (typically one to three) will be utilised for the survey. Chase vessels will scout ahead for obstructions and safely warn-off any vessels in the path of the survey. The vessels will be re-supplied with provisions from a port via a support vessel; however, there is no significant onshore component of this Project.

Typical seismic vessels are shown in *Figure 1.3* and the layout of the seismic vessel and equipment is shown in *Figure 1.4*. The different components of this figure are discussed below.

Airguns

The seismic sound source is created when a bubble of compressed air is discharged into water from airguns and the bubble subsequently collapses. The sound travels through the water column beneath the vessel to penetrate the subsurface rocks. Each gun is proposed to be towed by the vessels at a water depth of 8 m, using a firing interval of 10 seconds.

Streamer

The receivers (hydrophones) will be encased in a long cable or "streamer" towed behind the seismic vessel. For a 2D seismic survey there is just one



The seismic survey vessel is purposely built for towing the airguns and streamers for conducting the seismic surveys.

Indicative seismic survey vessel specifications

Parameter	Specification *
No. of personnel onboard (POB) (crew + survey personnel)	40-60
Length	50 – 90 m
Width	15 – 20 m
Draft	5 – 6 m
Fuel consumption	9 – 15 tonnes/ day
Minimum operating depth	~ 10 m
Maximum load speed	Up to 15 Knots
Survey speed	4-5 knots

* Indicative only





Figure 1.3

Illustrative Example of Seismic Survey Vessels



FILE: 0278791k.cdr DATE: 28/08/2015



streamer, which will be 10 km in length, and towed at a water depth of 12 m. The acquired data is recorded by on-board computers for processing.

Emissions

Vessels will be required to follow International Convention for the Prevention of Pollution from Ships (MARPOL) requirements with regards to handling of waste, wastewater, air emissions and effluents.

Programme and Seismic Survey Area

Block AD-10 is located in the Rakhine Basin, offshore Myanmar and covers an area of about 9,000 km². The 2D seismic survey is planned to take place during April/May2016 ⁽¹⁾, for a period of about 45 days.

1.4 DESCRIPTION OF THE ENVIRONMENT TO BE AFFECTED BY THE PROJECT

The review of baseline conditions within the Area of Interest has identified that shallow nearshore waters off the Rakhine coast host habitats with enhanced biological productivity and higher biodiversity (such as coral habitats, seagrass beds, mangroves). However, the areas of coral habitat encompassing Manaung Island that are the closest to the Block are still located over 150 km (90 miles) away (*Figure 1.5*).

Of the fish identified to species level, one is listed as species of conservational concern (vulnerable or above) on the IUCN Red List (narrow barred Spanish mackerel (Scomberomorus commerson)). The most common marine mammal species observed in Myanmar waters during a survey in 2015 were dwarf spinner dolphin (Stenella longirostris roseiventris) and Bryde's Whale (Balaenoptera edeni). Given that many different species of marine mammal have been recorded during a seismic survey close to Block AD-10, it can be assumed that marine mammals will be present during the survey. Marine mammal species in Rakhine waters are shown in *Figure 1.6*. There are five species of marine turtle listed as present in the offshore waters of Rakhine State (Figure 1.7), all of which are listed as species of concern on IUCN Red List. The green, hawksbill and olive ridley turtle are also known to nest along the Rakhine coast from September to March with peak nesting in December and January. As such, turtles could be migrating through Block AD-10 to their nesting beaches in the Rakhine State during the survey period.

The main sources of livelihood in Rakhine State are agriculture, fisheries and livestock holdings. More than 50 percent of the population is dependent upon agriculture for their livelihood, while 13 percent engage in fishing, and 10 percent in livestock farming. The coastal areas in Rakhine are characterised by fishing and agriculture as the two main livelihood opportunities, followed by tourism and sale of timber.



Common Name	Latin Name	IUCN Red List
Baleen Whales		
Bryde's whale	Balaenoptera edeni	Data Deficient
Blue whale	Balaenoptera musculus	Endangered
in whale	Balaenoptera physalus	Endangered
lumpback whale	Megaptera novaeangliae	Least Concern
oothed Whales		
Blainville's beaked whale	Mesoplodon densirostris	Data Deficient
Owarf sperm whale	Kogia sima	Data Deficient
alse killer whale	Pseudorca crassidens	Data Deficient
Killer whale	Orcinus orca	Data Deficient
lelon-headed Whale	Peponocephala electra	Least Concern
Pygmy killer whale	Feresa attenuata	Data Deficient
Pygmy sperm whale	Kogia breviceps	Data Deficient
Short-finned pilot whale	Globicephala macrorhynchus	Data Deficient
Sperm Whale	Physeter macrocephalus	Vulnerable
Porpoise and Dolphins		
Owarf Spinner Dolphin	Stenella longirostris roseiventris	Data Deficient
ndo-pacific bottlenose dolphin	Tursiops aduncus	Data Deficient
ndo-pacific finless porpoise	Neophocaena phocaenoides	Vulnerable
ndo-pacific humpbacked dolphin	Sousa chinensis	Near Threatened
rrawaddy dolphin	Orcaella brevirostris	Vulnerable
Pantropical spotted dolphin	Stenella attenuata	Least Concern
Rissos dolphin	Grampus griseus	Least Concern
Spinner dolphin	Stenella longirostris	Data Deficient
Striped dolphin	Stenella coeruleoalba	Least Concern
Sirenian		
Dugong	Dugon Dugong	Vulnerable





.tonywublog.com)



halesanddolphinsoftene





hales.org)







(Source: www.whale-watching.co.za)





(Source: www.greatocean.com.au/)



Irrawaddy dolphin

(Source: www.eoearth.org)





FILE: 0274927o.cdr DATE: 13/07/2015

Marine Mammal Species Recorded in Myanmar Waters

Latin Name	Common Name	Myanmar Name	IUCN Status	Potential Presence in Block AD	0-10	
Lepoidochely olivacea	Olive ridley turtle	Leik Lyaung	Endangered	Reported to occur in Rakhine and local fishermen. Known to be nes likely to be present in Block AD-1	d have been observe ting in Rakhine Stat 0.	ed by e and
Caretta caretta	Loggerhead turtle	Leik Khway	Endangered	Reported to occur in Rakhine and local fishermen. Not known to ne	d have been observe st on the Rakhine Co	ed by bast.
Chelonia mydas	Green turtle	Pyin Tha Leik	Vulnerable	Reported to be nesting in Rakhin present in Block AD-10.	e State and likely to	be
Eretmochelys imbricata	Hawksbill turtle	Leik Kyet Tu Yway	Critically Endangered	Reported to occur in Rakhine and local fishermen.Known to be ne likely to be present in Block AD-1	d have been observe sting in Rakhine Sta 0.	d by te and
Dermochelys coriacea	Leatherback turtle	Leik Zaung Lyar	Endangered	Have historically been recorded now considered rare.	in Rakhine waters bu	ut are
dir						
dive	Hawksbi	II Turtle		Leatherback Turtle		
• 1.7		Marine Turtles in Ra	khine waters		Environmental Resources	

The majority of offshore fishing in Rakhine State is undertaken within water depths of less than 100 m and up to 20 miles from the coast. Typical boats used for fishing are shown in *Figure 1.8*. A relatively small number of communities actively fish in the deep-water area (>200m of water depth) (*Figure 1.9*). It was stated in all meetings that there is no local Rakhine fishing activity in the vicinity of Block AD-10 as it is too far offshore. It was reported that fishing vessels from outside the Area of Interest may fish in the Block. It is anticipated that there may also be large commercial trawlers from outside Rakhine State. In general, deep-water fishermen suggested that November to May was the best season for fishing as better weather meant that fishing boats are able to travel greater distances from shore. However, larger vessels from Yangon or outside of Myanmar may continue to fish in deep water throughout the year.

1.5 SIGNIFICANT ENVIRONMENTAL IMPACTS

The key potential impacts associated with the project and required mitigation measures are summarised below and shown in *Table 1.1*:

- Potential increases in ambient underwater sound and generation of sound pressure levels from the operation of air guns. These activities have the potential to impact ecologically sensitive receivers, e.g. marine mammals, marine turtles and fish.
- Potential water contamination and related secondary impacts to biodiversity and fishing from accidental spills of chemicals or fuel (e.g. during offshore re-fuelling).
- Potential risk of entanglement with marine turtles by the operating seismic survey hydrophone streamers.
- Potential short-term disturbance to fishing activities.
- Potential risk of collisions with fishing vessels and other marine users and entanglement of fishing gear by the operating seismic hydrophone streamer.

Table 1.1Summary of Potential Impacts and the Residual Impact Significance

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impact
Impacts from towed equipment by collision with or entrapment of marine turtles	 Install turtle guards on seismic survey tail buoys in order to reduce the risk of trapping turtles in the seismic equipment. Implement JNCC Guidelines ⁽¹⁾ including the alignment of Contractor operations with JNCC Guidelines. In line with JNCC guidelines, implement a soft-start 	Moderate

 The JNCC "Guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys, 2010"





Large boats in Thabyugyiang

Small boats in Thabyugyaing

Ice delivery to large boats in Thabyugyaing

Boat size	Dimensions (length)	Distance offshore	Depth Range (m)	Trip Duration (days)	Nets used
Small	20 to 35 ft	Up to 18 km	Up to 50 m	1-7	Trawl Gill Net Traps
Large	50 to 90 ft	Up to 55 km	Up to 100 m	2-15	Drift Net Longline / Hook & line Trawl Surrounding Gear
Figure 1.8	Typical boats	size and associated details in co	pastal villages of Rakhine		Environmental Resources Management ERM



Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impact
	procedure to allow adequate time for marine fauna to leave the area).As an enhancement measure, all sightings of marine mammals / turtles should be recorded and reported to MOECAF following survey completion.	
	 Optimum airgun configurations to ensure that the lowest possible sound level of airguns is selected. Implement JNCC Guidelines ⁽¹⁾ including alignment of Contractor operations with JNCC Guidelines. In line with JNCC guidelines: Implement a soft-start procedure to allow adequate time for marine fauna to leave the area, Dedicated Marine Mammal Observers will be on-board 	Minor (for fishes)
Impacts from underwater sound on marine fauna	 to undertake pre-shooting search the vessel to postpone start-up if mammals observed within 500 m and Passive Acoustic Monitoring (PAM) will be used to detect marine mammals in the vicinity of the seismic vessel during night time or low visibility operations. To ensure protection of certain marine mammal species, the soft-start procedure will be extended to between 20-30 minutes duration. As an enhancement measures, all sightings of marine mammals / turtles should be recorded and reported to MOECAF following survey completion. 	Moderate (for marine mammals and turtle)
Impacts from unplanned spills on marine fauna	 Accepted industry good practice operating procedures will be implemented, including an offshore re-fuelling plan. Contingency plans will be prepared and implemented, e.g. vessel Shipboard Oil Pollution Emergency Plans (SOPEPs). 	Negligible
Impacts on marine users, fisheries and fishing communities from physical presence of seismic vessel, and equipment, unplanned collisions and underwater sound	 A mobile navigational safety zone will be implemented around the seismic vessel and equipment. An appropriate number of chase vessels that will liaise with fishermen and other mariners. The chase vessel(s) will have Myanmar speaking Fishing Liaison Officers on-board. Survey vessels will comply with international standards of navigational safety. A Stakeholder engagement plan will be developed to ensure timely sharing of information on the movement of survey vessels. Although this measure does not affect the impact significance, a grievance mechanism for the Project will be disclosed and implemented and timely investigation of any grievances will be conducted. 	Negligible (shipping, fishing activities) and livelihoods)

1.6 THE PUBLIC CONSULTATION AND PARTICIPATION PROCESS

Statoil undertook public consultation in Rakhine State in June 2015 in order to raise awareness for the project, collect baseline data and to receive opinions on the Project to feed into the IEE study, development of mitigation measures and the ESMP. The public consultation was conducted in the two townships closest to the Block; Thandwe and Gwa.

The stakeholder consultation meetings were structured to introduce the Project and Statoil, allow for the public to raise any comment, queries or concerns on the proposed Project and to collect environmental and social baseline data. The consultation materials used included a 2 page flyer explaining the project activities that was provided to all meeting attendees, a poster / presentation and questionnaires to collect information on the villages and townships visited. Information requested related to the profile of the village, fishing activities including locations, methods and type of catch and environmental questions on species present and locations of key habitats. This information was used to verify the secondary baseline data collected.

A summary of the public consultation, including information on date and venue, is provided in *Table 1.2*. Photos taken during the consultations showing the participants and meeting locations are provided in *Figure 1.10*.

Table 1.2Summary of Consultation Meetings undertaken as part of the IEE process

Date	Location
11th June 2015	Chief Minister Meeting
15th June 2015	Thandwe Township Meeting
16 th June 2015	Thabyugyaing Village Meeting
17th June 2015	Gwa Township Meeting
18th June 2015	Sat Thwar Village Meeting

Some of the key concerns and expectations of the stakeholder groups identified during the consultation meetings included: social investment and the likely benefits to local people and/or Rakhine State from the Project, the potential impacts of the Project on the fishing activities in offshore areas and impacts from future operations such as drilling. Drilling impacts will be covered in a future separate environmental and social impact assessment, if relevant. It should be noted that in general very few questions were asked regarding the proposed Project as it was generally felt that the coastal fishing activities would not overlap and therefore would not be impacted by Project activities.

1.7 SUMMARY OF THE EMP

An Environmental and Social Management Plan (ESMP) is provided for this Project separately. This plan discusses the mitigation measures adopted by the Project in order to ensure that all potential impacts are minimised and reduced as far as practicable during the operation of the seismic survey.

This ESMP provides the procedures and processes applied to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which Statoil has committed. The ESMP provides details of all the mitigation measures mentioned above and lists the reporting and monitoring requirements relevant to the Project. Some of the key points of the ESMP are summarised below.

A program will be developed to monitor for compliance with relevant regulatory standards to ensure that subcontractors are meeting contractual



Photo 1: Consultations in Sat Thwar



Photo 2: Consultations in Thabyugyaing



Photo 3: Q&A session at Sat Thwar



Photo 4: Secondary School in Sat Thwar



Photo 5: Meeting Hall in Sat Thwar Village



Photo 6: Meeting Hall in Thabyugyaing

Figure 1.10

Photo Records of Stakeholder Consultation

Environmental Resources Management



DATE: July 2015

obligations with respect to work practices and design specifications (e.g. Project emission standards). Supervision of subcontractor activities will be conducted by the seismic contractor and monitored by the Statoil on-board Health, Safety, Security and Environment (HSSE) representative.

Statoil will also submit an Environmental Monitoring Report to MOGE and MOECAF within 60 days after completion of the Project. The report will include the following information collected during the geophysical data acquisition program: safety record, waste record and marine mammals observation report.

1.8 CONCLUSIONS AND RECOMMENDATIONS OF THE IEE REPORT

The disclosure process will include disclosure of the executive summary of the IEE study in Myanmar language in the townships visited; Thandwe and Gwa. The IEE Report disclosure will also be advertised in two newspapers; one national and one local Rakhine. The project will also disclose information about the grievance mechanism for the project and information regarding movement of the seismic survey vessel to stakeholders. Detailed plans for disclosure will be developed prior to the commencement of the Project.

The engagement activities thus far, were undertaken as part of the IEE process. However, stakeholder engagement is understood to be a continuous process to be undertaken throughout the life of the Project, in this case during the duration of the seismic survey. Statoil will develop a Stakeholder Engagement Plan (as indicated in the *Section 7* of the IEE Report) to manage this ongoing consultation, address concerns if new stakeholders emerge and monitor stakeholder feedback.

The IEE Study for the 2D seismic survey in Block D-10 was conducted to comply with the requirements of the MOECAF draft EIA Procedures. The IEE demonstrates the proponent understands the environment and social setting in which they are operating and has properly assessed the key potential environmental and social impacts associated with the proposed Project. А project-specific, dedicated Environmental Social Management Plan (ESMP) has been developed and presented as a tool to manage impacts associated with the Project and ensure legislative compliance and standards of good practice during the execution of the survey in Block AD-10. Provided that the recommended mitigation measures are properly implemented, it is expected that the environmental and social impacts of the proposed seismic survey at Block AD-10 would be managed by Statoil in a professional and acceptable manner. As such, the IEE concludes that **no Major** impacts on the environment and people are anticipated from this Project and all impacts have been properly mitigated to be as low as reasonably practical.