**Myanmar: Environmental & Social Impact Study for Offshore Bay of Bengal Block A-4**

**Initial Environmental Examination Report – Executive Summary**

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<td>This document presents the <em>Initial Environmental Examination Report – Executive Summary</em> as required under the study <em>Myanmar: Environmental &amp; Social Impact Study for Offshore Bay of Bengal Block A-4</em> (Tender Ref 118899TND).</td>
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<tr>
<td>25. Nov. 2015</td>
<td>Craig A Reid</td>
</tr>
<tr>
<td></td>
<td>Partner</td>
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EXECUTIVE SUMMARY

1.1 THE PURPOSE AND EXTENT OF THE IEE REPORT

Myanmar Oil and Gas Enterprise (MOGE) have the exclusive authority to carry out all Petroleum Operations in Myanmar and BG Group, as operator, is responsible to the MOGE for the execution of Petroleum Operations in the A-4 Contract Area. **BG Group** (through its local branch company BG Exploration and Production Myanmar Pte Ltd) is planning to undertake a geophysical and geological sampling campaign to test the prospectivity of the waters offshore of the Rakhine State for hydrocarbons using seismic, gravity and magnetics surveys in conjunction with seabed sampling surveys (‘the Project’). These works will take place within a specific Activity Area within Block A-4 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. **BG Group** 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 Section 2 of the IEE Report (1). This Final IEE Report is available on BG Group’s website: http://www.bg-group.com/484/where-we-work/myanmar/ and upon request via email: info.myanmar@bg-group.com.

A Project Proposal Report was submitted to the Ministry of Environmental Conservation and Forestry (MOECAF) on 16th February 2015. 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 BG Group 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 set out the required contents of the IEE Report. The new EIA Administrative Instruction (July 2015) provided by MOECAF to ERM in August 2015 was also used to create the IEE Report, this Executive Summary and the Environmental and Social Management Plan.

Figure 1

Block A-4 and Area of Interest

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
1.2 **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 assessment was prepared for internal use at BG Group 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 Sittwe, Kyaukphyu, Ramree, Manauung and Thandwe. These consultations were undertaken in order to present the Project information, present BG Group, 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.

Collecting relevant baseline information also involved a literature review, using a range of published materials, including journals and online resources to help gain an 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 AND SELECTED ALTERNATIVE**

The Project is the initial data-gathering phase, which if the area appears prospective for hydrocarbons may lead to an exploration drilling program, which if successful in finding economic reserves of gas or oil may lead to development and production. Each of these three phases of activity will be preceded by an environmental and social assessment. Securing indigenous resources for the development of Myanmar is strategically important for the country and this first data gathering exercise is both key to an accurate assessment of prospectivity and has a very low environmental and social impact.

Nevertheless 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:

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(1) The Project Area of Interest was defined as the area within Block A-4 as well as its immediate surroundings including the adjacent nearshore waters and coasts of Rakhine State mainland.
• 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 practicably possible from any key sensitive receivers. In this instance, the Activity Area is around 10 km from the coastline of Manaung Island where there are sensitive coastal habitats (e.g. corals). In addition, although BG Group are licensed for the entirety of Block A-4, BG are not undertaking any Project activities in water depths of less than 50 m; and

• The navigational safety zone during seismic operations was proposed 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.

• The “No Project” alternative was also considered (i.e. no exploration campaign would be implemented). However, this would imply that no further exploration activity could be conducted in this Block; such as drilling exploration wells. This would in turn mean that no oil and gas development project could be undertaken. As a result, “No Project” would result in fewer opportunities for future gas supply to the domestic market as well as less direct and indirect employment opportunities.

The Selected Project Alternative

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

Programme and Seismic Survey Area

The exploration campaign in Block A-4 is proposed to consist of seismic and gravity / magnetic surveys as well as a seabed sampling survey. The seismic and gravity / magnetic surveys are planned to commence in approximately November 2015, and last for a period of two to three months. The seabed sampling survey is due to take place between approximately March and April 2016. The timing of the surveys coincides with the Northeast monsoon (December to April) so as to avoid the cyclone season.

The seismic survey will cover approximately 4,500 km². The seismic vessel will sail either up or down pre-plotted survey/ sail lines that run north-west to south-east orientation (Figure 1.1). It is envisaged that the survey will generally move from east to west but will initially start in the deeper waters of Block A-4 before acquiring the lines nearer to the shore.

It is planned that two-dimensional (2D) and/or three-dimensional (3D) surveys will be undertaken in the exploration campaign in water depths of over 50 m. It is expected that the seismic survey will be approximately 50 km from the mainland coast and 10 km from Manaung Island at its closest point.
Seismic Overview

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 sub-surface 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 seismic, gravity and magnetic 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 at 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. A separate vessel will be used to conduct the seabed sampling survey.

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.

Streamers

The receivers (hydrophones) will be encased in long cables or “streamers” towed behind the seismic vessel. There will be up to 12 streamers which are around 8 km in length, which are towed at a water depth of up to 25 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) Annex I, IV, V, and VI requirements with regards to handling of waste, wastewater, air emissions and effluents.

Gravity and Magnetic Survey

Gravity and magnetic surveys are used to assess the physical properties of the seabed sediments to more accurately target oil and gas deposits. This survey
Figure 1.2

Schematic of Marine Seismic Survey

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DATE: 13/07/2015

SEISMIC SURVEY VESSEL

Tail Buoy
Hydrophone Streamer
Signal Generating Device

Reflected Sound Waves
Sound Waves
Water Column
Seabed Sediments
Solid Rock Strata
The seismic survey vessel is purposely built for towing the airguns and streamers for conducting the seismic surveys.

**Indicative seismic survey vessel specifications**

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<th>Specification *</th>
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<td>30 – 100</td>
</tr>
<tr>
<td>Length</td>
<td>50 – 90 m</td>
</tr>
<tr>
<td>Width</td>
<td>15 – 20 m</td>
</tr>
<tr>
<td>Draft</td>
<td>5 – 6 m</td>
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<tr>
<td>Fuel consumption</td>
<td>9 – 15 tonnes/ day</td>
</tr>
<tr>
<td>Minimum operating depth</td>
<td>~ 10 m</td>
</tr>
<tr>
<td>Maximum load speed</td>
<td>Up to 15 Knots</td>
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</table>

*Indicative only*
Birds
Allows the streamers to be raised/ lowered in the water column to optimise its position or to avoid hazards e.g. in the event of very shallow water depth, seabed obstructions or another vessel sailing across the deployed streamer.

Hydrophone Streamer
Captures the reflected waves for a seismic line plot to map structural traps where hydrocarbons may accumulate.

Airgun Arrays
Pneumatic device that produces acoustic output by rapidly releasing a volume of compressed air.

Tail Buoy
Brightly coloured with a radar reflector and flashing lights for indication.

Illustrative Arrangement of Seismic Survey Equipment
will be carried out as part of the seismic survey and no additional vessel will be used. The equipment passively measures the naturally occurring variations in the earth’s gravity and magnetic fields and does not have any associated emissions.

**Seabed Sampling Survey**

Seabed sampling surveys are used to characterise surface and subsurface sediments, which can be used to provide information on the hydrocarbon and reservoir potential of an area as well as environmental, floral and faunal data.

A single dedicated vessel will be used for the sampling survey fitted with specialist sampling equipment, to obtain soft sediment samples approximately 10 centimetres in diameter of the seabed for physicochemical and biological testing and analysis. Prior to seabed coring, the vessel may opt to secure sub bottom profiling to ensure the locations is suitable for a sample (i.e., not rocky). This would involve using echo-sounders to map the seabed.

Approximately 100 core samples (10 cm in diameter) will be collected across the Block. The seabed samples and slick samples will undergo detailed geochemical and geological analysis in onshore laboratories which will provide new data on the hydrocarbon potential of the blocks.

The seabed sampling will commence around the beginning of March 2016 and will run for approximately 1 month.

1.4 **DESCRIPTION OF THE ENVIRONMENT TO BE AFFECTED BY THE PROJECT**

Information has been collected through stakeholder engagement and field visits have been undertaken from March to May 2015. Further information has been collected through desktop review of publicly available information. Findings of the baseline data review are summarised below. The Area of Interest for the baseline study encompasses Block A-4 and the immediate surroundings, extending for assessment purposes to the adjacent nearshore waters of the Rakhine State mainland (Figure 1.1) and also covers locations where fishing activities may overlap with the Project Activities.

The IEE Report focuses on the physical, environmental and social characteristics in the Area of Interest. A summary of the baseline is provided below.

1.4.1 **Physical Environment**

The survey will be primarily conducted during the northeast monsoon period which runs from December to April, when winds blowing from the north and east, bring less cloud, scant rainfall, mild temperatures and lower humidity. In the Bay of Bengal the surface circulation moves generally clockwise from January to July and counter-clockwise from August to December. Tides in the Area of Interest are semi-diurnal with a tidal range of 2.5 m at Manaung Island. The continental shelf in the Area of Interest is wide and characterized
by the islands of Ramree and Manaung. The water depth within the Activity Area ranges from 50 to 1,500 m and is located at the edge of the continental shelf and over the steep continental slope (1). The seafloor within the majority of the Activity Area is characterised by homogeneous olive grey muds typical of low energy depositional environments (2).

1.4.2 Biological Environment

Shallow nearshore waters within the Area of Interest host habitats with enhanced biological productivity and higher biodiversity (such as coral reefs, seagrass, mangroves). However, the Activity Area will be confined to open deeper waters where typically lower ecological value habitats occur, i.e. areas of lower productivity and biodiversity.

Coral habitats around Manaung Island are closest to the Activity Area (Figure 1.5), which, at the closest extent, are located at least 2 km from the Activity Area; however this is only for two isolated coral habitats; one near the northwest of Manaung Island and one in the south-eastern extent of the Activity Area. The majority of coral habitat is at least 5 km away. Industry studies show that the seismic method has little or no effect on coral habitats even at ranges of a few tens of metres. Photos of common coral species in Rakhine waters are shown in Figure 1.6; taken during a survey near Ngapali beach in Thandwe.

Fish in Rakhine waters have been categorised into three types: pelagic species, which inhabit the open ocean, neither near the seabed nor the coast; demersal species, which live on or near the seabed; and reef associated / coastal species, which live in coral reefs or coastal areas. Of the fish identified from data sources to have been possibly recorded within the Area of Interest, three are listed as species of conservation concern (vulnerable or above) on the IUCN Red List (3); whale shark (Rhincodon typus), bleeker’s grouper (Epinephelus bleekeri) and narrow barred Spanish mackerel (Scomberomorus commerson). Photos of commercial fish species observed during consultations in Rakhine are shown in Figure 1.7.

A total of 21 cetaceans (whale and dolphin) and 1 sirenian (dugong) species have been reported from Myanmar waters. The Irrawaddy dolphin (Orcaella brevirostris) and dugong (Dugong dugon) are protected under Myanmar Law (4) but these species are mostly coastal or riverine species and hence not likely to be present in the Activity Area. Numerous marine mammals have also been recorded from a recent seismic survey conducted in 2015 such as the humpback whale (Megaptera novaeangliae) and bryde’s whale (Balaenoptera edeni) in a neighbouring exploration block just south west of Block A-4, it is considered likely that cetaceans will also be present during the proposed

(1) The slope between the shallow waters of the continental shelf, bordering the mainland coast, and the deep waters of the ocean floor.
(2) Dr Rangin (2005) unpublished data.
(3) The International Union for the Conservation of Nature (IUCN) Red List provides information on the global conservation status of biological species.
(4) Protected under the Myanmar Protection of Wildlife and Conservation of Natural Areas Law.
Location of Sensitive Habitats in Rakhine
Figure 1.6

Coral Photos from Surveys in April 2015, Ngapali Beach

Platygyra sp.  Turbinaria sp.  Sponges with Porites sp.

Acropora sp.  Goniopora sp.  Favites sp.
Figure 1.7

Representative Photos of Some Commercial Fisheries Species observed during Site Visits in the Area of Interest

- Barramundi (Latidae)
- Catfish (Arridae)
- Shad (Clupeidae)
- Mackerel (Scombridae)
- Croaker (Sciaenidae)
- Spiny Lobster (Panulirus ornatus)
exploration campaign. The marine mammal species that have been recorded in the Area of Interest are shown in Figure 1.8.

There are five species of marine turtle listed as present in the offshore waters of Rakhine State, all of which are listed as species of concern on IUCN Red List. Turtles nest along the Rakhine coast from September to March with peak nesting in December and January. As such, turtles could be migrating through Block A-4 to their nesting beaches during the survey period. Turtle species that have been recorded in the Area of Interest are shown in Figure 1.9.

1.4.3 Social Environment

Rakhine State, located in Western Myanmar, is divided into four districts and 17 townships and is the eighth largest and the second most populous state in Myanmar. The main sources of livelihood are agriculture, fisheries and livestock; over 50 percent of the population is dependent upon agriculture, while 13 percent engage in fishing, and 10 percent in livestock farming. Within the coastal villages consulted, a large part of the local economy revolves around fishing, with only limited agricultural activities. In many villages around 80% to 90% of the households are engaged in fishing, with some of the households being fully dependent on fishing.

Fishing and fishing related livelihoods were considered the main social activity which could be impacted and the fishing baseline is presented below. The baseline builds upon a number of field visits to selected fishing communities along the Rakhine coast as well as Sittwe and Yangon, who could potentially be active in Block A-4, particularly in Activity Area. The majority of fishing communities in Rakhine State conduct their activities in nearshore (within 10 nautical miles) or offshore, shallow waters (0 to 50m of water depth), far from BG Group’s Activity Area. This is supported by information from the Department of Fisheries (DoF) which reported that 67% of the population in coastal regions fish in nearshore waters (within 10 nautical miles).

Fishing in the Area of Interest can be classified into the following:

- **Shallow water:** Fishing in waters of 0-50 m water depth to the north, east and south of Manaung Island. This area is considered a very rich fishing ground, where there is a high concentration of fishing activity from the surrounding villages. Diving for fish, lobster, prawn and other species also takes place here. No project activities are planned to take place in this area.

- **Outer Continental Shelf:** Fishing activities that focus efforts along the outer continental shelf in water depths of approximately 50 to 200m. This area is located over 50 km from the mainland coast. Fishing in this area was reported to be less common than in shallow waters. However, several villages consulted reported fishing in and nearby the outer continental shelf area, particularly from November to April. In addition,
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<th>Latin Name</th>
<th>IUCN Red List</th>
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<td><em>Balaenoptera musculus</em></td>
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<td>Hawksbill turtle</td>
<td>Leik Kyet Tu Yway</td>
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<td>Leatherback turtle</td>
<td>Leik Zaung Lyar</td>
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</tbody>
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**Figure 1.9**

Marine Turtles in Rakhine waters
during this period fishing camps are established on Manaung and Ye islands, for fishing around the west coast of Manaung and in this area.

- **Deep Water**: Fishing in water depths of more than 200 m. There appears to be only limited fishing in this area in any case and little is from local villages. Most fishing in these deeper waters is undertaken by vessels from outside Rakhine State.

Sizes of fishing boats typically fall into three categories: small (<20 ft), medium (30-45 ft) and large (50-90 ft). Details on the type of boats encountered in the area of interest are provided in Figure 1.10. Indicative fishing locations as recorded by local fishing villages are shown in Figure 1.11. Fishermen across villages commonly agreed that November to April was the best season for fish catch (in terms of monetary value). Fishing during the rainy season (June to September) was reported to be difficult due to poor weather conditions, especially in deeper water. As a result of this, fishing during the rainy season was generally undertaken closer to shore.

The main wholesale fish market is located at Yangon, with a number of local markets being located in the various States and Regions (Figure 1.12)(1). Consultations and site visits in the Rakhine coastal villages suggested that there are buying centres near most fishing villages, which are linked to Thandwe, Toungup, or Yangon.

Communication systems used by fishermen vary across fishing villages. Consultation with fishermen suggests that most fishermen have limited communications and navigational equipment, using only GSM-CDMA mobile (locally known as coastal phone). In contrast, larger commercial boats also use radio and have Global Positioning System (GPS) and echo-sounding equipment for positioning. Information at the village level that may be of concern to the fishermen is either distributed through the fisheries association or the Village Tract Leader. Information from the Department of Fisheries (DoF) is usually provided to Village Tract Leaders and then passed on to the fishermen. In some villages, fishing associations were considered as nodal point of information by the fishermen. Fishermen also use locally accessible media such as Skynet TV, MRTV and radio.

Block A-4 is not located in the main shipping route between ports in the north (Kolkata, Chittagong etc.) heading to the southern tip of India and the Straits of Malacca in the south. The Blocks neighbouring Block A-4 are also currently being explored for oil and gas by other operators. Cumulative impacts with other oil and gas Blocks is assessed in the IEE Report and summarised below.

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<th>POB</th>
<th>Distance offshore</th>
<th>Depth Range (m)</th>
<th>Trip Duration (days)</th>
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<td>Small</td>
<td>5.5-6.5m</td>
<td>9</td>
<td>3-4</td>
<td>4.5-8km</td>
<td>&lt;25</td>
<td>1</td>
<td>Longline Drift Net</td>
</tr>
<tr>
<td>Medium</td>
<td>9-14m</td>
<td>13-30</td>
<td>3-8</td>
<td>Up to 16km</td>
<td>25-60</td>
<td>1-4</td>
<td>Longline Drift Net Trawl Purse Seine</td>
</tr>
<tr>
<td>Big</td>
<td>15-25m</td>
<td>20-450</td>
<td>8-18</td>
<td>24km to 30km</td>
<td>30-140</td>
<td>2-25</td>
<td>Drift Longline Trawl Purse Seine</td>
</tr>
</tbody>
</table>
Figure 1.11

Locations of Fishing Areas (Excluding Nearshore Fishing)

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Date: 17/7/2015

Environmental Resources Management
Figure 1.12

Typical buying centres and fish markets in coastal areas of Rakhine

DATE: June 2015

Environmental Resources Management

Local Fish Market in Sittwe
Dried Tuna Fish in Sittwe market
Sittwe Fish Market: Women selling fish

Dry Fish Storage in Gyeiktaw
Fish Buying Centre in Gyeiktaw

Environmental Resources Management
1.5 SIGNIFICANT ENVIRONMENTAL IMPACTS

1.5.1 Impact Assessment Methodology

The impact assessment methodology followed a receptor sensitivity vs. impact magnitude model. Each of the predicted impacts was described in terms of its potential magnitude, derived from an examination of the extent, duration, scale and frequency of the impact. Additionally, for unplanned events only, magnitude incorporates the ‘likelihood’ factor (i.e., a qualitative assessment of the potential for any impact to occur). The sensitivity (including vulnerability and importance) of the impacted resource/receptor was also identified taking into account legal protection, government policy, stakeholder views and economic value. Once impact magnitude and resource/receptor sensitivity have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in Table 1.1. If a species is protected by law it is considered to be of high sensitivity so even small impacts will result in a moderately significant outcome.

Table 1.1 Impact Significances

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Resource/Receptor Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Small</td>
<td>Negligible</td>
</tr>
<tr>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>Large</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Potential Impacts and Mitigation Measures

Potential impacts from proposed project activities (both planned and unplanned) were identified through a systematic scoping process. A full discussion on the potential impact, required mitigation and residual impact significance is provided in Section 6 of the IEE Report. Interactions which were considered to have the potential to result in significant environmental and social impacts from the survey include:

- 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, fish and divers.

- 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 streamers.

Appropriate mitigation and management measures were recommended for the potentially significant environmental and social impacts identified in the IEE Study. No Major impacts were identified and those that were deemed Moderate significance have been mitigated appropriately to ensure they are as low as reasonably practicable. A summary of the potential impacts, mitigation measures and residual impact significance is presented in Table 1.2.

Table 1.2 Summary of Key Impacts, Mitigation Measures and Residual Impact Significance

<table>
<thead>
<tr>
<th>Potential Impact/Issue</th>
<th>Control / Mitigation Measures</th>
<th>Significance of Residual Impact</th>
</tr>
</thead>
</table>
| 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 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. | Moderate (Note: Small magnitude impact to high sensitivity resource) |
| Impacts from underwater sound on marine fauna | • 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 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. | Minor (for fishes) to Moderate (for marine mammals and turtle) (Note: Small magnitude impact to high sensitivity resource) |

(1) The JNCC “Guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys, 2010”
<table>
<thead>
<tr>
<th>Potential Impact/Issue</th>
<th>Control / Mitigation Measures</th>
<th>Significance of Residual Impact</th>
</tr>
</thead>
</table>
| **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 fisheries and fishing communities from physical presence of seismic vessel and equipment** | • 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 mariner users.  
• 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.  
• A “fishing and diving navigational safety protocol” will be followed, which sets out avoidance actions to be taken in the event that fishing or diving activities are encountered within the mobile navigational safety zone.  
• Prior to commencing the survey in the easternmost part of the Activity Area, a scouting survey will be carried out to assess fishing and diving activities.                                                                 | Minor (fishing activities) and Negligible (livelihoods) |
| **Impacts from underwater sound on Fisheries and divers** | 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.                                                                                                                                            |                                |
| **Impacts from unplanned collisions on fishing vessel and other marine users** | • The existing controls for fisheries and livelihoods from unplanned collisions will be the same as those mentioned for impacts on fishing activity from physical presence of seismic vessel and equipment.                                                                                                           | Moderate                       |

### 1.5.2 Cumulative Impacts

Cumulative impacts refer to impacts that result from more than one project operating at the same time. Block A-4 is surrounded by other offshore Blocks AD-1, AD-2, AD-3 and A-5 (shown in Figure 1.13). It is understood that of these, the only Block in which concurrent activities are being carried out is in Block A-5. Activities in Block A-5 are likely to be similar to Block A-4. As the mitigation measures listed in the above sections are standard international best practise for seismic surveys it is likely that the block holders of Block A-5 will adopt the same practises, therefore reducing the potential for a cumulative impact.

The main cumulative environmental impacts would be from underwater sound on marine fauna, physical presence of vessels impacting turtles and unplanned fuel spills. For cumulative impacts from underwater sound, the
Environmental
Resources
Management

Figure 1.13

Offshore Oil and Gas Blocks within Rakhine Waters

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Date: 15/7/2015
vessels operating on Block A-4 and A-5 are unlikely to be within close proximity of each other. Typically, to avoid any risk of operational interference, offshore seismic surveys maintain minimum separation distances of at least 20 to 30 km and often far greater. As such, there is unlikely to be a cumulative impact resulting in any auditory injury to these species and any disturbance resulting in temporary behavioural changes will be minimal. Therefore, the impact from underwater sound on all receptors will be the same magnitude as those experienced during the Block A-4 survey, with only a limited risk of overlap and will therefore be of Moderate significance to marine mammals and turtles and of Minor significance for fish. As a result of this, possible cumulative impacts from underwater sound or the physical presence of the surveys acting as a barrier to turtle migratory pathways to nesting beaches are considered to be Negligible. The potential for cumulative spills of fuel from the vessels is extremely unlikely to occur, and as both vessels use light fuels which are readily diluted and dispersed and implement standard mitigation measures, impacts would be expected to be Minor.

Potential cumulative social impacts, particularly those to fishermen, could occur as a result of a number of potential exploration campaigns taking place at the same time in offshore Rakhine waters. Impacts may include the cumulative impact of disturbance to fishing activities, as well as increased risk of collision and disturbance to divers from underwater sound.

However, through the application of a mobile navigational safety zone, and the significant distance between surveys taking place in different blocks, these potential impacts will only be short term and localised. In addition, fishermen tend to fish in greatest numbers in shallow waters of less than 50 m, where no Project activities will take place. Finally, the seismic vessels are only likely to be in the area where fishing occurs for a short period of time (a number of days).

Similarly, to the impact on fishing vessels, the cumulative impact of sound on divers is only relevant for when the survey is within the eastern most part of the Block and will therefore be temporary and localised.

It is expected that, with all mitigation measures in place, cumulative social impacts will be of Minor significance to fishing activities.

1.6 **THE PUBLIC CONSULTATION AND PARTICIPATION PROCESS UNDERTAKEN**

The stakeholder engagement process is driven by BG Group’s own social performance standards which have been aligned with international best practices, such as IFC PSs, for undertaking stakeholder consultations and social impact assessments.

Following a scoping exercise which included engagement with representatives from government, civil society, and fishing communities and organisations, a range of public consultation meetings were held, focused on significant offshore fishing communities in Rakhine state. Stakeholder engagement was
conducted at the four administrative levels, in line with MOECFAF regulations and subject to permissions of responsible authorities: National, State, District/Township, and selected Village (tract) level, where significant fishing communities are located. A list of public meetings conducted as part of the engagement process is summarised in Table 1.3 and photos are provided in Figure 1.14.

Table 1.3  Summary of Public Meetings undertaken as part of the IEE process

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>31st March 2015</td>
<td>Sittwe meeting</td>
</tr>
<tr>
<td>1st April 2015</td>
<td>Kyaukphyu Township meeting</td>
</tr>
<tr>
<td>2nd April 2015</td>
<td>Zin Chaung village meeting</td>
</tr>
<tr>
<td>3rd April 2015</td>
<td>Ramree Township meeting</td>
</tr>
<tr>
<td>4th April 2015</td>
<td>Kyauk-Ni-Maw (Rakhine community)</td>
</tr>
<tr>
<td>4th April 2015</td>
<td>Kyauk-Ni-Maw (Muslim community)</td>
</tr>
<tr>
<td>6th April 2015</td>
<td>Manaung Township meeting</td>
</tr>
<tr>
<td>7th April 2015</td>
<td>Ka Ei village meeting</td>
</tr>
<tr>
<td>8th May 2015</td>
<td>Thandwe Township Meeting</td>
</tr>
<tr>
<td>9th May 2015</td>
<td>Thabyuugaing Village Meeting</td>
</tr>
<tr>
<td>10th May 2015</td>
<td>Sin Gaung Village Meeting</td>
</tr>
<tr>
<td>11th May 2015</td>
<td>Gyeitkaw Village Meeting</td>
</tr>
</tbody>
</table>

The consultation process was guided by the following key principles:

- **Inclusive**: The consultations were organised to ensure representation of potentially affected and interested stakeholders. Separate focus groups were undertaken with women, fishermen and boat owners and, where relevant the consultation involved both Rakhine Buddhist and Muslim fishermen;

- **Sharing of information**: At the village level consultations, special emphasis was given to build understanding of the project. All the information was provided in Myanmar language;

- **Participatory**: Stakeholders were encouraged to actively participate in the consultations and were always given the opportunity to ask questions.

- **Gender inclusive**: The team consisted of female representatives for undertaking focus group discussions with women.

During stakeholder consultations the key issues raised included:

- **Impact on fishing**: Stakeholders were primarily concerned with whether the Project would result in exclusion from fishing grounds, thereby impacting their livelihoods. Some were concerned that underwater sound caused by the project would impact fish, and thereby affect fish catches. These issues are addressed in the impact assessment.
Figure 1.14
Photo Records of Stakeholder Consultation Sheet

Photo 1: Consultations in Thabyugyiang
Photo 2: Consultations in Gyeiktaw
Photo 3: Q&A session at Gyeitaw

Photo 4: Meeting with Sittwe Department of Fishery
Photo 5: Meeting with Sittwe District GAD
Photo 6: Consultations with Sittwe GAD and DoF
• Sharing of benefits and social investment: Stakeholders asked questions about how local people would benefit from BG Group’s presence, including on whether BG Group would invest in community projects.

• Information sharing and communication methods: Stakeholders wanted to know how information related to movement of the Project survey vessel would be communicated to them, and provided suggestions for routes BG Group should use.

• Grievance redressal: Stakeholders wanted to know what BG Group would do in case of a grievance, such as damage to nets or collisions with the seismic vessel and provided information on the current grievance redressal procedure at the village level.

1.7 SUMMARY OF THE ESMP

An ESMP for the Project is provided in Section 7 of the IEE Report and provides the procedures and processes which will be applied to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which BG Group has committed. The ESMP identifies the structure and responsibilities of the personnel responsible for environmental and social management and implementation of the ESMP. BG Group will work with and influence the contractor to ensure that all contractors are aware of and competent with respect to:

• Sensitive baseline conditions;

• Key environmental and social impacts;

• Necessity of conforming to the requirements of the IEE and ESMP;

• Roles, responsibilities and accountability to achieve that conformity; and

• Documentation and reporting requirements and other ESMP compliance requirements.

Emergency preparedness and response will be reviewed continually by the seismic contractor during operations, and after the occurrence of any accidents or emergency situations to ensure that lessons learnt inform continuous improvement.

1.8 CONCLUSIONS AND RECOMMENDATIONS OF THE IEE REPORT

1.8.1 Recommendations for Future Activities

The disclosure process will include disclosure of the executive summary of the IEE study in Myanmar language in the townships visited; Sittwe, Kyaukphyu, Ramree, Manaung and Thandwe. 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. BG Group will further develop the Stakeholder Engagement Plan to manage ongoing consultation and respond to stakeholder concerns that may be reported in relation to the implementation of the Project.

1.8.2 Conclusions of IEE Report

The IEE Study for the proposed exploration programme survey in Block A-4 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. A 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 programme in Block A-4. Provided that the recommended mitigation measures are properly implemented, it is expected that the environmental and social impacts of the proposed exploration programme at Block A-4 would be managed by BG Group 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.
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Ireland            Thailand
Italy              The Netherlands
Japan              United Arab Emirates
Kazakhstan         United Kingdom
Korea              United States
Malaysia           Vietnam
Mexico

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