PC Myanmar (Hong Kong) Limited (PCML)

Initial Environmental Examination (IEE) for 3D Seismic Survey within the Yetagun Gas Field

IEE Report

12 September 2018

Prepared by: Environmental Resources Management

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EIA Report

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

PC Myanmar (Hong Kong) Limited (PCML) is the operator of Yetagun Gas Field in offshore Myanmar Blocks M-12, M-13, and M-14. In May 1990, PCML signed the Petroleum Production Sharing Contract (PSC) with Myanma Oil & Gas Enterprise (MOGE), NIPPON and PTTEPI for Blocks M12, M13 and M14; located to the southwest of Dawei in the Andaman Sea.

This Report is the Initial Environmental Examination (IEE) for the proposed 3D Seismic Survey to be conducted in offshore Blocks M12/13/14 by PCML.

The survey objective is to analyse the data acquired in order to confirm the potential presence of hydrocarbons under the seabed for future exploration activities. The survey will last for approximately six to seven months (i.e. around 180-190 days).

As per the Myanmar Environmental Impact Assessment (EIA) Procedure, this Project requires an IEE to be conducted and submitted to the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation (MONREC).

1.2 POLICY AND REGULATORY FRAMEWORK

The Project will be undertaken in line with a number of national and local standards and laws. Local laws relating to IEE including but not limited to:

- Environmental Conservation Law (2012);
- Environmental Conservation Rules (2014);
- National Environmental Quality (Emission) Guidelines (2015); and
- Environmental Impact Assessment Procedure (2015).

1.3 PROJECT DESCRIPTION AND ALTERNATIVES

1.3.1 Proposed Project

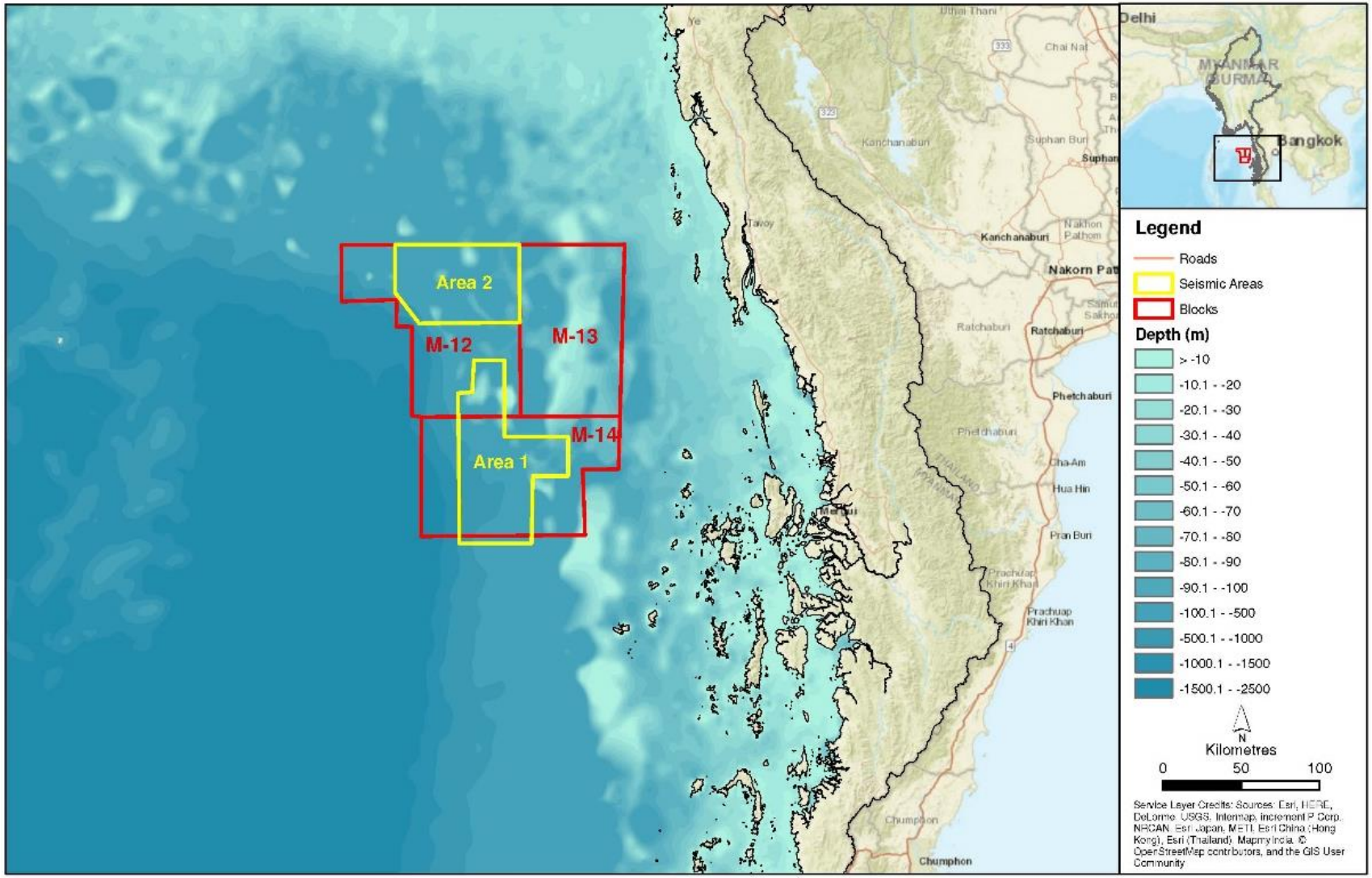
The Project Area (i.e., the area in which the 3D seismic survey will be conducted) encompasses an area of approximately 8,900 km^2 spanning shallow continental shelf waters adjacent to a portion of the Tanintharyi Region mainland. The Project Area is located in waters of about 70 km nearest outlying islands of the Myeik Archipelago, 33 km from nearest sensitive protected area (Lampi Island Shark Protected Area) and 125 km from the nearest point on the mainland coast (Launglon Township, Dawei District, Tanintharyi Division). Water depth in the Project Area ranges from around

10 m to over 1,000 m. The Project Area is shown in yellow in *Figure 1.1*. The coordinates of the Project Area are provided in *Table 1.1*.

Table 1.1 Project Area Coordinates (WGS-84)

Area 1	X	Y	Latitude	Longitude
1	231976.8	1452618	13° 07' 41.225"	96° 31' 40.162"
2	242284.9	1452608	13° 07' 44.115"	96° 37' 22.237"
3	242284.9	1472630	13° 18' 35.343"	96° 37' 15.924"
4	261204.7	1472659	13° 18' 41.959"	96° 47' 44.296"
5	261204.7	1423917	12° 52' 16.413"	96° 47' 58.386"
6	300263.6	1423926	12° 52' 26.686"	97° 09' 33.577"
7	300213.5	1398342	12° 38' 34.250"	97° 09' 37.933"
8	277229.7	1398307	12° 38' 27.553"	96° 56' 56.452"
9	276571.8	1355130	12° 15' 02.659"	96° 56' 45.713"
10	232035.9	1355037	12° 14' 47.510"	96° 32' 12.714"
Area 2	**X**	**Y**	**Latitude**	**Longitude**
1	193789.4	1517839	13° 42' 48.698"	96° 10' 08.320"
2	193829	1549380	13° 59' 54.181"	96° 09' 57.199"
3	271117.9	1548591	13° 59' 54.808"	96° 52' 51.540"
4	270938.1	1497411	13° 32' 09.892"	96° 53' 00.545"
5	209388.9	1497556	13° 31' 54.986"	96° 18' 54.557"

Figure 1.1 Location of Project Area



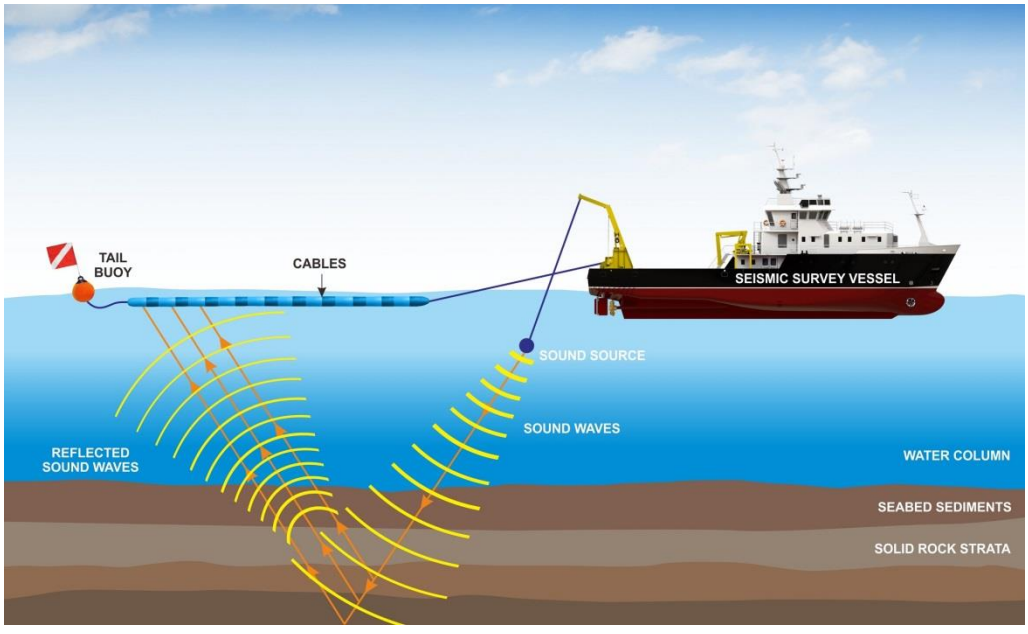
The Project is currently planned to commence in October 2018, and last for a period of about six to seven months (i.e. around 180-190 days). As this Project is only exploration activity, there is only one Phase – Operation Phase. There is no permanent infrastructure and no pre-construction, construction, or decommissioning phases.

Marine seismic surveys are used to define sub-seabed deposits and geological structures. During a marine seismic survey, a slow moving survey vessel (typically steaming at about 4 to 6 knots) tows an impulse emitting sound source (array of airguns). High energy low frequency sounds are produced by the airguns and directed downwards at the seabed and underlying sub-seabed geology. 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). 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*.

When using the marine streamer seismic method, the receivers (hydrophones) are encased in a long cable (streamer), which is towed or "streamed" behind the seismic vessel. The marine seismic survey operations are to be conducted by a specialized seismic survey vessel, which is typically supported by one, or more, smaller vessels referred to as "chase vessels". The role of the chase vessels is to scout ahead for obstructions (e.g. static fishing gear, fish traps) and to approach and warn-off any shipping that might be ignoring radio warnings to avoid the survey area.

A 3D seismic survey involves the use of multiple streamers. As seismic data are acquired from multiple angles, it provides data that can be used to build a detailed 3D model of the subsurface geology.

Figure 1.2 ***Seismic Survey Overview***



The survey will cover approximately 8,900 km² within the Project Area shown in *Figure 4.1*. As per standard operations, the seismic survey will be acquired in swaths (width of the deployed streamer arrangement) in a racetrack formation. The seismic vessel will sail down a pre- plotted line (i.e. survey/ sail line) at the centre of each swath. The sail lines are then acquired at intervals of up to half the swath width. Upon reaching the end of the sail line, the ship will typically take 2 to 3 hours (a manoeuvring area of 10 – 20 km) to turn around and start down another sail line. The survey will be conducted in an east-west orientation. Each line will be average of 60-70 km.

A specialized survey vessel will be selected for the actual seismic survey which is expected to have crew of around 50 people on-board. At the time of writing, the contracting process for the seismic contractor is still in progress so the specific details of the survey cannot be released. However, the information provided is based on standard seismic survey techniques and methods. Illustrative examples of typical seismic survey vessels are presented in *Figure 1.3*.

Figure 1.3 Typical Seismic Survey Vessel

Source: PCML

1.3.2 Alternatives

Consideration of Project options and alternatives is a fundamental requirement in the planning of any project as a means of avoiding or reducing adverse environmental and social impacts and maximising or enhancing project benefits. Several options that have been considered for the Project include the following:

- **Streamer**: the survey will use solid or gel-filled streamers rather than kerosene-filled streamers as these solid cables, which are constructed of extruded foam, are robust and resistant to damage, do not leak when damaged either on the vessel or in the sea, and are less sensitive to weather and wave noise; gels are inert. Therefore, the selected alternative is less likely to leak and impact the environment.

- **Sensitive receiver**: the 3D seismic survey area should be sited away from key sensitive receivers as far as practicable to avoid disturbance to the environmental and social sensitive receptors. For this Project, the Project Area is around 33 km from the nearest KBA and 125 km from the Myanmar coastline. Given that the distance from the nearest sensitive or protected area / receptor, no impacts are anticipated and the location of the survey is considered acceptable.

- **Operational safety zone**: the safety zone during seismic operations should be mobile around the survey vessel rather than restricting access to the whole block, in order to minimise disturbance to the extent possible to nearby marine operators, such as fishing vessels. This Project will utilise a mobile exclusion zone therefore reducing the scale (size) of the Area of Influence and limiting the area excluded to fishermen; and

- **No Project alternative**: The "No Project" alternative means that no seismic survey would be undertaken, which in turn implies that no further exploration activity would take place in these Blocks. Should there be no further exploration activity, no further oil and gas development project would be able to be developed in this area. 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.

1.4 DESCRIPTION OF THE SURROUNDING ENVIRONMENT

The following section describes the physical, biological, and social environment within the Study Area, which is defined as the waters of Project Area as well as the surrounding waters offshore Tanintharyi Region. As the 3D marine seismic survey will be located 125 km from the nearest communities on the mainland and 70 km from the nearest island of the Myeik Archipelago), the focus of the baseline information is on open water habitats.

The Area of Influence varies depending on the receptor and activity. The following provides information on the potential Area of Influence per activity/ receptor:

- Impacts to fisheries and fishing activity either through unplanned collision or from physical displacement of vessels will be limited to within the Project Area;

- Impacts to marine turtles, mammals and fish due to sound emissions can occur in proximity to the sound source (1-2 kms) and the sound may be noticeable out to 10's kms from the sound source (although this may not have any impact). Therefore, the Area of Influence for sound impacts is mostly with the Project Area but also out to 10-20 km from the Project Area;

- Impacts from towed equipment on turtles would be limited to the Project Area as that is where the equipment will be located; and

- Impacts from spills or leaks will on the marine environment will also be limited to the Project Area. The only spills possible would be small volume spills of fuel which would not impact local coastal areas.

Given the Area of Influence is offshore open waters the environmental impact assessment will focus on habitats and species in this area. Information on coastal areas and protected areas is included to provide a general baseline description.

The information provided in this *Section* is based on a desktop review of published information, supplemented with information provided by PCML, and through review of available ERM in house literature. Although this Project is an IEE and therefore does not require primary baseline data, baseline data from 2018 is available from the Yetagun Platform and will be utilised to inform this IEE Report.

Primary social data collected during public consultations have been used to supplement the desk-top review.

Secondary data sources were also referred to, such as; reports by the Wildlife Conservation Society (WCS), scientific journals, fisheries cruise data (2015), and local study reports available at the marine science department of Mawlamyine and Pathein Universities.

1.4.1 Environmental Baseline

A total of 43 designated or proposed protected areas with IUCN categories existing in Myanmar (Istituto Oikos and BANCA, 2011) however some are proposed as protected area without authorized designation (i.e. "soft" designation). None of these protected or environmentally sensitive areas lie within the Project Area. The closest is a designated Shark Protection Area located 33 km from the Project Area. The area was established in 2004 as a national Marine Protected Area (MPA) and covers an area of 11,836 km^2 where there are restrictions on fishing activities.

In 2012, the Wildlife Conservation Society (WCS) identified 132 Key Biodiversity Areas (KBAs) alongside Myanmar environmental experts (Holmes et al, 2013). These KBAs are regarded as areas holding significant populations of species of high conservation concern but are not legally recognized nor designated as protected areas in Myanmar. The closest KBA

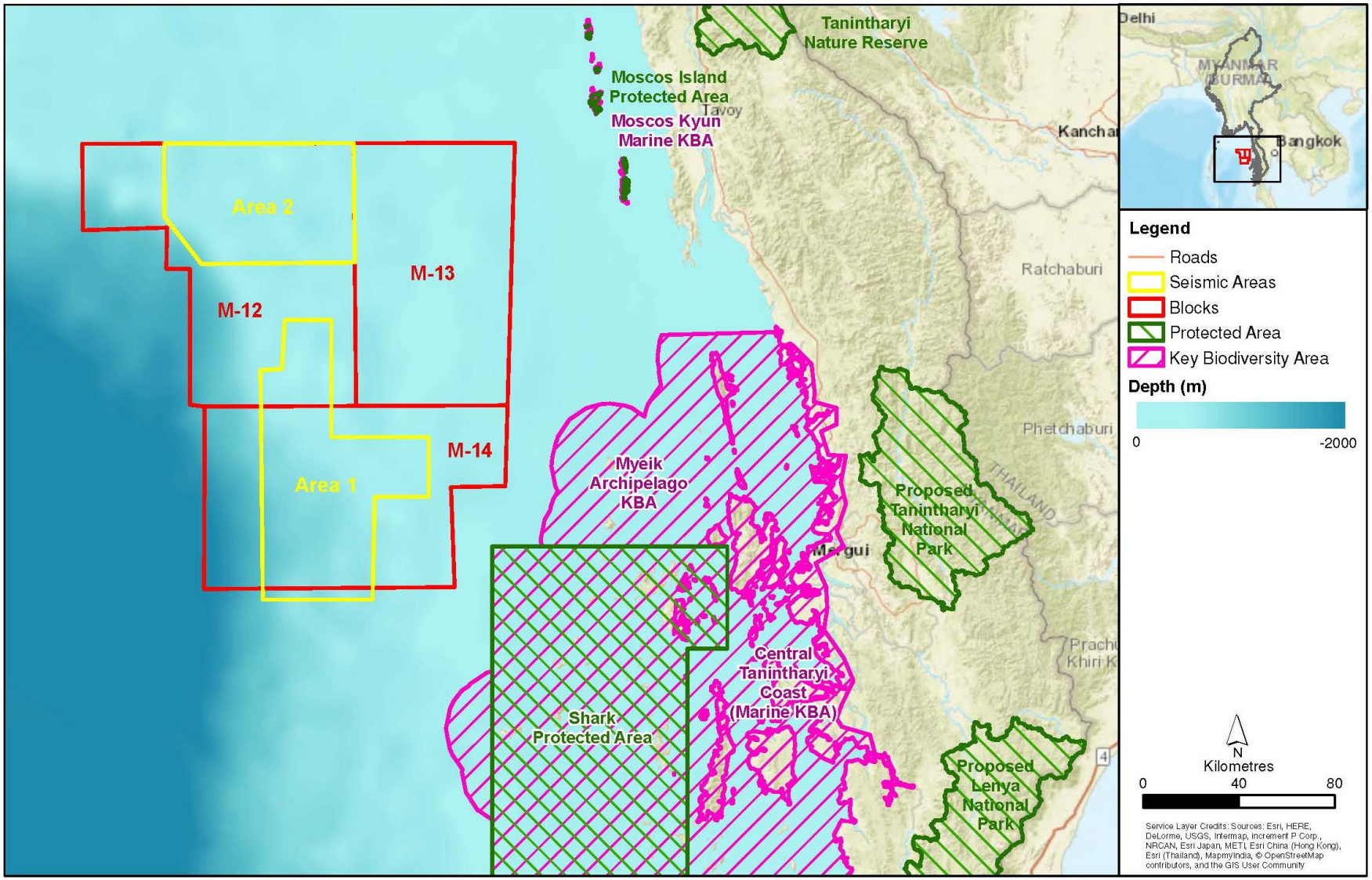
to the Project overlaps with the Shark Protected Area mentioned above. Another KBA is the Moscos Island group (Moscos Kyun), which is located around 100 km from the Project Area. This KBA was identified due to four key species of sea turtles potentially nesting on the islands.

The KBA's within the Study Area are provided in *Table 1.2* and *Figure 1.4*.

Table 1.2 Key Biodiversity Areas (KBAs) in the Study Area

Name	Area (km²)	Key species
Myeik Archipelago	43,963	Leatherback turtle, green turtle, hawksbill turtle
Moscos Kyun	57	Leatherback turtle, green turtle, hawksbill turtle, olive ridley turtle
Lampi Island MPA	225	Hornbill, numerous shark species, turtle species

Figure 1.4 Protected Areas and Restricted Fishing Areas in the Study Area



Source: Homles et al, 2014

Climate data is available from Dawei, which is located 148 km from the Project Area and is the closest District. Within Myanmar, Dawei is affected first by the southwest monsoon and is reported to experience an average of 142 rainy days and 17.9 ft. of precipitation per year (FAO, 2014).

Average monthly wind speeds in the Andaman Sea in the vicinity of the Project Area are reported to range from 3.5 m/s to 7.5 m/s (Steedman Science & Engineering 1994). The most common wind direction is from the north-northeast from November to April and southwest from May to October (worldweatheronline).

Data on temperature, salinity, oxygen, and fluorescence were recorded during a survey of the waters of Tanintharyi Region was conducted in 2015 as part of the 'Dr. Fridtjof Nansen' survey (Myanmar Ecosystem Survey, 2015). In the east of the survey area (where the Project Area is located) the near-surface temperatures (5 m depth) were around 32^{o}C and salinity at 5 m ranged from 31 to 34. Oxygen levels in surface waters were generally high (~4 - 5 ml/l), and showed relatively high variability.

The Project Area is in water depths between 10 and 1,000 m. The deeper part (western extent) of the Project Area is located over the continental slope and abyssal plain with water depths descending to >1,000 m.

A survey to investigate macrobenthic faunal communities in the vicinity of the Yetagun platform was conducted in 1998 for previous EIA Studies for the field development and export pipeline (AATA 1998). Samples were collected from eight stations spanning the vicinity of the Yetagun Complex to nearshore environment along the export pipeline route. The survey recorded that sediments were generally dominated by polychaete worms with the exception of arthropods at two stations near the Yetagun platforms. Macrobenthos abundance was found be lowest abundance and less diverse at the deeper stations near the Yetagun platform compared to the shallow nearshore environment.

A new marine baseline survey was conducted by ERM in April 2018 for a separate EIA for infill drilling at the Yetagun-A production platform. The survey recorded a total of 31 individual organisms, with a total biomass of 0.283 g in four sediment grab samples. The specimens belong to seven (7) Phyla (Annelida, Arthropoda, Chordata, Cnidaria, Echinodermata, Mollusca, and Nemertinea), from a total of 15 Families in seven Classes.

The April 2018 survey also observed that the majority (54.84%) of the number of macrobenthic organisms (i.e. abundance) recorded at Yetagun field were from the Class Polychaeta (Phylum Annelida (marine worms), followed by Class Crustacea (Phylum Arthopoda, 22.58 of the total). Samples were dominated by polychaete worms or crustaceans (Phylum Arthropoda), which was the same finding as reported from surveys in 1998.

Overall, the benthic grab sampling at the Yetagun field in April 2018 have revealed a sparse abundance, high variability, and low diversity of infauna. Bristleworms (polychaetes/worms) were most common with other fauna including crustaceans, ribbonworms, anemones, gastropods, fish and brittlestars. The benthic habitat within the Surveyed Area near the Platform spanning the outer continental shelf was found to consist of bare, unconsolidated sandy and muddy sediments supporting a sparse assemblage of benthic organisms.

In terms of nearshore habitats, Fauna and Flora International (FFI) have conducted research in the Myeik Archipelago into the presence of coral reefs and their health. Within the three reef types, substrates varied across sites and hard coral cover ranged from under 10% to over 90% in some locations. On the inner reefs hard coral cover varied from 1.5 to 95% (n= 227); on fringing from 0 to 80% (n= 21); and Rock Reefs 8.1 to 30% (n=14) (Howard, 2018). Given the deeper water depths at the Project Area Yetagun field (>100 m), insufficient light reaches the seabed to allow the growth of primary producers such as seagrass, macroalgae or zooxanthellate scleractinian (reef building) corals and these groups are absent from the seabed. Coral habitats would not be expected to be present in the Project's Area of Influence.

FFI also conducted a study on mangroves in Myeik Archipelago (not including near the Project Area) (San Tha Tun et al, 2014). This survey identified 46 species belonging to 32 genera from 20 families. The most abundant family was the *Rhizophoraceae* with eight species followed by *Avicenniaceae* with three species.

Based on data from U. Soe-Htun and Tint Swe (2013), Myanmar has 10 species of seagrass belonging to 5 genera from 2 families. These are *Cymodocea rotundata*, *C. serrulata, Halodule pinifolia, H.uninervis, Syringodium isotoefolium, Enhalus acoroides, Halophila beccarii, H.decipiens, H. ovalis,* and *Thalassia hemprichii*. Of these, *Cymodocea rotundata, C.serrulata* and *Enhalus acoroides* are dominant in the seagrass beds. Most of these seagrass species are found in Rakhine and Tanintharyi coastal areas. This is mostly over 125 km to the south of the Project Area.

A fish survey was conducted by FFI in 2014 of 28 sites in the Myeik Archipelago (Russel, 2015). Surveys were conducted using high definition underwater video. A total of 409 species belonging to 55 families were recorded. The majority of fish species recorded were typical coral and rocky reef-associated species. The most abundant families included wrasses (Labridae), damselfishes (Pomacentridae), gobies (Gobiidae), cardinalfishes (Apogonidae), groupers (Serranidae), butterflyfishes (Chaetodontidae), snappers (Lutjanidae), surgeonfishes (Acanthuridae), parrotfishes (Scaridae), and Scorpionfishes (Scorpaenidae). These 10 families accounted for 263 species or ~ 64% of the total fish species recorded.

A total of 25 cetacean (whale and dolphin) species have been recorded as either Confirmed or Probable in Myanmar waters (Holmes et al. 2014; IUCN, 2017). One sirenian (dugong; Dugong dugon) also has a confirmed presence in the coastal waters of Myanmar (Tun and Ilangakoon, 2006). Of the whale and dolphin species potentially present in Myanmar waters, most are far-ranging migratory oceanic species while several others are coastal species with closer affinities to shallow water habitat areas and estuarine areas. IUCN-listed threatened cetacean species in Myanmar waters are oceanic species that typically inhabit deep offshore open waters, namely the blue whale (*Balaenoptera musculus*) (Endangered), fin whale (*Balaenoptera physalus*) (Endangered) and sperm whale (*Physeter macrocephalus*) (Vulnerable). The blue whale and the fin whale are also listed as endangered species recognized as of prime importance to the Region and deserving special attention under the ASEAN Agreement on the Conservation of Nature and Natural Resources (ASEAN, 1985). Other common deeper water species such as humpback whale (*Megaptera novaeangliae*) and Bryde's whale (*Balaenoptera edeni*) are known to occur in offshore waters in Myanmar; however these are listed as Least Concern and Data Deficient on IUCN Red List, respectively.

Five (5) of the world's seven (7) marine turtle species are regularly seen nesting and foraging in the coast of Myanmar. These include the Hawksbill (*Eretmochelys imbricata*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys aolivacea*), and Leatherback (*Dermochelys coriacea*). UNEP data suggest sandy shore habitat along Moscos Island and the adjacent Tanintharyi coastline are nesting sites for species including green turtles, hawksbill, Olive Ridley and Leatherback (UNEP, 2017). Annual turtle nesting activity in Myanmar waters is reported to occur between September and March with the peak period of activity occurring from December to January. Given the location of Block M-12, M-13 and M-14 in relation to known nesting beaches, there is a potential for marine turtles to be present within these blocks when traversing open waters to and from seasonal nesting areas and adjacent mating areas. All known nesting beaches are outside the Project Area; located at least 70 km away.

Outlying islands of the Myeik Archipelago and Moscos Island which are located over 70 km from the Project Area are expected to be potential suitable nesting site for individuals of these species, though this is not confirmed by observation. Lampi Island located over 80 km from the Project Area, is classified as an Important Bird Area which has been identified for the presence of resident species of plain-pouched hornbills (*Rhyticeros subruficollis*) that are Vulnerable on the IUCN Red List.

1.4.2 Social Baseline

The Project is located 125 km from the mainland in the offshore waters of Tanintharyi Region. The closest Township is Laungdon, Dawei District, in Tanintharyi Region.

There are no specific regional plans or strategies for the Project Area.

The demography of Dawei District in provided in *Table 1.3*.

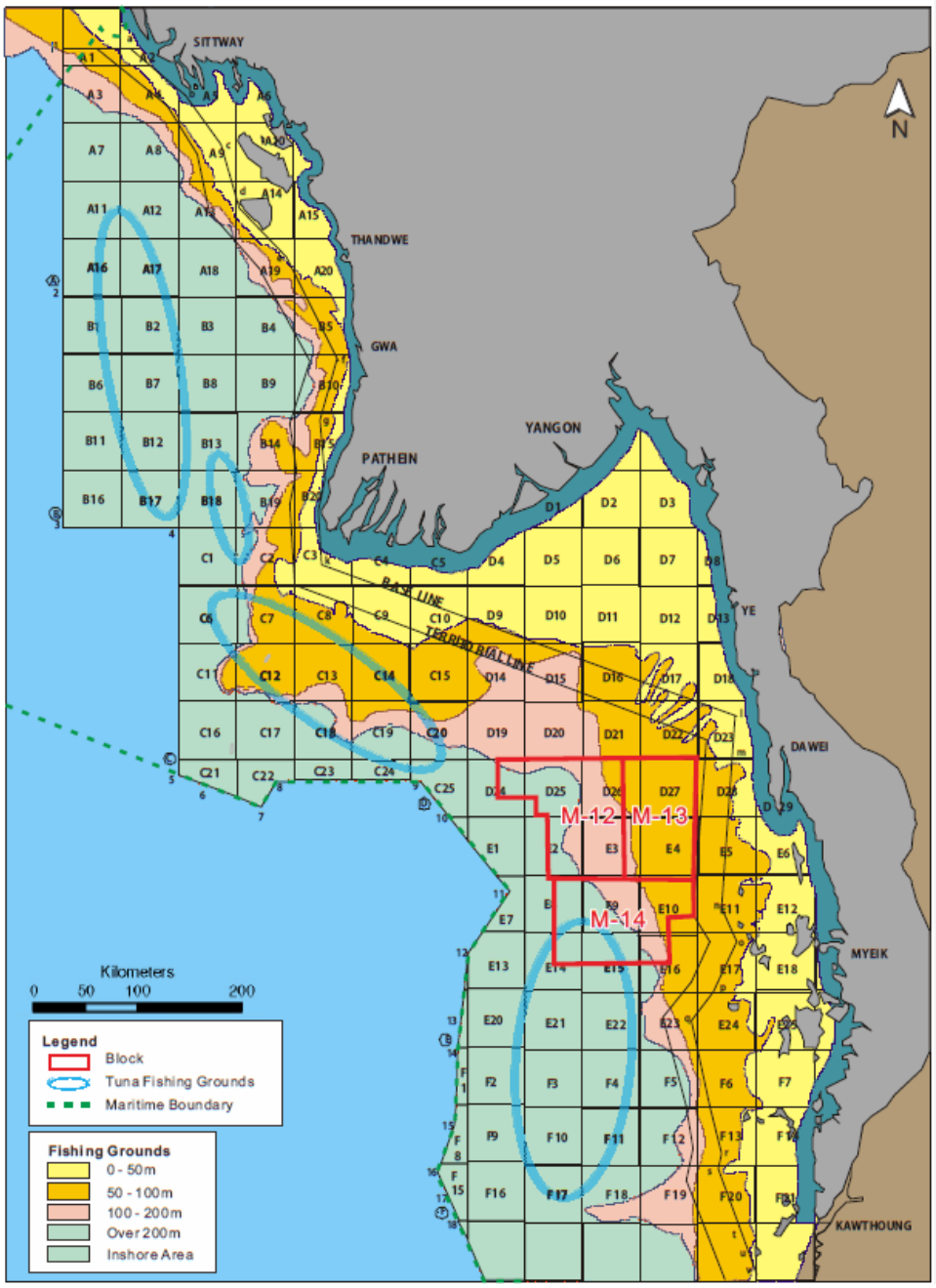
Table 1.3 Demographic data in Study Area

Township	Households	Population	Male	Female
Dawei	24,943	125,605	60,044	65,561
LaungLon	25,735	118,317	55,558	62,759
ThayetCahung	22,874	105,662	50,421	55,241
Yebyu	22,073	100,768	50,782	49,986

Source: Myanmar Population Census Data (2014)

The Department of Fisheries (DoF) has instituted two fishing zones which provide a restriction on fishing activities and a degree of protection to fisheries resources. Fishing Zone 1, for traditional coastal fisheries, extends from the shoreline to 10 nautical miles from the shore. Fishing Zone 2 extends from the outer limit of Fishing Zone 1 to the 200 nautical mile Exclusive Economic Zone (EEZ) limit (*Figure 1.5*). The peak fishing season is usually November to April as the sea conditions are calmer and vessels may fish further offshore. During the rainy season (i.e. generally May to October), fishing is often constrained to the Fishing Zone 1 (inshore) by adverse sea conditions.

Figure 1.5 Fishing Blocks in Tanintharyi Waters



Source: Department of Fisheries (2003), modified by ERM (2018)

Focus group discussions with fishers, fishing associations, and the DoF were conducted in July 2018. From the data collected, the townships with potential overlap of fishing activity and the Project Area includes boats over 40 ft. long from Maung Ma Kan, KyaukSan, and Pan Tin Inn. Boats over 60 ft. long from San Hlan, Tha Bawt Seik, and Pyin Gyi also may fishing in the Project Area. The best fishing grounds were roecorded as those around the islands; such as Bote Island and Heinze (Moscos) Islands. KyaukSin noted that the Project Area and offshore is their best fishing ground.

There are no known offshore sites of culture heritage are identified as within the Project Area.

Given that the Project is located over 125 km from the nearest habited land and over 70 km) from the nearest outlying islands of the Myeik Archipelago, there will not be any visual impacts from the Project.

1.5 IMPACT AND RISK ASSESSMENT AND MITIGATION MEASURES

For activities where possible significant effects could occur, these interactions will be assessed in more detail within this IEE Report. Those interactions include:

- Potential impacts from the physical presence of the survey vessel and equipment on fishing communities and fisheries (including livelihoods of fishermen);
- Potential impacts from increases in underwater sound from air guns on marine mammals, marine turtles, and fish;
- Potential impacts from unplanned collision and entanglement of marine turtles and the survey equipment;
- Potential impacts from collision with vessel / entanglement of equipment with fishing vessels and gear and shipping vessels; and
- Potential impacts from accidental spills of chemicals or fuel (e.g. during offshore re-fuelling) on marine water quality.

The potential impacts and mitigation measures are provided in *Table 1.4*.

Table 1.4 Summary of the Key Impacts and Control/Mitigation Measures for the Project

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 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 MONREC following survey completion.	**Minor**

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.
	• As an enhancement measures, all sightings of marine mammals / turtles should be recorded and reported to MONREC following survey completion.
		Minor (for fishes) to **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).	**Minor**

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

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impact
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. 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.	**Minor**
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.	**Minor**

1.6 CUMULATIVE IMPACT ASSESSMENT

The Project Area is surrounded by oil and gas blocks operated by other Companies, however, at the time of writing there are no other oil and gas activities in these Blocks that are likely to overlap with the timing of the Project activities.

However, near the Project Area is the existing Yetagun Platform and PCML are also planning on drilling some exploration and infill wells in the vicinity of the seismic survey. There could be overlap with these activities.

The main impacts arise from the temporary disturbance of fishing activity, specifically fishermen that fish near the continental shelf area where the Project Area overlaps with potential fishing grounds. The mitigation measures listed in the above sections are standard international best practise and will be adopted during all drilling and seismic activities.

With the standard mitigation measures in place, any impacts are unlikely to marine species will be of **Minor** significance.

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**.

In terms of social impacts, although the Project Area is large the exclusion zone will be limited to a mobile safety zone around the vessel and a stationary zone around the drilling rig. As such, the area from which fishermen will be temporarily displaced is relatively small. It is expected that the social impacts from the seismic surveys, if properly mitigated, will be localised to the area where fishing occurs and temporary in nature (a few days). Therefore, the impact will be of **Minor** significance to fishing activities but this is expected to be a **Negligible** impact on livelihoods.

1.7 ENVIRONMENTAL MANAGEMENT PLAN

The Project is being conducted in line with PCML HSE Management Policy, the requirements of the Production Sharing Contract (PSC), Myanmar regulatory requirements, and international conventions, standards and guidelines.

A summary of the Project environmental and social standards are shown in *Table 1.5*.

Table 1.5 Project Environmental and Social Standards

Environmental Parameter	Standard	Requirement
Air Emissions	MAPROL Annex VI	• Vessels will be in compliance with applicable MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI). • Use of low sulphur fuel (sulphur content not to exceed 3.5% m/m) when it is available • An International Air Pollution Prevention (IAPP) certification for the seismic survey vessel, support vessel and chase vessels as applicable or required by vessel class.
Sewage	MARPOL Annex IV / NEQ Guidelines	• The Project vessels will comply with applicable MARPOL requirements, including: discharge of untreated sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land. • Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land. • The discharge of sewage can only occur when the vessel is en route and travelling at no less than 4 knots. • An International Sewage Pollution Prevention (ISPP) certificate and International Oil Pollution Prevention (IOPP) certificate will be required, as appropriate to vessel class.
Waste Discharges (including food waste)	MARPOL Annex I & V	• Vessels will operate in compliance with MARPOL Annexes I: any oil-in-water content of discharges should not exceed 15 ppm. • General waste (excluding food) will not be disposed of to sea in line with MARPOL Annex V Requirements. • Combustible wastes will be segregated and disposed by incinerator on-board, should an incinerator be available on the selected vessel (in line with MARPOL Annex V requirements). No discharge of food waste is permitted less than 3 nm from the coast. Maceration is required at greater than 3 nm and less than 12 nm from the coast. Hazardous wastes will be stored on the vessels in appropriate containers with labels. • Hazardous waste storage will be designated in accordance with their Materials Data Sheet (MSDS)

Environmental Parameter	Standard	Requirement
		(in line with MARPOL Annex V requirements). Hazardous wastes will be returned to the vessels' selected shore base and sent to a licensed disposal facility by a licensed waste contractor (in line with MARPOL Annex V requirements).
Underwater sound generation	JNCC Guidelines (1)	The Project will implement the JNCC Guidelines including alignment of Contractor operating procedures with JNCC Guidelines. These guidelines include: • A soft-start procedure will be utilised at the commencement of airgun firing to allow adequate time for marine mammals, turtles, and whale sharks to leave the area. • Dedicated Marine Mammal Observers (MMOs) will be on-board to undertake the pre-shoot search. Use of Passive Acoustic Monitoring (PAM) to detect whether any marine mammals are in the vicinity of the seismic vessel during night time or low visibility operations.
Spills	MARPOL Annex I	Support and chase vessel standard operating procedures to be prepared and implemented including (if appropriate) an offshore bunkering procedure. Shipboard Oil Pollution Emergency Plans (SOPEPs) will be prepared and implemented.

It is estimated that the overall budget for implementing the EMP for the marine seismic survey is around $50k USD. Many of the management and mitigation measures are embedded controls as part of the standard operational costs of the seismic survey vessel, support vessel and chase vessels.

Given that there are no significant impacts from the Project (under *Chapter 6* of this IEE Report); no separate management plans are required for the following:

- Biodiversity: there are no Major impacts to biodiversity given the distance from sensitive receptors (over 70 km); and
- Community: the Project is located 125 km from the nearest human receptor and communities and therefore will not have an impact.

Management Plans are, however, prepared for **Emergency Response** and **Waste** as per industry standard procedures.

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

For this short duration seismic survey, no specific management plans are required for pre-construction, construction, operation and decommissioning phases as this activity only has the Operational Phase.

PCML will submit an Environmental Monitoring Report, to MOGE and MONREC after completion of the marine seismic survey. The Environmental Monitoring Report will include the items listed in *Table 1.6*. Given the limited duration of the seismic survey (2-3 months) and lack of significant impacts, no additional monitoring is considered to be required for the Project.

Table 1.6 Environmental Monitoring Recording

Project Activity/ Environmental Aspect	Monitoring Measures	Reporting
Operation of the seismic source	Visual monitoring for whales and turtles during the marine seismic survey	Record if any marine fauna sightings
	Fishery interaction, implementation of community grievance, mechanism	Record if any fishing vessel sightings
Incident reporting	Details of any environment or social	Incident report forms
	Incidents	
Accidental Releases and Leaks	Safety record	Safety record
Non-Compliance Reporting	Non-Compliance with EMP	Inspection check sheets

1.8 PUBLIC CONSULTATION AND DISCLOSURE

The IEE consultation meetings were held with various relevant stakeholders at the Regional Level in Tanintharyi. The consultation helped the Project to gather information on potentially affected people, on potential data gaps, and how these will be closed out in the IEE Report. The IEE consultation involved face-to-face meetings with a range of stakeholders including villagers, the Department of Fisheries (DoF), the Tanintharyi Chief Minister, the Regional Environmental Conservation Department (ECD), and the General Administrative Department (GAD), ward administrators, planning department as well as local community and fishing representatives. The date, time, location, stakeholder and purpose of each meeting is provided in *Table 1.7*.

Table 1.7 Consultation Activities Undertaken during IEE

Date, time, location	Stakeholder	Purpose of Engagement
23 August, 2018, 14:30-17:30 PM ThayetChaung GAD Office	Meeting with GAD, DOF, Village Leaders, Villagers	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
24 August, 2018, 10:00-12:00 PM LaungLon GAD Office	Meeting with GAD, Village Leaders, Fishermen, Villagers	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
24 August, 2018, 13:00-15:00 PM Zayyar Htet San Hotel, Dawei	Meeting with ECD, DOF, Concerned Departments, Media, CSOs, Village Leaders	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
26 August, 2018, 09:30-11:30 PM Grand Jade Hotel, Myeik	Meeting with ECD, DoF, Concerned Departments, MFF, Media, CSOs, Village Leaders and Fishermen	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen

The following section summarises the key issues raised in public consultation meetings and *Table 1.8* presents the responses concerned with these issues.

Table 1.8 Key Questions Raised During IEE Public Consultation

Comments Received	Response to Comments in Meeting	Consideration for IEE Study
Impacts on the Marine Environment Queries relating to wastes discharge from seismic vessels	PCML will conduct all project activities in compliance with the National Environmental (Emission) Quality (NEQ) Guideline. Different kinds of wastes must be categorized and treated prior to any discharge.	A waste management plan has been included in the IEE Report (*Section 8.5*).
Impacts on Fishermen and Fisheries The fishing community expressed their concern on impacts to fishing as the project is located in their fishing blocks	Prior to start of the seismic survey, a Notice to Mariners will be announced in the newspaper. In this notice, the boundaries/edges of the seismic Project Area will be described. However, fishing will only be restricted within the 500 m safety zone around the vessel. Fishing boats will be notified in advance whilst offshore by supporting vessels. If fishing boats are in the seismic vessel path, PCML will communicate with them using Marine Channel-16.	The potential impact to fishing has been assessed in the IEE study (*Section 6.3.*)
Corporate Social Responsibility (CSR) and Social Benefits One of the most common issues raised was accessible to electricity and cost per unit	Access to electricity and transmission lines are not part of this Project. However, to get access to electricity, the Region needs a transmission line that connects to National Grid and it will reduce the cost per unit. The Department of Electricity are planning to implement a Mawlamyaing-Yae-Dawei transmission line and a Dawei-Myeik-Bokepyin transmission line. For PCML CSR programs, PCML have to negotiate with the Regional Government not to overlap with their PCML project before starting our CSR activities.	CSR will not be assessed as part of IEE study but all suggestions raised by the local community.
Benefits to Regional Level from Natural Resources As the resources come from Tanintharyi, the local community from the Region should get the benefits.	The project is managed by the Union Government as the Project is located over 25 nautical miles from the coast. The revenue sharing between the Union and State Government is not within PCML control. The Union Government will share the profits for the development of States and Regions.	This is not part of the IEE Study.

Comments Received	Response to Comments in Meeting	Consideration for IEE Study
Contract between MOGE and PCML Queries raised about the contract and timeline.	The Production Sharing Contract is between MOGE and PCML. The project timeline is 30-yr and commenced in 2000.	Project background is included in *Section 4.1*.
Grievance Mechanism and Compensation One stakeholder's concern is about the grievance process if the fishing vessels/nets get damaged.	PCML has a grievance mechanism and the community can contact the phone number mentioned in the brochure for complaints. For compensation process, PCML will comply with the government instruction.	The grievance mechanism is described in *Section 9.6*.
Disclosure of Information Stakeholders mentioned that the operations and schedule for the Project must be disclosed to the public particularly in newspapers.	Information will be disclosed as per the IEE Procedure and a Notice to Mariners will be issued in the newspapers before Project activities commence.	Disclosure and further engagement is provided in *Section 9.4* and *Section 9.5*.

Stakeholder consultation undertaken to date confirmed that potential impacts as a result of Project activities will be small in scale and of limited extent.

Future engagement activities will consist of the following:

- Further disclosure of Project information and IEE Report, including opportunities to provide feedback;
- Engagement with relevant regional officials/authorities and government organisations on the outcomes of the IEE; and
- Ongoing communications with interested and potentially affected stakeholders during the operation. While impacts on local communities, ongoing project information will be provided to local areas.

PCML will provide an activity update in the notice to mariners prior to the start of the Project. A grievance mechanism will be in place during operation, in line with the steps required under the EIA Procedure, as well as international good practice.

The IEE Report will be made available online at PCML's website, **https://www.petronas.com**. There will also be adverts in one English and one Myanmar newspaper and hard copies of the report will be made available in Yangon, Dawei, and Myeik.

၁ အကျဉ်းချုပ် အစီရင်ခံစာ

၁.၁ နိဒါန်း

PC Myanmar (Hong Kong) Limited (PCML) သည် မြန်မာနိုင်ငံ ကမ်းလွန် လုပ်ကွက်အမှတ် M-12၊ M-13 နှင့် M-14 တို့ရှိ ရဲတံခွန် သဘာဝဓါတ်ငွေ့ထုတ်လုပ်ရေး စီမံကိန်း၏ လုပ်ငန်းဆောင်ရွက်သူ (operator) ဖြစ်ပါသည်။ ၁၉၉၀ ပြည့်နှစ် မေလတွင်၊ PCML သည် ကပ္ပလီပင်လယ်ရှိ ထားဝယ်မြို့၏ အနောက်တောင်ဘက်၌ ရှိနေသော လုပ်ကွက်အမှတ် M12၊ M13 နှင့် M14 တို့အတွက် မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း (MOGE)၊ NIPPON နှင့် PTTEPI တို့နှင့် ထုတ်ဝေမှု အပေါ် ခွဲဝေခံစားရေးစာချုပ် (PSC) ကို လက်မှတ်ထိုးချုပ်ဆိုခဲ့ကြပါသည်။

ယခု အစီရင်ခံစာမှာ ကမ်းလွန် လုပ်ကွက်အမှတ် M12/13/14 တို့၌ PCML က ဆောင်ရွက်မည့် အဆိုပြု 3D ဆိုက်စမစ်တိုင်းတာမှုအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ဖြစ်ပါသည်။

တိုင်းတာမှု၏ ရည်ရွယ်ချက်မှာ အနာဂတ် ရေနံနှင့်သဘာဝဓါတ်ငွေ့ ရှာဖွေရေး လုပ်ငန်းများအတွက် ပင်လယ်ကြမ်းပြင်အောက်တွင် ဖြစ်နိုင်ခြေရှိသော ရေနံနှင့်သဘာဝဓါတ်ငွေ့များရှိနေမှု ကိုအ တည်ပြုနိုင်ရန်အလို့ငှာ ရရှိသည့်အချက် အလက်များကို အနုစိတ်ခွဲခြမ်းလေ့လာနိုင်ရန် ဖြစ်ပါသည်။ တိုင်းတာမှုတွင် ခြောက်လ မှ ခုနှစ်လခန့် အထိ (ဥပမာ - ရက်ပေါင်း ၁၈၀-၁၉၀ ခန့်အထိ) ကြာမြင့်သွားနိုင်ပါသည်။

မြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအရ၊ စီမံကိန်းသည် IEE တစ်ရပ်ကို ဆောင်ရွက်ပြီး၊ သယံဇာတ နှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) ၏ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) ထံသို့ တင်သွင်းသွားရန် လိုအပ် ပါသည်။

၁.၂ မူဝါဒ နှင့် ကြီးကြပ်ရေးဆိုင်ရာ မူဘောင်

စီမံကိန်းကို အမျိုးသားအဆင့်နှင့် ဒေသအဆင့်စံနှုန်းများ နှင့် ဥပဒေများနှင့်အညီ ဆောင်ရွက်သွား မည် ဖြစ်ပါသည်။ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် သက်ဆိုင်ရာ ဒေသဥပဒေများတွင် အောက်ပါ တို့ပါဝင်ပါသည် -

- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)၊
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ (၂၀၁၄)၊
- အမျိုးသား ပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)၊ နှင့်
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း (၂၀၁၅)။

၁.၃ *စီမံကိန်းအကြောင်းအရာဖော်ပြချက် နှင့် အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများ*

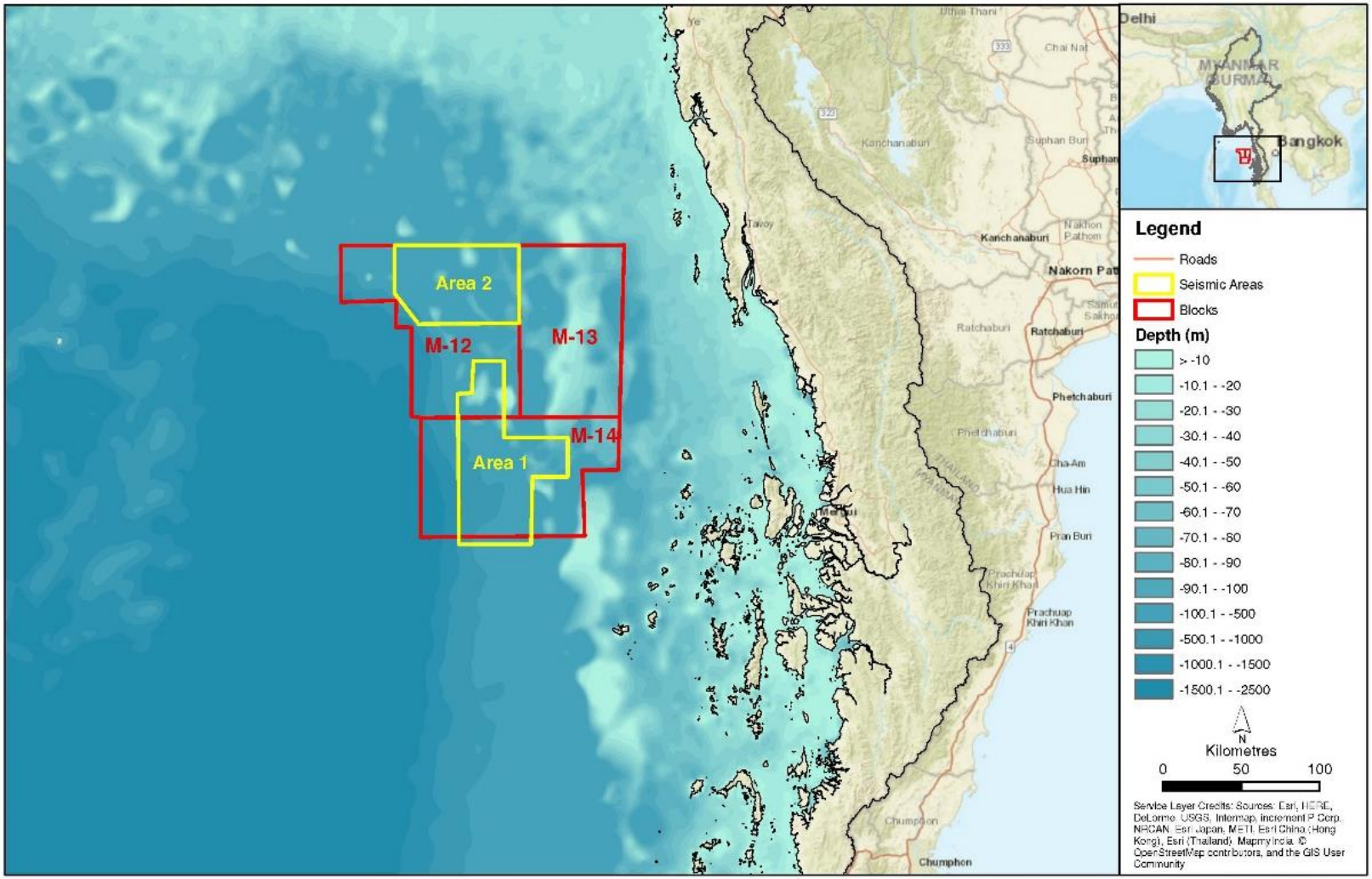
၁.၃.၁ *အဆိုပြု စီမံကိန်း*

စီမံကိန်းနယ်မြေဧရိယာ (ဥပမာ - 3D ဆိုက်စမစ်တိုင်းတာမှုကိုဆောင်ရွက်သွားမည့် နယ်မြေဧရိယာ) တွင် တနင်္သာရီတိုင်းဒေသကြီးပင်မနယ်မြေအစိတ်အပိုင်းနှင့် ဘေးချင်းကပ်လျက်ရှိသည့် ကမ်းလွန်ရေတိမ်ပိုင်းရေပြင် လွှမ်းခြုံနေသည့် စတုရန်းကီလိုမီတာ ၈၉၀၀ ခန့်ရှိ နယ်မြေဧရိယာကို အကျုံးဝင် စေ ပါသည်။ စီမံကိန်းနယ်မြေဧရိယာသည် မြေတ်ကျွန်းစု၏ ကျွန်းနေရာအစွန်းအဖျားအနီးဆုံးနေရာမှ ကီလိုမီတာ ၇၀၊ ထိခိုက်လွယ်ပြီးထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေဧရိယာ (လန်ပိကျွန်း ငါးမန်းထိန်းသိမ်းရေးနယ်မြေဧရိယာ) ရှိ အနီးဆုံးနေရာမှ ၃၃ ကီလိုမီတာ နှင့် ပင်မနယ်မြေကမ်း (တနင်္သာရီတိုင်းဒေသကြီး၊ ထားဝယ်ခရိုင်၊ လောင်းလုံမြို့နယ်) ရှိ အနီးဆုံးနေရာမှ ၁၂၅ ကီလိုမီတာခန့် အကွာအဝေး၌ တည်ရှိပါသည်။ စီမံကိန်းနယ်မြေဧရိယာရှိ ရေအနက်မှာ မီတာ ၁၀ ခန့် မှ မီတာ ၁၀၀၀ ကျော်အထိ ရှိပါသည်။ စီမံကိန်းနယ်မြေဧရိယာကို *ပုံ ၁.၁* တွင် အဝါရောင်ဖြင့် ဖော်ပြထားပါသည်။ စီမံကိန်းနယ်မြေဧရိယာ၏ ကိုဩဒိနိတ်များကို *ဇယား ၁.၁* တွင် တင်ပြထား ပါသည်။

ဇယား ၁.၁ စီမံကိန်းနယ်မြေဧရိယာ ကိုဩဒိနိတ်များ (WGS-84)

ဧရိယာ (၁)	X	Y	လတ္တီတွဒ်	လောင်ဂျီတွဒ်
၁	၂၃၁၉၆.၈	၁၄၅၂၆၁၈	၁၃° ၀၇' ၄၁.၂၂၅"	၉၆° ၃၁' ၄၀.၁၆၂"
၂	၂၄၂၂၈၄.၉	၁၄၅၂၆၀၈	၁၃° ၀၇' ၄၄.၁၁၅"	၉၆° ၃၇' ၂၂.၂၃၇"
၃	၂၄၂၂၈၄.၉	၁၄၇၂၆၃၀	၁၃° ၁၈' ၃၅.၃၄၃"	၉၆° ၃၇' ၁၅.၉၂၄"
၄	၂၆၁၂၀၄.၇	၁၄၇၂၆၅၉	၁၃° ၁၈' ၄၁.၉၅၉"	၉၆° ၄၇' ၄၄.၂၉၆"
၅	၂၆၁၂၀၄.၇	၁၄၂၃၉၁၇	၁၂° ၅၈' ၃၆.၄၁၃"	၉၆° ၄၇' ၅၈.၃၈၆"
၆	၃၀၀၂၆၃.၆	၁၄၂၃၉၂၆	၁၂° ၅၅' ၂၆.၆၈၆"	၉၇° ၀၉' ၃၃.၅၇၇"
၇	၃၀၀၂၁၃.၅	၁၃၉၈၃၄၂	၁၂° ၃၈' ၃၄.၂၅၀"	၉၆° ၀၉' ၃၇.၉၃၃"
၈	၂၇၇၂၂၉.၇	၁၃၉၈၃၀၇	၁၂° ၃၈' ၂၇.၅၅၃"	၉၆° ၅၆' ၅၆.၄၅၂"
၉	၂၇၆၅၇၁.၈	၁၃၅၅၁၃၀	၁၂° ၁၅' ၀၂.၆၅၉"	၉၆° ၅၆' ၄၅.၇၁၃"
၁၀	၂၃၂၀၃၅.၉	၁၃၅၅၀၃၇	၁၂° ၁၄' ၄၇.၅၁၀"	၉၆° ၃၂' ၁၂.၇၁၄"
ဧရိယာ (၂)	**X**	**Y**	**လတ္တီတွဒ်**	**လောင်ဂျီတွဒ်**
၁	၁၉၃၇၈၉.၄	၁၅၁၇၈၃၉	၁၃° ၄၂' ၄၈.၆၉၈"	၉၆° ၁၀' ၀၈.၃၂၀"
၂	၁၉၃၈၂၉	၁၅၄၉၃၈၀	၁၃° ၅၉' ၅၄.၁၈၁"	၉၆° ၀၉' ၅၇.၁၉၉"
၃	၂၇၁၁၁၇.၉	၁၅၄၈၅၉၁	၁၃° ၅၉' ၅၄.၈၀၈"	၉၆° ၅၂' ၅၁.၅၄၀"
၄	၂၇၀၉၃၈.၁	၁၄၉၇၄၁၁	၁၃° ၃၂' ၀၉.၈၉၂"	၉၆° ၅၃' ၀၀.၅၄၅"
၅	၂၇၀၉၃၈.၉	၁၄၉၇၅၅၆	၁၃° ၃၁' ၅၄.၉၈၆"	၉၆° ၁၈' ၅၄.၅၅၇"

ပုံ ၁.၁ စီမံကိန်းနယ်မြေရိုယာတည်နေရာပြပုံ



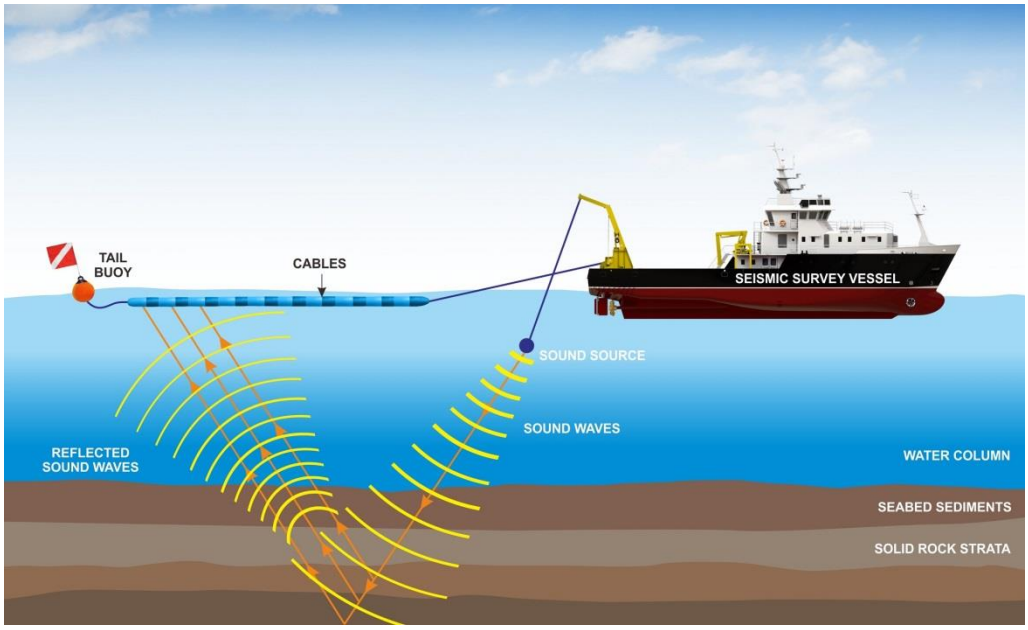
လက်ရှိအနေအထား၌၊ စီမံကိန်းကို ၂၀၁၈ အောက်တိုဘာလတွင် စတင်ဆောင်ရွက်ရန် စီစဉ်ထားပြီး၊ ခြောက်လ မှ ခုနှစ်လခန့်အထိ (ဥပမာ - ရက်ပေါင်း ၁၈၀-၁၉၀ ခန့်အထိ) ကြာမြင့်နိုင်ပါသည်။ ယခုစီမံကိန်းသည် ရှာဖွေရေးလုပ်ငန်းမျှသာဖြစ်သဖြင့်၊ လုပ်ငန်းလည်ပတ်ရေးကာလအဆင့် ဖြစ်သည့် ကာလအဆင့်တစ်ရပ်သာ အကျုံးဝင်မည် ဖြစ်ပါသည်။ အမြဲတမ်းဆောင်ရွက်ရွက်မည့် အဆောက်အအုံများရှိမည် မဟုတ်သည့်အပြင်၊ တည်ဆောက်ရေး သို့မဟုတ် ရပ်စဲခြင်း ကာလ အဆင့်များလည်းရှိမည် မဟုတ်ပါ။

ပင်လယ်ကြမ်းပြင်အောက် သတ္တုတိုက်များ နှင့် ဘူမိဖွဲ့စည်းပုံအနေအထားများကို သတ်မှတ်နိုင်ရန် ပင်လယ်ပြင်ဆိုက်စမစ်တိုင်းတာမှုများကို အသုံးပြုပါသည်။ ပင်လယ်ပြင်ဆိုက်စမစ်တိုင်းတာမှုကာလအတွင်း၊ ဖြည်းဖြည်းချင်းရွေ့လျားနေသော တိုင်းတာရေး ရေယာဉ် (ပုံမှန်အားဖြင့် တစ်နာရီလျင်၊ ရေမိုင် ၄ မိုင် မှ ၆ မိုင်ခန့် ခုတ်မောင်းနေမည်) အသံအရင်းအမြစ်များ (လေသေနတ်များ) ထုတ်လွှတ်သည့်ကိရိယာ ကို ဆွဲယူသွားနေမည် ဖြစ်ပါသည်။ စွမ်းအင်မြင့်ပြီး ကြိမ်နှုန်းနည်းနိမ့်သော အသံများကို လေသေ နတ် များမှ ထုတ်လွှတ်ပြီး၊ ပင်လယ်ကြမ်းပြင်အောက် နှင့် ပင်လယ်ကြမ်းပြင်အောက်ရှိနေသော ဘူမိ ဆိုင်ရာအနေအထားများသို့ ဦးတည်သွားပါသည်။ ၎င်းအသံများသည် မျက်နှာပြင်အောက်ရှိ ကျောက်ဖွဲ့စည်းမှုများကို ပြန်ကန်ထွက်ပြီး၊ ဖမ်းယူရေးကိရိယာများ (ဟိုက်ဒရိုဖုန်းများ) မှ ဆိုက်စမစ် စွမ်းအင်ကို စုဆောင်းယူမည့် မျက်နှာပြင်နေရာသို့ ပြန်ရောက်ပါသည်။ ထို့နောက် ရရှိသော အချက် အလက်များကို ဘူမိရူပ အဓိပ္ပါယ်ဖော်သတ်မှတ်ရန်အတွက် ပင်လယ်ကြမ်းပြင်အောက် ဘူမိဆိုင်ရာ အကြောင်းအရာများကို ထုတ်လုပ်ပေးရန် နောက်ထပ်လုပ်ငန်းစဉ်များအတွက် ယာဉ်ပေါ်ပါ ကွန်ပျူတာများမှ မှတ်တမ်းယူပါသည်။ ပင်လယ်ပြင်ဆိုက်စမစ်တိုင်းတာမှုလည်ပတ်ရေးလုပ်ငန်းများ၏ နောက်ကွယ်ရှိ အခြေခံမှုများကို *ပုံ ၁.၂* တွင် ရေးဆွဲဖော်ပြထားပါသည်။

ပင်လယ်ပြင်သုံးဆိုက်စမစ်ကြိုးကြီးများနည်းလမ်းအသုံးပြုသောအခါ၊ ဖမ်းယူးရေးကိရိယာများ (ဟိုက်ဒရို ဖုန်းများ) ကို ရှည်လျားသော ကေဘယ်ကြိုးများ (ကြိုးကြီးများ)ဖြင့် ဖုံးထားပြီး၊ ၎င်းကို ဆိုက်စမစ် ယာဉ်နောက်တွင် ဆွဲယူထားမည် သို့မဟုတ် တန်းလန်းဆွဲထားမည် ဖြစ်ပါသည်။ ပင်လယ်ပြင်ဆိုက်စမစ် တိုင်းတာမှုလည်ပတ်ရေးလုပ်ငန်းများကို အထူးပြုဆိုက်စမစ် တိုင်းတာမှုရေယာဉ်က ဆောင်ရွက် သွားမည် ဖြစ်ပြီး၊ ၎င်းကို "ကင်းလှည့်ရေယာဉ်များ" အဖြစ် ရည်ညွှန်းသည့် ပိုမိုသေးငယ်သော ရေယာဉ် တစ်စီး သို့မဟုတ် တစ်စီးထက်အများတို့မှ ပုံမှန် ထောက်ပံ့ဆောင်ရွက်မည် ဖြစ်ပါသည်။ ကင်းလှည့်ရေယာဉ်များ၏ အခန်းကဏ္ဍမှာ ပိတ်ဆို့မှုများ (ဥပမာ - ငါးဖမ်းပိုက်များ၊ ငါးဖမ်းမြှုံးများ) အတွက် ရှေ့မှကင်းထောက်ရန် နှင့် တိုင်းတာမှုပြုလုပ်နေသောနယ်မြေဇရိယာကို ရှောင်ကြဉ်ရန် ရေဒီယိုသတိပေးချက်များကို လျှစ်လျူရှုထားနိုင်သည့် ရေယာဉ်ဖြင့်သွားလာနေမှုများထံ ချဉ်းကပ် သတိပေးရန် ဖြစ်ပါသည်။

3D ဆိုက်စမစ်တိုင်းတာမှုတွင် များစွာသောကြိုးကြီးများအသုံးပြုမှုတို့ ပါဝင်ပါသည်။ မတူညီသော ထောင့်များမှ ဆိုက်စမစ်အချက်အလက်များရရှိသောကြောင့်၊ မျက်နှာပြင်အောက်ရှိ ဘူမိအနေ အထား၏ အသေးစိတ် 3D ပုံစံကို တည်ဆောက်ရန် အသုံးပြုနိုင်သည့် အချက်အလက်များကို ရရှိစေမည် ဖြစ်ပါသည်။

ပုံ ၁.၂ ဆိုက်စမစ်တိုင်းတာမှု ခြုံငုံပြပုံ



တိုင်းတာမှုသည် *ပုံ ၄.၁* တွင် ပြထားသည့်အတိုင်း စီမံကိန်းနယ်မြေဧရိယာအတွင်း ၈၉၀၀ စတုရန်း ကီလိုမီတာခန့် အကျုံးဝင်သွားမည် ဖြစ်ပါသည်။ ပုံမှန်လည်ပတ်ရေးလုပ်ငန်းများအရ၊ ဆိုက်စမစ် တိုင်းတာမှုကို ပြေးလမ်းကြောင်းပုံစံဖွဲ့စည်းမှု အခင်းပုံစံ (လွတ်ထားသောကြိုးကြိုးများနေရာ ချထား မှု၏ အကျယ်) ဖြင့် ရရှိသွားမည် ဖြစ်ပါသည်။ ဆိုက်စမစ်ရေယာဉ်သည် အခင်းပုံစံတစ်ခုချင်းစီရှိ ကြိုတင်နေရာချထားသောလိုင်း (ဥပမာ - တိုင်းတာမှု / ခုတ်မောင်းမှုလိုင်း) အတိုင်း ခုတ်မောင်းသွား မည် ဖြစ်ပါသည်။ ထို့နောက် ခုတ်မောင်းရေးလိုင်းများကို အခင်းပုံစံအကျယ်၏ တစ်ဝက်အထိရှိ အကြား၌ ရရှိပါသည်။ ခုတ်မောင်းရေးလိုင်း၏ အဆုံးနေရာသို့ရောက်ရှိရန်၊ ရေယာဉ်သည် ပြန်လှည့် ရန် နှင့် အခြားခုတ်မောင်းရေးလိုင်းကို စတင်ရန် ပုံမှန်အားဖြင့် ၂ - ၃ နာရီထိ (ကီလိုမီတာ ၁၀ - ၂၀ အထိရှိ မောင်းနှင်ရေနယ်မြေဧရိယာ) ကြာမြင့်သွားမည် ဖြစ်ပါသည်။ တိုင်းတာမှုကို အရှေ့မှ အနောက် မောင်းနှင်သွားလာမှုပုံစံဖြင့် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ လိုင်းတစ်ခုချင်းစီသည် ပုံမှန်အားဖြင့် ကီလိုမီတာ ၆၀ - ၇၀ အထိ ရှိသွားမည် ဖြစ်ပါသည်။

အမှန်တကယ်ဆိုက်စမစ်တိုင်းတာမှုအတွက် အထူးပြုတိုင်းတာမှုရေယာဉ်ကို ရွေးချယ်ဆောင်ရွက် သွားမည် ဖြစ်ပြီး၊ ယာဉ်ပေါ် အမှုထမ်း ၅၀ ဦးခန့် ထားရှိရန် ရည်ရွယ်ထားပါသည်။ အစီရင်ခံစာရေး သားနေသည့်ကာလအထိ၊ ဆိုက်စမစ်ဆိုင်ရာ ကန်ထရိုက်တာအတွက် စာချုပ် ချုပ်ဆိုရေးလုပ်ငန်း စဉ်ကို ဆောင်ရွက်နေဆဲဖြစ်သဖြင့်၊ တိုင်းတာမှု၏ အသေးစိတ်အချက်အလက်များကို မထုတ်ပြန်နိုင် သေးပါ။ သို့ရာတွင်၊ တင်ပြထားသော သတင်းအချက်အလက်များသည် ပုံမှန် ဆိုက်စမစ်တိုင်းတာမှု နည်းလမ်းများကိုအပေါ် အခြေခံထားခြင်း ဖြစ်ပါသည်။ ပုံမှန်ဆိုက်စမစ်တိုင်းတာမှုရေယာဉ်များ၏ ရုပ်ပုံဥပမာများကို *ပုံ ၁.၃* တွင် တင်ပြထားပါသည်။

ပုံ ၁.၃ ပုံမှန် ဆိုက်စမစ် ရေယာဉ်

ကိုးကား - PCML

၁.၃.၂ အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများ

စီမံကိန်းနှင့်ပတ်သက်သည့် အခြားရွေးချယ်စရာများကိုထည့်သွင်းစဉ်းစားခြင်းသည် ပတ်ဝန်းကျင် နှင့် လူမှုဆိုးကျိုးများကို ရှောင်ကြဉ်ရန် သို့မဟုတ် လျော့ချရန် နှင့် စီမံကိန်းအကျိုးအမြတ်များကို တိုးမြှင့်သွားရန် သို့မဟုတ် မြှင့်တင်သွားရန် စီမံကိန်းများကိုစဉ်ရေးဆွဲရာတွင် အခြေခံသတ် မှတ် ချက်တစ်ရပ် ဖြစ်ပါသည်။ စီမံကိန်းအတွက် ထည့်သွင်းစဉ်းစားခဲ့သော အခြားရွေးချယ်စရာများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည် -

- **ကြိုးကြီးများ** - တိုင်းတာမှုတွင် ခိုင်ခံသောကြိုးကြီးများအဖြစ် ရေနံဆီများပြည့်နေသော ကြိုးကြီး များထက် ခိုင်ခံ့သော သို့မဟုတ် အဆီပျစ်များပြည့်နေသော ကြိုးကြီးများကို အသုံးပြုသွားမည် ဖြစ်ပြီး၊ ၎င်းတို့မှာ ပုံသွန်းထားသောကာကွယ်ပေးသည့်ကိရိယာဖြင့်ပြုလုပ်ထားကာ၊ ထိခိုက်မှု တို့ကို ဒူပေနာပေခံရည်ရှိခြင်း၊ ရေယာဉ်ပေါ် သို့မဟုတ် ပင်လယ်ထဲတွင် ထိခိုက်မှုဖြစ်သော အခါ မယိုဖိတ်နိုင်ခြင်း နှင့် ရာသီဥတု နှင့် လှိုင်းသံများအတွက် ထိခိုက်လွယ်မှုနည်းပါးခြင်း နှင့် အဆီပျစ်များမှာ ဓာတ်မပြုနိုင်ခြင်းတို့ကြောင့် ဖြစ်ပါသည်။ ထို့ကြောင့် ရွေးချယ်ထားသည့် အခြား နည်းလမ်းမှာ ယိုဖိတ်မှု နှင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုမှာ ဖြစ်နိုင်ခြေ နည်း ပါသည်။

- **ထိခိုက်လွယ်ပတ်ဝန်းကျင်နေရာများ** - ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ ထိခိုက်လွယ်မသည့် နေရာများ အပေါ် အနှောင့်အယှက်ဖြစ်မှုကို ရှောင်ကြဉ်နိုင်ရန်၊ 3D ဆိုက်စမစ်တိုင်းတာမှု နယ်မြေဧရိယာကို အဓိကထိခိုက်လွယ်သောပတ်ဝန်းကျင်နေရာများမှ တတ်နိုင်သမျှ ဝေးကွာ အောင် ထားသင့်ပါသည်။ ယခုစီမံကိန်း၌ စီမံကိန်းနယ်မြေဧရိယာသည် အနီးဆုံး KBA များမှ ၃၃ ကီလိုမီတာ နှင့် မြန်မာနိုင်ငံ ကမ်းရိုးတန်းမှ ၁၂၅ ကီလိုမီတာခန့်

ကွာဝေးပါသည်။ အနီးဆုံး ထိခိုက်လွယ်သော သို့မဟုတ် ထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေဧရိယာ / ပတ်ဝန်းကျင်နေရာမှ ဝေးကွာသဖြင့်၊ သက်ရောက်မှုများရှိနိုင်သည်ဟု မမျှော်လင့်ထားပါ။ ထို့ပြင် တိုင်းတာမှုတည်နေရာသည် လက်ခံနိုင်ဖွယ်ရှိသည့်နေရာတွင်ရှိသည်ဟု ထည့်သွင်း စဉ်းစားထားပါသည်။

- **လည်ပတ်ရေးဘေးကင်းလုံခြုံမှုဇုန်** - ငါးဖမ်းရေယာဉ်များကဲ့သို့သော အနီးရှိပင်လယ်တွင် လုပ်ကိုင်ဆောင်ရွက်သူများထံ အနှောင့်အယှက်ဖြစ်မှုမှ တတ်နိုင်သမျှ လျော့ချနိုင်ရန် ဆိုက်စမစ်လည်ပတ်ရေးလုပ်ငန်းများကာလအတွင်း ဘေးကင်းလုံခြုံမှုဇုန်ကို လုပ်ကွက် တစ်ခုလုံးသို့လာရောက်မှုကို ကန့်သန့်ထားသည်ထက်၊ ရွှေ့လျားနေသော တိုင်းတာမှုရေယာဉ် ပတ်ပတ်လည်တွင် ထားရှိသင့်ပါသည်။ ယခုစီမံကိန်းသည် ရွှေ့လျားနေသော ကန့်သတ် ရေးဇုန်ကို အသုံးပြုသွားမည်ဖြစ်သောကြောင့်၊ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာ၏ အရွယ်အစား (ပမာဏ)ကို လျော့ချသွားနိုင်မည့်အပြင် ငါးဖမ်းဆောင်ရွက်သူများအတွက် နေရာများကိုလည်းချန်လှပ်ထားရှိမှု ရှိနေမည် ဖြစ်ပါသည်။ ထို့ပြင်၊
- **စီမံကိန်းမဆောင်ရွက်သည့် အခြားနည်းလမ်းရွေးချယ်မှု** - "စီမံကိန်းမဆောင်ရွက်တော့ခြင်း" ဆိုင်ရာရွေးချယ်မှုသည် ဆိုက်စမစ်တိုင်းတာမှုကို မဆောင်ရွက်တော့ခြင်းကြောင့် ဤလုပ်ကွက်များ ၌ နောက်ထပ်ရှာဖွေရေးလုပ်ငန်းများ မပြုလုပ်တော့ခြင်းဟု အဓိပ္ပါယ်သက်ရောက်ပါသည်။ နောက်ထပ်ရှာဖွေရေးလုပ်ငန်းမဆောင်ရွက်တော့သောကြောင့်၊ ဤနယ်မြေဧရိယာ၌ နောက်ထပ် ရေနုံ နှင့် သဘာဝဓာတ်ငွေ့ဖွံ့ဖြိုးရေးစီမံကိန်းများ ရှိလာနိုင်မည် မဟုတ်ပါ။ ထို့ကြောင့် စီမံကိန်းမဆောင်ရွက်တော့ခြင်း သည် ပြည်တွင်းစျေးကွက်သို့ အနာဂတ်တွင် ဓာတ်ငွေ့ထောက်ပံ့နိုင်မည့် အခွင့်အလမ်းများနည်းပါးနိုင်ခြင်း တိုက်ရိုက် သို့မဟုတ် သွယ်ဝိုက် ၍ အလုပ်အကိုင်အခွင့်အလမ်းများလျော့နည်းသွားနိုင်ပါသည်။

၁.၄ *အနီးပတ်ဝန်းကျင်ဖော်ပြချက်*

အောက်ပါအခန်းတွင် တနင်္သာရီတိုင်းဒေသကြီး ကမ်းလွန်ရေပြင်များအနီးတစ်ဝိုက်အပြင် စီမံကိန်း နယ်မြေဧရိယာ၏ ရေပြင်များအဖြစ် သတ်မှတ်ထားသည့် လေ့လာမှုနယ်မြေဧရိယာအတွင်းရှိ ရူပ၊ ဇီဝ နှင့် လူမှု ပတ်ဝန်းကျင်များကို ဖော်ပြထားပါသည်။ 3D ပင်လယ်ပြင်ဆိုက်စမစ်တိုင်းတာမှုသည် ပင်မနယ်မြေရှိ အနီးဆုံး ရပ်ရွာများမှ ၁၂၅ ကီလိုမီတာ နှင့် မြိတ်ကျွန်းစု၏ အနီးဆုံးကျွန်းများမှ ကီလိုမီတာ ၇၀ အကွာ၌ တည်ရှိသောကြောင့်၊ အခြေခံအချက်အလက်များ၏ အလေးပေးမှုမှာ ဟင်းလင်းဖြစ်နေသောရေပြင်နေရာများဖြစ်ပါသည်။

သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာသည် ပတ်ဝန်းကျင်နေရာ နှင့် လုပ်ငန်းဆောင်ရွက်မှုအပေါ် မူတည်လျက် ကွဲပြားပါသည်။ အောက်ပါတို့သည် လုပ်ငန်းဆောင်ရွက်မှု / ပတ်ဝန်းကျင်နေရာတစ်ခုလျင် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာဆိုင်ရာ အချက်အလက်များကို ဖော်ပြပေးပါသည် -

- မမျော်လင့်ထားသော ထိမိခိုက်မိမှုများ သို့မဟုတ် ယာဉ်များနေရွှေ့ပြောင်းရမှုတို့ကြောင့် ငါးဖမ်းလုပ်ငန်းများအပေါ် သက်ရောက်မှုများမှာ စီမံကိန်းနယ်မြေဧရိယာအတွင်း အကန့်သတ်ဖြင့် ဖြစ်ပေါ်နိုင်ပါသည်၊

- အသံထုတ်လွှတ်မှုများကြောင့် ပင်လယ်လိပ်များ၊ နို့တိုက်သတ္တဝါများ နှင့် ငါးများအပေါ် သက်ရောက်မှုများမှာ အသံလာရာ (၁-၂ ကီလိုမီတာ) အနီးတစ်ဝိုက်ဖြစ်ပေါ်နိုင်ပြီး၊ အသံလာရာ (သက်ရောက်မှုများမရှိနိုင်သော်လည်း) မှ ၁၀ ကီလိုမီတာအထိ အသံကို သတိပြုမိနိုင်ပါသည်။ ထို့ကြောင့် အသံကြောင့်သက်ရောက်မှုများတွက် သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာသည် များသောအားဖြင့် စီမံကိန်းနယ်မြေဧရိယာဖြစ်ပြီး၊ စီမံကိန်းနယ်မြေဧရိယာမှ အပြင်ဘက်သို့ ၁၀-၂၀ ကီလိုမီတာခန့်အထိလည်း ဖြစ်နိုင်ပါသည်၊

- နောက်တွင်ဆွဲယူလာသော ကိရိယာများမှ လိပ်များအပေါ် သက်ရောက်မှုများမှာ စီမံကိန်းနယ်မြေ ဧရိယာအထိ အကန့်သတ်ဖြင့် ဖြစ်ပေါ်နိုင်ပြီး၊ ၎င်းမှာ ကိရိယာများရှိနေသော နေရာဖြစ်ပါသည်၊ ထို့ပြင်

- ယိုဖိတ်မှုများ သို့မဟုတ် ယိုစိမ့်မှုများမှ ပင်လယ်ပြင်ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများမှာလည်း စီမံကိန်းနယ်မြေဧရိယာအထိ ကန့်သတ်ဖြစ်ပေါ်နိုင်မည် ဖြစ်ပါသည်။ ဒေသ ကမ်းရိုးတန်းနယ်မြေဧရိယာများကို သက်ရောက်မှုမရှိနိုင်သည့် ပမာဏအားဖြင့် သေးငယ်သည့် လောင်စာယိုဖိတ်မှုများသာ ဖြစ်နိုင်ပါသည်။

သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာသည် ကမ်းလွန်ဟင်းလင်းရေပြင်များတွင် ရှိနေသဖြင့်၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းကို ဤနယ်မြေဧရိယာရှိ နေရင်းဒေသများ နှင့် မျိုးစိတ်များအပေါ် အလေးပေးပြုလုပ်သွားမည် ဖြစ်ပါသည်။ ယေဘုယျအခြေခံဖော်ပြချက်ကိုထောက်ပံ့ပေးနိုင်ရန် ကမ်းရိုးတန်းနယ်မြေဧရိယာများ နှင့် ထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေဧရိယာများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကိုထည့်သွင်းထားပါသည်။

ယခု *အဓိန်း* ပါသတင်းအချက်အလက်များသည် PCML က ထောက်ပံ့ပေးသည့် သတင်းအချက်အလက်များနှင့်ဖြည့်စွက်၍ ပုံနှိပ်ထုတ်ဝေထားသော သတင်းအချက်အလက်များကို ပြန်လည်သုံးသပ်ခြင်း နှင့် ERM ရုံးတွင်းရှိ ရရှိနိုင်သော စာရွက်စာတမ်းများကို သုံးသပ်မှုတို့အပေါ် အခြေခံထားခြင်း ဖြစ်ပါသည်။ ယခုစီမံကိန်းသည် IEE စီမံကိန်းအမျိုးအစားဖြစ်ပြီး၊ မူလအခြေခံအချက်အလက်များ ကို မလိုအပ်သော်လည်း ရဲတံခွန်ပလက်ဖောင်းမှ ရရှိသည့် ၂၀၁၈ အခြေခံအချက်အလက်များကို ယခု IEE အစီရင်ခံစာတွင် ထည့်သွင်းအသုံးပြုသွားမည် ဖြစ်ပါသည်။

ရှေးကပင်ရှိနေသောပြန်လည်သုံးသပ်မှုများကို ထောက်ပံ့မှုပြုနိုင်ရန် အများပြည်သူနှင့်တိုင်ပင် ဆွေးနွေးမှုများ ကာလအတွင်း ကောက်ယူခဲ့သော မူလ လူမှုရေးဆိုင်ရာ အချက်အလက်များကို အသုံးပြုပါသည်။

တစ်ဆင့်ခံအချက်အလက်အရင်းအမြစ်များအဖြစ် သားငှက်ထိန်းသိမ်းရေးအဖွဲ့ (WCS)၊ သိပ္ပံဂျာနယ်များ၊ ငါးဖမ်းလုပ်ငန်းသွားရောက်လေ့လာမှုအချက်အလက် (၂၀၁၅)၊ နှင့် မော်လမြိုင် နှင့် ပုသိမ် တက္ကသိုလ်တို့၏ အဏ္ဏဝါသိပ္ပံဌာနရှိ ရရှိသော ဒေသလေ့လာမှုဆိုင်ရာ အစီရင်ခံစာများကို ကိုးကားခဲ့ပါသည်။

၁.၄.၁ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များ

မြန်မာနိုင်ငံတွင် IUCN အမျိုးအစားများအဖြစ် ပညတ်ထားသော သို့မဟုတ် အဆိုပြုထားသော ထိန်းသိမ်းကာကွယ်ထားသည့် စုစုပေါင်းနယ်မြေဧရိယာမှာ ၄၃ နေရာရှိပါသည် (Istituto Oikos နှင့် BANCA (2011))။ သို့ရာတွင် အချို့နေရာများမှာ တရားဝင်သတ်မှတ်ထားခြင်းမျိုး မဟုတ်ဘဲ ထိန်းသိမ်းကာကွယ်ထားသည်နယ်မြေဧရိယာအဖြစ် အဆိုပြုထားခြင်း ဖြစ်ပါသည်။ စီမံကိန်းနယ်မြေဧရိယာအတွင်း၌ ၎င်း ထိန်းသိမ်းကာကွယ်ထားသော သို့မဟုတ် ပတ်ဝန်းကျင်အရ ထိခိုက်လွယ် သော နေရာများရှိမနေပါ။ အနီးဆုံး အဆိုပြုပညတ်ထားသည့် ငါးမန်းထိန်းသိမ်းရေးနယ်မြေဧရိယာ သည် စီမံကိန်းနယ်မြေဧရိယာမှ ၃၃ ကီလိုမီတာအကွာ၌ တည်ရှိပါသည်။ ၎င်းဧရိယာနယ်မြေကို ၂၀၁၄ ခုနှစ်တွင် အမျိုးသား အဏ္ဏဝါထိန်းသိမ်းကာကွယ်ရေးနယ်မြေဧရိယာ (MPA) အဖြစ် တည်ထောင်ခဲ့ပြီး၊ ယင်းနယ်မြေဧရိယာသည် ၁၁၈၃၆ စတုရန်းကီလိုမီတာအထိ လွှမ်းခြုံပါဝင်ကာ ငါးဖမ်းလုပ်ငန်းများကို ကန့်သတ်ထားပါသည်။

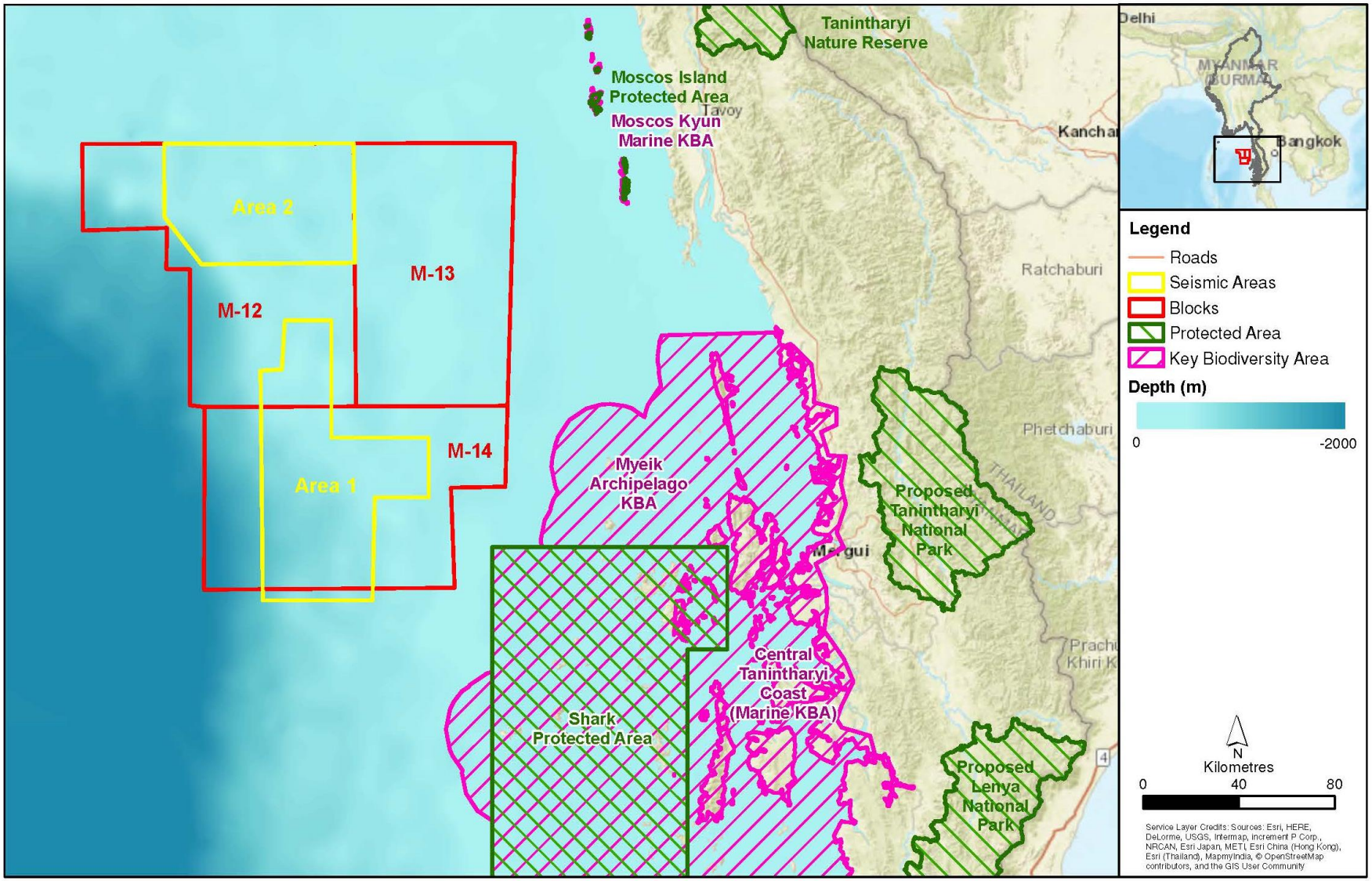
၂၀၁၂ ခုနှစ်တွင်၊ သားငှက်ထိန်းသိမ်းရေးအဖွဲ့ (WCS) သည် မြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ပညာရှင်များနှင့် အဓိကအရေးပါသောဇီဝမျိုးစုံမျိုးကွဲနယ်မြေဧရိယာများ (KBAs) အဖြစ် ၁၃၂ နေရာ ကို ဖော်ထုတ်သတ်မှတ်ခဲ့ပါသည် (Holmes et al၊ ၂၀၁၃)။ ၎င်း KBAs နေရာများကို ထိန်းသိမ်းရန်လိုအပ်သည့် မျိုးစိတ်များ သိသာထင်ရှားစွာ ရှိနေသည့်နေရာများအဖြစ် သတ်မှတ်ပါသည်။ သို့ရာတွင်၊ မြန်မာနိုင်ငံတွင် ထိန်းသိမ်းကာကွယ်ရေးနယ်မြေဧရိယာများအဖြစ် တရားဝင်အသိအမှတ်ပြုထားသည်တော့မဟုတ်ပါ။ စီမံကိန်းနှင့် အနီးဆုံး KBA သည် အထက်တွင်ဖော်ပြခဲ့သည့် ငါးမန်းထိန်းသိမ်းကာကွယ်မှုနယ်မြေဧရိယာနှင့် ထပ်တူကျပါသည်။ နောက်ထပ် KBA တစ်နေရာမှာ မော်စကိုကျွန်းစု (မော်စကိုကျွန်း) ဖြစ်ပြီး၊ စီမံကိန်းနယ်မြေဧရိယာမှ ကီလိုမီတာ ၁၀၀ ခန့်အကွာ၌ တည်ရှိပါသည်။ ၎င်း KBA ကို ကျွန်းများပေါ်တွင် အသိုက်ပြုလုပ်နိုင်ခြေရှိသည် လိပ်မျိုးစိတ် လေးမျိုးရှိနေသော ကြောင့် သတ်မှတ်ခဲ့ခြင်း ဖြစ်ပါသည်။

လေ့လာမှုနယ်မြေဧရိယာအတွင်းရှိ KBA ကို *ဇယား ၁.၂* နှင့် *ပုံ ၁.၄* တို့တွင် ဖော်ပြပေးထားပါသည်။

ဇယား ၁.၂ လေ့လာမှုနယ်မြေဧရိယာရှိ အရေးပါသောဇီဝမျိုးစုံမျိုးကွဲနယ်မြေဧရိယာများ (KBAs)

အမည်	ဧရိယာ (စတုရန်းကီလိုမီတာ)	အဓိက မျိုးစိတ်များ
မြစ်ကျွန်းစု	၄၃၉၆၃	Leatherback turtle မျိုးစိတ်၊ green turtle မျိုးစိတ်၊ hawksbill turtle မျိုးစိတ်
မိုစကိုကျွန်း	၅၇	Leatherback turtle မျိုးစိတ်။ green turtle မျိုးစိတ်၊ hawksbill turtle မျိုးစိတ်၊ olive ridley turtle မျိုးစိတ်
လမ်းပိ နှင့် MPA	၂၂၅	အောင်လောင်ငှက်မျိုးစိတ်၊ ငါးမန်း မျိုးစိတ်များ၊ နှင့် လိပ်မျိုးစိတ်များ

ပုံ ၁.၄ လှေလာမှုနယ်မြေဧရိယာရှိ ထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေဧရိယာများ နှင့် တားမြစ်ထားသော ငါးဖမ်းနယ်မြေဧရိယာများ



ကိုးကား - Homles et al, 2014

ဥတုရာတီအချက်အလက်များကို စီမံကိန်းနယ်မြေဧရိယာမှ ၁၄၈ ကီလိုမီတာကွာဝေးပြီး အနီးဆုံး ခရိုင်ဖြစ်သည့် ထားဝယ်မှ ရရှိပါသည်။ မြန်မာနိုင်ငံအတွင်း၊ ထားဝယ်သည် အနောက်တောင်မုတ်သုံ ၏ ပထမဆုံး သက်ရောက်မှုကိုခံရပြီး၊ တစ်နှစ်လျှင် ပုံမှန် မိုးရွာသည့် ရက်ပေါင်း ၁၄၂ ရက်ရှိကာ၊ မိုးရေချိန် ၁၇.၉ ပေအထိရှိပါသည် (FAO၊ ၂၀၁၄)။

စီမံကိန်းနယ်မြေဧရိယာ၏ အနီးဝန်းကျင်ရှိ ကပ္ပလီပင်လယ်တွင် လစဉ်ပုံမှန် လေတိုက်ခတ်မှုနှုန်းမှာ တစ်စက္ကန့်လျှင် ၃.၅ မီ မှ တစ်စက္ကန့်လျှင် ၇.၅ မီတာအထိအရှိကြောင်း သိရှိရပါသည် (Steedman Science & Engineering၊ ၁၉၉၄)။ နိဝင်ဘာလ မှ ဇန်နဝါရီအထိ အများဆုံးတွေ့ရသော လေဦးတည် ရာမှာ မြောက်မှ အရှေ့မြောက်ဖြစ်ပြီး၊ မေလ မှ အောက်တိုဘာလအထိ မှာ အနောက်တောင် ဖြစ်ပါ သည် (worldweatheronline)။

အပူချိန်၊ ဆားဓာတ်ပါဝင်မှု၊ အောက်ဆီဂျင်၊ နှင့် ဖလော်ရင်စ်တို့နှင့်ပတ်သက်သည့် အချက်အလက် များကို 'Dr. Fridtjof Nansen' စစ်တမ်း၏အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့် ၂၀၁၅ ခုနှစ်တွင် ဆောင် ရွက်ခဲ့သည့် တနင်္သာရီတိုင်းဒေသကြီးရေပြင်စစ်တမ်းကာလအတွင်း မှတ်တမ်းယူခဲ့ပါသည် (မြန်မာ နိုင်ငံဂေဟစနစ်စစ်တမ်း -၂၀၁၅)။ စစ်တမ်းအရှေ့ဘက် (စီမံကိန်းနယ်မြေဧရိယာတည်ရှိသည့် နေရာ) ရှိ အနီးမျက်နှာပြင်အပူချိန်မှာ (၅ မီတာ အနက်) ၃၂ ºC ခန့် နှင့် ၅ မီတာအနက်ရှိ ဆားဓာတ်ပါဝင်မှုများ ၃၁ မှ ၃၄ အထိ ရှိပါသည်။ မျက်နှာပြင်ရေပြင်များရှိ အောက်ဆီဂျင်အဆင့်များ မှာ ယေဘုယျအားဖြင့် မြင့် (~၄ - ၅ ml/l) ပြီး၊ ပြောင်းလဲနိုင်မှုမှာလည်း မြင့်လျက် ရှိပါသည်။

စီမံကိန်းနယ်မြေဧရိယာ၏ ရေအနက်မှာ ၁၀ မီတာ မှ ၁၀၀၀ မီတာအကြားရှိပါသည်။ စီမံကိန်းနယ် မြေ ဧရိယာ၏ ပိုမိုနက်သောအစိတ်အပိုင်း (အနောက်ဘက်ပိုင်း)သည် ကမ်းလွန်ကုန်းစောက်ပိုင်း နှင့် နေအနက် > ၁၀၀၀ မီတာ အထိ ပိုနက်သွားသည့် အလွန်နက်သောလွင်ပြင်များတွင် တည်ရှိ နေ ပါသည်။

လုပ်ကွင်းဖွံ့ဖြိုးမှုလုပ်ငန်း နှင့် တင်ပို့မှုပိုက်လိုင်းတို့နှင့်ပတ်သက်သည့် ယခင် EIA လေ့လာမှုများ အတွက် ရဲတံခွန်မလက်ဖောင်းအနီးရှိ အရွယ်အစားကြီးများသည့်သက်ရှိသတ္တဝါများကို လေ့လာရန် စစ်တမ်း တစ်ရပ်ကို ၁၉၈၉ ခုနှစ်က ဆောင်ရွက်ခဲ့ပါသည် (AATA ၁၉၉၈)။ ရဲတံခွန်ပေါင်းစပ်လုပ်ငန်း ၏ အနီး နှင့် တင်ပို့မှုပိုက်လိုင်းလမ်းကြောင်း ကမ်းနီးပတ်ဝန်းကျင်တို့ကို ဖြတ်သန်းသွားသည့် စခန်း (၈) ခုမှ နမူနာများကို ကောက်ယူစုဆောင်းခဲ့ပါသည်။ ရဲတံခွန်ပလက်ဖောင်းများအနီးရှိ စခန်း နှစ်ခု၌ နုန်းများသည် ပုံမှန်အားဖြင့် arthropods သည် ခြွင်းချက်အနေဖြင့်ဖြစ်ပြီး polychaete worms ဖြင့် အဓိကဖုံးလွှမ်းထားကြောင်း စစ်တမ်းမှ မှတ်တမ်းတင်ထားပါသည်။ ရေအောက်ကြမ်းပြင်နေ သတ္တဝါ များ ပေါများကြွယ်ဝမှုမှာ နည်းပါးပြီး၊ ရေတိမ်ပိုင်းကမ်းနီးပတ်ဝန်းကျင်နှင့် နှိုင်းယှဉ်လျှင် ရဲတံခွန် ပလက်ဖောင်းအနီးရှိ ရေနက်ပိုင်းစခန်းနေရာများ၌ မျိုးစုံမှုလည်း နည်းပါးကြောင်း တွေ့ရှိရပါသည်။

ရဲတံခွန်-အေ ထုတ်လုပ်ရေးပလက်ဖောင်း၌ ကြားဖြည့်တူးဖော်ရေးဆိုင်ရာ သီးသန့် EIA အတွက် ၂၀၁၈ ဇန်နဝါရီလတွင် ERM က အဏ္ဏဝါအခြေခံစစ်တမ်းသစ်ကို ဆောင်ရွက်ခဲ့ပါသည်။ စစ်တမ်းတွင် နုန်းနေရာ နမူနာလေးနေရာရှိ စုစုပေါင်း အလေးချိန် ၀.၂၈၃ ဂရမ် အပါအဝင်၊ စုစုပေါင်း ၃၁ သက်ရှိ မျိုးကို မှတ်တမ်းတင်နိုင်ခဲ့ပါသည်။ ခုနှစ်မျိုးထဲတွင်မျိုးရိုးစုစုပေါင်း ၁၅ မျိုးမှ၊ နမူနာ မျိုးပေါင်းစု(၇)မျိုး

(Annelida၊ Arthropoda၊ Chordata၊ Cnidaria၊ Echinodermata၊ Mollusca၊ နှင့် Nemertinea) တို့ ပါဝင်ကြပါသည်။

၂၀၁၈ ခုနှစ်ဧပြီလတွင် ရဲတံခွန်လုပ်ကွင်း၌ မှတ်တမ်းယူခဲ့သည့်ရေအောက်ကြမ်းပြင်နေသက်ရှိ သတ္တဝါများ၏ အများစု (၅၄.၈၄%) သည် Class Polychaeta (Phylum Annelida (marine worms)) မှဖြစ်ပြီး၊ ဒုတိယလိုက်သည်မှာ Class Crustacea (Phylum Arthopoda ဖြစ်ပြီး၊ စုစုပေါင်း၏ ၂၂.၅၈) ဖြစ်ပါသည်။ နမူနာများသည် ၁၉၉၈ ခုနှစ်က စစ်တမ်းများမှ တင်ပြသည့် တွေ့ရှိချက်များနှင့် အတူတူဖြစ်နေသော polychaete worms သို့မဟုတ် crustaceans (Phylum Arthropoda) တို့ဖြင့် အဓိကလွှမ်းမိုးနေပါသည်။

ခြုံငုံကြည့်လျှင်၊ ၂၀၁၈ ခုနှစ် ဧပြီလတွင် ရဲတံခွန်လုပ်ကွင်း၌ ရယူဆောင်ရွက်ခဲ့သည့် ရေအောက် နမူနာသည် သက်ရှိများကျိုးတိုးကျဲတဲဖြစ်မှု၊ ပြောင်းလဲမှုမြင့်ခြင်း၊ နှင့် ရေအောက်နန်းပေါ်နေသတ္တဝါများ မျိုးစုံမှု နည်းပါခြင်းတို့ကို တွေ့ရှိရပါသည်။ Crustaceans ribbonworms၊ anemones၊ gastropods၊ ငါးများ နှင့် brittlestars တို့အပါအဝင် အခြားဒေသရင်းသတ္တဝါများနှင့် Bristleworms (polychaetes/worms) တို့မှာ အတွေ့ရအများဆုံးဖြစ်ပါသည်။ အပြင်ဘက် ကမ်းလွန်ရေတိမ်ပိုင်း နှင့်ဆက်နေသောပလက်ဖောင်းအနီး စစ်တမ်းဆောင်ရွက်ခဲ့သည့်နယ်မြေဇရိယာအတွင်းရေအောက် ကြမ်းပြင် နေရင်းဒေသများကို ရေအောက်ကြမ်းပြင်နေ သက်ရှိများကျိုးတိုးကျဲတဲအစုအဝေးကို ထောက် ပံ့နေသော ခိုင်မာမှုမဲ့သော သဲများ နှင့် ရွှံ့များရှိနှန်းများပါဝင်ကြောင့် တွေ့ရှိပါသည်။

ကမ်းနီးနေရင်းဒေသများကိုကြည့်လျှင်၊ Fauna and Flora International (FFI) သည် မြိတ်ကျွန်းစု ရှိ သတ္တာကျောက်တန်းများ နှင့် ၎င်းတို့၏ အခြေအနေနှင့်ပတ်သက်၍ သုတေသနဆောင်ရွက်ခဲ့ပါ သည်။ ကျောက်တန်းနေရာသုံးမျိုးအတွင်း၊ အောက်ခံလွှာများသည် နေရာများတစ်လျှောက်ကွဲပြား ပြီး၊ အချို့နေရာများ၌ ကျောက်မာများသည် ၁၀% မှ ၉၀ % ကျော်ထိရှိပါသည်။ အတွင်းပိုင်း ကျောက်မာမှာ ၁.၅ မှ ၉၅% (n= 227) ကွဲပြားကြပါသည်။ အမြိတ်အတွန့်မှာ ၀ မှ ၀% (n= 21) နှင့် သတ္တာကျောက်တန်းများမှာ ၈.၁ မှ ၃၀ % (n=14) အထိ ရှိပါသည် (Howard၊ ၂၀၁၈)။ စီမံကိန်းနယ်မြေဇရိယာရဲတံခွန်လုပ်ကွင်းရှိ ရေမှာ (>၁၀၀ မီတာ) နက် သောကြောင့် ပင်လယ် မြက်များ၊ macroalgae သို့မဟုတ် zooxanthellate scleractinian (ကျောက်တန်းဖွဲ့စည်းမှု) ကျောက်တန်များ ကဲ့သို့သော မူလအတိုင်းဖွံ့ဖြိုးကြီးမားနိုင်စေမည့် ရေအောက်အထိ အလင်းရောင် လုံလုံလောက်လောက်မရရှိနိုင်သောကြောင့် ၎င်းအုပ်စုများမှာ ပင်လယ်ကြမ်းပြင်တွင် ရှိမနေနိုင်ပါ။ သတ္တာကျောက်တန်းနေရင်းဒေသများသည် စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဇရိယာတွင် ရှိနေနိုင်သည်ဟု တွက်ချက်ပါသည်။

မြိတ်ကျွန်းစုတွင် ဒီရေတောများနှင့်ပတ်သက်၍ (စီမံကိန်းနယ်မြေဇရိယာအနီးမပါဝင်ပါ) လေ့လာမှု တစ်ရပ်ကို FFI ကလည်း ဆောင်ရွက်ခဲ့ပါသည် (San Tha Tun et al၊ ၂၀၁၄)။ ဤစစ်တမ်းတွင် မျိုးရိုး (၂၀) မှ မျိုးစု (၃၂) မျိုးနှင့် အကျုံးဝင်သည့် မျိုးစိတ် ၄၆ မျိုးကို ဖော်ထုတ်သတ်မှတ်ခဲ့ပါသည်။ အများဆုံးတွေ့ရသည်မှာ *Rhizophoraceae* ဖြစ်ပြီး မျိုးစိတ် ရှစ်မျိုးရှိပြီး၊ နောက်တစ်မျိုးမှာ *Avicenniaceae* ဖြစ်ပြီး မျိုးစိတ်သုံးမျိုးဖြစ်ပါသည်။

ဦးစိုးထွန် နှင့် တင့်ဆွေ (၂၀၁၃) မှ အချက်အလက်များအရ၊ မြန်မာနိုင်ငံတွင် ပင်လယ်မြက် မျိုးစိတ် (၁၀) မျိုးရှိပြီး၊ မျိုးရိုး (၂) မှ မျိုးစု (၅) တွင် အကျုံးဝင်ပါသည်။ ၎င်းတို့မှာ *Cymodocea rotundata*၊ *C. serrulata*၊ *Halodule pinifolia*၊ *H.uninervis*၊ *Syringodium isotoefolium*၊ *Enhalus acoroides*၊ *Halophila beccarii*၊ *H.decipiens*၊ *H. ovalis* နှင့် *Thalassia hemprichii* တို့ဖြစ်ကြပါသည်။ ယင်းတို့အထဲမှ *Cymodocea rotundata*၊ *C.serrulata* နှင့် *Enhalus acoroides* တို့မှာ ပြင်လယ်မြက်ကြမ်းပြင်တွင် အဓိကလွှမ်းမိုးထားပါသည်။ ယင်းမျိုးစိတ်အများစုကို ရခိုင် နှင့် တနင်္သာရီ ကမ်းရိုးတန်းနယ်မြေဇရိယာများ၌ အများဆုံးတွေ့ရပါသည်။ ၎င်းသည် စီမံကိန်းနယ်မြေဇရိယာ တောင်ဘက်သို့ ၁၂၅ ကီလိုမီတာကျော်တွင် ရှိပါသည်။

မြိတ်ကျွန်းစုရှိ နေရာ (၂၈) နေရာကို ၂၀၁၄ ခုနှစ်တွင် FFI က ငါးစစ်တမ်းကို ကောက်ယူခဲ့ပါသည် (Russel၊ ၂၀၁၅)။ စစ်တမ်းကို ရေအောက် အမြင်ကြည်ဗွီဒီယိုအသုံးပြုလျက် ဆောင်ရွက်ခဲ့ပါသည်။ စုစုပေါင်း (၄၀၉) မျိုးစိတ်တို့သည် မျိုးရိုး (၅၅) မျိုးကို အကျုံးဝင်ကြောင်း မှတ်တမ်းတင်ခဲ့ပါသည်။ မှတ်တမ်းထားသည့် အဓိကငါးမျိုးစိတ်များသည် သတ္တာကျောက်တန်း နှင့် ကျောက်ပေါသောနေရာများနှင့် ဆက်နွယ်မှုရှိသောမျိုးစိတ်များ ဖြစ်ပါသည်။ အများဆုံးတွေ့ရသည့် မျိုးရိုးတို့တွင် wrasses (Labridae)၊ damselfishes (Pomacentridae)၊ gobies (Gobiidae)၊ cardinalfishes (Apogonidae)၊ ကျောက်ငါးမျိုး (Serranidae)၊ butterflyfishes (Chaetodontidae)၊ snappers (Lutjanidae)၊ surgeonfishes (Acanthuridae)၊ parrotfishes (Scaridae) နှင့် Scorpionfishes (Scorpaenidae) တို့ပါဝင်ပါသည်။ ဤမျိုးရင်း (၁၀) မျိုးသည် ၂၆၃ မျိုးစိတ် သို့မဟုတ် မှတ်တမ်းယူတင်ထားသည့် စုစုပေါင်းငါးမျိုးစိတ်များ၏ ~ ၆၄ % ကို အကျုံးဝင်ပါသည်။

မြန်မာ့ရေပြင်တွင် စုစုပေါင်း ceteceans (ဝဲလ နှင့် လင်းပိုင်) မျိုးစိတ် ၂၅ မျိုး ရှိကြောင်း မှတ်တမ်းတင်ထားပါသည် သို့မဟုတ် ရှိနိုင်ခြေရှိပါသည် (Holmes et al၊ ၂၀၁၄၊ IUCN၊ ၂၀၁၇)။ မြန်မာ့ ကမ်းရိုးတန်းရေပြင်များတွင် sirenian (ဇရပ်ကြီး; *Dugong dugon*) မျိုးစိတ် တစ်မျိုး ရှိကြောင်း လည်း အတည်ပြုထားပါသည် (Tun and Ilangakoon၊ ၂၀၀၆)။ မြန်မာရေပြင်များတွင် ဝဲလငါးများ နှင့် လင်းပိုင်မျိုးစိတ်များ ရှိနေနိုင်ပြီး၊ အချို့မှာကမ်းရိုးတန်းမျိုးစိတ်များဖြစ်သော်လည်း အများစုမှာ ပြောင်းရွှေ့သွားလာကျက်စားတတ်သော ပင်လယ်မျိုးစိတ်များ မှ ရေတိမ်နေရင်းဒေသများ နှင့် မြစ်ဝဒေသဇရိယာများအထိ ပါဝင်ကြပါသည်။ IUCN က မြန်မာနိုင်ငံရေပြင်များရှိ ထိန်းသိမ်းကာ ကွယ်ရန်လိုအပ်သည့် cetacean မျိုးစိတ်များစာရင်းတွင် ပုံမှန်အားဖြင့် ကမ်းလွန်ရေနက်နေရာ များတွင် နေထိုင်ကျက်စားတတ်သော blue whale (*Balaenoptera musculus*) (မျိုးသုဉ်း ခါနီးမျိုးစိတ်)၊ fin whale (*Balaenoptera physalus*) (မျိုးသုဉ်းခါနီးမျိုးစိတ်) နှင့် sperm whale (*Physeter macrocephalus*) (ထိခိုက်လွယ် မျိုးစိတ်) ကဲ့သို့သော အဏ္ဏဝါမျိုးစိတ်များပါဝင်ကြ ပါသည်။ Blue whale နှင့် fin whale မျိုးစိတ်တို့သည်လည်း ဒေသအတွင်း အဓိကအရေးပါသော မျိုးသုဉ်းခါခါနီးမျိုးစိတ်များအဖြစ် အသိအမှတ်ပြုထားပြီး၊ သဘာဝသယံဇာ နှင့် အရင်းအမြစ်များ ထိန်းသိမ်းရေးဆိုင်ရာ အာဆီယံ သဘောတူညီချက် အရ အထူးအလေးထားမှုကို ရရှိပါသည် (ASEAN၊ ၁၉၉၅)။ Humpback whale (*Megaptera novaeangliae*) နှင့် Bryde's whale (*Balaenoptera edeni*) ကဲ့သို့သော အခြားတွေ့မြင်နေကျ ရေနက်ပိုင်းနေမျိုးစိတ်များသည် မြန်မာနိုင်ငံ ကမ်းလွန်ရေပြင်များတွင် တွေ့ရှိရကြောင်း သိရှိပါသည်။ သို့ရာတွင်၊ IUCN အနီရောင် စာရင်းတွင် စိုးရိမ်မှုအနိမ့်ဆုံး နှင့် အချက်အလက်များလိုနေသည်ဟု စာရင်းဝင်ပါသည်။

ကမ္ဘာ့ ပင်လယ်လိပ်မျိုးစိတ် (၇) မျိုးထဲမှ (၅)မျိုးမှာ မြန်မာနိုင်ငံ ကမ်းခြေတို့၌ အသိုက်ပြုလုပ်ခြင်း နှင့် ကျက်စားခြင်းတို့ကို တွေ့ရှိပါသည်။ ၎င်းတို့တွင် Hawksbill မျိုးစိတ် (*Eretmochelys imbricata*)၊ Green မျိုးစိတ် (*Chelonia mydas*)၊ Loggerhead မျိုးစိတ် (*Caretta caretta*)၊ Olive Ridley မျိုးစိတ် (*Lepidochelys aolivacea*) နှင့် Leatherback မျိုးစိတ် (*Dermochelys coriacea*) တို့ပါဝင်ပါသည်။ UNEP အချက်အလက်များအရ၊ မိုစကိုကျွန်းတစ်လျှောက် သဲရိုသောကမ်းနေရာ နှင့် တနင်္သာရီကမ်းရိုးတန်းနှင့်ကပ်လျက်နေရာများသည် green turtles မျိုးစိတ်၊ hawksbill မျိုးစိတ်၊ Olive Ridley မျိုးစိတ် နှင့် Leatherback မျိုးစိတ် တို့အပါအဝင် မျိုးစိတ်များအတွက် အသိုက်လုပ်သော နေရာများဖြစ်ပါသည် (UNEP၊ ၂၀၁၇)။ မြန်မာရေပြင်များရှိ နှစ်စဉ် လိပ်အသိုက် ပြုလုပ်သည့်အချိန်အခါမှာ စက်တင်ဘာလမှ မတ်လဖြစ်ပြီး အများဆုံးဆောင်ရွက်သည့်ကာလမှာ ဒီဇင်ဘာလ မှ ဇန်နဝါရီလအတွင်း ဖြစ်ပါသည်။ အသိုက်များရှိနေနိုင်သောကမ်းခြေများနှင့်ဆက် စပ်လျက် လုပ်ကွက်အမှတ် M-12၊ M-13 နှင့် M14 တို့၏တည်နေရာအကွာအနေအထားကြောင့်၊ ရာသီလိုက်အသိုက်ပြုလုပ်မှု နှင့် မိတ်လိုက်သည်နေရာများနှင့် ကပ်လျက်ရှိသောရေပြင်များကို ဖြတ်သွားသောအခါ ၎င်းလုပ်ကွက်များအတွင် ပင်လယ်လိပ်များ ရောက်ရှိနိုင်ခြေရှိပါသည်။ သိရှိရသော အသိုက်ပြုလုပ်သည့် ကမ်းခြေနေရာများအားလုံးမှာ စီမံကိန်းနယ်မြေဧရိယာအပြင်ဘက် တွင်ရှိပြီး၊ အနည်းဆုံး ကီလိုမီတာ ၇၀ အကွာတွင် ရှိပါသည်။

စီမံကိန်းနယ်မြေဧရိယာမှ ကီလိုမီတာ ၇၀ ကျော်အကွာအဝေးတွင် ရှိသည့် မြိတ်ကျွန်းစု၏ အစွန် အဖျားကျွန်းများ နှင့် မိုစကိုကျွန်းတို့သည် အကဲခတ်လေ့လာမှုဖြင့် အတည်အပြုနိုင်သော်လည်း၊ အချို့မျိုးစိတ်များအတွက် အသိုက်ပြုလုပ်ရန်သင့်လျော်သောအထားရှိကြောင်း တွက်ချက်ပါသည်။ လန်ပိကျွန်းသည် စီမံကိန်းနယ်မြေဧရိယာမှ ကီလိုမီတာ ၈၀ ကျော်ကွာဝေးပြီး၊ IUCN အနီရောင် စာရင်း တွင် ထိခိုက်လွယ်သောအဆင့်ရှိသည့် အောင်လောင်ငှက်ခေါ် (*Rhyticeros subruficollis*) မျိုးစိတ်များ နေထိုင်ကျက်စားမှုရှိကြောင်း သတ်မှတ်ဖော်ထုတ်ထားသည့် အရေးပါသောငှက်နယ်မြေ ဧရိယာအဖြစ် အမျိုးအစားသတ်မှတ်ထားပါသည်။

၁.၄.၂ *လူမှုဆိုင်ရာအခြေခံအချက်အလက်များ*

စီမံကိန်းသည် တနင်္သာရီတိုင်းဒေသကြီးကမ်းလွန်ရေပြင်ရှိ ပင်မနယ်မြေမှ ၁၂၅ ကီလိုမီတာ အကွာ၌ တည်ရှိပါသည်။ အနီးဆုံးမြို့နယ်မှာတနင်္သာရီတိုင်းဒေသကြီး၊ ထားဝယ်ခရိုင်၊ လောင်းလုံဖြစ်ပါသည်။

စီမံကိန်းနယ်မြေဧရိယာအတွက် အသေးစိတ် ဒေသအစီအစဉ်များ သို့မဟုတ် မဟာဗျူဟာများ ရှိမနေပါ။

ထားဝယ်ခရိုင်၏ လူဦးရေဆိုင်ရာအချက်အလက်များကို *ဇယား ၁.၃* တွင် တင်ပြထားပါသည်။

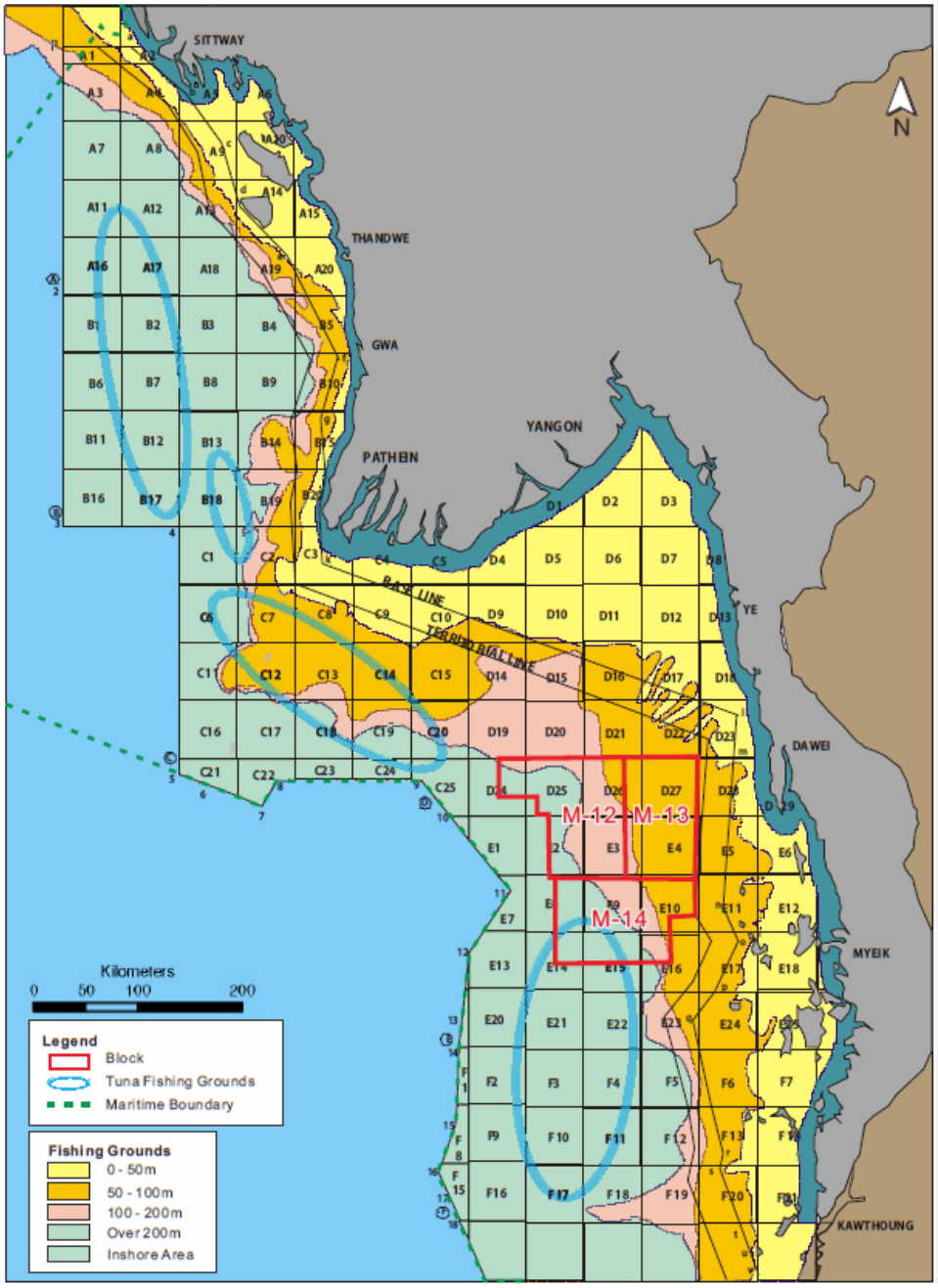
ဇယား ၁.၃ လေ့လာမှုနယ်မြေဧရိယာရှိ လူဦးရေဆိုင်ရာအချက်အလက်များ

မြို့နယ်	အိမ်ထောင်စု	လူဦးရေ	ကျား	မ
ထားဝယ်	၂၄၉၄၃	၁၂၅၆၈၅	၆၈၈၄၄	၆၅၅၆၁
လောင်းလုံ	၂၅၇၃၅	၁၁၈၃၁၇	၅၅၅၅၈	၆၂၇၅၉
သရက်ချောင်း	၂၂၈၇၄	၁၀၅၆၆၂	၅၀၄၂၁	၅၅၂၄၁
ရေဖြူ	၂၂၀၇၃	၁၀၀၇၆၈	၅၀၇၈၂	၄၉၉၈၆

ကိုးကား - မြန်မာနိုင်ငံ လူဦးရေသန်းခေါင်စာရင်းအချက်အလက် (၂၀၁၄)

ငါးလုပ်ငန်းဦးစီးဌာန (DoF) သည် ငါးဖမ်းလုပ်ငန်းဇုန်နှစ်ခုကို စုစည်းခဲ့ပြီး၊ ၎င်းနေရာတို့၌ ငါးဖမ်းလုပ်ငန်းကန့်သတ်မှုများ နှင့် ငါးအရင်းအမြစ်များကို အတိုင်းအတာတစ်ရပ်ထိ ထိန်းသိမ်းကာကွယ်မှုကို ဆောင်ရွက်ပါသည်။ ငါးဖမ်းလုပ်ငန်းဇုန် (၁) သည် ရိုးရာကမ်းရိုးတန်းငါးဖမ်းလုပ်ငန်းများ အတွက် ဖြစ်ပြီး၊ ကမ်းမှ ရေမိုင် ၁၀ မိုင် အကွာထိရှိပါသည်။ ငါးဖမ်းလုပ်ငန်းဇုန် (၂) သည် ငါးဖမ်းလုပ်ငန်းဇုန် (၁) ၏ အပြင်ဘက်သို့ ရေမိုင် ၁ မိုင် မှ ၂၀၀ မိုင်အထိရှိ သီးသန့်စီးပွားရေးဇုန် (EEZ) ကန့်သတ်နေရာထိ ရှိပါသည် (*ပုံ ၁.၅*)။ ငါးဖမ်းအများဆုံးရာသီမှာ ပုံမှန်အားဖြင့် နိုင်ဝင်ဘာလ မှ ဧပြီလ အထိဖြစ်ပါသည်။ ၎င်းမှာ ရာသီဥတုအခြေအနေများသည် ပိုမိုတည်ငြိမ်ပြီး၊ ပိုမိုဝေးကွာသော ကမ်းလွန်နေရာများထိ သွားဖမ်းနိုင်သောကြောင့် ဖြစ်နိုင်ပါသည်။ မိုးရာသီကာလအတွင်း (ဥပမာ - ပုံမှန်အားဖြင့် မေလ မှ အောက်တိုဘာလအထိ)၊ ဆိုးရွားသောပင်လယ်ရာသီဥတုအခြေအနေများကြောင့် ငါးဖမ်းလုပ်ငန်းဇုန် (၁) (ကမ်းနီး) ရှိ ငါးဖမ်းလုပ်ငန်းကို အကြာခဏဆိုသလို ကန့်သတ်ထားပါသည်။

ပုံ ၁.၅ တနင်္သာရီရေပြင်ရှိ ငါးဖမ်းလုပ်ကွက်များ



ကိုးကား - ငါးလုပ်ငန်းဦးစီးဌာနများ (၂၀၁၃)၊ ERM က ၂၀၁၈ ခုနှစ်တွင် အသစ်မွန်းမံထားသည်။

အုပ်စုလိုက်ဆွေးနွေးမှုများကို ငါးဖမ်းလုပ်ကိုင်သူများ၊ ငါးဖမ်းလုပ်ငန်းအသင်းအဖွဲ့များ၊ နှင့် DoF တို့နှင့် ၂၀၁၈ ဇူလိုင်လတွင် ဆောင်ရွက်ခဲ့ပါသည်။ စုဆောင်းခဲ့သည့် အချက်အလက်များအရ၊ ငါးဖမ်းလုပ်ငန်းနှင့်စီမံကိန်းနယ်မြေဧရိယာတို့အတွင်း ဖြစ်ပေါ်လာနိုင်သည့် အပြန်အလှန်ထပ်ကျနိုင်မည့် ပေ ၄၀ ရှည် စက်လှေများရှိသည့်မြို့နယ်များမှာ မောင်းမကန်၊ ကျောက်စံ နှင့် ပန်းတင်အင်းတို့ ဖြစ်ကြပါသည်။ စံလှန်၊ သဘောဆိပ် နှင့် ပြင်ကြီး တို့မှ ပေ ၆၀ ကျော်ရှည်သည့် စက်လှေများသည် စီမံကိန်းနယ်မြေဧရိယာအတွင်း ငါးဖမ်းဆောင်ရွက်နိုင်ပါသည်။ ငါးဖမ်းအကောင်းဆုံးနေရာများသည် ဘုတ်ကျွန်း နှင့် ဟိန်းဇေ (မိုစကို)ကျွန်းများကဲ့သို့သော ကျွန်းများပတ်ပတ်လည်နေရာများဖြစ်

ကြောင်း မှတ်တမ်းတင်ရရှိပါသည်။ ကျောက်ဆင်၌ဆွေးနွေးကြသည်မှာ စီမံကိန်းနယ်မြေဧရိယာ နှင့် ကမ်းလွန်နေရာတို့သည် သူတို့၏ ငါးဖမ်းအကောင်းဆုံးနေရာများဖြစ်ကြောင်း မှတ်သားရပါသည်။

စီမံကိန်းနယ်မြေဧရိယာအတွင်း ယဉ်ကျေးမှုအမွေအနှစ်ဆိုင်ရာ ကမ်းလွန်နေရာများ ရှိမနေပါ။

စီမံကိန်းလုပ်ငန်းသည် အနီးဆုံး ဒေသရင်းနေရာများမှ ၁၂၅ ကီလိုမီတာကျော် နှင့် မြိတ်ကျွန်းစု၏ အနီးဆုံးအစွန်အဖျားကျွန်းနေရာများမှ ကီလိုမီတာ ၇၀ ကျော် အကွာအဝေးတွင် တည်ရှိသော ကြောင့် စီမံကိန်းမှ မြင်သာသော သက်ရောက်မှုများ ရှိလာနိုင်မည် မဟုတ်ပါ။

၁.၅ *ထိခိုက်မှု နှင့် အန္တရာယ် ဆန်းစစ်ခြင်း၊ နှင့် လျော့ချရေး အစီအမံများ*

သိသာထင်ရှားသောသက်ရောက်မှုများဖြစ်ပေါ်နိုင်သည့် လုပ်ငန်းများအတွက်၊ အပြန်အလှန် ဆက်နွယ်မှုများကို IEE အစီရင်ခံစာအတွင်း ပိုမိုအသေးစိတ် ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။ ၎င်း အပြန်အလှန်ဆက်နွယ်မှုများမှာ အောက်ပါတို့ ပါဝင်ပါသည် -

- တိုင်းတာမှုဆောင်ရွက်သည့်ရေယာဉ် နှင့် ကိရိယာများ ရောက်ရှိနေမှုကြောင့် ငါးဖမ်းလုပ်ငန်း ဆောင်ရွက်သည့် ရပ်ရွာများ နှင့် ငါးဖမ်းလုပ်ငန်းများ (ငါးဖမ်းဆောင်ရွက်သူများ၏ အသက် မွေးဝမ်းကျောင်းလုပ်ငန်းများအပါအဝင်) အပေါ် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ။

- လေသေနတ်များမှ ရေအောက်အသံများကြောင့် အဏ္ဏဝါနို့တိုက်သတ္တဝါများ၊ ပင်လယ်လိပ်များ နှင့် ငါးများအပေါ် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ၊

- တိုင်းတာရေးသုံး ကိရိယာများကြောင့် ပင်လယ်လိပ်များနှင့် မရည်ရွယ်သည့် ထိမိခိုက်မိမှု နှင့် ပိတ်မိမှုဆိုင်ရာ ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ၊

- ငါးဖမ်းရေယာဉ်များ၊ ပိုက်များ နှင့် ပင်လယ်တွင်သွားလာနေသည့် ရေယာဉ်များနှင့် ဆိုက်စမစ် ရေယာဉ် / ကိရိယာများနှင့် ထိမိခိုက်မှုဆိုင်ရာ ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ၊ နှင့်

- ဓာတုပစ္စည်းများ သို့မဟုတ် လောင်စာများ (ဥပမာ - ကမ်းလွန်၌ လောင်စာပြန်လည်ဖြည့်တင်းမှုကာလအတွင်း) မတော်တဆ ယိုဖိတ်မှုများကြောင့် အဏ္ဏဝါရေပြင်အရည်အသွေးပေါ် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ။

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ နှင့် လျော့ချရေးအစီအမံများကို *ဇယား ၁.၄* တွင် ဖော်ပြထားပါသည်။

ဇယား ၁.၄ စီမံကိန်းအတွက် အဓိက သက်ရောက်မှုများ နှင့် ထိန်းချုပ်ရေး/လျှော့ချရေး အစီအမံများ အကျဉ်းဖော်ပြချက်

ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှု / ထိခိုက်မှု	ထိန်းချုပ်ရေး / လျှော့ချရေး အစီအမံများ	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
ယာဉ်နောက်ပိုင်း၌ဆွဲယူလာသည့် ကိရိယာကြောင့် ပင်လယ်လိပ်များ နှင့် ထိမိခိုက်မိမှု သို့မဟုတ် ပိတ်မိမှုဆိုင်ရာ သက်ရောက်မှုများ	• ဆိုက်စမစ်ကိရိယာ၌ လိပ်များပိတ်မိမှုအန္တရာယ်ကိုလျှော့ချရန် ဆိုက်စမစ်တိုင်းတာမှုနောက်ဘက်တွင် ဇော်ယာများတပ်ဆင်ခြင်း။ • JNCC လမ်းညွှန်ချက်များဖြင့် ကန်ထရိုက်တာ ဆောင်ရွက်မှုများအပါအဝင်၊ JNCC လမ်းညွှန်ချက်များ [(1)] ကို အကောက်အထည်ဖော် ဆောင်ရွက်ခြင်း။ • JNCC လမ်းညွှန်ချက်များနှင့် အညီ၊ အဏ္ဏဝါသတ္တဝါများအတွက် နယ်မြေဇရိယာမှ ထွက်ခွါချိန်ရစေမည့် လုံလောက်သောအချိန်ပေးရန် ဖြည်းဖြည်းချင်းစတင်ဆောင်ရွက်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို အကောက်အထည်ဖော် ဆောင်ရွက်ခြင်း။ • တိုးမြှင့်ရေးအစီအမံများအနေဖြင့်၊ မြင်တွေ့ရသော အဏ္ဏဝါနှိုတိုက်သတ္တဝါများ / လိပ်များအားလုံးကို မှတ်တမ်းယူသင့်ပြီး၊ တိုင်းတာမှု ပြီးနောက် MONREC ထံသို့ အစီရင်ခံသင့်ပါသည်။	**သာမည**

ရေအောက်အသံကြောင့် အဏ္ဏအဏ္ဏဝါ သတ္တဝါများအပေါ် သက်ရောက်မှုများ	• လေသေနတ်များ၏အနိမ့်ဆုံးအသံအဆင့်ကို ရွေးချယ်သေချာစေရန်၊ အသင့်တော်ဆုံး လေသေနတ် အစီအစဉ်စနစ်များကို အသုံးပြုခြင်း။
	• JNCC လမ်းညွှန်ချက်များဖြင့် ကန်ထရိုက်တာ ဆောင်ရွက်မှုများအပါအဝင်၊ JNCC လမ်းညွှန်ချက်များ [(1)] ကို အကောက်အထည်ဖော် ဆောင်ရွက်ခြင်း။
	• JNCC လမ်းညွှန်ချက်များနှင့်အညီ အောက်ပါတို့ကို ဆောင်ရွက်သွားမည် -
	  • အဏ္ဏဝါသတ္တဝါများအတွက် နယ်မြေဇရိယာမှ ထွက်ခွါချိန်ရစေမည့် လုံလောက်သောအချိန်ပေးရန် ဖြည်းဖြည်းချင်းစတင် ဆောင်ရွက် ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို အကောက်အထည်ဖော် ဆောင်ရွက်ခြင်း၊
	  • အကြိုရှာဖွေကြည့်ရှုမှုကို ဆောင်ရွက်ရန် အဏ္ဏဝါနှိုတိုက်သတ္တဝါစောင့်ကြည့်သူများကို ယာဉ်ပေါ်တွင် ထားရှိခြင်း၊
	  • မီတာ ၅၀၀ အတွင်း နှိုတိုက်သတ္တဝါများကို တွေ့ရှိရလျင်၊ ရေယာဉ်စတင်လည်ပတ်ဆောင်ရွက်မှုကို ရွှေ့ဆိုင်းခြင်း၊ နှင့်
		သာမည (ငါးများအတွက်) မှ **အတော်အတန်** (အဏ္ဏဝါနှိုတိုက်သတ္တဝါများ နှင့် လိပ်များအတွက်)

(1) ဆိုက္စမစ္တိုင်းတာမှုမွ အဏာယ္ဝါးိုု/တိုက္သတၱဝါမ်ားအေပၚ အနာတရျဖစ္မႈ ုးွင့္ အေးွာင့္အယွက္ျဖစ္မႈ အးိုရာယ္တို့ကို ေလွ်ာ့ခ်ရန္ အတြက္ JNCC လမ္းညြန္ခ်က္မ်ား (၂၀၁၀)

ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှု / ထိခိုက်မှု	ထိန်းချုပ်ရေး / လျှော့ချရေး အစီအမံများ	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
	• ညပိုင်းအချိန် သို့မဟုတ် မြင်ကွင်းမရှင်းသည့်ကာလအတွင်း ဆိုက်စမစ်ရေယာဉ် အနီး အဏ္ဏဝါနှံ့တိုက်သတ္တဝါများရှိ မရှိကို ရှာဖွေနိုင်ရန် အသံနားထောင်သည့်ကိရိယာဖြင့် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု (PAM) ကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။ • တိုးမြှင့်ရေးအစီအမံများအနေဖြင့်၊ မြင်တွေ့ရသော အဏ္ဏဝါနှံ့တိုက်သတ္တဝါများ / လိပ်များအား လုံးကို မှတ်တမ်းယူသင့်ပြီး၊ တိုင်းတာမှု ပြီးနောက် MONREC ထံသို့ အစီရင်ခံသင့်ပါသည်။	
မရည်ရွယ်ထားသော ယိုဖိတ်မှုများ ကြောင့် အဏ္ဏဝါ သတ္တဝါများအပေါ် သက်ရောက်မှုများ	• ကမ်းလွန်၌ လောင်စာပြန်လည်ဖြည့်ခြင်းဆိုင်ရာ အစီအစဉ်အပါအဝင်၊ လက်ခံထားသော လုပ်ငန်းသုံး အလေ့အကျင့်ကောင်းများ ဆောင်ရွက်ရေး လုပ်ထုံးလုပ်နည်းများကို အကောက်အထည်ဖော် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ • အရေးပေါ်အစီအစဉ်များကို ပြင်ဆင်ပြုလုပ်၍ အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည်၊ ဥပမာ - သဘော်ပေါ် ဆီညစ်ညမ်းမှု အရေးအပေါ် အစီအစဉ် (SOPEP)။	သာမည
ဆိုက်စမစ်ရေယာဉ် နှင့် ကိရိယာများ ရောက်ရှိနေမှုကြောင့် ငါးဖမ်းလုပ်ငန်းများ နှင့် ငါးဖမ်းလုပ်ငန်းလုပ်ကိုင်သည့် ရပ်ရွာများအပေါ် သက်ရောက်မှုများ	• ဆိုက်စမစ်ရေယာဉ် နှင့် ကိရိယာများ ပတ်ပတ်လည်၌ ရွှေ့လျားရေကြောင်းပြဘေးကင်းလုံခြုံရေးဇုန်ကို အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ • ငါးဖမ်းဆောင်ရွက်သူများ နှင့် အခြားပင်လယ်တွင် သွားလာလုပ်ရှားသူများနှင့် ညှိနှိုင်းဆောင်ရွက်မည့် သင့်လျော်သောအရေအတွက်ရှိသည့် ကင်းလှည့်ရေယာဉ်များကို အသုံးပြုခြင်း။ • ကင်းလှည့်ရောယာဉ် (များ) ပေါ်တွင် မြန်မာစကားပြောသည့် ငါးဖမ်းလုပ်ငန်းညှိနှိုင်းရေးအရာရှိများကို ထားရှိမည် ဖြစ်ပါသည်။ • တိုင်းတာမှုဆောင်ရွက်သည့် ရေယာဉ်များသည် ရေကြောင်းသွားလာရေးဆိုင်ရာ ဘေးကင်းလုံခြုံရေးဆိုင်ရာ နိုင်ငံတကာစံနှုန်းများ နှင့် အညီ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ • တိုင်းတာမှုရေယာဉ်များ ရွှေ့လျားသွားလာမှုဆိုင်ရာ အတင်းအချက်အလက်များကို အချိန်နှင့်တစ်ပြေးညီဖြစ်စေရန် သက်ဆိုင်သူများနှင့်ထိတွေ့ဆောင်ရွက်မှုအစီအစဉ်ကို ပြင်ဆင်ရေးဆွဲသွားမည် ဖြစ်ပါသည်။ ဤအစီအမံများသည် ထိခိုက်မှု၏အရေးပါမှုအပေါ် မသက်ရောက်နိုင်သော်လည်း၊ စီမံကိန်းအတွက် အကြံပြုတိုင်ကြားရေးဆိုင်ရာ ယန္တရားတစ်ရပ်ကို ထုတ်ဖော်တင်ပြ အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည်ဖြစ်ပြီး၊ မကျေနပ်ချက်များကို အချိန်နှင့် တစ်ပြေးညီ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။	သာမည
မရည်ရွယ်သော ထိမိခိုက်မိများကြောင့် ငါးဖမ်းယာဉ် နှင့် အခြား ပင်လယ်ပြင်သွားလာသူများအပေါ် သက်ရောက်မှုများ	• မရည်ရွယ်သော ထိမိခိုက်မိမှုများမှ ငါးဖမ်းလုပ်ငန်းများ နှင့် အသက်မွေးဝမ်းကျောင်းများအတွက် ရှိနေပြီးသော ထိန်းချုပ်မှုများသည် ဆိုက်စမစ်ရေယာဉ် နှင့် ကိရိယာများ ရောက်ရှိနေမှုကြောင့် ငါးဖမ်းလုပ်ငန်းများအပေါ် သက်ရောက်မှုများအတွက် ဖော်ပြထားချက်များနှင့် အတူတူဖြစ်ပါသည်။	သာမည

၁.၆ ဆက်စပ်ထိခိုက်မှုဆန်းစစ်ခြင်း

စီမံကိန်းနယ်မြေဇရိယာကို အခြားကုမ္ပဏီများမှ ဆောင်ရွက်နေသည့် ရေနံ နှင့် သဘာဝဓာတ်ငွေ့ လုပ်ကွက်များဖြင့် ဝန်းရံထားပါသည်။ သို့ရာတွင် ယခုအစီရင်ခံစာရေးသားနေသောကာလအထိ ဤလုပ်ကွက်များအတွင်း စီမံကိန်းလုပ်ငန်းများ၏ အချိန်နှင့် ထပ်တူကျနိုင်ခြေရှိသော အခြားရေနံ နှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်းဆောင်ရွက်မှုများ ရှိမနေပါ။

သို့ရာတွင်၊ စီမံကိန်းနယ်မြေဇရိယာအနီးတွင် တည်ရှိနေပြီးသောရဲတံခွန်ပလက်ဖောင်းရှိပြီး၊ PCML သည် ဆိုက်စမစ်တိုင်းတာမှုဝန်းကျင်၌ တူးဖော်ရှာဖွေမှုအချို့ နှင့် ကြားဖြည့်ရေနံတွင်းများကိုလည်း စီစဉ်လျက် ရှိပါသည်။ ၎င်းလုပ်ငန်းများနှင့် ထပ်တူကျနိုင်ခြေရှိပါသည်။

ဖြစ်ပေါ်လာနိုင်သည့် အဓိကသက်ရောက်မှုများမှာ ငါးဖမ်းလုပ်ငန်းအပေါ် ယာယီအနှောင့်အယှက် ဖြစ်ပေါ်ခြင်းဖြစ်ပြီး၊ အထူးသဖြင့် စီမံကိန်းနယ်မြေဇရိယာရှိ ကမ်းလွန်ရေတိမ်ပိုင်းအနီး ရှိနေနိုင်သော ငါးဖမ်းနေရာများအတွင်း ငါးဖမ်းဆောင်ရွက်သူများအပေါ် ဖြစ်ပါသည်။ အထက်ပါအပိုင်းများ၌ ဖော်ပြထားသည့် လျော့ချရေးအစီအမံများသည် နိုင်ငံတကာ အလေ့အကျင့်ကောင်းစံနှုန်းများဖြစ်ပြီး၊ တူးဖော်ရေး နှင့် ဆိုက်စမစ်လုပ်ငန်းများအားလုံးဆောင်ရွက်ရာကာလအတွင်း ကျင့်သုံးသွားမည် ဖြစ်ပါသည်။

လျော့ချရေးအစီအမံ စံနှုန်းများနေရာတကျရှိနေခြင်းဖြင့်၊ အလွှာဝါမျိုးစိတ်များအပေါ် သက်ရောက်နိုင်ခြေမှာ **သာမည** အဆင့်သာ ဖြစ်ပေါ်မည် ဖြစ်ပါသည်။

ယာဉ်များမှ ရေနံများ၏ ဆက်စပ်ယိုဖိတ်မှုများအတွက် အလားအလာမှာ ဖြစ်ပေါ်နိုင်ခြေနည်းပြီး၊ ရေယာဉ်နှစ်စင်းလုံးမှာ သန့်စင်သောလောင်စာများကို အသုံးပြုပြီး ၎င်းမှာ ရေရောလွယ်ပြီး ပျံ့နှံ့လွယ်ပါသည်။ ထို့ပြင်၊ လျော့ချရေးအစီအမံများအကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့်၊ သက် ရောက်မှုများသည် **သာမည** အဆင့်သာ သတ်မှတ်ထားပါသည်။

လူမှုသက်ရောက်မှုများအရကြည့်လျှင်၊ စီမံကိန်းနယ်မြေဇရိယာသည် ရေယာဉ်ပတ်ပတ်လည်တွင် ရွှေ့လျားဘေးကင်းရေးဇုန်အဖြစ် ကန့်သတ်သွားမည်ဖြစ်ပြီး၊ တူးဖော်ရေးစင်ပတ်ပတ်လည်တွင် ပုံသေဇုန်တစ်ခုရှိသွားမည် ဖြစ်ပါသည်။ ထို့ကြောင့် ငါးဖမ်းဆောင်ရွက်သူများကို ၎င်းဇရိယာမှ ယာယီ ရွှေ့ဆိုင်းသွားမည့် နေရာမှာ သေးငယ်မည် ဖြစ်ပါသည်။ လျော့ချရေးအစီအမံများကို စနစ်တကျ ဆောင်ရွက်ခြင်းဖြင့်၊ ဆိုက်စမစ်တိုင်းတာမှုများမှ လူမှုသက်ရောက်မှုများသည် ငါးဖမ်းဆောင်ရွက် သောနေရာတွင်သာ ကွက်၍ဖြစ်ပေါ်နိုင်ပြီး၊ သဘာဝအရ ယာယီ (ရက်အနည်းငယ်) သာ ဖြစ်ပါ သည်။ ထို့ကြောင့်၊ ငါးဖမ်းလုပ်ငန်းများအပေါ် သက်ရောက်မှုမှာ **သာမည** အဆင့်ဖြစ်ပြီး၊ အသက် မွေးဝမ်းကျောင်းများအပေါ် သက်ရောက်မှုမှာ **မပြောပလောက်သော** အဆင့်သာ ဖြစ်ပေါ်မည် ဖြစ်ပါ သည်။

၁.၇ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းကို PCML HSE စီမံခန့်ခွဲမှုဝါဒ၊ ထုတ်လုပ်မှုအပေါ် ခွဲဝေခံစားရေးစာချုပ် (PSC)၊ မြန်မာနိုင်ငံကြီးကြပ်ရေးဆိုင်ရာ သတ်မှတ်ချက်များ၊ နှင့် နိုင်ငံတကာ ကွန်ဗင်းရှင်းများ၊ စံနှုန်းများ နှင့် လမ်းညွှန်ချက်များနှင့်အညီ ဆောင်ရွက်လျက်ရှိပါသည်။

စီမံကိန်း၏ ပတ်ဝန်းကျင် နှင့် လူမှု စံနှုန်းသတ်မှတ်ချက်များဆိုင်ရာ အကျဉ်းကို *ဇယား ၁.၅* တွင် တင်ပြထားပါသည်။

ဇယား ၁.၅ စီမံကိန်းဆိုင်ရာ ပတ်ဝန်းကျင် နှင့် လူမှု စံနှုန်းများ

ပတ်ဝန်းကျင်ဆိုင်ရာ ပါရာမီတာ	စံနှုန်း	သတ်မှတ်ချက်
ထုတ်လွှတ်အခိုးအငွေ့	နောက်ဆက်တွဲ ၆	• သဘော်များမှ လေထုညစ်ညမ်းမှုကာကွယ် (နောက်ဆက်တွဲ-၆) ရန် ရေယာဉ်များသည် သက်ဆိုင်ရာ MARPOL ၇၃ / ၇၈ ကြီးကြပ် ရေးလုပ်ထုံးများနှင့် အညီ ဖြစ်မည် ဖြစ်ပါသည်။
		• ဆာလဖာပါဝင်မှုနည်းသည့်လောင်စာ (၃.၅% m/m ထက်မကျော် လွန်သည့် ဆာလဖာပါဝင်မှု) ကို ရရှိလျှင်၊ အသုံးပြုမည် ဖြစ်ပါသည်။
		• ဆိုက်စမစ်ရေယာဉ်၊ ထောက်ပံ့ရေးရေယာဉ် နှင့် ကင်းထောက် ရေယာဉ် တို့သည့် ရေယာဉ်အမျိုးအစားအပေါ် မူတည်၍ အပြည်ပြည်ဆိုင်ရာလေထု ညစ်ညမ်းမှုကာကွယ်ရေး (IAPP) သက်သေခံ လက်မှတ်ကို လိုက်နာဆောင်ရွက်မည် ဖြစ်ပါသည်။
မိလ္လာ အညစ်အကြေး ထုတ်လွှတ်မှု	MARPOL နောက် ဆက်တွဲ-၄ / NEQ လမ်းညွှန်ချက်များ	• စီမံကိန်းရေယာဉ်များသည် သက်ဆိုင်ရာ MARPOL သတ်မှတ် ချက်များနှင့်အညီ ဖြစ်မည် ဖြစ်ပါသည်။ ၎င်းတွင် အနီးဆုံးမြေပြင်မှ ရေမိုင် ၃ မိုင်ထွက် ကွာဝေးသည့် အကွာနေရာတွင် ခွင့်ပြုထား သောစနစ်တစ်ရပ် အသုံးပြုလျက် ပိုးသတ်ထားသော မိလ္လာ ရေဆိုးများ ကို သဘော်မှ စွန့်ထုတ်သောအခါ သို့မဟုတ် လည်ပတ်ရေးအတွက် ခွင့်ပြုထားသော မိလ္လာရေဆိုး ပြုပြင်မှု စက်ရုံတစ်ခု သဘော်ပေါ်တွင် ရှိနေသောအခါတို့မှ လွဲ၍၊ မပြုပြင် ထားသည့် မိလ္လာရေဆိုးများကို ပင်လယ်သို့စွန့်ထုတ်မှုကို တားမြစ်ခြင်း၊
		• ပိုးသတ်မထားသော မိလ္လာရေဆိုးများကို အနီးဆုံးကမ်းမှ ရေမိုင် ၁၂ မိုင်ထက် ကွာဝေးသည့် အကွာနေရာတွင် စွန့်ထုတ်ရမည် ဖြစ်ပါ သည်။
		• ရေယာဉ်မှ ရေမိုင် ၄ မိုင်ထက်ဝေးသည့်နေရာတွင် သွားလာရောက် ရှိနေမှသာ မိလ္လာရေဆိုးစွန့်ထုတ်မှုကို ဆောင်ရွက်မည် ဖြစ်ပါသည်။
		• ရေယာဉ်အမျိုးအစားနှင့် သင့်လျော်မှုအပေါ် မူတည်၍ အပြည်ပြည်ဆိုင်ရာမိလ္လာညစ်ညမ်းမှုကာကွယ်ခြင်း (ISPP) လက်မှတ် နှင့် အပြည်ပြည်ဆိုင်ရာ ရေနံဆီညစ်ညမ်းမှုကာကွယ်ခြင်း (IOPP) လက်မှတ်တို့ကို လိုအပ်သွားမည် ဖြစ်ပါသည်။
စွန့်ပစ်ပစ္စည်း စွန့်ပစ်မှု	MARPOL နောက် ဆက်တွဲ ၁ နှင့် ၅	• ရေယာဉ်များသည် MARPOL နောက်ဆက်တွဲ ၁ ကို လေးစား လိုက်နာ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ စွန့်ပစ်ရေဆီပါဝင်မှု သည် ၁၅ ppm ကို မကျော်လွန်သင့်ပါ။

ပတ်ဝန်းကျင်ဆိုင်ရာ ပါရာမီတာ	စံနှုန်း	သတ်မှတ်ချက်
(အစားအစာထိုက် စွန့်ပစ်ပစ္စည်း)		• MARPOL နောက်ဆက်တွဲ ၅ သတ်မှတ်ချက်များအရ ယေဘုယျ စွန့်ပစ်ပစ္စည်း များ (အစားအစာများမပါဝင်) ကို ပင်လည်ထဲသို့ စွန့်ပစ်သွားမည် မဟုတ်ပါ။ • မီးလောင်လွယ်သောသော စွန့်ပစ်ပစ္စည်းများကို သီးသန့်ခွဲထားပြီး ရေယာဉ်ပေါ် ပါရှိသော မီးမွှေစက်ဖြင့် ရှင်းထုတ်မည် ဖြစ်ပါသည် (MARPOL နောက်ဆက်တွဲ-၅ ပါသတ်မှတ်ချက်များနှင့်အညီ)။ ကမ်းမှ ၃ nm အကွာအဝေးထက်နီးသည့်နေရာများတွင် အစား အသောက် စွန့်ပစ်ပစ္စည်းများကို စွန့်ပစ်ရန် ခွင့်ပြုမည် မဟုတ်ပါ။ ကမ်းမှ ၃ nm အထက် နှင့် ၁၂ nm အောက်ကွာဝေးသော နေရာများတွင် နူးအောင်ပြုလုပ်ရန် လိုအပ် ပါသည်။ • အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများကို ရေယာဉ်ပေါ်ရှိ အမည် တပ်ထားသည့် သင့်လျော်သော ကွန်တိန်နာများတွင် သိုလှောင် သွားမည် ဖြစ်ပါသည်။ • အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများသိုလှောင်မှုကို ၎င်းတို့၏ ပစ္စည်းအချက်အလက် စာရွက် (MSDS) နှင့်အညီ ရွေးချယ် သတ်မှတ်သွားမည် ဖြစ်ပါသည် (MARPOL နောက်ဆက်တွဲ-၅ ပါသတ်မှတ်ချက်များနှင့်အညီ)။ အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း များကို ရေယာဉ်ဖြင့် သင့်လျော်သောကမ်းရိုးအခြေစိုက်နေရာသို့ ပြန်လည် ပို့ဆောင်မည် ဖြစ်ပြီး၊ လိုင်စင်ရ စွန့်ပစ်ပစ္စည်း ကန်ထရိုက်တာမှ လိုင်စင်ရစွန့်ပစ်ရေး အဆောက်အအုံနေရာသို့ ပို့ဆောင်မည် ဖြစ်ပါသည် (MARPOL နောက်ဆက်တွဲ-၅ ပါသတ်မှတ်ချက်များနှင့်အညီ)။
ရေအောက်အသံ ထွက်ရှိမှု	JNCC လမ်းညွှန်ချက်များ [1]	စီမံကိန်းသည် JNCC လမ်းညွှန်းချက်များနှင့် ကန်ထရိုက်တာ၏ လည်ပတ် ရေးဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများအပါအဝင် JNCC လမ်းညွှန်ချက်များကို အကောက်အထည်ဖော်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ဤလမ်းညွှန် ချက်များတွင် အောက်ပါတို့ပါဝင်ပါသည် - • အဏ္ဏဝါနှံ့တိုက်သတ္တဝါများ၊ လိပ်များ နှင့် ဝေလငါးမန်းများကို ဇရိယာတွင်းမှ ထွက်ခွာနိုင်ဖို့ လုံလောက်သောအချိန်ရရှိရန် လေသေနတ်စတင်ပစ်လွှတ် ်သောအခါ ဖြည်းဖြည်းချင်းစတင် ဆောင်ရွက်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။ • အကြီးရှာဖွေကြည့်ရှုမှုကို ဆောင်ရွက်ရန် အဏ္ဏဝါနှံ့တိုက် သတ္တဝါ စောင့်ကြည့်သူများ (MMOs) ကို ယာဉ်ပေါ်တွင် ထားရှိခြင်း၊ ညပိုင်းနှင့် မြင်ကွင်းမရှင်းလင်းသည့် လည်ပတ်ရေးလုပ်ငန်းများကာလ အတွင်း

(1) ဆိုက္စမစ္တိုင္းတာမႈမွ အဏၰဝါးႏို႔တိုက္သတၱဝါမ်ားအေပၚ အနာတရျဖစ္မွဳ ၊ႏွင့္ အေႏွာင့္ယွက္ျဖစ္မွဳ အႏၲရာယ္ကို ေလွ်ာ့ခ်ရန္ အတြက္ JNCC လမ္းညႊန္ခ်က္မ်ား (၂၀၁၀)

ပတ်ဝန်းကျင်ဆိုင်ရာ ပါရာမီတာ	စံနှုန်း	သတ်မှတ်ချက်
		ဆိုက်စမစ်ရေယာဉ်အနီးတွင် အကျွာဝါနှံတိုက်သတ္တဝါများရှိ မရှိကို ရှာဖွေရန် အသံနားထောင်သည့်ကိရိယာဖြင့် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု (PAM) ကို အသုံးပြုခြင်း။
ယိုဖိတ်မှု	MARPOL နောက် ဆက်တွဲ ၁	(သင့်လျော်သော) ကမ်းလွန်ရေယာဉ် လောင်စာဖြည့်ခြင်းဆိုင်ရာလုပ်ထုံး စနစ်များ အပါအဝင်၊ ထောက်ပံ့ရေး နှင့် ကင်းထောက်ရေး ရေယာဉ် လည်ပတ်မှု စံနှုန်းများ လုပ်နည်းစနစ်များကို ပြင်ဆင်ရေးဆွဲပြီး၊ အကောင် အထည်ဖော် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ သဘော်ပေါ်ရှိ ဆီညစ် ညမ်းမှုအရေးပေါ် အစီအစဉ်များ (SOPEPs) ကို ပြင်ဆင်အကောင် အထည်ဖော် ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။

ပင်လယ်ပြင်ဆိုက်စမစ်တိုင်းတာမှုအတွက် EMP အကောင်အထည်ဖော်ဆောင်ရွက်မှုအတွက် ခြုံငုံအသုံး စရိတ်မှာ အမေရိကန်ဒေါ်လာ ၅ သောင်းခန့်ရှိမည်ဟု ခန့်မှန်းထားပါသည်။ စီမံခန့်ခွဲမှု နှင့် လျော့ချ ရေးအစီအမံအမြောက်အများမှာ ဆိုက်စမစ်တိုင်းတာမှုရေယာဉ်၊ ထောက်ပံ့ရေးရေယာဉ် နှင့် ကင်း လှည့်ရေးရေယာဉ်များ၏ လည်ပတ်ရေးကုန်ကျစရိတ်များ၏ အစိတ်အပိုင်းအဖြစ် စွဲခိုင်ထားသော ထိန်းချုပ်ရေးတို့ ဖြစ်ပါသည်။

စီမံကိန်းမှ သိသာထင်ရှားသော ထိခိုက်မှုများမရှိနိုင်သဖြင့် (IEE အစီရင်ခံစာ၏ *အခန်း ၆* အရ)၊ အောက်ပါတို့အတွက် သီးသန့်စီမံခန့်ခွဲမှုအစီအစဉ်များ မလိုအပ်တော့ပါ -

- ဇီဝမျိုးစုံမျိုးကွဲ - ထိခိုက်လွယ်သော နေရာများမှ (ကီလိုမီတာ ၇၀ ကျော်) ကွာဝေးသော ကြောင့်၊ အရေးပါသောထိခိုက်မှုများမရှိနိုင်ခြင်း၊ နှင့်
- ရပ်ရွာပြည်သူ - စီမံကိန်းသည် အနီးဆုံးလူနေထိုင်ရာနေရာ နှင့် ရပ်ရွာများမှ ၁၂၅ ကီလိုမီတာ အကွာတွင် တည်ရှိသောကြောင့်၊ ထိခိုက်မှုများရှိမည် မဟုတ်ပါ။

သို့ရာတွင် လုပ်ငန်းစံနှုန်းလုပ်ထုံးလုပ်နည်းများအရ၊ **အရေးပေါ်တုံ့ပြန်မှု** နှင့် **စွန့်ပစ်ပစ္စည်း** အတွက် စီမံခန့်ခွဲမှုအစီအစဉ်များကို ပြင်ဆင်ထားပါသည်။

ယခုလုပ်ငန်းတွင် လည်ပတ်ရေးကာလအဆင့်သာဖြစ်သဖြင့်၊ ယခုကဲ့သို့တိုတောင်းသော ဆိုက်စမစ် တိုင်းတာမှုအတွက်၊ အကြိုတည်ဆောက်ရေး၊ တည်ဆောက်ရေး၊ လည်ပတ်ရေး နှင့် ရပ်စဲရေးကာလ အဆင့်များအတွက် သီးသန့်စီမံခန့်ခွဲမှုအစီအစဉ်များမလိုအပ်သွားမည် မဟုတ်ပါ။

PCML သည် အဏ္ဏဝါဆိုက်စမစ်တိုင်းတာမှုပြီးမြောက်ပြီးနောက်၊ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီရင်ခံစာကို MOGE နှင့် MONREC တို့ထံသို့ တင်သွင်းသွားမည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအစီရင်ခံစာ၌ *ဇယား ၁.၆* တွင် စာရင်းပြုစုထားသည့် အကြောင်းအရာများ ပါဝင်သွားမည် ဖြစ်ပါသည်။ ဆိုက်စမစ်တိုင်းတာမှု၏ ကာလမှာ အကန့်အသတ် (၂ လ မှ ၃ လ) ဖြင့်သာဖြစ်သဖြင့်၊ စီမံကိန်းအတွက် နောက်ထပ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုတို့ လိုအပ်သွားမည် မဟုတ်ပါ။

ဇယား ၁.၆ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု မှတ်တမ်းတင်ခြင်း

စီမံကိန်းလုပ်ငန်း / ပတ်ဝန်းကျင်ဆိုင်ရာ ကဏ္ဍ	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေး အစီအမံများ	အစီရင်ခံခြင်း
ဆိုက်စမစ်ရင်းမြစ် လည်ပတ်မှု	အဏ္ဏဝါဆိုက်စမစ်တိုင်းတာမှုကာလ အတွင်း ဝေလငါးများ နှင့် လိပ်များအတွက် စောင့်ကြည့်ခြင်း	အဏ္ဏာဝါ သတ္တဝါများတွေ့မြင်လျင် မှတ်တမ်းယူခြင်း
	ငါးဖမ်းလုပ်ငန်းနှင့် အပြန်အလှန်ချိတ်ဆက်မှု၊ ရပ်ရွာ အကြံပြုတိုင်ကြားရေး ယန္တရားကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း	အဏ္ဏာဝါ သတ္တဝါများတွေ့မြင်လျင် မှတ်တမ်းယူခြင်း
ဖြစ်ရပ်များ အစီရင်ခံခြင်း	ပတ်ဝန်းကျင် သို့မဟုတ် လူမှုဆိုင်ရာ အသေးစိတ်အကြောင်းအရာများ ဖြစ်ရပ်များ	ဖြစ်ရပ်များအစီရင်ခံစာ ပုံစံဖောင်များ
မတော်တဆ ယိုဖိတ်မှုများ နှင့် ယိုစိမ့်မှုများ	ဘေးကင်းလုံခြုံရေးဆိုင်ရာ မှတ်တမ်း	ဘေးကင်းလုံခြုံရေးဆိုင်ရာ မှတ်တမ်း
လိုက်နာမှုမရှိသည်များ အစီရင်ခံခြင်း	EMP နှင့် ကိုက်ညီမှုမရှိသည်များ အစီရင်ခံခြင်း	စစ်ဆေးခြင်းဆိုင်ရာ စာရွက်မှတ်တမ်းများ

၁.၈ *အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှု နှင့် ထုတ်ဖော်တင်ပြချက်*

IEE တိုင်ပင်ဆွေးနွေးမှုဆိုင်ရာအစည်းအဝေးများကို တနင်္သာရီတိုင်းဒေသကြီးအဆင့် အမျိုးမျိုးသော သက်ဆိုင်ရာ သက်ဆိုင်သူများနှင့် ကျင်းပခဲ့ပါသည်။ ဆွေးနွေးတိုင်ပင်မှုတို့သည့် ထိခိုက်ခံစားရနိုင်သည့် လူပုဂ္ဂိုလ်များ၊ ဖြစ်ပေါ်နိုင်သည့် အချက်အလက်ကွာဟချက်များ နှင့် IEE အစီရင်ခံစာ၌ မည်သို့ထည့်သွင်းဆောင်ရွက်သွားရမည်နှင့်ပတ်သက်သော အချက်အလက်များကို ရရှိစေရန် စီမံကိန်းအတွက် အထောက်အကူဖြစ်စေခဲ့ပါသည်။ IEE တိုင်ပင်ဆွေးနွေးမှုတွင် ကျေးရွာသူ/ သားများ အပါအဝင်၊ ငါးလုပ်ငန်းဦးစီးဌာန (DoF)၊ တနင်္သာရီတိုင်းဒေသကြီး ဝန်ကြီးချုပ်၊ တိုင်းဒေသ ကြီးအဆင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD)၊ နှင့် အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန (GAD)၊ ရပ်ရွာအုပ်ချုပ်ရေးမှူးများ၊ စီမံကိန်းဦးစီးဌာန၊ ဒေသခံရပ်ရွာ နှင့် ငါးဖမ်းလုပ်ငန်း ကိုယ်စား လှယ်တို့

နှင့် မျက်နှာချင်းဆိုင်အစည်းအဝေးများပါဝင်ခဲ့ပါသည်။ အစည်းအဝေးတစ်ခုချင်းစီ၏ နေ့စွဲ၊ အချိန်၊ နေရာ၊ သက်ဆိုင်သူများ နှင့် ရည်ရွယ်ချက်များကို *ဇယား ၁.၇* တွင် ဖော်ပြထားပါသည်။

ဇယား ၁.၇ IEE ကာလအတွင်း ဆောင်ရွက်ခဲ့သည့် တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ

နေ့စွဲ၊ အချိန်၊ နေရာ	သက်ဆိုင်သူများ	တိုင်ပင်ဆွေးနွေးမှု၏ ရည်ရွယ်ချက်
၂၀၁၈ ဩဂုတ် ၂၃၊ နေ့လယ် ၁၄း၃၀ - ၁၇း၃၀ သရက်ချောင်း GAD ရုံး	GAD၊ DOFi၊ ကျေးရွာ ခေါင်းဆောင်များ၊ ကျေးရွာသူ/သားများ နှင့် တွေ့ဆုံခြင်း	စီမံကိန်းအကြောင်းအရာများတင်ပြခြင်း၊ စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာအတွင်း ငါးဖမ်းလုပ်ငန်းများဆိုင်ရာ သတင်းအချက်အလက်များတင်ပြခြင်း ထိခိုက်ခံစားရနိုင်သည့် ရပ်ရွာများ နှင့် လူပုဂ္ဂိုလ်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို ကောက်ယူခြင်း
၂၀၁၈ ဩဂုတ် ၂၄၊ မနက် ၁၀း၀၀- နေ့လယ် ၁၂း၀၀ လောင်းလုံ GAD ရုံး	GAD၊ ကျေးရွာခေါင်း ဆောင်များ၊ ငါးဖမ်းဆောင်ရွက်သူများ၊ ကျေးရွာသူ /သားများနှင့် တွေ့ဆုံခြင်း	စီမံကိန်းအကြောင်းအရာများတင်ပြခြင်း၊ စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာအတွင်း ငါးဖမ်းလုပ်ငန်းများဆိုင်ရာ သတင်းအချက်အလက်များတင်ပြခြင်း ထိခိုက်ခံစားရနိုင်သည့် ရပ်ရွာများ နှင့် လူပုဂ္ဂိုလ်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို ကောက်ယူခြင်း
၂၀၁၈ ဩဂုတ် ၂၄၊ နေ့လယ် ၁၃း၀၀ - ၁၅း၀၀ ဇေယျာထက်စံဟိုတယ်၊ ထားဝယ်	ECDi၊ DoFi၊ သက်ဆိုင်ရာဌာနများ၊ မီဒီယာ၊ CSO များ၊ ကျေးရွာခေါင်းဆောင်များနှင့် တွေ့ဆုံခြင်း	စီမံကိန်းအကြောင်းအရာများတင်ပြခြင်း၊ စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာအတွင်း ငါးဖမ်းလုပ်ငန်းများဆိုင်ရာ သတင်းအချက်အလက်များတင်ပြခြင်း ထိခိုက်ခံစားရနိုင်သည့် ရပ်ရွာများ နှင့် လူပုဂ္ဂိုလ်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို ကောက်ယူခြင်း
၂၀၁၈ ဩဂုတ် ၂၆၊ ညနေ ၀၃း၃၀ - ၁၁း၃၀ ဂရမ်းဒ်ဂျိတ်ဟိုတယ်၊ မြိတ်	ECD DoFi၊ သက်ဆိုင်ရာဌာနများ၊ MFFi၊ မီဒီယာ၊ CSO များ၊ ကျေးရွာခေါင်းဆောင်များ နှင့် ငါးဖမ်းဆောင်ရွက်သူများ နှင့် တွေ့ဆုံခြင်း	စီမံကိန်းအကြောင်းအရာများတင်ပြခြင်း၊ စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာအတွင်း ငါးဖမ်းလုပ်ငန်းများဆိုင်ရာ သတင်းအချက်အလက်များတင်ပြခြင်း ထိခိုက်ခံစားရနိုင်သည့် ရပ်ရွာများ နှင့် လူပုဂ္ဂိုလ်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို ကောက်ယူခြင်း

အောက်ပါအပိုင်း၌ အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုအစည်းအဝေးများအတွင်း မေးမြန်းခဲ့သည့် အဓိကကိစ္စရပ်များကို အကျဉ်းဖော်ပြထားပြီး၊ *ဇယား ၁.၈* တွင် ၎င်းကိစ္စရပ်များနှင့်စပ်လျဉ်းသည့် တုံ့ပြန်ဖြေကြားချက်များကို တင်ပြထားပါသည်။

ဇယား ၁.၈ IEE အတွက် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှုကာလအတွင်း မေးမြန်းခဲ့သည့် အဓိကမေးခွန်းများ

လက်ခံရရှိသည့် မှတ်ချက်များ	အစည်းအဝေးတွင် မှတ်ချက်များအပေါ် တုံ့ပြန်မှုများ	IEE လေ့လာချက် အတွက် ထည့်သွင်းစဉ်းစားမှု
<u>အဏ္ဏဝါပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများ</u> ဆိုက်စမစ်ရေယာဉ်များမှ စွန့်ပစ်ပစ္စည်းများစွန့်ထုတ်ခြင်းနှင့် ပတ်သက်သည့် မေးခွန်းများ	PCML သည် စီမံကိန်းလုပ်ငန်းများအားလုံးကို မြန်မာနိုင်ငံ အမျိုးသား ပတ်ဝန်းကျင် (ထုတ်လွှတ်မှု) အရည်အသွေး (NEQ) လမ်းညွှန်ချက်နှင့် အညီ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ စွန့်ထုတ်မှုများမပြုလုပ်မီ မတူညီသော စွန့်ပစ်ပစ္စည်းများကို အမျိုးအစားခွဲပြီး ပြုပြင်ရမည် ဖြစ်ပါသည်။	စွန့်ပစ်ပစ္စည်းများစီမံခန့်ခွဲရေးအစီအစဉ် တစ်ရပ်ကို IEE အစီရင်ခံစာ၌ ထည့်သွင်းပြီး ဖြစ်ပါသည် *(အခန်း ၈.၅)*။
<u>ငါးဖမ်းဆောင်ရွက်သူများ နှင့် ငါးဖမ်းလုပ်ငန်းများအပေါ် သက်ရောက်မှုများ</u> စီမံကိန်းသည် တည်နေရာသည် ငါးဖမ်းဆောင်ရွက်သည့် နေရာတွင် တည်ရှိနေသောကြောင့်၊ ငါးဖမ်းလုပ်ငန်းများအပေါ် ထိခိုက်နိုင်မှုနှင့်စပ်လျဉ်းသည်များကို ငါးဖမ်းရပ်ရွာလူထုမှ ၎င်းတို့၏ စိုးရိမ်မှုကို ဖော်ပြခြင်း	ဆိုက်စမစ်တိုင်းတာမှုမစတင်မီ၊ ရေကြောင်းသတိပေးချက်များကို သတင်းစာတွင် ကြေညာပေးသွားမည် ဖြစ်ပါသည်။ ၎င်းသတိပေးချက်တွင်၊ ဆိုက်စမစ်စီမံကိန်းနယ်မြေဇရိယာ၏ နယ်နိမိတ်များ/အစွန်းနေရာများကို ဖော်ပြပေးသွားမည် ဖြစ်ပါသည်။ သို့ရာတွင်၊ ငါးဖမ်းရေယာဉ်များကို ဆိုက်စမစ်ရေယာဉ်ပတ်ပတ်လည်တွင် မိတာ ၅၀၀ ရှိ ဘေးကင်းလုံခြုံရေးဇုန်အတွင်းသာ ကန့်သတ်သွားမည် ဖြစ်ပါသည်။ ကမ်းလွန်ရှိ ငါဖမ်းစက်လေ့များကို ထောက်ပံ့ရေး ယာဉ်များမှ ကြိုတင်၍ သတိပေးဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ငါးဖမ်းစက်လေ့များသည် ဆိုက်စမစ်ယာဉ်လမ်းကြောင်းတွင် ရောက်ရှိနေလျင်၊ PCML သည် ပင်လယ်တွင်း သုံး ချိန်ယဲလ် ၁၆ ကို သုံး၍ ၎င်းတို့နှင့် ဆက်သွယ်သွားမည် ဖြစ်ပါသည်။	ငါးဖမ်းလုပ်ငန်းအပေါ် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများကို IEE လေ့လာမှု *(အခန်း ၆.၃)* ၌ ဆန်းစစ်ပြီး ဖြစ်ပါသည်။
<u>လူမှုရေးဆိုင်ရာတာဝန်ယူဆောင်ရွက်မှု (CSR) နှင့် လူမှုအကျိုးအမြတ်များ</u> အများဆုံးမေးမြန်းကြသည့် ကိစ္စရပ်များထဲမှ တစ်ခုမှာ လျှပ်စစ်မီးရရှိနိုင်ခြေ နှင့် တစ်ယူနစ် ကုန်ကျစရိတ်နှင့် ဆက်စပ်ပါသည်။	လျှပ်စစ်မီးရရှိရေး နှင့် သွယ်ယူရေးလိုင်းများသည် ဤစီမံကိန်း၏ အစိတ်အပိုင်းတစ်ရပ်အနေနှင့် မပါဝင်ပါ၊ သို့ရာတွင် လျှပ်စစ်မီးရရှိရန်၊ တိုင်းဒေသကြီးသည် လျှပ်စစ်သွယ်ယူရေးလိုင်းများကို လိုအပ်ပြီး၊ အမျိုးသား မဟာဓာတ်အားလိုင်းနှင့် ချိတ်ဆက်နိုင်မှသာ တစ်ယူနစ်ကုန်ကျစရိတ်အတွက် လျော့ပေါ့သွားနိုင်မည် ဖြစ်ပါသည်။ လျှပ်စစ်ဦးစီးဌာနသည် မော်လမြိုင်-ရေ-ထားဝယ် ဓာတ်အားသွယ်ယူရေးလိုင်း နှင့် ထားဝယ်-မြိတ်-ဘုတ်ပြင်း ဓာတ်အားသွယ်ယူရေးလိုင်းတိုက်ကို အကောက်အထည်ဖော်ဆောင်ရွက်ရန် စီစဉ်လျက် ရှိပါသည်။ PCML CSR အစီအစဉ်များနှင့်စပ်လျဉ်း၍ PCML သည် CSR အစီအစဉ်များမစတင်မီ PCML စီမံကိန်းနှင့် ထပ်တူကျမသွားစေရန် တိုင်းဒေသကြီးအစိုးရ နှင့် ညှိနှိုင်းဆောင်ရွက်သွားရမည် ဖြစ်ပါသည်။	CSR နှင့်စပ်လျဉ်းသည်များကို IEE လေ့လာ မှု၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့် ဆောင်ရွက်သွားမည် မဟုတ်ပါ၊ သို့ရာတွင် ဒေသခံရပ်ရွာမှ ထွက်ပေါ်လာသော အကြံပြုချက်များအားလုံးကို ဆန်းစစ်သွား မည် ဖြစ်ပါသည်။
<u>သဘာဝသယံဇာတများမှ တိုင်းဒေသကြီးအဆင့်သို့ အကျိုးအမြတ်များ</u>	စီမံကိန်းသည် ကမ်းမှ ရေမိုင် ၂၅ မိုင်ကျော်အကွာတည်ရှိဖြင့်၊ စီမံကိန်းကို ပြည်ထောင်စုအစိုးရ က စီမံခန့်ခွဲသွား မည် ဖြစ်ပါသည်။ ပြည်ထောင်စု နှင့် ပြည်နယ်အစိုးရအကြား အခွန်အခများ ခွဲဝေမှုကိစ္စမှာ	ဤသည်မှာ IEE လေ့လာမှု၏ အစိတ်အပိုင်း မဟုတ်ပါ။

လက်ခံရရှိသည့် မှတ်ချက်များ	အစည်းအဝေးတွင် မှတ်ချက်များအပေါ် တုံ့ပြန်မှုများ	IEE လေ့လာချက် အတွက် ထည့်သွင်းစဉ်းစားမှု
သယံဇာတများသည် တနင်္သာရီတိုင်းဒေသကြီးမှ ဖြစ်သောကြောင့်၊ တိုင်းဒေသကြီးမှ ဒေသခံရပ်ရွာများသည် အကျိုးအမြတ်ရသင့်ကြောင်း မေးမြန်းခြင်း	MCML ၏ ထိန်းချုပ်မှု အောက်တွင် ရှိမနေပါ။ ပြည်ထောင်စုအစိုးအရသည် ပြည်နယ်များ နှင့် တိုင်းဒေသကြီးများ၏ ဖွံ့ဖြိုးတိုးတက်ရေး အတွက် အကျိုးအမြတ်များကို ဝေမျှသွားမည် ဖြစ်ပါသည်။	
MOGE နှင့် PCML အကြားရှိ စာချုပ် စာချုပ် နှင့် အချိန်ဇယားအကြောင်းကို မေးမြန်းခြင်း	ထုတ်ဝေမှုအပေါ် ခွဲဝေခံစားရေးစာချုပ်မှာ MOGE နှင့် PCML တို့အကြား ချုပ်ဆိုခြင်း ဖြစ်ပါသည်။ စီမံကိန်းအချိန်ကာလမှာ နှစ် ၃၀ ဖြစ်ပြီး၊ ၂၀၁၀ ပြည့်နှစ်တွင် စတင်ခဲ့ခြင်း ဖြစ်ပါသည်။	စီမံကိန်းနောက်ခံအကြောင်းအရာများကို *အခန်း ၄.၁* တွင် ထည့်သွင်းထားပါသည်။
အကြံပြုတိုင်ကြားရေးဆိုင်ရာ ယန္တရား နှင့် လျော်ကြေးပေးဆောင်ရွက်ခြင်း သက်ဆိုင်သူတစ်ဦး၏ စိုးရိမ်မှုမှာ အကယ်၍ ၎င်း၏ ငါးဖမ်းယာဉ်များ/ပိုက်များ ပျက်စီးသွားစေခဲ့လျှင်စသည့် နှင့် စပ်လျဉ်းသည့် အကြံပြုတိုင်ကြားရေးလုပ်ငန်းစဉ်နှင့်ပတ်သက် ပါသည်။	PCML တွင် အကြံပြုတိုင်းကြားရေးယန္တရားတစ်ရပ်ရှိပြီး၊ ရပ်ရွာမှ လက်ကမ်းစာစောင်တွင် တိုင်ကြားရန်အတွက် ဖော်ပြထားသည့် ဖုန်းနံပါတ်မှတစ်ဆင့်ဆက်သွယ်နိုင်ပါသည်။ လျော်ကြေးပေးရေး လုပ်ငန်းစဉ်အတွက်၊ PCML သည် အစိုးရ၏ ညွှန်ကြားချက်နှင့် အညီ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။	အကြံပြုတိုင်ကြားခြင်းဆိုင်ရာ ယန္တရားကို *အခန်း ၉.၆* တွင် ဖော်ပြထားပါသည်။
သတင်းအချက်အလက်များထုတ်ဖော်တင်ပြခြင်း စီမံကိန်းအတွက် လည်ပတ်မှုများ နှင့် အချိန်ဇယားကို ထုတ်ဖော်တင်ပြရမည်ဟု သက်ဆိုင်သူများက တင်ပြကြပါသည်။	IEE လုပ်ထုံးလုပ်နည်းအရာ သတင်းအချက်အလက်များကို ထုတ်ဖော်တင်ပြသွားမည် ဖြစ်ပြီး၊ စီမံကိန်းလုပ်ငန်းများ မစတင်မီ သတင်းစာများ၌ ရေကြောင်းသတိပေးချက်များကို ထုတ်ပြန်သွားမည် ဖြစ်ပါသည်။	ဖော်ထုတ်တင်ပြမှု နှင့် နောက်ထပ်ထိတွေ့ ဆက်ဆံမှုတို့ကို *အခန်း ၉.၄* နှင့် *အခန်း ၉.၅* တို့တွင် တင်ပြထားပါသည်။

စီမံကိန်းလုပ်ငန်းများ၏ ရလဒ်များအဖြစ် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများသည် အရွယ်အစားအားဖြင့် သေးငယ်ပြီး၊ အကန့်အသတ်ဖြင့်သာ ဖြစ်ပေါ်မည်ဖြစ်ကြောင်း ယခုအချိန်ထိဆောင်ရွက်ခဲ့ သော သက်ဆိုင်သူများနှင့် တိုင်ပင်ဆွေးနွေးမှုများက အတည်ပြုပါသည်။

နောက်ထပ်တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများတွင် အောက်ပါတို့ ပါဝင်သွားမည် ဖြစ်ပါသည် -

- အကြံပြုမှတ်ချက်များထောက်ပံ့ပေးနိုင်ရန် အခွင့်အလမ်းများအပါအဝင်၊ စီမံကိန်းအချက်အလက်များ နှင့် IEE အစီရင်ခံစာကို နောက်ထပ် ထုတ်ဖော်တင်ပြခြင်း၊
- IEE ၏ ရလဒ်များနှင့် စပ်လျဉ်း၍ သက်ဆိုင်ရာ ဒေသ အစိုးရအရာရှိများ/အာဏာပိုင်များ နှင့် အစိုးရအဖွဲ့အစည်းများနှင့် တိုင်ပင်ဆွေးနွေးခြင်း၊ နှင့်
- စိတ်ဝင်စားပြီး ခံစားထိခိုက်ခံရနိုင်သည့် သက်ဆိုင်သူများနှင့် ရှိနေဆဲဆက်သွယ်မှုများ ဆက်လက်ဆောင်ရွက်နေခြင်းများဆောင်ရွက်မည် ဖြစ်ပြီး၊ ဒေသခံရပ်ရွာများအပေါ် သက်ရောက်မှုများနှင့် စပ်လျဉ်း၍၊ ဒေသခံနယ်မြေဇရိယာများသို့ ဆောင်ရွက်နေသည့်စီမံကိန်းသတင်း အချက်အလက်များကို တင်ပြသွားမည် ဖြစ်ပါသည်။

PCML သည် စီမံကိန်းမစတင်မီ လုပ်ငန်းနောက်ဆုံးဆောင်ရွက်ထားရှိမှုအခြေအနေများနှင့် စပ်လျဉ်းသည့် သတိပေးချက်များကို ရေလုပ်ငန်းလုပ်ကိုင်သူများထံသို့ ထုတ်ပြန်ပေးသွားမည် ဖြစ်ပါသည်။ EIA လုပ်ထုံးလုပ်နည်း နှင့် နိုင်ငံတကာအလေ့အကျင့်ကောင်းများအရ၊ လိုအပ်သည့် အဆင့်များနှင့်အညီ၊ လည်ပတ်ရေးကာလအတွင်း အကြံပြုတိုင်ကြားရေးဆိုင်ရာယန္တရားတစ်ရပ်ကို ထားရှိသွားမည် ဖြစ်ပါသည်။

IEE အစီရင်ခံစာကို PCML ဝက်ဘ်ဆိုက်ဖြစ်သည့် https://www.petronas.com တွင် ဝင်ရောက်ကြည့်ရှု နိုင်အောက် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ အင်္ဂလိပ်ဘာသာဖြင့်ရေးသားသည့် သတင်းစာ တစ်စောင်နှင့် မြန်မာဘာသာဖြင့်ရေးသားသည့် သတင်းစာတစ်စောင်တို့၌ ကြော်ငြာများ ပါရှိသွားမည်ဖြစ်ပြီး၊ အစီရင်ခံစာ၏ ကော်ပီစာမူများကို ရန်ကုန်၊ ထားဝယ် နှင့် မြိတ်တို့တွင် ထားရှိသွားမည် ဖြစ်ပါသည်။

2 INTRODUCTION

This Report is the Initial Environmental Examination for the proposed 3D Seismic Survey conducted in Offshore Blocks M12/13/14 by PC Myanmar (Hong Kong) Limited (PCML).

2.1 PRESENTATION OF THE PROJECT PROPONENT

PCML has signed 13 Production Sharing Contracts (PSCs) for Blocks M12/13/14, M15/16/17/18, MD 4/5/6, RSF2/3, IOR5, and 1 Improved Petroleum Recovery Contract (IPR) for block IOR7 and farmed into 4 blocks (Block D, AD9, AD11, EP1). PETRONAS' portfolio in Myanmar includes a total of 6 blocks. PCML are the operator of three offshore blocks (M12, M13 and M14: Yetagun Gas Project in Tanintharyi Region) and two onshore blocks (IOR5 and IOR7 in Ayeyarwaddy Region). The contact details for PCML are provided below:

Name: Than Naing Myint/Zaw Zaw Aung
Address: Myanmar Centre Business Suites, 10th, 11th, 12th Connecting Floor, Myanmar Centre Tower 2, 192, Kaba Aye Pagoda Road, Bahan 11201, Yangon, Myanmar

Telephone: +(951) 515011/526411, 9345065/66/67/68
Fax: +(951) 525698/525684
Email: **than_naingmyint@petronas.com/zzaung@petronas.com**

2.2 PRESENTATION OF ENVIRONMENTAL AND SOCIAL EXPERTS

Environmental Resources Management (ERM) – Hong Kong Limited are the environmental and social consultants that conducted this IEE Study and they are registered under the MONREC Consultant Registration Scheme. Information on the experts is presented in *Table 2.1*.

2.3 PRESENTATION OF HEALTH EXPERTS

As this Project is located 70 km from the nearest islands (uninhabited) and 125 km from the nearest community (Laungdon, Dawei), no health experts are considered to be required as there will be no impact to public health. Occupational health and safety is, however, considered in this IEE Report under the accidental events.

Table 2.1 Environmental and Social Experts for Project

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	Registration Status
Craig A. Reid	ERM	BSc (honours) Marine Biology	20	Ecology and Biodiversity	Registered Under ERM Hong Kong (Certificate No. 0016) and Individually (Certificate No. 0053)
Rebecca Summons	ERM	MSc Marine Environmental Protection	8	Ecology and Biodiversity	Registered Under ERM Hong Kong (Certificate No. 0016) and Individually (Certificate No. 0053)
Khin Su Su Naing	ERM	M.A (International and Community Development) Management	>10	Socio-economic Facilitation of Meeting	Registration Application submitted to ECD under ERM Hong Kong
Aye Mya Thinzar	ERM	B.Sc (Forestry)	4	Socio-economic Facilitation of Meeting	Registration Application submitted to ECD under ERM Hong Kong
Tom Glenwright	ERM	PhD Marine Ecology	16	Water Pollution Control, Modeling for Water Quality, Ground water and Hydrology	Registered Under ERM Hong Kong (Certificate No. 0016)
Stuart Mackenzie	ERM	BSc Environmental Geography	10	Waste Management	Registered Under ERM Hong Kong (Certificate No. 0016)
Piers Touzel	ERM	MBA	15	Facilitation of meeting, Socio-Economy, Land use	Registered Under ERM Hong Kong (Certificate No. 0016)
Edmund Taylor	ERM	MSc Environmental Dynamics and Climate Change	5	Air Pollution Control, Modelling for Air Quality	Registered Under ERM Hong Kong (Certificate No. 0016)

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	Registration Status
Man Ping To (Mandy To)	ERM	MSc Environmental Management	20	Noise and Vibration	Registered Under ERM Hong Kong (Certificate No. 0016)
Herve Bonnel	ERM	M.Eng Mechanical Engineering	19	Risk Assessment and Hazard Management	Registered Under ERM Hong Kong (Certificate No. 0016)
Laurence Genee	ERM	MSc Environmental Science	20	Risk Assessment and Hazard Management, Legal Analysis	Registered Under ERM Hong Kong (Certificate No. 0016)
Wai Hang Ng (Nicci Ng)	ERM	M.A. Geographic Information Systems	10	Other (GIS)	Registered Under ERM Hong Kong (Certificate No. 0016)
Chi Hung Wan (Frank Wan)	ERM	MSc Waste Management	30	Geology and Soil, Archaeology	Registered Under ERM Hong Kong (Certificate No. 0016)
Dr Ohnmar May Tin Hlaing	EQM	PhD	>20	Air Quality	Registered Under EQM (Certificate No. 0009)

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section provides the relevant legal and policy context in Myanmar including the following:

- PCML policies relating to health, safety, and the environment.
- Policy and legal framework; including:
  - Myanmar EIA legislation, other relevant Myanmar legislation; and
  - International conventions, standards and guidelines relevant to the Project.
- Institutional framework of Myanmar; and
- Environmental, social and/or health standards related to the Project.

3.1 CORPORATE ENVIRONMENTAL AND SOCIAL POLICY

PCML have a Health, Safety, and Environment (HSE) System which includes a HSE Policy that provides the direction on how issues relating to HSE are to be managed and integrated into the overall business process throughout the company. This is provided in *Figure 3.1*.

Figure 3.1 PCML HSE Management Policy

PETRONAS	PETRONAS CARIGALI HSE MANAGEMENT SYSTEM (HSE MS)	WW ALL S 08 003 I Rev. 4
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2.0 POLICY AND STRATEGIC OBJECTIVES

2.1 HSE POLICY

(1) Purpose

i. PETRONAS Carigali HSE Policy provides the direction on how issues relating to HSE are to be managed and integrated into the overall business process throughout the Company.

ii. PETRONAS Carigali HSE associated policies (also referred to as daughter policies) on the other hand are developed for specific HSE associated subjects to complement PETRONAS Carigali HSE Policy. These HSE associated policies shall be in line with PETRONAS Carigali HSE Policy.

(2) Expectations

i. PETRONAS Carigali HSE Policy and its associated policies are in line with Group HSE Policy, which can be referred to in Appendix 1.

ii. The HSE Policy and its associated policies shall be reviewed at least once a year or as and when required, taking into account the relevancy and adequacy as part of Management Review.

iii. Contractor HSE policies shall be consistent with the Company policies.

iv. The HSE Policy and its associated policies shall be communicated and explained to all employees and key stakeholders e.g. contractor, visitor, supplier etc. Records of communication shall be maintained.

v. The HSE policy and its associated policies shall be readily available and displayed at prominent location in a language and format that is easily understood.

(3) Verifications

i. Compliance to the above expectations may be demonstrated by the following:

a. Availability of PETRONAS Carigali HSE Policy and its associated policies in English and country-specific national language;

b. Display of PETRONAS Carigali HSE Policy and its associated policies at strategic locations throughout workplaces;

c. Records of PETRONAS Carigali HSE Policy and its associated policies revisions including stakeholders review; and

d. Records of dissemination and communication of the PETRONAS Carigali HSE Policy and its associated policies to all employees and Contractors.

2.2 HSE MANAGEMENT OF JOINT VENTURES

(1) Purpose

i. This Sub-Element defines PETRONAS Carigali HSE Policy in respect to the HSE management of Joint Ventures.

(2) Scope

i. The requirement on HSE management of Joint Ventures shall apply for Joint-Operated Ventures and Joint Ventures Operated by Others, throughout PETRONAS Carigali global operations.

(3) Expectations

i. For Joint-Operated Ventures, PETRONAS Carigali representatives assigned to work in the ventures shall steer the implementation of an effective HSE MS that is in line with International Standards and/or Industry Standards.

ii. For Joint Ventures Operated by Others, PETRONAS Carigali Joint Ventures Division shall influence the implementation of an effective HSE MS that is in line with International Standards and/or Industry Standards.

iii. Formal mechanism shall be in place to enable the Management Committee of the Joint Ventures to monitor the implementation of the HSE MS, including monitoring of HSE performance.

iv. HSE MS assurance shall be carried out to verify the effective implementation of HSE MS of the Joint Ventures.

(4) Verifications

i. Compliance to the above expectations may be demonstrated by the following documentations:

a. Availability of Joint Ventures HSE MS, including associated HSE governance documents;

b. Records of minutes of Management HSE Committee Meeting, or equivalent;

c. Records of related report on HSE MS assurance; and

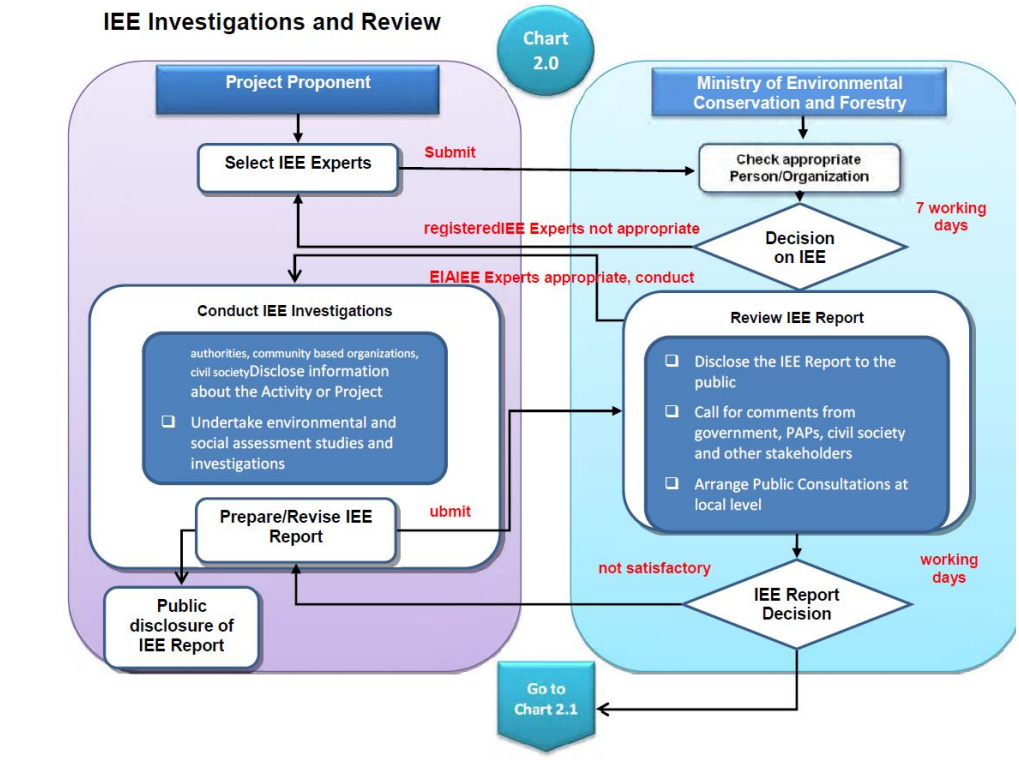
d. Records of HSE Performance.

3.2 POLICY AND LEGAL FRAMEWORK

3.2.1 Myanmar EIA Procedure

The Myanmar EIA Procedure (dated 29 December 2015) set out the IEE Process as shown in *Figure 3.2*.

Figure 3.2 ***IEE Process within the Myanmar EIA Procedure (2015)***



PCML has undertaken a systematic assessment of the Project activities. Screening was conducted as part of the assessment to identify all potential environmental and social risks. A summary of the screening and the preliminary identified environmental and social impacts was submitted to MONREC in the form of a Project Proposal Report (PPR) in June 2018. MONREC used this document to decide what level of assessment would be required. ECD stated that an IEE was required in line with Annex I of the EIA Procedure.

This IEE Report has been prepared to address potential adverse environmental and social impacts and propose appropriate mitigation measures. The report includes the results of public consultations and addresses public concerns when assessing impacts, designing mitigation measures and selecting monitoring parameters. This IEE report will be submitted to MONREC.

3.2.2 *Myanmar Legislation Relevant to the Project*

Laws relating to environmental and social issues within the Oil and Gas Sector and hence their relevance to the IEE Study for the proposed Project are included in *Table 3.1*.

3.2.3 *International Agreements and Conventions*

Relevant international conventions to which Myanmar is a signatory include those related to waste management, biodiversity conservation and labour conventions. The key international conventions of relevance to the Project are included in *Table 3.2*.

Table 3.1 Myanmar Legislation Relevance to Project

Laws and Regulations	Description
Constitution of the Republic of the Union of Myanmar, 2008	
The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. Articles in the Constitution relevant to environmental protection are Articles 37, 42 and 390. They are quoted below:	
Article 37	(a) The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; (b) The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces;
Article 42	The Union shall protect and conserve natural environment.
Article 390	Every citizen has the duty to assist the Union in carrying out the following matters: (a) preservation and safeguarding of cultural heritage; (b) environmental conservation; (c) striving for development of human resources; (d) protection and preservation of public property. These three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment.
The Environmental Conservation Law, 2012	
The Pyidaungsu Hluttaw enacted this law by Law No. 9 of 2012 on the date of 30 March, 2012. The legal mechanism for ESHIA has been put in this law. This law was enacted with the objectives of: (a) To enable to implement the Myanmar National Environmental Policy; (b) To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process; (c) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations; (d) To reclaim ecosystems as may be possible which are starting to degenerate and disappear; (e) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially; (f) To enable to implement for promoting public awareness and cooperation in educational for dissemination of environmental perception; (g) To enable to promote international, regional and bilateral cooperation in the matters of environmental conservation; *(h)* To enable to cooperate with Government Departments, Government Organizations, International Organizations, non-government organizations and individuals in matters of environmental conservation. Clause 7(O) of Chapter IV enables the Ministry to require a proponent to provide compensation for environmental impact and contribute funds. Clause 14 of Chapter VII requires emissions to the environment to meet stipulated environmental quality standards.	

Laws and Regulations	Description
Clause 15 of Chapter VII requires proponent to provide onsite controlling equipment to monitor, control, manage, reduce or eliminate pollutants, or if impracticable, arrange environmentally-sound disposal. Clause 29 of Chapter X11 provides that the proponent shall not violate any prohibition contained in the rules, notifications, orders, directives and procedures under the Environmental Conservation Law.	
The Environmental Conservation Rules, 2014	
The Ministry of Natural Resources and Environmental Conservation, in exercise of power conferred under sub-section (a) of section 42 of the Environmental Conservation Law, issues this rules by No. 50 of 2014 on the date of 5 June, 2014.	
Rule 51	The Ministry shall assign duty to the Department for enabling to adopt and carry out the environmental impact assessment system.
Rule 52	The Ministry shall determine the categories of plan, business or activity which shall carry out environmental impact assessment
Rule 53	The Ministry shall to scrutinize whether or not it is necessary to conduct environmental impact assessment, determine the proposed plans, businesses or activities which do not include in stipulation under rule 52
Rule 56	The person who carries out any project, business or activity shall arrange and carry out for conducting the environmental impact assessment for any project, business or activity by a qualified third person or organization accepted by the Ministry.
Rule 58	The Ministry shall form the Environmental Impact Assessment Report Review Body with the experts from the relevant Government departments, Government organizations.
Rule 61	The Ministry may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee
Rule 69	i. Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. ii. Any person shall not carry out to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.
EIA Procedure(2015)	
The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorisation, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues.	
National Environmental Quality (Emissions) Guidelines (2015)	
The NEQ guidelines set out emission standards for air, noise and effluent discharges for oil and gas operations. The project shall consider emissions standards in its environment impact assessment and environmental management plan.	
The Ethnic Rights Protection Law (2015)	
Clause 5 of Chapter IV provides that project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups.	
The State Owned Economic Enterprises Law, 1989	

Laws and Regulations	Description
4. The Government may, by notification, permit in the interest of the Union of Myanmar any economic enterprise which is prescribed under Section 3 to be operated solely by the Government to be carried out by joint-venture between the Government and any other person or any other economic organization or under conditions by any person or any economic organization subject to conditions.	
Conservation of Water Resources and Rivers Law (2006)	
Section 6 outlines prohibitions for the following activities: • "No person shall anchor the vessels where vessels are prohibited from anchoring in the rivers and creeks. • No person shall dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk. • No one shall dispose of any substance into the river creek that may cause damage to waterway or change of watercourse from the bank or vessel." The aims of this Law are as follows: • to conserve and protect the water resources and river systems for beneficial utilization by the public; • to smooth and enhance safety of waterways navigation along rivers and creeks; • to contribute to the development of State economy through improving water resources and river systems; • to protect environmental impact. The empowerment of this Law is provided to the Ministry of Transport for controlling navigation of vessels in the rivers and creeks as well as communicating with local and foreign government and organizations for conservation of water resources, rivers and creeks. Also, to carry out conservation works for water resources, rivers and creeks, in accordance with the relevant international conventions, regional agreements and bilateral agreements for environmental conservation.	
The Protection of Wildlife and Conservation of Natural Areas Law (1994)	
Clause 36(c) sets out the penalty for destroying ecosystem or any natural state in the natural area; Clause 37(a) set out the penalty killing, hunting or wounding a completely protected wild animal without permission, possessing, selling, transporting or transferring such wild animal or any part thereof without permission.	
Rules On Protection Of Wildlife, And Protected Area Conservation Law (2003) And The Protection Of Wildlife, And Wild Plant And Conservation Of Natural Areas Rules (2002)	
Protected Wildlife	15. The Director General shall, with the approval of the Minister: a) determine and declare endangered species of wild animal which are to be protected according to the following categories: i. completely protected species of wild animals; ii. normally protected species of wild animals; iii. seasonally protected species of wild animals; b) determine and declare the endangered species of wild plants and their nature habitats thereof; c) lay down and carry out measures for the preservation of protected wildlife species;
Taking Administrative Action	31. A Forest Officer may pass an administrative order causing a fine that may extend to Kyat 10,000 to be paid, on a person who kills, hunts, wounds or raises a seasonally protected wild animal without permission during the closed season.

Laws and Regulations	Description
The Burma Wildlife Protection Act 1936 and The Burma Wildlife Protection Rules 1941 (Burma Act No. Vii Of 1936)	
This legislation makes provision for the establishment of sanctuaries (game sanctuaries) on any land at the disposal of the government or, subject to the consent of the owner, any land which is private property. It also provides for the protection of a number of named species outside sanctuaries and reserved forests.	
National Environmental Policy (1994)	
Under this policy, the main environmental body was the NCEA. Prior to the establishment of MONREC, environmental conservation was undertaken by various ministries and departments. In 1990, the NCEA was established to advise the government on environmental policy, to act as a focal point and as a coordinating body for environmental affairs and to promote environmentally sound and sustainable development. The NCEA's main mission is to ensure sustainable use of environmental resources and to promote environmentally sound practices in industry and other economic activities, objectives and mandates.	
National Sustainable Development Strategy (2009)	
Sustainable management of natural resources in Myanmar, from environmental perspective comprises 11 areas, in which mining sector development concerned are as follow: • Sustainable forest resources management; • Biodiversity conservation; • Sustainable fresh water resources management; • Environmental quality management and enhancement; • Sustainable management of land resources; • Sustainable management for mineral resources utilization; • Sustainable energy production and consumption; and • Sustainable industrial, transport and communication development.	
The Protection and Preservation of Cultural Heritage Regions Law, 1998	
The State Peace and Development Council Law enacted this law by Law No. 9/98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones/region: a) Ancient monumental zone; b) Ancient site zone. Objectives**:** a) to implement the protection and preservation policy with respect to perpetuation of cultural heritage that has existed for many years; b) to protect and preserve the cultural heritage regions and the cultural heritage therein so as not to deteriorate due to natural disaster or man-made destruction; c) to uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving the cultural heritage regions; d) to promote public awareness and will as to the high value of the protection and preservation of the cultural heritage regions; e) to protect the cultural heritage regions from destruction; f) to carry out protection and preservation of the cultural heritage regions in conformity with the International Convention approved by the State. Clause 13 provides that certain land-based construction works must apply for prior permission and must abide by provisions of existing laws Clause 22 states that buildings in cultural heritage region must conform to conditions prescribed by the Ministry of Culture.	

Laws and Regulations	Description
The Conservation of Antique Objects Law 2016	
The objectives of this law are as follows: a) to implement the policy of protection and preservation for the perpetuation of antique objects; b) to protect and preserve antique objects so as not to deteriorate due to natural disaster or man-made destruction; c) to uplift hereditary pride and to cause dynamism of patriotic spirit by protection and preservation of antique objects; d) to have public awareness of the high value of antique objects; e) to carry out in respect of protection and preservation of antique objects in conformity with the International Convention and Regional Agreement ratified by the State. Clause 12 of Chapter 6 states that persons who find an object that is reasonable to assume is an antique object must inform the relevant Ward or Village Tract Administrator	
The Protection and Preservation of Ancient Monuments Law (2016)	
3. The objectives of this law are as follows: a. To implement the protection and preservation policy for the perpetuation of ancient monuments which have existed for many years; b. To protect and preserve cultural heritage regions and ancient monuments so that they are not destroyed by natural disaster or man; c. To uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving cultural heritage regions; d. To promote public awareness and will as to the high value of the protection and preservation of cultural heritage regions; e. To explore and preserve new ancient monuments; f. To protect cultural heritage regions from destruction; g. To implement protection and preservation of ancient monuments in conformity with international conventions and regional agreements. Clause 12 states a person who finds an ancient monument over one hundred years old under the water or above ground shall promptly inform the relevant Ward or Village-Tract Administrative Office. Clause 15 states prior permission must be obtained from the Department before searching for and extracting oil and gas or constructing pipelines Clause 20 states no one shall damage ancient monuments including using machinery which causes vibration and discharging chemical substance.	
Myanmar Fire Force Law, 2015	
The objectives of Myanmar Fire Force Law are: a) To take precautionary and preventive measure and loss of state own property, private property, cultural heritage and the lives and property of public due to fire and other natural disasters b) To organize fire brigade systemically and to train the fire brigade c) To prevent from fire and to conduct release work when fire disaster, natural disaster, epidemic disease or any kind of certain danger occurs d) To educate, organize an inside extensively so as to achieve public corporation e) To participate if in need for national security, peace for the citizens and law and order The relevant Government Department or organization shall, for the purpose of precaution and prevention, obtain the approval of the Fire force Department before granting permission for the following cases: a) Constructing three-storied and above buildings market and condominium buildings,	

Laws and Regulations	Description
	b) Operating hotel, motel, guest house enterprise c) Constructing factory, workshop, storage facilities and warehouse d) Operating business expose to fire hazard by using in inflammable materials or explosive materials e) Producing and selling fire-extinguishing apparatuses Doing transport business, public utility vehicles train, airplane, helicopter, vessel, ship, etc. The relevant government department or organization shall obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans. Clause 25: 25. The factory, workshop, highway bus, airport, jetty, hotel, motel, guest house, collective-owned building, market, work-site or business exposed to fire hazard of the owner or manager shall; (a) Not fail to form the reserve fire brigade (b) Not fail to provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department
Prevention from Danger of Hazardous Chemical and Associated Material Law (Pyidaungsu Hluttaw Law No 28/2013)	
	The objectives of this law are: a) to prevent damage to environmental resources and living organisms due to chemicals and associated materials b) to provide for the systematic control of businesses using chemicals and associated materials in accordance with government approvals c) to carry out data gathering and to undertake education and research regarding the safe and systematic utilization of chemicals and associated materials d) to achieve continuous improvements in worksite safety, health and environmental conservation Chapter 7 – "Any person, who wants to do the business of chemical and associated materials, shall apply to the central body for the acquisition of the license, attached with the management plan for the environmental conservation in accord with the stipulations". Chapter 8 – "20. License holder shall apply to the central supervising body in accord with the stipulation for the relevant chemicals and associated materials using for his chemicals and associated materials business" for a certificate. "22. The registered certificate holder shall abide by the regulations contained in the registered certificate and shall follow the order and directives issued from time to time by the central supervising body". Clause 8 sets out the duties and powers of the central supervising board. Clause 15 states that a) before works, license holder shall be inspected by the relevant supervising and inspection team for safety and machinery/equipment check and b) The persons who are discharging the duty shall be asked to attend foreign training or preventative trainings conducted by government departments and organisations. Clause 16 provides that licence holders shall a) follow the licence regulations, b) follow directives on safe handling and shall ask workers to strictly follow c) shall provide necessary safety equipment and issue free personal protective equipment to workers, d) provide training in occupational saftey e) determine the hazard to the environment, people and animals f) provide fit for work medical check ups and keep records g) send permission letter to Department of Township Administration if the chemicals and associated material are permitted to store h) acquire in advance guidance and agreement from fire service department if using inflammable materials or explosives i) transport only the permitted amount of chemicals in accordance with prescriptive stipulations j) obtain approval of central supervising body if transporting chemical and associated material from the permitted region to any other region h) abide and operate in accordance with related environmental laws to avoid impacts and damage to the environment. Clause 17 states the licence holder must have insurance in accordance with stipulations in case of compensation is required for losses related to people, animals and environment. Clause 23 states the registered certificate holder shall apply again for using chemical which are not in the registered list.

Laws and Regulations	Description
Clause 27 states the license holder shall a) classify the hazard level of chemicals and related substances in advance b) show Material Safety Data Sheet and warning signage c) provide safety equipment, personal protective equipment and training on their use d) possess, transport, store, use and discharge chemicals and related materials in accordance with stipulations, e) not import or export chemicals and related materials banned by the central supervising board.	
Underground Water Act, 1930	
The underground water act enacted on the date of 21st June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Myanmar. This act prohibits sinking of a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Township Officer or sub-divisional officer had power to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.	
Explosives Act (1887)	
The President of the Union make rules consistent with this Act to regulate or prohibit, except under and in accordance with the conditions of a licence granted as provided by those rules, the manufacture, possession, use, sale, transport and importation of explosives, or any specified class of explosives.	
Explosive Substances Act (1908)	
Any person who unlawfully and maliciously causes, by any explosive substance, an explosion of a nature likely to endanger life or to cause serious injury to property shall, whether any injury to person or property has been actually caused or not, be punished with transportation for life or any shorter term, to which a fine may be added, or with imprisonment for a term which may extend ten years, to which a fine may be added.	
Myanmar Agenda 21 (1997)	
The Myanmar Agenda 21 makes recommendations for the drafting and promulgation of a framework law which can further promote the integration of environmental and developmental concerns in the decision-making processes of the country. The Myanmar Agenda 21 contains guidelines to address the following issues: • increasing energy and material efficiency in production processes; • reducing wastes from production and promoting recycling; • promoting use of new and renewable sources of energy; • using environmentally sound technologies for sustainable production; • reducing wasteful consumption; • increasing awareness for sustainable consumption.	
Myanmar Insurance Law (1993)	
The Myanmar Insurance is established under this Law as a legal entity having perpetual succession, capable of suing and being sued in its own name. The rules for establishing insurances in the country are established. The Myanmar Insurance is established with the following aims: • to overcome financial difficulties by effecting mutual agreement of insurance against social and economic losses which the people may encounter, due to common perils; • to promote the habit of savings individually by effecting life assurance, thus contributing to the accumulation of resource, of the State; • to win the trust and confidence of the people in the insurance system by providing effective insurance safeguards which may become necessary in view of the social and economic developments.	

Laws and Regulations	Description
Clause 15 states it is compulsory for owners of motor vehicles to have Third Party Liability Insurance with Myanma Insurance Clause 16 states it is compulsory for organisations operating as an enterprise which may cause damage to life and property of the public or may pollute the environment to have General Liability Insurance with the Myanma Insurance.	
The Science and Technology Development Law (1994)	
• To carry out development of Science and Technology for promotion of industrial production contributory towards the National Economic Development Plans; • To carry out Research and Development for the increased extraction and utilization of domestic raw materials and the promotion of industrial production enterprises based on modern Science and Technology; • To effect Technology Transfer for the promotion of production processes and the improvement of the quality of goods; • To nurture luminaries required for the development of Science and Technology and for Research and Development and to improve their qualifications.	
Myanmar Port Authority Law 2015	
"Any person who by himself or another so casts or throws any ballast or rubbish or any such other thing or so discharges any oil or water mixed with oil, or the master of any vessel from which the same is so cast, thrown or discharged, shall be punishable with fine not exceeding fifty thousand kyats, and shall pay any reasonable expenses which may be incurred in removing the same". Clause 23(b) sets out the Myanma Port Authority shall distribute information and technology for precautionary spill prevention measures Clause 23(c) sets out the Myanma Port Authority shall arrange in coordination with experts a spill clean-up and may claims costs from the polluter in accordance with stipulations. Clause 19 sets out the Myanma Port Authority may claim damages from the relevant organisation if damage and losses to environmental resources occur within the port limit due to oil spill. Clause 80(a) states any person shall not cause oil spill or discharge of sludge from tankers navigated in port limit or from oil test wells, oil wells and oil pipelines and grounding of vessels Clause 80 (b) states any person shall not discharge, dispose or cause to fall dangerous materials, toxic materials, garbage, sludge and waste from vessels and above or below water from exploration rigs and structures within a port limit. Clause 80 (d) states any person shall not dispose or drop materials that may slide into the port because of tide, storm or flood on land. Clause 83 states any person shall not fail to comply with any order or directive by the assigned person on duty of the Myanma Port Authority	
Law Amending the Territorial Sea and Maritime Zone Law (2008)	
After clause 3 of the annex to the Territorial Sea and Maritime Zone Law, clause 4 and clause 5 have been inserted with new coordinates which have no impact on the Project.	
Union of Myanmar Marine Fisheries law (25 April1990, amended 1993)	
The relevance of this law to the offshore component of the Project is that it places restriction on pollution: "No person shall dispose of living aquatic creatures or any material into the Myanmar Marine Fisheries Waters to cause pollution of water or to harass fishes and other marine organisms." Clause 39 No person shall dispose of living aquatic creatures or any material into the Myanmar Marine Fisheries Waters to cause pollution of water or to harass fishes and other marine organisms. Clause 40 No person shall search for and collect any marine products without a licence.	

Laws and Regulations	Description
Freshwater Fisheries Law, 1991	
Clause 40 states no one shall cause harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries waters. Not directly relevant to project as no freshwater exists within or near to the Project Area.	
The Law Relating to Aquaculture, 1989	
Not directly relevant to project as no aquaculture exists within or near to the Project Area.	
The Law Relating to the Fishing Rights of Foreign Fishing Vessels, 1989	
Not directly relevant to the project. Relevant to foreign fisheries.	
The Conservation of Rivers, Creeks and Water Resources Law, 2006	
3. The objectives of this Law are as follows: (a) To conserve and protect the water resources and rivers system for beneficial utilization by the public; (b) To provide smooth and safe waterways navigation along rivers and creeks; (c) To contribute to the development of State economy through improving water resources and river system; (d) To protect against environmental impact	
The Protection of Wildlife and Protected Areas Law (2018)	
Clause 39: Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 3 years or with fine of a minimum Kyats 200,000 extending to a maximum of 500,000, or with both - (a) hunting without a license; (b) violation of any condition of the hunting license; (c) commercial breeding of critically endangered wild animals without permission; (d) polluting the soil, water and air with intention, damaging water-course or poisoning water, electrification, using chemical or explosive materials within a Protected Area; (e) possessing or disposing of pollutants or mineral wastes in a Protected Area; (f) establishing and operating a zoological garden or a botanical garden without a license. (g) dishonestly altering, adding or counterfeiting any documents, marks, facts and figures issued by the person designated as the Management Authority of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); (h) altering, destroying or damaging the mark made on animals, plants or their specimens which are regulated for international trade ; (i) importing, breeding, farming or possession of alien wild animal and wild plant species or any parts, derivatives or products without permission thereof. Clause 40. Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 5 years or with fine of a minimum Kyats 300,000 which may extend to a maximum of Kyats 1,000,000 or with both -	
Territorial Sea and Maritime Zones law (2017)	
20. The state has following rights and jurisdictions in the exclusive economic zone- (a) Sovereign rights for the purposes of exploration, catches and production, conservation and management of its natural resources, as well as for producing energy from water and winds and other business exploration, production and livestock.	

Laws and Regulations	Description
(b) Exclusive rights and jurisdictions for the construction, maintenance or operation of artificial islands, offshore terminals, installations and other structures and devices necessary and the jurisdictions for the security of this area. (c) Exclusive jurisdictions to authorize, regulate and control of marine scientific researches. (d) Exclusive jurisdictions to preserve and protect the marine environment and to prevent and control marine pollution and (e) Such other rights as are recognized by United Nations Convention on the law of the sea. 30. No one move the anything of antique and historical objects in the seabed of associated zone without permission by the government. 30. Do not move antiques and historical items present on the sea bed without permission of the government. 31. Nobody can do the following without permission of the government in the exclusive economic zone; (a) Exploration (b) Drilling or Production of natural resources (c) Research	
Petroleum Products Law (2017)	
30. Any person shall, without the relevant licence, not carry out any business activities or measures required to obtain licence under this law, 31. Any licensee: - shall not violate any prohibition contained in the rules, regulations, bye-laws, notifications, orders, directives, procedures and conditions or fail the duty to implement; - shall not use a receptacle and transport vehicles and pipelines that contains any dangerous petroleum and petroleum product without saliently mentioning in writing of warning signs; - shall not import, transport, store and sell and distribute the dangerous petroleum and petroleum product, or non-dangerous petroleum and petroleum product except by the means stipulated in this law; - shall not have the right to carry out without undertaking the environmental impacts, in operating petroleum and petroleum product business activities; - shall not distribute and sell petroleum and petroleum products which do not fulfil or are not in conformity with the standard, quality and measurement. 32. Any person who carries out a petroleum and petroleum product business activities shall not refuse if an authorized officer or organization asks to provide suitable help, to inspect the petroleum and petroleum product, receptacle, and machine-powered vehicle, machinery, vessel or pipeline that transports and to take sample of petroleum and petroleum product at any place of import, export, storage, refining, sale and distribution of any petroleum and petroleum product, or at the time of transport . 33. Any person who manages a petroleum and petroleum product business activities shall not fail to report immediately to the nearest authority concerned and provide information relating to any accident if an explosion or fire occurs due to any petroleum and petroleum product business activities, or it is likely to cause fire at or near to the place where petroleum and petroleum product is stored.	
The Oilfields Act (1918)	
This act provides clarification on activities within the oil and gas industry, and provides the Government with the power to define and alter limits of any notified oilfield. In addition, the Government may make rules for regulating all matters connected with many operations related to the extraction of oil and/or gas. The Act also provides guidance and issues such as preventing oil and gas wastes, reporting of fires, accidents and other occurrences and regulating the collection and disposal of both oil and gas.	
Public Health Law, 1972	
Purpose: to ensure the public health include not only employees but also resident people and cooperation with the authorized person or organization of health department. It is concerned with the protection of peoples' health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics. The project owner will cooperate with the authorized person or organization in line with the section 3 and 5 of said law. Section 3: The project owner will abide by any instruction or stipulation for public health.	

Laws and Regulations	Description
Section 5: The project owner will accept any inspection, anytime, anywhere if it is needed.	
The Protection and Prevention of Communicable Disease Law, 1995	
Clause 3 of Chapter 2 states that the Department of Health will carry out immunisations and health education activities related to communicable diseases Clause 4 of Chapter 2 states that the Department of Health will carry out immunisation or other measures in the event of a Principal Epidemic Disease or a Notifiable Disease occurs and the public will abide by the measures. Clause 9 of Chapter 5 of this law states that all persons are responsible for reporting an outbreak of a communicable disease to the nearest Health Officer. Clause 11 of Chapter 6 states that Health Officer may undertake investigations and medical examinations to prevent the control the spread of Principal Epidemic Disease.	
The Control of Smoking and Consumption of Tobacco Product Law, 2006	
3. The objectives of this Law are as follows; (a) to convince the public that health can be adversely affected due to smoking and consumption of tobacco product and to cause refraining from the use of the same; (b) to protect from the danger which affects public health adversely by creating tobacco smoke-free environment; (c) to obtain a healthy living style of the public including child and youth by preventing the habit of smoking and consumption of tobacco product; (d) to uplift the health, economy and social standard of the public through control of smoking and consumption of tobacco product; (e) to implement measures in conformity with the international convention ratified by Myanmar to control smoking and consumption of tobacco product;	
The Myanmar Engineering Council Law, 2013	
3. The objectives of this Law are as follows; (a) to uphold and upgrade the dignity, ethics and quality of the Myanmar citizen engineers, graduate technicians and technicians who are practising engineering works; (b) to explore using engineering technology and information technology combined the good methods, research and development activities by which the natural resources and human resources of the State may be beneficially applied with least impact on environment; (c) to carry out guidance and supervision, and to take necessary actions for fulfilment of the requirements of stipulated technical standard, proper method, free from danger, keeping ethic and being dutiful in the fields of engineering and technology education, researches and services; (d) to service engineering and technology related functions and duties beneficial for the State assigned by the relevant Ministry and relevant organizations Clause 20 states a holder of a technology degree or diploma in technology conferred by a local or foreign engineering university, university of technology, or by a technical college and institute, desirous to obtain the graduate technician register certificate or technician register certificate, shall submit an application to the Council in accord with the stipulations. Clause 24 (a) The person who obtains the registered technician certificate shall, when the stipulated period is fulfilled, apply to the Council to obtain the registered graduate technician certificate in accord with the stipulations Clause 24 (b) The Executive Committee shall, on behalf of the Council, issue, specifying terms and conditions, registered graduate technician certificate to a registered technician who has passed the examinations pertaining to specific discipline, conducted by the Council and has fulfilled the stipulated qualifications of a registered graduate technician Clause 25 (a) The person who obtains the registered graduate technician certificate shall, when the stipulated period is fulfilled, apply to the Council to obtain the registered engineer certificate in accord with the stipulations. Clause 25 (b) The Executive Committee shall, on behalf of the Council, issue, specifying terms and conditions, registered engineer certificate to a registered graduate technician who has passed the examinations pertaining to specific discipline, conducted by the Council and has fulfilled the stipulated qualifications of a registered engineer.	

Laws and Regulations	Description
Clause 37 Any person without the register certificate issued by the Council, except engineering civil service personnel appointed at the Government departments and Government organizations carrying out the public works, shall not practice engineering and technical works which may endanger the public safety and which are stipulated under the rules made under this Law. Clause 31(a) The engineers, graduate technicians and technicians who obtain the register certificates shall abide by the rules, procedures, orders and directives issued under this Law.	
The Petroleum and Petroleum Product Law, 2017	
3. The objectives of this Law are as follows; (a) to carry out the petroleum and petroleum product businesses activities systematically in accordance with the provisions of the law, stipulated standards, procedures and conditions; (b) to enable the petroleum and petroleum product business activities to carry out safely without environmental impact; (c) to establish free and fair competition in carrying out petroleum and petroleum product business activities; (d) to secure energy requirement and energy security of the Union; (e) to obtain tax revenue of the Union. Clause 7 states the Ministry of Commerce shall functions relating to: (a) issuing licences relating to import and export (c) determining procedures and conditions related to import and export Clause 8 states the Ministry shall carry out the following functions relating to any Petroleum and Petroleum product (a) issuing licences relating to refining, transit, transport by pipeline, sale and distribution, inspection, and testing; issuing joint licence or compound licence for carrying out more than a type of business activities; (e) determining standard and quality of receptacles for transport, and procedures and conditions for the pipelines; (f) determining and prohibiting portion and volume of toxic chemicals and metal chemicals that may damage the machineries, to be contain in any petroleum and petroleum product, which do not contain in the prohibition and restrictions under the existing laws; (j) determining conditions relating to possession and sale and distribution; (k) determining procedures and conditions necessary to appropriately supervise petroleum and petroleum product business activities. Clause 9 states the Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product (a) issuing licences relating to refining, transit, transport by pipeline, sale and distribution, inspection, and testing; issuing joint licence or compound licence for carrying out more than a type of business activities; (d) taking action, as necessary, in accordance with the existing laws if it occurs spill or accident in carrying out import, export, transport, and sale and distribution of petroleum and petroleum product by water; Clause 10 states the Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product (a) issuing licence for the right to store for the storage tanks and warehouses; (b) issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product; (d) if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, taking action, as necessary , in accordance with the existing laws of on-site inspection Clause 11 states warning sign of danger or if not possible writing shall be displayed on all receptacles containing any dangerous petroleum and petroleum product	

Laws and Regulations	Description

Clause 13 states warning sign of danger or writing shall be displayed on pipeline that transports any petroleum and petroleum product.

Clause 32 states any person who carries out a petroleum and petroleum product business activities shall not refuse if an authorized officer or organization asks to provide suitable help, to inspect the petroleum and petroleum product, receptacle, and machine-powered vehicle, machinery, vessel or pipeline that transports and to take sample of petroleum and petroleum product at any place of import, export, storage, refining, sale and distribution of any petroleum and petroleum product, or at the time of transport.

Clause 33 states any person who manages a petroleum and petroleum product business activities shall not fail to report immediately to the nearest authority concerned and provide information relating to any accident if an explosion or fire occurs due to any petroleum and petroleum product business activities, or it is likely to cause fire at or near to the place where petroleum and petroleum product is stored.

The Development of Employees and Expertise (Skill), 2013

5. (a) (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment.

(2) If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1).

(b) The following particulars shall be included in the employment agreement:

(1) the type of employment;
(2) the probation period;
(3) wage, salary;
(4) location of the employment;
(5) the term of the agreement;
(6) working hour;
(7) day off, holiday and leave;
(8) overtime;
(9) meal arrangement during the work hour;
(10) accommodation;
(11) medical treatment;
(12) ferry arrangement to worksite and travelling;
(13) regulations to be followed by the employees;
(14) if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training;
(15) resigning and termination of service;
(16) termination of agreement;
(17) the obligations in accord with the stipulation of the agreement;
(18) the cancellation of employment agreement mutually made between employer and employee;
(19) other matters;
(20) specifying the regulation of the agreement, amending and supplementing;
(21) miscellaneous.

Laws and Regulations	Description
(c) The worksite regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law. (d) According to the employment agreement, the Ministry shall issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions. (e) The employment agreement made under sub-section (a) shall be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization. (f) The worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees shall be amended as necessary, in accord with the existing law. (g) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labour exchange office within the stipulated period and shall get the approval of it. (h) The employment agreement made before the enforcement of this law shall be confirmed up to the end of the term of the original agreement. 14. The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present. 15. The Employer: (a) shall carry out the training for each work or compounding the work individually or group-wise by opening on-job training, training systematically at worksite, sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers; (b) appointing the youths of 16 years as apprentice, shall arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team. 30. (a) The employer of the industry and service business shall put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%; (b) Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.	
The Settlement of Labour Dispute Law, 2012	
The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. Clause 38 provides that no employer will fail to negotiate and coordinate in respect of a complaint within the prescribed period without sufficient cause Clause 39 provides that no employer shall alter the conditions of service of workers involved in disputes prior to investigation by tribunals Clause 40 provides that no party shall strike or lock-out without negotiation, conciliation and arbitration by Arbitration Body. Clause 51 provides that employer if commits acts without sufficient cause, may be liable to pay full compensation to workers as determined by Arbitration Body or Tribunal.	
The Welfare of Labours of Oilfield Act, 1951 (After notification)	
The act provides for the prevention of waste of oil or gas and also the prevention of environmental pollution by petroleum operations. For the labours' Working hours: Higher physical danger risk establishment (e.g. an oil rig): 8 hours/day or 40 hours/week, Medium physical danger risk establishment (e.g. factory, oilfield, open mine): 8 hours/day or 44 hours/week. If factory work is part of a continuous process (i.e. technical reasons): admissible 48 hours/week, 10 hours a day Max. 6 days/week (i.e. Sunday = weekly holiday). For Overtime: 2x normal pay rate. Work on weekly holiday = alternative day off within a period of 2 months. In Practice: No specific rules for offshore workers except in old law—oilfields act. Workers in industrial zones work around 11 hours a day, 6 days a week. Many in oilfields the same, but more dangerous jobs, 40/ week.	

Laws and Regulations	Description
The Workmen Compensation Act, 1923 (amended 2005)	
In the Workmen's compensation Act, 1923, the expression" Kyats 2,160 and Kyats 7,200" contained in clause A (i) of sub-section (1) of section 4, the expression "two hundred Kyats" contained in clause A (ii) of sub-section (1) of section 4, the expression "Kyats 3,024and Kyats 10,080" contained in clause B (i) of sub-section (1) of section 4, the expression "twelve hundred Kyats" contained in clause B (ii) of sub-section (1) of section 4, the expression. • "one hundred Kyats" contained in the proviso of sub-section (1) of section 8 shall be substituted respectively by the expression "the amount of compensation prescribed by notification by the Ministry of Labour, with the approval of the Government." The expression "subject to a maximum of thirty Kyats" contained in clause D (ii) of sub-section (1) of section 4 of the Workmen's Compensation Act, 1923 shall be deleted. The expression "ten Kyats" contained in sub-section (2) of section 8, the expression "twenty five Kyats" contained in sub-section (4) of section 8, the expression "three hundred Kyats" contained in the first proviso of sub-section (1) of section 30 of the Workmen's Compensation Act, 1923 shall be substituted respectively by the expression "the amount of money prescribed by notification by the Ministry of Labour, with the approval of the Government. The expression "shall be punishable with fine which may extend to one hundred Kyats" contained in sub-section (1) of section 18 A of the Workmen's Compensation Act, 1923 shall be substituted by the expression "shall be punishable with fine which may extend to Kyats 10,000."	
Labour Organization Law, 2012	
This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labour organizations systematically and independently. Clause 17 provides that Labour Organisations are free to organise and negotiate workers rights if not meeting labour laws. Clause 18 provides that Labour Organisations may demand re-appointment of worker if cause of dismissal is related to labour organisation membership or activities or not conform with labour laws.. Clause 19 provides that Labour Organisations have the right to send representatives to conciliation tribunals. Clause 20 provides that Labour Organisations have the right to participate and discuss workers rights and interests with government and employers Clause 21 provides that Labour Organisation have the right to participate in collective bargaining in accordance with labour laws. Clause 22 provides that Labour Organisation may take collective actions in accordance with the relevant procedures, regulations and law.	
Minimum Wages Law, 2013	
This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness.	
Payment of Wages Law, 2016	
Salaries are to be paid at the end of the month or, depending on the size of the employing enterprise, between 5-10 days before the end of the month. The employer is permitted and required to withhold income tax and social security payments. Other deductions, e.g. for absence, may only be withheld in accordance with the law. Section 3 The employer (a) will pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary (b) If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. Section 4 When the contract finish, employer need to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire. When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. Section 5 If the employer has difficulties to pay wages on time because of significant events (eg natural disaster), the employer must report to the Department with evidence of payment at later date agreed with the employee.	

Laws and Regulations	Description
Section 7 Wages deductions are allowed for absence except public holiday and entitled leave, for accommodation, transportation and utilities (water and electricity), taxes and errors of payment, pre-issued/expensed/contributed amounts in contracts or based on judgement of the Court of Arbitrator Jury Council. Section 8 The employer cannot deduct wages except in accordance with Section 7 and 11. Section 9 When cut the salary due to the employees' absence, total cut salary not more than 50 % of his salary. Section 10 Employer need to approval form the department as a penalty and cannot more than actual ravage rate when cut salary. No cut salary from the employees under 16 age. Section 11 Employers may fine employees for intentional or negligent direct damage to company property, breach of employment contract or breach of rules for which a fine is previously set.	
Social Security Law, 2012	
The Establishments Applied Section 11. (a) The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board: (i) production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; (ii) Government departments, Government organizations and regional administrative organizations doing business; (iii) development organizations; (iv) financial organizations, (v) companies, associations, organizations and their subordinate departments and branch offices doing business; (vi) shops, commercial establishments, public entertaining establishments; (vii) Government departments and Government organizations doing business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body; (viii) construction works carried out for a period of one year and above under employment agreement; (ix) works carried out with foreign investment or citizen investment or joint ventured businesses; (x) works relating to mining and gemstone contained in any existing law; (xi) works relating to petroleum and natural gas contained in any existing law; (xii) ports and out-ports contained in any existing law; (xiii) works and organizations carried out with freight handling workers; (xiv) Ministry of Labour and its subordinate departments and organizations; (xv) establishments determined by the Ministry of Labour from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law. (b) Any establishment which is applied with the provisions of compulsory registration under sub-section (a) shall continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work: (i) carrying out work by employing under stipulated minimum number of workers but more than one worker; (ii) changing the employer or changing the type of business. Section 48	

Laws and Regulations	Description
(a) The employer shall effect insurance by registering for employment injury benefit insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits. Section 51 The employer (a) shall pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover he shall also bear the expenses for paying as such; (b) shall pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit. Section 53 (a) The employers and workers shall co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment; Section 54 (a) The employer shall report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such. (b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the relevant township social security office in accord with the stipulations.	
The Protection of rights of National Race Law, 2015	
Consists of four bills, as submitted to the legislature; Buddhist Women's Special Marriage Bill, Religious Conversion Bill, Monogamy Bill and Population Control Bill.	
Leaves and Holidays Act, 1951	
Under the Leave and Holidays Act (1951), every employee shall be granted paid public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year, depending on the date of the variable holidays. Myanmar law recognizes various types of leave. Leave is governed by the Leave and Holidays Act (1951), but additional rules may apply in accordance with other laws, such as the Social Security Law (2012) for employees contributing to the Social Security Fund.	
The Import and Export Law, 2012	
7. A person who obtained any license shall not violate the conditions contained in the license.	

Table 3.2 International Conventions of Relevance to the Project

Legislation	Description	Relevance to the Project	Ratification Status
Environmental			
The International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997(MARPOL)	Regulates waste, emission and discharges from vessels. Contains the following Annexes: • Annex I: Regulations for the Prevention of Pollution by Oil (October 1983) • Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (1986) • Annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (1992) • Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships (September 2003) • Annex V: Regulations for the Control of Pollution by Garbage from Ships (December 1998) • Annex VI: Regulations for the Prevention of Air Pollution from Ships (1997)	The Project vessels will comply with emissions and discharge standards. Annex I, IV, V and VI are or relevance to the Project.	Ratified Annexes I to V
Convention on Biological Diversity 1992	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.	The Project will be undertaken in offshore habitats.	Ratified 25 Nov 1994
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	The Convention regulates the transboundary movements of hazardous wastes and provides obligations to its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.	The Project may generate hazardous wastes.	Entered into force 6 April 2015
		The Project will form part of Myanmar's total emissions output.	
United Nations Framework Convention on Climate Change 1992 (UNFCCC) and Paris Accord 2015	Provide a framework for intergovernmental efforts to tackle climate change. Recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.		Entered in force 23 Feb 1995 (UNFCCC) and 16 Feb 2005 (Kyoto Protocol)

Legislation	Description	Relevance to the Project	Ratification Status
Asia Least Cost Greenhouse Gas (GHG) Abatement Strategy (ALGAS) 1998	Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country.	The Project will produce air emissions from the MODU and vessels.	1998
Myanmar Agenda 21	Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmes and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.	Not relevant to Project. Relevant to government.	Since 1997
Maritime Safety			
The International Convention for the Safety of Life at Sea (SOLAS) 1974	Ensures that ships flagged by signatory States comply with minimum safety standards in construction, equipment and operation.	The Project vessels will comply with safety standards.	Entered into Force 11 Feb 1988
Convention on the International Regulations for Preventing Collisions at Sea (COLREG) 1972	Sets out the navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels.	The Project vessels will comply with navigation rules.	Entered into Force 11 Nov 1987
International Convention on Standards of Training, Certification and Watch-keeping for Seafarers 1978 (STCW)	Sets out requirements for marine environment awareness training and training in leadership and teamwork including new training guidance for personnel operating Dynamic Positioning (DP) Systems.	The Project vessels will comply with training requirements including for DP (if applicable).	Entered into Force 1988

3.2.4 *Good International Industry Practice Guidelines*

PCML has undertaken the impact assessment study and will undertake Project activities in a manner which is guided by good international industry practice.

Applicable guidelines which PCML will consider in preparing its approach include:

- IFC Performance Standards (IFC PS) (2012): The IFC PS's represent the 'policy framework' for the EIA and sustainable social and environmental management for the Project, whereas the World Bank Group's Environmental, Health, and Safety (EHS) Guidelines provide guidance on general and industry best practice as well as recommended numerical limits for emissions to the atmosphere, noise, liquid and solid wastes, hazardous wastes, health and safety, and other aspects of industrial facilities and other types of development projects.

- World Bank Group (WBG) EHS General Guidelines (2007): The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

- WBG EHS Guidelines for Offshore Oil and Gas Development (updated 2015): These latest guidelines for offshore oil and gas development (June 2015) consider industry-specific impacts and management relevant to the environment, occupational health and safety and community health and safety, as well as the development of performance indicators and monitoring programs. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of the environmental assessment.

3.3 *CONTRACTUAL AND OTHER COMMITMENTS*

The Production Sharing Agreement between MOGE and PCML notes that the Project shall be undertaken in accordance with the laws, regulations and directives of Myanmar:

"Art. 2.13 Ecological and Environmental. Costs incurred in connection with the Joint Operations for geological and geophysical surveys relative to the identification and protection of cultural resources and/or environmental or ecological surveys. Also costs to provide or have available pollution containment and removal equipment plus the cost of actual control and clean up and resulting responsibilities of oil spills and similar environmental damage as required by applicable laws and regulations".

PCML also commit to adhering to the requirements of all the applicable laws listed in *Table 3.1*.

3.4 INSTITUTIONAL FRAMEWORK

Key ministries, agencies and state-owned enterprises that have jurisdiction over HSE matters in the oil and gas sector are included in *Table 3.3*.

Table 3.3 Key Ministries, Agencies and State-Owned Enterprises Involved in HSE

Ministry/Agency	Responsibility
Ministry of Natural Resources and Environmental Conservation (MONREC)	The Environmental Conservation Department (ECD) of MONREC has ultimate responsibility for the review and approval, or otherwise, of submissions under the IEE/EIA process.
Myanma Oil and Gas Enterprise (MOGE)	MOGE is the state-owned enterprise responsible for working together with oil and gas companies (local and international) in Myanmar and oversees the PSCs in cooperation with foreign oil companies. MOGE is involved in direct communication and coordination with various levels of different government agencies for HSE related issues.
Ministry of Electricity and Energy (MOEE)	MOEE manages Health, Safety and Environmental (HSE) issues of power generation operators in Myanmar, encouraging operators to establish an HSE Management System and prepare their own EIA for their project.
Myanmar Investment Commission (MIC)	MIC is a government agency responsible for coordinating with ministries (such as the MOEE) and other state entities to facilitate foreign investment in Myanmar. The MIC is also responsible for granting MIC permits which enable foreign investors to carry out business activities under the Myanmar Investment Law (2016). The Law specifies MIC shall "*take consideration on the facts such as financial credibility, economic justification of the business, appropriateness of technology and protection and conservation of environment in scrutinizing the proposals of investment*".

3.5 PROJECTS ENVIRONMENTAL AND SOCIAL STANDARDS

With the release of the final EIA Procedure in December 2015, the National Environmental Quality (Emissions) Guidelines (NEQ) were also released. These Guidelines provide the basis for regulation and control of emissions and discharges from projects in order to prevent pollution and protect the environment and public health. These standards are noted to be the same as that recommended by the IFC General EHS Guidelines (IFC 2007).

For offshore oil and gas operations, *Table 3.4* presents the standards as per the NEQ Guidelines which are the same as the International Convention for the Prevention of Pollution from Ships (MARPOL) Guidelines. As the Project is a seismic survey and no drilling will occur, the NEQ standards relating to drill cuttings, produced water, produced sand, etc. are not relevant.

Table 3.4 Project Standards

Environmental Parameter	Standard	Requirement
Air Emissions	MAPROL Annex VI	• Vessels will be in compliance with applicable MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI). • Use of low sulphur fuel (sulphur content not to exceed 3.5% m/m) when it is available • An International Air Pollution Prevention (IAPP) certification for the seismic survey vessel, support vessel and chase vessels as applicable or required by vessel class.
Sewage	MARPOL Annex IV / NEQ Guidelines	• The Project vessels will comply with applicable MARPOL requirements, including: discharge of untreated sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land. • Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land. • The discharge of sewage can only occur when the vessel is en route and travelling at no less than 4 knots. • An International Sewage Pollution Prevention (ISPP) certificate and International Oil Pollution Prevention (IOPP) certificate will be required, as appropriate to vessel class.
Waste Discharges (including food waste)	MARPOL Annex I & V	• Vessels will operate in compliance with MARPOL Annexes I: any oil-in-water content of discharges should not exceed 15 ppm. • General waste (excluding food) will not be disposed of to sea in line with MARPOL Annex V Requirements.

Environmental Parameter	Standard	Requirement
		• Combustible wastes will be segregated and disposed by incinerator on-board, should an incinerator be available on the selected vessel (in line with MARPOL Annex V requirements). No discharge of food waste is permitted less than 3 nm from the coast. Maceration is required at greater than 3 nm and less than 12 nm from the coast. Hazardous wastes will be stored on the vessels in appropriate containers with labels. • Hazardous waste storage will be designated in accordance with their Materials Data Sheet (MSDS) (in line with MARPOL Annex V requirements). Hazardous wastes will be returned to the vessels' selected shore base and sent to a licensed disposal facility by a licensed waste contractor (in line with MARPOL Annex V requirements).
Underwater sound generation	JNCC Guidelines (1)	The Project will implement the JNCC Guidelines including alignment of Contractor operating procedures with JNCC Guidelines. These guidelines include: • A soft-start procedure will be utilised at the commencement of airgun firing to allow adequate time for marine mammals, turtles, and whale sharks to leave the area. • Dedicated Marine Mammal Observers (MMOs) will be on-board to undertake the pre-shoot search. Use of Passive Acoustic Monitoring (PAM) to detect whether any marine mammals are in the vicinity of the seismic vessel during night time or low visibility operations.
Spills	MARPOL Annex I	Support and chase vessel standard operating procedures to be prepared and implemented including (if appropriate) an offshore bunkering procedure. Shipboard Oil Pollution Emergency Plans (SOPEPs) will be prepared and implemented.

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

4 PROJECT DESCRIPTION AND ALTERNATIVES

This section provides the detailed description of the proposed 3D seismic survey to be conducted across offshore Blocks M-12, M-13, and M-14.

4.1 PROJECT BACKGROUND

PCML is the operator of Yetagun Gas Field in offshore Myanmar Blocks M-12, M-13, and M-14. In May 1990, PCML signed the Petroleum Production Sharing Contract (PSC) with Myanma Oil & Gas Enterprise (MOGE), NIPPON and PTTEPI for Blocks M12, M13 and M14; located to the southwest of Dawei in the Andaman Sea.

PCML is currently proposing to conduct a 3D marine seismic survey commencing in October 2018 in Blocks M-12, M-13 and M-14. The survey objective is to analyse the data acquired in order to confirm the potential presence of hydrocarbons under the seabed for future exploration activities. The survey will last for approximately 2-3 months.

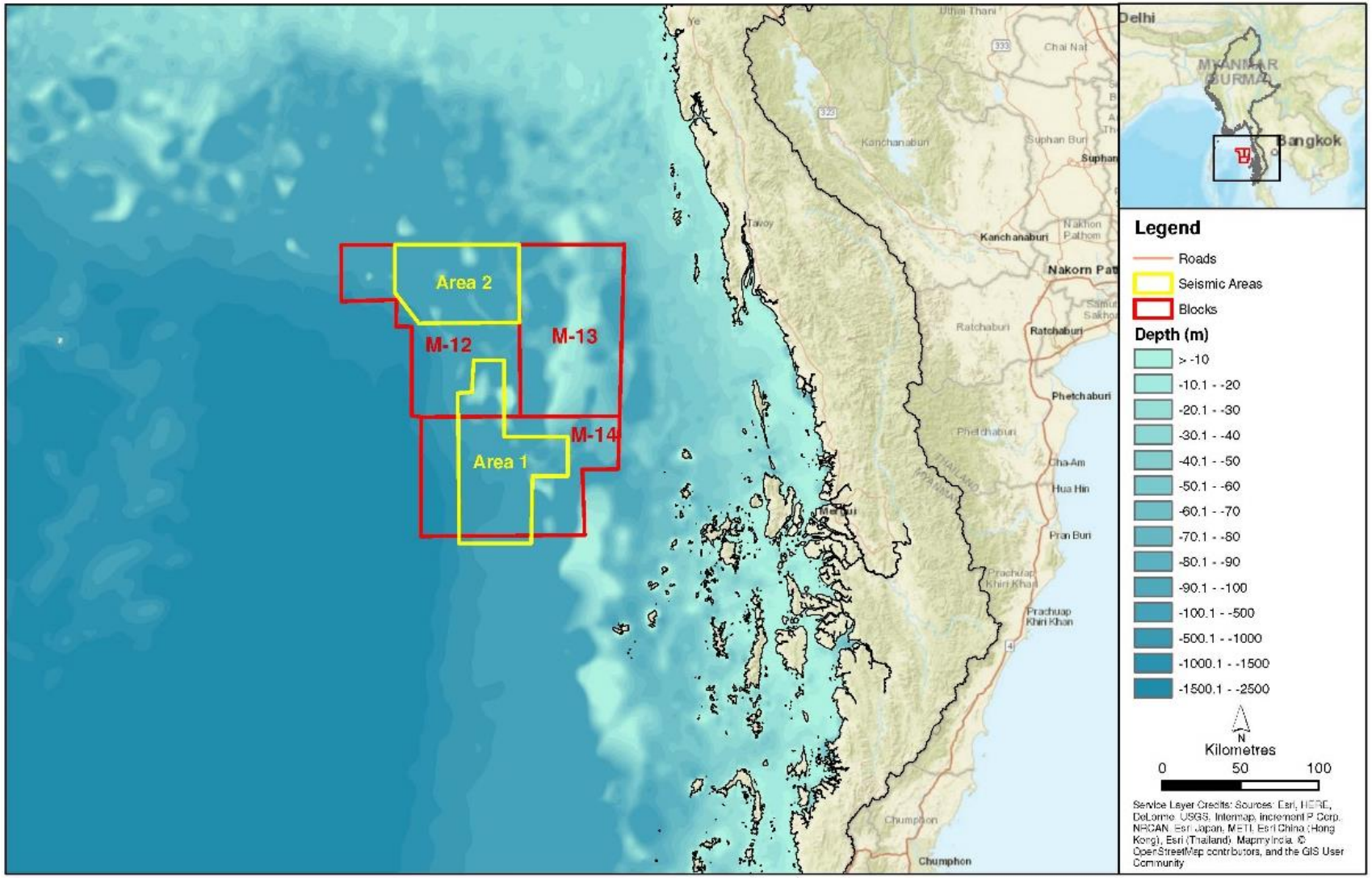
4.2 PROJECT LOCATION

The Project Area (i.e., the area in which the 3D seismic survey will be conducted) encompasses an area of approximately 8,900 km^2 spanning shallow continental shelf waters adjacent to a portion of the Taninthari Region mainland. The Project Area is located in waters of about 70 km nearest outlying islands of the Myeik Archipelago), 33 km from nearest sensitive protected area (Lampi Island Shark Protected Area) and 125 km from the nearest point on the mainland coast (Launglon Township, Dawei District, Tanintharyi Division). Water depth in the Project Area ranges from around 10 m to over 1,000 m; however the Project is located in open ocean waters over the continental slope. The Project Area is shown in yellow in *Figure 4.1*. The coordinates of the Project Area are provided in *Table 4.1*.

Table 4.1 Project Area Coordinates

Area 1	X	Y	Latitude	Longitude
1	231976.8	1452618	13° 07' 41.225"	96° 31' 40.162"
2	242284.9	1452608	13° 07' 44.115"	96° 37' 22.237"
3	242284.9	1472630	13° 18' 35.343"	96° 37' 15.924"
4	261204.7	1472659	13° 18' 41.959"	96° 47' 44.296"
5	261204.7	1423917	12° 52' 16.413"	96° 47' 58.386"
6	300263.6	1423926	12° 52' 26.686"	97° 09' 33.577"
7	300213.5	1398342	12° 38' 34.250"	97° 09' 37.933"
8	277229.7	1398307	12° 38' 27.553"	96° 56' 56.452"
9	276571.8	1355130	12° 15' 02.659"	96° 56' 45.713"
10	232035.9	1355037	12° 14' 47.510"	96° 32' 12.714"
Area 2	**X**	**Y**	**Lat**	**Long**
1	193789.4	1517839	13° 42' 48.698"	96° 10' 08.320"
2	193829	1549380	13° 59' 54.181"	96° 09' 57.199"
3	271117.9	1548591	13° 59' 54.808"	96° 52' 51.540"
4	270938.1	1497411	13° 32' 09.892"	96° 53' 00.545"
5	209388.9	1497556	13° 31' 54.986"	96° 18' 54.557"

Figure 4.1 Location of Project Area



4.3 PROJECT DEVELOPMENT AND IMPLEMENTATION SCHEDULE

The Project is currently planned to commence in October 2018, and last for a period of about six to seven months (i.e. around 180-190 days). As this Project is only exploration activity, there is only one Phase – Operation Phase. There is no permanent infrastructure and no pre-construction, construction, or decommissioning phases.

4.4 DESCRIPTION OF THE PROJECT

4.4.1 Seismic Survey (3D) Operations

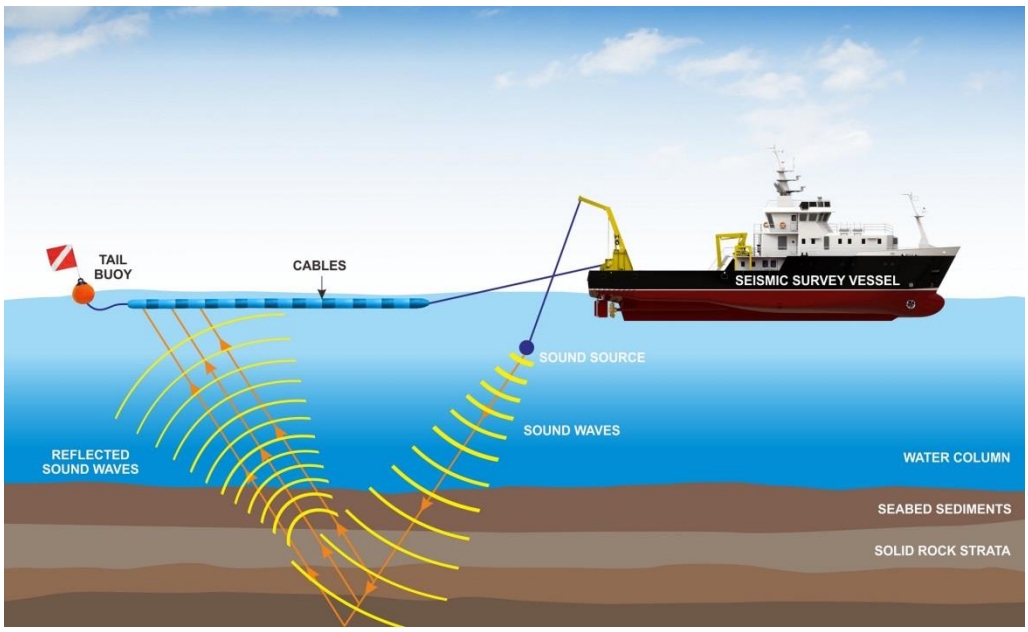
General Principles of Seismic Surveys

Marine seismic surveys are used to define sub-seabed deposits and geological structures. During a marine seismic survey, a slow moving survey vessel (typically steaming at about 4 to 6 knots) tows an impulse emitting sound source (array of airguns). High energy low frequency sounds are produced by the airguns and directed downwards at the seabed and underlying sub-seabed geology. 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). 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 4.2*.

When using the marine streamer seismic method, the receivers (hydrophones) are encased in a long cable (streamer), which is towed or "streamed" behind the seismic vessel. The marine seismic survey operations are to be conducted by a specialized seismic survey vessel, which is typically supported by one, or more, smaller vessels referred to as "chase vessels". The role of the chase vessels is to scout ahead for obstructions (e.g. static fishing gear, fish traps) and to approach and warn-off any shipping that might be ignoring radio warnings to avoid the survey area.

A 3D seismic survey involves the use of multiple streamers. As seismic data are acquired from multiple angles, it provides data that can be used to build a detailed 3D model of the subsurface geology.

Figure 4.2 Seismic Survey Overview



Seismic Survey Programme

The survey programme will include the following main activities:

- Mobilisation of seismic and support vessels;
- Deployment of towed equipment (i.e. airgun array, streamers);
- Data acquisition, comprising the bulk of the programme; and
- Retrieval of equipment and demobilisation.

The survey itself will cover approximately 8,900 km^2 within the Project Area shown in *Figure 4.1*. As per standard operations, the seismic survey will be acquired in swaths (width of the deployed streamer arrangement) in a racetrack formation. The seismic vessel will sail down a pre- plotted line (i.e. survey/ sail line) at the centre of each swath. The sail lines are then acquired at intervals of up to half the swath width. Upon reaching the end of the sail line, the ship will typically take 2 to 3 hours (a manoeuvring area of 10 – 20 km) to turn around and start down another sail line. The survey will be conducted in an east-west orientation. Each line will be average of 60-70 km.

Airguns

Airguns are the standard marine seismic energy source. The seismic energy pulse is created when a bubble of compressed air is discharged into the water. An airgun array comprises a number of different sized airguns – this helps to attenuate the residue bubble pulse and enhance the signal level. Illustrative examples of seismic survey airguns are presented in *Figure 4.3*.

Seismic activities will use several individual airguns, ranging in size from 20 - 250 cubic inches, with a total airgun array volume around 3,000 cubic inches.

Each gun is proposed to be at a water depth of 8 m, using a firing interval of 7.5 seconds and a shot point interval of 12.5 m. The airgun array is configured to ensure that guns are positioned as such to reduce the extent at which sound can travel underwater (i.e., the sound is directed towards the seabed to minimise horizontal spreading).

Streamers

The receivers (hydrophones) will be encased in long cables (10 to 12 streamers), which are towed or "streamed" behind the seismic vessel at a depth of up to 15 m below the sea surface. The streamers will be around 8,100 m in length and will be spaced 112.5 m apart behind the vessel with an overall width of around 1.35 km. Hydrophones will be evenly spaced along the streamer to provide the required sub-surface information. Recordings captured by the hydrophones are about 7.5 seconds record length and will be sampled every 1 – 2 milliseconds (thousandths of a second). A tail buoy will be fitted to the end of each streamer and will be brightly coloured and filled with a radar reflector and strobe light. More information on streamer equipment is provided in *Figure 4.4*. The overall layout of the seismic equipment is provided in *Figure 4.5*.

Figure 4.3 Illustrative Examples of Airguns for Use in Marine Seismic Surveys

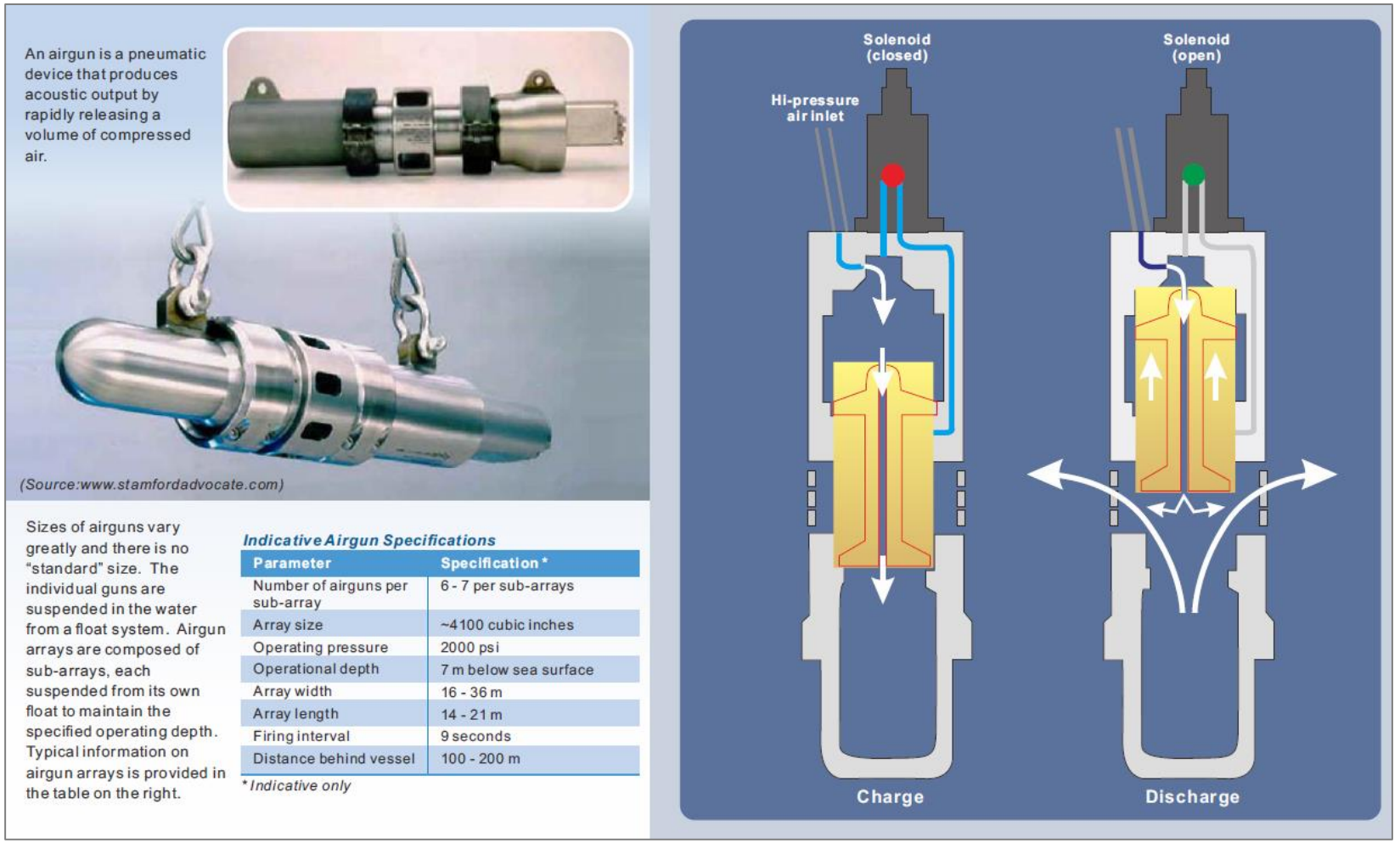


Figure 4.4 Illustrative Example of Tail Buoy and Birds

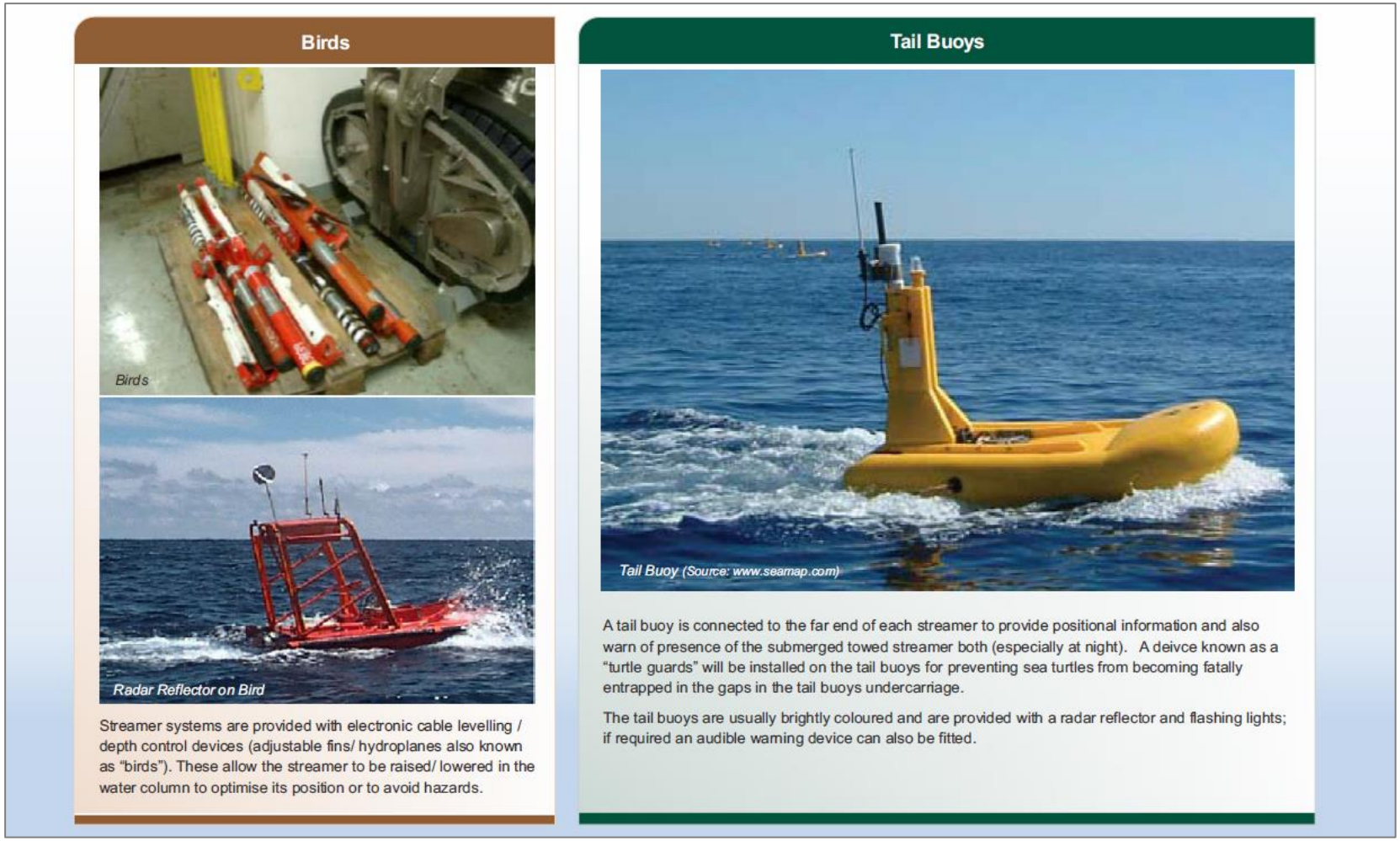
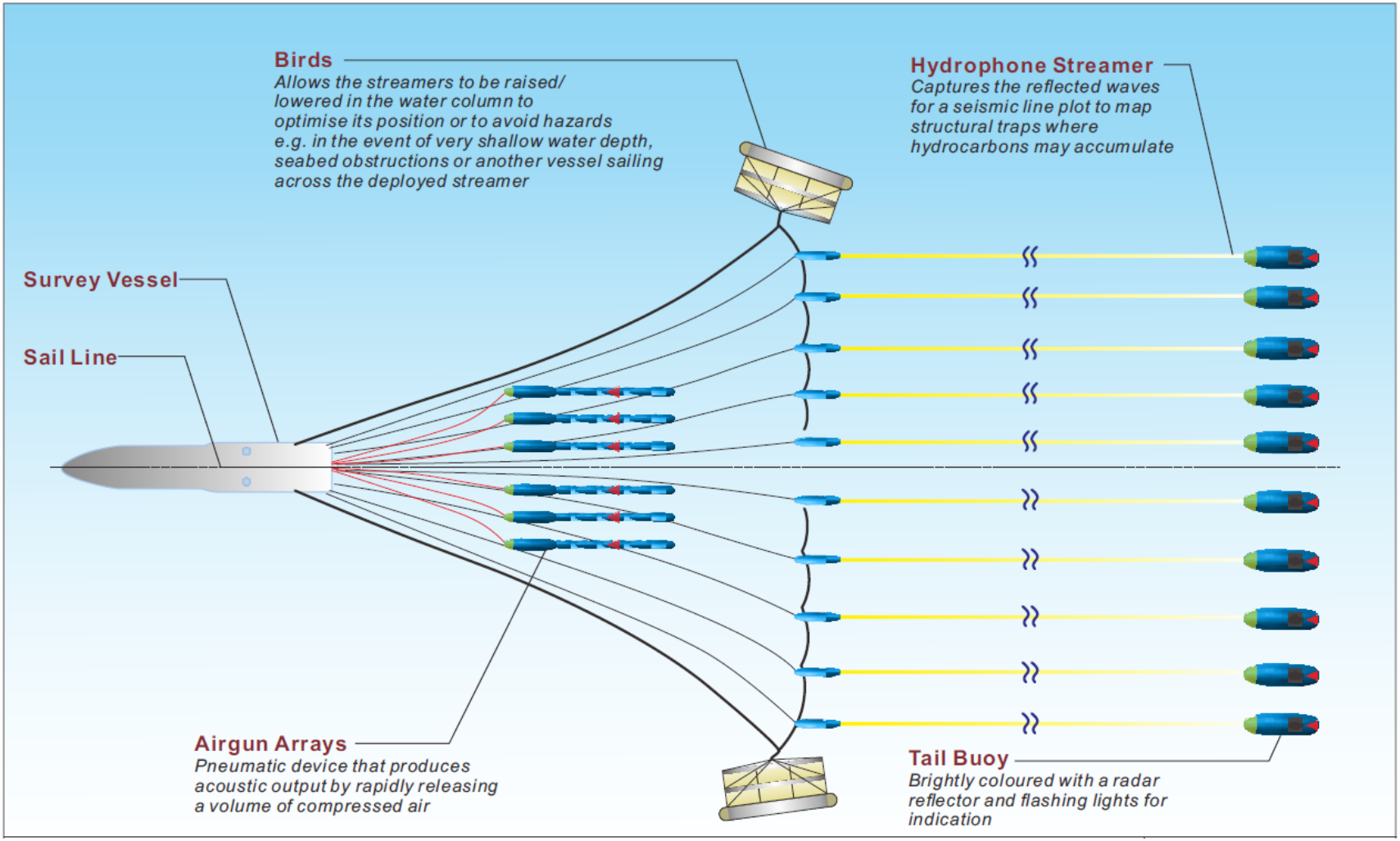


Figure 4.5 Illustrative Examples of Seismic Survey Equipment



Seismic Survey Vessel

A specialized survey vessel will be selected for the actual seismic survey which is expected to have crew of around 50 people on-board. At the time of writing, the contracting process for the seismic contractor is still in progress so the specific details of the survey cannot be released. However, the information provided is based on standard seismic survey techniques and methods. Illustrative examples of typical seismic survey vessels are presented in *Figure 4.6*.

Figure 4.6 Typical Seismic Survey Vessel

Source: PCML

It can be assumed that the vessel specifications in *Table 4.2* may be relevant for the Project vessel.

Table 4.2 Potential Seismic Survey Vessel Specifications

Typical Seismic Vessel	Specification
No. Personnel on Board (POB)	50 people
Length	112.6 m
Beam (width)	21.5 m
Max Draft	8.0 m
Gross Tonnage	10,146 GT
Fuel consumption	45m^3 – 60m^3 per day
Fuel Type	Marine Fuel
Largest average fuel tank size	Approximately 4105m^3
Cruising speed when acquiring seismic data	4.5-4.8 knots

All survey operations will be conducted in accordance with the vessels standard operating procedures, which detail the manner in which all

operations are to be conducted. These procedures also detail the responses and actions to be taken in the event of accidental events or upset conditions.

The survey vessel will be equipped with extensive navigation, radio/satellite communication equipment as well as dual radar systems. Regular warning messages will be broadcast advising other vessels in the area of the proposed operations.

Chase Vessels

Typically between one to three chase vessels will be provided by the seismic survey contractor. The chase vessels will maintain an operational perimeter around the survey vessel to keep the area clear of obstructions (e.g. static fishing gear). The chase vessel will also ensure that any shipping or fishing vessels are protected from collision or incidents by providing radio warnings of the presence of the seismic vessel and survey area. Chase vessels will normally sail a few kilometres in front, at both sides and at the back of the survey vessel to provide sufficient support. There will also be a separate supply vessel which supports the survey vessel with fuel and consumables.

PCML will ensure that all vessels are capable for the operation. Contractor personnel are well-trained in terms of their job responsibilities, health and safety, and environment requirements. In addition, prior to vessel mobilization, PCML personnel will conduct a full technical and HSE audit on the vessel, its crew, operational procedures and equipment.

Each chase vessel is expected to have crew of around 10 people on board. PCML will provide on-board representatives during the seismic survey to monitor the performance of the survey contractor and to monitor and control that all operations are in full compliance with the seismic acquisition programme.

4.4.2 *Materials, Supplies, Labour & Logistics*

Refuelling, resupplying, and crew changes during the 2-3 month seismic survey will be undertaken with a supply vessel in port. The seismic vessel will be refuelled at sea and crew changes will be undertaken at sea via a supply vessel. The likely port (supply base) would be located at Yangon. For more advanced requirements, possible shore support will utilise Singapore. Transfers from supply vessel to the survey and chase vessels will be offshore. All offshore transfer operations will be undertaken to the required MARPOL standards.

Diesel oil fuel will be used by the survey vessels' engines. Fuel consumption rate for the survey vessels is up to 45m^3 per day. All electrical demands for operations undertaken on the survey vessels are provided by batteries and/or diesel generators. Fresh water will be produced on board the seismic survey vessel for consumption at about 400 L per person per day.

4.4.3 *Emissions, Discharges & Wastes*

An inventory of the main emissions (sound and air pollutants), discharges to sea and, wastes that may potentially be generated during the 3D seismic survey is presented in the following sections. As the contractor to conduct the seismic survey is not yet selected, the specific emission details of the survey are not known. The information presented has been drawn from relevant, publicly available literature, government/authority information sources, internet research and databases, ERM in-house archives and the application of emission factors.

Importantly, all emissions, discharges, and waste generation will comply with applicable government regulations in Myanmar and MARPOL requirements.

Underwater Sound Emissions

It is expected sound levels would be in the order of up to 259 dB at 1 m from the array (*NB: all dB values quoted for underwater noise are referenced to 1 micro Pascal (*Pa)*). The fundamental frequencies are expected to fall within the range 0 - 300 Hz.

Emissions to Air

The principal atmospheric emissions during the exploration survey activities will be from the marine seismic survey operations and will comprise exhaust emissions, primarily carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_X), sulphur dioxide (SO_2), methane (CH_4) with small quantities of un-burnt hydrocarbons and smoke/particulates discharged from propulsion and power generation equipment on the vessels involved in the survey. Exhaust emissions from vessels are directly related to fuel consumption rates as well as the sulphur content of the fuel (SO_2 emissions).

Potential quantities of each pollutant are estimated based on United States Environmental Protection Agency (USEPA) AP-42 Emission Factors and fuel consumption of vessels (1). An estimation of typical exhaust emissions during a seismic operation is presented in *Table 4.3*.

Table 4.3 Indicative Air Emissions by Vessels during the Seismic Survey (Source: USEPA)

Sources	Daily Marine Gas Oil Consumption (metric ton) [1]	Indicative Daily Emission Rate (metric ton of individual substance) [2]					
		CO_2	CO	NOx	SO_2	CH_4	NMHC
USEPA AP-42 Emission Factor		*3.2*	*0.008*	*0.059*	*0.01*	*0.00027*	*0.0024*
Seismic Survey Vessel	10	32	0.08	0.59	0.1	0.0027	0.024
Chase/ Support Vessel	1.5	4.8	0.012	0.0885	0.015	0.000405	0.0036

[1] Indicative only; daily marine gas oil consumption typically ranges from 9 – 15 metric ton for streamer survey vessels and 1 – 2 metric ton for chase/ support vessel

[2] Assuming 0.5% wt sulphur fuel content

(1) UKOOA (1999) Guidelines for the Compilation of an Atmospheric Emissions Inventory – Transportation Fuel Consumption Emissions Factors: Vessels

Other air emissions will include negligible volumes of fugitive hydrocarbons from fuel/ oil storage and handling as well as fugitive releases of refrigerants from on-board air conditioning/ chiller/ refrigeration equipment.

Some seismic survey vessels are also provided with on-board incineration systems for disposing of domestic/ combustible waste. If such a vessel is utilised for the survey then the use of this system will give rise to intermittent combustion product emissions. Any use of on-board incineration will be managed in compliance with relevant International standard by the IMO as well as any applicable government regulations.

Effluent Discharges

The principal effluents discharged to the marine environment during survey operations will comprise domestic wastewater (grey water – laundry/ shower discharges and other wash water) and sewage (black water – human body wastes) with small quantities of drainage water (non-contaminated and contaminated areas e.g. bilge and machinery spaces) and service water/ cooling water system discharge. An estimation of domestic wastewater and sewage discharged during the proposed Project is presented in *Table 4.4*.

In general, many of these discharges are regulated by MARPOL and are considered standard industry practice provided they are undertaken in accordance with MARPOL regulations which are the same as the national (NEQ) guidelines.

Table 4.4 Indicative Effluent Discharges from Vessels during the Seismic Survey

Sources	Indicative No. of personnel on-board (POB)	Daily domestic wastewater discharges to sea (m^3/day)	Daily sewage discharges to sea (m^3/day)
		Approximately 0.12 m^3 per person per day [1]	Approximately 0.08 m^3 per person per day
Seismic Survey Vessel	50	6	4
Chase/ Support Vessel	10	1.2	0.8

[1] Domestic wastewater generation rate = 80% of water consumption (0.15m^3)

The seismic survey vessel would likely have an on-board sewage handling and treatment system in compliance with the requirements of MARPOL Annex IV (*Prevention of Pollution by Sewage*)). The vessel's compliance will be documented via a Sewage Pollution Prevention Certificate.

The seismic survey vessel would also comply with the requirements of MARPOL Annex I (*Prevention of Pollution by Oil*). The vessel compliance will be documented via Oil Record Book, International Oil Pollution Prevention (IOPP) Certificate, and the installation of an oily water separator for bilge and machinery space drainage and a slop oil tank. Discharges of bilge water or drainage from machinery spaces would be treated to a specification of 15 ppm oil content or lower prior to overboard discharge. The separated slop oil will be handled for disposal by a licensed contractor.

Cooling water (typically a once through system) and surplus service water (e.g. from a potable water generation system) may also be discharged to the sea. Discharges from the service water system may contain residual chlorine (typically < 1 ppm).

Other effluents discharged during survey operations such as deck drainage (e.g. rainfall/ sea spray run-off) and effluents from deck wash down operations may contain trace quantities of lube oil, cable oil and fuel oil/ diesel.

Solid and Hazardous Waste Generation

Waste generated during seismic survey operations may comprise of:

- Non-hazardous industrial type solid wastes, which include general refuge (e.g. packaging materials, paper/ plastic bags and containers);
- Domestic food waste from the galleys on the vessels; and
- Small quantities of hazardous wastes, which include solvent, thinner, spent lubrication oil, hydraulic fluids, fluid, oily rags, lithium batteries, slop oil and oil contaminated materials (e.g. containers used to store lubricating fluids).

General refuse will not be disposed of to sea. Combustible wastes will be segregated and disposed by incinerator on-board. Non-combustible and recyclable wastes will be stored in containers and returned to shore for disposal. The disposal of non-combustible wastes will be the responsibility of the contractor, who will be required to have a Waste Management Plan in place as well as record all waste retained on-board or transferred to the supply vessel for transport to shore. This will include information on how and where wastes have been disposed. PCML will play an assurance and oversight role to support contractor compliance with the agreed Waste Management requirements.

The use of specific waste facilities in Myanmar has not been confirmed by the contractor at this stage. However, if any wastes are transferred to shore in Myanmar, it will be handled by the local port authorities and the contractor will retain waste transfer records which PCML will check and inspect. PCML will collate and report waste volumes and disposal routes to MONREC after the survey.

Seismic survey vessel would be expected to fully comply with the requirements of MARPOL Annex V (*Prevention of Pollution by Garbage*). Food waste will be macerated into smaller pieces (25 mm) prior to discharge overboard.

All hazardous wastes will be stored in appropriate containers with labels. Hazardous waste storage area will be designated in accordance with their Materials Data Sheet (MSDS). Hazardous wastes will be returned to shore and sent to a licensed disposal facility by a licensed waste contractor.

Control Measures and Built in Mitigation

A number of measures have been built-in to the design of the Project in order to ensure any potential impacts are avoided or reduced to the extent possible. These measures include: compliance with applicable international legislation (e.g. NEQ / MARPOL) for reducing the impact from waste discharges and the use of Fisheries Liaison Officers on-board vessels to communicate with any fishing vessels in the vicinity of the seismic vessel. A full list of all control measures is included as commitments in *Section 8* of this IEE Report.

4.5 *COMPARISON AND SELECTION OF PROJECT ALTERNATIVES*

Consideration of Project options and alternatives is a fundamental requirement in the planning of any project as a means of avoiding or reducing adverse environmental and social impacts and maximising or enhancing project benefits. Several options that have been considered for the Project include the following:

- **Streamer**: the survey will use solid or gel-filled streamers rather than kerosene-filled streamers as these solid cables, which are constructed of extruded foam, are robust and resistant to damage, do not leak when damaged either on the vessel or in the sea, and are less sensitive to weather and wave noise; gels are inert. Therefore, the selected alternative is less likely to leak and impact the environment.

- **Sensitive receiver**: the 3D seismic survey area should be sited away from key sensitive receivers as far as practicable to avoid disturbance to the environmental and social sensitive receptors. For this Project, the Project Area is around 33 km from the nearest KBA and 125 km from the Myanmar coastline. Given that the distance from the nearest sensitive or protected area / receptor, no impacts are anticipated and the location of the survey is considered acceptable.

- **Operational safety zone**: the safety zone during seismic operations should be mobile around the survey vessel rather than restricting access to the whole block, in order to minimise disturbance to the extent possible to nearby marine operators, such as fishing vessels. This Project will utilise a mobile exclusion zone therefore reducing the scale (size) of the Area of Influence and limiting the area excluded to fishermen; and

- **No Project alternative**: The "No Project" alternative means that no seismic survey would be undertaken, which in turn implies that no further exploration activity would take place in these Blocks. Should there be no further exploration activity, no further oil and gas development project would be able to be developed in this area. 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.

5 DESCRIPTION OF THE SURROUNDING ENVIRONMENT

5.1 SETTING THE STUDY LIMITS

The following section describes the physical, biological, and social environment within the Study Area, which is defined as the waters of Project Area as well as the surrounding waters offshore Tanintharyi Region. As the 3D marine seismic survey will be located 125 km from the nearest communities on the mainland and 70 km from the nearest island of the Myeik Archipelago), the focus of the baseline information is on open water habitats.

The Area of Influence varies depending on the receptor and activity. The following provides information on the potential Area of Influence per activity/ receptor:

- Impacts to fisheries and fishing activity either through unplanned collision or from physical displacement of vessels will be limited to within the Project Area;
- Impacts to marine turtles, mammals and fish due to sound emissions can occur in proximity to the sound source (1-2 kms) and the sound may be noticeable out to 10's kms from the sound source (although this may not have any impact). Therefore, the Area of Influence for sound impacts is mostly with the Project Area but also out to 10-20 km from the Project Area;
- Impacts from towed equipment on turtles would be limited to the Project Area as that is where the equipment will be located; and
- Impacts from spills or leaks will on the marine environment will also be limited to the Project Area. The only spills possible would be small volume spills of fuel which would not impact local coastal areas.

Given the Area of Influence is offshore open waters the environmental impact assessment will focus on habitats and species in this area. Information on coastal areas and protected areas is included to provide a general baseline description.

5.2 METHODOLOGY AND OBJECTIVES

The information provided in this *Section* is based on a desktop review of published information, supplemented with information provided by PCML, and through review of available ERM in house literature. Although this Project is an IEE and therefore does not require primary baseline data, baseline data from 2018 is available from the Yetagun Platform and will be utilised to inform this IEE Report.

Primary social data collected during public consultations have been used to supplement the desk-top review.

Secondary data sources were also referred to, such as; reports by the Wildlife Conservation Society (WCS), scientific journals, fisheries cruise data (2015), and local study reports available at the marine science department of Mawlamyine and Pathein Universities.

The purpose of reviewing the baseline conditions is to present an understanding of the potential environmental and social sensitivities of the surrounding environment that could be impacted by the Project activities. Reviewing the baseline conditions allows PCML and its advisors to make an informed judgement on the appropriate level of impact assessment for the Project.

5.3 *PUBLIC ADMINISTRATION AND PLANNING*

The Project is located 125 km from the mainland. The Project is located in the offshore waters of Tanintharyi Region; the closest Township is Laungdon, Dawei District, in Tanintharyi Region.

There are no specific plans or strategies for the Project Area.

The demography of Dawei District in provided in *Table 5.1*.

Table 5.1 Demographic data in Study Area

Township	Households	Population	Male	Female
Dawei	24,943	125,605	60,044	65,561
LaungLon	25,735	118,317	55,558	62,759
ThayetCahung	22,874	105,662	50,421	55,241
Yebyu	22,073	100,768	50,782	49,986

Source: Myanmar Population Census Data (2014)

5.4 *PROTECTED AND ENVIRONMENTALLY SENSITIVE AREAS*

A total of 43 designated or proposed protected areas with IUCN categories existing in Myanmar (Istituto Oikos and BANCA, 2011) however some are proposed as protected area without authorized designation (i.e. "soft" designation). None of these protected or environmentally sensitive areas lie within the Project Area. The closest is a designated Shark Protection Area located 33 km from the Project Area. The area was established in 2004 as a national Marine Protected Area (MPA) and covers an area of 11,836 km^2 where there are restrictions on fishing activities.

In 2012, the Wildlife Conservation Society (WCS) identified 132 Key Biodiversity Areas (KBAs) alongside Myanmar environmental experts

(Holmes et al, 2013). These KBAs are regarded as areas holding significant populations of species of high conservation concern but are not legally recognized nor designated as protected areas in Myanmar. The closest KBA to the Project overlaps with the Shark Protected Area mentioned above. Another KBA is the Moscos Island group (Moscos Kyun), which is located around 100 km from the Project Area. This KBA was identified due to four key species of sea turtles potentially nesting on the islands (*Figure 5.2;* please refer to *Section 4.4.2* above for further information).

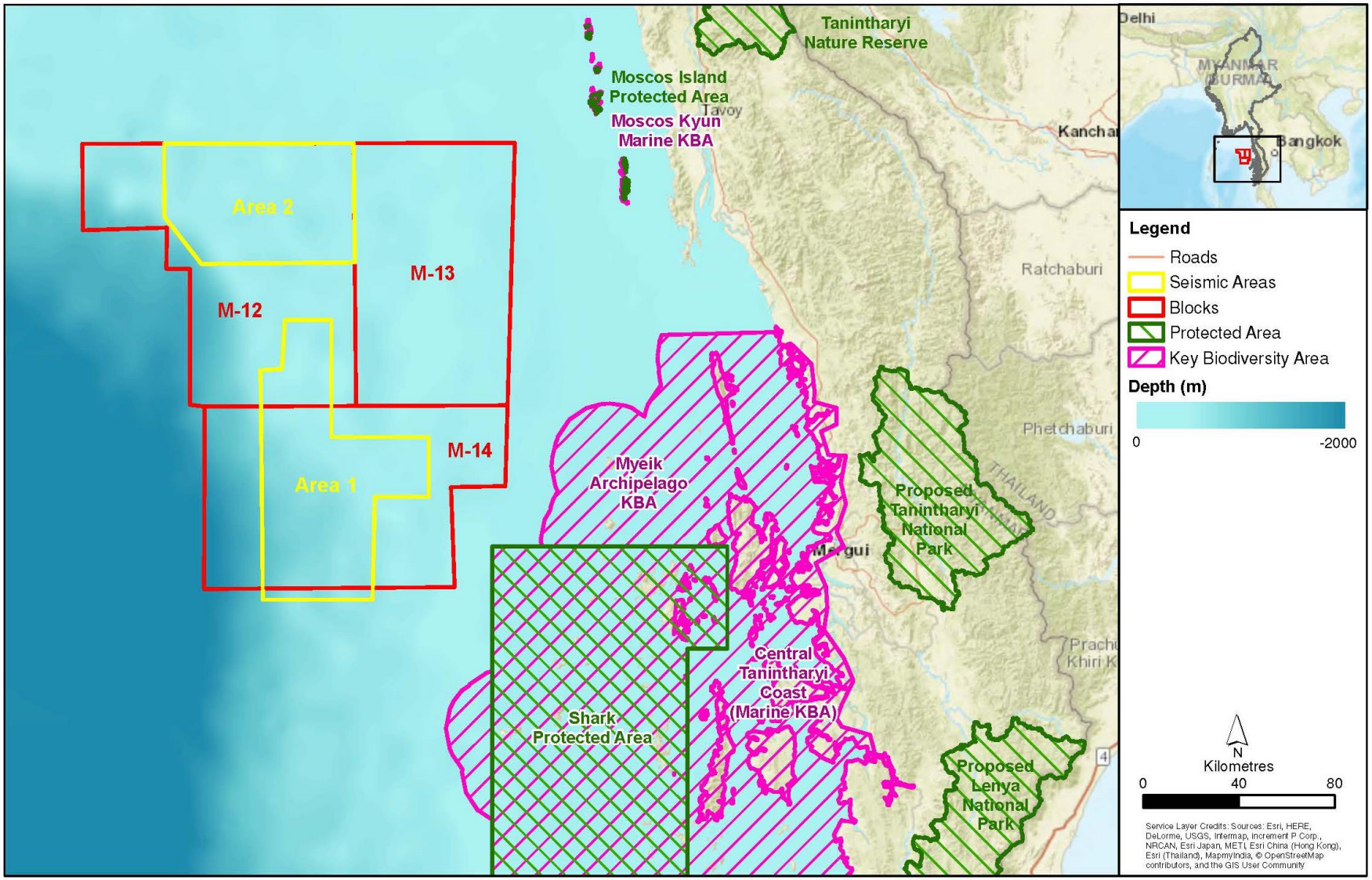
A large area encompassing islands and surrounding waters of the Myeik Archipelago is designated as a KBA with three sea turtle species recorded (refer to *Section 4.4.2* above for further information on sea turtles potentially nesting at Myeik Archipelago). This KBA is located over 35 km) from the Project Area.

The KBA's within the Study Area are provided in *Table 5.2*.

Table 5.2 Key Biodiversity Areas (KBAs) in the Study Area

Name	Area (km^2)	Key species
Myeik Archipelago	43,963	Leatherback turtle, green turtle, hawksbill turtle
Moscos Kyun	57	Leatherback turtle, green turtle, hawksbill turtle, olive ridley turtle
Lampi Island MPA	225	Hornbill, numerous shark species, turtle species

Figure 5.1 Protected Areas and Restricted Fishing Areas in the Study Area



Source: Homles et al, 2014

5.5 PHYSICAL COMPONENTS

5.5.1 Climate and Meteorology

The weather and climate of Myanmar is primarily influenced by the Northeast and the Southwest monsoons and the short transitional periods between them. The southwest monsoon (June to September) is characterised by extensive cloud cover, and light rain almost daily, interspersed with rain squalls or thunderstorms. The northeast monsoon (December to April) brings less cloud, scant rainfall, mild temperatures and lower humidity during winter (Suwannathatsa et al 2012). The spring and autumn transition periods between the monsoons (April and May, October and November) are generally hot with very variable weather and heavy squalls.

Climate data is available from Dawei, which is located 148 km from the Project Area and is the closest District. Within Myanmar, Dawei is affected first by the southwest monsoon and is reported to experience an average of 142 rainy days and 17.9 ft. of precipitation per year (FAO, 2014).

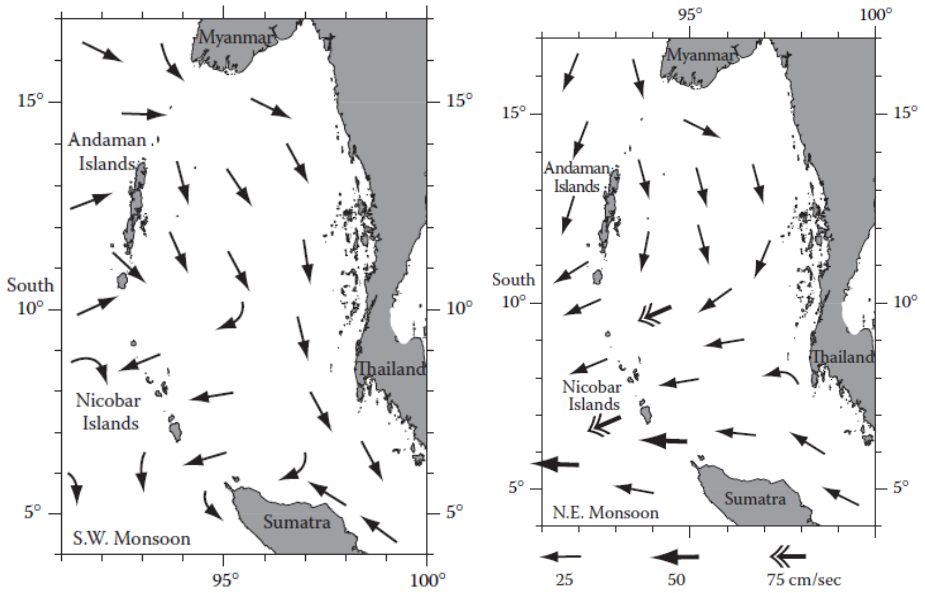
Over a 39-year period, the maximum temperature in Dawei was 35°C in April and the lowest temperature was ~25°C in January (worldweatheronline). The average temperature of Dawei is about 26°C year-round with April and May as the hottest months. Annual variations above or below the average seldom exceeds 3°C.

Average monthly wind speeds in the Andaman Sea in the vicinity of the Project Area are reported to range from 3.5 m/s to 7.5 m/s (Steedman Science & Engineering 1994). The most common wind direction is from the north-northeast from November to April and southwest from May to October (worldweatheronline).

5.5.2 Oceanography and Hydrography

The predominant surface currents at the central eastern area of the Andaman Sea (where the Project Area is located) are generally towards to the south or southeast during both the southwest monsoon and the northeast monsoon. In both seasons, flows in the vicinity of the Project Area predominantly continue to circulate southwards and eastwards, generally exiting the Andaman Sea to the south of the Andaman Islands or Malacca Strait, as presented in *Figure 5.3*.

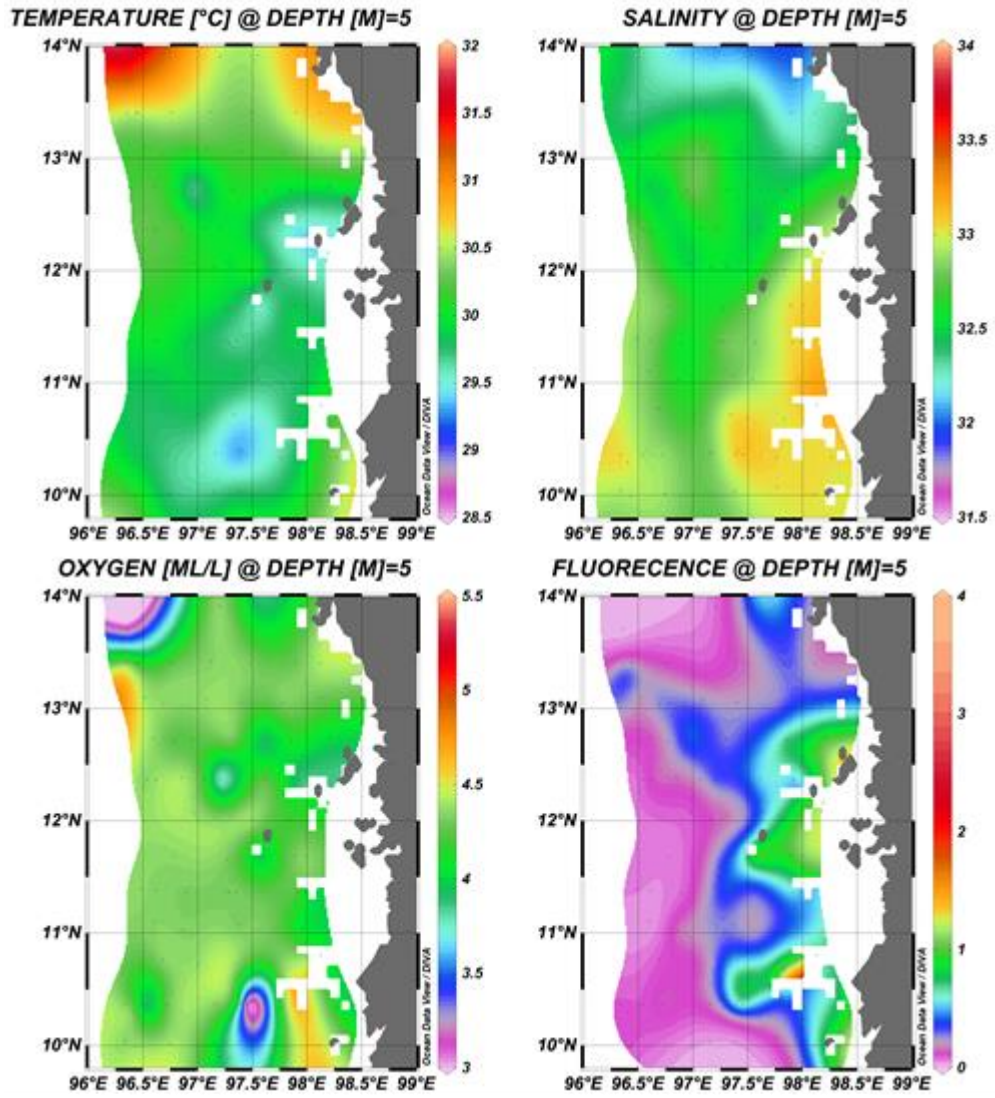
Figure 5.2 ***Predominant Surface Currents in the Andaman Sea in the Northeast and Southwest Monsoon Seasons***



Source: Soegiarto, 1985

Data on temperature, salinity, oxygen, and fluorescence were recorded during a survey of the waters of Tanintharyi Region was conducted in 2015 as part of the 'Dr. Fridtjof Nansen' survey (Myanmar Ecosystem Survey, 2015) (*Figure 5.4*). In the east of the survey area (where the Project Area is located) the near-surface temperatures (5 m depth) were around 32ºC and salinity at 5 m ranged from 31 to 34. Oxygen levels in surface waters were generally high (~4 - 5 ml/l), and showed relatively high variability.

Figure 5.3 *Near-surface (5m depth) Temperature, Salinity, Oxygen and Fluorescence along the Tanintharyi Coastal Region*



5.5.3 *Seabed Bathymetry and Composition*

The bathymetry along the coast of Myanmar falls under two distinct types with the narrow continental shelf and deep water in the north, which is typical of the Bay of Bengal, and the wide continental shelf and shallow waters in the south, which is typical of the Andaman Sea and the Gulf of Martaban. The Project Area is located in the latter.

The Project Area is in water depths between 10 and 1,000 m. The majority of the Project Area is situated over the relatively flat continental shelf. The deeper part (western extent) of the Project Area is located over the continental slope and abyssal plain with water depths descending to >1,000 m.

5.5.4 *Natural Hazards*

Storms and Cyclones

A tropical cyclone is a storm with rotating winds at speeds of greater than 74 miles per hour. Myanmar is vulnerable to cyclones, which often originate in the Bay of Bengal during pre- and post-monsoon seasons. The Andaman Sea/Bay of Bengal area averages two cyclones per year but can range from 0 to four.

Gale force winds (17.2 m/s or over) are mainly associated with local rain squalls and with severe tropical storms or cyclones. The threat of cyclones affects different areas at different times of the year, overall affecting all areas though the major tracks do not tend pass over the Andaman Sea; i.e., over the Project Area.

The Project is expected commence in October 2018 and last for 2-3 months to avoid northeast monsoon storms and cyclones which are most frequent from mid-May to mid-October. Standard operating procedures for poor weather will be employed during such an event.

Earthquakes

A review of available literature has shown that Myanmar is seismologically unstable and vulnerable to earthquakes (Theilen and Pararas-Carayannis, 2009). Historic records show that at least 15 major earthquakes with magnitudes M≥7.0 Richter scale (RS) have occurred in Myanmar in the last hundred years. Historical records of earthquakes are noted within the Study Area and the magnitudes of the earthquakes were ranked 5 or less (Union of Myanmar, 2009).

Tsunami

Myanmar is an earthquake-prone country and at moderate risk for tsunamis. Tsunamis have been recorded in the Myanmar coastal areas. The recent 2004 tsunami generated by the Sumatra earthquake caused moderate damage to the Rakhine Coast, Ayeyarwady Delta, and the Tanintharyi Coast with more than 60 lives and hundreds of boats lost (Union of Myanmar, 2009).

5.6 *BIOLOGICAL COMPONENTS*

5.6.1 *Offshore Habitats*

The Project Area encompasses some deep water habitats of the continental shelf (>100m water depths). The deeper water communities (e.g. continental shelf, continental shelf) within the Area of Influence are thought to be composed of common, well-represented and widely distributed species such as polychaetes, molluscs and echinoderms.

A survey to investigate macrobenthic faunal communities in the vicinity of the Yetagun platform was conducted in 1998 for previous EIA Studies for the field

development and export pipeline (AATA 1998). Samples were collected from eight stations spanning the vicinity of the Yetagun Complex to nearshore environment along the export pipeline route. The survey recorded that sediments were generally dominated by polychaete worms with the exception of arthropods at two stations near the Yetagun platforms. Macrobenthos abundance was found be lowest abundance and less diverse at the deeper stations near the Yetagun platform compared to the shallow nearshore environment.

A new marine baseline survey was conducted in April 2018 for infill drilling at the Yetagun-A production platform.

The survey recorded a total of 31 individual organisms, with a total biomass of 0.283 g in four sediment grab samples. The specimens belong to seven (7) Phyla (Annelida, Arthropoda, Chordata, Cnidaria, Echinodermata, Mollusca, and Nemertinea), from a total of 15 Families in seven Classes.

The April 2018 survey also observed that the majority (54.84%) of the number of macrobenthic organisms (i.e. abundance) recorded at Yetagun field were from the Class Polychaeta (Phylum Annelida (marine worms), followed by Class Crustacea (Phylum Arthopoda, 22.58 of the total). Samples were dominated by polychaete worms or crustaceans (Phylum Arthropoda), which was the same finding as reported from surveys in 1998.

A summary of the percentage abundance of different Classes of macrobenthic organisms in sediment is provided in *Table 5.3*.

Table 5.3 ***Percentage (%) Abundance of Main Groups of Macrobenthos in Seabed Sediments from Sampling Stations in April 2018***

Class	Common Name	YA1	YA2	YA3	YA4	Mean
Anopla	Ribbonworm	0.00	0.00	14.29	14.29	7.14
Anthozoa	Anemone	0.00	0.00	14.29	0.00	3.57
Crustacea	Crustacean	0.00	50.00	28.57	21.43	25.00
Gastrapoda	Snail	0.00	25.00	0.00	0.00	6.25
Osteichthyes	Fish	16.67	0.00	0.00	0.00	4.17
Polychaeta	Bristleworm	83.33	25.00	28.57	64.29	50.30
Stelleroidea	Brittlestar	0.00	0.00	14.29	0.00	3.57

In conclusion, benthic grab sampling at the Yetagun field in April 2018 have revealed a sparse abundance, high variability, and low diversity of infauna. Bristleworms (polychaetes/worms) were most common with other fauna including crustaceans, ribbonworms, anemones, gastropods, fish and brittlestars. The benthic habitat within the Surveyed Area near the Platform spanning the outer continental shelf consists of bare, unconsolidated sandy and muddy sediments supporting a sparse assemblage of benthic organisms.

Based on the grab samples collected in 2018, the abundance of microbenthic organisms inhabiting the seabed across the seabed near the Platform was

found to be patchy but with similar low abundance at each sampled locations. Overall the infauna associated with the soft unconsolidated sediment at the Yetagun Field are expected to be widespread and well-represented along the continental shelf in the region and thus regarded as low sensitivity. It is expected that similar species are observe in the 3D seismic survey area which is located between 100 m and 1,000 m water depth.

5.6.2 *Coastal Habitats within the Study Area*

Although the Project is located over 125 km from the mainland and 70 km from outlying islands, the following sections provide a brief overview of the coastal habitats neighbouring the Project Area. However, given the scale of impacts and distance between habitats and Project activities, no impacts to the closest habitats are anticipated.

Coral Reefs

Myanmar's coastal areas contain both hard and soft corals. Burke et al (2002) indicates that at least 65 coral species in 31 genera have been catalogued in Myanmar's reefs, although some studies have estimated over 500 hard coral species within Myanmar. According to UNEP (2004), coral reefs in Myanmar represent 0.66% of the world's reefs, covering an area of 1,870 km^2. 56% of Myanmar's reefs are threatened. The main threats to Myanmar's corals are storms, coral bleaching, diving, fishing gear, blast fishing, dredging, and land-based pollutants.

United Nations Environmental Programme (UNEP) satellite analyses show that coral reefs (usually fringing or patch reefs in Myanmar) occur along the coast of Tanintharyi Region. The coral formation in Myeik Archipelago consists of fringing reefs, submerged pinnacles and seamounts, limestone caves, sheer and sloping rock walls, and boulder-strewn sand bottoms (BOBLME, 2015). The number of coral species has increased significantly (51 species in 1972 to 512 species in 2014) as a result of the recent data researched by the Marine Science Department at Mawlamyine University. These 512 species were recorded from 24 islands of the northern Myeik Archipelago. Photos of coral from the Myeik Archipelago are provided in *Figure 5.4*.

Figure 5.4 Coral Communities in the Myeik Archipelago

Source: BOBLME (2015). Note: a) Coral communities illustrating diversity and abundance of coral species, b) Corals damaged by a combination of bleaching event and dynamite fishing, and c) Corals impacted by fishing activity and entangled by fishing net.

Fauna and Flora International (FFI) have conducted research in the Myeik Archipelago into the presence of coral reefs and the health of these habitats.

Within the three reef types, substrates varied across sites and hard coral cover ranged from under 10% to over 90% in some locations. On the Inner reefs hard coral cover varied from 1.5 to 95% (n= 227); on fringing from 0 to 80% (n= 21); and Rock Reefs 8.1 to 30% (n=14) (Howard, 2018).

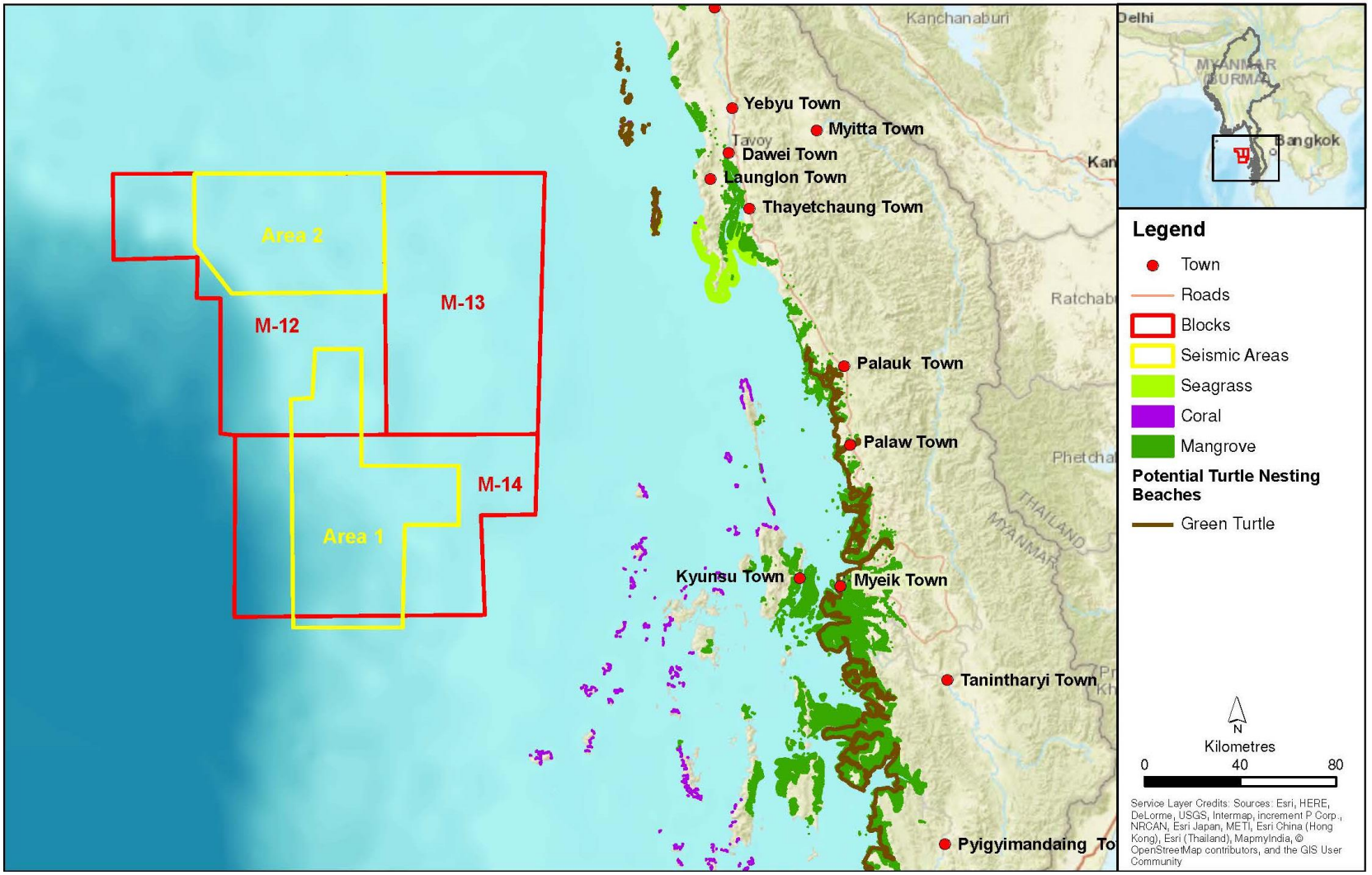
FFI also conducted a coral survey in the Myeik Archipelago in March 2014 into coral reef diversity. Thirty five sites were surveyed from Myeik to Kawthaung (not encompassing the Moscos Islands) (Obura et al, 2014).

Coral genera range from 29 to 46 present at each site with a total of 68 genera in 17 families. The relative abundance of coral genera showed a decline from the dominant genus, *Porites*, to genera that were recorded at just one site, including *Siderastrea, Alveopora, Caulastrea, Cynarina, Lithophyllon* and *Madracis*. *Porites* was present at all sites. *Acropora* was also found at all sites and was dominant at more than one site. Hard/stony corals dominated at all sites and in total, 287 coral species were recorded (Obura et al, 2014).

Given the deeper water depths at the Project Area Yetagun field (>100 m), insufficient light reaches the seabed to allow the growth of primary producers such as seagrass, macroalgae or zooxanthellate scleractinian (reef building) corals and these groups are absent from the seabed. Coral habitats would not be present in the Project's Area of Influence.

Potential coral reef habitat in the Study Area is shown in *Figure 5.5*.

Figure 5.5 Coastal Habitats in Study Area



Source: UNEP-WCMC Website

Mangrove Resources

Mangrove forests are important as habitats for many wildlife and fisheries, as they provide nursery areas for fish and crustacean species, and are a natural form of protection against winds, storms or floods. Mangroves along Myanmar coasts are of value to the local population, particularly as fire wood and charcoal (brought from local markets) for kitchen, timber for construction and fisheries.

There are at least 29 documented species of mangroves in Myanmar, hosting 69 species of fish, 13 species of shrimp, 4 species of crab and 9 species of other shellfish. *Rhizophora, Sonneratia, Avicennia, Bruguiera* and *Xylocarpus spp* are dominant species in Myanmar. Predominant species in the Rakhine and Tanintharyi coastal mangroves are *Rhizophora mucronata* and *Rhizophora apiculata*. Predominant species in the Ayeyarwady delta mangroves are *Heritiera fomes* (Mangrove Service Network, 2006). There are two (2) species of mangrove regarded as Critically Endangered species (*Crinum asiaricum* and *Sonneratia griffithii*), six (6) regarded as Endangered (*Acanthus volubilis*, *Avicennia alba*, *Lumnitzera littorea*, *Xylocarpus granatum*, *Bruguiera cylindrical*, and *Heritiera fomes*), 1 regarded as Vulnerable (*Diospyros embryopteris*), and 7 regarded as Near Threatened (*Phoneix plaudosa*, *Scaevola taccada*, *Aegialitis rotundifolia*, *Pandanas tectorius*, *Aegialitis rotundifolia*, *Ceriops decandra*, and *Brownlowia tersa*).

FFI conducted a study on mangroves in Myeik Archipelago (not including near the Project Area) (San Tha Tun et al, 2014). This survey identified 46 species belonging to 32 genera from 20 families. The most abundant family was the *Rhizophoraceae* with eight species followed by *Avicenniaceae* with three species.

Potential mangrove habitat in the Study Area is shown in *Figure 5.6*.

Seagrass

Seagrasses are unique as they are the only truly marine flowering plants. Seagrass beds form complex physical structures and are a highly productive ecosystem. They provide habitat for fish and marine invertebrates, and perform important physical functions of filtering coastal waters, dissipating wave energy and anchoring sediments. Seagrasses often occur in proximity to, and are ecologically linked with, coral reefs, mangroves and other marine habitats. Seagrasses are the primary feeding ground for dugongs and green turtles.

Seagrass usually grow in relatively shallow waters, and form a key feeding, breeding, and nursery ground for many species of fish, turtles, lobsters, and dugong.

Based on data from U. Soe-Htun and Tint Swe (2013), Myanmar has 10 species of seagrass belonging to 5 genera from 2 families. These are *Cymodocea rotundata*, *C. serrulata, Halodule pinifolia, H.uninervis, Syringodium isotoefolium,*

Enhalus acoroides, Halophila beccarii, H.decipiens, H. ovalis, and *Thalassia hemprichii*. Of these, *Cymodocea rotundata, C.serrulata* and *Enhalus acoroides* are dominant in the seagrass beds. Most of these seagrass species are found in Rakhine and Tanintharyi coastal areas. Potential seagrass habitat is shown in *Figure 5.6*. This is mostly over 125 km to the south of the Project Area.

5.6.3 Plankton

There are limited data on the species composition, abundance and distribution of plankton within the Study Area. A survey to investigate phytoplankton and zooplankton communities in the vicinity of the Yetagun platforms was previously conducted in 1998 for previous EIA Studies for the field development and export pipeline (AATA 1998). Phytoplankton were found to be represented by typical forms that are common in tropical marine environments of the Indian Ocean. Algal groups included diatoms, dinoflagellates, cyanobacteria, silicoflagellates, prasinophytes, and prynesiophytes. The survey found lower phytoplankton abundance near the Yetagun platform compared to abundance at nearshore locations, which likely reflected higher nutrient availability in nearshore waters from terrestrial runoff. As is typical, zooplankton communities were found dominated by copepods at all stations with no clear trend in abundance away from coast. Oceanic taxa such as the copepod *Candacia pachydactyla* and pteropods *Diacra quadridentata* were indicators of deeper water environment being only found from the deepest waters near the Yetagun platforms.

Plankton populations are naturally extremely patchy and variable over time. Most species of plankton have short generation times, high fecundity and high abundance over a large area, particularly, in the open water, offshore environment. For these reasons plankton populations within the Project Area are not considered to be potentially impacted by the project activities.

5.6.4 Fish Assemblages

Fish communities in the Study Area occupy a range of habitats from coral and rocky reefs and seagrass habitat in shallow waters to deep-water habitats below the sun-lit euphotic zone (>200 m or 650 feet) in open ocean, and the open water pelagic zone. As the Project is located in water depths of approximately 357 ft (109m), the focus of this section will be on fish species that inhabit this area.

A fish survey was conducted by Fauna and Flora International (FFI) in 2014 of 28 sites in the Myeik Archipelago (Russel, 2015). Surveys were conducted using high definition underwater video. A total of 409 species belonging to 55 families were recorded. The majority of fish species recorded were typical coral and rocky reef-associated species. The most abundant families included wrasses (Labridae), damselfishes (Pomacentridae), gobies (Gobiidae), cardinalfishes (Apogonidae), groupers (Serranidae), butterflyfishes (Chaetodontidae), snappers (Lutjanidae), surgeonfishes (Acanthuridae), parrotfishes (Scaridae), and Scorpionfishes (Scorpaenidae). These 10 families accounted for 263 species or ~ 64% of the total fish species recorded.

Another fisheries survey was conducted by the Institute of Marine Research (IMR) Norway in 2015 on the Tanintharyi inner shelf (between 66 – 164 feet water depth) (Krastad et al, 2015). Leiognathidae (pony fishes) was the most important group with catch rates of 34.4 kg/h followed by the Cephalopoda (octopus and squid) (28.8 kg/h) who showed the biggest catch rate in the survey area in this region. The following groups were Synodontidae (Lizardfish) (14.6 kg/h), Carangids (jacks) (14.4 kg/h), and Scombrids (mackerels) (6.8 kg/h).

Whale sharks (*Rhincodon typus*) are listed as a species of conservation concern of the IUCN Red List and have been observed in the waters offshore Tanintharyi Region (pers comm with fishermen). This species is highly migratory occurring in both tropical and temperate waters, though there is a general lack of knowledge on many aspects of whale shark biology, including definitive migration patterns.

5.6.5 *Marine Mammals*

Cetaceans (Whales and Dolphins)

A total of 25 cetacean (whale and dolphin) species have been recorded as either Confirmed or Probable in Myanmar waters (Holmes et al. 2014; IUCN, 2017). One sirenian (dugong; Dugong dugon) also has a confirmed presence in the coastal waters of Myanmar (Tun and Ilangakoon, 2006).

Of the whale and dolphin species potentially present in Myanmar waters, most are far-ranging migratory oceanic species while several others are coastal species with closer affinities to shallow water habitat areas and estuarine areas. IUCN-listed threatened cetacean species in Myanmar waters are oceanic species that typically inhabit deep offshore open waters, namely the blue whale (*Balaenoptera musculus*) (Endangered), fin whale (*Balaenoptera physalus*) (Endangered) and sperm whale (*Physeter macrocephalus*) (Vulnerable). The blue whale and the fin whale are also listed as endangered species recognized as of prime importance to the Region and deserving special attention under the ASEAN Agreement on the Conservation of Nature and Natural Resources (ASEAN, 1985). Other common deeper water species such as humpback whale (*Megaptera novaeangliae*) and Bryde's whale (*Balaenoptera edeni*) are known to occur in offshore waters in Myanmar; however these are listed as Least Concern and Data Deficient on IUCN Red List, respectively.

Sirenians (Dugongs)

The Dugong (Dugong dugong) is a large, herbivorous, exclusively marine mammal and is the only extant (living) member of the family Dugonidae. It is one of the only four extent species of the order Sirenia.

The Dugong is listed as vulnerable to extinction by the IUCN Red List of Threatened Species (IUCN, 2017), on the Convention on the Conservation of Migratory Species of Wild Animal (Bonn Convention), and on Appendix 1 of

the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Along with the Irrawaddy dolphin (*Orcaella brevirostris*); dugong are also protected under the Myanmar Protection of Wildlife and Conservation of Natural Areas Law since 1994 under the category "completely protected".

Dugongs are rare and are mostly found west of the Ayeyarwady Delta and further north of the main coastline. Occurrence of dugong at some islands of Myeik Archipelago such as Sular Island, La Ngan Island, Bo Lut Island and War Kyunn Island, as well as waters in the Rakhine Coast, has been reported by local communities (Ilangakoon and Tun, 2007).

5.6.6 *Marine Turtles*

Five (5) of the world's seven (7) marine turtle species are regularly seen nesting and foraging in the coast of Myanmar. These include the Hawksbill (*Eretmochelys imbricata*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys aolivacea*), and Leatherback (*Dermochelys coriacea*).

Turtles undertake migrations from foraging areas to mating, inter-nesting and nesting areas (Miller 1997). In general, mature adult turtles (approximately 30 to 50 years old) undertake the migration from coastal shallow foraging areas to shallow water inter-nesting areas near nesting beaches every two to eight years. On arrival, turtles mate in the waters adjacent to nesting beaches and females may nest multiple times at approximately two week intervals before returning to foraging areas. Eggs hatch after eight to 10 weeks of incubation with hatchings dispersing into the open ocean where they forage for the next five to 20 years. The nearest potential turtle nesting site is on the Moscos Islands. The green turtle (*Chelonia mydas*) is known to nest here, which is listed on the IUCN Red List as Endangered (WCS, 2014).

UNEP data suggest sandy shore habitat along Moscos Island and the adjacent Tanintharyi coastline are nesting sites for species including green turtles, hawksbill, Olive Ridley and Leatherback (UNEP, 2017). Annual turtle nesting activity in Myanmar waters is reported to occur between September and March with the peak period of activity occurring from December to January. Given the location of Block M-12, M-13 and M-14 in relation to known nesting beaches, there is a potential for marine turtles to be present within these blocks when traversing open waters to and from seasonal nesting areas and adjacent mating areas. All known nesting beaches are outside the Project Area; located at least 70 km away (*Figure 5.5*).

5.6.7 *Seabirds*

The most abundant group of seabirds in offshore Myanmar are the terns, of which 13 species regularly occur. Other seabirds which may use these waters include gulls, storm petrels, Jaegers (also known as Skuas), tropic birds, boobies, noddies and frigatebirds. Seabird species tend be highly migratory, far ranging and widely distributed away from breeding areas. Offshore Myanmar waters are used by seabirds for foraging and loafing (resting). Islands and islets can also be used for roosting, resting and moulting. Only two species, the Little Tern (*Sterna albifrons*) and the Brown Booby (*Sula leucogaster*), are reported to have breeding colonies in Myanmar.

Outlying islands of the Myeik Archipelago and Moscos Island which are located over 70 km from the Project Area are expected to be potential suitable nesting site for individuals of these species, though this is not confirmed by observation. Lampi Island located over 80 km from the Project Area, is classified as an Important Bird Area which has been identified for the presence of resident species of plain-pouched hornbills (*Rhyticeros subruficollis*) that are Vulnerable on the IUCN Red List.

Of the seabird species that occur in the Study Area, only species of seabird that spend large quantities of time underwater while foraging for food, either underwater swimmers or aerial divers, are considered potentially vulnerable to underwater sound impacts. Feeding by seabirds involves snatching prey items from or below the water surface (terns, noddies, tropic birds, frigate birds, gulls), by paddling (petrels) and mainly kleptoparasitism (i.e. taking from others) (jaeger). Of the species potentially present, only boobies feed by aerial diving.

Although detailed data on distribution, abundance, habitat utilisation and seasonality of seabirds specific to the Study Area are limited at present, noting the above it can be conservatively assumed that seabirds may be expected to occasionally pass within or close by the Project Area.

5.7 *INFRASTRUCTURE AND SERVICES*

5.7.1 *Education and Schools*

Myanmar Census data (Myanmar population and housing census, 2015) notes that Tanintharyi Region had 1,007 primary schools, 142 middle schools, and 102 high schools. The literacy rate for youth between the ages of 15 to 24 years was higher than the overall literacy rate of Myanmar at 95.8%. The literacy rate of females is reported to be higher than that of the males. The number of university and schools in Tanintharyi Region are shown in *Table 5.4*.

Table 5.4 University and Schools in Study Area

Township	University/ College	High School	Middle School	Primary School
Dawei	5	7	12	89
Lounglon	2	13	5	2
Thayetchaung	-	12	35	81
Myeik	4	21	18	83

Source: Myanmar population and housing census, 2015

5.7.2 Electricity and Energy

ERM field visits in July 2018 found that the local community in the Study Area do not have access to electricity provided by the government. Most of the households use the electricity distributed by private business and the cost per unit is 350 MMK; much higher than the national average unit cost.

Firewood is the main source for cooking as around 50% of people use it for cooking, 43.5% use charcoal and 4.4% use others such as electricity, coal.

The different sources for energy usage are shown in *Table 5.5.*

Table 5.5 Main source of Energy

Township	Private Generator	Electricity	Candle	Others (Kerosene, Solar, etc.)
Dawei	71.7%	4.4%	11.3%	12.5%
Lounglon	54.9%	7.7%	19.4%	18%
Thayetchaung	48.6%	2.4%	14.4%	34.4%
Myeik	55.0%	10.5%	19.4%	15%

Source: Myanmar population and housing census, 2015

5.8 SOCIO-ECONOMIC COMPONENTS

5.8.1 Fishing Operations and Resources

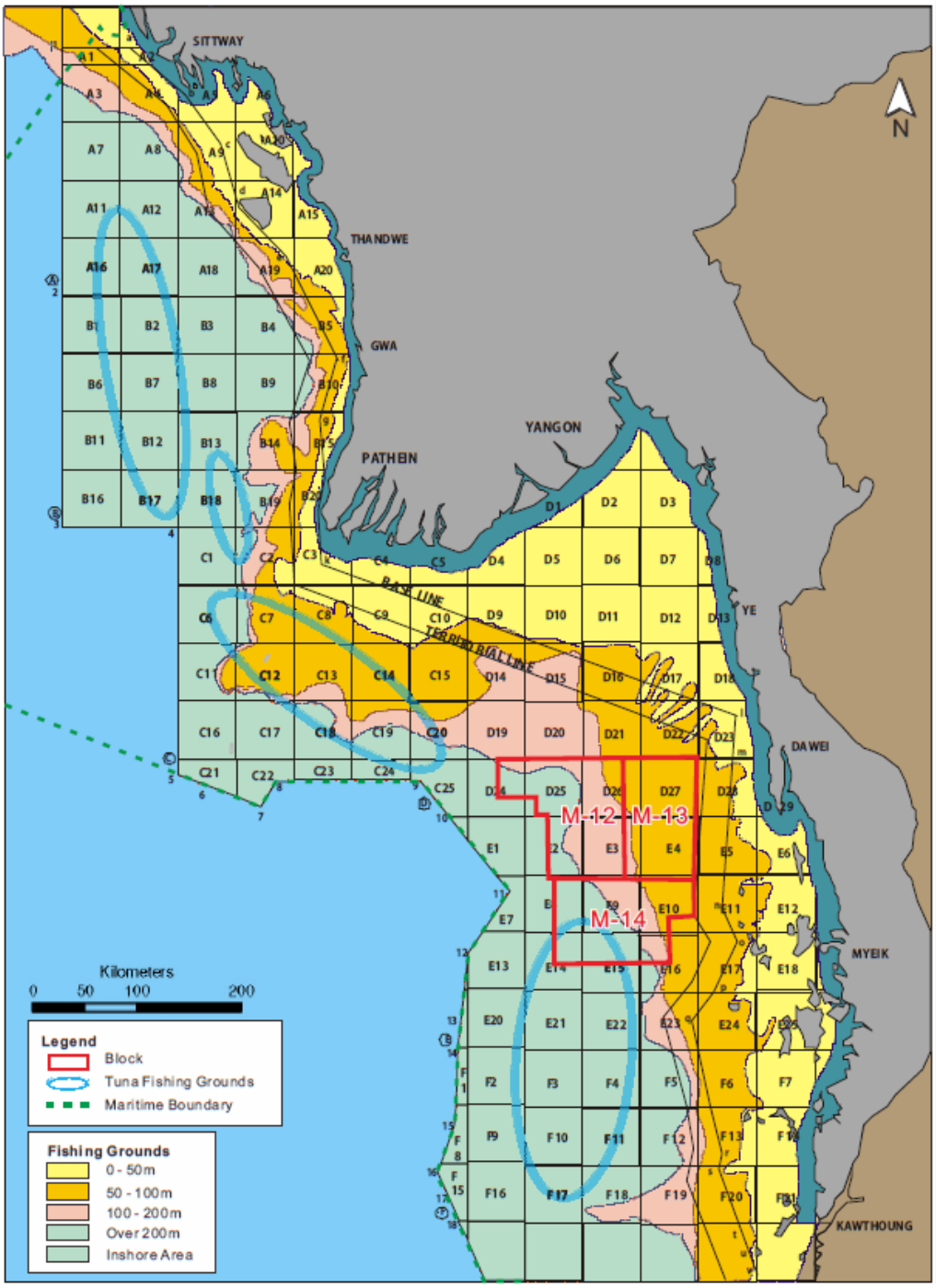
The Department of Fisheries (DoF) has instituted two fishing zones which provide a restriction on fishing activities and a degree of protection to fisheries resources. Fishing Zone 1, for traditional coastal fisheries, extends from the

shoreline to 10 nautical miles from the shore. Fishing Zone 2 extends from the outer limit of Fishing Zone 1 to the 200 nautical mile Exclusive Economic Zone (EEZ) limit (*Figure 5.6*). The DoF at the national level controls offshore fishing activities and licenses, while inshore licenses are granted at the Region/State level. As the Project is offshore, the impact to fishing is a key concern. Public consultation was undertaken in July 2018. It was noted the fishing grounds used by large licensed commercial vessels (mainly purse seine vessels), including those operating from Dawei and Myeik, may overlap with the waters of the Project Area. In addition, discussions with regional local DoF representatives indicated it is likely mostly fishers from Tanintharyi Region potentially operate in these Blocks.

The peak fishing season is usually November to April as the sea conditions are calmer and vessels may fish further offshore. During the rainy season (i.e. generally May to October), fishing is often constrained to the Fishing Zone 1 (inshore) by adverse sea conditions. Fishing is still conducted during the monsoon season but this is generally within the nearshore fishing area; within 16 km from the coast. Furthermore DoF restrict seasonally fishing (i.e. 15 May to 15 August) when only a proportion of commercial fishing vessels are permitted to fish.

DoF indicated there are year round restrictions on fishing at the Shark Protection Area at the Myeik Archipelago.

Figure 5.6 Fishing Blocks in Tanintharyi Waters



Source: Department of Fisheries (2003), modified by ERM (2018)

Focus group discussions with fishers, fishing associations, and the DoF were conducted in July 2018. A summary of all data collected is provided in *Table 5.6* showing the size of boats, distance of fishing grounds offshore, number of fishermen and average time spent at sea.

Table 5.6 Fishing Data on Boats by Township

Village	Township	Type of Boats	Carrying Capacity	Distance covered (miles)	Maximum water depth (ft.)	Number of HHs	Average fishing trip (time spent)	Number of Fishermen
Maung Ma Kan	LaungLon	Small (15-20) ft	50-100 viss	1-2 miles	10-20 ft	100	daily round trip	40
		Medium (40-50) ft	**1000-1500 viss**	**100- 200 miles**	_	**50**	**1 month**	**50**
		Large (60-70) ft	**1500- 2000 viss**	**200-300 miles**	**600 ft**	**20**	**1 month**	**20**
KyaukSin	LaungLon	Small (15-20) ft	300 viss	7-15 miles	-	_	24 hr (daily round trip)	25
		Medium (40-50) ft	**1000 viss**	**100 miles**	**-**	_	**20 days**	**5**
		Large (60-70) ft	**1500 viss**	**100-200 miles**	**-**	_	**20-25 days**	**5**
Ti Zit	LaungLon	Small (15-20) ft	300 viss	12 miles	-	200	_	400
Pyin Gyi	LaungLon	Small (15-20) ft	500 viss	30-35 miles	220 ft	2 or 3	24 hr (daily round trip)	26

Village	Township	Type of Boats	Carrying Capacity	Distance covered (miles)	Maximum water depth (ft.)	Number of HHs	Average fishing trip (time spent)	Number of Fishermen
		Medium (40-50) ft	800 viss	50- 60 miles	300 ft	3 or 4	72 hr (3days)	100
		Large (60-70) ft	**1000 vviss**	**100 miles**	**300-400 ft**	**5 or 6**	**5- 7 days**	**200**
Tha Bawt Seik	LaungLon	Small (15-20) ft	300 viss	10 miles	40 ft	10	24 hr (daily round trip)	30%
		Medium (40-50) ft	3000 viss	30 miles	200 ft	10	24 hr (daily round trip)	50%
		Large (60-70) ft	**10000 viss**	**100 miles**	**300-400 ft**	**15**	**24 hr (daily round trip)**	**20%**
Tha Bawt Seik	LaungLon	Small (15-20) ft	400 viss	10 miles	90 ft	80 HH	1 day	100 boats
		Medium (40-50) ft	**3000 viss**	**10-60 miles**	**330 ft**	**50 HH**	**7-8 days**	**50 boats**
		Large (60-70) ft	**10000 viss**	**over 60 miles**	**1500 ft**	**200 HH**	**25 days**	**200 boats**
Tha Bawt Seik	LaungLon	Small (15-20) ft	<1000viss	20 miles	115 ft.	70	7 days	80
		Medium (40-50) ft	**1000viss**	**30- 100 miles**	**130-190 ft.**	**80**	**1 month (summer) 10 days (rainy)**	**200**

Village	Township	Type of Boats	Carrying Capacity	Distance covered (miles)	Maximum water depth (ft.)	Number of HHs	Average fishing trip (time spent)	Number of Fishermen
		Large (60-70) ft	**>1000 viss**	**>100miles**	**>330 ft.**	**-**	**-**	**-**
San Hlan	LaungLon	Small (15-20) ft	300 viss	20-35 miles	115 ft.	5 per fishing boat	3-5 days	>40
		Medium (40-50) ft	500 viss	35-50 miles	130 ft.	7-8 per fishing boat	5-7 days	>50
		Large (60-70) ft	**1000-3000 viss**	**>100 miles**	**390 ft.**	**8-10 per fishing boat**	**7 days**	**>10**
Pan Tin Inn	LaungLon	Small (15-20) ft	Unknown	12 miles	100 ft.	30%	3 days	100
		Medium (40-50) ft	**Unknown**	**100 miles**	**600 ft.**	**-**	**30 days**	**around 100**
		Large (60-70) ft	**Unknown**	**Over 100 miles**	**600 ft.**	**30%**	**45 days**	**200**

Source: ERM Field Trip (2018), 1 viss = 1.34 kg, those shown in **bold** could have overlap of fishing grounds with Project Area.

From the data collected in July 2018, the townships with potential overlap of fishing activity and the Project Area are provided in bold in Table 5.6. This includes boats over 40 ft. long from Maung Ma Kan, KyaukSan, and Pan Tin Inn. Boats over 60 ft. long from San Hlan, Tha Bawt Seik, and Pyin Gyi also may fishing in the Project Area.

The best fishing grounds were roecorded as those around the islands; such as Bote Island and Heinze (Moscos) Islands. KyaukSin noted that the Project Area and offshore is their best fishing ground.

The impact to these offshore fisheries will be assessed in this IEE Report in *Chapter 6*.

5.8.2 *Oil and Gas Infrastructure and Activities*

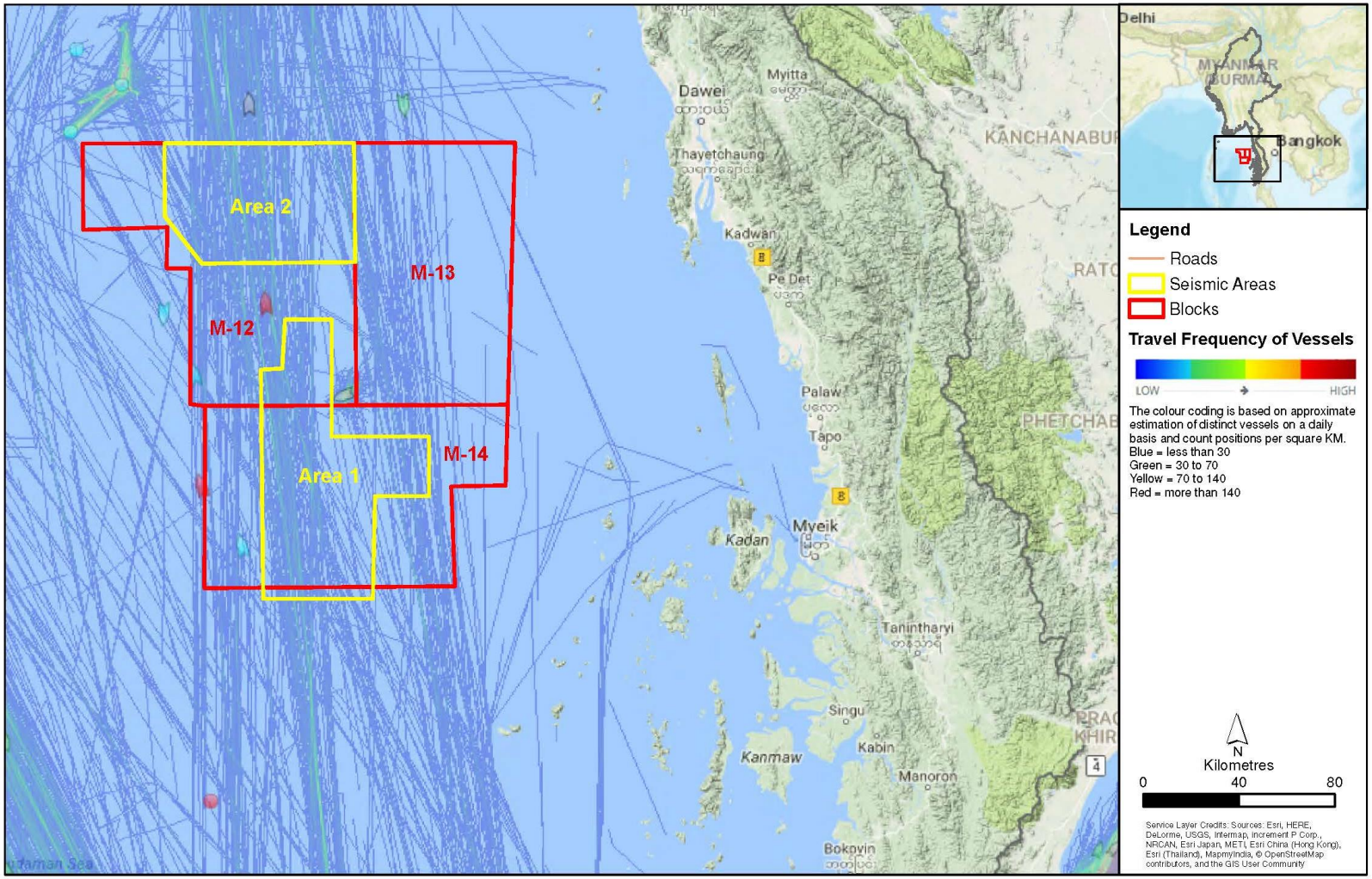
Blocks M-12, M-13, and M-14, in which the Project is located, are surrounded by other offshore Blocks including Block M-9 and M-11. It is understood that oil and gas production activities are being carried out in these blocks. An assessment of the potential cumulative impacts with other oil and gas operations is provided in *Chapter 7*.

5.8.3 *Shipping and Navigation*

Within offshore Tanintharyi Region waters, shipping and other marine traffic (excluding fishing) is typically limited to regional vessel movements. The main shipping lane in the area connects Yangon in Myanmar to Malaysia and Singapore via the Malacca Strait. As the western extent of the Project Area is located within this shipping lane, vessel encounters can be expected (*Figure 5.7*) (Marine Traffic Website, 2018).

Apart from regional shipping, there are existing levels of marine traffic within Blocks M-12, M-13 and M-14 associated with operation of the Yetagun Gas Field. Similarly, marine traffic *en route* to PTTEP's Zawtika Field from via the Malacca Strait may also pass through the Project Area.

Figure 5.7 Vessel Traffic Crossing the Project Area



Source: **https://www.marinetraffic.com**

5.9 PUBLIC HEALTH COMPONENTS

In Tanintharyi Region, there are 22 midwives, 22 nurses, and 11 medical doctors per 100,000 population. In 2011, the total number of hospitals in Tanintharyi Region was 30, and the average available hospital beds per 100,000 population was 72. (Myanmar Regional Statistics, 2013).

The health facilities in townships of Dawei District (the closest to the Project Area) are provided in *Table 5.7*.

Table 5.7 Health Facilities in Dawei, Long Lon, Tha Yet Chaug and Myeik townships

Township	Public Hospital	Private Hospital	Public Clinic	Private Clinic	Rural Health Centre (RHC)	Sub RHC
Dawei	3	4	4	8	7	22
LoungLon	3	-	1	-	7	31
ThayetChaung	3	-	-	-	6	26
Myeik	2	-	5	4	6	26

Source: Myanmar Population and Housing Census, 2015

5.10 CULTURAL COMPONENTS

There are no known offshore sites of culture heritage are identified as within the Project Area.

5.11 VISUAL COMPONENTS

Given that the Project is located over 125 km from the nearest habited land and over 70 km) from the nearest outlying islands of the Myeik Archipelago, there will not be any visual impacts from the Project.

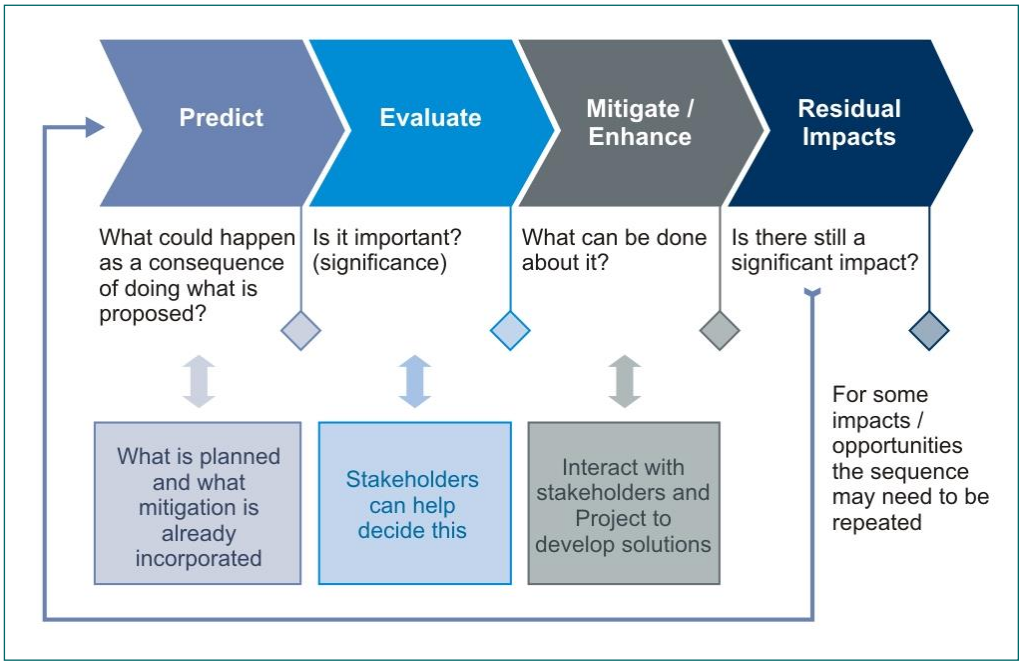
6 IMPACT ASSESSMENT

6.1 IMPACT ASSESSMENT METHODOLOGY

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process. The principal impact assessment steps are summarised in *Figure 6.1* and comprise:

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Figure 6.1 Impact Assessment Process



6.1.1 Prediction of Impacts

Prediction of impacts is an objective exercise to determine what could potentially happen to the environment as a consequence of the Project activities. This is a repeat of the process undertaken in scoping, whereby the potential interactions between the Project and the baseline environment are identified. In the impact assessment stage, these potential interactions are

updated based on additional Project and baseline information. From these potential interactions, the potential impacts to the various resources/receptors are identified, and are elaborated to the extent possible. The diverse range of potential impacts considered in the impact assessment process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

6.1.2 *Evaluation of Impacts*

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in *Table 6.1*.

Table 6.1 Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	The relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project footprint, projected for several kilometres, etc.).	Local Regional International
Duration	The time period over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	*[no fixed designations; intended to be a numerical value]*
Frequency	A measure of the constancy or periodicity of the impact.	*[no fixed designations; intended to be a numerical value]*

The definitions for the *type* designations are shown in *Table 6.2*. Definitions for the other designations are resource/receptor-specific, and are discussed in the resource/receptor-specific chapters.

Table 6.2 Impact Type Definitions

Designations (Type)	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., sound emitted from the survey leading to behavioural changes in marine fauna).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., reduction in water quality from waste discharges leading to toxic effects in marine fauna).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains **only to unplanned events** is **likelihood**. The **likelihood** of an unplanned event occurring is designated using a qualitative scale, as described in *Table 6.3*.

Table 6.3 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

6.1.3 Impact Magnitude, Receptor/Resource Sensitivity and Impact Significance

Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor-by-resource/receptor basis, as further discussed in each of the resource/receptor-specific chapters. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large

In the case of a *positive* impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the IA to

indicate that the Project is expected to result in a *positive* impact, without characterising the exact degree of positive change likely to occur.

In addition to characterising the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity / vulnerability / importance of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity / vulnerability / importance of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterising sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in *Figure 6.2.*

Figure 6.2 Impact Significance

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negligible**	**Negligible**	**Negligible**	**Negligible**
	Small	**Negligible**	**Minor**	**Moderate**
	Medium	**Minor**	**Moderate**	**Major**
	Large	**Moderate**	**Major**	**Major**

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/importance designations that enter into the matrix. *Box 6.1* provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the impact assessment process). An example of an embedded control is a standard

acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Box 6.1 Context of Impact Significances

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this impact assessment, ERM has adopted the following mitigation hierarchy:

- **Avoid at Source; Reduce at Source**: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site**: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor**: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).

- **Repair or Remedy**: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.

- **Compensate in Kind; Compensate Through Other Means**: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

Management and Monitoring

The final stage in the impact assessment process is definition of the management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An Environmental and Social Management Plan, which is a summary of all actions which PCML has committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the IEE report. The Environmental and Social Management Plan includes mitigation measures, compensatory measures and offsets and management and monitoring activities.

6.2 *IDENTIFICATION OF POTENTIAL IMPACTS OF THE PROJECT*

For the Project, potential impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental and social resources or receptors.

The results from the scoping process for the Project are presented in the Scoping Matrix in *Table 6.4*. The scoping matrix displays Project activities against resources/receptors, and supports a methodological identification of the potential interactions each Project activity may have on the range of resources/receptors within the Area of Influence for the Project.

Table 6.4 Potential Interactions and Significance of Impacts to Receptors / Receivers from the Project

Resource/ Receptors	Physical				Biological							Socio-Economic				
Project Activity	Sediment Quality	Seabed Features/ Profile	Marine Water Quality	Air Quality	Marine Mammals	Fish & Pelagic Communities	Planktonic Communities	Marine Habitats & Benthic Communities	Marine Reptiles	Seabirds	Fishing Community/ Fisheries	Shipping (Navigation etc.)	Subsea Infrastructure	Occupational Health and Safety	Public Health & Safety
Marine Seismic Survey															
Presence of Survey Vessel and Equipment															
Air Emissions															
Vessel Operational Discharges to Sea															
Noise Emissions															
Waste Generation and Disposal															
Unplanned Event															
Accidental Spills/ Leakage															
Dropped Objects/ Lost Equipment															
Collisions / Entanglement with other marine users (shipping / fishing)															
Collisions / Entanglement with marine fauna															
Introduction of invasive species															

Key	
Interaction not reasonably expected	
Non-Significant Impact	
Potentially Significant Impact	

6.2.1 *Scoped out impacts*

A summary of the impacts scoped out of the impact assessment and the associated rationale is provided in *Table 6.5*.

Table 6.5 Scoped Out Impacts and Rationale

Impact	Rationale for scoping out of Assessment
Impacts from presence of vessels on marine habitats and species (excluding turtles)	The seismic vessel and equipment will be located on or near to the sea surface in at least 100 m water depth. As such, there is no potential for impact on marine seabed habitats or species from the presence of the vessel and equipment. The potential for the vessel to collide with marine fauna (especially mammals) is not expected to be significant given vessel type (hull displacement vessels), small number of vessels (3-5) and slow speeds (4 to 6 knots during survey and 10 to 12 knots when *en route*). Presence of vessels will represent a small and insignificant incremental increase in vessel traffic and the survey will be temporary; lasting for around 2-3 months.
Impacts from exhaust emissions on ambient air quality	Fuel combustion to power engines and electrical generators on-board vessels are the main sources of air emissions. As the emissions will be temporary and small in volume, significant impacts to air quality are not considered likely. As such, no knock on impacts to public or occupational health and safety are expected. In addition, as the vessels will be in compliance with MARPOL Regulations for the prevention of air pollution from ships (Annex VI), no significant impacts on ambient air quality are anticipated.
Impacts from vessel discharges on marine habitats	Sensitive marine habitats are found in shallow waters, generally less than 20 m water depth. As the survey will not be undertaken in under 100 m water depth, vessel discharges will not impact these habitats. Waste discharges to the marine environment from vessels will be limited in volume and comply with MARPOL Regulations therefore no significant impacts are likely.
Impacts from the introduction of invasive species	Project vessels can inadvertently introduce invasive alien species by ballast water or as fouling organisms on the vessels hull. The seismic vessel will use a small volume of ballast water. The vessel is mobilising from Singapore and will exchange ballast water as required during transit. The seismic vessel will not be calling at a port in Myanmar so there is no risk that any ballast water would be exchanged very close to the coast. Therefore no significant impacts are expected.
Impacts from dropped objects on marine habitats	Accidental incidents involving objects dropped over board from vessels during the survey have the potential to disturb the seabed. However, given operations will be undertaken in accordance with approved plans and procedures such events are unlikely to occur and considered to be insignificant. In addition, the marine benthic habitats within the Project Area are considered to be of low sensitivity and would most likely consist of sandy or muddy seabed sediment.

Impact	Rationale for scoping out of Assessment
Impacts from underwater sound on marine invertebrates and corals	Impacts from underwater sound are not anticipated on marine invertebrate species or coral reefs. Coral reefs and their associated polyps are not known to have sound sense organs indicating that they are unlikely to be impacted by increased exposure to sound. This is supported by the surveys undertaken in Australia investigating the impacts of 3D seismic surveys on coral reefs which demonstrated that impacts to corals do not occur through the use of airguns (Grebe et al, 2008). Furthermore, the survey is expected to be at least 35 km away from the nearest coral habitats in the Myeik Archipelago. Although without sensory organs to perceive sound pressure, some invertebrates can detect the particle motion component of sound via mechanoreceptors and hairs and in this way can detect seismic sound source at close ranges (within 20 meters). However, as these invertebrates are associated with the seabed and as the survey is being conducted in water depth in excess of 100 m there is limited potential for invertebrates to detect and therefore be impacted by underwater sound from the surveys.
Impacts from unplanned collisions with marine fauna	Some offshore vessels can sometimes collide with large marine fauna (whales). This is more likely to fast moving shipping vessels. The seismic vessels will be slow moving and the marine mammals would be able to avoid any collision. As such, this has been scoped out of the impact assessment.

6.2.2 *Key Potential Impacts*

The scoping of impacts indicates that the majority of identified potential impacts are not expected to be significant (i.e. those scoped out above). For activities predicted to have no significant impact (i.e. those in white in the Matrix), no detailed quantification or further assessment will be conducted in this IEE Report.

For activities where possible significant effects could occur, these interactions will be assessed in more detail within this IEE Report. Those interactions include:

- Potential impacts from the physical presence of the survey vessel and equipment on fishing communities and fisheries (including livelihoods of fishermen);
- Potential impacts from increases in underwater sound from air guns on marine mammals, marine turtles, and fish;
- Potential impacts from unplanned collision and entanglement of marine turtles and the survey equipment;
- Potential impacts from collision with vessel / entanglement of equipment with fishing vessels and gear and shipping vessels; and

- Potential impacts from accidental spills of chemicals or fuel (e.g. during offshore re-fuelling) on marine water quality.

Drawing on the outcomes of scoping, *Section 6.3* presents the detailed assessment of the key potential environmental and social impacts associated with the 3D seismic survey.

6.3 IMPACTS ON FISHERIES AND FISHING COMMUNITIES

6.3.1 Source of Impact

The stakeholder consultation undertaken in July 2018 was utilised to gather information on the type and scale of fishing that could occur in the Project Area.

The assessment will focus on fishing activity in deep water at a distance of 125 km from the mainland coast.

The Project could impact fishers from the presence of the seismic and other Project vessels and the overlap of these with the local fishing grounds. Temporary disturbance of fishing activities may occur during the 2-3 month seismic activity period due to the presence of the vessels and associated 500 m safety exclusion zone.

The winter season (November to April) was identified as the main fishing season. The Project is scheduled to be conducted from October to December and therefore overlaps with this time.

From the data collected in July 2018, the townships with potential overlap of fishing activity and the Project Area are provided in bold in Table 5.6. This includes boats over 40 ft. long from Maung Ma Kan, KyaukSan, and Pan Tin Inn. Boats over 60 ft. long from San Hlan, Tha Bawt Seik, and Pyin Gyi also may fishing in the Project Area.

The preferred fishing grounds were recorded as those around the islands; such as Bote Island and Heinze (Moscos) Islands. KyaukSin noted that the Project Area and offshore is their preferred fishing ground.

6.3.2 Existing/In Place Controls

The following controls have been identified:

- Detailed plan for seismic survey vessel movement in the Project Area.
- Chase vessel with Myanmar speaking Fisheries Liaison Officers (FLOs) will be employed to ensure navigational safety and appropriate management of fishing interactions.
- Mobile exclusion zone of 500 m radius around the seismic vessel and equipment, limiting the duration and extent of disruption to the fishing activity in any area.

- Timely sharing of information on the movement of seismic survey through Notice to Mariners.

- Disclosure and implementation of the grievance mechanism for the Project and timely investigation of any grievances.

6.3.3 Significance of Impacts

During the seismic survey, a safety exclusion zone will be maintained around the seismic survey vessel to avoid collision with other vessels in the area. The implementation of exclusion zone may temporarily displace fishing activities, thus potentially affecting the livelihood of the community that are fishing within the Project Area.

The survey is short-term (2-3 months) and the vessel is only likely to be in one area for a few days as it is always moving. The survey will not exclude fishing in the area but rather cause temporary displacement of any potential fishing activities from the area in the immediate vicinity of the seismic vessel. As such, fishing vessels will be able to avoid the area of the seismic vessel. The Project is located in Fishing Blocks D25, D26, E2, E3, E8, E9, E1, E14, & E15. Each Fishing Block is 30*30 nautical miles (3,000 km^2) so a total for the nine fishing Blocks is 27,000 km^2. As the Project Area is 8,900 km^2; around 0.3% of the total Fishing Grounds in the Project Area could be impacted. However, the actual area excluded is only around the vessel and is 0.172 km^2 which is less than 0.01% of one fishing Block.

As such, impacts to fishing activities will be temporary and only located in the area around the vessel which is small in comparison to the total area of fishing offshore. The vessel presence may cause short-term displacement of fishing activities within the immediate vicinity of the seismic vessel. With the existing control measures in place, it is expected that the impacts on fishing activities and the fishing community will be **Minor** (*Table 6.6*).

Table 6.6 Assessment of Impacts on Fisheries and Fishing Communities

Impact	Fisheries and Fishing Community				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Affect the fishing groups active in the Project Area				
Frequency	2-3 months				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	**Minor**	Moderate	Major	

6.3.4 *Additional Mitigation, Management and Monitoring*

The assessment has indicated that the impacts on fisheries and fishing communities are considered to be **Minor.** As such, no additional mitigation or monitoring activities are considered necessary over and above the existing or in-place controls.

6.3.5 *Significance of Residual Impacts*

Based on the assumption that PCML will be able to control and mitigate the impacts arising from its Project activities, the impacts on fisheries and fishing communities are likely to be **Minor**.

6.4 *IMPACTS FROM UNDERWATER SOUND GENERATION ON MARINE FAUNA*

6.4.1 *Source of Impact*

The seismic survey will use individual airguns, ranging in size from 20 – 250 cubic inches with a total airgun array volume around 3,000 cubic inches. The airguns will be towed behind the seismic vessel at as water depth of around 8 m and will be firing at intervals of 7.5 seconds with a shot point interval of 12.5 m. This will lead to increases in ambient underwater sound levels and the generation of sound pressure levels from the operation of air guns. Underwater sound generation has the potential to impact marine mammals, marine turtles, and fish that are sensitive to noise. The potential impacts of underwater sound on these receptors are discussed separately in the following sections. Given the distance from the nearest coastal communities (coral reefs, etc.) these are not included in this impact assessment as the noise will not impact these areas.

Marine Mammals

Marine mammals can be adversely impacted by sound from seismic surveys as it can affect their ability to echolocate, communicate, and may cause physical harm (through disorientation leading to beaching, and in extreme cases, trauma to the auditory apparatus). For marine mammals, there have been no confirmed cases where exposure to seismic airgun noise directly caused mortality or serious injuries (Southall et al, 2007). Sound can also cause certain cetacean species to exhibit behavioural changes such as avoidance or displacement and in some cases can cause a change in vocalisations, diving and foraging activities, and migratory pathways (Weilgart, 2013).

It is concurrently inconclusive whether injuries recorded in marine mammal species are from direct exposure to underwater sound. These injuries observed in marine mammals are mainly related to damaged auditory (hearing) organs (Southall et al, 2007) and may lead to temporary threshold shift (TTS) or permanent threshold shift (PTS). TTS is a hearing impairment where the animals' hearing threshold rises temporarily and a sound must be louder to be heard. TTS can last for a few minutes to a few days before full recovery is achieved. PTS occurs when there the animal suffers physical

damage to the sound receptors leading to total or partial deafness, or an impaired ability to hear sounds within specific frequency ranges (Southall et al, 2007).

Vocalisation changes have been recorded in cetacean species where it may represent attempts to overcome 'masking' effects and compensating for the additional noise in the environment (Di Iorio and Clark, 2010). These changes have been observed in response to sound generation from anthropogenic activities such as shipping, sonar use, and seismic activities. Of the marine mammal species potentially present in Myanmar waters, blue whales (*Balaenoptera musculus*) have been observed to call more frequently when seismic surveys were being conducted (Southall et al, 2007), humpback whales (*Megaptera novaeangliae*) changed their singing behaviour (Miller et al, 2005), and both pilot whales (*Globicephala melas*) and bottlenose dolphins (*Tursiops truncatus*) produced more whistles. Some species such as sperm whales (*Physeter macrocephalus*) and humpback whales have also shown to decrease or ceasing calls in response to noise exposure from seismic surveys, and fin whales (*Balaenopterid physalus*) in response to ship noises (IWC, 2007). Vocalisations are considered to be used by marine mammals for communication in feeding, mating, threat avoidance, and socialising and can therefore affect marine mammal populations.

Increases in ambient underwater sound can also have behavioural changes on marine mammals such as changes in their surface behaviour in the presence of seismic noise (Weilgart, 2013). The movements of sperm whales in the Gulf of Mexico were recorded before, during, and after seismic exposures where it was observed that individuals swimming speed and foraging behaviour appeared reduced. Other changes observed in marine mammals in response to increases in anthropogenic underwater sound included a decrease in the frequency of dives as well as changes in diving depths (Richardson et al, 1995), an increase in the amount of time spent at the surface (Stone and Tasker, 2006) and increased swimming rate (IWC, 2007).

Marine Turtles

Marine turtles are considered less susceptible to increases in ambient underwater sound increases than marine mammals. However, turtles hearing range of highest sensitivity is at lower frequencies, with peak hearing range of sea turtles from around 200 to 700 Hz (Samuel et al, 2005) and as such could be sensitive to the low frequency sounds generated by seismic surveys (typically from 10 to 300 Hz). Limited information is available on the effects of increased underwater sound on turtles, however the impacts are likely to be similar to other marine animals including temporary or permanent hearing damage and avoidance behaviour (McCauley et al, 2000).

There are no available data on injury or mortality of turtles in relation to exposure to increases in underwater ambient sound. Behavioural changes have been recorded in green turtles and hawksbill turtles when exposed to noise levels higher than 166 dB re 1 µPa (rms) and when levels were higher than 175 dB re 1 µPa (rms) demonstrated "erratic behaviour" or "agitation"

(Mccauley et al, 2000). The airguns used for the seismic survey will be up to 259 dB at 1 m for the array. Hypothetical studies on turtles in relation to 3D seismic surveys have shown that turtles could exhibit responses out to 2 km from the sound source and avoidance behaviour out to an estimate 1 km form the sound source (McCauley et al, 2000). As with marine mammals, turtles have also been observed to alter their diving behaviour in response to underwater sound. Some loggerhead turtles (*Caretta caretta*) in the Mediterranean Sea were observed to dive following an airgun shot (DeRuiter and Doukara, 2012). In some instances, turtles were found to adapt to the noise after prolonged exposure although they did exhibit avoidance behaviours during initial exposure.

Although turtles are considered less sensitive to increases in underwater sound than marine mammals, they are also less capable of quickly moving away. Marine turtles also show strong fidelity to specific nesting beaches and associated migratory corridors and it is therefore considered they can be susceptible to impacts which could alter these migrations.

The Project Area is 125 km from the mainland coast of Myanmar and is thus not likely to impact mainland nesting beaches. There are known green turtle nesting beaches on the Myeik Archipelago, the closest is located over 70 km from the Project Area. As such, there is a potential for migratory routes of turtles to these nesting beaches to be impacted by underwater sound generation by the Project.

Fish

There is a lack of understanding about the effect of increases in sound on fish species. Research into underwater sound and the associated responses from fish species is currently based on a limited number of species (Popper and Hastings, 2009). Some fish, such as Clupeids (e.g. herring and anchovy) are considered to be hearing "specialists" in that they have evolved specialised anatomical structures that enhance hearing sensitivity and hearing range. Many other species of fish (such as groupers and snappers) are not considered as sensitive to underwater sound. Fish are generally considered to have good low frequency hearing and are likely to hear seismic shots up to several kilometres from the source.

Underwater sound can potentially cause behavioural changes in fish species. Behavioural changes in relation to exposure to sound have been observed in fish species with noticeable changes in fish swimming behaviour expected from 1 to 5 km of the seismic source, depending on the species threshold and the sound level/ transmission loss. Although there are no conclusive studies on fish behavioural changes in relation to increases in ambient underwater sound, no reported significant effects have been reported by numerous studies. However, there are a number of studies which have shown that fish will immediately leave the area around the sound source; this avoidance area can in some instances be up to 2 km (Turnpenny an Nedwell, 1994). It should be noted that any behavioural changes to fish have been observed to

be short-lived and fish tend to exhibit normal behaviour after an initial startle or avoidance response (Wardle et al, 2005).

In relation to coral reef species, studies conducted into the response of fish and invertebrates have found no permanent changes in behaviour on the reef (Wardle et al, 2005). At its closets extent, the Project Area is located 70 km from any potential reef areas and will not impact coral reefs or species associated with coral reefs.

The potential for physical injury of fish in relation to underwater sound is greater in species which have swim bladder as the organ is unable to adapt quickly enough to the high intensity seismic pressure waves. However, this type of physical injury is only likely in very close proximity (a few metres) to the sound source and therefore, is highly unlikely for adult fish. Eggs and larvae in close proximity to the sound source could be physically injured as they are present near the sea surface and unable to avoid the sound. However, the amount of eggs and larvae likely to be impacted by exposure to sound is not considered to be significant when compared to the large areas in which eggs and larvae would cover in the water column (Popper and Hastings, 2009).

6.4.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts from underwater sound generation will include:

- Optimum airgun configurations will be selected to ensure that the lowest possible sound level for the required activity and to ensure that guns are positioned as such to reduce the extent sound can travel underwater.
- A soft-start procedure will be utilised at the commencement of the seismic survey. The seismic sound will slowly build up to allow adequate time for marine fauna to leave the area.
- Dedicated Marine Species Observers will be on-board the seismic vessel to undertake the pre-shoot search. If any marine turtles or mammals are observed within 500 m of the seismic vessel, the seismic activity start-up will be postponed until the animals have moved away.
- Use of Passive Acoustic Monitoring (PAM) to detect whether any marine mammals are in the vicinity of the seismic vessel during night time or low visibility operations.
- Implement JNCC Guidelines ([1]) including the preparation of specific protocols for the management of marine mammal and turtle interactions in contractors' management plans.

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

6.4.3 *Significance of Impact*

The above measures will help reduce the potential that any fish, turtle, or marine mammals are present in the vicinity of the seismic vessel which in turn reduces the potential for impacts related to the increase in underwater sound.

Fish, turtles, and mammals and highly mobile and are likely to avoid the area of increased sound around the vessel. As such, any impacts will be localised to a few kilometres around the vessel and a small number of individuals. The resultant magnitude of the impact is therefore considered to be small. It is anticipated that with all the existing control measures in place the impact will be of **Moderate** (*Table 6.7*) significance for turtles and mammals as these are highly sensitive receptors. As fish are consider to have medium sensitivity the resultant impact significance will be **Minor** (*Table 6.8*).

Table 6.7 Assessment of Impacts from Increases in Ambient Underwater Sound on Marine Mammals and Turtles

Impact	Increase in underwater sound leading to behavioural changes or physical impact on marine mammals and turtles				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Localised potential injury to a small number of individuals.				
Frequency	Frequent.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	**Moderate**	Major	

Table 6.8 Assessment of Impacts from Increases in Ambient Underwater Sound on Fish

Impact	Increase in underwater sound leading to behavioural changes or physical impact on fish				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Localised potential injury to a small number of individuals.				
Frequency	Frequent.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	**Minor**	Moderate	Major	

6.4.4 *Additional Mitigation, Management and Monitoring*

The mitigation measures adopted by the Project are considered international best practise for reducing the impact of underwater sound from seismic surveys on marine fauna. Although the impact is of Moderate significance for turtles and mammals, it is highly unlikely given the control measures in place that there will be any significance impact on marine mammals or turtles.

6.4.5 *Significance of Residual Impacts*

The residual impact from increases in ambient underwater sound from seismic surveys is considered to be of **Moderate** significance on marine mammals and turtles. With the additional mitigation in place, the impact on fish (including reef species) will be of **Minor** significance.

6.5 *IMPACTS FROM UNPLANNED COLLISIONS WITH MARINE TURTLES AND EQUIPMENT*

6.5.1 *Source of Impact*

The seismic survey will use towed streamers which have tail buoys attached to the end. There is the potential risk of collision with or entrapment of marine turtles. The potential for marine mammals to become entangled or trapped in seismic equipment is rare. However, turtles are smaller and less mobile than marine mammals and could potentially become entangled in the towed seismic equipment. Turtles also need to approach the water surface in order to breathe which increases the potential for entrapment. Turtles becoming fatally trapped in seismic equipment has been reported off of West Africa in 2007 (Weir, 2007).

6.5.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts from towed equipment will include:

- The Project will install turtle guards on seismic survey tail buoys in order to reduce the risk of trapping turtles in the seismic equipment. Turtle guards are designed to prevent turtles from entering gaps in the subsurface structure of the tail buoy which can potentially lead to drowning.
- A soft-start procedure will be utilised at the commencement of the seismic survey. The seismic sound will slowly build up to allow adequate time for marine turtles to leave the area.
- Dedicated Marine Species Observers will be on-board the vessel to undertake the pre-shoot search. If any marine turtles are observed within 500 m of the seismic vessel, the seismic activity will be postponed until the animals have moved away.
- Implement JNCC Guidelines including the preparation of specific protocols for the management of marine mammal and turtle interactions in contractors' management plans. The JNCC guidelines reflect best international practice for seismic operators to follow during the planning, operational and reporting stages.

6.5.3 *Significance of Impact*

The above control measures will help reduce the potential that any marine turtles are present in the vicinity of the seismic vessel which in turn reduces the potential for turtles to collide with seismic survey equipment. Turtles are likely to avoid the area of increased sound around the vessel. As such, any impacts will be infrequent, localised, and will only potentially affect a very small number of individuals. In addition, the likelihood of the impact occurring is rare and as such the impact magnitude is considered to be small. Turtles are a highly sensitive receptor given that they have international protected status and are a species of conservational concern on the IUCN Red List; as such the impact will be of **Minor** significance (*Table 6.9*).

Table 6.9 ***Assessment of Impact of Collision with or Entrapment of Marine Turtles by the Seismic Survey Vessel or Hydrophone Streamers***

Impact	Marine Turtle entrapment in seismic equipment				
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Localised potential injury and mortality to a small number of individuals				
Frequency	Infrequent				
Likelihood	Rare				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	**Minor**		Moderate	Major

6.5.4 *Additional Mitigation, Management and Monitoring*

The assessment has indicated that the impacts associated with collision with or entrapment of marine turtles by the operating seismic survey vessel and the hydrophone streamers are considered to be of **Minor** significance**.** No additional mitigation or monitoring activities are considered necessary over and above the existing or in-place controls.

6.5.5 *Significance of Residual Impacts*

The residual impact on turtles from towed equipment is deemed to be of **Minor** significance.

6.6 *IMPACTS FROM UNPLANNED COLLISIONS ON FISHING VESSEL AND OTHER MARINE USERS*

6.6.1 *Source of Impact*

Collisions between fishing vessels and seismic survey activities would most likely result in damage to fishing gear (e.g. nets/lines entangled in the equipment or the survey vessel) and damage to the survey equipment. Other key concerns with regard to interactions with other vessels include potential

for loss of life in the event of a collision, associated pollution effects (fuel oil spillage – covered in *Section 6.7*) and damage to the streamers. Accidental collisions with fishing vessels could also lead to a reduction in fishing revenue, and knock on economic impacts on the fishing community.

The issues associated with other marine users are the same as those mentioned above for fishing except for damage to fishing gear.

6.6.2 Existing/In Place Controls

In order to minimize the risks associated with the seismic survey to other vessels, the following mitigation measures will be put in place:

- Detailed plan for seismic survey vessel movement in the Project Area.
- Chase vessel with Myanmar speaking Fisheries Liaison Officers (FLOs) will be employed to ensure navigational safety and appropriate management of fishing interactions.
- Mobile exclusion zone of 500 m radius around the seismic vessel and equipment, limiting the duration and extent of disruption to the fishing activity and other marine users in any area.
- Timely sharing of information on the movement of seismic survey.
- Disclosure and implementation of the grievance mechanism for the Project and timely investigation of any grievances.

6.6.3 Significance of Impacts

The mitigation measures applicable to impacts to fisheries and fishing activities (*Section 6.3*) are also applicable to reducing the impact of collisions. The seismic vessel will be accompanied at all times by a chase vessel that would act as a fishing liaison vessel and will also look out for the presence of other marine users. Collisions are extremely rare. Given the measures in place, the risk of collision between the survey vessel and fishing or shipping vessels is considered low.

With the existing controls, the impacts from potential collisions are likely to be **Minor** (*Table 6.10*).

Table 6.10 Assessment of Impacts on Fishing Vessel and Other Marine Users

Impact	Fishing Vessel and Other Marine Users			
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	Affect the vessels using the Project Area			
Frequency	Duration of the survey activities			
Likelihood	Rare			
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High	
Impact Significance	Negligible	**Minor**	Moderate	Major

6.6.4 *Additional Mitigation, Management and Monitoring*

The assessment has indicated that the impacts are **Minor.** As such, no additional mitigation or monitoring activities are considered necessary over and above the existing or in-place controls.

6.6.5 *Significance of Residual Impacts*

Based on the assumption that PCML will be able to control and mitigate the impacts arising from its Project activities, the impacts on fishing vessels and other marine users are likely to be **Minor**.

6.7 *IMPACTS FROM UNPLANNED SPILLS ON MARINE FAUNA*

6.7.1 *Source of Impact*

There is the potential for an unplanned or accidental spill of fuel from the vessels (e.g. during refuelling) which could lead to water contamination and secondary impacts to biodiversity. The seismic vessel is likely to use fuel which is non-persistent oils (such as marine gas oil or marine diesel oil). These spills would evaporate quickly in the open ocean environment (such as that found in the Project Area) and would be rapidly diluted and dispersed by ocean currents. Surface spills would generally only effect animals in close proximity and given the distance offshore there is unlikely to be large numbers of birds on the sea surface within the area of the Project. In addition, spills of this nature are extremely rare and have a very low likelihood of occurring.

6.7.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts from underwater sound generation will include:

- Vessel standard operating procedures to be prepared.
- Contingency plans, e.g. oil spill response plan, and spill control kits to be formulated and implemented

- Proper training and protocols, e.g. Emergency Management Plan to be prepared and implemented.

6.7.3 *Significance of Impact*

The above measures will help reduce the likelihood that a spill would occur. Given the type of fuel likely to be used and the area in which it could potentially be spilt (over 70 km from the nearest coastline), there is unlikely to be a significant effect on marine fauna and would be small magnitude impact. The main species and habitats to be impacted by an oil spill (such as birds, fish and coastal habitats) are of medium sensitivity and as such the impact would be of **Minor** significance overall (*Table 6.11*).

Table 6.11 Assessment of Impacts from Accidental Spills on Marine Fauna

Impact	Water contamination and secondary impacts to biodiversity from accidental spills				
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Localised potential to a small number of individuals				
Frequency	Infrequent				
Likelihood	Rare				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	**Minor**		Moderate	Major

6.7.4 *Additional Mitigation, Management and Monitoring*

Provided that the control measures are in place, the likelihood of a spill occurring is extremely low and no additional mitigation is required.

6.7.5 *Significance of Residual Impacts*

The residual impact from an unplanned or accidental spill would be of **Minor** significance.

7 CUMULATIVE IMPACT ASSESSMENT

7.1 METHODOLOGY AND APPROACH

Cumulative impacts encompasses impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. IFC (2012) defines cumulative impacts as those generally recognised as important on the basis of scientific concerns and or concerns from affected communities[1].

Cumulative impacts summarised in this section refer to the additional impacts that may be generated by other developments or activities in the vicinity of the Project Area, that when added to the impacts of the proposed seismic survey combine to cause a greater impact. Such impacts may arise due to spatial overlap (e.g. overlap in spatial extent of water quality changes) or temporal overlap (e.g. sound impacts caused by seismic activities at the same time from different sources).

7.2 CUMULATIVE IMPACT ASSESSMENT

The Project Area is surrounded by oil and gas blocks operated by other Companies however, at the time of writing there are no other oil and gas activities in these Blocks that are likely to overlap with the timing of the Project activities.

However, near the Project Area is the existing Yetagun Platform and PCML are also planning on drilling some exploration and infill wells in the vicinity of the seismic survey. There could be overlap with these activities.

The main impacts arise from the temporary disturbance of fishing activity, specifically fishermen that fish near the continental shelf area where the Project Area overlaps with potential fishing grounds. The mitigation measures listed in the above sections are standard international best practise and will be adopted during all drilling and seismic activities.

With the standard mitigation measures in place, any impacts are unlikely to marine species will be of **Minor** significance.

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**.

In terms of social impacts, although the Project Area is large the exclusion zone will be limited to a mobile safety zone around the vessel and a stationary zone around the drilling rig. As such, the area from which fishermen will be

(1) IFC Performance Standards on Environmental and Social Sustainability, January 2012, International Finance Corporation, World Bank Group

temporarily displaced is relatively small. It is expected that the social impacts from the seismic surveys, if properly mitigated, will be localised to the area where fishing occurs and temporary in nature (a few days). Therefore, the impact will be of **Minor** significance to fishing activities but this is expected to be a **Negligible** impact on livelihoods.

8 ENVIRONMENTAL MANAGEMENT PLAN

This document provides the Environmental Management Plan (EMP) for the planning and operation of the Project. This EMP 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 PCML has committed. In addition, this EMP is used to ensure compliance with statutory requirements and corporate sustainability policies.

8.1 PROJECT DESCRIPTION BY PROJECT PHASE

The Project Area is located in the offshore waters of south western Myanmar. It is over 125 km from the mainland and 70 km from the closest outlying island. The marine seismic survey will commence in October 2018 and will run for approximately 2-3 months. There will be a seismic vessel supported by one to the support/chase vessels. The Project Area covers an area of 8,900 km^2. As this Project is only exploration activity, there is only one Phase – Operation. There is no permanent infrastructure so no pre-construction, construction, or decommissioning phases.

8.2 PROJECT'S ENVIRONMENTAL, SOCIO-ECONOMIC, POLICIES AND COMMITMENTS, LEGAL REQUIREMENTS, AND INSTITUTIONAL ARRANGEMENTS

The Project is being conducted in line with PCML HSE Management Policy, the requirements of the Production Sharing Contract (PSC), Myanmar regulatory requirements, and international conventions, standards and guidelines.

A summary of the Project environmental and social standards are shown in *Table 8.1*.

8.3 SUMMARY OF IMPACTS AND MITIGATION MEASURES

The IEE has assessed the potential impacts and proposed mitigation and management measures to reduce the level of the impact. The IEE concluded that potential impacts are typically short term and are well understood from previous experience in the industry, with little or no evidence of adverse consequences on the majority of environmental or social receptors.

Through the Project development and the IEE process, PCML has made commitments to ensure appropriate environmental and social performance. A summary of the Project impacts and the committed measures designed to manage and mitigate those impacts is presented in *Table 8.2.*

Table 8.1 Project Environmental and Social Standards

Environmental Parameter	Standard	Requirement
Air Emissions	MAPROL Annex VI	• Vessels will be in compliance with applicable MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI). • Use of low sulphur fuel (sulphur content not to exceed 3.5% m/m) when it is available • An International Air Pollution Prevention (IAPP) certification for the seismic survey vessel, support vessel and chase vessels as applicable or required by vessel class.
Sewage	MARPOL Annex IV / NEQ Guidelines	• The Project vessels will comply with applicable MARPOL requirements, including: discharge of untreated sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land. • Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land. • The discharge of sewage can only occur when the vessel is en route and travelling at no less than 4 knots. • An International Sewage Pollution Prevention (ISPP) certificate and International Oil Pollution Prevention (IOPP) certificate will be required, as appropriate to vessel class.
Waste Discharges (including food waste)	MARPOL Annex I & V	• Vessels will operate in compliance with MARPOL Annexes I: any oil-in-water content of discharges should not exceed 15 ppm. • General waste (excluding food) will not be disposed of to sea in line with MARPOL Annex V Requirements. • Combustible wastes will be segregated and disposed by incinerator on-board, should an incinerator be available on the selected vessel (in line with MARPOL Annex V requirements). No discharge of food waste is permitted less than 3 nm from the coast. Maceration is required at greater than 3 nm and less than 12 nm from the coast. Hazardous wastes will be stored on the vessels in appropriate containers with labels. • Hazardous waste storage will be designated in accordance with their Materials Data Sheet (MSDS) (in line with MARPOL Annex V requirements). Hazardous wastes will be returned to the vessels' selected shore base and sent to a licensed disposal facility by a licensed waste contractor (in line with MARPOL Annex V requirements).
Underwater sound generation	JNCC Guidelines (1)	The Project will implement the JNCC Guidelines including alignment of Contractor operating procedures with JNCC Guidelines. These guidelines include: • A soft-start procedure will be utilised at the commencement of airgun firing to allow adequate time for marine mammals, turtles, and whale sharks to leave the area. • Dedicated Marine Mammal Observers (MMOs) will be on-board to undertake the pre-shoot search. Use of Passive Acoustic Monitoring (PAM) to detect whether any marine mammals are in the vicinity of the seismic vessel during night time or low visibility operations.
Spills	MARPOL Annex I	Support and chase vessel standard operating procedures to be prepared and implemented including (if appropriate) an offshore bunkering procedure. Shipboard Oil Pollution Emergency Plans (SOPEPs) will be prepared and implemented.

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

Table 8.2 Summary of Mitigation and Management Measures

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
Atmospheric emissions generated from internal combustion engines of the seismic, support and chase vessels	SS1	Reduction in localised air quality from vessel air emissions	SS1.1	Vessels will be in compliance with applicable MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI).	Not Assessed (scoped out)	SS1.1.1	Contractor to provide MARPOL certification for the seismic vessel.	Contractor	Pre-survey	MARPOL Certification
			SS1.2	Use of low sulphur fuel (sulphur content not to exceed 3.5% m/m) when it is available		SS1.2.1				
			SS1.3	An International Air Pollution Prevention (IAPP) certification for the seismic survey vessel, support vessel and chase vessels as applicable or required by vessel class.		SS1.3.1				
Routine discharges from seismic survey and support/chase vessels	SS2	Impacts of sewage on marine water quality and localised impacts to marine biota	SS2.1	The seismic survey vessel and support vessels will comply with applicable National Environmental (Emissions) Quality Guidelines (NEQ Guidelines) which are those listed in the applicable MARPOL 73/78 Annex IV requirements, including: • The discharge of untreated sewage into the sea is prohibited, except when the vessel is in operation, an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the coast; • Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land; • The discharge of sewage can only occur when the vessel is en route and travelling at no less than 4 knots. • International Sewage Pollution Prevention (ISPP) certificate, as appropriate to vessel class.	Not Assessed (scoped out)	SS2.1.1	Contractor to provide MARPOL certification for the seismic vessel.	Contractor	Pre-survey	MARPOL Certification

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
	SS3	Impacts of putrescible (food) wastes on marine water quality and localised impacts to marine biota	SS3.1	The vessels (as applicable or required by vessel class) will comply with applicable National Environmental (Emissions) Quality Guidelines (NEQ Guidelines) which are those listed in the applicable MARPOL 73/78 Annex V requirements (Reg. 3). • No discharge of food waste is permitted less than 3 nm from the coast. • Food waste will be macerated into smaller pieces (25 mm) prior to discharge overboard (if discharged <12 nm from shore) in line with MARPOL Annex V Requirements.	Not Assessed (scoped out)	SS3.1.1	Contractor to provide MARPOL certification for the seismic vessel.	Contractor	Pre-survey and during survey	MARPOL Certification
	SS4	Impacts of industrial wastewater (i.e. bilge water and deck drainage) discharges from vessels on marine water quality	SS4.1	Vessels operate in compliance with applicable National Environmental (Emissions) Quality Guidelines (NEQ Guidelines) which are those listed in the applicable MARPOL Annex I: • Vessels will hold a valid International Oil Pollution Prevention (IOPP) Certificate, as appropriate to vessel class. • Any oil-in-water content of discharges should not exceed 15 ppm. • Waste management plan providing procedure for minimizing, collecting, storing, processing and disposing of garbage waste. • Maintain a waste log including waste type, quantity and disposal method.	Not Assessed (scoped out)	SS4.1.1	Contractor to provide MARPOL certification for the seismic vessel. PCML's contactor will develop a Waste Management Plan	Contractor	Pre-survey and during survey	MARPOL Certification Waste Management Plan
Solid & hazardous waste generation from seismic survey vessel and support vessels	SS5	Impacts due to solid and hazardous waste generation and disposal from vessels	SS5.1	General waste (excluding food) will not be disposed of to sea in line with applicable National Environmental (Emissions) Quality Guidelines (NEQ Guidelines) which are those listed in the applicable MARPOL Annex V Requirements.	Not Assessed (scoped out)	SS5.1.1	Contractor Waste Management plan	Contractor	During the survey	Contractor Waste Management Plan, waste manifest and garbage record book
			SS5.2	Combustible wastes will be segregated and disposed by incinerator on-board, should an incinerator be available on the selected vessel (in line with MARPOL Annex V requirements).		SS5.2.1	Contractor to show compliance with MARPOL Annex V standard.	Contractor	During the survey	Incinerator certificate
			SS5.3	Non-combustible and recyclable wastes will be stored in containers and returned to the selected vessel shore base for disposal (in line with MARPOL Annex V Requirements).		SS5.3.1	Contractor to disposed combustible waste with incinerator complied with MARPOL Annex V standard.	Contractor	Before the survey	Contractor Waste Management Plan, waste manifest and garbage record book
			SS5.4	Hazardous wastes will be stored on the vessels in appropriate containers with labels. Hazardous waste storage will be designated in accordance with their MSDS (in line with MARPOL Annex V requirements).		SS5.4.1	Contractor to segregate non-combustible and recyclable wastes for onshore disposal at the selected vessel shore base.	Contractor	During the survey	Contractor Waste Management Plan, waste manifest and garbage record book

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
			SS5.5	Hazardous wastes will be returned to the vessels' selected shore base and sent to a licensed disposal facility by a licensed waste contractor (in line with MARPOL Annex V requirements).		SS5.5.1	Contractor to ensure food waste discharge is complaint with MARPOL	Contractor	During the survey	Contractor Waste Management Plan, waste manifest and garbage record book
Operation of seismic survey vessel and support vessel	SS6	Light emissions from this seismic survey vessel and support vessels causing behavioural response in marine species	SS6.1	The seismic and support vessels will display navigational lighting and external lighting as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation.	Not Assessed (scoped out)	SS6.1.1	None applicable			
	SS7	Introduction of invasive marine species (IMS) to the marine environment	SS7.1	All contracted vessels will comply with IMO Ballast Water requirements as relevant to class.	Not Assessed (scoped out)	SS7.1.1	Vessels to maintain records of ballast water uptake and discharge locations.	Contractor – Vessel Master	Pre-survey and during survey	Contractor ballast water log book
			SS7.2	Seismic survey vessel and support vessels which have obtained their ballast water from an area outside the Gulf of Martaban are not to discharge within 50 nm from land or in water depths less than 200 m		SS7.2.1	Seismic survey vessel and support vessels will not discharge within 50 nm from land or in water depths less than 200 m	Contractor	During survey	Vessel log book
	SS8	Impacts on fishing activity and shipping from physical presence of seismic survey vessel and support vessels	SS8.1	A safety zone of 1,640 ft. (500 m) around the seismic survey array will be implemented	Minor	SS8.1.1	Maintain safety zone around the seismic survey vessel	Contractor Vessel Master	Pre-survey and during the survey	Seismic survey vessel and support vessel communications logs Contractor survey safety management plan or equivalent
			SS8.2	At least one bi-lingual (Myanmar/English), speaking person on-board		SS8.2.1	Contractor to ensure the provision of bi-lingual speaking crew for the marine seismic survey	Contractor	During survey	Vessel log book
			SS8.3	Issuance of Notice to Mariners		SS8.3.1	Issue Notice to Mariners	Contractor	Pre-survey and during the survey	Stakeholder Engagement Plan Notice to Mariners
			SS8.4	Disclosure and implementation of a Grievance Mechanism for the Project and timely investigation of any grievances		SS8.4.1	PCML to disclose Grievance Mechanism to maritime authorities, fisheries authorities, fishing communities and other marine users.	PCML	Pre-mobilisation and during survey	Consultation records
			SS8.5	Survey, support and chase vessels to have fact sheets in Myanmar language on board		SS8.5.1	Survey and support vessels to have fact sheets in Myanmar on board	Contractor	Pre-survey and during survey	Stakeholder Engagement Plan

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
			SS8.6	The Project will use newspaper advertising as well as placing hard copies of the Executive Summary of the IEE in public locations to communicate with fishing communities before the marine seismic survey		SS8.6.1	PCML to disclose Project information in local newspapers and send hard copies of Executive summaries of the IEE in public places	PCML	Pre-survey	N/A
			SS8.7	Seismic survey vessel and support vessels (as applicable or required by vessel class) will comply with international regulations for collision avoidance (COLREGs 1972), navigation and watch-keeping, including: • Maintaining look-outs (e.g. visual, hearing, radar etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar). • Navigation light display requirements, including visibility, light position/shape and noise signals appropriate to activity. • Maintenance of minimum safe manning levels. • Maintenance of navigation equipment in efficient working order (compass/radar / communications). • Navigational systems and equipment as specified in Regulation 19 of Chapter V of SOLAS. • Automatic Identification System installed as applicable or required by vessel class, in accordance with Regulation 19 of Chapter V of SOLAS.		SS8.7.1	PCML will conduct an audit of vessels to demonstrate compliance with international requirements.	Contractor / PCML	Pre-survey and during the survey	N/A
Operation of the seismic source during the marine seismic survey	SS9	Impacts from underwater noise generation on marine fauna	SS9.1	Implementing a soft-start procedure at the start of initiating the seismic source (airgun array). The sound level will be slowly increased over a period of 20 minutes to allow adequate time for marine mammals, turtles, and whale sharks to leave the area.	Moderate to Minor	SS9.1.1	Undertake a 20 minute soft-start before testing of all seismic sources at full power.	Contractor	During the survey	Marine Fauna Observations (MFO) Report
						SS9.1.2	Power should be built up slowly from a low energy start-up (e.g. starting with the smallest seismic source in the array and gradually adding in others) until full operational power over 20 minutes to give adequate time for marine fauna to leave the area. This build-up of power should occur in uniform stages to provide a constant increase in output.	Contractor	During the survey	MFO Report

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
						SS9.1.3	Once the soft-start has been performed and the seismic source is at full power the survey line should start immediately. Operators should avoid unnecessary firing at full power before commencement of the line.	Contractor	During the survey	MFO Report
						SS9.1.4	If, for any reason, firing of the seismic source has stopped and not restarted for at least 10 minutes, then a pre-shooting search and 20 minute soft-start should be carried out (the requirement for a pre-shooting search only applies if there was no MFO on duty and observing at this time, and if the break in firing occurred during the hours of daylight). After any unplanned break in firing for less than 10 minutes the MFO should make a visual assessment for (not a pre-shooting search) within 1,640 ft. (500 m) of the centre of the airgun array.	Contractor	During the survey	MFO Report
						SS9.1.5	To test a single seismic source, or a number of guns on high power, the airgun or airguns should be fired at lower power first, and the power then increased to the level of the required test; this should be carried out over a time period proportional to the number of guns being tested and ideally not exceed 20 minutes in duration.	Contractor	During the survey	MFO Report
			SS9.2	Recording and reporting all marine mammal sightings. MFOs will be on-board the vessel to undertake search for marine mammals, turtles, and whale sharks within 1,640 ft. (500 m) of the seismic source (60 minutes for deep water [i.e. >200 m]).		SS9.2.1	Pre-shooting search should be conducted over a period of 30 minutes in shallow water and 60 minutes for deep water (>200 m) before commencement of any use of the airguns. The MFO should make a visual assessment to determine if any marine mammals, turtles, and whale sharks are within 1,640 ft. (500 m) of the centre of the airgun array.	Contractor	During the survey	MFO Report
						SS9.2.2	If marine mammals are detected within 1,640 ft. (500 m) of the centre of the airgun array during the pre-shooting search, the soft-start of the seismic sources should be delayed until their passage, or the transit of the vessel, results in the marine mammals (and turtles) being more than 500 metres away from the source. In both cases, there should be a 20 minute delay from the time of the last sighting within 1,640 ft. (500 m) of the source to the commencement of the soft-start, in order to determine whether the animals have left the area.	Contractor MFOs and contractor seismic surveyor	During the survey	MFO Report

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
						SS9.2.3	MFO to maintain a watch as outlined in the pre-shooting search guidance above before any instances of gun testing.	Contractor MFOs and contractor seismic surveyor	During the survey	MFO Report
						SS9.2.4	The airgun array will be shut down at the end of each survey line and prior to restarting a pre-acquisition search will be undertaken for marine mammals, turtles and whale sharks at the start of the next line to be surveyed. Thus a preshooting search and soft start-up will be undertaken as a starting procedure at the start of the next survey line.	Contractor MFOs and contractor seismic surveyor	During the survey	MFO Report
						SS9.2.5	Shutdown of acoustic source when operating at full power where marine mammals, turtles, and whale sharks are sighted within 1,640 ft. (500 m) of the source.	Contractor	During the survey	MFO Report
			SS9.3	Utilising Passive Acoustic Monitoring (PAM) to detect whether any marine mammals are in the vicinity of the seismic vessel during pre-shoot surveys undertaken in night time.		SS9.3.1	Contractor PAM operator to detect marine mammals during night time operations for procedures related to the pre-shooting search.	Contractor	During the survey in night-time	MFO Report
Accidental Leaks and spills	SS10	Impacts from unplanned spills of hydrocarbons / chemicals on marine fauna and habitats	SS10.1	Vessel standard operating procedures and a fuel bunkering plan will be prepared and implemented. Implementation of the following controls as minimum fuel bunkering procedures implemented during all fuel bunkering activities: • Bunkering to commence during daylight hours (can continue into night) and when sea conditions are appropriate. • Visual monitoring of gauges, hoses, fittings and the sea surface • Dry break couplings fitted to transfer hose. • Bunkering will take place no closer than 31 miles (50km) from the coastline. • Issuance of Notice to Mariners will be issued to advise as many vessels as possible of the survey activities and timing.	Minor	SS10.1.1	To review Contractor vessel standard operating procedures in relation to spill prevention.	PCML	Pre-survey	Contractor bunkering procedures

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
			SS10.2	Vessels (as applicable or required by vessel class) will operate in compliance with MARPOL 73/78 Annex I (Reg. 7, 17 and 37) including: • Vessels will hold a valid IOPP certificate. • Vessels will maintain an oil record book. • SOPEP to be developed as applicable or required by vessel class. • OPEP to be developed, if required.		SS10.2.1	Contractor to provide MARPOL certification for the seismic vessel.	Contractor	Pre-survey	MARPOL Certification
			SS10.3	Chemicals and/or hydrocarbons will be handled and stored in compliance with the Material Safety Data Sheets (MSDSs).		SS10.3.1	Appropriate storage and handling of chemicals.	Contractor	Pre-survey and during the survey	Spill report
			SS10.4	All chemical and/or hydrocarbon wastes will be segregated into clearly marked containers prior to onshore disposal by a licensed waste management contractor, as per the relevant MSDSs.		SS10.4.1	Contractor to ensure segregation of hydrocarbon and chemical wastes as per MSDS and maintain Garbage Record Book for all vessels	Contractor	During the survey	WMP & Garbage Record Book
Unplanned collisions and/or Entanglement	SS11	Impacts from unplanned collisions and/ or entanglement with marine fauna	SS11.1	If the tail buoys have not been designed to avoid entrapment, they will be fitted with guards to prevent accidental entrapment of turtles.	Minor	SS11.1.1	Contractor to install guards on seismic survey tail buoys, if required.	Contractor	Pre-survey	Inspection report
			SS11.2	As per SS9.1 to SS9.3		SS11.2.1	As per SS9.1 to SS9.3	As per SS9.1 to SS9.3	As per SS9.1 to SS9.3	As per SS9.1 to SS9.3
Unplanned collisions with shipping / other marine users	SS12	Impacts from Unplanned Collisions on Fishing Vessels and Other Marine Users	SS12.3	As per SS8.1 to 8.7	Minor	SS12.1.1	As per SS8.1 to 8.7	As per SS8.1 to 8.7	As per SS8.1 to 8.7	As per SS8.1 to 8.7
Physical loss of seismic streamers, acoustic source, seabed sampling equipment.	SS13	Localised short-term damage of benthic subsea habitats in the immediate location of the dropped seismic streamers and/or acoustic source.	SS13.1	• Adequate maintenance of streamers, cables and depth control devices • Adequate maintenance of navigation equipment • Adequate depth of streamers and streamer control • Propulsion redundancy • Streamer recovery devices (SRDs) to be used for recovery • Streamer will be recovered where practicable	Not assessed (scoped out)	SS13.1.1	Contractor to ensure that all equipment is maintained and loss streamers are recovered where practicable	Contractor	During Survey	Inspection report
General	SS14	Legislation	SS14.1	• Compliance with all laws listed in Table 3.3 of the IEE Report.	N/A	SS14.1.1	PCML will operate in compliance with all law listed in *Table 3.1* of the IEE Report	PCML	Throughout Project	N/A

Project Activity	Potential Impact/Issue		Control / Mitigation Measures		Significance of Residual Impacts	Specific Action		Responsible Project Team Member	Schedule	Records
	SS15	Monitoring	SS15.1	• Undertake environmental and social monitoring	N/A	SS15.1.1	PCML will undertake monitoring as mentioned in *Table 8.3* of the IEE Report	PCML / Contractor	Throughout Project	Environmental Monitoring Report
			SS15.2	• Submit Environmental Monitoring Report	N/A	SS15.2.1	PCML will submit the Environmental Monitoring Report to ECD every 6 months (i.e., after the Project has completed)	PCML	After survey	Environmental Monitoring Report

8.4 OVERALL BUDGET FOR THE IMPLEMENTATION OF THE EMP

It is estimated that the overall budget for implementing the EMP for the marine seismic survey is around 50K USD. Many of the management and mitigation measures are embedded controls as part of the standard operational costs of the seismic survey vessel, support vessel and chase vessels.

8.5 MANAGEMENT AND MONITORING SUB-PLANS

Given that there are no significant impacts from the Project (under *Chapter 6* of this IEE Report); no separate management plans are required for the following:

- Biodiversity: there are no Major impacts to biodiversity given the distance from sensitive receptors (over 70 km); and
- Community: the Project is located 125 km from the nearest human receptor and communities and therefore will not have an impact.

Management Plans are, however, prepared for **Emergency Response** and **Waste** as per industry standard procedures.

For this short duration seismic survey, no specific management plans are required for pre-construction, construction, operation and decommissioning phases as this activity only has the Operational Phase.

8.5.1 *Objectives*

Waste Management Plan

A waste management plan will be prepared to outline the methods and practices to meet the requirements of this EIA and applicable regulations.

The objectives of the plan are to:

i. ensure waste is managed in a controlled and appropriate manner in compliance with statutory requirements concerning the management of waste
ii. ensure resources are recovered where possible and safe to do so, for re-use and recycling
iii. detail responsibilities, both offshore and onshore (supply bases) for waste management
iv. outline the appropriate handling, storage, transportation and disposal of waste
v. describe the recording and tracking for all wastes generated

Emergency Response Plan

PCML, through the drilling contractor's HSE Plan, will further develop plans and procedures to identify the potential for and response to environmental accidents and health and safety emergency situations and for preventing and mitigating any potentially adverse environmental and social impacts that may arise.

PCML has a number of Emergency Response Plans (ERP) in place, which detail the actions and resources available in the event of various emergency scenarios. A vessel ERP will be drafted for the proposed seismic survey in Myanmar. The ERPs contain instructions for support relating to:

- Vessel emergency procedures (SOPEP will be implemented for minor vessel-based spills).
- An Oil Spill Response Plan will be implemented in the event of a hydrocarbon spill requiring response beyond the capability of the SOPEP).
- Medical emergencies including medevac procedures.
- Search and rescue – includes man-overboard procedures and helicopter ditching.
- Heavy weather/cyclone plan.
- Hazardous material spill response plans.
- Any other emergency response plan required by the Republic of the Union of Myanmar authorities.

8.5.2 Legal Requirements

The Management Plans will be completed in accordance with MARPOL requirements.

8.5.3 Implementation Schedule

The Management Plans will be enacted throughout the life of the Project (2-3 months).

8.5.4 Management Actions

Emergency Response Plan

PCML's seismic contractors will have a Shipboard Oil Pollution Emergency Plan (SOPEP) (also known as an Oil Spill Response Plan) for vessel-based spills. A SOPEP is required in accordance with the requirements of regulation 37 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL Convention). The purpose of the SOPEP is to provide guidance to the Master and officers on board the ship with respect to the steps to be taken when an oil pollution incident has

occurred or is likely to occur. The typical SOPEP has not yet been developed for this Project as the contractor has not yet been selected. However, PCML have included the commitment in *Table 8.2* for the contractor to develop a SOPEP prior to the marine seismic survey commencing.

Waste Management Plan

PCML's contractors for the marine seismic survey will develop a Waste Management Plan (WMP). WMPs are guides for reducing, handling, and disposing of waste during the Operation of the Project.

PCML have included the commitment in *Table 8.2* for the contractor to develop a WMP prior to the marine seismic survey commencing.

8.5.5 Monitoring Plans

PCML will submit an Environmental Monitoring Report, to MOGE and MONREC after completion of the marine seismic survey. The Environmental Monitoring Report will include the items listed in *Table 8.3*. Given the limited duration of the seismic survey (2-3 months) and lack of significant impacts, no additional monitoring is considered to be required for the Project.

Table 8.3 Environmental Monitoring Recording

Project Activity/ Environmental Aspect	Monitoring Measures	Reporting
Operation of the seismic source	Visual monitoring for whales and turtles during the marine seismic survey	Record if any marine fauna sightings
	Fishery interaction, implementation of community grievance, mechanism	Record if any fishing vessel sightings
Incident reporting	Details of any environment or social	Incident report forms
	Incidents	
Accidental Releases and Leaks	Safety record	Safety record
Non-Compliance Reporting	Non-Compliance with EMP	Inspection check sheets

8.5.6 Projected Budgets and Responsibilities

The budget for the waste management is within the operational cost of the Project. PCML have additional third party contracts for oil spill clean-up and management.

Resources include the appropriate human resources and specialised skills. The roles and responsibilities for environmental and social management and implementation of the EMP are outlined in *Table 8.4*.

Table 8.4 Environmental & Social Management Organisation Roles and Responsibilities

Position	Responsibility
Office-based Personnel	
PCML Exploration Manager	• Oversee the implementation of marine seismic survey activities undertaken as per this EMP. • Provide sufficient resources to implement the management measures in this EMP. • Relevant personnel will be provided with an environmental induction at the start of the marine seismic survey.
PCML HSE Manager	• Prepare environmental component of relevant Induction Package. • Assist with the review, investigation and reporting of environmental incidents. • Oversee environmental monitoring and inspections/audits undertaken as per the requirements of this EMP. • Liaise with relevant regulatory authorities as required. • Assist in preparation of external regulatory reports required, in line with environmental approval requirements and PCML incident reporting procedures. • Monitor and close out corrective actions identified during environmental monitoring or inspections.
Geophysical Operations Manager	• Operational and technical aspects of the Project including contractor supervision during operations.
Geophysical Operations HSE Leader	• Advise and monitor on implementation of HSE and Social (Fisheries) protection measures.
PCML Corporate Affairs Adviser	• Implement the SEP. • Report on stakeholder consultation. • Ensure ongoing liaison as required.
Seismic Survey Vessel-based Personnel	

Position	Responsibility
PCML HSE Adviser Offshore	• Oversee that the activities are undertaken are as outlined in this EMP. • Support the Exploration Manager to ensure the monitoring requirements are met and the EMP is implemented during the marine seismic survey. • Ensure environmental incidents are reported. • Ensure periodic environmental inspections are completed
Vessel Master	• Oversee the vessel management system and procedures are implemented. • Ensure that personnel commencing work on the vessel receive an environmental induction and are competent to undertake the work they have been assigned. • Ensure SOPEP drills are conducted as per the vessel's schedule. • Ensure the vessel Emergency Response Team has been given sufficient training to implement the SOPEP. • Ensure any environmental incidents or breaches of this EMP are reported immediately to the HSE Adviser Offshore.

PCML will work with and coordinate with the contractors to ensure that all contractors are aware of and competent with respect to:

- Environmental and social impacts that could potentially arise from their activities;
- Necessity of conforming to the requirements of the IEE and EMP (i.e. implementing the control and mitigation measures) in order to avoid or reduce those impacts.
- Roles and responsibilities to achieve that conformity, including with regard to change management and emergency response.

9 PUBLIC CONSULTATION AND DISCLOSURE

9.1 METHODOLOGY AND APPROACH

9.1.1 Purpose of the Consultation

The specific objectives for stakeholder engagement were to:

- Inform relevant stakeholders about the project and its planned Project activities;
- Identify stakeholders and communities potentially affected by Project activities;
- Gather baseline information on the social and biological environment; and,
- Engage with potentially affected groups to understand potential Project impacts, perceptions and concerns and discuss appropriate mitigation measures.

9.1.2 Identification of Relevant Stakeholders and Potential Issues

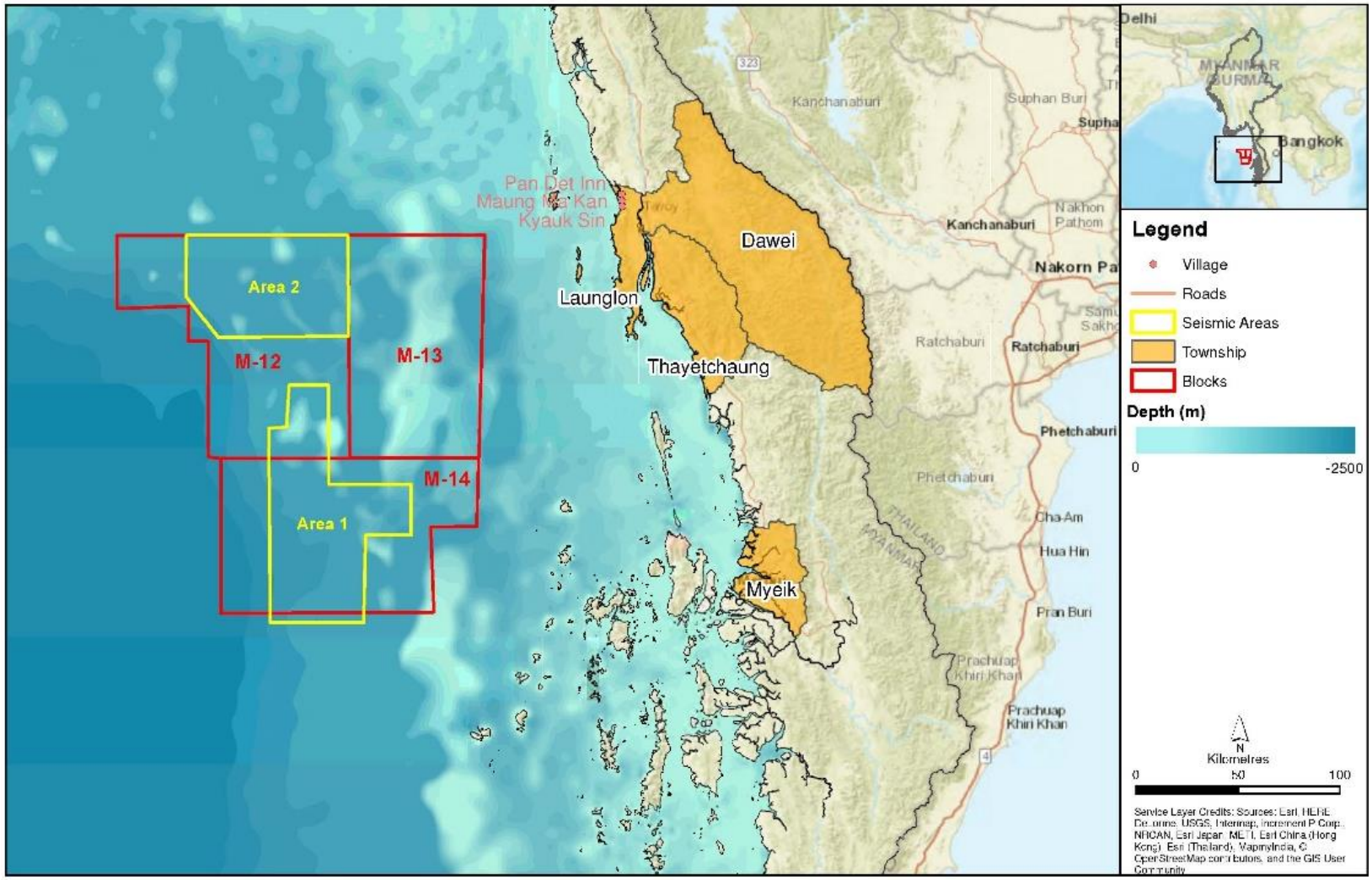
The process of identifying potentially affected stakeholders started with scoping which is conducted to identify relevant issues and select the townships and villages potentially impacted. The scoping exercise involved both desk-based and preliminary consultation with a number of stakeholders including government authorities.

ERM's previous experience of stakeholder engagement in the Region was utilised to inform the stakeholder selection. This information is based on discussions with General Administrative Department (GAD) representatives as well as previous project experience.

Figure 9.1 shows the location of the townships and village tracts visited for the public consultation.

Stakeholder engagement is an ongoing process and as such new stakeholders may emerge as the Project progresses. This will be captured and inform ongoing stakeholder engagement activity that will be undertaken for the Project.

Figure 9.1 Townships and Villages Consulted

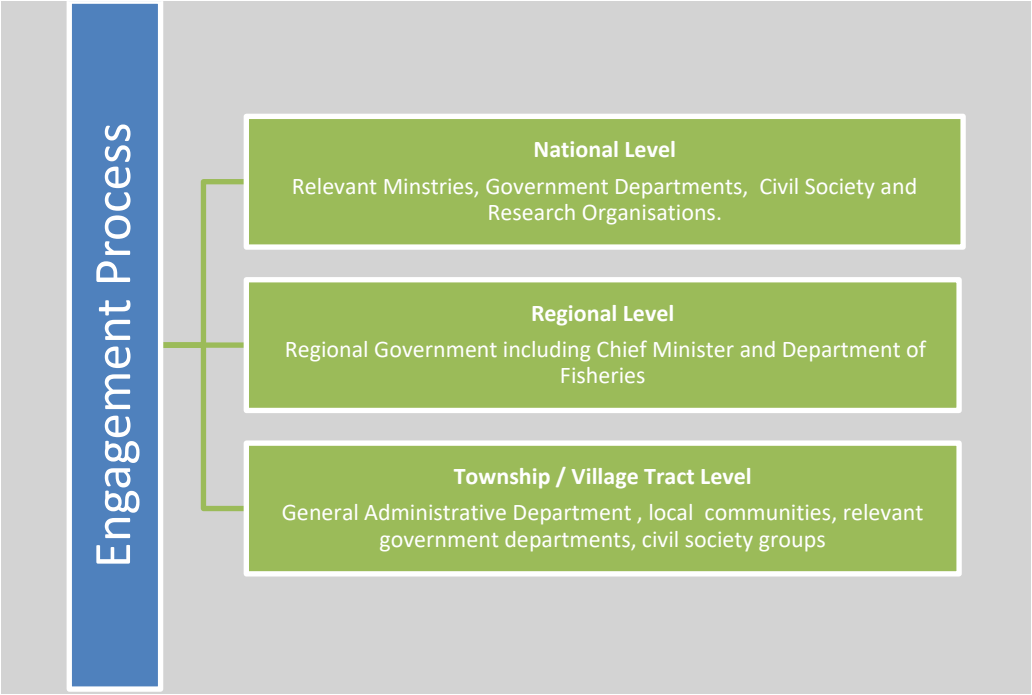


9.1.3 *Overall Approach and Scope of Engagement for the Impact Assessment*

Stakeholder engagement was conducted across administrative levels, subject to permissions of responsible authorities. *Figure 9.2* provides an overview of the levels engaged including: National Government, Regional, and township and village tract levels.

Engagement, as specified in the Myanmar EIA Procedure, was undertaken in July 2018. A consultation team consisting of ERM, MOGE, and PCML representatives conducted meetings and consultations at the three administrative levels.

Figure 9.2 Engagement at three levels with Key Stakeholders



National Level

Stakeholder engagement at the national level was focused on government agencies with regulatory and policy making responsibility. The purpose of early engagement was to introduce the Project and PCML, to seek clarity on the IEE process and expectations on stakeholder engagement and disclosure. The opportunity was also used to obtain required permissions for engagement with agencies at state and township level and get access to data and information for the IEE Study.

Regional Level

Stakeholder engagement at the Regional Level focused on obtaining required permission for engagement activities at the township level and get access to information on local communities in the Area of Influence. At the Regional level the Project met with the Chief Minister of Tanintharyi Region and delegates.

Township / Village Tract Level

Meetings were conducted with Townships in Thayetchaung, LongLon, Dawei, and Myeik. The necessity for this meeting and the participation was also discussed during the Chief Minister's meeting in Tanintharyi undertaken during the IEE Investigations. The purpose of engagement was to make the township levels aware of the Project, seek an understanding of specific issues and stakeholder concerns, discuss potential impacts and mitigation measures and obtain village and township level social and environmental data.

The key stakeholders engaged with included;

- GAD (District and Township);
- Department of Fisheries;
- Myanmar Fisheries Federation;
- Village Tract Leaders and Elders;
- Fishing Communities;
- Civil Society Organisations; and
- NGOs.

9.1.4 Format and Content of Consultation Meetings

Key Principles

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 group discussions (FGDs) were undertaken with fishers.
- Sharing of information: At the township and village level consultations, special emphasis was given to build community level understanding of the Project and 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.

The approach to consultation, informed by these principles, is described in the sections below.

Consultation Approach

The stakeholder consultation meetings were structured as followed:

- Introductions and information disclosure: Introduce PCML, the Project, the IEE, the proposed stakeholder engagement process, the potential

environmental and social impacts and mitigation to help the stakeholders understand the Project and PCML's intentions for engagement.

- Question and answer session for all stakeholders in the town hall meetings to raise concerns, comments or ask questions to which PCML can directly respond.

- Data collection: Collection of more in-depth information through FGDs with key stakeholder groups in the town hall meetings and village tracts.

In order to inform stakeholders about the Project and share information on the activities, a two page flyer was produced which contained Project information and details on how to feedback into the Project. All information was communicated through use of visual media (including posters and power point presentations) and was provided in local Myanmar language.

To gather more environmental and social baseline data and to identify potentially affected communities, FGDs were undertaken with village leaders, and were guided by questionnaires covering information relating to:

- Generic village profile: Collected information on demographic patterns, communities, occupations, and communication and grievance systems.

- Focus group discussion (FGD) questionnaires: Collected information at the fishing group level. In total, nine FGD were conducted in Maung Ma Kan, Kyauk Sin, Pyin Gyi, Tha Pot Seik, San Hlan, Pan Tein Inn, and Ti Zit villages.

- Environment: Collected information on marine species and protected areas.

All information collected was summarised and confirmed with stakeholders at the end of the discussion. Stakeholders were also given time to share their concerns and views and any further clarifications they required at the end of the meetings.

Any queries raised by the stakeholders were responded to, and also noted to feed into the impact assessment process for the IEE.

9.2 *SUMMARY OF CONSULTATION AND ACTIVITIES UNDERTAKEN*

The IEE consultation meetings were held with various relevant stakeholders at the Regional Level in Tanintharyi. The consultation helped the Project to gather information on potentially affected people, on potential data gaps, and how these will be closed out in the IEE Report. The IEE consultation involved face-to-face meetings with a range of stakeholders including villagers, the Department of Fisheries (DoF), the Tanintharyi Chief Minister, the Regional Environmental Conservation Department (ECD), and the General Administrative Department (GAD), ward administrators, planning department as well as local community and fishing representatives. The

date, time, location, stakeholder and purpose of each meeting is provided in *Table 9.1*.

Table 9.1 Consultation Activities Undertaken during IEE

Date, time, location	Stakeholder	Purpose of Engagement
23 August, 2018, 14:30-17:30 PM ThayetChaung GAD Office	Meeting with GAD, DOF, Village Leaders, Villagers	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
24 August, 2018, 10:00-12:00 PM LaungLon GAD Office	Meeting with GAD, Village Leaders, Fishermen, Villagers	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
24 August, 2018, 13:00-15:00 PM Zayyar Htet San Hotel, Dawei	Meeting with ECD, DOF, Concerned Departments, Media, CSOs, Village Leaders	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen
26 August, 2018, 09:30-11:30 PM Grand Jade Hotel, Myeik	Meeting with ECD, DoF, Concerned Departments, MFF, Media, CSOs, Village Leaders and Fishermen	Present information on Project. Present information on fishing activities within the Area of Influence of the Project Gather information on Potential Affected Communities and Fishermen

The minutes of the meetings and photos from the consultation are provided in **Appendix A**; some photos of the meetings are also provided in *Figure 9.3*.

Figure 9.3 Photos from Public Consultation Meetings

	
Public Consultation in Zaeyar Htet San Hotel, Dawei	Public Consultation in LaungLon GAD Office
	
Comments from Myeik Fishery Association	Collecting Community Data from Village Leader

9.3 RESULTS OF CONSULTATION

The following section summarises the key issues raised in public consultation meetings and *Table 9.2* presents the responses concerned with these issues.

Table 9.2 Key Questions Raised During IEE Public Consultation

Comments Received	Response to Comments in Meeting	Consideration for IEE Study
Impacts on the Marine Environment Queries relating to wastes discharge from seismic vessels	PCML will conduct all project activities in compliance with the National Environmental (Emission) Quality (NEQ) Guideline. Different kinds of wastes must be categorized and treated prior to any discharge.	A waste management plan has been included in the IEE Report (*Section 8.5*).
Impacts on Fishermen and Fisheries The fishing community expressed their concern on impacts to fishing as the project is located in their fishing blocks	Prior to start of the seismic survey, a Notice to Mariners will be announced in the newspaper. In this notice, the boundaries/edges of the seismic Project Area will be described. However, fishing will only be restricted within the 500 m safety zone around the vessel. Fishing boats will be notified in advance whilst offshore by supporting vessels. If fishing boats are in the seismic vessel path, PCML will communicate with them using Marine Channel-16.	The potential impact to fishing has been assessed in the IEE study (*Section 6.3.*)
Corporate Social Responsibility (CSR) and Social Benefits One of the most common issues raised was accessible to electricity and cost per unit	Access to electricity and transmission lines are not part of this Project. However, to get access to electricity, the Region needs a transmission line that connects to National Grid and it will reduce the cost per unit. The Department of Electricity are planning to implement a Mawlamyaing-Yae-Dawei transmission line and a Dawei-Myeik-Bokepyin transmission line. For PCML CSR programs, PCML have to negotiate with the Regional Government not to overlap with their PCML project before starting our CSR activities.	CSR will not be assessed as part of IEE study but all suggestions raised by the local community.
Benefits to Regional Level from Natural Resources As the resources come from Tanintharyi, the local community from the Region should get the benefits.	The project is managed by the Union Government as the Project is located over 25 nautical miles from the coast. The revenue sharing between the Union and State Government is not within PCML control. The Union Government will share the profits for the development of States and Regions.	This is not part of the IEE Study.

Comments Received	Response to Comments in Meeting	Consideration for IEE Study
Contract between MOGE and PCML Queries raised about the contract and timeline.	The Production Sharing Contract is between MOGE and PCML. The project timeline is 30-yr and commenced in 2000.	Project background is included in *Section 4.1*.
Grievance Mechanism and Compensation One stakeholder's concern is about the grievance process if the fishing vessels/nets get damaged.	PCML has a grievance mechanism and the community can contact the phone number mentioned in the brochure for complaints. For compensation process, PCML will comply with the government instruction.	The grievance mechanism is described in *Section 9.6*.
Disclosure of Information Stakeholders mentioned that the operations and schedule for the Project must be disclosed to the public particularly in newspapers.	Information will be disclosed as per the IEE Procedure and a Notice to Mariners will be issued in the newspapers before Project activities commence.	Disclosure and further engagement is provided in *Section 9.4* and *Section 9.5*.

9.4 FUTURE ONGOING CONSULTATIONS

Stakeholder consultation undertaken to date confirmed that potential impacts as a result of Project activities will be small in scale and of limited extent.

Future engagement activities will consist of the following and are shown in detail in *Table 9.3*:

- Further disclosure of Project information and IEE Report, including opportunities to provide feedback;
- Engagement with relevant regional officials/authorities and government organisations on the outcomes of the IEE; and
- Ongoing communications with interested and potentially affected stakeholders during the operation. While impacts on local communities, ongoing project information will be provided to local areas.

PCML will provide an activity update in the notice to mariners prior to the start of the Project. A grievance mechanism will be in place during operation, in line with the steps required under the EIA Procedure, as well as international good practice.

If significant issues, concerns or impacts are identified, further stakeholder consultation with relevant, interested or affected stakeholders may be undertaken during operation.

Table 9.3 Stakeholder Communication and Notification

Timing	Purpose	Stakeholder / Group	Method of communication / notification
Following lodgement of IEE for assessment	Disclose IEE Report	• Relevant regional officials/ authorities • Relevant Government organisations • Villagers • Other relevant stakeholders • General public	• Hardcopy IEE executive summary (Myanmar) made available in Tanintharyi and Yangon • Publish Project information on signboards at the site; • Regional and national advertising – via newspapers. • IEE (English) and executive summary (Myanmar and English) available on PCML website
During the Project activities	Address any community concerns that may arise during Project activities	Implement the Grievance Mechanism	Grievance mechanism disclosed to local community and government

9.5 *DISCLOSURE*

The IEE Report will be made available online at PCML's website, https://www.petronas.com. There will also be adverts in one English and one Myanmar newspaper and hard copies of the report will be made available in Yangon, Dawei, and Myeik.

9.6 *COMMUNITY GRIEVANCE MECHANISM*

A grievance mechanism will be created by PCML so that stakeholders can raise questions or concerns with the Project and have the concerns addressed in a prompt and respectful manner. Should a grievance or complaint be made, the complaint/grievance will be received by a Community Liaison Officer or similar. The grievance will be recorded and investigated and responded to. Should the complainant not accept the response, a review will be carried out. Once resolved, the grievance will be closed out and recorded in the Grievance Register.

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Appendix A –Public Consultation & Disclosure

Meeting of Minutes: Environmental and Social Impact Assessment (ESIA) for PC Myanmar (Hong Kong) Limited (PCML) Yetagun Infill Drilling and 3D Seismic Project

Detail			
Project	ESIA for Offshore Block M12, M13 and M14 Project		
Venue	Zayyar Htet San Hotel	**Region/State**	Tanintharyi
District	Dawei	**Township**	Dawei
Objective	Stakeholder Consultation Meeting		
Date	24th August 2018		
Time	15:00-18:00 PM		

Comment from U Nay Min Yar Zar, National Democratic Force

- Thanks for the Kaleinaung to Daminseik road construction. I would like to request you to construct a road between Zardi and Htwat Wa. We should consider not only physical impacts but also psychological consequences. The company should listen to local people's feelings and concerns. It is good that the impact of air and water will be assessed, please also include a soil assessment.
- Can oil and gas production cause earthquakes?

Response from Daw Tin Nwe Nwe Nyo, PCML

- We will consider road construction as a part of our corporate social responsibility (CSR) program.

Response from U Phyo Paing Soe, PCML

- In gas production, the gap in the soil is filled with oil and water. This does not cause earthquakes. In Myanmar, large earthquakes occurs around once in every 100 years. These earthquakes are not due to the production of oil and gas but rather due to movement of the tectonic plates (the Indian plate and Burma plate).

Comment from U Tin Soe, Maung Mal Shaung Village

- Can production of gas have impact fish?
- If the project is successful (commercial in the future), will Dawei Township have access to electricity? Does the project have any other impacts on the local community?

Response from U Phoe Kyaw, PCML

- The waste from the Project will be discharged in compliance with National Environmental Quality (Emissions) Guidelines (NEQG). If the waste cannot be discharged over board, it will be carried to the shore to disposal. General wastes such as kitchen waste will be discharged as per MARPOL (international) standards. We believe that there won't be much impact from the project as the project try to reduce waste impacts as much as possible.

Response from Dr. Soe Moe Aung, Myanmar Oil and Gas Enterprise (MOGE)

- Ministry of Energy and Electricity (MOEE) proposes to construct a transmission line (Mawlamyine-Ye-Dawei transmission line) to get access to electricity.
- We sell the gas for domestic consumption with a reasonable price. If the region connects with the national grid, the cost of electricity may be lower than the current price.

Comment from U Htein Win

- Is the Yetagun Platform still operating?
- The project is 90 miles far from Loung Lon, 96 miles from Dawei, 105 miles from Myeik and 85 miles from the nearest island.
- What are the benefits and drawbacks of the project on marine tourism and fishing blocks?
- Could the protected area near Laung Lon be affected by the project?

Response from U Phoe Kyaw, PCML

- The two drilling activities that will be undertaken are exploration and infill drilling. We already have gas pipelines for the existing drilling and production.
- If we discover the new reserves of gas, there will be only one additional small production rig.

Response from U Zaw Zaw Aung, PCML

- Water depth in the Project Area is about 300 feet and there are no tourism activities in that area. The Project will not affect the tourism industry given the distance offshore.

Comment from U Soe Thant, Regional Department of Fishery

- The blocks operated by this project (M12, M13, and M14) are offshore as well as very important fishing areas. Drilling operations would take about 25 days per well and exclusion zone is 500 m.
- We have previous experience that drilling took more than 75 days and the exclusion zone was over 500 m. The exact information about drilling duration and exclusion area should be disclosed.
- As fishing at sea can last for about 20 days per month, fishermen would have many concerns on their livelihood if they could not fish in those days. What is the exclusion zone of drilling rig?
- This presentation included information about leatherback turtle. I started to establish regional marine conservation and according to my knowledge, there is no observation of leatherback turtle in Thanintharyi region. How did the third party organisation collect data about it or from which reference? Where and when did the company undertake seabed micro-organism survey?

Response from U Phoe Kyaw, PCML

- Prior to the Project commencement a, "Notice to Mariners" will be announced in newspapers. This Notice will include the boundaries/edges of the Project Area. If fishing boats are in the path of the Project vessels, PCML will negotiate with them using Marine Channel-16.
- If a gas reservoir is found, a drilling rig would be mobilized and safety zone will be 500 m around it.
- The safety protection area is five nautical miles radius from safety zone. The project doesn't allow vessels to enter and operate in this area. This is a small area compared to the large area of the fishing grounds.

Response from Daw Khin Su Su Naing, Environmental Resources Management (ERM)

- Seawater, sediment, plankton, and benthos sampling was conducted in April 2018. If you want detailed sampling locations and information, I can provide this.

- When we collected environmental data from fishermen in LongLon, we found out that the most common turtle species observed was the Olive Ridley. However, as a precaution, we also include any turtle species that may occur in the Region. The data sources will all be listed in the EIA.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	U Kyi Htay	Administrator	Ta Lai Htein quarter
2.	Daw Thida Moe	Assistant	
3.	U Sein Win	Reporter	Myawaddy Newspaper
4.	U Tin Soe Wai	District Chief Executive Officer(EO)	Myanmar Witter Association
5.	U Zaw	Reporter	Dawei Watch
6.	U Aung Thein	Village Administrator	
7.	U Tin Soe	Secretary	Maung Mal Shaung Village
8.	U Soe Soe	Secretary	
9.	U Min Maung	Township Reporter	Myanmar Radio and Television (MRTV), Myawaddy(MWD)
10.	U Than Win	Member	Human Rights Watch Dawei
11.	U Kyaw Soe		Village Elder
12.	U Aung Thwin		Village Administrator
13.	Daw Htet Taryar		Project Planner
14.	Daw Thae Zun Mo		Project Planner
15.	U Than Zaw	Deputy Assistant Staff Officer	Ye Phyu Department of Fishery
16.	U Tin Maung Win	Assistant Staff Officer	Laung Lon Department of Fishery
17.	U Soe Myaing	Township Staff Officer	Fishery
18.	U Aung Paing Oo		
19.	U Kyaw Sein		Information and Public Relations Department
20.	U Kyaw Kyaw Latt		Information and Public Relations Department
21.	U Kyaw Moe	Deputy Staff Officer	Department of Marine Administration
22.	U Aung Htay	Village Administrator	
23.	U Htein Win	Executive Committee (EC)	Public Light Network
24.	U Kyaw Ye Thu	Executive Committee (EC)	Civil Society Organization (CSO)
25.	U Khaing Tun	Assistant Director	Environmental Conservation Department
26.	U Soe Thant	Staff Officer	District Department of Fishery
27.	U Si Thu Aung	Deputy Inspector	Bureau of Special Investigation
28.	Daw Marlar	General Service (G.S)	Women's Union
29.	U Khin Aung		
30.	U Kyi Htwe	Special Branch (SB)	
31.	U Aung Zin Htay		Dawei Police Station
32.	Dr. Zaw Win Hlaing	Staff Officer	Township Medical Office
33.	U Nyan Htun		District Public Health Department
34.	U Zaw Htun	Chairman	Future Light
35.	U Hla Gyi	Village Elder	

No	Name	Position	Department/ Organization/ Address
36.	U Aung Moe Naing	Village Administrator	
37.	U Nay Min Yar Zar	Deputy Chairman	National Democratic Force
38.	U Khin Kyaw	Village Administrator	
39.	U Tint Lwin	Reporter	Hinthar Media
40.	U Htay Naing	Deputy Director	Project Planning
41.	U Ba Sein	Deputy Chairman	National League for Democracy
42.	U Myint Kywe		
43.	U Phay Lwin	Officer	District Department of Fishery
44.	U Phyo Zin	Reporter	Eleven Media

Photo











Meeting of Minutes: Environmental and Social Impact Assessment (ESIA) for PC Myanmar (Hong Kong) Limited (PCML) Yetagun Infill Drilling and 3D Seismic Project

Detail			
Project	ESIA for Offshore Block M12, M13 and M14 Project		
Venue	General Administrative Department's Office	**Region/State**	Tanintharyi
District	Dawei	**Township**	Launglon
Objective	Stakeholder Consultation Meeting		
Date	24th July 2018		
Time	09:00-12:00 PM		

Comment from U Aung Thu, Individual Civil Society Organization

- What is the Contract sharing between Myanmar Oil and Gas Enterprise (MOGE) and PCML? From this contract, how much will be used in this region?
- How do you mitigate the impacts on fishermen?
- How will the company protect coral reefs?
- We are concerned about waste disposal even though the company will be conducting a waste management plan. If there is leakage of mercury, it can affect fish and other marine animals. I want to know how PCML will manage mercury as I didn't see any mercury management in this presentation. Who will PCML collaborate with to conduct laboratory analysis?
- If we enter the exclusion zone during the night, there is a risk for both sides. I want to know the safety measures for fishermen.
- I found that the Environmental Impact Assessment (EIA) study has conducted only for the drilling areas, not for the immediate areas around the blocks. The EIA study should cover the three blocks and the other blocks around the project site. These drilling areas are located around our main fishing zone so PCML should conduct the Project carefully during the drilling activities.
- The third party should directly disclose the EIA reports to the local community, rather than doing it after getting permission from PCML. The Cooperate Social Responsibility (CSR) activities should be implemented in the undeveloped villages in Dawei and Laung Lon, which are difficult to access.

Response from Dr. Soe Moe Aung, MOGE

- There is a Production Sharing Contract (PSC) between PCML and MOGE. The Union Government manages all the profits although the contract was signed by MOGE. The regional government manage resources within 25 nautical miles of the coast.
- The current drilling project is outside of 25 nautical miles of the coast, the profits from this project are under the management of the Union Government. The Union Government will share the profits equally to the development programs of States and Regions. MOGE's role is to take responsibilities in technology for exploration, drilling and production as the governmental department.

Response from Daw Khin Su Su Naing, ERM

- I would like to explain about the EIA. We collected different marine species including phytoplankton and zooplankton that can only be seen by microscope. We also assess the location of mangroves, seagrass and coral reefs where marine species can breed and are very important for marine ecology.

- PCML will disclose the report on their website when it is finished. This is a legal requirement for the Proponent under the EIA Procedure.
- The report also accesses the cumulative impacts of surrounding areas around the project site. Monitoring programs along with the proposed mitigation measures and will be submitted to the Environmental Conservation Department (ECD). If you want to know the progress of monitoring plans, you can ask the project proponent. This stage is only the assessment stage, we will include your comments, suggestions and recommendations in the EIA report.

Response from U Phoe Kyaw, PCML

- We have to submit an Environmental Monitoring Plan to ECD as per requirements of EIA. We will use modeling to know where the drill cuttings will disperse and the amount of cuttings deposited. The drill cuttings will be discharged in accordance with the National Environmental Quality (Emission) Guidelines. We will discharge drill cuttings only after treatment which achieve the acceptable levels. An acceptable level for mercury is 1 mg/kg and for oil and gas is 6.9 ppm according to the guideline.

Comment from U Maung Maung Aye, Villager, Auk Yae Phyu

- Tanintharyi Region is a major oil and gas production area, but we are still purchasing diesel, gas, and electricity at a high price. What are the benefits from the future blocks?

Response from Dr. Soe Moe Aung, MOGE

- We are trying to produce gas from the project as the amount of gas produced in Myanmar has decreased. Power generation is required in order to generate electricity and transmission lines are also required to distribute electricity to other areas. There are no transmission lines from the national grid in Tanintharyi Region at present. Therefore we can only distribute to areas where there are transmission lines. In the drilling stage, we are not sure if the reservoir exists or not. If a reservoir is found, the project move onto the development stage.

Comment from U Kyaw Lwin Soe, Villager, Pan Tae Inn

- What are the management plans for mercury leakage and how will you mitigate that kind of leakage?
- The EIA report should be translated into Burmese and disclosed into local community.
- The community want to accept this project as it is the country's development project but this project doesn't give any benefit for local.

Comment from U Aung Soe, Fisherman, Pa Nyit Village

- Most fishermen are facing many difficulties due to drilling of gas.

Response from U Phyo Paing Soe, PCML

- We have Notice to Mariner which will be notices for the drilling of oil and gas. Ships are rotating within 500 m exclusion zone in order to be safe for fishing boats and fishermen.

Comment form U Aung Soe, Fisherman, Pa Nyit Village

- Fishermen need to be informed about project operations using brochures that should be sent to every fishing household.
- If the marine environment and animals within the blocks are affected and fishing is prohibited, our livelihood would be impacted. How will the company handle this issue?

Response from U Phoe Kyaw, PCML

- These blocks are far from the shore. Some fishing boats may go around the blocks. Fishermen will be informed in advance where the Project vessels are going to operate and there will be support vessels offshore to liaise with fishermen.
- Local communities need to aware that seismic vessels would go back and forth over the Block during seismic operations. PCML will make sure the seismic survey contractor is aware of the presence of fishing boats.
- Total duration of seismic survey and exploration drilling is about 7 months and these operations are temporary. If gas reservoir is found economically, gas pipelines will be connected from this place to the bottom of the station built in the first phase. Seismic survey takes about 50 or 70 days as maximum and it will take about 75 days to drill one exploration well. The actual duration could be shorter.

Comment from U Aung Soe, Fisherman, Pa Nyit Village

- How will the company address socio-economic impacts?
- Will the community have any negative impacts from eating fish that eat wastes generated from drilling operations?

Response from Daw Khin Su Su Naing, ERM

- There are two approaches. Firstly, an assessment of the impacts to fisheries is undertaken and mitigation is recommended. Secondly, 'Notice to Mariner' will be communicated. The Project Area is located about 100 miles from the shore.
- Data collection would be undertaken not only with fishermen in this meeting but also with relevant organizations including the Regional Fishery Federation and Department of Fishery. The Notice to Mariner will be communicated one month in advance pf the activity to the fishery community and will include information on the operation area .
- Waste generated from Project activities will be categorised. Some wastes will be sent to the shore where it can be disposed. Food waste will be disposed into the sea (after being ground into very small pieces). No solid or hazardous waste will be disposed of at sea. Waste management will be undertaken in compliance with national and international standards; such as MARPOL.

Discussion from U Tun Kyi, Villager, Maung Makan

- Is it possible for the project to be go ahead?
- MOGE representative said that the Union government is responsible for this project as it is located over 45 nautical miles from the shore. In terms of fishing, inshore fishing is within 12 miles from the shore and offshore is over 12 nautical miles from the shore.

Comment from Daw Yee Yee Htwe, Fishermen Union

- The community have experienced with Cooperate Social Responsibility (CSR) programs conducted by the Yetagun project where there were conflicts among local communities as the project did not provide enough money. For example, the project provided budget for building preschool in one village. Land ownership issues are complex in rural area as there is no official documentation of ownership. There have been arguments between villagers and land owners. That preschool was built on the land with ownership issues and the Project did not take responsibility. They only asked how much the villagers and owner needed as compensation and didn't pay the current market price. It is necessary that all village administrators are aware of the Yetagun CSR programs and that we don't get anything free from Yetagun. However, most of the administrators have accepted Yetagun's support. Yetagun is undertaking these tasks, in coordination with the union government and locals do not have the right to discuss about these matters. So I request to stop this project.

Response from Dr. Soe Moe Aung, MOGE

- The project is not a new one and it is continuation of the Yetagun. The contract includes the duration in which the specified amount of gas will be produced but it cannot currently be achieved due to the current decrease in production. The government is in the situation of compensating the loss.
- Infilling and exploration wells have to be drilled in order to overcome this situation. The probability of successful production for an infilling well is 80% to 90%, whereas that of exploration well is from 10% to 15%. The compensation of government for the loss disadvantages the citizens.
- Gas reservoirs will be explored in Blocks M-12, M-13 and M-14 only. The production process will be carried out in the area of gas reservoirs where environmental impact assessments have been conducted.

Comment from U Tun Kyi, Villager, Maung Makan

- The locals have to pay from 200 to 600 kyats per unit for electricity while the nationwide price is 35 kyats per unit. Please inform the government that they are only concerned about their contract and not about the concerns of the community. We heard that we are entitled to access 25% of the produced gas. Where does this 25% go? The government should equally treat both developer and community, if not, we will protest.

Response from Dr. Soe Moe Aung, MOGE

- Concerning the profit sharing, 20.5 % of the profit will be received to the whole nation (Union Level). Regarding access to electricity, MOGE has supported domestic use by installing domestic gas pipelines. Just like other regions/states, natural gas has been sold to Taninthari region at 7.5 USD per 1MMbtu (British thermal units).
- A power plant which will use natural gas will also be built in Tanintharyi and transmission lines need to be constructed to get access to electricity.

Discussion from U Kyaw Lwin Soe, Villager, Pan Tae Inn

- It is said that the drilling activity has no impacts on the environment, but it will affect the marine environment. Dead fish and animals are found near the Project Area and we believe that it is related to the waste generated from the drilling rigs.

Comment from U Tin Htwe, Administrator, Pa Nyit Village

- The Project Area is about 30 miles (*NOTE: this is not correct and wasn't mentioned by ERM or PCML*) from LaungLon and it is closer to our coastal region. Yetagun have conducted many CSR programs in the towns/villages which have accessible roads. There are 18 villages in LaungLon Township and Yetagun CSR programs have reached only 2 or 3 villages. CSR programs should be reviewed. The meeting was organized by MOGE, the project proponent, and the EIA company. We want to have an open conversation with the EIA Company but we need to aware the government representative.

Response from Daw Khin Su Su Naing, ERM

- We normally conduct the meetings together with government representative and project proponent as we intend to explain all information related to the project at the same time. If the meetings are conducted separately, the community may not be comfortable to attend all these. However, we are able to listen to you privately if you would like. We do focus group discussions individually with the community after the presentation. Please feel free to talk to us and your concerns will be considered and accessed in the EIA.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	Daw Aye Aye Mar	Officer	Meteorology Department
2.	Daw Pyae Pyae Moe	Engineer -2	Rural Development Department
3.	U Sein Win	Wai Di	Administrator
4.	U Zaw Win	Wai Di	Community Based Organization
5.	U Aung Than	Wai Di	Community Based Organization
6.	Daw Phyu Phyu Aung	Industry – 5	Communication
7.	Daw Tar Lwin	Staff Officer	Planning
8.	Dr. Thein Zaw	Staff Officer	
9.	U Myo Thein	Villager	San Hlan
10.	U Naing	Villager	San Hlan
11.	U Thin Kyaing	Villager	San Hlan
12.	U Thit San	Villager	San Hlan
13.	U Soe Thu	Hundred Household Head	
14.	Daw Tin Zar Aung	Staff Officer	Commission
15.	U Maung Than	Ta Sa Nya Party	Tha Byar
16.	U Aung Soe	Fisherman	Pa Nyit

No	Name	Position	Department/ Organization/ Address
17.	U San Htet	Fisherman	Pa Nyit
18.	U Than Naing	Administrator	Maung Makan
19.	U Tint San	Villager	Maung Makan
20.	U Maung Maung Aye	Clerk	Auk Yae Phyu
21.	Daw Swe Swe Mwe	Clerk	Pa Nyit
22.	Daw Saw Phyu	Clerk	Wai Di
23.	Daw Yee Yee Lwin	Post Officer	Myanma Post
24.	Daw Khin Mar Win	Township Manager	Fire Service Department
25.	U Pyae Phyo Aung	Assistant Officer	Fire Service Department
26.	U Zaw Moe Naing	Deputy Staff Officer (Civil)	
27.	U Min Lwin		Myanmar Police Force
28.	U Than Win	Hundred Household Head	Kyauk Matat
29.	U Myint Aung	Village Administrator	Kyauk Matat
30.	U Tin Maung Win	Assistant Director	Department of Fisheries
31.	U Than Htike	Farmer	Ba Kyet Taw
32.	U Aung Naing Soe	Fisherman	Kyauk Sin
33.	U Nyi Nyi Htwe	Villager	Kyauk Sin
34.	U San Lwin	Villager	Kyauk Sin
35.	U Than Zaw Oo	Villager	Kyauk Sin
36.	U Kyaw Lwin Soe	Villager	Pan Tae Inn
37.	U Htun Kyin	Villager	Maung Makann
38.	U Kyaw Swar Lin	Administrator	Kyauk Wut Pyin
39.	U Thura Shein	Clerk	Kyauk Wut Pyin
40.	U Myo Thein	Villager	Kyauk Ni Maw
41.	U Kyaw Htay	City Development Committee	Laung Lon
42.	U Zaw Naing Oo	Township Manager	Development Bank
43.	U Aung Tin Saw	Township Staff Officer	Department of Fishery

No	Name	Position	Department/ Organization/ Address
44.	U Thet		Department of Traditional Medicine
45.	Daw Thandar Soe	Staff Officer	Audit Department
46.	U Naing Naing	Villager	San Hlan
47.	U Myo Zaw Lin	Clerk	Myin Gyi Kyun
48.	U Thet Htwe	Clerk	Tha Kyet Taw
49.	U Zaw Zaw Win	Clerk	San Hlan
50.	U Naing Min Htun	Clerk	General Administrative Department
51.	U Aung Ko Phyo	Clerk	General Administrative Department
52.	U Zaw Zaw Soe		Department of Education
53.	U Soe Myint	Elder	Tizit
54.	U Thein Aung	Staff Officer	Revenue Department
55.	U Min Thu Lat	Clerk	General Administrative Department
56.	U Aung Kyaw Moe	Elder Person	(Kha) Yard
57.	U Hla Win	Village Administrator	
58.	U Myo Aung	Hundred Household Head	
59.	U Zaw Naing Lin	Staff Officer	Forest Department
60.	U Aung Naing	Deputy Staff Officer	Department of Immigration
61.	U Win Htoo	Staff Officer	Laung Lon
62.	U Kyaw Min Htun	Lawyer	Law Offices
63.	Daw Moe War	Staff Officer	Department of Information and Public Relations
64.	U Aung Khant	Township Court	Laung Lon
65.	U Zay Yar Htay	Sport Coach	Laung Lon
66.	U Aung Thein	Villager	Nyin Maw
67.	Dr. Maung Maung Kyaw	Administrator	Kyauk Sin
68.	U Phoe Shein	Administrator	

No	Name	Position	Department/ Organization/ Address
69.	U Aung Min Htun	Senior Assistant Engineer	Road Department
70.	Dr. Lin Zar Ni Myo	Assistant Surgeon	Laung Lon Hospital
71.	Daw Thet Thet Soe	Village Administrator	Kyauk Ni Maw
72.	U Khin Naing Win	Fisherman	Kyauk Ni Maw
73.	U Maung Naing	Clerk	Kyauk Ni Maw
74.	U San Shwe	Elder	Kyauk Ni Maw
75.	U Win Min Soe	Village Administrator	Tizit
76.	U Aung Thu	Individual Civil Society Organization	Laung Lon
77.	U Maung Myint	Villager	Tizit
78.	Daw Cho Cho San	Maternal and Welfare Association	Nyin Maw
79.	U Soe Paing Thu	Villager	Nyin Maw
80.	U Aung Thu Oo	Village Administrator	Zalut
81.	U Kyaw Phay	Hundred Household Head	Zalut
82.	U Myo Aung	Staff Officer	Department of Agriculture
83.	U Aye Lwin	Villager	Kanni
84.	U Thet Lwin	Villager	Laung Lon
85.	U Than Win	Villager	Kyauk Twin
86.	U Toe Htet	Villager	Kyauk Twin
87.	U Myo Win	Fisherman	Thabawt Seik
88.	U Chit Wai	Villager	Kanyut
89.	U Zaw Oo	Villager	Maung Makan
90.	U Tin Htwe	Village Administrator	Pa Nyit
91.	U Hla Htwe	Fisherman	Ma Nyit
92.	U Win Aung	Village Administrator	Auk Kyauk Wut
93.	U Tun Kyi	Villager	Maung Makan
94.	Daw Yee Yee Htwe	Fishermen Union	
95.	Daw Su Zin Mar	Fishermen Union	

Photo

Meeting of Minutes: Environmental and Social Impact Assessment (ESIA) for PC Myanmar (Hong Kong) Limited (PCML) Yetagun Infill Drilling and 3D Seismic Project

Detail			
Project	ESIA for Offshore Block M-12, M-13 and M-14 Project		
Venue	Grand Jade Hotel	**Region/State**	Tanintharyi
District	Myeik	**Township**	Myeik
Objective	Stakeholder Consultation Meeting		
Date	26th July 2018		
Time	09:00-12:00 PM		

Comment form U Win Naing, Fishery Businessman

- I am interested in environmental and socio-economic impact assessment. I am sure that there will be impacts. Is there any plan to compensate the short-term impact on fishery due to the activity?
- There must be long term impact as Yetagun and Yadana have been operating here for 20 years and those are unrenewable energy resources.
- People are annoyed they cannot use the resources. Electricity is very expensive in this area. Do you have any plan to sell the gas produced from the project in the future and will people have access to electricity.
- The Pinlong Peace Conference mentioned that resources have to be shared. I would like to know how things would change if the regional government had authority to manage the resources.

Response from Dr. Soe Moe Aung, Myanmar Oil & Gas Enterprise (MOGE)

- The project contract is not a new one. The production rate of the existing well is decreasing therefore, infill drilling and exploration drilling is required in order to meet the expected production. The project activities include exploration and infilling drilling which will be undertaken near the area of existing Yetagun platform. The project is to extract gas which will be sold at the fixed prices by connecting with national gas pipe lines.
- There are three steps to get access to electricity; generation, transmission lines and distribution. Although gas will be sold with the fixed price for generation, a transmission line is still required. If this Region can connect lines to the national grid, the electric cost per unit will be reduced.

Response from U Zaw Zaw Aung, PCML

- PCML has a grievance mechanism. We have to comply with the local laws and regulations. If there are laws and regulation to give compensation for the project located in the sea, we will comply with the governments instruction.

Comment from U San Maung, Myeik Fishery Federation

- We usually participate in different public consultation meetings related to oil and gas projects but I feel that our opinions and comments given in the meetings were not submitted to the higher level as there have been no actions. Even though our region is rich in natural resources, we have to pay 400 kyats per unit for electricity.
- There are CSR programs in Tanintharyi (Dawei) but there is no CSR activity in Myeik Township, this area should be considered for the support.
- Fishing is the main business in Myeik. As blocks M-12, M-13 and M-14 are located within our fishing ground, 20 fishing plots out of 52 plots cannot be used for fishing. Previous projects, such as TOTAL

and Shell, operated their project activities at the place where the water depth is about 500- 1000 m. However, this project is near to the shore, it is also close to the shark protection area. One of scholar who did a study said that there are so many fishing boats and overfishing is currently taking place in the area. When oil and gas activity takes place, fishing boats have to move and might reach to restricted areas.

- We understand that these projects are important for national development. When will the contract end? Will the infill drilling fulfil the amount required in the contract? Will the project take be extended if oil and gas extraction can continue?
- What will be the positive impacts from this project to our region? There if Form 7 for land ownership; what is the ownership in the water? We have fishing license in the sea and we also have to pay taxes according to the government regulations. The mitigation measures only apply for the company and not for the fishermen. Notice to Mariners explains where the activity will take place but it does not mention the loss of the fishermen. We are fishing seasonally and if the restriction is in the season, we cannot do our business. It is only the restriction for the fishermen not to fish in the project area. We have mentioned several times and there is no actions coming out of this message. If oil and gas companies come to inform us about the project but not to consider the impact from the fishing business, we don't want to participate in the consultation meeting anymore.
- The presentation explained that seismic activity will be undertaken with a soft start to alert marine animals. What about crabs living in the ground and sea turtles? The presentation mentioned about whales and sharks. We aren't interested in them as we don't catch them. We are aware that the red crab catch is decreasing which impacts our business. What is the impact of seismic surveys on fishes and crabs.
- We also want to understand how much gas has to be produced to fulfil the contract? How much gas can be produced from the potential wells? I want you to disclose the amount because seismic survey had already been done. Then we can understand whether the gas can be left for the people when the contract expire.

Comment from U San Hmwe, Kyun Su Department of Fishery

- There is Form 7 for land ownership, likewise there are 52 fishing blocks for Tanintharyi region and there can be a kind of ownership for the fishermen in the sea.

Response from Daw Khin Su Su Naing, Environmental Resource Management (ERM)

- Third party organization has to prepare the report and submit to the Environmental Conservation Department (ECD) to be reviewed and give approval. The report is reviewed by different relevant departments such as Ministry of Labor, Immigration and Population, Ministry of Health and Sports, Forest Department, Department of Meteorology and Hydrology, Department of Marine Administration, Port Authority, and professors from relevant universities. The department officers give comments and suggestions for the report to be amended. The comments and suggestions of the local people in the meetings are included and considered in the report.
- There is no evidence of significant impact to fish species or animals on the seabed from 3D seismic surveys.

Response from Dr. Soe Moe Aung, Myanmar Oil & Gas Enterprise

- Oil and gas projects, like Yadana, Yetagun, and Zaw Ti Ka, are doing CSR programs. They have to negotiate with the Regional Government before starting the CSR activities. The regional government makes sure the projects not to overlap with their planned projects.
- The current production rate of oil and gas become decreasing. We assume that the proposed wells will have some chance of success. According to technology, drilling on the existing well has only 30% for success. Iinfrastructure is required to be built if the gas volumes found are commercially viable

Comment from U Tin Than, Myeik Fishery Federation

- Offshore fishing can be undertaken to around 160 miles from the shore. The Project Area is 60 square miles (*NOTE: this is incorrect information and was not mentioned by PCML or ERM*). There are around 2,000 members in fishery association. We cannot catch fishes in these 60 square miles and we have to fight for the fishing ground in the remaining areas.

Comment from U Win Naing, Fishery Businessmen

- The community wants transparency of the project and responsibility of the company. It should not be mentioned that the grievance mechanism will be undertaken only if the government gives instruction.
- The information presented that fishermen mostly catch fish within 10 miles from the shore was wrong as fishermen usually go 20-100 miles for fishing.

Comment (unknown)

- It is mentioned that the company spent 750,000 USD on their CSR program. It should be disclosed in the presentation how much percentage of the profit will be used for the CSR program.

Response from Daw Tin Nwe Nyo, PCML

- We pay taxes to the government according to the contract. We have to share profit by proportion with government and MOGE as per this contract. The CSR program is not included in the contract.
- Yetagun performs CSR program for the local development.

Comment from U Myat Zaw Moe, Myeik University

- What does the term "profit sharing with proportion" mean? The contact numbers mentioned in the presentation is not important for the locals. We only want the number that we can complain effectively for the project negative impacts. What is the plan for fishermen having to relocation to another area as it is very important and costly.

Response from Dr. Soe Moe Aung, MOGE

- Sharing profit with proportion means that all proponents have to invest a certain amount for hiring ships, drilling cost, and constructing platform (if necessary) when exploration drilling starts. The amount of profit depends on the investment amount and therefore it is termed "sharing profit with proportion".

Comment from U Aung Than

- Does the third party stand for PCML or local community?

Comment from U Yan Kin, Department of Fishery

- When drilling activities start, there may have noise and vibration. Will you consider impacts to fisheries? We are trying to conserve marine resources by reducing 10% of catching fishes and restricting for breeding season three (3) months.

Response from Daw Khin Su Su Naing, ERM

- The Third party is an independent organisation which assesses the potential environmental and social impacts by the project. The information "fishing within 10 miles" was received from a previous visit but now we know that offshore fishing boats go over 100 miles from the shore. In the EIA report, we will include all the comments, suggestions and conduct fishery assessments. We will also include the mitigation measures for any impacts.

Comment from U Kyaw Kyaw Naing

- 20 years ago, there were only 230 KV transmission lines, but now 500 KV is available, in Myanmar. In Kanbauk Township, there is a Liquefied natural gas (LNG) power plant and the electricity will be sent to Bago, however, Tanintharyi Region is not included. Although projects are located in our region, why don't we have any benefits?

Response from Dr. Soe Moe Aung, MOGE

- The LNG power plant is currently under construction in Kanbauk Township. The Department of Electricity (DOE) and MOGE is not the same. Oil and gas processes are operated under MOGE and electricity generation and distribution is run by the Department of Electricity. According to the DOE plan, the implementation timeline is that a Dawei-Myeik transmission line will be constructed in 2021-2022, a Myeik- Bokepyin line in 2021- 2022, and a Bokepyin- Kawthaung line in 2022- 2023.

Comment from U Chit Htwe, Youth Network

- The project cannot get license to operate without local people agreement. There is no fisherman in the Union Government and they don't know about the local fishery. The Regional government has no authority on this project and local people have no power as well. I want to suggest you to extend the project schedule for more discussion and comments.

Comment from U Htay Hlaing

- Blocks M-12, M-13 and M-14have been contracted with the previous government and processed to continue by the current government. These blocks are located near the fishing grounds.
- When will the project end and can these blocks be managed by local when the contract ends?
- As a local, I would like you suggest to stop this project because these three (3) blocks are the most dangerous and nearest to the shore.

Response from Dr. Soe Moe Aung, MOGE

- The project had already been contracted. The production rate of the existing well is decreasing and therefore infilling need to be done to fulfill the expected production. If the production amount is less than the amount in the contract, the government has to compensate according to the contract. The project activities such as exploration and infill drilling will be done near the existing platform.
- The Yetagun project as a whole has a 30 year contract and it started in 2000. The time remaining for the project is 12 years from now.

Comment

- Do you make a record of the comments and suggestion of local people in this meeting? The agenda of the meeting should be provided and group discussions conducted to get more comments and suggestion.

Comment from U San Maung, Myeik Fishery Association

- Can you please confirm that "the restricted area is 5 miles radius from the drilling rig"?
- When the fishing boat is 6 miles away from drilling rig, and if the fishing boat is caught by the Navy guards, how would you solve for this issue?
- The fishery federation have previous experience that fishing boats could not enter within 10 miles. The navy guards usually stay 10 miles away from the restricted area. Therefore, the restricted area is 20 miles distance from the drilling rig.
- We would like to suggest that to disclose the information of restricted area in newspapers and magazines.

Response from U Zaw Zaw Aung, PCML

- The restricted area is five miles radius from the drilling rig and will be marked on nautical maps and disclosed. We have not seen any fishing boats entering the restricted area.

Comment from U San Maung, Myeik Fishery Association

- We know that it is disclosed in the nautical map. We want you to disclose this information in newspaper and magazines because we want to have an evidence when there will be a problem relating to the restricted area.
- How can we assess the results of this public consultation meeting? How would ERM analyse the results of this meeting according to recent comments and suggestion of ship owners, local people and associations?

Comment from U Chit Htwe

- How do the company submit the report to the Environmental Conservation Department? We don't believe that our comments and suggestion will be included in that report.

Response from Daw Khin Su Su Naing, ERM

- When the EIA process is conducted, the report has to be disclosed to the public. This report has also to be sent to Department of Fishery and relevant administrative offices in the Region. It will be also

disclosed on the project proponent's website. If you have questions and comments, you can contact to the address described in the presentation. The purpose of this meeting is to explain about the project information and to collect comments and suggestion from local people. We will include this meeting minutes in the report and undertake the assessment based on your information.

Comment from U Too Hlaing Myint

- If the local people disagree with the project, would you stop the activities? If the project will be processed to continue, although local people disagree with the project? If so, the public consultation meetings are nonsense.

Comment from U Aung Than

- If the company continue project activities without local people's agreement, conducting public consultation meetings are time consuming.
- Is the activity under a new contract?

Response from U Phoe Kyaw, PCML

- The contract is the old one.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	U Aung Min Naing	Accountant	Kyaw Chan Thar Company
2.	U Kyaw Htay Win	Squid Business Association	Myeik
3.	U Tin Shein	Chairman	Regional Fishery Department
4.	U Aung Lwin	Squid Business Association	Myeik
5.	U Win Myint	Community Person	Myeik
6.	U Tin Than	Fishery	Myeik
7.	U Chan Thar Oo	Government Staff	Bureau of Special Investigation
8.	U Than Soe	Project Officer	Law Ka Alin
9.	U Myo Thura Kyaw	Fishery	Myeik
10.	U Soe Thu Aung	Observer	
11.	U Kyaw Naing Soe	Reporter	Myawaddy New
12.	U Aung Oo	Squid Business Association	Myeik
13.	U Aung Kyaw	Reporter	Democratic Voice of Burma
14.	U Kyaw Shein	Accountant	Regional Fishery Department
15.	U Soe Htike Aung	Member	Fish Vessel Association
16.	U Hlaing Thura	Finance Officer	Regional Fishery Department
17.	U Htay Hlaing	Assistant Finance Officer	Squid Business Association
18.	U Thaung Aye	Administrator	Seiklu
19.	U Tin Soe	Community Person	Myeik
20.	U Myint Oo	Reporter	Myanma Alin/ Mirror
21.	U Khaing Htoo	Staff	Information Department
22.	U Aung Thaw Oo	Community Person	Myeik
23.	U Nyi Nyi Aung	Community Person	Myeik
24.	U Min Kyaw	Community Person	Myeik
25.	U Naing Win Tun	Community Person	Myeik
26.	U Maung Gyi	Fishermen	Myeik
27.	U San	Reporter	Thanintharyi Journal
28.	U Kyaw Oo	Community Person	Yay Pone
29.	U Zaw Moe Oo	Senior Reporter	Eleven Media

No	Name	Position	Department/ Organization/ Address
30.	Ma Zin Mar Win	Student	Myeik University
31.	U Yan Kin	Township Staff Officer	Department of Fishery
32.	Daw Mon Mon Naing	Deputy Director	Planning Department
33.	U Thaung Myint	Secretary	Myeik Fishery Association
34.	U Thet Soe	Secretary	Regional Fishery Association
35.	U San Hmwe	Township Staff Officer	Kyun Su, Department of Fishery
36.	U Nay Thawtar Nyi Nyi	Deputy Staff Officer	Environmental Conservation Department
37.	U Too Hlaing Myint	Member	Squid Business Association
38.	U Win Myint	Member	Squid Business Association
39.	U Thet Tun San	Assistant Director	City Development Committee
40.	U Thein Saw	Community Person	Myeik
41.	U Kyaw Moe Lwin	Range Officer	Forest Department
42.	U Wai Linn	Staff	Lin Aung Phyo Co., Ltd
43.	U Win Naing	Fisherman	Myeik
44.	U Maung Yu	Fisherman	Myeik
45.	U Htay Lwin	Fisherman	Myeik
46.	U Min Min Hlaing	Administrator	Talai Su, Myeik
47.	U Sein Thaung	Community Person	Myeik
48.	Daw Su Yee Htay	Reporter	Myawaddy New
49.	Dr. Mya Mya Tun	Professor	Zoology Department, Myeik University
50.	U San Maung	Chairman	District Fishery Association
51.	U Myat Zaw Moe	Junior Biologist	Fauna & Flora International
52.	U Tin Sein	Accountant	Fishery Association
53.	U San Htoo	Reporter	Newspaper
54.	U Chit Htwe	Incharge Person	Youth Network
55.	U Kyaw Ye Tun	Community Person	Myeik
56.	U Aung Than	Member	Our Future Initiative- Network
57.	U Aung Yan Htet	Deputy Staff Officer	Environmental Conservation Department
58.	U Tun Aung Kyaw	Deputy Chairman	District Fishery Association
59.	U Zaw Zaw	Media	Myeik

No	Name	Position	Department/ Organization/ Address
60.	U Maung Win	Manager	Taw Win Saung Co., Ltd
61.	U Than Tun Oo	Secretary	Squid Business Association
62.	U Myint Lwin	Member	Squid Business Association
63.	U Khin Maung Win	Community person	Myeik
64.	U Tin Myint	Associate Secretary	Fishery Association
65.	U Tun Tun Win	Community Person	Myeik
66.	U Ni Toe	Agent	Kyaw Khaing Min Group
67.	U Aung Min Lwin	Incharge Person	Vantage Co., Ltd
68.	U Than Ko	Administrator	Nan Taw Yar
69.	U Tin Soe	Community Person	Yay Pone Yat
70.	U Aung Kyaw Htay	Community Person	Myo Thit

Photos






Meeting of Minutes: Environmental and Social Impact Assessment (ESIA) for PC Myanmar (Hong Kong) Limited (PCML) Yetagun Infill Drilling and 3D Seismic Project

Detail			
Project	ESIA for Offshore Block M12, M13 and M14 Project		
Venue	General Administrative Department's Office	**Region/State**	Tanintharyi
District	Dawei	**Township**	ThaYetChaung
Objective	Stakeholder Consultation Meeting		
Date	23rd July 2018		
Time	15:00-18:00 PM		

Comment form U Kyaw Kyaw Thet, Dawei District Fishery Federation

- Do Myanma Oil and Gas Enterprise and PETRONAS Carligali Myanmar (Hong Kong) Limited (PCML) have a new contract for these wells?
- Is there any electricity allocation for Tanintharyi region?
- Tanintharyi has an issue of overfishing. The fishery resources are declining up to 60% due to overfishing. Although the law had determined to fish 10 miles from the shore for onshore fishermen, they are extending further than this.

Response from Dr. Soe Moe Aung, MOGE

- This current project is not a new agreement and it continues as per the existing agreement. The project is the long-term agreement. When the production starts to decreased, there will be infill drilling to increase production and meet the contract requirements.
- The government has been distributing electricity for domestic uses from Yadanar and Zawtika gas fields.
- The agreement was contracted not only between PCML and MOGE but also with the Union Government. The economic benefit from the oil and gas industry goes directly to the union government and cannot be used as the department. The main contract is with the Union Government, MOGE is the department which participates and provides technical support.

Comment from U Kyaw Kyaw Thet, Dawei District Fishery Federation

- The cost of electricity is expensive and we have to purchase gas.

Response from Dr. Soe Moe Aung, MOGE

- There are currently two responsible departments, Department of Electricity (DOE) who is responsible for electricity transmission and distribution and MOGE who is focusing on exploration and drilling.
- According to the DOE, there is a liquefied natural gas project in Tanintharyi (Kanbauk) that will hopefully distribute electricity to the Region and a plan for transmission lines in the Region to connect to the national grid. The main reason for high electricity cost is that there is no connection with national grid.

Comment from Dr. Soe Thein, Myo Ma Ward

- The company continues the operation due to the existing contract. The exploration wells are in Tanintharyi offshore. If they find the gas source, will they need to make a new contract?

Response from Dr. Soe Moe Aung, MOGE

- The international and Myanmar law of resources states that if the zone is located in 25 miles from shore, it will be regional management. This block is located over 60 miles from shore, so it will be under the management of Union Government. According to the contract, the current agreement will end in 2025.

Comment from U Kyaw Kyaw Thet, Dawei District Fishery Federation

- Will the agreement for new block cover the current contract?

Response from Dr. Soe Moe Aung, MOGE

- This exploration wells are not in new block and they are part of the existing contract. Annual selling amounts were also included in the first contract. We have been drilling for 20 years in these three blocks since the first contract was signed.
- The production has decreased so we need to drill new wells to cover the production rate requirements in the contract. The new wells have only 50 percent possibility to success due to technical and natural resources limitations. We also invested in exploration drilling which has 20 percent probability to success. If the drilling can produce gas, we need to ensure it is commercially viable. If gas is not discovered, the exploration company and also the shareholder company have to compensate because these projects have long term contract with government.

Comment form U Shu Tun, Elder Person

- Although Tanintharyi Region can produce natural gas, the locals are still purchasing it. We need appropriate privilege for our Region.

Response from Dr. Soe Moe Aung, MOGE

- The contract has been running for 10 to 15 years but recently the natural gas resources are declining. Exploration drilling is required to meet the amounts in the contract. If the natural gas production increases, the government will supply for all Regions that need electricity.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	Dr. Soe Thein	Elder Person	Myo Ma Ward
2.	Dr. Zaw Zaw Htun	Assistant Director	Livestock Breeding and Veterinary Department
3.	U Tin Yu	Deputy Administrator	General Administration Department
4.	U Saw Kyaw Soe	Assistant Director	Planning Department
5.	U Tin Htay Oo	Staff Officer	Forest Department
6.	Daw Ei Ei Maw	Member	Myanmar Maternal and Child Welfare Association
7.	Daw Khine Thinzar Lwin	Member	Myanmar Maternal and Child Welfare Association
8.	U Soe Htwe	District Hluttaw (Retired)	Myo Ma Ward
9.	U Aung Myo Lin	Administrator	Myo Ma Ward
10.	U Than Win	Administrator	
11.	Daw Myint Myint Khine	Women Affair	Myo Ma Ward
12.	Daw Thi Thi Win	Women Affair	Myo Ma Ward
13.	Daw Than Htay	Women Affair	Myo Ma Ward
14.	Daw Su Su Hlaing	Member	Myanmar Maternal and Child Welfare Association
15.	Daw Than Than Myint	Township Staff Officer	Fishery Department
16.	U Htay Min	Deputy Supervisor	Electricity Department
17.	U Myo Chit Oo	Camera - 2	Information and Public Relation Department
18.	Daw Soe Soe Thi	Staff Officer	Department of Rural Development
19.	U Tin Swan	Executive	City Development Committee
20.	U Twal Tar Aung	Village leader	Pan Taw
21.	U Kyaw Kyaw Naing	SYF Media	Thayet Chaung
22.	U Myint Ko Ko	Staff Officer	Land Record Department
23.	U Saw Naing		
24.	U Mya Lwin	Administrator	Kyauk Myaung
25.	U Nay Win	Administrator	Maw Shae Tone

No	Name	Position	Department/ Organization/ Address
26.	U Nyan Win	Reporter	Myanma Alin
27.	U Aye Win	Elder Person	Myo Ma Ward
28.	U Aung Thin	Village Administrator	Pein Taw
29.	U San Lwin	Village Administrator	Pan Che Shaung
30.	U Shu Tun	Elder Person	Thayet Chaung
31.	U Naing Win	Staff Officer	Information and Public Relation Department
32.	U Kyaw Kyaw Thet	Chairman	Dawei District Fishery Federation
33.	U Hein Zaw	Staff Officer	
34.	U Aung Tin Win	Staff Officer	Irrigation and Water Utilization Management Department
35.	Kyaw Lin Naing	Reporter	
36.	Daw Tin Mar Aye	Staff Officer	Thayet Chaung
37.	U Win Latt	Community Person	Thayet Chaung

Photo






ရိုတံခွန်သဘာဝဓာတ်ငွေ့ စီမံကိန်း၏
ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်းတူးဖော်ခြင်းအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာလူမှုရေးလာဆန်းစစ်ခြင်းနှင့် သုံးသက်သြဇာ ဆိုက်စမစ်တိုင်းတာခြင်းအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း - လုပ်ကွက်အမှတ် (M-12, M-13 နှင့် M-14)

တင်ပြသူ - ERM နှင့် PC MYANMAR (HONG KONG) LIMITED (PCML)

ရေစွဲ - ဇူလိုင်လ၊ ၂၀၁၈ ခုနှစ်

The business of sustainability

အစီအစဉ်

	အကြောင်းအရာ
၀.	မိတ်ဆက်ခြင်း
၂.	စီမံကိန်းနှင့် စီမံကိန်းဇော်ဆောင်သူ၏ အချက်အလက်များ
၃.	ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်းတူးဖော်ခြင်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာလူမှုဆန်းစစ်ခြင်းဆိုင်ရာလေ့လာချက်
၄.	သုံးသက်ခြင်းဆိုက်စမစ်တိုင်းတာခြင်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းဆိုင်ရာလေ့လာချက်
၅.	သဘာဝပတ်ဝန်းကျင်အခြေအနေ
၆.	လူမှုပတ်ဝန်းကျင်အခြေအနေနှင့် လူထုသွေ့ဆုံ့ပွဲများ
၇.	ထိခိုက်သက်ရောက်နိုင်မှုများ နှင့် လျော့ချရေး အစီအမံများအား တင်ပြခြင်း (ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်းတူးဖော်ခြင်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာလူမှုဆန်းစစ်ခြင်း)
၈.	ထိခိုက်သက်ရောက်နိုင်မှုများ နှင့် လျော့ချရေး အစီအမံများအား တင်ပြခြင်း (သုံးသက်ခြင်းဆိုက်စမစ်တိုင်းတာခြင်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း)
၉.	စီမံကိန်းဇော်ဆောင်သူ၏ ထက်သွေယိမ်း လိပ်စာ

စီမံကိန်းဇော်ဆောင်သူနှင့် စီမံကိန်းဇာတ်အလက်များ (ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း တူးဖော်ခြင်းနှင့် သုံးသက်ခြင်း ဆိုက်စမစ် တိုင်းတာခြင်း)

စီမံကိန်းဇော်ဆောင်သူ

မြန်မာနိုင်ငံဆွဲငင် PETRONAS ၏ စီမံကိန်း လုပ်ငန်းများ
လုပ်ကွက် (၉) ခု ၏ ဧဘော်ဝေတော နှင့် လုပ်ကွက် (၁) ခု၏ အကျိုးတူပူးပေါင်းဆောင်ရွက်သူ

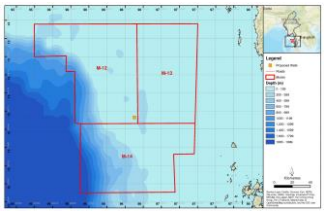
PETRONAS သည် လုပ်ကွက် M12/13/14, M15/16/17/18, MD 4/5/6, RSF2/3, IOR5 တို့အတွက် Production Sharing Contracts (PSC) စာချုပ် (၁၃) ခု နှင့် လုပ်ကွက် IOR7 အတွက် Improved Petroleum Recovery Contract(IPR) စာချုပ် (၁) ခု အား လက်မှတ်ရေးထိုးထားပြီး အခြားလုပ်ကွက် ၄ ခု (လုပ်ကွက် D, AD9, AD11, EP1) ကိုလည်း လုပ်ကိုင်ဖျက်ဆီးခဲ့ သည်။

ယနေ့အခါ မြန်မာနိုင်ငံတွင် Petronas မှပါဝင်ဆောင်ရွက်နေသော လုပ်ကွက် (၆) ခု ရှိပါသည်။
- ဧဘော်ဝေတောအပြင် ကမ်းလွန်လုပ်ကွက် (၃) ခု (တနင်္သာရီတိုင်းဒေသကြီးတွင် ကမ်းလွန်လုပ်ကွက် M12,13,14 ၊ ရခိုင်ပြည် သဘာဝဓာတ်ငွေ့ စီမံကိန်း) နှင့် ကျန်းတွင်း လုပ်ကွက် (၂) ခု (ရေထဝတီတိုင်းဒေသကြီးတွင် ကုန်တွင်း လုပ်ကွက် IOR5 နှင့် IOR7)။
- အခြား ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း ဖော်ပိုရေတာများနှင့်အတူ မူအခြေခံဆောင်ရွက်သူအဖြစ် (EP1 မောင်္ဂတိုင်းဒေသကြီးအတွင်း ကုန်တွင်းလုပ်ကွက် EP1)

PETRONAS သည် မြန်မာနိုင်ငံတွင် ဂုဏ်သိက္ခာရှိသော ကုမ္ပဏီ တစ်ခုအဖြစ် ရပ်တည်လျက်ရှိပြီး ကျန်းမာရှိသို့ ပြည်တွင်း နှင့် ပြည်ပ အကြီးတန်းလုပ်ငန်းများတွင် Myanma Oil and Gas Enterprise (MOGE), PTTEP International Limited, JX Nippon Oil & Gas Exploration, UNOG Pte Ltd နှင့် PB Myanmar တို့ဖါဝင်သည်။

စီမံကိန်းတည်နေရာ(ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ခြင်း)

- ရိုတံခွန်သဘာဝဓာတ်ငွေ့စီမံကိန်းမှာ လုပ်ကွက်အမှတ် M12 ၊ M13 နှင့် M14 တွင် တည်ရှိပါသည်။
- ထားဝယ်မြို့ (ဆိုးအနောက်အရပ် ၁၁၂) မိုင် (၁၈၀ ကီလိုမီတာ) အကဲ့ဖန်ပင်လယ်အတွင်းတွင် တည်ရှိပါသည်။
- ဗီဝတိန်းသိမ်းရေနေသပ်မြေအနီးရှိ (ဖော်ကုံကျွန်း) မှ မြဝိုင် (၁၀၅) ကီလိုမီတာ) အကွာတွင် တည်ရှိပါသည်။
- မြိတ်ကျွန်းစု မြဝိုင် (၁၁၁ကီလိုမီတာ) အကွာတွင် တည်ရှိပါသည်။
- လောင်းလုံမြို့နယ်ရှိ ကမ်းရိုးတန်းကျွန်းစုယိမ် ဧကျိုင် (၁၄၄ကီလိုမီတာ) တွင်တည်ရှိပါသည်။



စီမံကိန်းအကြောင်းအရာ (ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ခြင်း)

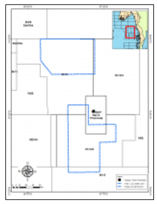
- ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း ၃တွင်း တူးဖော်ပါမည်
- တွင်းတည်ရှိရာရေအနက်မှာ ၇၆၊ ၈၀ (၁၀၆တာ)ရှိပါသည်
- တည်ဆောက်ရေကာလ = ၂၂၀၀ ဝတ္ထုဧည့်သုံးလပတ် (အောက်တိုဘာ-ဒီဇင်ဘာလ) တွင်ရည်ရွယ်ထားပါသည်
- တွင်းတူးမီခက်နိုးကာလ = တစ်တွင်းစီလျင် ၂၃ရက်ကြာမြင့်ပါမည်
- တွင်းတူးမည့်ပင်လယ်ရေအောက်ကြမ်းခြင်းအနက် = ၆၅၀၀၀ ပေ မှ ၉၀၀၀၀ ပေ (၂၀၀၀မီတာ မှ ၃၀၀၀မီတာ)
- ရွေ့လျားကမ်းလွန်ရေနံတူးစက်ယူနစ်ကို အသုံးပြုသွားမည်
- ထောက်ပံ့ရေးယာဉ် ၃စီးထားရှိပါမည်
- ရွေ့လျားကမ်းလွန်ရေနံတူးစက်ယူနစ် (MODU) မှ ထားရှိထားမည့် ကင်းဖွတ်ရန် ဧရိယာ = အချင်းတက် ၁၆၀၀ ပေ/ ၀.၃ မိုင် (၅၀၀မီတာ)

No	Name	Coordinates
1	YA-01	Lat: 13° 4'17.09"N/ Long: 96°52'5.31"E
2	YA-05	Lat: 13° 4'17.09"N/ Long: 96°52'5.31"E
3	YA-12TS1	Lat: 13° 4'17.09"N/ Long: 96°52'5.31"E

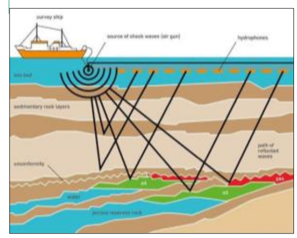
သုံးဘက်မြင် ဆိုက်စမစ်တိုင်းတာခြင်းအတွက် အဆိုပြုနေရာ နှင့် စီမံကိန်းအကြောင်းအရာ

ဆိုက်စမစ်တိုင်းတာမည့် စီမံကိန်းတည်နေရာ	စီမံကိန်းအကျယ်အဝန်း	ဆောင်ရွက်မည့်ပုံစံ	စီမံကိန်းဆောင်ရွက်မည့်ကာလ
လုပ်ကွက်အမှတ် M12, M13, M14	၈၃၀၀ စတုရန်းကီလိုမီတာ	ကြိုးမဲ့အွန်လိုင်းစနစ်ဖြင့် ဆိုက်စမစ်တိုင်းတာ၍ အချက်အလက်ရယူခြင်း	၂လ မှ ၃လ ခန့်

အဓိကလုပ်ငန်းဆောင်ရွက်မှု	ဖော်ပြချက်
ဆိုက်စမစ်တိုင်းတာမည့် အဏ္ဏဝါရေအောက် သင်္ဘောယာဥ်များ	• ရေယာဉ်ပေါ်တွင် ဆိုက်စမစ်တိုင်းတာသည့်ပစ္စည်း(air gun) နှင့် အချက်အလက်ရယူခြင်းများ ပါရှိခြင်း
လိုက်လံဆောင်ရွက်မည့် ရေယာဉ်များ	• ကမ်းလွန်ငါးဖမ်းလုပ်သားများနှင့်သဘောတူညီနိုင်း ဆောင်ရွက်ခြင်း၊ ကားဖမ်းပိုက်များအား ဆိုက်စမစ်လိုင်းဆောင်ရွက်မည့် ဧရိယာမှ ဖယ်ရှားခြင်း၊ • အရေးပေါ်ကျန်းမာရေးအခြေအနေအတွက် ဆေးဘက်ဆိုင်ရာများ ကူညီဆောင်ရွက်ပေးခြင်း
ထောက်ပံ့ရေးရေယာဉ်များ	• အစာရိက္ခာများထောက်ပံ့ဖြည့်တင်းပေးခြင်းနှင့် အလုပ်သမား ပြောင်းလဲပေးခြင်း • အရေးပေါ်ကယ်ဆယ်ရေး၊ ပြန်လည်ဖြည့်တင်းပေးခြင်းနှင့် အထွေထွေ ထောက်ပံ့ပေးခြင်း



သုံးဘက်မြင် ဆိုက်စမစ်တိုင်းတာခြင်း သဘောတရား



Acquisition Parameters	
Number of Streamer	10/12
Streamer Length	8100 m
Streamer Separation	112.5 m
Streamer Depth	~15m (TBA)
Streamer Type	Full Solid Streamer
Record Length	7.5 seconds

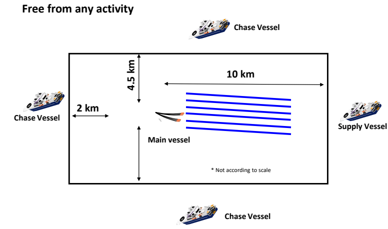
1) တိုင်းတာရေးကိရိယာမှ လေဖိအားတစ်ရပ်ကို သင့်တော်သည့် အချိန်ကာလ တစ်ခုခြား၍ ထုတ်လွှတ်မည် ဖြစ်ပါသည်။
2) အသံရောင်ပြန်ဟပ်ခြင်းသဘောတရားအရ လေဖိအားမှထွက်လာသောအသံသည်ကမ္ဘာမြေမျက်နှာသွင်ပြင်သို့ ရောက်ရှိပြီး၊ ပင်လယ်ရေမျက်နှာပြင်သို့ ပြန်လည် ရောင်ပြန် ဟပ်ပါသည်။
3) ရောင်ပြန်ဟပ်သည့် အသံလှိုင်းကို တိုင်းတာရေးကိရိယာ၏ Streamers မှ လက်ခံပြီး မှတ်တမ်းတင်ပါသည်။

သုံးဘက်မြင် ဆိုက်စမစ်တိုင်းတာခြင်း သဘောတရား (Streamer)

သင်္ဘောကုန်းပတ် (ဝဲဘက်) တွင် သိမ်းဆည်းထားသည့် Streamer ပုံ နှင့် သင်္ဘော၏နောက်ကျောဖက်တွင် Streamers များကို ဖြန့်ကြဲထားပုံ (ညာဘက်)

ဆိုက်စမစ်တိုင်းတာစဉ်အတွင်း ကန့်သတ်နယ်မြေ

Free from any activity



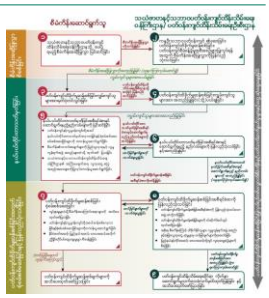
ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လေ့လာချက်

ERM

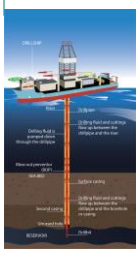
- ERM သည် ပတ်ဝန်းကျင်ဆိုင်ရာ၊ ကျန်းမာရေးဆိုင်ရာနှင့် လူမှုရေးဆိုင်ရာ ကိစ္စရပ်များအပေါ် ညှိနှိုင်းတိုင်ပင်ဆောင်ရွက် ပေးနေသောကုမ္ပဏီဖြစ်ပါသည်။
- နိုင်ငံပေါင်း ၄ဂကျော်တွင် ဆောင်ရွက်လျက်ရှိသောကုမ္ပဏီ ဖြစ်ပါသည်။
- ရန်ကုန်တွင်လည်း ERMရုံးခန်းတည်ရှိပြီး ပြည်တွင်းဝန်ထမ်းနှင့် နိုင်ငံတကာမှ ဝန်ထမ်းများတို့ဖြင့် ဖွဲ့စည်းတည်ထောင်ထားရှိပါသည်။
- ERMသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ဆောင်ရွက်ခြင်းအတွက် သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန(MONREC) ထံတွင် မှတ်ပုံတင်ထားရှိသည့် အသိအမှတ်ပြုခံထားရသော ကုမ္ပဏီတစ်ခု ဖြစ်ပါသည်။
- ERMသည် ၁၉၉၆တည်းမှစ၍ မြန်မာနိုင်ငံတွင် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း(IEE), ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) နှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) (၁ဝဝ)ကျော်မျှ ဆောင်ရွက်ပြီးစီးခဲ့သော ကုမ္ပဏီ တစ်ခု ဖြစ်ပါသည်။
- အခြေခံစစ်တမ်းကောက်ယူမှုများကိုလည်း Environmental Quality Management (EQM) နှင့် အတူတကွဆောင်ရွက်လျက်ရှိပါသည်။

EIA လုပ်ငန်းစဉ်

လုပ်ငန်းစဉ်	ဆောင်ရွက်ချက်
၁.	စီမံကိန်းအဆိုပြုလွှာ
၂.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းကျွမ်းကျင်သူများအားမှတ်ပုံတင်သွင်းခြင်း
၃.	လူထုတွေ့ဆုံပွဲ အစည်းအဝေးများကို ပြုလုပ်တာဝန်ယူဆောင်ရွက်ခြင်း
၄.	နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအစီရင်ခံစာနှင့် ဆောင်ရွက်ရမည့်နည်းလမ်းများ
၅.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ
၆.	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှလက်ခံခြင်း



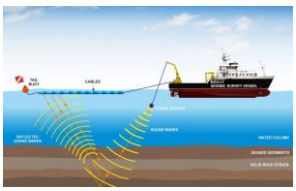
တိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း တူးဖော်ခြင်း



Video

သုံးဘက်မြင် ဆိုက်စမစ် တိုင်းတာခြင်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း ဆိုင်ရာလေ့လာချက်

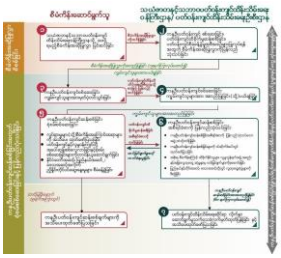
အဏ္ဏဝါရေအောက် ဆိုက်စမစ်တိုင်းတာလေ့လာခြင်း



Video

IEE လုပ်ငန်းစဉ်

လုပ်ငန်းစဉ်	ဆောင်ရွက်ချက်
၁.	သဘာဝပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ရှိ ရလဒ်များနှင့်အန္တရာယ်ရှိသချေတ်များကို စိစစ်လေ့လာခြင်း
၂.	ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းကျွမ်းကျင်သူများအားမှတ်ပုံတင်သွင်းခြင်း
၃.	လူထုတွေ့ဆုံပွဲ အစည်းအဝေးများကို ပြုလုပ်တာဝန်ယူဆောင်ရွက်ခြင်း
၄.	ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာ
၅.	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှလက်ခံခြင်း



ပတ်ဝန်းကျင်အခြေအနေ

ရုပ်ပိုင်းဆိုင်ရာ ပတ်ဝန်းကျင်အခြေအနေ

- လုပ်ကွက်အမှတ် M-12, 13, 14 တို့သည် ပင်လယ်ရေအောက်ကြမ်းပြင် အနက် ၃၅၀ ပေ မှ ၃၃၀၀ ပေ အထက် (၁၀၀ မီတာ မှ ၁၀၀၀ မီတာအထက်) တွင်တည်ရှိပါသည်။
- ရေနံတွင်းအနီး ပင်လယ်ရေအောက်ကြမ်းပြင်သည် ရွှံ့စေး မြေသား ဖြစ်ပြီး၊ ကမ်းစပ်ရေဧရိယာသည် သဲ၊ သောင်ပြင်ဖြစ်ပါသည်။

ဇီဝမျိုးစိတ် ပတ်ဝန်းကျင်အခြေအနေ

သန္တာကျောက်တန်း

- မြိတ်ကျွန်းစု၏အစွန်အဖျားကျသော ကျွန်းများတွင်သာအများဆုံးတွေ့ရသည်။

လမုတောများ

- ကျွန်းကမ်းပါးတလျှောက်တွင် ကာရံလျက်ရှိသည်။
- မြစ်ဝများတွင်ရှိပါသည်။
- မြစ်ဒီရေအတက်အကျဖြစ်သော ဧရိယာများတွင် တွေ့ရသည်။

ပင်လယ်မြက်များ

- ရေတိမ်ပိုင်းရှိ ရေအနက် ၆၅ပေ အထက် အရိပ်အာဝါသကောင်းသော ဧရိယာတွင်တွေ့ရပါသည်။

ဇီဝပတ်ဝန်းကျင်အခြေအနေ

ဝေလငါးနှင့်လင်းပိုင်များ

- ဝေလငါးပြာ (Balaenoptera musculus) (EN)
- ဆူးတောင်ဝေလငါး (Balaenoptera physalus) (EN)
- ငါးကြီးဆီထုတ်ဝေလငါး (Physeter macrocephalus) (VU)

ပင်လယ်နို့တိုက်သတ္တဝါ

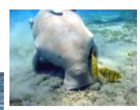
- မြိတ်ကျွန်းစုများတွင်တွေ့ရသည်။ (စူလာကျွန်း၊ လင်ကျွန်း၊ ဘိုလွတ်ကျွန်းနှင့် ဝါးကျွန်း)

အဏ္ဏဝါပင်လယ်လိပ်များ

- လိပ်ကြက်တူရွေး Hawksbill (*Eretmochelys imbricata*)
- ပြင်သာလိပ် Green (*Chelonia mydas*)
- လိပ်ခွေး Loggerhead (*Caretta caretta*),
- လိပ်လျှောင်းOlive Ridley (*Lepidochelys aolivacea*)
- လိပ်စောင်းလျား Leatherback (*Dermochelys coriacea*)

ပင်လယ်ငှက်များ

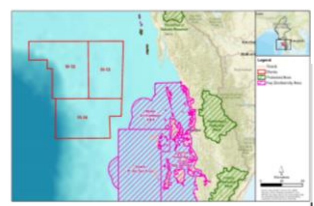
- ပင်လယ်ပျံလွှားငှက်ငယ်လေးများ (*Sterna albifrons*) နှင့် ရေဘဲငှက် Brown Booby (*Sula leucogaster*) တို့ကို မြိတ်ကျွန်းစုများတွင် တွေ့ရသည်။



ဇီဝထိန်းသိမ်းရေးနယ်မြေ

တွင်းနေရာများမှ အကွာအဝေး

- မြိတ်ကျွန်းစု = ၄၄မိုင်
- မော်စကိုကျွန်းစု (မော်စကိုကျွန်း) = ၆၅မိုင်
- မြိတ်ကျွန်းစုရှိ ငါးမန်းကာကွယ်ရေးဧရိယာ = ၁၁၈၃၆ စတုရန်းကီလိုမီတာ (၄၂မိုင်)



Name	Area (km²)	Key species
Myeik Archipelago	43,963	Leatherback, green turtle, hawksbill turtle
Moscos Kyun	57	Leatherback, green turtle, hawksbill turtle, Olive Ridley
Central Tanintharyi Coast	11,000	Spoon-billed sandpiper, greater adjutant, spotted greenshank

အခြေခံစစ်တမ်းကောက်ယူမှုများ

နမူနာကောက်ယူသည့် တတည်နေရာ	တည်နေရာတစ်ခုစီတွင် နမူနာကောက်ယူသည့် အရေအတွက်			
	အနည်အနှစ်	ပင်လယ်ရေအောက်ခြေခြေတွင် နေထိုင်သော ဇီဝ(သက်ရှိ/အပင်)များ	ပင်လယ်ရေ	**ပင်လယ်ရေအောက်တွား သွားသတ္တဝါငယ်လေးများ**
ရဲတံခွန်-A ၏ မြောက်ဘက်/ တိုးတက်ဖွံ့ဖြိုး ထုတ်လုပ်ရေးတွင်း အနီး	၁	၁	၃	၁
ရဲတံခွန်-A ၏ အရှေ့ဘက်/ တိုးတက်ဖွံ့ဖြိုး ထုတ်လုပ်ရေးတွင်း အနီး	၁	၁	၃	၁
ရဲတံခွန်-A ၏ တောင်ဘက်/ တိုးတက်ဖွံ့ဖြိုး ထုတ်လုပ်ရေးတွင်း အနီး	၁	၁	၃	၁
ရဲတံခွန်-A ၏ အနောက်ဘက် တွင်း အနီး	၁	၁	၃	၁
	၄	**၄**	**၁၂**	

ကွင်းဆင်းလေ့လာမှုအတိုင်းအတာများ

ပင်လယ်ရေ အရည်အသွေး

- ကြည်လင်မှု၊ အပူချိန်၊ ဆားပါဝင်မှု၊ အောက်စီဂျင်ပျော်ဝင်မှု၊ အနည်အနှစ်ပါဝင်မှု၊ အဟာရဓာတ်၊ ဆီနှင့်ချောဆီ၊ သတ္တုဓါတ်၊ ဟိုက်ဒရိုကာဗွန်၊ ရေနံတွင် ဟိုက်ဒရိုကာဗွန် ပါဝင်မှု၊

အနည်အနှစ်အရည်အသွေး

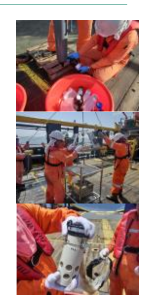
- အမှုန်များ၏အရွယ်အစား၊ ကာဗွန်၊ ဆီနှင့်ချောဆီ၊ သတ္တုဓါတ်၊ ရေနံတွင် ဟိုက်ဒရိုကာဗွန် ပါဝင်မှု၊

ပင်လယ်ရေအောက်ကြမ်းပြင်ရှိ ဇီဝရုပ်များပင်လယ်ကြမ်းပြင်တွင်နေထိုင်ကြသောသတ္တဝါများ (အနည်အနှစ်များတွင်)

- အမြောက်အများရှိမှု၊ အမျိုးအစားများရှိမှု

Plankton (မိုက်ခရိုစကုပ်ဖြင့်သာမြင်ရသော အပင်များနှင့် သတ္တဝါများ)

- အမြောက်အများရှိမှု၊ အမျိုးအစားများရှိမှု



ကွင်းဆင်းလေ့လာမှု ရလာဒ်များ

ပင်လယ်ရေ အရည်အသွေး
- ညစ်ညမ်းမှု အထောက်အထားများ မတွေ့ရှိရပါ။

အနည်အနှစ်အရည်အသွေး
- ညစ်ညမ်းမှု အထောက်အထားများ မတွေ့ရှိရပါ။

ပင်လယ်ကြမ်းပြင်တွင်နေထိုင်ကြသောသတ္တဝါများ (အနည်းအနှစ်များတွင်)
- ရေနက်ပိုင်းတွင်ရှိလေ့ရှိသောသတ္တဝါအနည်းငယ်တွေ့ရပါသည်
- တွေ့မြင်နေကြ ဂဏန်းငယ်များ နှင့် တီကောက်ငယ်များရှိပါသည်

Plankton (ရိုက်ခတ်ရိုက်ခြင်းဆန်ခြင်းရသော အပင်များနှင့် သတ္တဝါများ)
- တွေ့မြင်နေကြ မျိုးစိတ်များကိုသာတွေ့ရပါသည်




လူမှုပန်းကျင်နှင့် လူထုတွေ့ဆုံဆွေးနွေးပွဲများ

သက်ဆိုင်သူများနှင့် ဆွေးနွေးဆောင်ရွက်ခြင်း

တွေ့ဆုံခဲ့ပြီးသူများ

ပြည်ထောင်စု/အမျိုးသားအဆင့်
သက်ဆိုင်ရာဝန်ကြီးဌာနများ၊ အစိုးရဌာနများ၊
အရပ်ဖက်အဖွဲ့အစည်းများ နှင့် သုတေသနအဖွဲ့အစည်းများ

ပြည်နယ်/ခရိုင်အဆင့် - တနင်္သာရီတိုင်း
ဝန်ကြီးချုပ်နှင့် သက်ဆိုင်ရာဌာနများပါဝင်သော
တိုင်းဒေသကြီးအစိုးရ၊ အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၊
ငါးလုပ်ငန်းဦးစီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန

မြို့နယ်/ရွာအဆင့်
အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၊ သက်ဆိုင်ရာ အစိုးရဌာနများ၊
ဒေသအခြေ အရင်းများ၊ လှုပ်ရှားတက်ကြွပ်စားလှယ်များနှင့် သက်ဆိုင်ရာ
အရပ်ဖက်အဖွဲ့အစည်းများ၊ လူနေအခြေ အရင်းများ (ထားဝယ် လောင်းလုံ၊
သရက်ချောင်း မြိတ် မြို့နယ်များ)

Outcome of Scoping Consultation (infill drilling)

- Tanintharyi fishermen mostly fish within 10 miles (16 km) from the coast
- Some larger boats may be present in Blocks M-12, M-13 and M-14
- Trawlers and purse seiners are the two types of offshore vessels in Tanintharyi
- The majority of questions related to impacts on the environment and fisheries

Scoping Consultation


Dawei (2-4-2018)


Myeik (3-4-2018)

Planned ESIA Consultation Programme

Township	Meeting and Venue
Thayetchaung Township	Meeting with Thayetchaung GAD and stakeholders
Launglon Township	Meeting with Launglon GAD and stakeholders (including Kyauksin, Thinbawseik, Pandan inn, and Sanhlan villages)
Dawei Township	Meeting with Dawei GAD and stakeholders (Zaryar Htet San Hotel, Dawei)
Myeik Township	Meeting with Myeik GAD and stakeholders (Grand Jade Hotel, Myeik) Meeting with KyunSu stakeholders

နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းဆိုင်ရာ လူထုတွေ့ဆုံပွဲရလဒ်များ (ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း)

- တနင်္သာရီတိုင်းရှိ ငါးဖမ်းသမားအများစုမှာ ကမ်းရိုးတန်းမှ ၁၀မိုင် (၁၆ကီလိုမီတာ)ထိ ငါးဖမ်းလေ့ရှိကြပါသည်။
- အချို့လေကြီးများမှာ လုပ်ကွက်အမှတ် M-12၊ M-13 နှင့် M-14 အထိတိုင် ရောက်ရှိနိုင်းဆီးလေ့ရှိကြသည်ကိုတွေ့ရှိရသည်။
- တနင်္သာရီတိုင်းရှိ ကမ်းလွန်ငါးဖမ်းသင်္ဘောများမှာ ပျောပိုက်များနှင့် ဆွဲပိုက်ကွန်ကြီးများကို အသုံးပြုဖမ်းဆီးကြသည်။
- အဓိကအနေဖြင့်ပတ်ဝန်းကျင်နှင့်ငါးဖမ်းလုပ်ငန်းအပေါ် ထိခိုက်သက်ရောက်နိုင်မှုများကို ဖေးမြှုပ်ခဲ့ကြသည်။

နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်း လူထုတွေ့ဆုံပွဲများ


ထားဝယ် (၂-၄-၂၀၁၈)


မြိတ် (၃-၄-၂၀၁၈)

ထိခိုက်မှုများနှင့် ထိခိုက်သက်ရောက်မှုများအား လျှော့ချရေး အစီအမံများ

သက်ရောက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ နည်းလမ်းများ

- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း၏ ရည်ရွယ်ချက်မှာ စီမံကိန်းကြောင့် ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှုများအားသေချာစွာသိရှိပြီး သက်ရောက်မှုများအား လျှော့ချသွားရန်ပြုလုပ်ခြင်း ဖြစ်ပါသည်။
- ERMသည် စီမံကိန်းကြောင့် သက်ရောက်ခံရနိုင်ခြေရှိသူအားလုံးကို စိစစ်လေ့လာပါမည်။ (ဥပမာ- ဒေသခံများ၊ ရေအရည်အသွေး အစရှိသော သက်ရောက်မှုခံရနိုင်သော အရာများအားလုံး)
- ထို့နောက်သက်ရောက်မှုအတိုင်းအတာကို ဆန်းစစ်ပါသည်။ (ဥပမာ- စီမံကိန်း အရွယ်အစား၊သက်ရောက်နိုင်မှု)

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

ထိခိုက်သက်ရောက်နိုင်မှုများကို လျှော့ချနိုင်မည့်နည်းလမ်းများ (ရေနံတိုးတက်ဖွံ့ဖြိုးထုတ်လုပ်ရေးတွင်း)

သက်ရောက်မှု	လျှော့ချရေးနည်းလမ်းများ	ကြွင်းကျန်မည့် သက်ရောက်မှုအခြေအနေ
• တွင်းမှစွန့်ပစ်ပစ္စည်းများ • မိလ္လာ၊ သင်္ဘောကုန်းပတ် ရေစွန့်ထုတ်ခြင်းနှင့် စားကြွင်းစားကျန်များ • အစိုင်အခဲနှင့်အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ	• စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ်- လျှော့ချခြင်း၊ ပြန်လည်သုံးစွဲခြင်း၊ ပြန်လည်စီရင်သုံးစွဲခြင်း၊ • ရေဆိုးများအား ပြုပြင်စီရင်ပြီးမှသာ စွန့်ထုတ်ရန်၊ • MARPOL ညွှန်ကြားချက်အား လိုက်နာခြင်း • မှန်ကန်သော သိုလှောင်ခြင်းနှင့် စနစ်တကျအညွှန်းတပ်ခြင်း • ဓာတုပစ္စည်းအကဲဖြတ်ခြင်း၊	အနည်းငယ်
• ဖြတ်စများနှင့် တွင်းတူးရည်စွန့်ထုတ်မှု	• တွင်းတူးရည်စွန့်ပစ်မှုအား တတ်နိုင်သရွေ့ အနည်းဆုံးဖြစ်စေရန် စီမံခန့်ခွဲခြင်း၊ • ဖြတ်စများနည်းနိုင်သမျှနည်းစေမည့် ကောင်းမွန်သောတွင်းဒီဇိုင်းအားအသုံးပြုခြင်း၊ • တွင်းတူးရည်အားရွေးချယ်ရာတွင် ပတ်ဝန်းကျင်ဆိုင်ရာအကဲဖြတ်ခြင်း ဆောင်ရွက်ပြီးမှသာ ရွေးချယ်ခြင်း	အနည်းငယ်
• အခြားစီးပွားဖြစ်ရေယာဉ်များနှင့်ပေါင်ပေါင်းကူး ဆက်သွယ်ခြင်း	• ရေကြောင်းသတိပေးချက်ထုတ်ပြန်ခြင်း၊ • ဒေသခံများနှင့်ဆက်သွယ်ဆောင်ရွက်ရန် ထောက်ပံ့ရေးသင်္ဘောများထားရှိခြင်း၊	အနည်းငယ်
• ရေနံတွင်း၊ တွင်းတူးစင် (သို့မဟုတ်) ရေယာဉ်များမှ စနစ်တကျမရှိသော စွန့်ပစ်မှုများ	• ကောင်းမွန်သောစက်မှုပညာဒီဇိုင်းဖြင့် ထိန်းချုပ်ခြင်း ဥပမာ- Blowout Preventer (BOW), ရေနံတွင်းတူး အလေ့အကျင့်များနှင့် လုပ်ထုံးလုပ်နည်းများ၊ • အရေးပေါ် တုံ့ပြန်မှုအစီအစဉ်၊	အနည်းငယ် (အလားအလာနည်းပါး)

ထိခိုက်သက်ရောက်နိုင်မှုများကို လျှော့ချနိုင်မည့်နည်းလမ်းများ (ဆိုက်စမစ်တိုင်းတာခြင်း)

သက်ရောက်မှု	လျှော့ချရေး နည်းလမ်းများ	ကြွင်းကျန်မည့် သက်ရောက်မှုအခြေအနေ
• ပင်လယ်လိပ်များ ကြိုးတပ်ဆွဲသည့်ကိရိယာများနှင့်တိုတိုက်ညိ မိနေခြင်း (သို့) ပိတ်မိနေခြင်း ထိခိုက်မှုများ	• ဇော်ယာများတွင် အကာအရံများတပ်ဆင်ထားပေးခြင်း၊ • တိုင်းတာလေ့လာမှုပြီးဆုံးပါက ဆောင်ရွက်ခဲ့စဉ်တလျှောက် တွေ့ရှိခဲ့ရသည့် အဏ္ဏဝါနို့တိုက်သတ္တဝါများ နှင့်ပင်လယ်လိပ်များ၏ အချက်အလက်များကို မှတ်သားပြုစု၍ သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာနသို့ တင်ပြခြင်း၊	အနည်းငယ်
• ရေအောက်အသံလှိုင်းကြောင့် အဏ္ဏဝါသက်ရှိများအပေါ် ထိခိုက်မှု	• ဆိုက်စမစ်တိုင်းတာသည့်ပစ္စည်း (air gun) ကို အနိမ့်ဆုံးအသံလှိုင်းဖြင့် ပစ်လွှတ်၍ အချက်အလက်ရယူသည့်စနစ်ကို ရွေးချယ်အသုံးပြုဆောင်ရွက်ခြင်း၊ • တိုင်းတာရန်အတွက် ဇရိယာအတွင်းတွင် ပင်လယ်သတ္တဝါများ မရှိတော့သည်အထိ လုံလောက်သောအချိန် စောင့်ဆိုင်းပြီးမှသာ ဆောင်ရွက်ခြင်း၊ • တိုင်းတာစဉ်ကာလတွင်လည်း ယာဉ်ပေါ်တွင် ရေအောက်အဏ္ဏဝါသက်ရှိများကို လေ့လာလျက်ရှိသော အတွေ့အကြုံရှိ ပညာရှင်၂ဦးကိုလည်းထားရှိ၍ စောင့်ကြည့်သွားမည်ဖြစ်ခြင်း၊ • ရေယာဉ်သည် ၅၀၀ မီတာ ပတ်လည်ဝန်းကျင်တွင် ပင်လယ်အဏ္ဏဝါနို့တိုက်သတ္တဝါများကို တွေ့ရှိပါက တိုင်းတာခြင်းကို ရွှေ့ဆိုင်းဆောင်ရွက်သွားမည်ဖြစ်ခြင်း၊ • ပင်လယ်နို့တိုက်သတ္တဝါနှင့်ပင်လယ်လိပ်များ၏ အချက်အလက်များကို မှတ်သားပြုစု၍ သယံဇာ သယံဇာတနှင့်သဘာဝ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသို့ တင်ပြခြင်း၊	အလယ်အလတ် မှ အနည်းငယ်
• မတော်တဆယိုဖိတ်စင်ခြင်းများမှ အဏ္ဏဝါသက်ရှိများအပေါ် ထိခိုက်မှု	• လုပ်ငန်းစဉ်အတိုင်း စနစ်တကျကောင်းမွန်စွာလေ့ကျင့်ပေးခြင်း၊ • ဖြစ်ပေါ်လာနိုင်သည့် အရေးပေါ်အခြေအနေများ (ဥပမာ - ရေယာဉ်ပေါ်တွင်ကြုံတွေ့လေ့ရှိသော ရေနံညစ်ညမ်းမှုအား အရေးယူဆောင်ရွက်မည့် အရေးပေါ်အစီအစဉ်- SCPEPs)	အနည်းငယ်
• ဆိုက်စမစ်တိုင်းတာသည့် ရေယာဉ်များနှင့် စက်ပစ္စည်းများနှင့် မတော်တဆ ထိခိုက်တိုက်မိခြင်းများကြောင့် ရေကြောင်းအသုံးပြုသူများ၊ ငါးဖမ်းလုပ်သားများနှင့် ငါးလုပ်ငန်းအဖွဲ့အစည်းများ အပေါ်ထိခိုက်မှု	• ဆိုက်စမစ်ဆောင်ရွက်စဉ် သီးသန့်ဇုန်တစ်ခုကို ဇရိယာအလိုက် ရွှေ့ပြောင်း၍ ထားရှိခြင်း၊ • ထောက်ပံ့ရေးရေယာဉ်များကြောင့် ငါးဖမ်းလုပ်သားများအပေါ်ထိခိုက်မှုမရှိစေရန် စီစဉ်ဆောင်ရွက်ခြင်းနှင့် မြန်မာဘာသာပြောဆိုနိုင်သော ဆက်သွယ်ရေး အရာရှိများကို ထားရှိပေးထားခြင်း၊ • ရေယာဉ်များအားလုံးကို မြန်မာဘာသာပြန်ထားသောလက်ကမ်းစာစောင်များ ဖြန့်ဝေပေးခြင်း၊ • ထိခိုက်နစ်နာမှုကိုတိုင်ကြားနိုင်သောယန္တရားစနစ်	အနည်းငယ်

ထပ်မံဆောင်ရွက်မည့်အစီအစဉ်

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းနှင့် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အကျဉ်းချုပ်

EIA , IEE အနှစ်ချုပ်

- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာချက်သည် ပတ်ဝန်းကျင်နှင့်လူထုအပေါ် ထိခိုက်သက်ရောက်မှုမရှိစေရန် ရည်ရွယ်၍ဆောင်ရွက်ခြင်း ဖြစ်ပါသည်။
- ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းလေ့လာချက်သည် ပတ်ဝန်းကျင်နှင့်လူထုအပေါ် ထိခိုက်သက်ရောက်မှုမရှိစေရန် ရည်ရွယ်၍ဆောင်ရွက်ခြင်း ဖြစ်ပါသည်။
- ထိခိုက်နိုင်မှုလျှော့ချခြင်းသည် ဖြစ်နိုင်ချေရှိသောထိခိုက်နိုင်မှုများကို ကာကွယ်ရန်နှင့်လျှော့ချသွားရန်အတွက်ဖြစ်သည်။
- စီမံကိန်းဖော်ဆောင်သူသည် စွန့်ပစ်မှုနှင့်ထုတ်လွှတ်မှုများကို မြန်မာ့ဥပဒေနှင့်နိုင်ငံတကာ စံချိန်းစံညွှန်းအတိုင်း လေ့လာစောင့်ကြည့်သွားမည်။
- စီမံကိန်းဖော်ဆောင်သူသည် စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာနိုင်မည့် ပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်နိုင်မှု၏ အကျိုးဆက်များကို တာဝန်ယူဆောင်ရွက်သွားမည်။
- စီမံကိန်းသက်တမ်းတလျှောက် ညှိနှိုင်းတိုင်ပင်ဆွေးနွေးပွဲများကို ဆက်လက်လုပ်ဆောင်သွားမည်။
- စီမံကိန်းဖော်ဆောင်သူသည် မည်သည့်စိုးရိမ်မှုများအတွက်ကိုမဆို ထိခိုက်နစ်နာမှုကိုတိုင်ကြားနိုင်သောယန္တရားစနစ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည်။

ထုတ်ပြန်ချက်

- စီမံကိန်းဖော်ဆောင်သူ၏ Website
- ပြည်တွင်းသတင်းစာများ (မြန်မာ့အလင်း နှင့် ကြေးမုံ)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအကျဉ်းချုပ်(မြန်မာဘာသာ)ကို အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနရုံး၊ ငါးလုပ်ငန်းဦးစီးဌာနနှင့် ငါးလုပ်ငန်းအဖွဲ့ချုပ် (ထားဝယ်၊ လောင်းလုံ၊ သရက်ချောင်း၊ မြိတ် နှင့် ကျွန်းစုမြို့နယ်များ) သို့ပေးပို့ခြင်း


ဆက်သွယ်ရန်


ကျေးဇူးတင်ပါသည်
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