



Seismic Survey of Onshore PSC H

Environmental and Social Impact Assessment Report

5th November 2017

Environmental Resources Management

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Summary: This document presents the Environmental and Social Impact Assessment for the seismic survey of the Onshore PSC H.		Date: 5 th November 2017			
		Approved by:  Craig A Reid Partner			
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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This document is the Environmental Impact Assessment (EIA) Report for a proposed onshore seismic survey to be conducted across PSC H in the Taungoo-Pyinmana area, the Union of Myanmar (Myanmar) (the Project). This EIA Report has been prepared for the approval of the Ministry of Natural Resources and Environmental Conservation (MONREC), in compliance with the Myanmar Environmental Impact Assessment Procedure (EIA Procedure) 2015 (Notification No. 616 / 2015; dated 29 December 2015).

As per the EIA Procedure, an EIA Report and an Environmental Management Plan (EMP) are prepared and submitted to MONREC.

Pacific Hunt Energy (Pacific Hunt) was awarded the Production Sharing Contract (PSC) of the onshore PSC H by Myanmar Oil and Gas Enterprise (MOGE) in 2013. Pacific Hunt is planning to undertake the seismic survey across PSC H which will include a total of the 19 seismic survey lines with a total length of approximately 307.7 km.

In accordance with the EIA Procedure, the first stage of the Project involved screening. This included the submission of the Project Proposal Report (PPR) to Myanmar Oil and Gas Enterprise (MOGE), for onward submission to MONREC. Subsequently, a Scoping Report which included the Terms of Reference for the EIA Study should be submitted. Both the PPR and the Scoping Report were prepared and submitted in February 2015.

This document is the EIA Report for the Project in PSC H. A separate EMP has also been prepared alongside this report for submission to, and approval by, MONREC.

1.2 POLICY AND REGULATORY FRAMEWORK

The EIA Procedure for Myanmar was promulgated on 29th December 2015. The procedures were prepared by the MONREC, formerly called the Ministry of Environmental Conservation and Forestry (MOECAF), along with the support of an EIA Review Team Committee comprising the members of relevant union ministries, union attorney general's office, three city development committees and Non-governmental Organisations (NGOs) and technical support by experts from the Asian Development Bank Greater Mekong Region – Environment Operations Centre (ADB GMS-EOC).

Under the EIA Procedure, there is a requirement for the undertaking of an IEE or an EIA in order to obtain an ECC for certain development projects. This process is elaborated further in *Section 3* of this EIA, along with a complete list

of laws related to environmental and social issues and hence relevant to the EIA Study for the proposed seismic survey.

1.3 PROJECT DESCRIPTIONS AND ALTERNATIVES

1.3.1 Project Location

The onshore PSC H is located in the Taungoo-Pyinmana area of southern Myanmar covering an area of approximately 25,744 km². It extends from the Myanmar capital, Nay Pyi Taw, in the north and towards the Indaing gas field in the south. The Project Area is detailed in *Figure 1.1*. Two-Dimensional (2D) seismic survey will be undertaken within PSC H with locations of the 19 survey lines illustrated in *Figure 1.1*. Total length of the lines is approximately 307.7 km.

1.3.2 Project Activities

Preparation / Mobilisation Phase

During the preparation / mobilisation phase, ownership of land and properties that fall within the land required by the seismic survey programme will be determined. If compensation is required for the land occupancy, for example for the base camp, Pacific Hunt will liaise accordingly with the township / district / government as well as the landholders / villagers as appropriate on the compensation terms. A base camp will be constructed on land leased from a local land owner during this phase.

Seismic Survey Phase

The surveying of the subsurface geology can be undertaken by seismic survey. A seismic survey uses an acoustic source to direct energy into the ground. As these sound waves travel through the various layers of rock in the subsurface they are also reflected at the boundaries between the geologic layers or strata back to the surface where they are recorded into an array of receivers called geophones. The reflected sound waves, once recorded, can be processed to provide information about the structural shape and composition of the geological formations below the surface.

Vibroseis will be used as the acoustic source for the seismic survey.

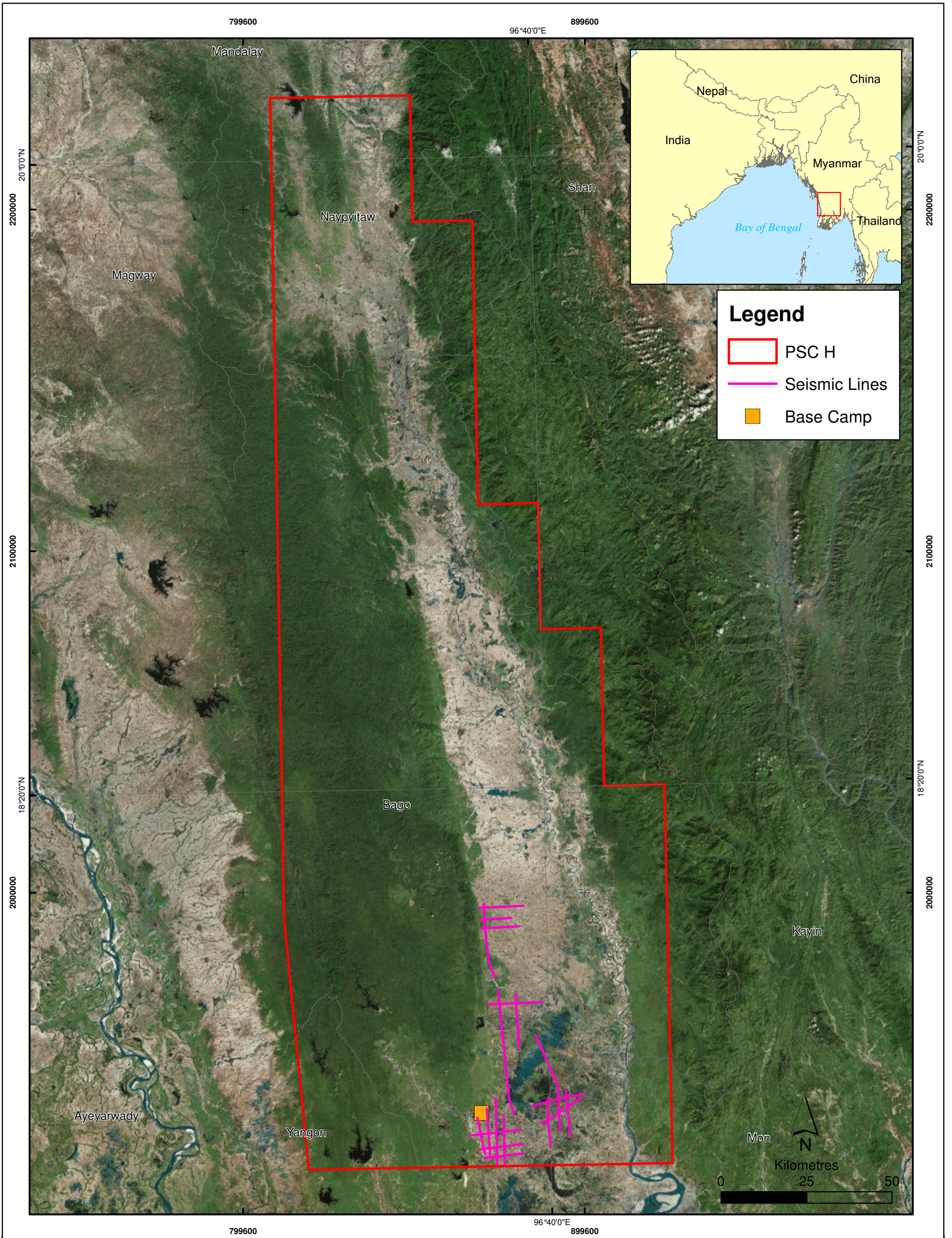


Figure 1.1

Location of Base Camp and Seismic Lines within PSC H

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Date: 3/11/2017

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Demobilisation

Once the survey and recording are finished, equipment will be removed and personnel will leave the site. The site will also be restored into its original state by collecting all wastes and materials and transporting out of the site. This base camp may be retained by the seismic survey contractor for other projects with other operator(s) which is not within the scope of this impact assessment. It is expected to take approximately one month to complete the site restoration, including recording public complaints, if any.

1.3.3 *Project Schedule*

It is expected that activities associated with the seismic survey will commence in mid-November for the completion in 180 days.

1.3.4 *Employment and Accommodation*

The Project will involve a total of 20 people initially and up to a maximum of 140 people during the seismic survey. The ratio of skilled to unskilled labour is expected to be 1:5 to 1:10, and will be higher when seismic crew is in place. Labour is planning to be hired from local townships for routine work.

1.4 *BASELINE CONDITIONS*

PSC H is situated with the Bago Region, Mon State and Naypyidaw Union Territory of Myanmar. The area is noted to have moderate rainfall of around 1,000 mm to 2,500 mm per year. According to the available weather information in Bago, which is located near the proposed seismic areas, the area is being categorised as Tropical Monsoon Climate (Köppen-Geiger climate classification, Am). The average temperature of Bago is 27.0 °C while the average annual rainfall is 3,810 mm. Rainfall is much higher in summer than winter months. January is recorded as the driest month and rainfall is the highest in June.

Secondary data are not available on ambient air quality in the Study Area. The principal sources of emissions to the atmosphere in the immediate vicinity of the Study Area are likely to be from household fires for domestic purposes (i.e. heating and cooking) and exhaust emissions from road transportation.

Secondary data are not available on noise in the Study Area. However, the sources of noise pollution are likely to include the road traffic from the nearby main road.

The main sources of surface water within PSC H are noted to be the Sittaung River and reservoirs, namely Baw Nat Gyi Reservoir, Baw Ni, Kawliya Dam Reservoir, Ye New Dam Reservoir and Baing Dar Dam Reservoir. Whilst the water quality in the reservoir is relatively fair, the Sittaung River is expected to be contaminated principally from agriculture inputs, boat vessel emissions, mining activities and surface run-off.

The area of PSC H is located within the Bago Yoma mountain range. Groundwater in the region is dependent upon natural recharge from Sittaung River and Bago River. Villages within PSC H reported the use of groundwater from deep tube wells and hand dug wells as water supply.

Focussed baseline field surveys for terrestrial biodiversity were conducted during the dry season in January 2015. Findings from the surveys indicated that the Study Area comprised four (4) key habitat types, including forest, cultivated land, developed area and reservoir, with forest and cultivated land as the main habitat types.

Community surveys were undertaken in 11 villages in January 2015 which are located in the vicinity of the Project Area. The total population was reported to be 28,800 individuals across 6,590 households with an average household size of 4.37 individuals per household. Agriculture and livestock holdings are the key source of livelihood for the households surveyed. The key crops grown in the Project Area are reported to include rice and peanuts.

1.5

SUMMARY OF KEY IMPACTS AND MITIGATION MEASURES

A summary of key impacts from the Project as well as the results of impact assessment are listed in *Table 1.1*. Full details on all potential impacts from each Project activity are presented in *Section 6* with a list of mitigation measures for each impact presented in *Section 8*.

Table 1.1 Summary of the Key Impacts and Control/Mitigation Measures

Potential Impact/Issue	Significance of Impacts	Significance of Residual Impacts
Impacts from Labour (including Hunting), Equipment and Services Supply on terrestrial and Aquatic Flora and Fauna	Moderate	Minor
Impacts from Site Preparation / Clearance and Creation on Terrestrial Habitats and Associated Flora and Fauna	Moderate	Minor
Impacts from Mobile Power Generation on Terrestrial Fauna	Minor	Minor
Impacts from Waste Disposal on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna	Minor	Negligible
Impacts from Sewage and Wastewater Discharge on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna	Minor	Minor
Impacts from Vibroseis operation on Airborne Noise.	Minor	Minor
Impacts from spills/leaks on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	Moderate	Minor
Impacts from fires and explosions on air quality, ground water quality, surface water quality, landscape and visual character, use of natural resources, terrestrial habitats and aquatic habitats as well as their associated flora and fauna.	Major	Minor
Impacts on Community and Occupational Health and Safety	Major	Minor
Impact on Livelihood Profile of the Community	Positive	Positive
Impact on Transport and Infrastructure Services	Negligible to Minor	Negligible
Impact on Land and Crop Loss	Minor	Minor
Impact on Source Water Vulnerability	Minor	Minor
Impact on Cultural Heritage	Minor to Moderate	Minor

In order to enhance stakeholder's understanding on the planned 2D seismic Project activities, and obtain suggestions/concerns for developing appropriate mitigation measures, public consultation was conducted for this Project. The approach and methodology for public consultation is described in detail in *Section 9* of this EIA report.

The date, location, stakeholder and purpose of consultation activities are provided in *Table 1.2*. Through these engagement activities, information on the Project was disclosed to the stakeholders and an attempt was made to develop an understanding of the socio-economic profile in the area. Also, an understanding of the perception of the stakeholder of the Project was developed and the concerns and expectations from the same. These concerns and expectations were then taken into account while assessing the impacts from the Project activities and the identification of the proposed mitigation measures.

Table 1.2 *Consultation Activities Undertaken*

Date and Location	Stakeholder	Purpose of Engagement
21 January, 2015 (13:00 to 14:00)	Lewe Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Request permission for further stakeholder consultations
22 January, 2015 (11:00 to 12:00)	Yedashe Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Request permission for further stakeholder consultations
23 January, 2015 (10:00 to 12:00)	Local communities from Ta Pyay Tan, Nyung Pin Thar, Pa Dauk Khin, and Khin Tan Kyi villages at Yedashe	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Undertake household surveys.
24 January 2015 (10:00 10:30)	Waw Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Request permission for further stakeholder consultations
25 January 2015 (08:00 to 08:30)	Deik U Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Request permission for further stakeholder consultations
25 January 2015 (13:00 to 17:00)	Local communities from Hpa Aung, Ah Lel Ywar and San Dwin Kone villages at Nyaung Lay Pin Township and Shwe Nyaung Pin, Ein Chay Lay Se and Aungbarlay at Daik-U township	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Undertake household surveys.
26 January 2015 (13:30 to 14:30)	Local communities from Ahkayit, Kyaikhla, Phyarpyo, and Thabaukkan at Waw township	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Undertake household surveys.

As part of the engagement undertaken with the local stakeholders in the form of focus group discussions during the impact assessment process, certain key concerns and expectations of the local community were identified:

- **Impact on Land Availability:** One of the key concerns of the local community was in terms of the impact of the Project activities on the availability of land in the area and the agriculture undertaken by the community. From the information made available it is understood that agriculture is the primary source of livelihood for a majority of the local community. Thus the Project activities are likely to result in a reduction of the land available for agriculture, which in turn would impact the income and livelihood sources for the community. This impact is likely to be heightened for those households who are solely dependent upon agriculture, whose majority land holdings are impacted by the Project and those who do not have alternative land available.
- **Community Development Activities:** In keeping with this understanding of the impact of the Project activities on the livelihood of the community, the community identified certain areas of expectations from the Project in terms of financial and/or technical assistance for undertaking agriculture and other livelihood activities, especially in terms of providing irrigation facilities, assistance for the purchase of agricultural machinery and subsidizing the purchase of fertilizers and seeds.

1.7 STATEMENT OF COMMITMENTS

Pacific Hunt will at all times comply fully with the commitments, mitigation measures, and plans that have been presented in this EIA Report.

Pacific Hunt shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, including the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015), as well as the EMP, Project commitments and conditions.

Pacific Hunt and ERM hereby confirm that:

1. The EIA Report is accurate, consolidated and complete;
2. The EIA has been conducted in accordance with relevant laws, including the EIA Procedure (2015); and
3. The Project will fully follow the commitments, mitigation measures and plans set out in this EIA Report.

This EIA for the proposed 2D seismic survey at PSC H was conducted to comply with the requirements of the EIA Procedures. This EIA demonstrates the proponent's understanding of the environment in which they are operating and details the management systems and plans. A project-specific, dedicated EMP has been developed and presented as a tool to manage potentially negative impacts, enhance Project benefits and ensure legislative compliance and standards of good practice during the execution of the seismic survey programme at PSC H. Provided that the recommended mitigation measures are properly implemented, it is expected that the environmental and social impacts of the proposed seismic survey programme at PSC H would be of an acceptable manner.

1.1

နိဒါန်း

ဤစာတမ်းသည် ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံ၏ တောင်ငူ-ပျဉ်းမနားဧရိယာရှိ PSC H တစ်လျှောက် ဆောင်ရွက်မည့် အဆိုပြု ကုန်းပေါ်ဆိုင်ခံစားတိုင်းတာရေးအတွက် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာ ဖြစ်ပါသည်။ (စီမံကိန်း)။ မြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (EIA လုပ်ထုံးလုပ်နည်း) ၂၀၁၅ (၂၀၁၅ ဒီဇင်ဘာလ ၂၉ ရက်နေ့တွင်ထုတ်ပြန်သည့် အမိန့်ကြော်ငြာစာ နံပါတ် ၆၁၆ / ၂၀၁၅) နှင့် အညီ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) ၏ ခွင့်ပြုချက်ကို ရယူရန်အတွက် ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာကို ပြုစုခဲ့ခြင်း ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအရ၊ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို ပြင်ဆင်ရေးသား၍ သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန သို့ တင်သွင်းပါသည်။

၂၀၁၃ တွင် Pacific Hunt Energy (Pacific Hunt) သည် မြန်မာ့ရေနံနှင့်သဘာဝဓာတ်ငွေ့လုပ်ငန်း (MOGE) နှင့် ကုန်းပေါ် PSC H အတွက် ခွဲဝေမှုအပေါ်မျှဝေခံစားရေးစာချုပ် (PSC) ကို ချုပ်ဆိုခဲ့ပါသည်။ Pacific Hunt သည် စုစုပေါင်း အရှည် ၃၀၇.၇ ကီလိုမီတာခန့်ရှိသည့် စုစုပေါင်း ဆိုင်ခံစားတိုင်းတာရေး ၁၉ လိုင်းပါဝင်မည့် PSC H တစ်လျှောက် ဆိုင်ခံစားတိုင်းတာ ရေး ဆောင်ရွက်ရန် စီစဉ်လျက် ရှိပါသည်။

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းအရ၊ စီမံကိန်း၏ ပထမအဆင့်တွင် စိစစ်ခြင်း ပါဝင်ခဲ့ပါသည်။ ၎င်းတွင် စီမံကိန်းအဆိုပြုလွှာ (PPR) ကို မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့ လုပ်ငန်း (MOGE) သို့တင်သွင်းခဲ့ပြီး ယင်းမှတစ်ဆင့် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင် ထိန်း သိမ်းရေးဝန်ကြီးဌာန သို့တင်သွင်းခဲ့ပါသည်။ ထို့နောက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာမှုအတွက် လုပ်ငန်းတာဝန်များပါဝင်သည့် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာ ကို တင်သွင်းခဲ့ပါသည်။ စီမံကိန်းအဆိုပြုလွှာနှင့် နယ်ပယ်သတ်မှတ်ခြင်းအစီရင်ခံစာ နှစ်ခုလုံးကို ၂၀၁၅ ဖေဖော်ဝါရီလအတွင် ပြင်ဆင်ပြုစုတင်သွင်းခဲ့ပါသည်။

ဤစာတမ်းသည် PSC H ရှိ စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ဖြစ်ပါ သည်။ ဤအစီရင်ခံစာနှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင် ထိန်း သိမ်းရေးဝန်ကြီးဌာန သို့တင်ပြရန်နှင့် သယံဇာတနှင့် သဘာဝပတ်ဝန်း ကျင် ထိန်း သိမ်းရေးဝန်ကြီးဌာန မှ ခွင့်ပြုချက်ရယူရန် သီးသန့် ပြင်ဆင်ပြုစုထားပြီး ဖြစ်ပါသည်။

1.2

မူဝါဒနှင့် ကြီးကြပ်ရေးဆိုင်ရာမူဘောင်

မြန်မာနိုင်ငံ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို ၂၀၁၅ ဒီဇင်ဘာလ ၂၉ ရက်နေ့တွင် ထုတ်ပြန်ကြေညာခဲ့ပါသည်။ ၎င်းလုပ်ထုံးလုပ်နည်းကို သယံဇာတ နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MONREC) (ယခင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သစ်တောရေးရာ ဝန်ကြီးဌာ - MOECF ဟုခေါ်ပါသည်) သည် သက်ဆိုင်ရာပြည်ထောင်စုဝန်ကြီး အဖွဲ့ဝင်များ၊ ပြည်ထောင်စု ရှေ့နေချုပ်ရုံး၊ မြို့နယ်စည်ပင်သာယာရေးကော်မတီသုံးခု နှင့် အစိုးရ မဟုတ်သော

အဖွဲ့အစည်းများ (NGOs) နှင့် Asian Development Bank Greater Mekong Region – Environment Operations Centre (ADB GMS-EOC) မှ ပညာရှင်များ၏ နည်းပညာဆိုင်ရာ အထောက်အပံ့များဖြင့် ဖွဲ့စည်းထားသော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ စိစစ်သုံးသပ်ရေး အဖွဲ့ကော်မတီ၏ အကူအညီဖြင့် ပြင်ဆင်ရေးသားခဲ့ပါသည်။

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းအရ ဖွံ့ဖြိုးရေးစီမံကိန်းများ ဆောင်ရွက်ရာတွင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် (ECC) ကို ရရှိရန် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) သို့မဟုတ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကို ဆောင်ရွက်ရန်အတွက် သတ်မှတ်ချက်တစ်ခု ပါဝင်ပါသည်။ ဤ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း-EIA ၏ အပိုင်း ၂ တွင် ပတ်ဝန်းကျင်နှင့် လူမှုရေးအကြောင်းအရာများ နှင့် စပ်လျဉ်းသည့် ဥပဒေစာရင်းအပြည့်အစုံ နှင့် အဆိုပြု ဆိုက်စမစ် တိုင်းတာရေးများ အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာမှုဆိုင်ရာ ဥပဒေများ အပါအဝင် ဤလုပ်ငန်းစဉ်ကို နောက်ထပ်ဖော်ပြထားပါသည်။

1.3 စီမံကိန်းဖော်ပြချက်နှင့် အခြားနည်းရွေးချယ်ခြင်း

1.3.1 စီမံကိန်းတည်နေရာ

ကုန်းပေါ် PSC H သည် မြန်မာနိုင်ငံတောင်ဘက်၏ တောင်ငူ-ပျဉ်းမနားဧရိယာ၌ တည်ရှိပြီး ဧရိယာ ၂၅,၇၄၄ စတုရန်းကီလိုမီတာခန့် ပါဝင်ပါသည်။ ၎င်းသည် မြန်မာနိုင်ငံမြို့တော် နေပြည်တော်မှ တောင်ဘက်ရှိ အင်းတိုင် သဘာဝဓာတ်ငွေ့လုပ်ကွင်းသို့ဦးတည်သွားပါသည်။ စီမံကိန်းဧရိယာကို ပုံ ၁.၁ တွင် ဖော်ပြထားပါသည်။ နှစ်ဖက်မြင် (2D) ဆိုက်စမစ်တိုင်းတာမှုကို PSC H အတွင်း ပုံ ၁.၁ တွင် ရေးဆွဲဖော်ပြထားသော တိုင်းတာရေး ၁၉ လိုင်း နေရာများဖြင့် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ လိုင်းများ၏ စုစုပေါင်းအရှည်မှာ ၃၀၇.၇ ကီလိုမီတာခန့် ဖြစ်ပါသည်။

1.3.2 စီမံကိန်းလုပ်ငန်းများ

ကြိုတင်ပြင်ဆင်ခြင်း / စုစည်းခြင်း ကာလအဆင့်

ကြိုတင်ပြင်ဆင်ခြင်း / စုစည်းခြင်း ကာလအဆင့်အတွင်း ဆိုက်စမစ်တိုင်းတာရေးအစီအစဉ်အတွက် လိုအပ်သည့် နယ်မြေအတွင်းကျရောက်နေသော မြေ နှင့် အိမ်ရာ အဆောက်အအုံများ ပိုင်ဆိုင်မှုကို ဆုံးဖြတ်သွားမည် ဖြစ်ပါသည်။ မြေပေါ်တွင်နေထိုင်မှု ဥပမာ- အခြေစိုက်စခန်း တည်ဆောက်ရန် အတွက် လျော်ကြေးပေးရန် လိုအပ်လျှင် Pacific Hunt သည် မြို့နယ် / ခရိုင် / အစိုးရ နှင့် မြေပိုင်ရှင်များ / ကျေးရွာသူကျေးရွာသားများ ဖြင့် လျော်ကြေးသဘောတူချက်များအပေါ်မူတည်၍ လိုအပ်သလို ဆက်သွယ်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ဤကာလအဆင့်အတွင်း ဒေသခံ မြေပိုင်ရှင်ထံမှ မြေငှားယူ၍ အခြေစိုက်စခန်းတစ်ခုကို တည်ဆောက်သွားမည် ဖြစ်ပါသည်။

ဆိုက်စမစ်တိုင်းတာရေး ကာလအဆင့်

မြေမျက်နှာပြင်အောက်ဘူမိတိုင်းတာရေးကို ဆိုက်စမစ်တိုင်းတာရေးဖြင့် ဆောင်ရွက်နိုင်မည် ဖြစ်ပါသည်။ ဆိုက်စမစ်တိုင်းတာမှုသည် မြေကြီးသို့ တိုက်ရိုက်အားထုတ်လွှတ်မည့် အသံ အရင်းအမြစ်ကို အသုံးပြုပါသည်။ ၎င်းအသံများသည် မျက်နှာပြင်အောက်ရှိ မတူညီသော ကျောက်အလွှာများကို

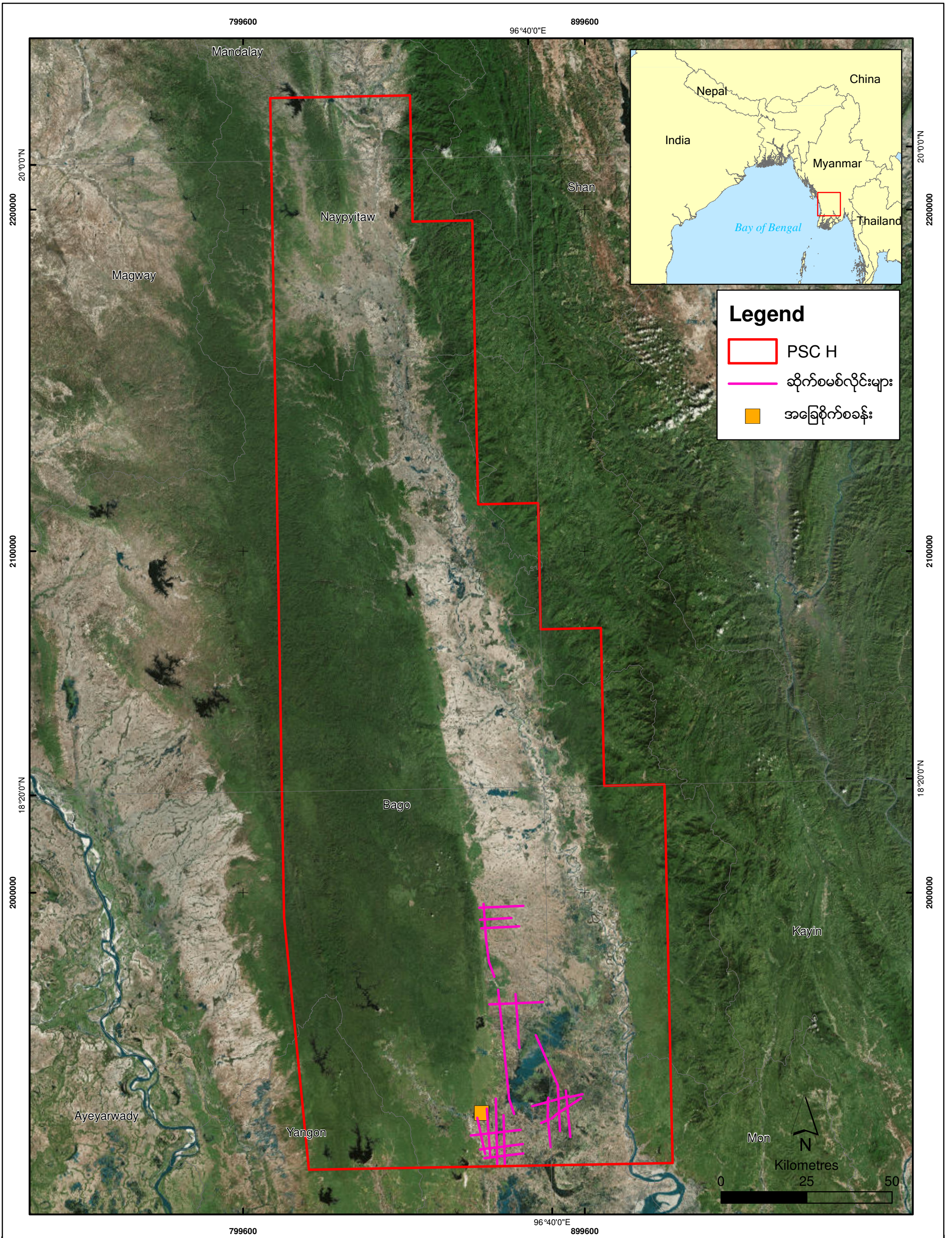


Figure 1.1

PSC H အတွင်းရှိ ဆိုက်စမစ်လိုင်းများ နှင့် အခြေစိုက်စခန်း တည်နေရာပြပုံ

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Resources
Management



ဖြတ်သန်းသွားသောအခါ၊ ဘူမိလွှာများ သို့မဟုတ် အလွှာအဆင့်များအကြား နယ်နိမိတ်များကို ရိုက်ခတ်ထင်ဟပ်ပြီး မျက်နှာပြင်ပေါ်ရှိ ဂျီအိုဖုန်းများ (geophones) ဟုခေါ်သော လက်ခံယူရေး ကိရိယာများတွင် မှတ်တမ်းယူထားမည် ဖြစ်ပါသည်။ ပြန်လာသောအသံလှိုင်းများကို မှတ်တမ်းယူပြီး သည်နှင့်တစ်ပြိုင်နက် မျက်နှာပြင်အောက်ရှိ ဘူမိဖွဲ့စည်းပုံများ တည်ဆောက်ထားမှုပုံစံများနှင့် ပတ်သက်သည့် အချက်အလက်များကို ထောက်ပံ့ပေးနိုင်ရန် ဆောင်ရွက်နိုင်ပါသည်။

ဆိုက်စမစ်တိုင်းတာမှုအတွက် အသံအရင်းအမြစ်ထုတ်လွှတ်ရာတွင် ဝိုင်ဘရိုဆစ် (Vibroseis) ကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။

ပြည်လည်ရှုပ်သိမ်းခြင်း

တိုင်းတာမှု နှင့် မှတ်တမ်းယူမှု ပြီးမြောက်သွားသည်နှင့်တစ်ပြိုင်နက်၊ ကိရိယာများကို ဖယ်ရှားပြီး အမှုထမ်းများလည်း လုပ်ငန်းခွင်နေရာမှ ထွက်ခွာသွားမည် ဖြစ်ပါသည်။ စွန့်ပစ်စွည်းများ နှင့် ရုပ်ဝတ္ထုပစ္စည်းများ အားလုံးကို ကောက်ယူစုဆောင်းခြင်းနှင့် လုပ်ငန်းခွင်နေရာအပြင်ဘက်သို့ သယ်ယူပို့ဆောင်စေခြင်းဖြင့် လုပ်ငန်းခွင်နေရာကိုလည်း နဂိုမူလအခြေအနေအတိုင်းဖြစ်အောင် ပြန်လည်ပြုပြင်သွားမည် ဖြစ်ပါသည်။ ယခု ထိခိုက်မှုဆန်းစစ်ခြင်း၏ နယ်ပယ်သတ်မှတ်မှုအတွင်း မပါဝင်သော အခြား လုပ်ငန်းဆောင်ရွက်သူ(များ) (operators) နှင့် အခြားစီမံကိန်းများအတွက် အခြေစိုက်စခန်းကို ဆိုက်စမစ်တိုင်းတာရေးကန်ထရိုက်တာမှ ထိန်းသိမ်းထားမည် ဖြစ်ပါသည်။ အများပြည်သူမကျေနပ်ချက်များရှိလျှင်၎င်းတို့ကို မှတ်တမ်း ယူခြင်းများအပါအဝင် လုပ်ငန်းခွင်များ ပြန်လည်ပြုပြင်ခြင်းကို ပြီးမြောက်ရန် အချိန် တစ်လခန့် ကြာမြင့်မည်ဟု တွက်ချက်ထားပါသည်။

1.3.3 စီမံကိန်းအချိန်ဇယား

ဆိုက်စမစ်တိုင်းတာမှုနှင့်ပတ်သက်သည့်လုပ်ငန်းများကို ရက်ပေါင်း ၁၈၀ အတွင်း ပြီးမြောက်ဆောင် ရွက်နိုင်ရန် အတွက် နိုဝင်ဘာလ အလယ်လောက်တွင် စတင်ဆောင်ရွက်သွားနိုင်ရန် တွက်ချက် ထားပါသည်။

1.3.4 အလုပ်ခန့်အပ်ခြင်း နှင့် အလုပ်သမားများနေထိုင်ရာ နေရာ

စီမံကိန်း၌ ကနဦးတွင် လူစုစုပေါင်း အမှုထမ်း ၂၀ ဦးမှ ဆိုက်စမစ်တိုင်းတာရေးကာလအတွင်း အမှုထမ်း ၁၄၀ ဦးအထိ ရှိမည် ဖြစ်ပါသည်။ ကျွမ်းကျင်သောအလုပ်သမားနှင့် မကျွမ်းကျင်သော အလုပ်သမားများအချိုးကို ၁:၅ မှ ၁:၁၀ အထိရှိရန် မျှော်လင့်ထားပြီး၊ ဆိုက်စမစ်အမှုထမ်းများ နေရာတကျဖြစ်သောအခါ ပိုမိုမြင့်မားလာမည် ဖြစ်ပါသည်။ ပုံမှန်အလုပ်များအတွက် ဒေသခံ မြို့နယ်များမှ အလုပ်သမားများ ငှားရမ်းခန့်အပ်ရန် စီစဉ်လျက်ရှိပါသည်။

1.4 အခြေခံအချက်အလက် သတ်မှတ်ချက်များ

လက်ကွက်အမှတ် H သည် ပဲခူးတိုင်းဒေသကြီး၊ မွန်ပြည်နယ် နှင့် နေပြည်တော် ပြည်ထောင်စု နယ်မြေတို့အတွင်း တည်ရှိပါသည်။ ဒေသ၌ မိုးရေချိန်မှာ နှစ်စဉ် ၁,၀၀၀ မီလီမီတာ မှ ၂,၅၀၀ မီလီမီတာ ခန့် ရှိကြောင်း မှတ်သားရပါသည်။ အဆိုပြုဆိုက်စမစ်ဧရိယာများအနီး၌တည်ရှိသော ပဲခူးရှိ မိုးလေဝသအချက်အလက်များအရ ၎င်းဧရိယာကို အပူပိုင်းမှတ်သုံးရာသီဥတုအဖြစ် အမျိုးအစားသတ်မှတ်ပါသည် (Köppen-Geiger climate classification, Am)။ ပဲခူးရှိ ပုံမှန် အပူချိန်မှာ ၂၇.၀ °C ရှိပြီး နှစ်စဉ် ပုံမှန် မိုးရေချိန်မှာ ၃,၈၁၀ မီလီမီတာ ဖြစ်ပါသည်။ မိုးရေချိန်မှာ

ဆောင်းရာသီလများထက် နွေရာသီတွင် ပိုမိုမြင့်မားပါသည်။ ဇန်နဝါရီလသည် အခြောက်သွေဆုံး လဖြစ်ပြီး မိုးရေချိန်မှာ ဖွန်လတွင် အမြင့်ဆုံးဖြစ်ပါသည်။

လေ့လာမှုဧရိယာအတွက် ဝန်းကျင်လေထုအရည်အသွေးဆိုင်ရာ တစ်ဆင့်ခံအချက်အလက်များ မရှိပါ။ လေ့လာမှုဧရိယာအနီးပတ်ဝန်းကျင်ရှိ လေထုသို့ အဓိက ထုတ်လွှတ်မှုအရင်းအမြစ်များမှာ အိမ်မှုကိစ္စရပ်များ (ဥပမာ - အပူပေးခြင်း နှင့် ချက်ပြုတ်ခြင်း) အတွက် မီးဖိုခြင်း နှင့် လမ်းပန်း ဆက်သွယ်ရေးမှ အိပ်ဇောထုတ်လွှတ်မှု တို့ ဖြစ်နိုင်ပါသည်။

လေ့လာမှုဧရိယာရှိ ဆူညံမှုဆိုင်ရာ တစ်ဆင့်ခံအချက်အလက်များ မရှိပါ။ သို့ရာတွင် အသံဆူညံမှု အရင်းအမြစ်များတွင် အနီးရှိလမ်းမကြီးပေါ်မှ ယာဉ်အသွားအလာများပါဝင်နိုင်ပါသည်။

PSC H အတွင်း မြေပေါ်ရေ၏ အဓိကအရင်းအမြစ်များမှာ စစ်တောင်းမြစ်နှင့် ဘောနက် ကြီး (Baw Nat Gyi) ရေလှောင်တံ၊ ဘောနီရေလှောင်တံ၊ ကောလိယ (Kawliya) ရေလှောင် တံ၊ ရဲနွယ်ဆည် ရေလှောင်တံ (Ye Nwe Dam Reservoir) နှင့် ဘိုင်ဒါးဆည် (Baing Dar) ရေလှောင်တံ တို့ကဲ့သို့သော ရေလှောင်တံတို့ ဖြစ်ကြပါသည်။ ရေလှောင်တံများရှိ ရေအရည် အသွေးမှာ အတော်အတန်ကောင်းမွန်ပြီး၊ စစ်တောင်းမြစ်ရေသည် စိုက်ပျိုးရေးသွင်းအားစုများ၊ ရေယဉ်များမှ ထုတ်လွှတ်မှုများ၊ သတ္တုတွင်းလုပ်ငန်းများ နှင့် မျက်နှာပြင်ရေစီးဆင်းမှုတို့ကြောင့် ညစ်ညမ်းမှုများရှိနိုင်သည်ဟု တွက်ချက်ပါသည်။

PSC H ၏ ဧရိယာသည် ပဲခူးရိုးမတောင်တန်းအတွင်း တည်ရှိပါသည်။ ဒေသရှိ မြေအောက်ရေမှာ စစ်တောင်းမြစ် နှင့် ပဲခူးမြစ်တို့၏ သဘာဝအလျောက် ပြန်လည်ဖြည့်စွမ်းမှုအပေါ် မူတည်ပါသည်။ PSC H အတွင်းရှိ ကျေးရွာများတွင် ရေရရှိမှုအတွက် ရေတွင်းများနှင့် လက်တူးတွင်းများမှရရှိသော မြေအောက်ရေကို အသုံးပြုကြကြောင်း တင်ပြကြပါသည်။

၂၀၁၅ ဇန်နဝါရီလ ခြောက်သွေ့ရာသီကာလအတွင်း ကုန်းနေ ဇီဝမျိုးစုံမျိုးကွဲများအတွက် အခြေခံ ကွင်းဆင်းစစ်တမ်းများကို ဆောင်ရွက်ခဲ့ပါသည်။ စစ်တမ်းတွေ့ရှိမှုများမှ လေ့လာမှုဧရိယာတွင် သစ်တောမြေ၊ စိုက်ပျိုးမြေ၊ ဖွံ့ဖြိုးရေးမြေ နှင့် ရေလှောင်တံမြေ စသည်ဖြင့် မှီခိုရာနေရာ (၄) မျိုးရှိနေပြီး ၎င်းတို့ထဲမှ သစ်တောမြေ နှင့် စိုက်ပျိုးမြေတို့မှာ အဓိကမှီခိုရာနေရာများဖြစ်ကြောင်း တွေ့ရှိရပါသည်။

စီမံကိန်းဧရိယာတွင် ကျေးရွာအုပ်စု ၁၂ စုရှိ ကျေးရွာ ၁၃ ရွာရှိပါသည်။ ကျေးရွာ ၁၃ ရွာထဲမှ ကျေးရွာ ၁၁ ရွာ၌ ၂၀၁၅ ဇန်နဝါရီလတွင် ရပ်ရွာစစ်တမ်းများကို ကောက်ယူဆောင်ရွက်ခဲ့ပါသည်။ အိမ်ထောင်စုတစ်စုလျှင် ပုံမှန် ၄.၃၇ ဦးစီရှိသည့် အိမ်ထောင်စုပေါင်း ၆,၅၉၀ တွင် လူဦးရေ စုစုပေါင်း ၂၈,၈၀၀ ဦးရှိကြောင်း တွေ့ရှိရပါသည်။ ကောက်ယူခဲ့သည့် အိမ်ထောင်စုများအတွက် အသက်မွေး ဝမ်းကျောင်းအဓိကအရင်းအမြစ်မှာ စိုက်ပျိုးရေးနှင့် ခြံမွေးတိရစ္ဆာန်များပိုင်ဆိုင်မှုဖြစ်ပါသည်။ စီမံကိန်း ဧရိယာရှိ အဓိက စိုက်ပျိုးသော သီးနှံများတွင် စပါး နှင့် မြေပဲတို့ ပါဝင်ကြပါသည်။

1.5 အဓိက သက်ရောက်မှုများ နှင့် လျော့ချရေးအစီအမံများ အကျဉ်းချုပ်

စီမံကိန်းမှ အဓိကသက်ရောက်မှုများ နှင့် ထိခိုက်မှုဆန်းစစ်ခြင်း၏ ရလဒ်များအကျဉ်းချုပ်ကို ဇယား ၁.၁ တွင် တင်ပြထားပါသည်။ အပိုင်း ၆ တွင် စီမံကိန်းလုပ်ငန်းတစ်ခုချင်းမှ ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ နှင့် အပိုင်း ၈ တွင် သက်ရောက်မှုတစ်ခုချင်းအတွက် လျော့ချရေးအစီအမံများ စာရင်းကို အသေးစိတ်တင်ပြထားပါသည်။

ဇယား ၁.၁ အဓိက သက်ရောက်မှုများနှင့် ထိန်းချုပ်ရေး/လျှော့ချရေး အစီအမံများ အကျဉ်းချုပ်

ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှု/အကြောင်းကိစ္စ	သက်ရောက်မှုများ၏ အရေးပါမှု	ကြွင်းကျန်သက်ရောက်မှုများ၏ အရေးပါမှု
အလုပ်သမားများ (အမဲလိုက်ခြင်းအပါအဝင်)၊ ကိရိယာများနှင့် ဝန်ဆောင်မှုထောက်ပံ့ရေးတို့ကြောင့် ကုန်းပေါ်နှင့် ရေပေါ်ရှိ သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အတော်အသင့်ဖြစ်သော	အရေးမပါသော
လုပ်ငန်းခွင်ပြင်ဆင်ခြင်း / ရှင်းလင်းခြင်းကြောင့် ကုန်းပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ၎င်းတို့နှင့်ဆက်သွယ်သည့် သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အတော်အသင့်ဖြစ်သော	အရေးမပါသော
အရွေ့စွမ်းအင်ထုတ်လွှတ်မှုကြောင့် ကုန်းနေသတ္တဝါများအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
စွန့်ပစ်ပစ္စည်းများစွန့်ထုတ်မှုကြောင့် မြေပေါ်ရေ အရည်အသွေး၊ မြေအောက်ရေအရည်အသွေး၊ မြေဆီလွှာ၊ ကုန်းပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ရေပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ၎င်းတို့နှင့်ဆက်သွယ်သည့် သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အရေးမပါသော	မပြောပလောက်သော
မိလ္လာနှင့် ရေဆိုးများစွန့်ထုတ်မှုကြောင့် မြေပေါ်ရေ အရည်အသွေး၊ မြေအောက်ရေအရည်အသွေး၊ မြေဆီလွှာ၊ ကုန်းပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ရေပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ၎င်းတို့နှင့်ဆက်သွယ်သည့် သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
ဗိုင်းဘရီဆစ် (Vibroiseis) လည်ပတ်ဆောင်ရွက်မှုကြောင့် လေထုဆူညံသံအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
ယိုဖိတ်မှုများ/ယိုစိမ့်မှုများကြောင့် မြေပေါ်ရေ အရည်အသွေး၊ မြေအောက်ရေအရည်အသွေး၊ မြေဆီလွှာ၊ ကုန်းပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ရေပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ၎င်းတို့နှင့်ဆက်သွယ်သည့် သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အတော်အသင့်ဖြစ်သော	အရေးမပါသော
မီးကျွမ်းခြင်းနှင့် ဖောက်ခွဲဆောင်ရွက်ခြင်းတို့ကြောင့် လေထုအရည်အသွေး၊ မြေအောက်ရေအရည်အသွေး၊ မြေပေါ်ရေ အရည်အသွေး၊ ရှင်းနှင့် မြင်နေရသော ပိသေသလက္ခဏာများ၊ သယံဇာတများအသုံးပြုမှု၊ ကုန်းပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ရေပေါ်နေထိုင်ကျက်စားရာနေရာများနှင့် ၎င်းတို့နှင့်ဆက်သွယ်သည့် သဘာဝအပင်များနှင့် သတ္တဝါများအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
ရပ်ရွာလူထုနှင့် လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းရေးအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော

ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှု/အကြောင်းကိစ္စ	သက်ရောက်မှုများ၏ အရေးပါမှု	ကြွင်းကျန်သက်ရောက်မှုများ၏ အရေးပါမှု
ရပ်ရွာ၏ အသက်မွေးဝမ်းကျောင်းလုပ်ငန်းများအပေါ် သက်ရောက်မှု	အပြုသဘောဆောင်သော	အပြုသဘောဆောင်သော
သယ်ယူပို့ဆောင်ရေးနှင့် အခြေခံအဆောက်အအုံဆိုင်ရာ ဝန်ဆောင်မှုများအပေါ် သက်ရောက်မှု	မပြောပလောက်သော အဆင့်မှ အရေးမပါသောအဆင့်	မပြောပလောက်သော
မြေနှင့်ကောက်ပဲသီးနှံဆုံးရှုံးမှုအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
ရေအရင်းအမြစ်ထိခိုက်လွယ်မှုအပေါ် သက်ရောက်မှု	အရေးမပါသော	အရေးမပါသော
ယဉ်ကျေးမှုဆိုင်ရာအမွေအနှစ်အပေါ် သက်ရောက်မှု	အရေးမပါသော အဆင့်မှ အတော်အသင့်ဖြစ်သော အဆင့်	အရေးမပါသော

သက်ဆိုင်သူများနှင့် ဆက်ဆံဆွေးနွေးမှု

စီစဉ်ထားသော 2D ဆိုက်စမစ် စီမံကိန်းလုပ်ငန်းများအပေါ် သက်ဆိုင်သူများ၏ နားလည်သဘောပေါက်မှုကို မြှင့်တင်နိုင်ရန်နှင့် သင့်လျော်သောလျှော့ချရေးအစီအမံများရေးဆွဲရန်အတွက် အကြံဉာဏ်များ/ စိုးရိမ်မှုများကို လက်ခံရယူနိုင်ရန် စီမံကိန်းအတွက် အများပြည်သူနှင့် တိုင်ပင် ဆွေးနွေးမှုကို ဆောင်ရွက်ခဲ့ပါသည်။ အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုအတွက် ချဉ်းကပ်မှုနှင့် နည်းလမ်းတို့ကို ဤ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ၏ အပိုင်း ၉ တွင် အသေးစိတ် တင်ပြထားပါသည်။

တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ၏ ရက်စွဲ၊ နေရာ၊ သက်ဆိုင်သူများ နှင့် ရည်ရွယ်ချက် တို့ကို ဇယား ၁.၂ တွင် ဖော်ပြထားပါသည်။ ဤတွေ့ဆုံဆွေးနွေးမှုလုပ်ငန်းများတွင် စီမံကိန်းဆိုင်ရာ သတင်းအချက်အလက်များကို သက်ဆိုင်သူများထံ ထုတ်ပြန်ပေးခြင်း နှင့် ဒေသရှိ လူမှုစီးပွားအခြေအနေကို နားလည်နိုင်ရန် ကြိုးပမ်းခဲ့ပါသည်။ ထို့အပြင်၊ စီမံကိန်းနှင့် သက်ဆိုင်သူများ၏ အမြင်များ၏ နားလည်မှုတစ်ရပ်ကို ဆောင်ရွက်ခဲ့ပြီး၊ စိုးရိမ်မှုများနှင့် မျှော်လင့်ချက်များကို ထည့်သွင်းဆောင်ရွက်ခဲ့ပါသည်။ ဤစိုးရိမ်မှုများ နှင့် မျှော်လင့်ချက်များကို စီမံကိန်းမှ သက်ရောက်မှုများကို ဆန်းစစ်ရာ နှင့် အဆိုပြုအစီအမံများကို သတ်မှတ်ဖော်ထုတ်ရာတွင် ထည့်သွင်းစဉ်းစားဆောင်ရွက်ခဲ့ပါသည်။

ဇယား ၁.၂ ဆောင်ရွက်ခဲ့သည့် တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ

ရက်စွဲ၊ အချိန်၊ နေရာ	သက်ဆိုင်သူများ	တွေ့ဆုံမှု၏ ရည်ရွယ်ချက်
၂၀၁၅ ဇန်နဝါရီလ ၂၁ ရက် (၁၃:၀၀ မှ ၁၄:၀၀ ထိ)	လယ်ဝေးမြို့နယ် GAD အုပ်ချုပ်ရေးမှူး	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများ နှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက် သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ သက်ဆိုင်သူများနှင့် နောက်ထပ် တိုင်ပင်ဆွေးနွေးမှုများ ဆောင်ရွက်နိုင်ရန် အတွက် ခွင့်ပြုချက်တောင်းခံခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၂ ရက် (၁၁:၀၀ မှ ၁၂:၀၀ ထိ)	ရေတာရှည်မြို့နယ် GAD အုပ်ချုပ်ရေးမှူး	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများ နှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက် သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများ နှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။ သက်ဆိုင်သူများနှင့် နောက်ထပ် တိုင်ပင်ဆွေးနွေးမှုများ ဆောင်ရွက်နိုင်ရန် အတွက် ခွင့်ပြုချက်တောင်းခံခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၃ ရက် (၁၀:၀၀ မှ ၁၂:၀၀ ထိ)	ရေတာရှည်မြို့နယ်ရှိ သပြေတန်း၊ ညောင်ပင်သာ၊ ပိတောက်ခင်း နှင့် ခင်တန်းကြီးကျေးရွာတို့မှ ဒေသခံလူထု	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများ နှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက် သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများ နှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။ အိမ်ထောင်စုစစ်တမ်းများကောက်ယူဆောင်ရွက်ခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၄ ရက် (၁၀:၀၀ မှ ၁၀:၃၀ ထိ)	ဝေါမြို့နယ် GAD အုပ်ချုပ်ရေးမှူး	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများ နှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက် သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများ နှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။ သက်ဆိုင်သူများနှင့် နောက်ထပ် တိုင်ပင်ဆွေးနွေးမှုများ ဆောင်ရွက်နိုင်ရန် အတွက် ခွင့်ပြုချက်တောင်းခံခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၅ ရက် (၀၈:၀၀ မှ ၀၈:၃၀ ထိ)	ဒိုက်ဦးမြို့နယ် GAD အုပ်ချုပ်ရေးမှူး	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများ နှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက် သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများ နှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။

ရက်စွဲ၊ အချိန်၊ နေရာ	သက်ဆိုင်သူများ	တွေ့ဆုံမှု၏ ရည်ရွယ်ချက်
		<ul style="list-style-type: none"> သက်ဆိုင်သူများနှင့် နောက်ထပ် တိုင်ပင်ဆွေးနွေးမှုများ ဆောင်ရွက်နိုင်ရန် အတွက် ခွင့်ပြုချက်တောင်းခံခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၅ ရက် (၁၃း၀၀ မှ ၁၄း၀၀ ထိ)	ညောင်လေးပင်မြို့နယ်ရှိ ဖအောင်း၊ အလယ်ရွာနှင့် စမ်းတွင်းကုန်းကျေးရွာတို့နှင့် ခိုက်ဦးမြို့နယ်ရှိ ရွှေညောင်ပင်၊ အိမ်ခြေလေးဆယ်နှင့် အောင်ဘာလေးကျေးရွာတို့မှ ဒေသခံလူထု	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများနှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများနှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။ အိမ်ထောင်စုစစ်တမ်းများကောက်ယူဆောင်ရွက်ခြင်း။
၂၀၁၅ ဇန်နဝါရီလ ၂၆ ရက် (၁၃း၃၀ မှ ၁၄း၃၀ ထိ)	ဝေါမြို့နယ်ရှိ ဧကရာဇ် (Ahkayit)၊ ကျိုက်လှ၊ ဘုရားပြို (Phyarpyo) နှင့် သပေါက်ကန်ကျေးရွာတို့မှ ဒေသခံလူထု	<ul style="list-style-type: none"> စီမံကိန်းသက်ရောက်မှုများနှင့် EIA တွေ့ရှိချက်များနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကို တင်ပြခြင်း။ ဖြစ်ပေါ်လာနိုင်သော ထိခိုက်ခံစားရမည့် ရပ်ရွာများနှင့် လူများနှင့် ပတ်သက်သည့် သတင်းအချက်အလက်များကောက်ယူခြင်း။ အိမ်ထောင်စုစစ်တမ်းများကောက်ယူဆောင်ရွက်ခြင်း။

ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်ကာလအတွင်း အဖွဲ့လိုက်ဆွေးနွေးခဲ့သည့်နည်းလမ်းဖြင့် ဒေသခံ သက်ဆိုင် သူများ နှင့် ဆောင်ရွက်ခဲ့သည့် တွေ့ဆုံဆွေးနွေးပွဲများမှ ဒေသခံရပ်ရွာလူထု၏ အဓိက စိုးရိမ်မှုများ နှင့် မျှော်လင့်ချက်များကို သတ်မှတ်ဖော်ထုတ်ထားပါသည် -

- မြေရရှိမှုအပေါ် သက်ရောက်မှု - ဒေသခံရပ်ရွာလူထု၏ အဓိကစိုးရိမ်မှုများထဲမှ တစ်ခုမှာ ဒေသရှိ မြေရရှိနိုင်မှု နှင့် ရပ်ရွာမှ ဆောင်ရွက်သည့် စိုက်ပျိုးရေး အပေါ် စီမံကိန်းလုပ်ငန်းများမှ သက်ရောက်နိုင်မှုနှင့် ပတ်သက်ပါသည်။ ရရှိနိုင်သောသတင်းအချက်အလက်များအရ ဒေသခံ ရပ်ရွာလူထုအများစုအတွက် အသက်မွေးဝမ်းကျောင်း၏ အဓိကအရင်းအမြစ်မှာ စိုက်ပျိုးရေး လုပ်ငန်းဖြစ်ပါသည်။ ထို့ကြောင့် စီမံကိန်းလုပ်ငန်းများသည်ကြောင့် စိုက်ပျိုးရေးလုပ်ရန် မြေရရှိနိုင်မှုနည်းပါးသွားစေနိုင်ပြီး၊ ရပ်ရွာလူထုအတွက် ဝင်ငွေနှင့် အသက်မွေးဝမ်းကျောင်း အရင်းအမြစ်များအပေါ် သက်ရောက်နိုင်ပါသည်။ ဤသက်ရောက်မှုသည် စီမံကိန်းမှ အဓိက မြေပိုင်ဆိုင်ထားမှုများအပေါ် သက်ရောက်နိုင်ပြီး အခြားရွေးချယ်စရာမြေရရှိသူများ ဖြစ်ကြ သည့် စိုက်ပျိုးရေးတစ်ခုတည်းကိုသာအဓိပြုနေရသော အိမ်ထောင်စုများအတွက် ပိုမိုကြီးမား နိုင်ပါသည်။
- ရပ်ရွာဖွံ့ဖြိုးရေးလုပ်ငန်းများ - ရပ်ရွာ၏ အသက်မွေးဝမ်းကျောင်းအပေါ် စီမံကိန်းလုပ်ငန်းများ ၏ သက်ရောက်မှုအကြောင်း နားလည်ထားကြရာ၊ ရပ်ရွာသည် အထူးသဖြင့် ရေသွင်း စိုက်ပျိုးရေးအဆောက်အအုံနေရာများထောက်ပံ့ပေးစေလိုခြင်း၊ စိုက်ပျိုးရေးလုပ်ငန်းဆိုင်ရာ စက်ယန္တရားများဝယ်ယူနိုင်ရန် အကူအညီပေးစေလိုခြင်း နှင့် မြေဩဇာများနှင့် မျိုးစေ့များ ဝယ်ယူရာတွင် ထောက်ပံ့ငွေ ပေးစေလိုခြင်း နှင့် ပတ်သက်သည့် ငွေကြေးဆိုင်ရာ နှင့်/ သို့မဟုတ် နည်းပညာအကူအညီများကို စီမံကိန်းမှ မျှော်လင့်ချက်များကို ဖော်ပြကြပါသည်။

ကတိကဝတ်များ တင်ပြချက်

Pacific Hunt သည် ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း-EIA အစီရင်ခံစာတွင် တင်ပြထားသည့် ကတိကဝတ်များ၊ လျှော့ချရေးအစီအမံများ နှင့် အစီအစဉ်များကို အစဉ်တစိုက် အပြည့်အဝ လိုက်နာ သွားမည် ဖြစ်ပါသည်။

Pacific Hunt သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်-EMPI စီမံကိန်းကတိကဝတ်များအားလုံး နှင့် စည်းကမ်း ချက်များကို အပြည့်အဝ အကောင် အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်ပြီး၊ စီမံကိန်း၏ ကန်ထရိုက်တာ များ နှင့် ဆပ်ကန်ထ ရိုက်တာများအားလုံးမှ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်-EMPI စီမံကိန်း ကတိကဝတ်များ နှင့် စည်းကမ်းချက်များ အပြင်၊ ပတ်ဝန်း ကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ နှင့် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံး လုပ်နည်း (၂၀၁၅) တို့ အပါအဝင် သက်ဆိုင်ရာဥပဒေများ အားလုံးကို အပြည့်အဝလိုက်နာ ဆောင်ရွက်စေရန် တာဝန် ရှိပါသည်။

Pacific Hunt နှင့် ERM တို့မှ အောက်ပါတို့ကို အတည်ပြုပါသည် -

1. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း-EIA အစီရင်ခံစာသည် တိကျ၊ ခိုင်မာပြီး ပြည့်စုံမှုရှိပါသည်။
2. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း-EIA ကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ် ထုံးလုပ်နည်း (၂၀၁၅) အပါအဝင်၊ သက်ဆိုင်ရာဥပဒေများ နှင့် အညီ ဆောင်ရွက်ခဲ့ပါသည်။
3. စီမံကိန်းသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာပါကတိကဝတ်များ၊ လျှော့ချရေး အစီအမံများကို နှင့် အစီအစဉ်များကို အပြည့်အဝ လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါ သည်။

နိဂုံး နှင့် အကြံပြုချက်များ

ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းကို PSC H ရှိ အဆိုပြု 2D ဆိုက်စမစ်တိုင်းတာမှု အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ၏ သတ်မှတ်ချက်များနှင့် အညီ ဆောင်ရွက်ခဲ့ပါသည်။ ဤ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းသည် စီမံကိန်းအဆိုပြုသူ၏ ၎င်းတို့ ပြုလုပ်ဆောင်ရွက်မည့် ပတ်ဝန်းကျင်အပေါ်နားလည်သဘောပေါက်မှုကို ထင်ရှားစေပြီး စီမံ ခန့်ခွဲမှုစနစ်များ နှင့် အစီအစဉ်များကို ပြည့်ပြည့်စုံစုံဖော်ပြထားပါသည်။ PSC H ၌ ဆိုက်စမစ် တိုင်းတာရေးအစီအစဉ်ဆောင်ရွက်စဉ်ကာလအတွင်း ဖြစ်ပေါ်လာနိုင်သော ဆိုးကျိုး၊ သက်ရောက်မှု များကို စီမံခန့်ခွဲရန်၊ စီမံကိန်းအကျိုးအမြတ်များကို တိုးမြှင့်စေရန် နှင့် အလေ့အကျင့် ကောင်းဆိုင်ရာ စံနှုန်းများ၊ ဥပဒေများကို အသေအချာလိုက်နာဆောင်ရွက်စေရန် နည်းလမ်းတစ်ရပ် အဖြစ် စီမံကိန်း အခြေပြု ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို ပြင်ဆင်ရေးသားတင်ပြပြီး ဖြစ်ပါသည်။ အကြံပြုထားသော လျှော့ချရေးအစီအမံများကို စနစ်တကျအကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း ဖြင့် PSC H ရှိ အဆိုပြု ဆိုက်စမစ်တိုင်းတာရေးအစီအစဉ်၏ သဘာဝ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ အပေါ်သက်ရောက်မှုများသည် လက်ခံနိုင်ဖွယ်ရှိသောပုံစံဖြင့်သာ ဖြစ်ကြောင်း တွက်ချက်ထား ပါသည်။

2 INTRODUCTION

2.1 PROJECT OVERVIEW

Pacific Hunt Energy (Pacific Hunt) operates the onshore PSC H in Myanmar under the Production Sharing Contract (PSC) awarded by the Myanma Oil and Gas Enterprise (MOGE) in 2013. Under the PSC, Pacific Hunt is planning to conduct two-dimensional (2D) seismic exploration survey across PSC H to determine the prospect (“the Project”).

The location of PSC H is shown in *Figure 2.1*.

2.2 PROJECT PROPONENT

The proponent of the Project is Pacific Hunt Energy.

Pacific Hunt Energy is an integrated exploration and production (E&P) company with drilling and technological capabilities targeting the Pacific Rim region. The headquarter of the company is located in Singapore and a local office is established in Yangon, Myanmar. Further information about the company is available at the website <http://pacifichuntenergy.com/>.

Contact details of the company, the chairman and responsible officer for the Project are provided below.

Myanmar

Company Name: Pacific Hunt Energy Corp. (Myanmar Branch)

Address: No. 19-12, 221 Sule Pagoda Road
Sule Square Business Center
Yangon

Tel / Fax No.: +95 019255185

Contact Person: Tamara Makaryan, Country Manager, Myanmar

Email: tamara@pacifichuntenergy.com

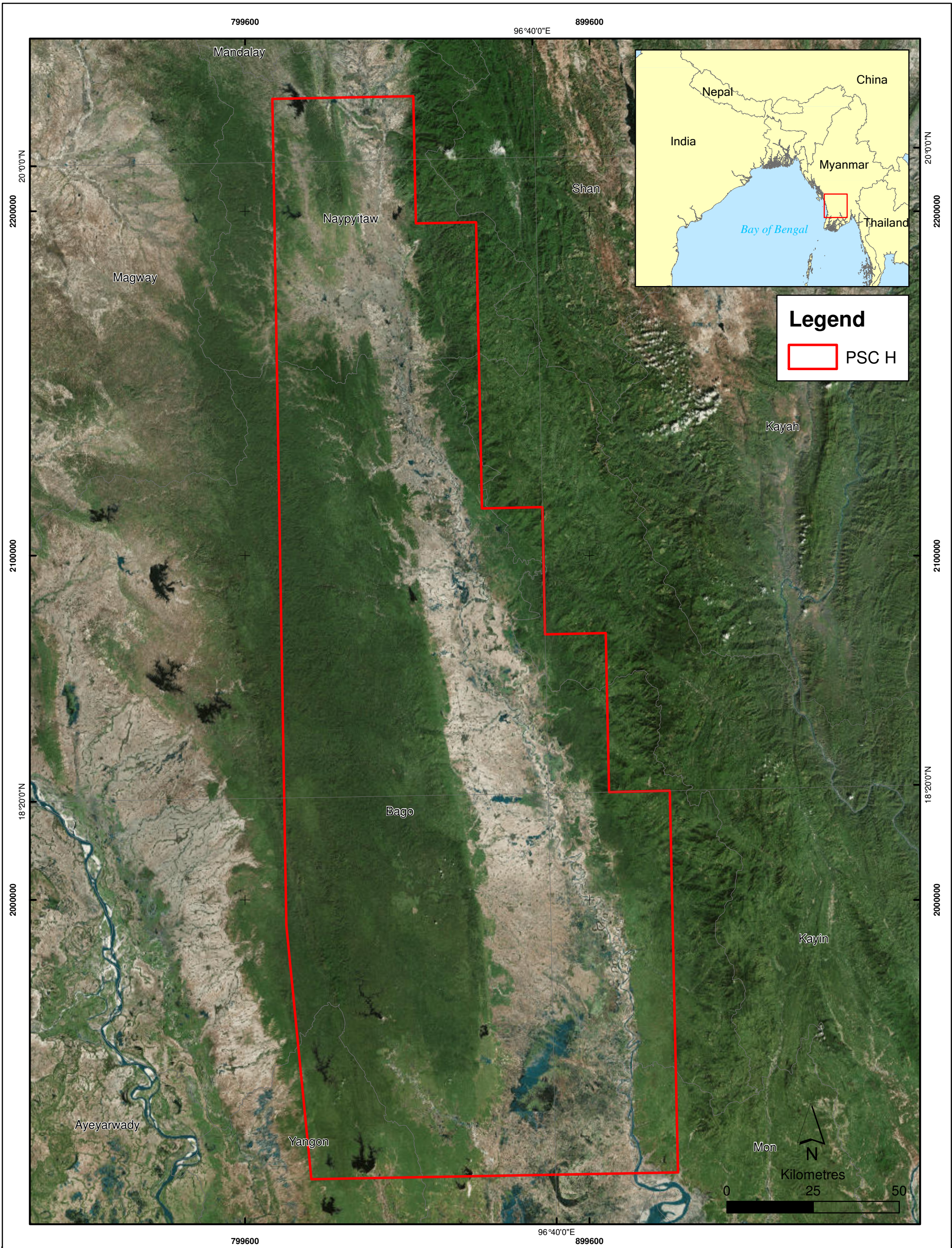


Figure 2.1

Location of PSC H

File: T:\GIS\CONTRACT\0273740\Mxd\2017\0273740_Block_H.mxd
Date: 3/11/2017

Environmental
Resources
Management



Singapore

Company Name: Pacific Hunt Energy Pte. Ltd.

Address: 47 Scotts Road, GoldBell Towers #02-01
228233 Singapore

Tel No.: +65 6262 8593

Contact Person: Nina Koskinen, Coordinator of Sustainable
Development

Email: nina.koskinen@pacifichuntenergy.com

Contact Person: Grant Petersen, Managing Director

Email: grantpetersen@pacifichuntenergy.com

2.3

THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Pursuant to *Section 7 of the Environmental Conservation Law and Articles 52 and 53 of the Environmental Conservation Rules of the Republic of the Union of Myanmar*, all Projects undertaken in Myanmar which have the potential to cause significant environmental and social impacts are required to undertake an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) and to obtain an Environmental Compliance Certificate (ECC) in accordance with the *Environmental Impact Assessment (EIA) Procedure* ("the Procedure").

In relation to the above, Pacific Hunt has commissioned **Environmental Resources Management (ERM)**, supported by local specialists from **Resource and Environment Myanmar (REM)**, to undertake an ESIA Study for the proposed seismic survey in PSC H in accordance with the requirements of the Procedure. This ESIA Report has been prepared for Pacific Hunt by ERM and presents the objectives, methodology and outcomes of the ESIA in accordance with the *EIA Procedure*.

2.4

ESIA OBJECTIVES

The overall purpose of the Study is to complete a robust ESIA to meet requirements of the *EIA Procedures* for the ESIA to be approved by the Ministry of Natural Resources and Environmental Conservation (MONREC).

Specifically, the objectives of the ESIA are:

- To review the proposed Project activities including its alternatives with respect to their potential to interact with environmental and social receptors and resources;

- To identify the potentially vulnerable environmental and social components;
- To identify and evaluate environmental and social impacts arising from the Project;
- To recommend mitigation or enhancement measures to remove, reduce or avoid negative impacts;
- To provide an environmental and social management plan (ESMP) including an approach for monitoring; and
- To summarise public consultation and disclosure of the Project.

2.5 *STUDY LIMITATIONS*

This ESIA is based on the Project description obtained from Pacific Hunt at the time of the Study. Any future changes to the Project description, upon which this report is based or additional relevant information revealed as Project design, equipment and service procurement proceed may affect the analysis, assessment and conclusions contained in this report. Should significant changes occur, they would be the subject of further study to verify that the conclusions of this ESIA do not change and to determine whether any additional mitigation, management or monitoring measures are warranted.

2.6 *ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT EXPERTS*

The EIA is led and conducted by Environmental Resources Management (ERM), who has been certified under the Transitional Consultant Registration as an EIA Consulting Organization Type-A (Certificate No. 0016).

Table 2.1 List of Environment and Social Experts

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	Registration Status
Craig A. Reid	ERM	BSc (honours)	19	Ecology and Biodiversity	Registered Under ERM Hong Kong (Certificate No. 0016) and Individually (Certificate No. 0053)
Rebecca Summons	ERM	MSc	8	Ecology and Biodiversity	Registered Under ERM Hong Kong (Certificate No. 0016) and Individually (Certificate No. 0053)
Myat Mon Swe	ERM	M.Eng.	>10	Socio-economic Facilitation of Meeting	Registered Individually (Certificate No. 0069) Registration Application to be submitted to ECD under ERM Hong Kong
Tam Man Cheong (Jovy Tam)	ERM	Mphil	>10	Ecology and Biodiversity, Socio-Economy	Registered Under ERM Hong Kong (Certificate No. 0016)
Tom Glenwright	ERM	PhD	16	Water Pollution Control, Modeling for Water Quality, Ground water and Hydrology	Registered Under ERM Hong Kong (Certificate No. 0016)
Stuart Mackenzie	ERM	BSc	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	5	Air Pollution Control, Modelling for Air Quality	Registered Under ERM Hong Kong (Certificate No. 0016)
Man Ping To (Mandy To)	ERM	MSc	20	Noise and Vibration	Registered Under ERM Hong Kong (Certificate No. 0016)
Wai Hang Ng (Nicci Ng)	ERM	M.A	10	Other (GIS)	Registered Under ERM Hong Kong (Certificate No. 0016)

The remainder of this report is structured as follows:

- *Section 3* defines the institutional framework for the Project including a summary of legislation, guidelines and standards applicable to the Project.
- *Section 4* presents the Project description and alternatives selection.
- *Section 5* presents a summary of environmental and social baseline conditions within the Study Area.
- *Section 6* presents the impact assessment methodology and the findings of the assessment of potentially significant impacts to environmental and social receptors and resources and proposed mitigation measures.
- *Section 7* presents findings of assessment of cumulative impacts to environment and social receptors and resources within the Study Area.
- *Section 8* details the Environmental and Social Management Plan and any monitoring measures to be completed.
- *Section 9* presents a summary of the public consultation and disclosure carried out for the Project.

This section sets out the relevant legal and policy context in Myanmar and documents the environmental and social standards with which the Project will achieve compliance as well as the international standards that the Project will follow. Specifically, this section summarises the following:

- Pacific Hunt Environmental and Social Policy;
- Myanmar administrative and legislative framework as well as existing regulatory requirements;
- EIA Legislation including EIA Procedure (2015) and National Environmental Quality (Emission) Guidelines in Myanmar;
- International organizations such as the World Bank and International Finance Corporation (IFC) environmental and social guidelines and standards that relate to both conducting an environmental and social impact assessment (ESIA) as well as to the technical performance standards applicable to the Project; and
- A discussion of international conventions to which Myanmar is a signatory and with which the Project must therefore comply.


Specific benchmarks used to assess individual impacts are also summarized under each assessment topic in *Section 6*.

3.1

CORPORATE ENVIRONMENTAL AND SOCIAL POLICY

Pacific Hunt has adopted a comprehensive HSE Management System. This system is an important and integral part of the company's overall management system and is shown in *Figure 3.1* below. This ESIA Study is conducted in accordance with Pacific Hunt's environmental and social guidelines.

Figure 3.1 Pacific Hunt's HSE Policy



PACIFIC HUNT ENERGY

PACIFIC HUNT ENERGY'S SAFETY, SOCIAL AND ENVIRONMENTAL POLICY

Pacific Hunt Energy is committed to achieving an operational environment that is safe for all of its employees, contractors, and visitors as well as to local residents, and has the lightest possible environmental footprint.

Pacific Hunt Energy's operations affect not only its employees and contractors but also a variety of stakeholders. In our everyday operations we aim to minimize any possible adverse impacts.


Pacific Hunt Energy is committed to:

- Providing an operational environment, which complies with relevant applicable laws and regulations.
- Operating in a sustainable way so that future generations are able to enjoy the same multiple dimensions of the surrounding environment as we do.
- Making sure all employees, contractors and visitors go through a safety induction when first entering the operational sites to ensure a safe working place for everyone.
- Ensuring company policies and procedures are implemented, reviewed and updated when necessary.
- Getting to know the communities with whom we share mutual environment and with whom we wish to cooperate.
- Working toward its goal of zero long term harm to the environment.

Contractors and visitors are accountable to:

- Complying with relevant laws, regulations and rules, whether governmental or set by Pacific Hunt Energy
- Cooperating and acting in a manner to maintain and support Pacific Hunt Energy safety, social and environmental standards

Our objective is to ensure the safety of those affected by our operations, and enable proper cooperation with all stakeholders.



Grant Petersen
Managing Director

3.2 MYANMAR REGULATORY REQUIREMENTS

Matters pertaining to Health, Safety and Environmental (HSE) requirements are generally under the jurisdiction of the ministries and state-owned enterprises in the oil and gas sector. Key ministries/ agencies / state-owned enterprises that have jurisdiction over HSE matters in oil and gas operations include the following:

- Ministry of Natural Resources and Environmental Conservation (MONREC);
- Ministry of Fisheries, Livestock and Rural Development;
- Ministry of Labour, Immigration and Population;
- Ministry of Electricity and Energy (MOEE);
- MOGE; and
- Myanmar Investment Commission (MIC).

Table 3.1 provides a list of laws relevant to HSE of the proposed Project.

It should be noted that the relevant General Administration Department (GAD) office and Department of Historical Research will be informed if finds of potential archeological interest is found during the Project activities.

Table 3.1 Myanmar Legislation Relating to the Oil and Gas Sector and 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	
Section 7:	The duties and powers relating to the environmental conservation of the Ministry are as follows: (a) implementing the environmental conservation policies; (b) planning and laying down national or regional work plans relating to environmental management;

Laws and Regulations	Description
	<ul style="list-style-type: none"> (c) laying down, carrying out and monitoring programmes for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution; (d) prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality; (e) submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment; (f) facilitating for the settlement of environmental disputes and, if necessary, forming bodies to negotiate such disputes; (g) specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities; (h) prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment; (i) promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances; (j) prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms; (k) negotiating, cooperating and implementing in respect of international, regional and bilateral agreements, instruments and programmes relating to matters of environment; (l) implementing the international, regional and bilateral agreements accepted by Myanmar for environmental conservation and enhancement of environmental quality in accord with the guidance adopted by the Union Government or the Committee; (m) causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment; (n) laying down guidances relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biological diversity, conservation of coastal environment, mitigation and adaptation of global warming and climate change, combating desertification and management of non-depleting substances and management of other environmental matters; (o) managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works; (p) carrying out other functions and duties assigned by the Union Government relating to environmental conservation.
Section 14:	A person causing a point source of pollution shall treat, emit, discharge and

Laws and Regulations	Description
	deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
Section 15:	The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.
Section 24:	The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conservation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or inform the relevant Government departments, Government organizations to carry out inspections.
Section 25:	<p>The Ministry may, if it is found that a holder of the prior permission fails to comply with any of the terms and conditions relating to environmental conservation contained in the prior permission, pass any of the following administrative penalties:</p> <p>(a) causing to comply with in accord with the terms and conditions after warning, causing to sign the bond;</p> <p>(b) causing to comply with in accord with the terms and conditions after paying a fine.</p>
Section 29:	No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this 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.	
Rule9(a)	The Committee may suggest and encourage, if necessary, the relevant departments to insert and amend the school lessons on environmental conservation;
Rule 9(b)	The Committee shall scrutinize, from time to time, the progress of implementation developed by the advice of the relevant Government department and Government organization.
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

Laws and Regulations	Description
	<p>or indirectly.</p> <p>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.</p>
EIA Procedure(2015)	
<p>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.</p>	
Section 102	<p>The Project Proponent shall bear full legal and financial responsibility for:</p> <p>a) all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and</p> <p>b) PAPs until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.</p>
Section 103	<p>The Project Proponent shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.</p>
Section 104	<p>The Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.</p>
Section 105	<p>The Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.</p>
Section 106	<p>The Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.</p>
Section 107	<p>The Project Proponent shall notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.</p>
Section 108	<p>The Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.</p>
Section 109	<p>The monitoring reports shall include:</p> <p>a) documentation of compliance with all conditions;</p> <p>b) progress made to date on implementation of the EMP against the submitted implementation schedule; c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;</p> <p>d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;</p>

Laws and Regulations	Description
	<p>e) accidents or incidents relating to the occupational and community health and safety, and the environment; and</p> <p>f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.</p>
Section 110	<p>Within ten (10) days of completing a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.</p>
Section 113	<p>For purposes of monitoring and inspection, the Project Proponent:</p> <p>a) shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and</p> <p>b) from time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.</p>
Section 115	<p>In the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry.</p>
Section 117	<p>The Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and subcontractors.</p>
National Environmental Quality (Emission) Guidelines (2015)	
<p>The NEQ sets 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.</p>	
The rights of ethnic minorities 2015 (BURMA 2015 HUMAN RIGHTS REPORT)	
Section 5	<p>Human Rights to access to vulnerable populations, particularly clashes with ethnic armed groups in Shan and Kachin states and to operate in ethnic-minority states, including in Shan, Rakhine, and Kachin states.</p>
The Prevention and Control of Communicable Diseases Law 1995	
Section 8	<p>For prevention of the outbreak of Communicable Disease and effective control of Communicable Disease when it occurs, the public shall, under the supervision and guidance of the Health Officer of the relevant area, undertake the responsibility carrying out the following environmental sanitation measures:</p> <p>(a) in-door, out-door sanitation or inside the fence, outside the fence sanitation;</p> <p>(b) well, ponds and drainage sanitation;</p> <p>(c) proper disposal of refuse and destruction thereof by fire;</p> <p>(d) construction and use of sanitary latrines;</p> <p>(e) Other necessary environmental sanitation measures.</p>
The control of Smoking and Consumption of Tobacco Product Law (2006)	

Laws and Regulations	Description
Section 9	9. The person-in-charge shall: <ul style="list-style-type: none"> (a) Keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations. (b) Arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations. (c) Supervise and carry out measures so that no one shall smoke at the non-smoking area. (d) Accept the inspection when the supervisory body comes to the place for which he is responsible.
The Protection and Prevention of Antique Objective Law, 2015	
Section 12	The person who finds any object which has no owner or custodian, he shall promptly inform the relevant Ward or Village-Tract Administrator if he knows or it seems reasonable to assume that the said object is an antique object.
The Factories Act , 1951	
This act contains the provisions for chemicals management and storage. Some chemicals are likely to require permits. It also requires all factories to have proper pollution control measures such as air pollution, sewage and wastewater treatment system.	
The Conservation of Water Resources and Rivers Law, 2006	
The State Peace and Development Council Law enacted this law by Law No. 8/ 2006 on the date of 2 October, 2006. This law covers for all water sources above and underground within boundaries of rivers, creeks, banks and water fronts. Under this law, Ministry of Transport has power to direct for carrying out waterways conservation work, to notify the land boundary as waterfront boundary for bank protection, river-creek improvement and to navigate the vessels in the rivers and creeks with the objectives of:	
<ul style="list-style-type: none"> a) To conserve and protect the water resources and rivers system for beneficial utilization by the public; b) To smooth and safety 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 environmental impact. 	
The Conservation of Antique Objects Law 2016	
The objectives of this law are as follows:	
<ul style="list-style-type: none"> 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. 	
The Forest Law, 1992	
The State Law and Order Restoration Council had enacted the following Law in 3 November, 1992 as Forest Law.	
Chapter II: Basic Principles	3. This Law shall be implemented in accordance with the following basic principles:

Laws and Regulations	Description
	<ul style="list-style-type: none"> a) to implement the forestry policy of the Government; b) to implement the environmental conservation policy of the Government; c) to promote the sector of public co-operation in implementing the forestry policy and the environmental conservation policy of the Government.
Chapter IV: Management of Forest Land	<p>9. The functions and responsibilities of the Forest Department are as follows:-</p> <ul style="list-style-type: none"> a) implementation of the forestry policy of the Government; b) implementation of the plans relating to conservation of water, bio-diversity and environment, sustained yield of forest produce and protection of forest covered land; c) management of forest land in accordance with the provision of this Law; d) submitting proposals to the Minister for the determination, alteration or cancellation of reserved forest, protected public forest and species of reserved trees; <p>Whoever, within a forest land and forest covered land at the disposal of the Government:</p> <ul style="list-style-type: none"> a) is desirous of carrying out any development work or economic scheme shall obtain the prior approval of the MONRAEC.
Chapter XII: Offences and Penalties	<p>40. Whoever commits any of the following acts shall, on conviction be punished with fine which may extend to Kyat 5,000 or with imprisonment for a term which may extend to 6 months or with both:</p> <ul style="list-style-type: none"> a) trespassing and encroaching in a reserved forest; b) pasturing domestic animals or permitting domestic animals to trespass in a reserved forest; c) breaking up any land, clearing, digging or causing damage to the original condition of the land without a permit in a reserved forest; d) causing damage to a water-course, poisoning in the water, using chemicals or explosives in the water in a reserved forest; e) catching animals, hunting or fishing in a reserved forest; f) kindling, keeping, carrying any fire or leaving any fire burning which may set fire to the forests in a reserved forest; h) violating any provision of the rule, procedure, order, directive or notification issued under this Law.
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	<p>15. The Director General shall, with the approval of the Minister:</p> <ul style="list-style-type: none"> a) determine and declare endangered species of wild animal which are to be protected according to the following categories: <ul style="list-style-type: none"> 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;

Laws and Regulations	Description
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.
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 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:	
<ul style="list-style-type: none"> • 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. 	
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.	
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.	
Section 5: The project owner will accept any inspection, anytime, anywhere if it is needed.	
Myanmar Investment Law, 2016	
Section 51	<p>The investor:</p> <ul style="list-style-type: none"> (a) may appoint of any citizen who is a qualified person as senior manager, technical and operational expert, and advisor in his investment within the Union in accordance with the Laws; (b) shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to different level positions of management, technical and operational experts, and advisors; (c) shall appoint only citizens for works which does not require skill; (d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules;

Laws and Regulations	Description
	<p>(e) shall ensure to obtain the entitlements and rights in the labor laws and rules, including minimum wages and salary, leave, holiday, overtime fee, damages, compensation of the workman, social welfare, and other insurance relating to workers in stipulating the rights and duties of employers and employees and occupational terms and conditions in the employment contract;</p> <p>(f) shall settle disputes arising among employers, among workers, between employers and workers, and technicians or staff in the investment in accordance with the applicable laws.</p>
Section 73	The investor shall insure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance businesses within the Union.
The Labour Organization Law 2011	
Section 17 to 22	<p>17. The labour organizations shall have the right to carry out freely in drawing up their constitution and rules, in electing their representatives, in organizing their administration and activities or in formulating their programmes. The Labour Organizations have the right to negotiate and settle with the employer if the workers are unable to obtain and enjoy the rights of the workers contained in the labour laws and to submit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached.</p> <p>18. The labour organization has the right to demand the relevant employer to re-appoint a worker if such worker is dismissed by the employer and if there is cause to believe that the reasons of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour laws.</p> <p>19. The labour organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labour organizations.</p> <p>20. In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labour laws, the representatives of the labour organization also have the right to participate and discuss.</p> <p>21. The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.</p> <p>22. The labour organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accord with their procedure, regulations, by-laws and any directives prescribed by the relevant Labour Federation.</p>
The Labour Dispute Law 2012	
Section 38	No employer shall fail to negotiate and coordinate in respect of the complaint within the prescribed period without sufficient cause.
Section 39	No employer shall alter the conditions of service relating to workers concerned in such dispute at the consecutive period before commencing the dispute within the period under investigation of the dispute before the Arbitration Body or Tribunal, to affect the interest of such workers immediately.
Section 40	No party shall proceed to lock-out or strike without accepting negotiation, conciliation and arbitration by Arbitration Body in accord with this law in respect of a dispute.
Section 51	If any employer, in the course of settlement of dispute, commits any act or

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	omission, without sufficient cause, which by causing a reduction in production resulting so as to reduce the workers' benefits shall be liable to pay full compensation in the amount determined by the Arbitration Body or Tribunal. Such money shall be recovered as the arrear of land revenue.
The 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.	
Section 4	Every employee who has completed a period of twelve months continuous service shall be granted earned leave with average wages or average pay for a period of ten consecutive days by his employer during the subsequent period of twelve months.
The Minimum Wage Law, 2013	
Section 12	<p>The employer:</p> <ul style="list-style-type: none"> (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law; (b) may pay more than the minimum wage stipulated under this Law; (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law; (d) shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker; (e) in paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.
Section 13(a) to (g)	<p>The employer:</p> <ul style="list-style-type: none"> (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers; (b) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly; (c) shall report the lists, schedules and documents prepared and maintained under subsection(b) to the relevant department in accord with the stipulations; (d) shall accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit; (e) shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances; (f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations;

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	(g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.
Payment of Wages Act 2016	
Section 3	<p>The employer must...</p> <p>(a) Pay in local currency or foreign currency recognized by the Central Bank of Myanmar. This may be in cash, check or deposit into the bank account of Employee.</p> <p>(b) Moreover, pay can be in the means of...</p> <p>(1) Totally in cash OR half the cash and half in things set according to the local price to those employees working in trade, manufacturing and service sectors.</p> <p>(2) Totally in cash OR half the cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors. But, this must be for the sake of the employees and their families. And, it also must be reasonable/fair.</p> <p>(3) An employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.</p>
Section 4	<p>An employer must pay for...</p> <p>(a) Part-time, daily, weekly or other part-time job, temporary or piecework when the work is done OR at the agreed time.</p> <p>(b) According to the Article (a), the time frame shall not exceed one month.</p> <p>(c) Wages for the permanent work must pay per monthly basis. If so...</p> <p>(1) Must pay at the end of the payment period when there are not more than 100 workers.</p> <p>(2) If there are 100 workers and above, pay must not be administered later than 5 days after the end of the payment period.</p> <p>(d) Upon termination, wages must be paid within 2 days from the date of termination.</p> <p>(e) If a resignation letter is submitted, wages must be paid at the ending day of the payment period.</p> <p>(f) If an employee dies, wages must be paid to the legally recognized heir within 2 working days after the day he/she has died.</p> <p>(g) All wages must be paid during the working day.</p>
Section 5	<p>If the owner encounters difficulty to pay the wages according to Section 4 sub-section (c) because of significant happenings, including natural disaster, the employer must report to the Department with solid evidence that wages will be paid at the mentioned day upon the workers' agreement.</p>
Section 7	<p>The Employer...</p> <p>(a) Can deduct from wages for absences except when such absence is during a public holiday or entitled leave, according to the law.</p> <p>(b) Accommodation charges and transportation charges, meal allowances, charges for water and electricity, taxes and errors in payment shall be allowed for deduction.</p> <p>(c) Can deduct from pre-issued, expensed and saved (or) contributed amount according to the law upon the employee contract.</p> <p>(d) The Employer can deduct with the judgment of the Court of Arbitrator Jury Council.</p>

Laws and Regulations	Description
Section 8	The Employer cannot deduct except the deduction in accordance with Section 7 and Section 11.
Section 9	The total amount of other deductions, except when the employee fails to perform their duties, shall not be more than 50% of the employee's wages.
Section 11	Employers shall fine for the following actions or performance failure by the employees... (a) Direct damage which is either intentional or due to negligence or due to the failure of the employee concerned with company property to take proper care. (b) A breach of the employment contract or breach of any rules for which a fine had been previously set.
Section 14	If an Employee carries out overtime work, he/she must be allowed the presiding overtime rate as set by the Law.
Employment and skill Development Law 2013	
Chapter 5	The skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.
Chapter 14	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.
Section 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%;
Section 30(b)	Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.
The Social Security Law 2012	
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) industries which carry out business whether or not they utilize mechanical power or a certain kind of power, businesses of manufacturing, repairing and servicing, or engineering businesses, factories, warehouse-es and establishments; (ii) Government departments, Government organizations and regional administrative organizations which carry out business; (iii) development organizations; (iv) financial organizations; (v) companies, associations, organizations, and their subordinate departments and branch offices which carry out business; (vi) shops, commercial establishments, public entertaining establishments; (vii) Government departments and Government organizations which carry out 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) constructions carried out for a period of one year and above under employment agreement; (ix) businesses carried out with foreign investment or citizen investment

Laws and Regulations	Description
	<p>or joint ventured businesses;</p> <p>(x) businesses relating to mining and gem contained in any existing law;</p> <p>(xi) businesses relating to petroleum and natural gas contained in any existing law;</p> <p>(xii) ports and out-ports contained in any existing law;</p> <p>(xiii) businesses and organizations carried out with freight handling workers;</p> <p>(xiv) Ministry of Labour and its subordinate departments and organizations;</p> <p>(xv) establishments determined by the Ministry of Labour, from time to time, that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law in co-ordination with the Social Security Board and with the approval of the Union Government;</p>
Section 15 (a)	<p>The following funds are included in the Social Security Fund:</p> <p>(i) health and social care fund;</p> <p>(ii) family assistance fund;</p> <p>(iii) invalidity benefit, superannuation benefit, and survivors' benefit fund;</p> <p>(iv) unemployment benefit fund;</p> <p>(v) other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of Labour, in co-ordination with the Social Security Board, under clause (ii) of sub-section (e) of section 13;</p> <p>(vi) other social security fund stipulated that contribution may be paid after voluntary registration under clause (ii) of sub-section (e) of section 13;</p> <p>(vii) Social Security Housing Plan fund;</p>
Section 18 (b)	<p>The employer shall deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund. The employer shall also incur the expense for such contribution;</p>
Section 48	<p>(a) The employer shall effect insurance by registering at the relevant township social security office in order to get employment injury benefit by the workers applied to provisions of compulsory registration for employment injury benefit insurance system contained in section 45 and by paying contribution to employment injury benefit fund in accord with the stipulations;</p> <p>(b) The employers may effect insurance by registering voluntarily for the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system and by paying stipulated contribution to employment injury benefit insurance fund;</p> <p>(c) When registering to effect insurance for employment injury benefit under sub-sections (a) and (b), the worker shall submit medical certificate.</p>
Section 49	<p>The employers and insured of establishments where the employer had registered compulsorily under sub-section (a) of section 48 or where the employer had registered voluntarily under sub-section (b) of section 48 who have paid contribution to employment injury benefit fund shall not apply to the provisions contained in the Workmen's Compensation Act in respect of</p>

Laws and Regulations	Description
	the employment injury benefit; (b) The insured who has effected insurance for employment injury benefit under sub-sections (a) and (b) of section 48 shall only be entitled to employment injury benefits contained in this Law.
Section 75	<p>The employers of establishments applied by this Law:</p> <p>(a) shall prepare and keep the following records and lists correctly and submit to the relevant township social security office in accord with the stipulations:</p> <ul style="list-style-type: none"> (i) records and lists of workers' daily attendance; (ii) records on appointment of new workers, employing worker by changing of work, termination, dismissal and resignation; (iii) records on promotion and paying remuneration ; (iv) records and lists of employer, manager, and administrator and records on change of them; <p>(b) shall inform the relevant township social security office if the following matters arise:</p> <ul style="list-style-type: none"> (i) changes in number of workers and address of establishment; (ii) change of employer, change of business, suspension of work, and close-down of work; (iii) employment injury, decease and contracting diseases; <p>(c) shall submit records of work and lists if requested by inspectorate or official assigned by the Social Security Head Office and various levels of Regional Social Security Office under this Law.</p>
Workers Compensation Act 1951	
To compensation to workers for injuries arising out of or in the course of their employment, and for other purposes	
Factory Act 1951	
To follow occupational health and safety.	
Myanmar Fire Services Law 2015 (Law related to fire fighters -Pyidaungsu Hluttaw Law No. 11/2015)	
Section 25	<p>The Factory, Bus Station, Airport, Jetty, Hotel, Motel, Guest-house, Collective-owned Building, Market, Department of Employment, Organization and fire in critical business owner or any other management who are under with the instructions of fire department in accordance-</p> <p>(a) Not failure to form exclusively fire brigade.</p> <p>(b) Not failure to carry of some equipment for fire safety.</p>
Public Health Law 1972	
Section 3	<p>Aim of the law:</p> <p>(a) To develop private health care services in accordance with the national health policy.</p> <p>(b) To participate and carry out systematically by private health care services in the national health care system as an integral part</p> <p>(c) To enable utilization effectively the resources of private sector in prThe suties and powers of the oviding health care to the public</p> <p>(d) To enable the public to choose as desired in fulfilling their needs for health by establishing private health care services</p> <p>(e) To enable provision of quality service at fair cost and to take responsibility</p>

Laws and Regulations	Description
Section 5	Duties and powers of the Central Body area.
The Protection and Prevention of Communicable Disease Law, 1995	
This law states that all persons are responsible for reporting an outbreak of a communicable disease to the nearest Health Officer.	
Section 3	In order to prevent the outbreak of Communicable Diseases, the Department of Health shall implement the following project activities:- (a) immunization of children by injection or orally; (b) immunization of those who have attained majority, by injection or orally, when necessary; (c) carrying out health educative activities relating to Communicable Disease.
Section 4	When a Principal Epidemic Disease or a Notifiable Disease occurs:- (a) immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof; (b) the public shall abide by the measures undertaken by the Department of Health under sub-section (a).
Section 9	The head of the household or any member of the household shall report immediately to the nearest health department or hospital when any of the following events occurs:- (a) rat fall (b) outbreak of a Principal Epidemic Disease; (c) outbreak of a Notifiable Disease.
Section 11	In order to prevent and control the spread of a Principal Epidemic Disease, the Health Officer may undertake the following measures:- (a) investigation of a patient or any other person required; (b) medical examination; (c) causing laboratory investigation of stool, urine, sputum and blood samples to be carried out; (d) causing investigation by injection to be carried out; (e) carrying out other necessary investigations.
Control of smoking and consumption of Tobacco product law 2006	
Section 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;
Section 9	The person-in-charge shall:

Laws and Regulations	Description
	<ul style="list-style-type: none"> (a) Keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations. (b) Arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations. (c) Supervise and carry out measures so that no one shall smoke at the non-smoking area. (d) Accept the inspection when the supervisory body comes to the place for which he is responsible.
The Protection and Preservation of antique objects law 2015	
Section 12	The person who finds any object which has no owner or custodian, he shall promptly inform the relevant Ward or Village-Tract Administrator if he knows or it seems reasonable to assume that the said object is an antique object.
The Protection and Preservation of ancient monuments law 2015	
Section 12	If a person who finds an ancient monument of over one hundred years old and above or under the ground or above or under the water which has no owner or custodian knows or it seems reasonable to assume that the said monument is an ancient monument, he shall promptly inform the relevant Ward or Village-Tract Administrative Office.
Section 15	<p>A person desirous of any of the followings within the specified area of an ancient monument shall apply to get prior permission to the Department:</p> <ul style="list-style-type: none"> (a) extending towns, wards and villages; (b) constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence; (c) digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment; (d) connecting underground electric cable, communication cable and other underground works; (e) digging or extending wells, lakes, cannels and ponds; (f) gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearth sand, removing the mounds and hills which can damage the physical feature of the land (g) placing and fencing ancient monuments in a private compound and area; (h) constructing a building which is not consistent with the terms and conditions stipulated according to the region by the Ministry near and at the surrounding of an ancient monument.
Section 20	<p>No one shall carry out any of the following acts which is assumed to cause damage to an ancient monument within the specified area of an ancient monument or of a listed ancient monument without a written prior permission:</p> <ul style="list-style-type: none"> (a) taking photo, video, film or copying and modeling an ancient monument stipulated as a listed ancient monument for commercial purposes; (b) using machines which causes vibration within the specified place of an

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	<p>ancient monument and running various types of vehicles</p> <p>(c) cultivating, gardening, breeding, fencing by blocking nearby an ancient monument or doing any other act which can affect an ancient monument;</p> <p>(d) emission of gas such as hot-air balloon which can affect an ancient monument;</p> <p>(e) landing and taking off and, flying aeroplane and helicopter which can directly or indirectly affect an ancient monument</p> <p>(f) discarding chemical substance and rubbish which can affect an ancient monument and the environment.</p>

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.

Section 13	<p>A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulations to obtain prior permission under this Law</p> <p>(a) within the ancient monumental zone or the ancient site zone:-</p> <ol style="list-style-type: none"> (1) constructing or extending a building; (2) renovating the ancient monument or extending the boundary of its enclosure; <p>(b) within the protected and preserved zone, constructing, extending, renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure;</p> <p>(c) within the cultural heritage region:-</p> <ol style="list-style-type: none"> (1) carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original ancient workmanship; (2) carrying out archaeological excavations; (3) building road, constructing bridge, irrigation canal and embankment or extending the same.
Section 22	<p>No person shall construct a building which is not in conformity with the conditions prescribed region wise by the Ministry of Culture in the cultural heritage region.</p>

The Myanmar Assurance Law 1993

Section 15	<p>Owners of motor vehicles shall effect compulsory Third Party Liability Insurance with the Myanmar Insurance.</p>
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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.

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

Laws and Regulations	Description
	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.
Section 16	An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may cause pollution to the environment shall effect compulsory General Liability Insurance with the Myanmar Insurance.
Myanmar Engineering council 2013	
Section 20	If the holder of a technological degree or technological diploma, conferred by any engineering university, any technological university, any technological college or any technological institute within the country or abroad, wishes to obtain a registered graduate technologist certificate or a registered technician certificate, he shall apply to the council in accordance with the stipulations.
Section 24	<p>(a) A registered technician certificate holder may apply to the council in accordance with the stipulations to obtain a registered graduate technologist certificate upon the specified period having elapsed;</p> <p>(b) The executive committee shall, on behalf of the council, issue a registered graduate technologist certificate to a registered technician who has passed the examination held by the council in the respective specialized engineering subject and who meets the specified qualifications of a registered graduate technologist, and fix the terms and conditions of the registration.</p>
Section 25	<p>(a) A registered graduate technologist certificate holder may apply to the council in accordance with the stipulations to obtain a registered engineer certificate upon the specified period having elapsed.</p> <p>(b) The executive committee shall, on behalf of the council, issue a registered engineer certificate to a registered graduate technologist who has passed the examination held by the council in the respective specialized engineering subject and who meets the specified qualifications of a registered engineer, and fix the terms and conditions of the registration.</p>
Section 31(a)(b)	<p>(a) If a foreign engineer who meets the requirements applies to the council for issuance of a registered limited engineer certificate, the executive committee shall, on behalf of the council, fix the permitted engineering subjects, the permitted status, the permitted region, the permitted time and other terms and conditions and issue, upon payment of the registration fee and the annual fees, the registered limited engineer certificate.</p> <p>(b) If a foreign registered professional engineer who meets the requirements in accordance with the ASEAN Mutual Recognition Arrangement on Engineering Services applies to the council for issuance of a registered limited professional engineer certificate, the executive committee shall, on behalf of the council, fix the permitted engineering subjects, the permitted status, the permitted region, the permitted time and other terms and conditions and issue, upon payment of the registration fee and the annual fees, a registered limited professional engineer certificate.</p>
The Protection of wildlife and conservation of natural areas law 1994	
Section 36 (c)	Whoever commits any of the following acts shall, on conviction be punished

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	with imprisonment for a term which may extend to 5 years or with fine which may extend to kyats 30,000 or with both:- destroying ecosystem or any natural state in the natural area;
Section 37 (a)	Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 7 years or with fine which may extend to kyats 50,000 or with both:-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;

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,
- 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.

Prevention from Danger of Hazardous Chemical and Associated Material Law (Pyidaungsu Hluttaw Law No 28/2013)

Section 8	<p>The duty and powers of the central supervising team are as follows:</p> <ol style="list-style-type: none"> (a) Supervising and directing whether the chemical and associated materials produced by the chemical and associated materials business are in compliance with the standard norm or not; (b) Forming and specifying the duty and responsibility of the supervising teams of the region, the state, the union territory, self-administered division, self-administered region, district or township, with the consent of central body; (c) Specifying safety rules and regulations in connection with the chemical and associated materials businesses; (d) Advising the central body the names of the chemical and associated materials which should be amended or supplemented or abolished from the list of the national level chemical and associated materials; (e) Carrying out the educating work in the permitted and used chemical
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Laws and Regulations	Description
	<p>and associated materials for transporting, keeping, buying, distributing, selling, storing, using and disposing systematically;</p> <p>(f) Attending local and foreign trainings for keeping and using the safety devices and personal protective equipment systemically, in order to prevent and alleviate occurring of accidents with respect to chemical and associated materials;</p> <p>(g) Specifying rules and regulations relating to the transporting, storing, using and disposing methods for the chemical and associated materials;</p> <p>(h) Prohibiting the importing and exporting of deterred chemical and associated materials or the equipment utilized for these materials, in accord with the international agreement;</p> <p>(i) Specifying regulations and inspecting whether the specified regulations are followed or not in connection with the vapor, liquid, oil and solid waste emitted from chemical and associated materials businesses, destroying, dumping, disposing of damaging or expired chemical and associated materials;</p> <p>(j) Issuing or refusing the recommendation for transit trading from the country, importing or exporting the chemical and associated materials;</p> <p>(k) Specifying danger level and danger types of the chemical and associated materials;</p> <p>(l) Specifying the regulation for license and registered certificate;</p> <p>(m) Performing the duty and responsibilities assigned by the central body.</p>
Section 15	<p>Before doing the business for the relevant chemical and associated materials, the license holder:</p> <p>(a) Shall be inspected by the relevant supervising team and inspecting team for the safety and endurance of the equipment;</p> <p>(b) The persons, who are discharging the duty shall be asked to attend the relevant foreign training or for the trainings for prevention from the danger of chemical and the associated materials conducted by the government department and organizations.</p>
Section 16	<p>The license holders:</p> <p>(a) Shall follow the principles contained in the license;</p> <p>(b) Shall follow the directives for safety in handling the chemical and associated materials and shall ask the workers to follow strictly ;</p> <p>(c) Shall keep the necessary safety equipment sufficiently in the chemical and associated materials business and shall issue personal protective equipment and clothing to the workers free of charge;</p> <p>(d) Shall give the course to use personal protective equipment and clothing systematically, to give the training and shall instruct as necessary the chemical and associated materials business;</p> <p>(e) In respect of whether affecting the danger to the health of man and animals, environment or not, shall be examined by the relevant supervising teams and inspection teams;</p> <p>(f) Shall give the medical check-up to the workers who shall do the chemical and associated material business and shall allow to working in the said business if they have the recommendation to fit for the health. Shall keep the records of the medical check-up of them systematically;</p> <p>(g) If the dangerous chemical and associated materials are allowed to</p>

Laws and Regulations	Description
	<p>store, shall give the copy of the permit to the relevant township general administration department;</p> <p>(h) If the business is prone to the fire hazard using inflammable materials or explosives, the prior consent, directive of the relevant fire service department must be taken;</p> <p>(i) Shall transport the allowed amount in accord with the stipulations upon transporting the chemical and the associated materials in the country;</p> <p>(j) Shall get the approval of the central supervising body if the chemical and the associated materials are transported from the permitted region to any other region;</p> <p>(k) Shall follow to abide by the law relating to the environment in order not to impact the environment in doing the chemical and the associated materials business.</p>
Section 17	The license holder shall keep the insurance in accord with the stipulations to pay for the compensation if any loss occurred to man and animals or environment in respect of the chemical and associated materials business.
Section 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.
Section 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.
Section 23	<p>The registered certificate holder:</p> <p>(a) Shall apply again to the central supervising body to register if he wants to use the chemical in the associated materials which are not contained in the registered list;</p> <p>(b) Shall inform to the central supervising body if he does not want to use the chemical in the associated materials which are contained in the registered list.</p>
Section 27	<p>The license holders shall follow the stipulations of the following items to control, prevent and alleviate the danger relating to the chemical and associated materials:</p> <p>(a) To classify the danger level according to the properties of the chemical and associated materials so as to prevent the danger in advance;</p> <p>(b) To reveal the danger warning sign and safety level certificate;</p> <p>(c) To attend the training for keeping the personal protective equipment and using them systematically to prevent and elevate accident;</p> <p>(d) To carry out in accord with the stipulations in connection with transporting, keeping, storing, using and disposing the chemical and associated materials;</p> <p>(e) Importing or exporting the chemical and associated materials which are prohibited by the central supervising team, the equipment which are used inside the said materials.</p>

The Petroleum Rules (1937) and The Petroleum Act 1934

Production, storage or transportation of oil.

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.

Laws and Regulations	Description
Explosive Substances Act (1908)	
<p>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.</p>	
Myanmar Agenda 21 (1997)	
<p>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.</p>	
<p>The Myanmar Agenda 21 contains guidelines to address the following issues:</p>	
<ul style="list-style-type: none"> • 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)	
<p>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.</p>	
<p>The Myanmar Insurance is established with the following aims:</p>	
<ul style="list-style-type: none"> • 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. 	
The Law On Standardization (2014)	
<p>The objectives of Law on Standardization are as follows:</p>	
<ul style="list-style-type: none"> • to enable to determine Myanmar Standards; • to enable to support export promotion by enhancing quality of production organizations and their products, production processes and services; • to enable to protect the consumers and users by guaranteeing imports and products are not lower than prescribed standard, and safe from health hazards; • to enable to support protection of environment related to products, production processes and services from impact, and conservation of natural resources; • to enable to protect manufacturing, distributing and importing the disqualified goods which do not meet the prescribed standard and those which are not safe and endangered to the environment; • to support on establishing the ASEAN Free Trade Area and to enable to reduce technical barriers to trade. • to facilitate technological transfer and innovation by using the standards for the development of national economic and social activities in accordance with the national development program. 	
The Science and Technology Development Law (1994)	

Laws and Regulations	Description
	<ul style="list-style-type: none"> • 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	
	<p>“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”.</p>
Section 19	
Section 23 (b) (c)	
Section 80(a)(b) (d)	
Section 83	
Law Amending the Territorial Sea and Maritime Zone Law (2008)	
	<p>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.</p>
Conservation of Water Resources and Rivers Law (2006)	
	<p>Section 6 outlines prohibitions for the following activities:</p>
	<ul style="list-style-type: none"> • “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.”
	<p>The aims of this Law are as follows:</p>
	<ul style="list-style-type: none"> • 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.
	<p>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.</p>
Myanmar Marine Fisheries law (25 April 1990, amended 1993)	
	<p>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</p>

Laws and Regulations	Description
	Myanmar Marine Fisheries Waters to cause pollution of water or to harass fishes and other marine organisms.”
Section 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.
Section 40	No person shall search for and collect any marine products without a licence.
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.	
Territorial Sea and Maritime Zones law (1977)	
The Union of Myanmar has exclusive jurisdiction for the construction, maintenance or operation of offshore terminals and exclusive jurisdiction to preserve and protect the marine environment, and to prevent and control marine pollution.	
Section 18(d)	
The Petroleum Act (1939) and Rules (1937)	
<p>This act refers that the import, transport or store of any petroleum cannot be made save in accordance to the rules that may be defined by the President of the Union.</p> <p>“All receptacles containing dangerous petroleum shall have a stamped, embossed, painted or printed warning, either on the receptacle itself or, where that is impracticable, displayed near the receptacle, exhibiting in conspicuous characters the words “Petrol” or “Motor Spirit”, or an equivalent warning of the dangerous nature of the petroleum” .</p> <p>It also establishes the needs and exemptions from licenses and authorizes the testing of petroleum by the President of the Union and rules that might issue rules on that regard.</p>	
The Oilfields Act (1918)	
<p>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.</p>	
The Control of Smoking and Consumption of Tobacco Product Law, 2006	
<p>3. The objectives of this Law are as follows;</p> <ol style="list-style-type: none"> (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 Development of Employees and Expertise (Skill), 2013	
<ol style="list-style-type: none"> 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 	

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	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.
	(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

Laws and Regulations	Description
	<p>employment for the workers who are proposed to appoint and working at present.</p> <p>15. The Employer:</p> <p>(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;</p> <p>(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.</p> <p>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%;</p> <p>(b) Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.</p>
<p>Leaves and Holidays Act, 1951</p>	
	<p>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.</p>
<p>The Import and Export Law, 2012</p>	
	<p>7. A person who obtained any license shall not violate the conditions contained in the license.</p>
<p>The Protection of rights of National Race Law, 2015</p>	
	<p>Consists of four bills, as submitted to the legislature; Buddhist Women's Special Marriage Bill, Religious Conversion Bill, Monogamy Bill and Population Control Bill.</p>
<p>The Welfare of Labours of Oilfield Act, 1951 (After notification)</p>	
	<p>The act provide 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.</p>
<p>The Workmen Compensation Act, 1923 (amended 2005)</p>	
	<p>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 3,024 and 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.</p> <ul style="list-style-type: none"> • "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." <p>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.</p> <p>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</p>

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	<p>(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.</p> <p>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."</p>
The Settlement of Labour Dispute Law, 2012	
	<p>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.</p>
Labour Organization Law, 2012	
	<p>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.</p>
Minimum Wages Law, 2013	
	<p>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.</p>
Section 12	<p>The employer:</p> <ul style="list-style-type: none"> (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law; (b) may pay more than the minimum wage stipulated under this Law; (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law; (d) shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker; (e) in paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.
Section 13 (a) to (g)	<p>The employer:</p> <ul style="list-style-type: none"> (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers; (b) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly; (c) shall report the lists, schedules and documents prepared and maintained under subsection(b) to the relevant department in accord with the stipulations; (d) shall accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit;

Laws and Regulations	Description
	(e) shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances; (f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations; (g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.
Fresh Water Fisheries Law, 1991	
Section 40	No one shall cause harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries water.
The Motor Vehicles Law, 1993	
Section 40	The Ministry has to implement the following duties with the approval of the Union Government
	(a) Categorizing and defining motor vehicles imported from abroad based on types, manufacturing date and the numbers that can be imported. (b) Defining places in the country where it is allowed to drive based on the types of motor vehicles. (c) Making rules for the transport of goods to or from other countries and for international travellers.

3.2.1

EIA Procedure

The Myanmar EIA Procedure (dated 29 December 2015) set out the requirements for development, assessment and subsequent monitoring of an EIA. The requirements to conduct an EIA are outlined in the Environment Conservation Law (2012) and Environment Conservation Rules (2014). In addition, the EIA Procedures are supported by the draft Administrative Instruction which sets out a proposed format and content for reports.

The full EIA Process undertaken for the Project is shown in *Figure 3.2*. This Project is currently in the EIA Investigation and Reporting Phase which is discussed in detail below.

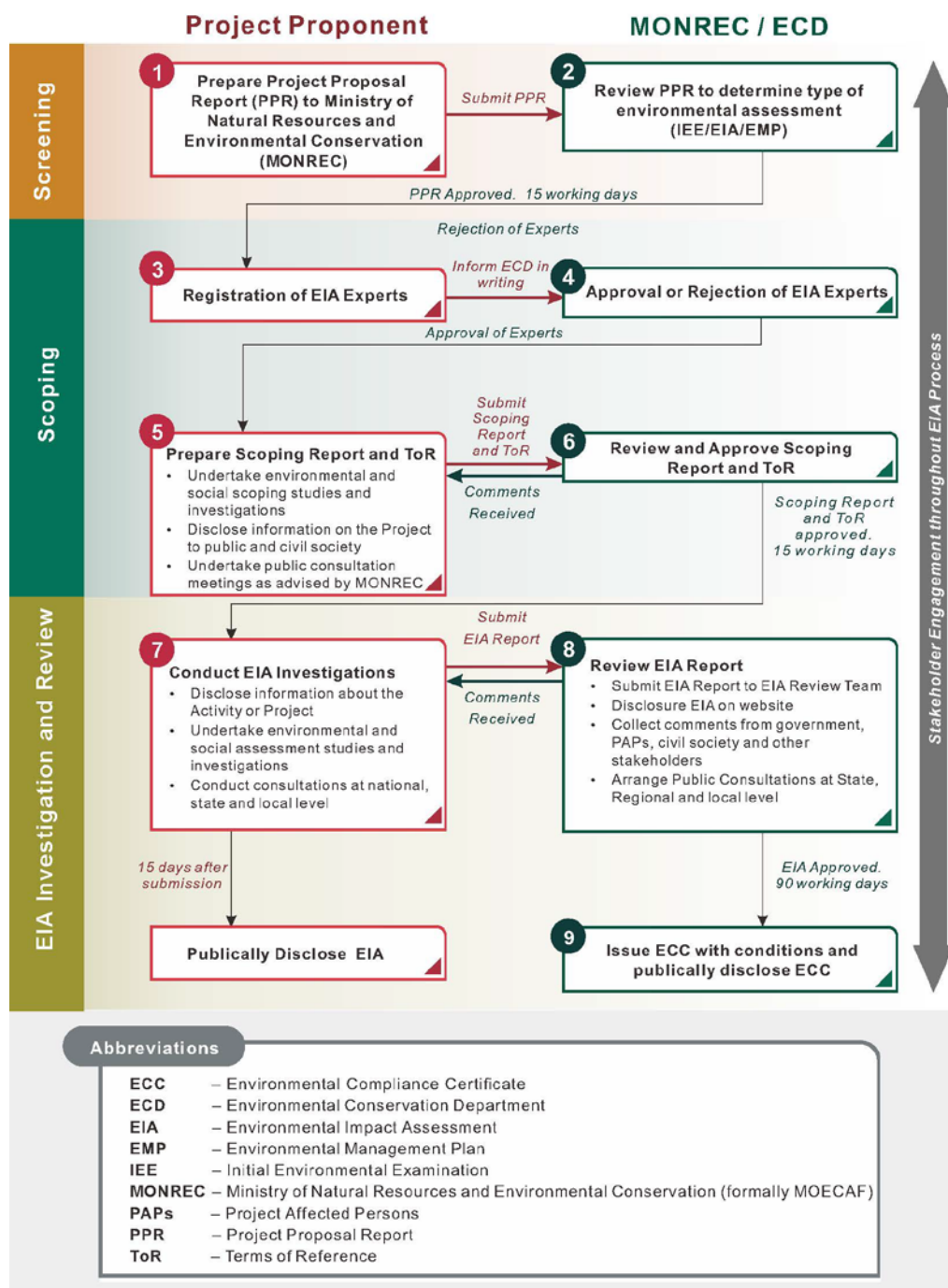
EIA Study and Report Preparation

Pacific Hunt undertook a systematic assessment of the proposed activities. Screening was conducted as part of the assessment to identify all potential environmental risks. A summary of the screening and the preliminary identified environmental and social impacts was submitted to MONREC and MOGE in the form of a Project Proposal Report. MONREC used this document to decide whether the Project required an IEE or an EIA Study would be required. For this Project, an EIA Study was undertaken

After screening, a scoping phase was conducted to further identify the potential impacts of the Project, and likely Project Affected Peoples / Communities and to identify potential mitigation measures. The Scoping Report contained the Terms of Reference for the EIA Report which outlined the scope and studies necessary as part of the EIA Phase.

The subsequent EIA Report (this Report) has been prepared to address all 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. The EIA report will be submitted to MONREC and MOGE.

Figure 3.2 EIA Process in Myanmar



3.2.2

Environmental and Social Standards

With the release of the Myanmar EIA Procedure in December 2015, the National Environmental Quality (Emissions) Guidelines (NEQEG) was also enacted. The NEQEG provide the basis for regulation and control of noise and air emissions and effluent discharges from projects in order to prevent pollution and protect the environment and public health. The NEQEG are noted to be the similar to that recommended by the IFC General EHS Guidelines (2007) (World Bank Group, 2007) and the IFC sector specific 2017 Environmental, health, and safety guidelines for onshore oil and gas development.

Air Emissions / Noise and Vibration

The air and noise emission parameters are taken from *Section 1.1* and *Section 1.3* of the NEQEG and shown in *Tables 3.2* and *3.3* respectively.

Table 3.2 *NEQEG Air Emissions Parameters*

Parameter	Averaging Period	Guideline Value $\mu\text{g}/\text{m}^3$
Dichloromethane	24-hour	3,000
Nitrogen dioxide	1-year 1-hour	40 200
Ozone	8-hour daily maximum	100
Particulate matter PM ₁₀ ^a	1-year 24-hour	20 50
Particulate matter PM _{2.5} ^b	1-year 24-hour	10 25
Sulphur dioxide	24-hour 10-minute	20 500

a PM 10 = Particulate matter 10 micrometres or less in diameter

b PM 2.5 = Particulate matter 2.5 micrometres or less in diameter

Table 3.3 *NEQEG Noise Level Parameters*

Receptor	One hour LAeq (dBA) ^a	
	Daytime 07:00 – 22:00 (10:00 – 22:00 for Public holidays)	Night Time 22:00 – 07:00 (22:00 – 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

^a Equivalent continuous sound level in decibels

NEQEG Effluent Discharge

Requirements on effluent discharges are provided in a sector specific section in the NEQEG. These are detailed in *Table 3.4* for sewage. In addition, the NEQEG requires storm water runoff to be treated through an oil / water separation system able to achieve oil and grease concentration of 10 mg/l.

Table 3.4 *NEQEG on Effluent Discharge Levels for Sewage*

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125
Oil and grease	mg/l	10
pH	S.U. ^a	6-9
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

^a Standard unit

3.3 *INTERNATIONAL STANDARDS, GUIDELINES AND TREATIES/CONVENTIONS RELEVANT TO THE PROJECT*

In addition to national legislation, a range of international standards, including IFC Performance Standards (IFC PS) and the World Bank Guidelines, are applicable to the Project. These standards are set to complement and reinforce national legislation and ensure the Project is conducted under best practices in a way that minimises risks, impacts and ensures compliance and fair practices. The IFC PS and the World Bank Guidelines provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the Project Proponent in relation to project-level activities ⁽¹⁾ ⁽²⁾.

In the case of its direct investments (including project and corporate finance provided through financial intermediaries), the IFC PS require its clients to manage environmental and social risks and impacts so that development opportunities are enhanced.

The applicable guidelines and standards for the Project are as follows:

- IFC Performance Standards (IFC PS) (2012);

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

(2) Environmental, Health and Safety (EHS) Guidelines – General EHS Guidelines: Introduction, April 2007, International Finance Corporation, World Bank Group

- World Bank Group (WBG) Environmental Health and Safety (EHS) General Guidelines (2007);
- WBG EHS Guidelines for Onshore Oil and Gas Development (2007); and
- Relevant international treaties to which Myanmar is a signatory, including those related to waste management, biodiversity conservation as well as labour and human rights conventions.

3.3.1 *International Finance Corporation (IFC) Performance Standards (PS)*

The IFC of the World Bank Group updated its Sustainability Framework in January 2012. This included revising the PS which replaced the previous safeguard policies and will be used to evaluate any project seeking funding through the IFC.

The IFC PS represent the 'policy framework' for the ESIA and sustainable social and environmental management for the Project, whereas the World Bank Group's 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. The relevant IFC PSs are listed in *Table 3.5* and the General Guidelines and Onshore Oil and Gas Guidelines are detailed in *Table 3.6* and *Table 3.7*, respectively.

3.3.2 *International Finance Corporation (IFC)/World Bank Environmental, Health, and Safety (EHS) Guidelines*

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 and the contents are summarised in *Table 3.6* and *Table 3.7*.

Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. 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 an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

Where different standards are prescribed by the different agencies, the most stringent of the national and international standards will apply to the Project:

"When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less

stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.”

Table 3.5 IFC Performance Standards ⁽¹⁾

Performance Standards	Objectives
<p>Performance Standard 1 –Assessment and Management of Environmental and Social Risks and Impacts</p> <p><i>Underscores the importance of managing social and environmental performance throughout the life of a project (any business activity that is subject to assessment and management).</i></p>	<ul style="list-style-type: none"> • <i>Impact identification and assessment.</i> To identify and assess social and environmental impacts, both adverse and beneficial, in the project’s area of influence. • <i>Mitigation.</i> To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment. • <i>Stakeholder engagement.</i> To ensure that affected communities are appropriately engaged on issues that could potentially affect them. • <i>Effective management.</i> To promote improved social and environment performance of companies through the effective use of management systems.
<p>Performance Standard 2 – Labour and Working Conditions</p> <p><i>Recognises that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers.</i></p>	<ul style="list-style-type: none"> • To promote fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws. • To establish, maintain and improve the worker management relationship. • To promote compliance with national employment and labour laws. • To protect the workforce by addressing child labour and forced labour. • To promote safe and healthy working conditions, and to protect and promote the health of workers.
<p>Performance Standard 3 - Resource Efficiency and Pollution Prevention</p> <p><i>Recognises that increased industrial activity and urbanisation often generate increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level.</i></p>	<ul style="list-style-type: none"> • To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. • To promote more sustainable use of resources, including energy and water. • To reduce project -related GHG emissions.
<p>Performance Standard 4 – Community Health, Safety and Security</p> <p><i>Recognises that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development.</i></p>	<ul style="list-style-type: none"> • To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. • To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimises risks to the Affected Communities.
<p>Performance Standard 5 – Land Acquisition and Involuntary Resettlement</p> <p><i>Outlines that involuntary resettlement refers both to physical displacement</i></p>	<ul style="list-style-type: none"> • To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. • To avoid forced eviction. • To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts

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

Performance Standards	Objectives
<p><i>(relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition</i></p>	<p>from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected.</p> <ul style="list-style-type: none"> • To improve, or restore, the livelihoods and standards of living of displaced persons. • To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.
<p>Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Natural Resources</p>	<ul style="list-style-type: none"> • To protect and conserve biodiversity. • To maintain the benefits from ecosystem services. • To promote the sustainable management of living natural resources through the adoption of practices that integrated conservation needs and development priorities.
<p><i>Recognises that protecting and conserving biodiversity – the variety of life in all its forms, including genetic, species and ecosystem diversity – and its ability to change and evolve, is fundamental to sustainable development</i></p>	
<p>Performance Standard 7 – Indigenous Peoples</p>	<ul style="list-style-type: none"> • To ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples. • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner. • To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. • To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the life of the project. • To ensure the Free, Prior and Informed Consent (FPIC) of the Affected Communities of the IPs when the circumstances described in this Performance Standard are present. • To respect and preserve the culture, knowledge and practices of Indigenous Peoples.
<p><i>Recognises that Indigenous Peoples, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population.</i></p>	
<p>Performance Standard 8 – Cultural Heritage</p>	<ul style="list-style-type: none"> • PS 8 aims to protect the irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations. In addition, the requirements of this PS on a project’s use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. PS 8 recognises the importance of cultural heritage with an objective to: <ul style="list-style-type: none"> • Protect cultural heritage from the adverse impacts of project activities and support its preservation; and • Promote the equitable sharing of benefits from the use of cultural heritage in business activities. • The PS requires the project proponent to comply with relevant national law on the protection of cultural heritage, including national law implementing the host country’s obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage and other relevant international law.
<p><i>Recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities.</i></p>	

Table 3.6 *IFC/World Bank General EHS Guidelines* ⁽¹⁾

Applicable Guideline
General Environmental Guidelines
1. Environment
1.1 Air Emissions and Ambient Air Quality
1.2 Energy Conservation
1.3 Wastewater and Ambient Water Quality
1.4 Water Conservation
1.5 Hazardous Materials Management
1.6 Waste Management
1.7 Noise
1.8 Contaminated Land
General Occupational Health and Safety Guidelines
2. Occupational Health and Safety
2.1 General Facility and Design and Operation
2.2 Communications and Training
2.3 Physical Hazards
2.4 Chemical Hazards
2.5 Biological Hazards
2.6 Radiological Hazards
2.7 Personal Protective Equipment (PPE)
2.8 Special Hazards Environments
2.9 Monitoring
General Community Health and Safety
3.1 Water Quality and Availability
3.2 Structural Safety and Project Infrastructure
3.3 Life and Fire Safety (L&FS)
3.4 Traffic Safety
3.5 Transport of Hazardous Materials
3.6 Disease Prevention
3.7 Emergency Preparedness and Response
General Construction and Demolition Guidelines
4.1 Environment
4.2 Occupational Health and Safety
4.3 Community Health and Safety

(1) Environmental, Health and Safety (EHS) Guidelines – General EHS Guidelines: Introduction, April 2007, International Finance Corporation, World Bank Group.

Table 3.7 IFC/World Bank EHS Guidelines for Onshore Oil and Gas Development ⁽¹⁾

Applicable Guideline	
1.0	Industry-Specific Impacts and Management
1.1	Environment
	- Air Emissions
	- Wastewaters
	- Waste Management
	- Hazardous Materials Management
	- Noise
	- Terrestrial Impacts and Project Footprint
	- Spills
	- Decommissioning-
1.2	Occupational Health and Safety (OH&S)
	- Fire and Explosion
	- Air Quality
	- Hazardous Materials
	- Transportation
	- Well Blowouts
	- Emergency Preparedness and Response-
1.3	Community Health and Safety
	- Physical Hazards
	- Hydrogen Sulfide
	- Security
2.0	Performance Indicators and Monitoring
2.1	Environment
	- Emission and Effluent Guidelines
	- Environmental Monitoring
2.2	Occupational Health and Safety (OH&S)
	- OH&S Guidelines
	- Accident and Fatality Rates
	- OH&S Monitoring

3.3.3 *International Conventions*

Convention on Wetlands of International Importance (Ramsar Convention)

The mission of the Convention is the conservation and wise use of all wetlands through local and national actions and international cooperation, in order to contribute towards achieving sustainable development throughout the world.

The United Nations Convention on Biodiversity 1992

This Convention seeks to conserve biodiversity and promote its sustainable use. It requires the identification and monitoring of the biodiversity in an area and adopting the necessary conservation measure. Myanmar became party to this Convention in 1994.

⁽¹⁾ Environmental, Health and Safety Guidelines for Onshore Oil and Gas Development, April 2007, International Finance Corporation, World Bank Group.

The Basel Convention 1989

This was developed under the auspices of the United Nations Environmental Programme (UNEP) in response to the growing worldwide awareness of the problem of international traffic in hazardous waste. The *Basel Convention 1989* is the first and foremost global environmental treaty that strictly regulates the trans-boundary movement of hazardous wastes. It obligates parties to ensure environmentally sound management, especially during the disposal process.

The objectives of the Convention are to:

- Ensure that waste is disposed of as near as possible to the place or source of its generation;
- Reduce trans-boundary waste and where it cannot be avoided, to be disposed of in an environmentally sound and efficient manner; and
- Provide assistance to developing countries in the management of hazardous waste and the generation.

Labour and Human Rights Conventions

Myanmar as a State party has signed and ratified various international conventions, laws and treaties which are now an obligation for the nation. Below mentioned labour conventions provide a comprehensive framework to fight injustice with the blue collar workforce through preventive measures, law enforcement and international cooperation. Also by agreeing to the land and agriculture related conventions the country is promising its people of their right on the land and to practice agriculture on it.

Table 3.8 *Labour, Land and Human Rights Conventions*

Convention Type	Name of the Convention	Dated
Labour Conventions	Hours of Work (Industry) Convention, 1919	14 Jul 1921
	Unemployment Convention, 1919	14 Jul 1921
	Night Work of Young Persons (Industry) Convention, 1919	14 Jul 1921
	Right of Association (Agriculture) Convention, 1921	11 May 1923
	Weekly Rest (Industry) Convention, 1921	11 May 1923
	Minimum Age (Trimmers and Stokers) Convention, 1921	20 Nov 1922
	Medical Examination of Young Persons (Sea) Convention, 1921	20 Nov 1922
	Workmen's Compensation (Accidents) Convention, 1925	16 Feb 1956
	Workmen's Compensation (Occupational Diseases) Convention, 1925	30 Sep 1927
	Equality of Treatment (Accident Compensation) Convention, 1925	30 Sep 1927

Convention Type	Name of the Convention	Dated
	Inspection of Emigrants Convention, 1926	14 Jan 1928
	Seamen's Articles of Agreement Convention, 1926	31 Oct 1932
	Minimum Wage-Fixing Machinery Convention, 1928	21 May 1954
	Marking of Weight (Packages Transported by Vessels) Convention, 1929	07 Sep 1931
	Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934	17 May 1957
	Holidays with Pay Convention, 1936	21 May 1954
	Convention concerning Statistics of Wages and Hours of Work, 1938 Excluding Parts III and IV	24 Nov 1961
	the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards	15 th July 2013
	Forced Labour Convention, 1930	04 Mar 1955
	Freedom of Association and Protection of the Right to Organise Convention, 1948	04 Mar 1955
Land and Agriculture Conventions	Constitution of the Food and Agriculture Organization	
	Agreement on Agriculture	
	Agreement establishing the International Fund for Agricultural Development	
Human rights Treaties	Convention on the Elimination of All Forms of Discrimination against Women	22 July 1997
	United Nations Convention against Transnational Organized Crime	30 March 2004
	Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, supplementing the United Nations Convention against Transnational Organized Crime Preamble, supplementing the United Nations Convention against Transnational Organized Crime	30 March 2004
	Protocol against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations Convention against Transnational Organized Crime	30 March 2004
	Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others	14 Mar 1956
	Convention on the Rights of the Child	15 Jul 1991
	Freedom of Association and Protection of the Right to Organise Convention	4 Mar 1955
	Convention concerning Forced or Compulsory Labour	4 Mar 1955
	Convention on the Prevention and Punishment of the Crime of Genocide	14 Mar 1956
	Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field	25 Aug 1992
	Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea	25 Aug 1992

Convention Type	Name of the Convention	Dated
	Geneva Convention relative to the Treatment of Prisoners of War	25 Aug 1992
	International Convention for the Suppression of Terrorist Bombing	12 Nov 2001
	International Convention for the Suppression of the Financing of Terrorism	12 Nov 2001
	International Convention for the Suppression of Unlawful Seizure of Aircraft	22 May 1996
	Convention on the Privileges and Immunities of the United Nations	25 Jan 1955

The significance of confirming to the international criminal court is an essential step taken by the country towards universal justice. In a way it has signed in to ensure that no ruler, State or army is an exception to abuse human rights with impunity. Binding to this humanitarian law prohibits Myanmar from torture and other forms of ill treatment to anyone living in the country. The legal principles within the definition of torture have been recognized in previous international treaties, including Geneva Convention. It is mandatory to adopt necessary and corresponding national legislations in conformity with this treaty for Myanmar as a signatory.

This section provides the detailed descriptions of the proposed onshore seismic survey to be conducted across PSC H. Information provided in this section is based on those made available during preparation of this ESIA Report.

4.1 PROJECT BACKGROUND

Pacific Hunt was awarded the PSC of the onshore PSC H by MOGE in 2013. PSC H is located in the Taungoo-Pyinmana area of southern Myanmar covering an area of approximately 25,744 km². It extends from the Myanmar capital, Nay Pyi Taw, in the north and towards the Indaing gas field in the south. The Project Area is detailed in *Figure 2.1* with block coordinates provided in *Table 4.1*. Following the PSC award, Pacific Hunt is planning to undertake Two-Dimensional (2D) seismic exploration survey across PSC H to determine the prospect.

Table 4.1 *Coordinates of PSC H*

Point ID	Latitude	Longitude
1	20° 10' 0.000" N	95° 56' 32.000" E
2	20° 10' 0.000" N	96° 20' 0.000" E
3	19° 50' 0.000" N	96° 20' 0.000" E
4	19° 50' 0.000" N	96° 30' 0.000" E
5	19° 5' 0.000" N	96° 30' 0.000" E
6	19° 5' 0.000" N	96° 40' 0.000" E
7	18° 45' 0.000" N	96° 40' 0.000" E
8	18° 45' 0.000" N	96° 50' 0.000" E
9	18° 20' 0.000" N	96° 50' 0.000" E
10	18° 20' 0.000" N	97° 0' 0.000" E
11	17° 20' 0.000" N	97° 0' 0.000" E
12	17° 20' 0.000" N	96° 0' 0.000" E
13	18° 0' 0.000" N	95° 56' 32.000" E
14	20° 10' 0.000" N	95° 56' 32.000" E

4.2 PROPOSED LOCATION OF SEISMIC SURVEY LINES

Two-Dimensional (2D) seismic survey will be undertaken within PSC H with locations of the 19 survey lines illustrated in *Figure 4.1*. Total length of the lines is approximately 307.7 km. Coordinates of the survey lines are shown in *Figure 4.2*. The seismic survey lines cover Bago, Daik-U, Kyauktaga and Waw townships.

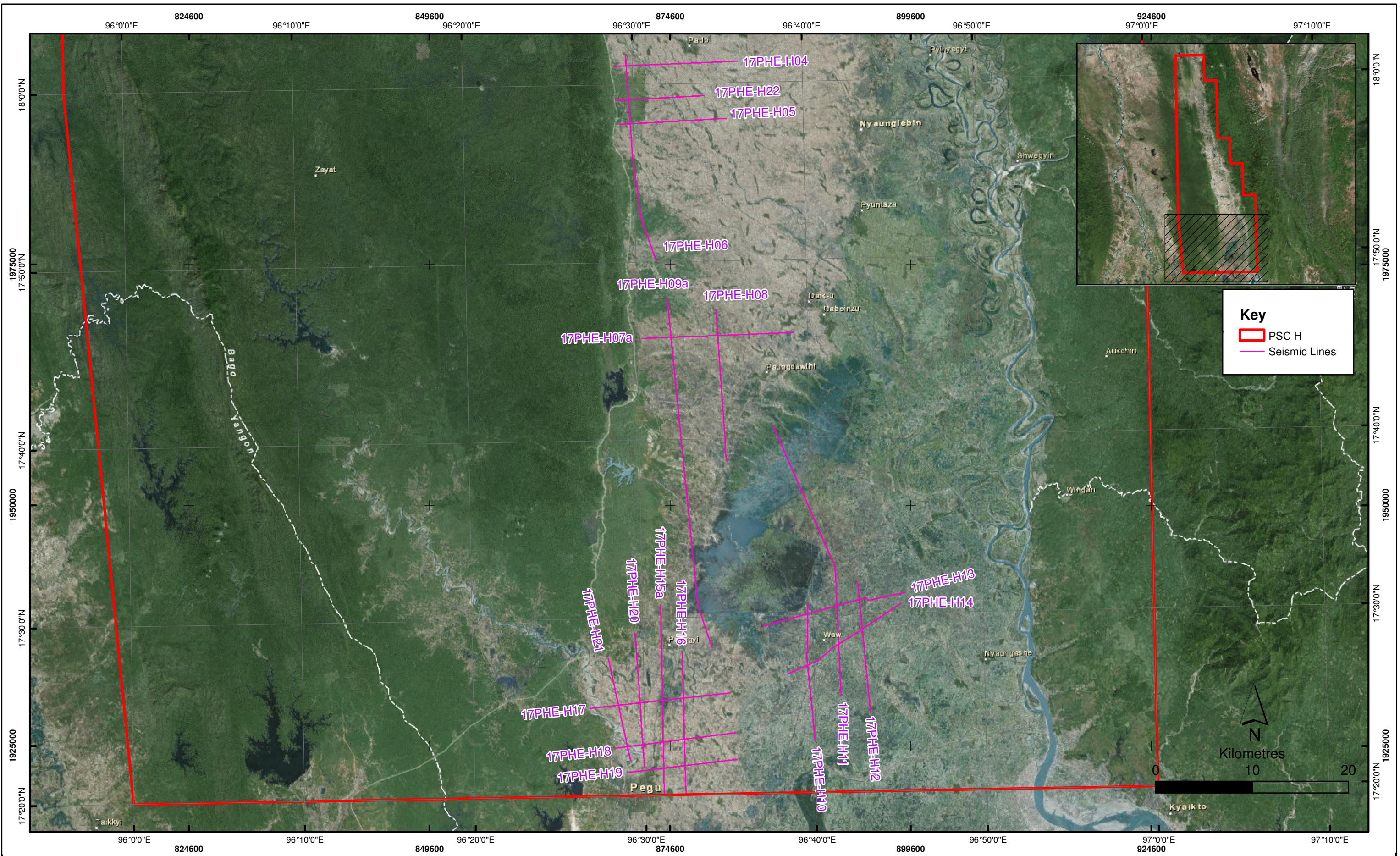


Figure 4.1

Location of Seismic Lines within PSC H

Figure 4.2 Coordinates and Length of the Seismic Survey Lines within PSC H

Block H Seismic Line Name	Block H Seismic Line Path	Latitude	Longitude	Line Length	Area
17PHE-H04	17PHE-H04	18° 1' 4.675548"	96° 28' 52.625064"	12.9	Lead A
17PHE-H04	17PHE-H04	18° 1' 14.330208"	96° 36' 12.356748"		
17PHE-H05	17PHE-H05	17° 57' 48.408156"	96° 29' 10.188780"	11.1	
	17PHE-H05	17° 57' 58.994604"	96° 34' 45.470460"		
	17PHE-H05	17° 58' 0.555636"	96° 34' 53.689548"		
17PHE-H05	17° 58' 0.501312"	96° 35' 27.291768"			
17PHE-H06	17PHE-H06	18° 1' 39.551592"	96° 29' 36.583872"	21.7	
	17PHE-H06	17° 55' 58.056600"	96° 29' 55.305816"		
	17PHE-H06	17° 52' 27.176088"	96° 30' 19.716912"		
	17PHE-H06	17° 50' 4.273260"	96° 31' 11.117460"		
17PHE-H07a	17PHE-H07	17°45'43.89"N	96°30'14.98"E	15.7	
	17PHE-H07	17°45'55.23"N	96°39'8.19"E		
17PHE-H08	17PHE-H08	17° 47' 16.864512"	96° 34' 37.636176"	15.8	
	17PHE-H08	17° 39' 36.337140"	96° 35' 2.703444"		
	17PHE-H08	17° 39' 18.449172"	96° 34' 59.730780"		
	17PHE-H08	17° 38' 45.107844"	96° 35' 6.386424"		
17PHE-H09a	17PHE-H09	17°48'0.35"N	96°31'45.60"E	36.7	
	17PHE-H09	17° 30' 42.391440"	96° 33' 13.312548"		
	17PHE-H09	17° 28' 17.940684"	96° 33' 59.685264"		
17PHE-H10	17PHE-H10	17° 30' 45.113868"	96° 39' 41.394348"	14.6	
	17PHE-H10	17° 30' 10.027080"	96° 39' 38.767608"		
	17PHE-H10	17° 27' 57.807180"	96° 39' 36.083556"		
	17PHE-H10	17° 27' 54.942120"	96° 39' 31.308156"		
	17PHE-H10	17° 22' 53.860872"	96° 39' 57.724164"		
17PHE-H11	17PHE-H11	17° 40' 40.450872"	96° 37' 51.087828"	29.3	
	17PHE-H11	17° 32' 41.925516"	96° 41' 18.819168"		
	17PHE-H11	17° 25' 25.727880"	96° 41' 31.231572"		
17PHE-H12	17PHE-H12	17° 31' 48.598860"	96° 42' 37.310688"	13.6	
	17PHE-H12	17° 24' 27.853992"	96° 43' 12.918648"		
17PHE-H13	17PHE-H13	17° 29' 26.988288"	96° 37' 1.513884"	15.3	
	17PHE-H13	17° 30' 55.587240"	96° 43' 3.972180"		
	17PHE-H13	17° 30' 47.497140"	96° 43' 13.400796"		
	17PHE-H13	17° 31' 11.112672"	96° 45' 21.701520"		
17PHE-H14	17PHE-H14	17° 26' 44.725920"	96° 38' 25.706220"	13.9	
	17PHE-H14	17° 27' 27.760788"	96° 40' 14.216952"		
	17PHE-H14	17° 28' 6.081384"	96° 41' 0.857688"		
	17PHE-H14	17° 30' 34.399656"	96° 45' 7.197876"		
17PHE-H15a	17PHE-H15	17°30'45.64"N	96°31'2.42"E	19.7	
	17PHE-H15	17°20'6.03"N	96°31'4.83"E		
17PHE-H16	17PHE-H16	17°28'6.61"N	96°32'15.10"E	14.8	
	17PHE-H16	17°20'4.51"N	96°32'19.60"E		
17PHE-H17	17PHE-H17	17°25'0.08"N	96°26'47.66"E	14.6	
	17PHE-H17	17°25'44.16"N	96°35'0.94"E		
17PHE-H18	17PHE-H18	17°22'44.45"N	96°28'16.28"E	12.6	
	17PHE-H18	17°23'29.02"N	96°35'20.72"E		
17PHE-H19	17PHE-H19	17°21'21.91"N	96°28'58.14"E	11.4	
	17PHE-H19	17°21'59.13"N	96°35'23.70"E		
17PHE-H20	17PHE-H20	17°29'12.10"N	96°29'31.90"E	14	
	17PHE-H20	17°21'36.47"N	96°29'56.55"E		
17PHE-H21	17PHE-H21	17°27'46.97"N	96°27'55.55"E	10.8	
	17PHE-H21	17°22'2.22"N	96°29'6.88"E		
17PHE-H22	17PHE-H22	17°59'9.96"N	96°28'58.39"E	9.2	
	17PHE-H22	17°59'20.99"N	96°34'10.42"E		
TOTAL LINE KMS				307.7	

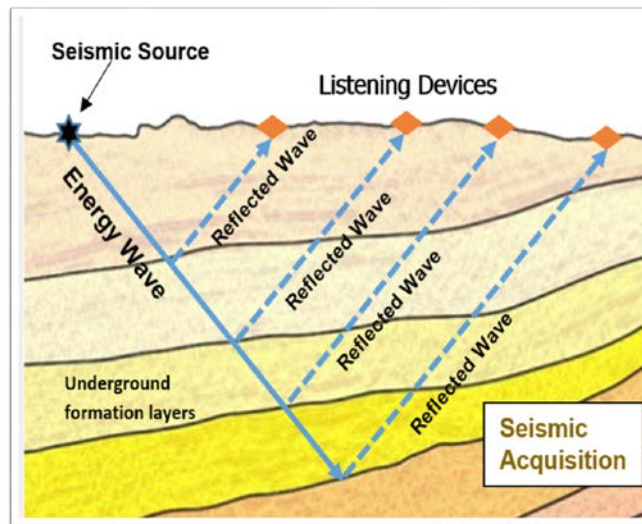
4.3 GENERAL INTRODUCTION OF SEISMIC SURVEY

The surveying of the subsurface geology can be undertaken by seismic survey. A seismic survey uses an acoustic source to direct energy into the ground. Seismic sources generate low to moderate frequency sound waves, generally in the range of 5Hz up to as high as 125Hz that are propagated from the seismic source into the ground. As these sound waves travel through the various layers of rock in the subsurface they are also reflected at the

boundaries between the geologic layers or strata back to the surface where they are recorded into an array of receivers called geophones.

The reflected sound waves, once recorded, can be processed to provide information about the structural shape and composition of the geological formations below the surface. A seismic survey can therefore be used for exploration purposes to identify prospects for hydrocarbon reservoirs, shallow drilling hazards, for engineering purposes to identify competent rock versus weak rock and for research purposes such as study into zones faulted and fractured due to earth movement.

Figure 4.3 Schematic of Single Source Point of a Seismic Survey



Seismic surveying operations can vary in size from a small group of people and light vehicles only through to an operation with many hundreds of personnel and utilizing large vehicles and different types of machinery. The size of the operation depends on the terrain of the area being surveyed and the objectives of the survey especially in terms of depth of penetration of the seismic signal. Seismic operations are a well understood practice used worldwide for over 75 years and have been demonstrated to have minimal impacts on the surrounding environment and community.

Seismic surveys can typically be divided into the following phases:

- Preparation / mobilisation phase;
- Seismic recording
- Close-out phase.

Description of these three phases with details specific to the planned PSC H project are provided in the following sections.

4.4

PROGRAMME

The tentative programme of the proposed seismic survey is presented in *Table 4.2*. It is expected that activities associated with the seismic survey will commence in mid-November for the completion in 180 days.

Table 4.2 *Tentative Programme for the Seismic Survey with PSC H*

Phase	Schedule
Preparation / Mobilisation	Mid-November to mid-December 2017
Seismic Survey	Mid-December 2017 to March 2018
Close-out	April - May 2018

4.5

PREPARATION/MOBILISATION PHASE

During the preparation / mobilisation phase, ownership of land and properties that fall within the land required by the seismic survey programme will be determined. Appropriate engagement and procedures to obtain permission and notify owners to access land to conduct the survey will be performed. According to the seismic survey programme, the required land for the seismic survey will be occupied for no more than six (6) months. If compensation is required for the land occupancy, for example for the base camp, Pacific Hunt will liaise accordingly with the township / district / government as well as the landholders / villages as appropriate on the compensation terms. This will be undertaken during the preparation and mobilisation phase.

A base camp will be constructed on land leased from a local land owner with location shown in *Figure 4.4a*. The base camp is located on developed area with low ecological value (*Figure 4.4b*). The base camp will have room for up to 140 people with waste, toilet and kitchen facilities. The camp will be powered by a 50 kVA generator and a water well with a 155 W pump will supply the water for the camp. This camp may be expanded at a later stage by the seismic survey contractor for other projects with other operator(s) which is not within the scope of this impact assessment.

Road improvement works may be undertaken, however, no new roads are expected to be required as seismic equipment, materials and workers will be transported mostly using existing road, existing river transportation route and facilities along Sittaung River. It is assumed that appropriate drainage facilities will be constructed for the improved road section and for any new roads, though unlikely to be required, should they be constructed (see *Figure 4.5* for example of existing roads, which are often paved for the main road between townships but also included unpaved roads for access to villages).

Given the block location and relatively close proximity to Bago City, it is likely that materials and supplies for the site preparation (i.e. gravel, shale, sand, cement, wood etc.) will be able to be sourced from the city.

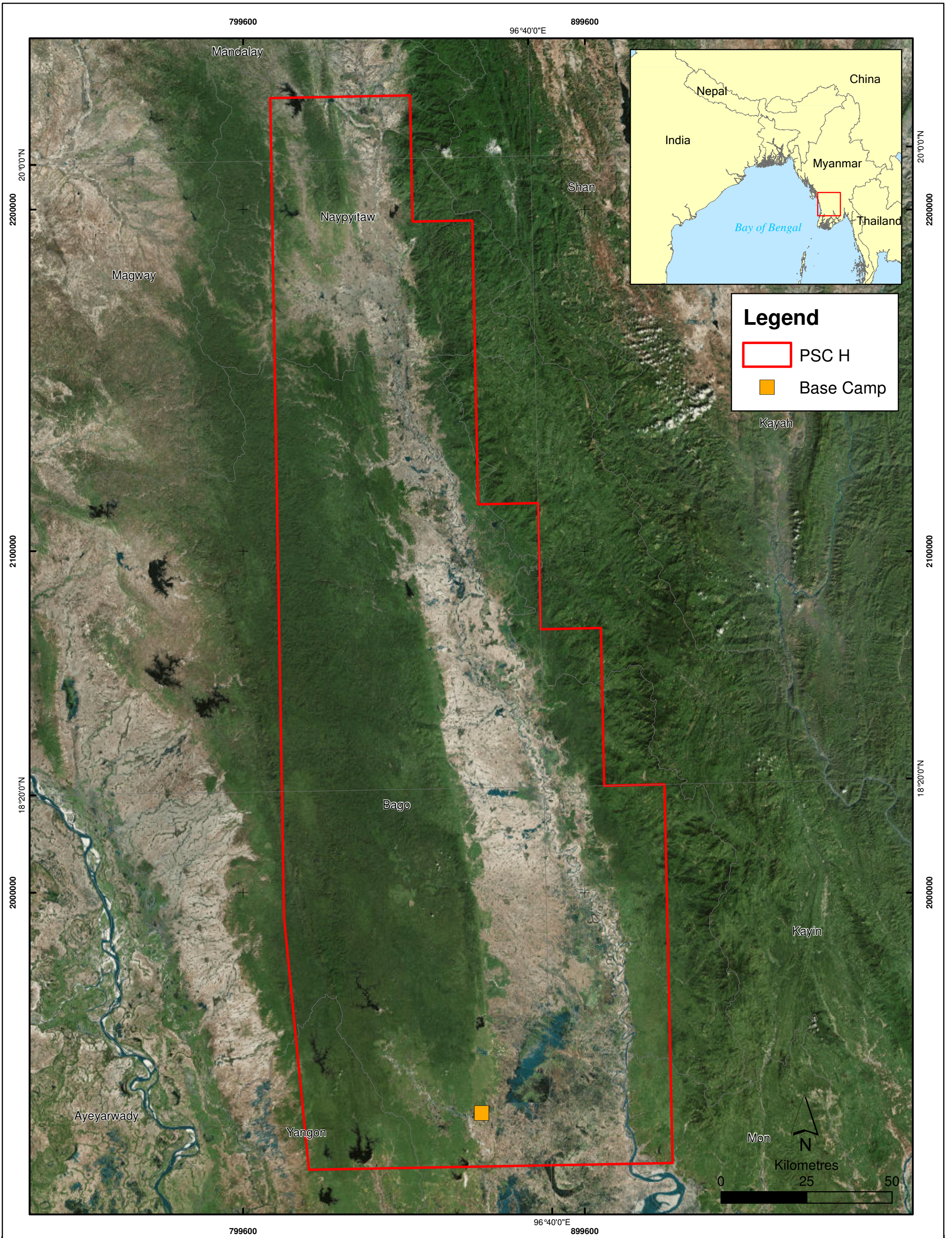


Figure 4.4a

Location of Base Camp within PSC H

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Date: 3/11/2017

Environmental
Resources
Management



Figure 4.4b Layout of Base Camp

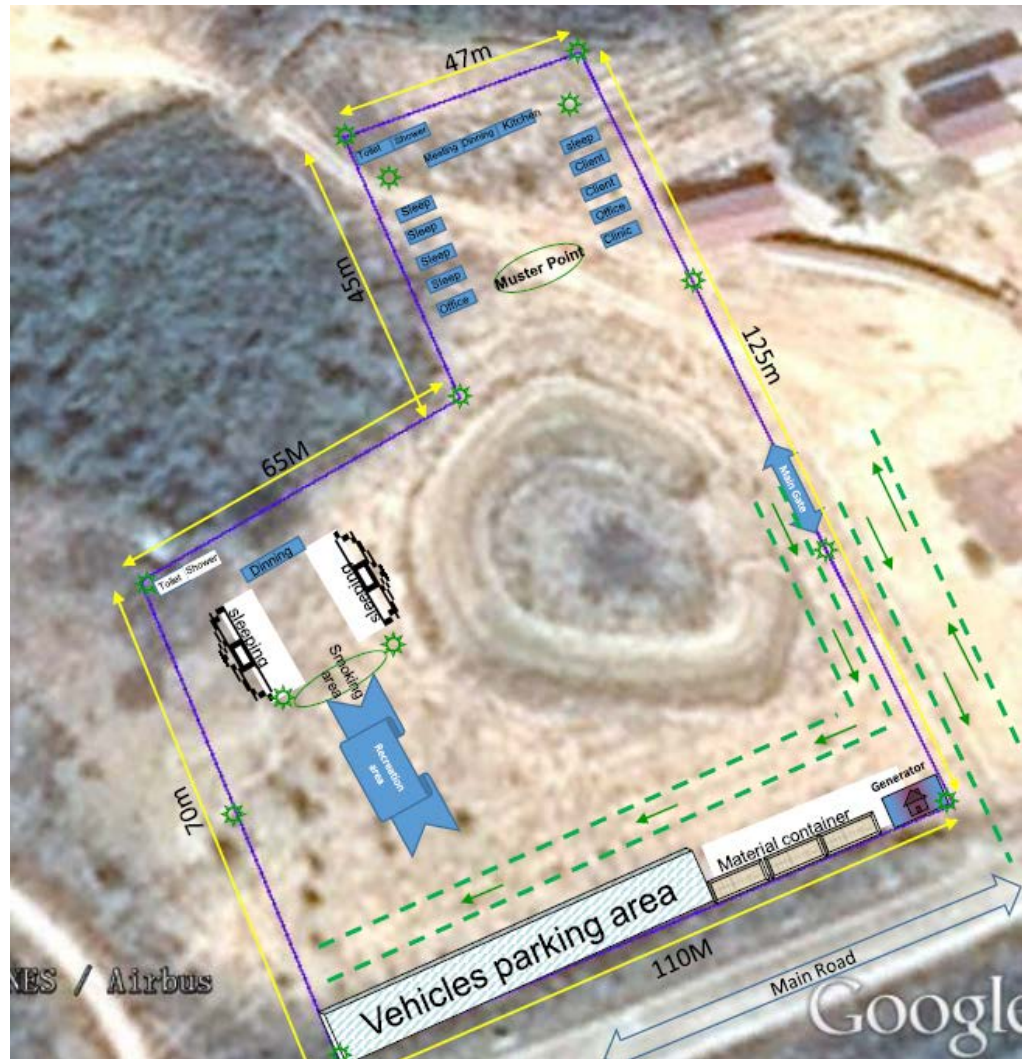


Figure 4.5 Photos showing Condition of Existing Access Road in PSC H



The seismic survey is planned to be undertaken from mid-December 2017 to March 2018 for a period of about 105 days. The principle of seismic survey is illustrated in *Figure 4.3*. Specifications for the seismic survey are shown in *Table 4.3*. During the seismic survey phase, existing roads and tracks will be used for access and for the actual seismic line if suitable. As most of the land the seismic survey is traversing is cultivated land and the survey is will be largely post-harvest there should not be any extensive vegetation clearance. If the land still has crops in it a track for the seismic line will be cut through the crops and compensation paid to the land holder as determined by the compensation committee. A track width of approximately 5m will be sufficient for both vibrator access and receiver line laying.

Table 4.3 *Seismic Survey Specifications*

Parameter	Value
Source Parameters	
Source Type	Vibroseis -Servo-Hydraulic Vibrator
Manufacturer/Model	Sercel - Nomad 65
Peak Force	278kN (62,400lbf)
Hold Down weight	28,294 Kg
Base Plate area	2.64 m ²
Vibrator width	3.5m approx
Vibrator length	10.6m approx
Drive Level	60 - 90%
Sweep Length	6 - 10 seconds (subject to field testing)
Total Source Line Length (km)	307.7 km
Source Interval	12.5 m
Move Ups	1 x 12.5 m
Sweep Frequency	5 - 70/80 Hz (subject to field testing)
Sweep Types	Linear
Start Taper/End Taper	300 msec
Receiver Parameters	
Receiver Type	Geophone SG-10 plant on or just below surface
Receiver Interval	25m, 12 geophones linear ar 2.08m spacing
Receiver Configuration	Split Spread, no gap
Active Receiver per record	402 minimum live
Total Receiver Line Length (km)	307.7 km
Minimum Offset	6.25mm
Maximum Offset	5012.5m (Minimum Maximum offset)
Record Length	6s

4.6.1

Seismic and Acoustic Sources

Vibroseis will be used as the source for the seismic survey.

Vibroseis is the name for a seismic energy source used in exploration for minerals, oil and gas and general geophysical studies of the subsurface.

In a Vibroseis survey, specially designed vehicles lift their weight onto a plate, in contact with the ground, which is then vibrated over a period of time (typically 6-14 seconds), through a sweep of frequencies.

Vibroseis was originally developed by Conoco Corporation during the late 1950's and the methodology has become the main non-explosive seismic source used on land world wide. It is a surface energy source and has the advantage that the low energy level reduces the instantaneous energy imparted into the earth. This feature makes it possible for Vibroseis to be used in areas where dynamite would be unacceptable.

Equipment

All receiver equipment, geophones, cables, line boxes and recording instrument, are identical on a Vibroseis survey to those used on an impulsive source survey. The additional equipment as on a Vibroseis survey are a Vibrator, usually mounted on a truck or buggy and additional electronic equipment of a vibrator controllers in each Vibroseis truck, sweep generator and a correlator with the recording instrument.

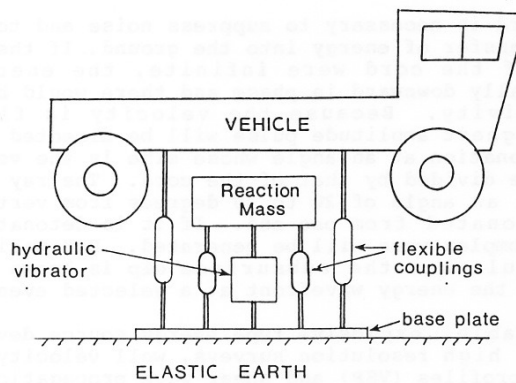
The Vibrator

Figure 4.6 shows a modern vibrator in a desert environment ready to begin sweeping. The vibrator mechanism is in the centre of the vehicle directly above the pad with a diesel engine mounted above the rear wheels driving the hydraulics for the vibrator. The vibrator hydraulics drive the vibrator to oscillate the reaction mass to follow the programmed sweep sent from the sweep generator. The oscillatory movement of the reaction mass imparts those oscillations to the base plate and thus the earth.

Figure 4.6 A Buggy Mounted Vibrator with Pad Down Ready to Sweep



Figure 4.7 Schematic of the Vibrator Mechanism



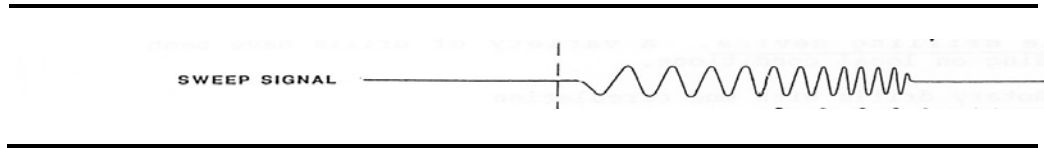
The Sweep

The sweep programmed into the sweep generator is commonly a sinusoid waveform that starts at a low frequency and then increases in frequency progressively over the length of the sweep. A modern vibrator will commonly start as low as 5 Hz and progress (sweep) to as high as 80 or 90 Hertz over a period of 6-12 seconds.

The sweep energy penetrates the earth and is refracted and reflected back from the geologic boundaries in exactly the same way that an impulsive source would be but over a dispersed time period rather than as an

instantaneous impulse. The data received by the geophones and recorded initially by the recording instrument is known as uncorrelated data. Because the energy of a vibrator is imparted over an extended time period the instantaneous energy is much less than an impulsive (explosive) source.

Figure 4.8 *A Stylised Sweep Signal*

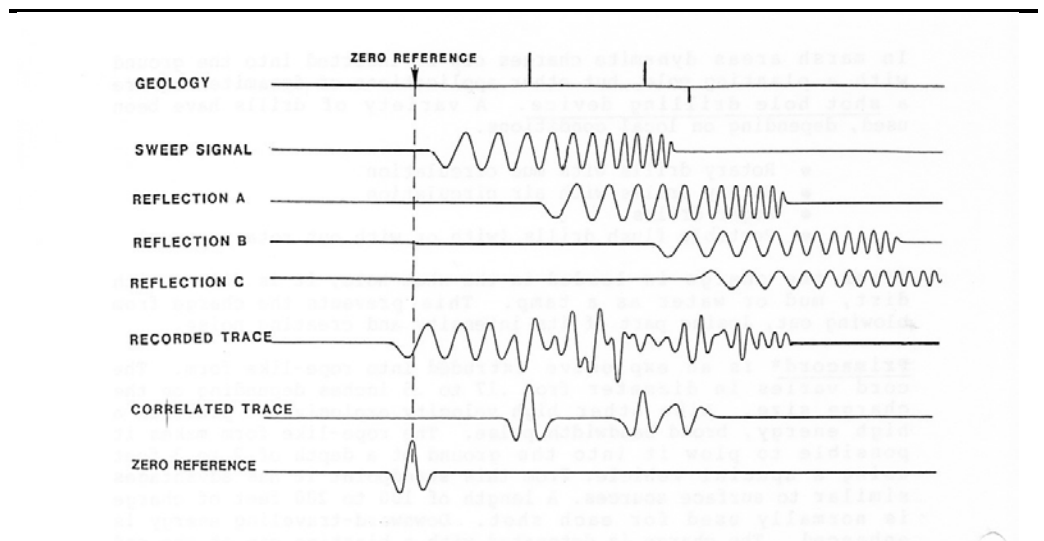


Recovering the waveform

The recorded uncorrelated data is useless for the seismic interpreter or geologist and must be processed by a mathematical technique called cross-correlation to reduce the data to simulate the result obtained by an impulsive source.

The schematic below shows the process in pictorial form.

Figure 4.9 *Schematic of Cross-Correlation process. Increasing Time*



Recording with a Vibroseis source.

The planned seismic line will be laid out by the survey crew and each receiver and source position will be marked by pin flags (to be recovered later) or with biodegradable markers. The receivers (geophones) will be laid out by the line crew and connected to the recording system and checked for faults.

Once ready the observer will advise the vibrator operator to position the vibrator on the programmed source position and lower the pad and advise the observer they are ready. The observer will then initiate the recording and the sweep controller will signal the vibrator to begin sweeping. The vibrator will then sweep through the specified frequency range for the specified time. When the vibrator has stopped vibrating the operator will lift the pad and

drive to the next source position and lower the vibrator pad. The system will sense when the vibrator is settled onto its pad and unless the operator or observer intervenes will begin the next sweep automatically when ready.

The vibrator move-up between source positions is commonly 10-20 m, or the seismic line source interval, say 25m. Driving speed is rarely greater than 5 km/hr as the operator must position the vehicle as close as possible to the source point marker and the drive distance is short. The cycle time for a single source point is made up of the sweep dwell plus the time to raise and lower the pad and the drive time to the next location, usually 20-40 seconds.

The recording of the seismic line will continue uninterrupted in this fashion until the line is finished or the vibrator comes up to an obstacle. If equipment availability allows the crew may have other vibrators positioned on the other side of the obstacle or in other locations and recording with these vehicles will commence until the first vibrator has detoured around the obstacle and is ready to recommence.

Figure 4.10 *Nomad 65 Vibrator which will be used in PSC H*



Receivers/Geophones

The receiver/geophones will be planted parallel with and close to the source points. The receiver points are the reference points and the source points are at the $\frac{1}{4}$ and $\frac{3}{4}$ position of the receiver points. The vibrators have dynamic GPS positioning such that their exact location is recorded whilst they have the pad down and are sweeping. Receiver points for each receiver/geophone line will be located 25 m apart. Each receiver position has a geophone group which consists of 12 individual geophones spread over the 25 m receiver interval at 2.08 m intervals. The tips of geophones are metal spikes which can be pinned into the ground or are small triangular plates that can be buried slightly into soft soil.

Figure 4.11 *Example of a 2D seismic line in a desert environment immediately after recording. Note the vibrator pad marks and wheel tracks on the left and the geophone cables in the centre with the fibre optic cable to the recording instrument on the right.*



The number of geophones groups per line varies depending on the line length, at a minimum 402 geophone groups are required to be ‘alive’ for recording to be undertaken. A fibre optic cable relays the received signal to recording instrument which is mounted in a 4WD truck.

Pacific Hunt will ensure that, no trees will be cut down during the PSC H survey.

An example of a recorder truck is shown in *Figure 4.12*, and examples of field equipment are shown in *Figure 4.13*.

Figure 4.12 4WD recording truck in sand dune desert environment



Figure 4.13 A string of 12 geophones collected onto its storage clip



Figure 4.14 A line "box" that collected the signal from 6 geophone strings before transmitting along the fibre optic cable to the recording instrument



Vibroseis vehicles will be driven by licensed heavy vehicle drivers/operators. All appropriate safety regulations for operation of heavy duty vehicles will be followed.

On completion of recording, the line recovery crew and Permitting Team will join in to:

- Rehabilitate the seismic line and access if required and
- Advise the date, time, and location of the seismic line, together with information on compensation, to village head, Compensation committee member and landowner and landowner according to compensation agreement.

4.6.2 Vehicle Requirement

The vehicle requirements are listed in *Table 4.4* below. These requirements are the maximum requirements expected during the seismic survey phase.

Table 4.4 *Estimated Vehicle Requirement of the Project*

Item Name	Description	Qty.
Pajero	Client	2
Hilux Double Cab	Base camp	2
Hilux Double Cab	HSE	1
Pajero	Ambulance	1
Hilux Double Cab	Recording crew	2
Hilux Double Cab	Vibrator crew	2
Hilux Double Cab	Survey crew	1

Item Name	Description	Qty.
Hilux Single Cab	Recording crew	2
JAC VAN	Reorder	1
Water Tanker	Basecamp	1
Fuel Tanker	Basecamp	1

4.7 ACCOMMODATION REQUIREMENTS

The seismic crew will be housed in the base camp for which the location is shown in *Figure 4.4a*. Most of the labour will be sourced locally and not more than 140 people is expected to stay in the base camp.

Camp doctor will be available to handle minor injuries / incidents at the base camp. Serious incidents and injuries will be handled at Bago Hospital.

4.8 MATERIALS, SUPPLIES & LOGISTICS

Materials to be used for the seismic survey phase (i.e. fuel, gravel, shale, sand, cement, wood etc.) are likely to be sourced via local suppliers from the Bago City.

Transportation of labour, equipment and materials will mostly use existing road, existing river transportation route and facilities along Sittaung River and No new road is expected to be built for the Project and only road improvement may be undertaken.

4.9 LABOUR REQUIREMENTS

The Project will involve a total of 20 people initially and up to a maximum of 140 people during the seismic survey. The ratio of skilled to unskilled labour is expected to be 1:5 to 1:10, and will be higher when seismic crew is in place. Labour is planning to be hired from local townships for routine work.

4.10 FUEL CONSUMPTION

It is expected that diesel of ~250 - 300 gallons per day will be used during the seismic survey programme. The fuel will be obtained from local townships and no fuel storage is required be built for the Project.

4.11 WATER CONSUMPTION

Water is expected to be required for daily use by the workforce in the camps. It is assumed that 0.15 m³/ person / day of water will be used. As such, a maximum of 21 m³ of water will be used per day during the period when the number of seismic workers is at its maximum (i.e. 140 people). A water well will be drilled to supply the camp.

4.11.1 *Waste Management*

During the seismic survey programme, it is expected that general refuse (mainly consist of food waste, metals, plastics and paper) will be generated from the workforce which requires to be disposed of properly. The storage and disposal of general refuse has the potential to give rise to adverse environmental impacts. These include odour if the waste is not collected frequently, windblown litter, water quality impacts if waste enters water bodies, and visual impact.

Assuming a maximum of 140 workers will be working for the seismic survey, with a general refuse generation rate of 0.65 kg per worker per day the amount of general refuse to be generated will be about 91 kg per day.

An adequate number of waste containers will be provided to avoid spillage of waste. Recyclable materials such as paper, plastics and aluminum cans will be separated and delivered to the local recyclers. The non-recyclable waste will be collected and disposed of properly on a regular basis by a contractor.

In terms of liquid wastes, domestic wastewater (grey water) and sewage (black water) will mainly be generated by the workforce at the base camp. The amount of domestic wastewater generated is estimated to be not more than 16.8 m³ per day during the period when the number of seismic workers is at its maximum (i.e. 140 people) ⁽¹⁾. The amount of sewage generated is estimated to be 0.08 m³/ person / day and a total of 11.2 m³ will thus be generated daily for a maximum of 140 workers.

A Waste Management Plan will be developed to provide details on the waste management policy and procedures for properly handling and disposal of wastes generated from the seismic survey programme.

4.12 *DEMOBILIZATION PHASE*

Once the survey and recording are finished, equipment will be removed and personnel will leave the site. The site will also be restored into its original state by collecting all wastes and materials and transporting out of the site. This base camp may be retained by the seismic survey contractor for other projects with other operator(s) which is not within the scope of this impact assessment. It is expected to take approximately one month to complete the site restoration, including recording public complaints, if any.

Seismic survey activities, including demobilization, will be controlled by the Project HSE plan. All staff must follow such standards in carrying out all activities throughout the Project period. This is to ensure that the survey meets its objectives and the survey quality meets the Project owner's demand,

(1) It is assumed that domestic wastewater generation per person per day is 80% of water consumption per day (80% of 0.15 m³ = 0.12 m³). Total volume of domestic wastewater generation per day will thus be 0.12 m³ / person / day x 140 people = 16.8 m³ per day.

which also take into consideration environmental issues and health and safety risks to staff and community.

4.13 *COMPENSATION PROCEDURES*

4.13.1 *Crop Compensation*

Crop compensation will be considered for the Project. Price appraisals for crop damage will be provided by respective township government departments, and will be approved by district administrator. A compensation committee will be organized, and composed of officials from MOGE, Pacific Hunt and local township authorities. Damage measurement, calculation and payment will be carried out systematically.

A detailed compensation plan will be prepared after discussion with township/district/region authorities. The compensation approval process will be handled by a Compensation Committee.

Pacific Hunt will seek MOGE's support to coordinate with respective ministries, departments, local authorities and affected villagers on the crop compensation for any damage caused by the seismic survey operations.

MOGE's criteria/practice for delineating crop compensation boundaries are detailed below:

- Receiver line (geophone) = 1.5 feet (0.5 m) offset of each side (Total = 3 feet, or 1 m).

4.13.2 *Forest Compensation*

The Project is not expected to cause any damage to trees or forest during the survey. However, in case any accidental damage to trees or forest takes place due to the Project activities, Pacific Hunt will compensate accordingly. The amount of compensation and specific procedures will be carried out under advice of MOGE, who will liaise directly with the Forest Department and other relevant departments and receive instructions and requirements accordingly.

4.14 *PROJECT ALTERNATIVES FOR SEISMIC SURVEY*

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 / are considering for the Project include the following:

- No-Project Option: This is an exploratory campaign to identify prospects for hydrocarbon reservoirs within PSC H. Without the Project, it will not be possible to develop and extract the hydrocarbon reservoirs, if any,

within PSC H. This will in turn result in potential loss of economic benefits to Myanmar, employment opportunities to local people which are required to raise the living standards of Myanmar. As such, the Project is considered as a favourable option compared to the no-Project alternative.

- Access requirements: existing roads and tracks will be used as far as practicable to avoid the need to construct new facilities which would lead to a larger environmental footprint of the Project;
- Siting of facilities: existing facilities will be used as far as practicable to avoid unnecessary construction of new facilities and hence disturbance to the environmental and social sensitive receptors. For example, fuel will be sourced locally such that it is not required to build fuel storage facility for the Project.

This section provides information on the bio-physical and social baseline characteristics and conditions in the Project Area. The discussion is limited to the factors and environmental and social components that could have a direct impact on the Project, or which may be impacted by the Project. The baseline is presented as follows:

- Physical Environment;
- Biological Environment; and
- Human Environment.

5.1 *SETTING THE STUDY LIMITS*

For the purposes of defining the Study Area, environmental and social components within the proposed seismic areas of PSC H have been considered as appropriate. Other environmental and social resources / components located further away from the PSC Have also been described where relevant to this ESIA.

5.2 *OBJECTIVES AND METHODOLOGY*

The objectives of the baseline review and data collection are as follows:

- To characterise the baseline environmental and social components of the Study Area which may potentially be affected by the Project activities;
- To provide baseline information for the assessment of potential impacts from the Project to the environmental and social components of the Study Area; and
- To provide baseline data before commencement of the Project which may be used for future monitoring of the Project impacts by comparing the baseline data within the impact monitoring (i.e. obtained during Project implementation) and post-project monitoring data (i.e. obtained after Project completion).

The information presented has been obtained through desktop research on secondary information and primary data collection through baseline field surveys, interviews and focus group discussions. Baseline field surveys were conducted in January 2015 (dry season) within PSC H. Detailed methodologies of the baseline field surveys are presented in the relevant sections under which the baseline findings are discussed.

5.3 *LITERATURE REVIEW*

The information provided in this section is based on a desktop review of published information and also through review of available ERM in house literature.

5.3.1 *Physical Environment*

Climate and Meteorology

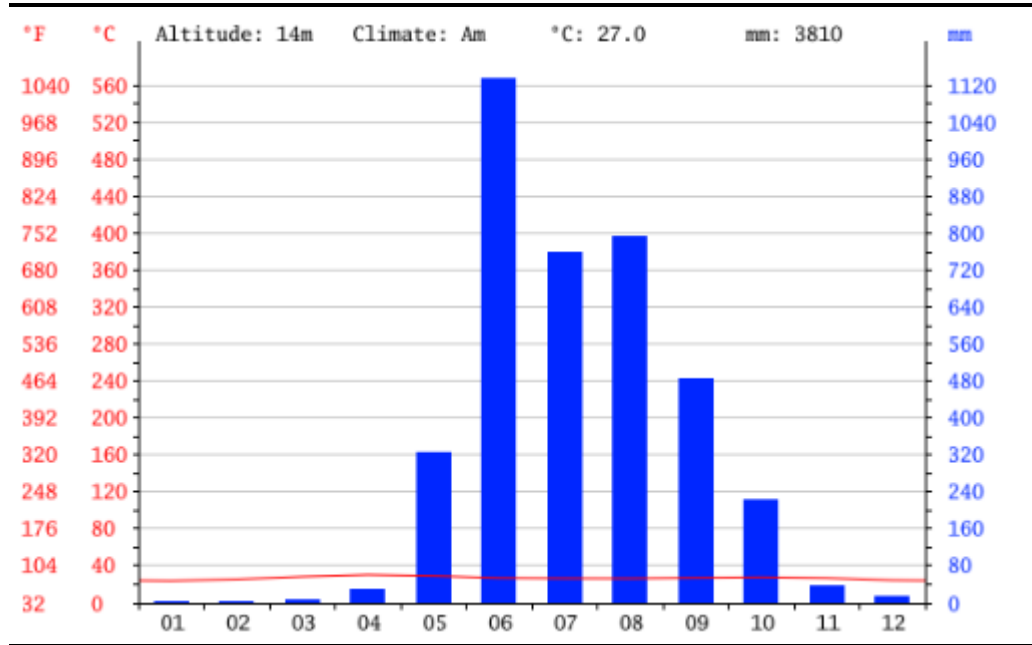
Myanmar is characterised by a dominant tropical monsoon climate. Seasons can generally be classified as into a cool dry season from November to April and a hot rainy season from May through October which is driven by the rainy southwest monsoon ⁽¹⁾. The southern part of Myanmar is the first part affected by the southwest monsoon starting in May and the entire country is experiencing the rainy season by the beginning of June. Climate variability within the country is largely controlled by topography which affects exposure to the southwest monsoon.

PSC H is situated with the the Bago Region, Mon State and Naypyidaw Union Territory of Myanmar. The area is noted to have moderate rainfall of around 1,000 mm to 2,500 mm per year. According to the available weather information in Bago, which is located near the proposed seismic areas, the area is being categorised as *Tropical Monsoon Climate (Köppen-Geiger climate classification, Am)*. The average temperature of Bago is 27.0 °C while the average annual rainfall is 3,810 mm ⁽²⁾ (*Figure 5.1*). Rainfall is much higher in summer than winter months. January is recorded as the driest month and rainfall is the highest in June.

(1) Kye Baroang (2013) Background Paper No. 1 - Myanmar Bio-Physical Characterization: Summary of Findings and Issues to Explore.

(2) <http://en.climate-data.org/location/717499/>

Figure 5.1 Average Monthly Temperature and Rainfall Chart of Bago, Myanmar (1982 - 2012) (Sources: <http://en.climate-data.org/location/317/>)



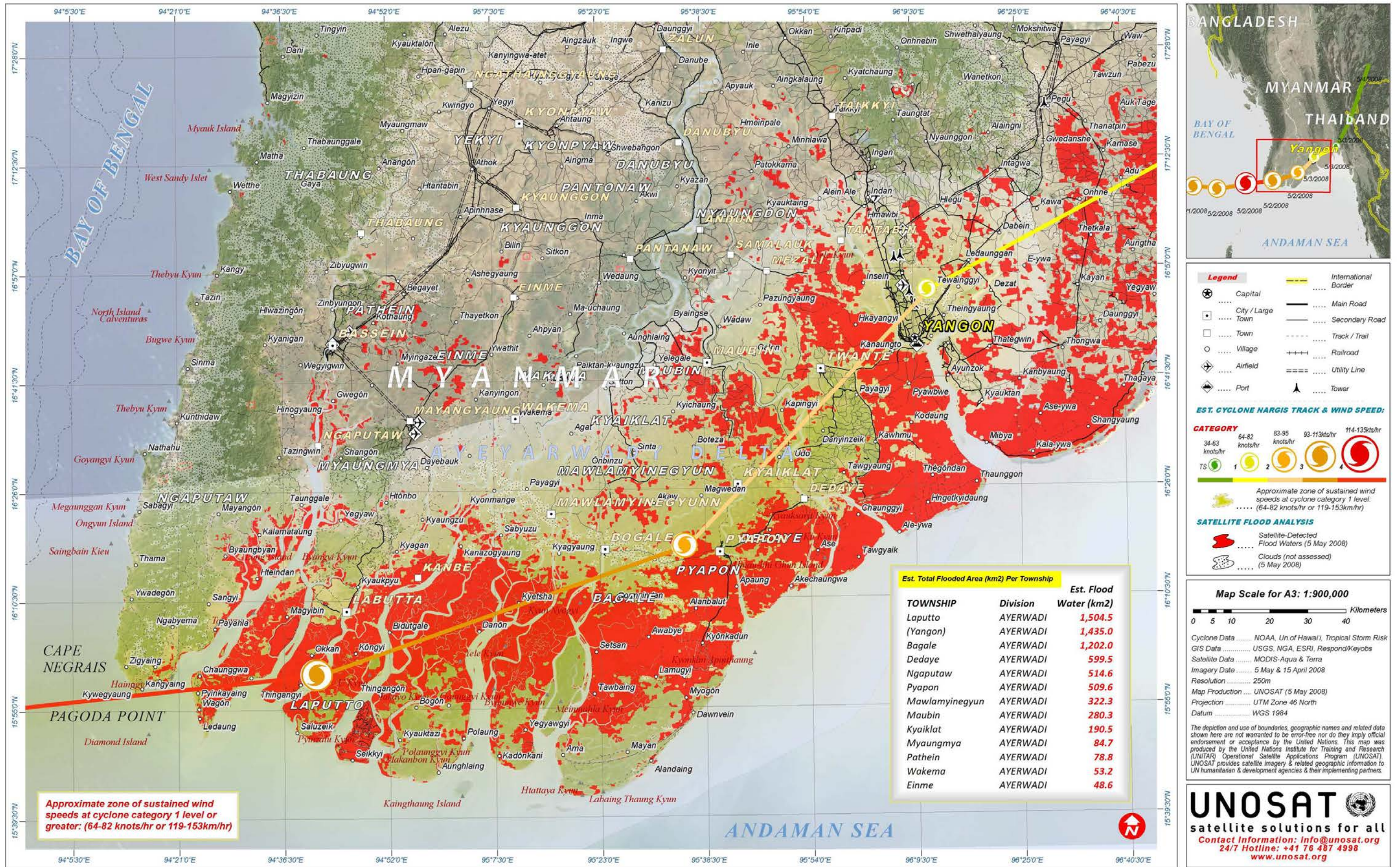
Tropical Cyclones

A tropical cyclone is a tropical storm with rotating winds at speeds of greater than 74 miles (119 km) per hour. Myanmar is vulnerable to cyclones, which often originate in the Southern Andaman Sea and enter the Bay of Bengal. These cyclones can result in heavy rains, storms, and floods. There are two prominent cyclone seasons for the country, between April to May and October to December. Historically, cyclone-related disasters tend to occur every 3 to 4 years in this region and on average every ten years a major cyclone makes a landfall in Myanmar ⁽¹⁾.

The available desktop information appears to indicate that the area of PSC H tends to be affected by tropical cyclone moderately, in which Cyclone Nargis which hit Myanmar in May 2008 has been reported to affect the wider Bago Region where PSC H is located, causing severe damages and flooding in the Ayeyarwady Delta, including Bago Region (Figure 5.2).

(1) Asian Disaster Reduction Centre, 2003. Theilen-Willige B., (2009) Natural Hazard Assessment of SW Myanmar – A contribution of remote sensing and GIS methods to the detection of areas vulnerable to earthquakes and Tsunami Cyclone Flooding. Science of Tsunami Hazards., Vol. 28 No. 2, page 108

Figure 5.2 Affected Areas in Myanmar of Cyclone Nargis (Source: http://reliefweb.int/sites/reliefweb.int/files/resources/7B040930C71040CE85257440006A1EB7-unosat_TC_mmr080505b.pdf)



Climate Change Projections

Projected climate changes over Myanmar have been studied based on both General Circulation Model (GCMs) used in the Intergovernmental Panel on Climate Change (IPCC's) fourth assessment, and using dynamic downscaling with regional climate models forced by the GCMs ⁽¹⁾.

Myanmar has been witnessing changing weather events in almost every year during the last two three decades. These include the onset, withdrawal, duration and intensity of monsoon, and the frequency of the monsoon depressions ⁽²⁾. The frequency of hot days and nights is expected to increase, while the frequency of cold days/nights will decrease.

Earthquakes

A review of available literature has shown that Myanmar is seismologically unstable and vulnerable to earthquakes ⁽³⁾. Historic records show that at least 15 major earthquakes with magnitudes $M \geq 7.0$ have occurred in Myanmar in the last hundred years.

Earthquakes occurred within the Ayeyarwady Delta in 1930 at Bago, in 1970 at Yangon and in 1975 at Pagan ⁽⁴⁾.

Air Quality

Secondary data are not available on ambient air quality in the Study Area. The principal sources of emissions to the atmosphere in the immediate vicinity of the Study Area are likely to be from household fires for domestic purposes (i.e. heating and cooking) and exhaust emissions from road transportation.

Noise

Secondary data are not available on noise in the Study Area. However, the sources of noise pollution are likely to include the road traffic from the nearby main road.

Soil

The Land Use Division (LUD) of Myanmar Agricultural Service is responsible for carrying out soil surveys, producing soil maps and coordinating the research activities with related agencies for the introduction of soil conservation and land improvement practices. According to the soil analysis undertaken by LUD, Myanmar has altogether 24 different soil types which are related with adaptable crops. The proposed seismic survey areas within PSC H is being classified nitisol and gleysol soil types which are favourable

⁽¹⁾ Intergovernmental Panel on Climate Change. IPCC Fourth Assessment Report (AR4), (2007), Climate Change: Synthesis Report

⁽²⁾ Tun Lwin, Khin and Cho Cho Shein., 2006. Hydrology and Meteorology report of Myanmar.

⁽³⁾ Theilen and Pararas-Carayannis (2009) *Op cite*

⁽⁴⁾ Union of Myanmar (2009), Hazard Profile - Myanmar

for the cultivation of paddy, pulses, sesame, maize, sugarcane, vegetable, groundnut, cotton, jute, tobacco etc (*Figure 5.3*). High rates of soil erosion and reduced sediment delivery have contributed to a sedimentation problem throughout the Ayeyarwady River Basin. The sediment budget has broad effects upon several processes of soil erosion in the Ayeyarwady River Basin which are of serious concern. In addition, the problem of nutrient deficiency, namely low content of phosphate, nitrogen and zinc, is also reported to occur in Bago Region which is often observed in rice growing area ⁽¹⁾.

Surface Water Quality

The main sources of surface water within PSC H are noted to be the Sittaung River and reservoirs, namely Baw Nat Gyi Reservoir, Baw Ni, Kawliya Dam Reservoir, Ye New Dam Reservoir and Baing Dar Dam Reservoir. Whilst the water quality in the reservoir is relatively fair, the Sittaung River is expected to be contaminated principally from agriculture inputs, boat vessel emissions, mining activities and surface run-off.

Groundwater Quality

In Myanmar groundwater resources have been estimated as 454 km³/year but a large part of this water (about 443 km³/year) comprises the base flow of the rivers and is also accounted for as surface runoff ⁽²⁾. It was estimated that 91% of the total water withdrawal in Myanmar comes from surface water and 9% from groundwater ⁽³⁾. Currently there is no single institution that is responsible for the overall management of national water resources in the public and private sectors.

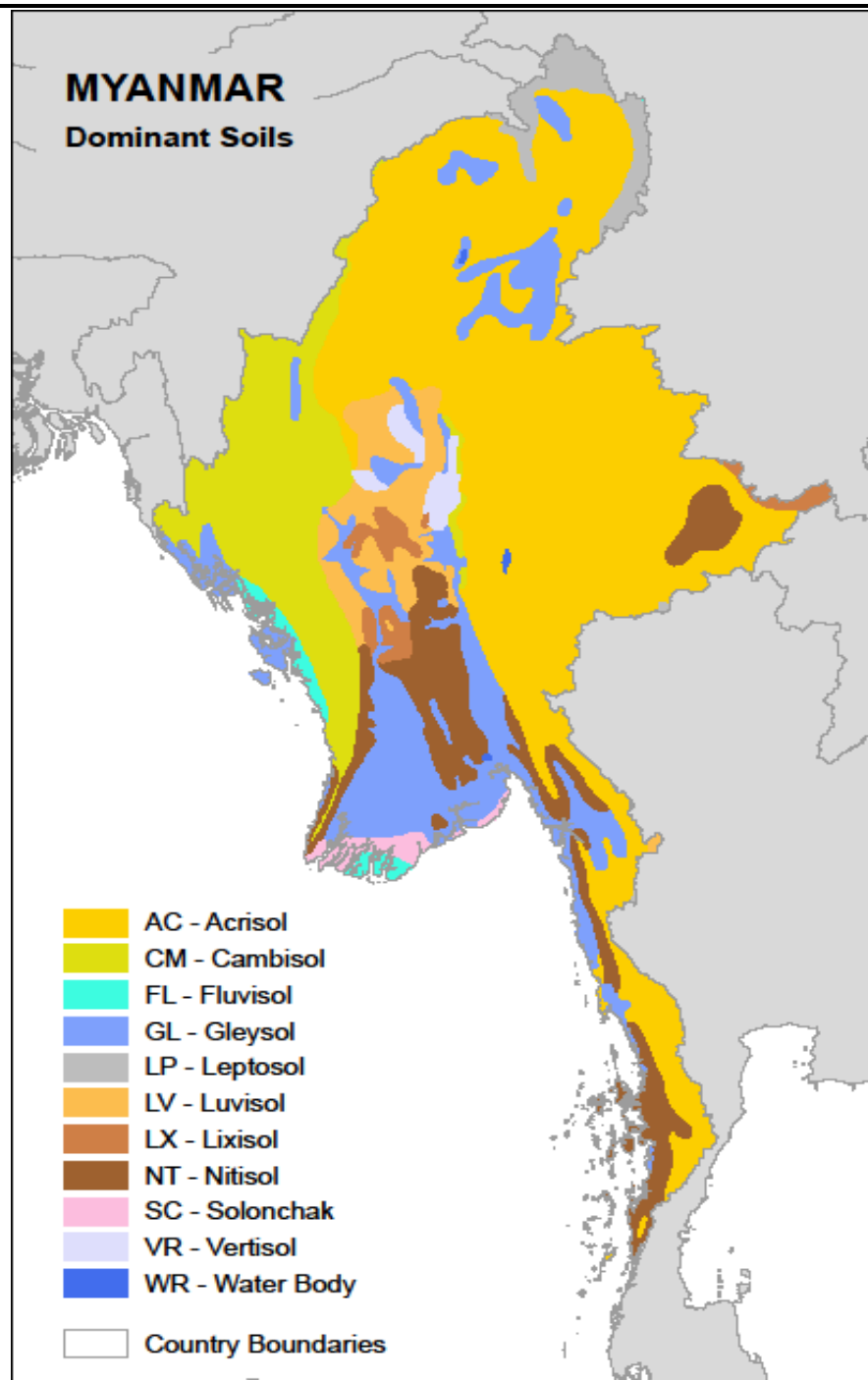
The area of PSC H is located within the Bago Yoma mountain range. Groundwater in the region is dependent upon natural recharge from Sittaung River and Bago River. Villages within PSC H reported the use of groundwater from deep tube wells and hand dug wells as water supply.

(1) <http://www.fao.org/docrep/010/ag120e/AG120E15.htm>

(2) FAO (2010), FAO's information system on water and agriculture, http://www.fao.org/nr/water/aquastat/countries_regions/myanmar/index.stm, accessed 19-06-2014

(3) FAO (2010), *Op cite*

Figure 5.3 Soil Types and Distribution in Myanmar



Source: Reliefweb International (2014) ⁽¹⁾

(1) http://reliefweb.int/sites/reliefweb.int/files/resources/329CF8B14D479D85852574560063A495-2-fao_NTR_mmr080527.pdf accessed, 14 June 2014.

Habitat

Myanmar is well endowed with forests and other natural resources. Forests cover about 40% of the total land area. Forest exploitation is controlled by law but the government allows rural communities to use various forest products (except protected plants and animal species) ⁽¹⁾. However, it is noted that loss in forest area is an ongoing issue in the Bago Region due to change in land use ⁽²⁾.

Limited information is available for the habitat type within PSC H. Based on preliminary review of aerial photos with the block, it is expected that habitats including cultivated land, developed area, forests, woodland, shrubland and streams or rivers will be found within the block. These habitats have the potential to support fauna groups including mammals, birds, amphibians, reptiles, odonates and fishes.

Terrestrial and Aquatic Fauna

Limited baseline ecological information is available for the terrestrial and aquatic fauna groups within PSC H. In 2009, the Forest Department provided a list of 43 sites which included a total of 35 designated and 8 proposed protected areas ⁽³⁾. Moyingyi Wetland, which is a protected area for bird, is located with the southern part of PSC H (*Figure 5.4*). The site supports several wetland habitats which were considered with high ecological value for resident and migratory waterbirds. More than 20 aquatic plants are present, including Kaing grass and Nwaysaba (*Oxyza officinalis*), especially in the shallow areas of the site which are breeding grounds for water birds. A total of 130 bird species, 20 reptile species, 9 amphibian species, 45 fish species and 30 insect species are recorded by the sanctuary office within the wetland. The proposed seismic survey and the associated facilities will avoid the Moyingyi Wetland.

⁽¹⁾ <http://www.fao.org/docrep/005/ac648e/ac648e08.htm>, accessed 21 Oct 2014

⁽²⁾ <http://rainforests.mongabay.com/20myanmar.htm>

⁽³⁾ http://www.istituto-oikos.org/files/download/2012/MyanmarProtectedAreas.Context_CurrentStatusandChallenges.pdf

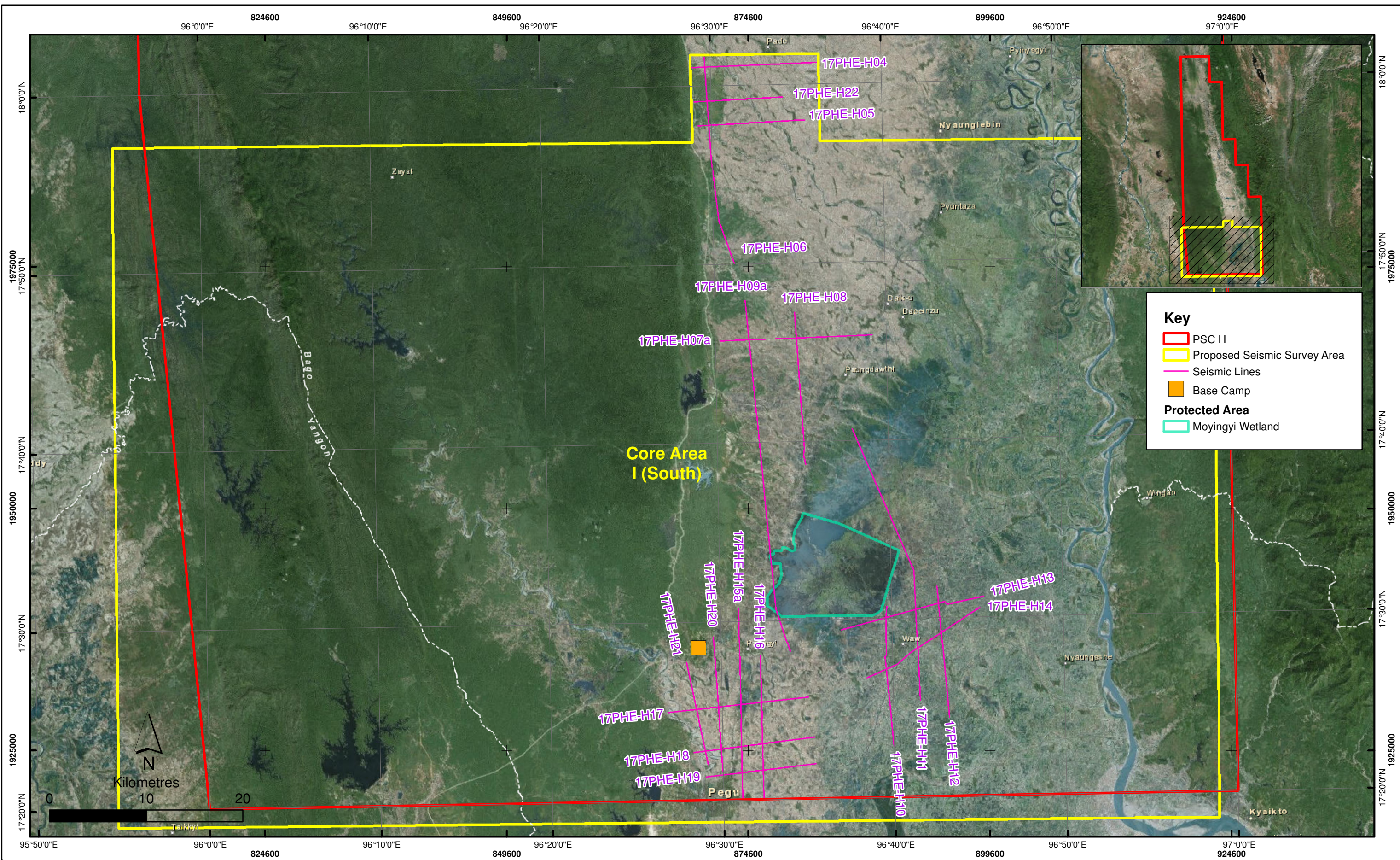


Figure 5.4

Protected Area within The Core Area I (South) of PSC H

File: T:\GIS\CONTRACT\0273740\Mxd\2017\0273740_Block_H_Moyingyi_Wetland.mxd
 Date: 3/11/2017

Environmental
 Resources
 Management



This section presents finding of the desktop literature review of the human environment in the Project Area as well as the wider regional and country level. The secondary information pertaining to the socio-economic profile of the country, the region and the Project Area is extremely limited and is restricted to the reports of international organizations.

Country Profile: Myanmar

This subsection provides a brief understanding of the socio-economic profile of Myanmar, in terms of its demographic profile, land and livelihood profile.

Administrative Structure

The Republic of the Union of Myanmar is characterised as a presidential republic with a bicameral legislature. The country is governed by its Constitution, passed in September 2008. The country is divided into seven state and seven regions. The administrative divisions are further subdivided into districts, and in turn townships, wards and villages. An understanding of the administrative divisions in the country is shown in *Table 5.1*.

Table 5.1 *Administrative Structure of Myanmar*

No.	State/Region	Districts	Townships	Cities /Towns	Wards	Village groups	Villages
1	Kachin State	3	18	20	116	606	2630
2	Kayah State	2	7	7	29	79	624
3	Kayin State	3	7	10	46	376	2092
4	Chin State	2	9	9	29	475	1355
5	Sagaing Region	8	37	37	171	1769	6095
6	Tanintharyi Region	3	10	10	63	265	1255
7	Bago Region	4	28	33	246	1424	6498
8	Magway Region	5	25	26	160	1543	4774
9	Mandalay Region	7	31	29	259	1611	5472
10	Mon State	2	10	11	69	381	1199
11	Rakhine State	4	17	17	120	1041	3871
12	Yangon Region	4	45	20	685	634	2119
13	Shan State	11	54	54	336	1626	15513
14	Ayeyarwady Region	6	26	29	219	1912	11651
Total		63	324	312	2548	13742	65148

Source: *Wikipedia.org* accessed on June 18, 2014

While regions are understood to be predominantly inhabited by the dominant ethnic group, the states are areas that are occupied by ethnic minorities.

The lowest levels of government offices are generally located in the townships, which in turn report to the government offices at the district and region level. The regions are governed by a Chief Minister appointed by the

President, who in turn is supported by a unicameral legislative assembly. However, these laws are expected to be in keeping with the laws passed by the Union Legislative Assembly. Furthermore, the unicameral legislative assembly can only pass laws for eight sectors listed in *Schedule Two* of the *Constitution*. While the assembly at the region level can pass laws on “Energy, Electricity, Mining and Forestry”, it does not have powers to formulate laws for any matters relating to the Oil and Gas sector.

The region assemblies can legislate on matters of land revenue, municipal taxes on buildings and land and the sale, lease and other matters involving property of the Region or State. On the other hand, revenues from the exploitation of the natural resources of a region or state are to be paid to the Union Fund, and not the Region or State Fund. The Union Government does not need approval from state or regional governments for large scale investments in their local jurisdictions, although they must be informed, and their views are sought as part of the evolving EIA process and on foreign lease of land in their area ⁽¹⁾.

Demographic Profile

The Republic of the Union of Myanmar is a sovereign state in Southeast Asia. The country borders Laos, Thailand, China, Bangladesh and India. The country of Myanmar is characterised by the following demographic profile in *Table 5.2*.

Table 5.2 *Demographic Profile of Myanmar*

Attribute	Number
Area (sq. km)	676578
Population	52.8 Million
Population Density (population per sq. km)	78.03
Population Growth (average annual % for 2010-2015)	0.8
Sex Ratio (women per thousand men)	971
Urban Population (%) (2012)	33.2
Rural Population (%) (2012)	66.8
Urban Population Growth (average annual % for 2010-2015)	2.5
Rural Population Growth (average annual % for 2010-2015)	-0.1
Population aged 0-14 years (%) (2012)	24.8
Population aged 60+ years (%) (2012)	8.45

Source: UN data ⁽²⁾ and BTI (2014) Myanmar Country Report ⁽³⁾

Estimation and classification of Myanmar’s population is difficult due to the absence of reliable data and the complex ethnic identity. The last proper census was conducted in 1931 (an incomplete census was also conducted in 1983). The data available is in the form of that collected by different independent agencies such as the United Nations (UN) and World Bank amongst others.

⁽¹⁾ Myanmar Oil and Gas Sector-Wide Impact Assessment: Government Structure and Legal Framework

⁽²⁾ <http://data.un.org/CountryProfile.aspx?crName=MYANMAR#Social>

⁽³⁾ <http://www.bti-project.org/fileadmin/Inhalte/reports/2014/pdf/BTI%202014%20Myanmar.pdf>

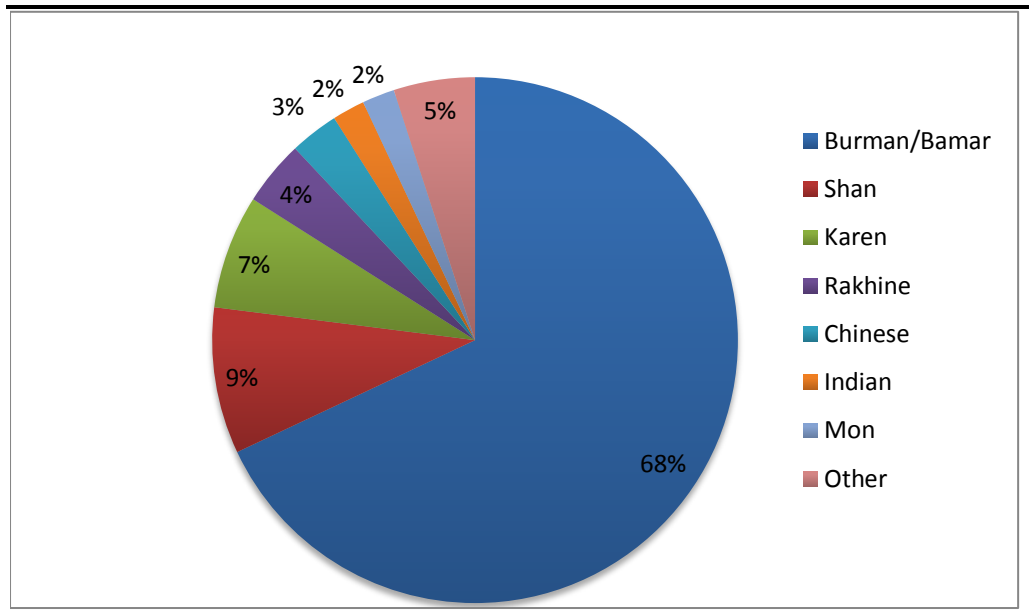
Myanmar with an area of 676,578 km² is the 40th largest country in the world and the second largest in Southeast Asia. It is also the 24th most populous country in the world. The country is characterised by a population density of 78.03 individuals per km² with most of the population being concentrated in the rural areas. However, it should be noted that while the rural population is dominant, there has been a shift towards urban areas, with the rural population experiencing a negative average growth rate in the years 2010-2015. In comparison to this, the urban population has experienced a growth rate of 2.5% in the same time period, which is higher than the overall growth rate of the Country.

Of the total population, approximately 33.25% is characterised as dependent population, comprised those below the age of 14 years and higher than 60 years. The country is characterised by a sex ratio of 971 females per thousand males.

Social Stratification

The population of the country is composed of a number of ethno linguistic groups, of which the majority is composed of Tibeto-Burman populations along with Tai-Kadai, Hmong-Mien and Austroasiatic groups, of which the majority population belongs to the Burman groups. The main ethnic groups include, Burman, Shan, Mon, Rakhine, Chin, Kachin, Kernni Kayan, Chinese, Indian, Danu, Akha, Kokang, Lahu, Naga, Palaung, Pao, Rohyinga, Tavoyan and Wa. The following *Figure 5.5* provides the ethnic composition of the country.

Figure 5.5 Ethnic Composition of Myanmar

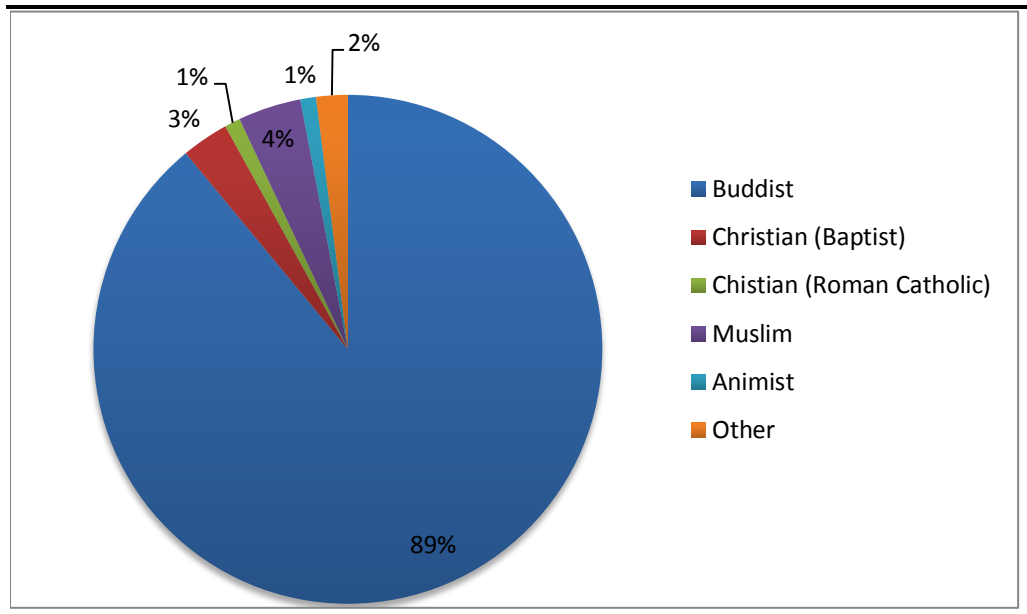


Source: *indexmundi.com*

Myanmar’s population is characterised by four main language families, namely, the Sino-Tibetan, Tai-Kadai, Austro-Asiatic and Indo-European, of

which the Sino-Tibetan are the dominant languages. Burmese is the official language of the country.

Figure 5.6 *Religious composition of Myanmar*



Source: *indexmundi.com*

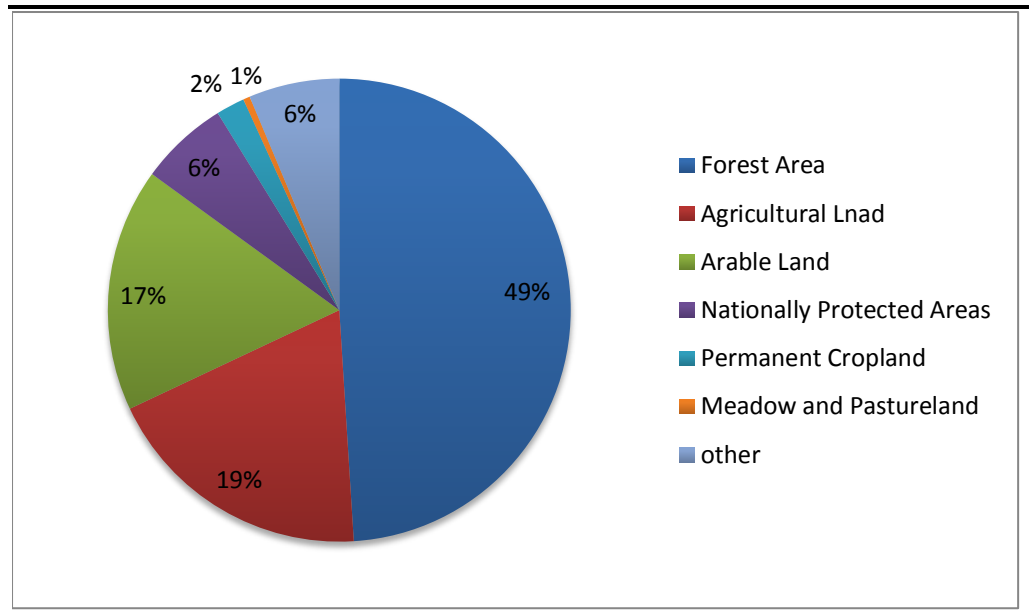
In terms of religious groups, the country is composed of mostly Buddhist population, with the other religious groups included Christianity (Protestant and Catholic), Muslim, Hindu, Animalism, Mahayan Buddhism and other East Asian religions. The *Figure 5.6* given above provides an understanding of the religious composition of the population.

Land Use and Ownership

The country is divided into three physical zones, namely Uplands, the Dry Zone and the Irrawaddy Delta. The Uplands, comprised of the states of Kachin, Karenni, Karen, Chin and parts of Shan, Mon and Arakan are characterised by a hilly terrain, ranging from 1,000 to 2,000 m in altitude. In the past swidden agriculture (traditional shifting) was common in the areas. However, due to an increase in the population density, farmers are increasing clearing the steep hills in the area, which are characterised by poor soil quality which does not allow for sustained agriculture or appropriate fallow periods.

The Dry Zone is referred to as the central heartland and spans the semiarid region of the country. The Study Area partly falls in the dry zone. This area is characterised by frequent draughts and increasing land degradation due to loss of natural vegetation, soil erosion and decreasing soil fertility. The following *Figure 5.7* provides an understanding of the land classification in the country.

Figure 5.7 Land Classification in Myanmar



Source: USAID Country Profile: Property Rights and Resource Governance, Burma

As can be seen from the above figure, the dominant land use in the country is forest area followed by agricultural land. Of the agricultural land (~128,549.82 km²) approximately 25% is classified as irrigated land. The forest area is comprised of tropical evergreen forests, hill forests and temperate evergreen forests. However, due to activities such as legal and illegal logging and traditional practices there has been a rapid depletion of the country’s forest resources, with the country losing 19% of its forest cover in the years 1990-2010.

The primary central body governing land in Myanmar is the Ministry of Agriculture and Irrigation (MoAI) and departments under the Ministry are responsible for land planning, water resources, irrigation, mechanisation, settlement and land records, amongst other matters. The Farmland Management Body (FMB) and the Central Committee for the Management of Vacant, Fallow and Virgin Land (CCVFV), both established by laws enacted in 2012 and chaired by the head of MoAI are responsible along with their lower-level branches for approving certain requests for land- use rights.

The land ownership in the country is vested in the state, with the citizens and organizations being provided with user rights. While the dependence on land as a source of livelihood is high in the country, especially amongst the rural areas, it is estimated at 30-50% of the rural areas are landless. The average farm size in the country is 6.7 acres, which is considered to be moderate by Southeast Asian standards and low by international standards. The largest average sizes are found in Irrawaddy (11.2 acres), Yangon (9.3 acres) while the lowest is in Chin state (1.7 acres)

The proportion of landless households is reported to vary across the regions in the country with the Bago region in lower Myanmar, Mandalay Region Central Myanmar and Rakhine State in Western Myanmar having the highest

proportion. While the country's constitution and the Customary Laws (governing Buddhist groups) guarantees women equal rights before the law in terms of property matters, in practice, however, certain systems applicable on the ground do not afford them equal rights. Furthermore, the country's latest laws pertaining to land such as Farmland Law and Vacant, Fallow and Virgin Land (VFV) Law are reported to not be gender neutral with no mechanism for joint ownership of property between husbands and wives. These laws state that the land will be registered to the head of the household, which is interpreted to mean the husband.

Land Tenure Types

In Myanmar, the state is the owner of all land, thus, all private tenure rights are usufruct rights, and are determined according to the type of land involved. While attempts have been made to simplify the land classifications through several new laws in 2012, their success is still unclear. In 2009, 12 land categories were identified, which are discussed in *Table 5.3* below.

Table 5.3 *Land Types in Myanmar*

No	Land Type	Description
1	Freehold Land	Freehold land equates roughly to 'ancestral land,' existing mostly in urban areas and rarely in small towns and villages. Freehold land is transferrable, not subject to land revenue taxes and can be taken by the state only pursuant to laws on compulsory acquisition.
2	Grant Land	Owned and allocated by the state, grant land is common in cities and towns, but rare in village areas. The state may lease grant land out for extendable periods of ten, thirty, or ninety years. Grant land is transferable, is subject to land tax and may be reacquired by the state during a lease period in accordance with laws governing compulsory acquisition.
3	Farmland	The Farmland Law of 2012 has replaced the earlier classification of Agricultural Land with Farmland. Farmland includes garden land; paddy lands; dry land (ya); alluvial land (kiang); perennial plant land; coastal land (dhani); shifting cultivation land (taungya); alluvial islands; and land for growing vegetables and flowers. Farmland is transferable through sale, lease, inheritance and donation, with the condition that transfers must be registered with the state. Farmland rights may also be "pawned" as security for a loan, with the condition that the loan can only be used to finance agricultural production. Unless the user obtains express permission for other uses, land held under a farmland use right must be used for permitted purposes. The user cannot allow the farmland to remain fallow without sound reason and cannot transfer the use right to a foreigner or an organization that includes a foreigner without state permission.
4	Grazing land	Grazing land is for use by cattle of nearby villagers and is protected from trespassers and is not subject to land taxes.
5	Town land	While in most cases, town land is the same as freehold land or grant land, an exception exists in reference to La Na 39 land. This category is provided for in the article 39 of the Land Nationalization

No	Land Type	Description
		Act 1953. This land is defined as farmland that has been re-categorised for another purpose. This land is transferable and those who have it registered under their name must pay land tax to the government.
6	Village land	Village land is land located outside the parameters of town land and can either be grant land or La Na 39 land. Village land is transferable, but only if it has been transformed into La Na 39 land or grant land. Those with village land must pay land tax to the government unless their plot is less than one-fourth of an acre and occupied by a building.
7	Cantonment Land	Cantonment land is land that the state has acquired for the military's exclusive use. When an area is earmarked as cantonment land, the government issues a declaration of the designation, and the state acquires it under the Land Acquisition Act, which provides that owners should be compensated if the land was classified as freehold land, grant land or La Na 39 land. The military is required to surrender cantonment land to the government once it is no longer necessary for military use.
8	Monastery Land	Monastery land is that which the Ministry of Home Affairs has declared as such. If that land is freehold land, grant land, La Na 39 land or farmland, the government must invoke the Land Acquisition Act, and the state must pay compensation to the rightholders before acquiring the land for use as monastery land. Land classified as monastery land is not subject to land taxes and retains its classification for eternity.
9	Vacant, Fallow and Virgin Land	According to the VFV Law, land users who hold use rights to vacant, fallow or virgin land cannot mortgage, give, sell, lease or otherwise transfer or divide land without permission from the Cabinet of the Union Government. The seven categories of use of these lands are as follows: <ul style="list-style-type: none"> • Perennial plants and industrial crops; • Orchards; • Use by a rural farmer and a family; • Aquaculture; • Breeding and raising of livestock and poultry; • Mining; and • Other.

Source: USAID Country Profile: Property Rights and Resource Governance, Burma

Apart from these statutory tenures, there also exist customary tenures, which do not enjoy formal legal recognition. These tenures, though declining, play an important role in the ethnic areas in the Uplands. One such customary tenure is as identified by the Karen group. In practicing shifting cultivation, the Karen population classifies forest areas as rotational farms, irrigated farms, orchard farms, communal forest, grazing land and sacred forest.

Livelihood Profile

Myanmar's economy is heavily dependent upon the natural resources and agriculture. While very limited data is available on the economic profile of the country, the *Table 5.4* provides a summary of the basic economic profile of the country.

Table 5.4 Economic Profile of Myanmar

Attribute	Number
GDP (Billions current US\$) (2014)	60.29
GDP per capita (current US\$) (2014)	910.36
GNI (current US\$) (2012)	1126
Labour Force Participation (female) (%) (2011)	75
Labour Force Participation (male) (%) (2011)	84.9
Labour Force Participation (total) (%) (2011)	81.9

Source: <http://data.worldbank.org/country/myanmar> and <http://knoema.com/IMFWEO2014Apr/imf-world-economic-outlook-april-2014?country=1001140-myanmar>

Myanmar characterised by a GDP of US\$55,320 is amongst the countries with the lowest GDP in the world and is significantly lower than the GDP across South Asia at US\$2,303,123.

The economic growth in recent years has averaged at 5% with a per capita income of US\$ 702. Due to issues such as inadequate infrastructure, limited access to finance, limited access to agricultural and off-farm ‘know-how’ and administrative constraints have resulted in a stagnation of the non-urban economy. This is also reflected in the high poverty levels in the country, with 26% of the population falling below the poverty levels (below US\$ 1.25 per day).

Some of the key sources of income are agriculture, natural resources, employment in the service sector and casual labour.

Agriculture

The agriculture in the country varies across the regions. The Uplands are increasingly characterised by a high dominance of rain-fed paddy. On the other hand, the Dry Zone is characterised by commercial farming of cash crops such as sesame, pulses, beans, potatoes, tomatoes, cotton, onions and vegetables. Of these, the crops sesame, pulses and beans are grown for mostly export. The Irrawaddy Delta has mostly paddy cultivation and is identified as the center of the country’s rice economy, responsible for a large share of the country’s rice export. Myanmar is the 6th largest rice exporter in the world, with estimated 1.5 metric tons in export in 2012. This can be seen in the fact that 25% of the households in the region identify paddy cultivation as its most important income source. Rice farmers reportedly keep 25% of the produce for self-consumption and next year’s seeds while 75% is sold in the market. Since 2008, the government has also been encouraging large-scale monoculture plantations of cassava, sugar cane, rice, jatropha, palm oil and rubber, mostly through military- favoured domestic companies.

Natural Resource Based Income

Myanmar has rich natural resource reserves including oil and gas, minerals, precious stones and gems (ruby, sapphire, diamond, spinel etc), timber and forest products, hydropower potential etc. Of these, natural gas, rubies, jade and timber logs comprise of a substantial proportion of the national income.

While the Northern Shan Plateau is characterised by deposits of silver, lead, zinc and gold, the Tenasserim region is identified for tin and tungsten while Maymyo in the central basin is known for its reserves of barite. Myanmar also has major coal deposits, mostly concentrated in the upper Irrawaddy and Chindwin valleys.

Non-Farm based activities

Issues such as frequent droughts, floods and landslides, increasing land degradation, increasing population density, loss of natural vegetation, soil erosion, deterioration of soil fertility, increase in extractive industrial activities etc. have resulted in an increasing shift towards non-farm based activities. In terms of non-farm based livelihoods, the main sectors include the industrial and service sectors. The main industries in the country include agricultural processing, wood and wood products, copper, tin, tungsten, iron, cement, construction materials, pharmaceuticals, fertilizers, oil and natural gas, garments etc.

While manufacturing sector has grown in the country since its independence, its growth rate is slower than that across the other countries in the region. The main enterprises in the sector comprise of tobacco producing factories and cottage industries, producing cigarettes and cheroots (a type of small cigar). Apart from this, the other major manufacturing sectors include steel processing, nonelectrical machinery and transportation equipment production, cement production and textiles. While the textile industry has played a crucial role in the areas of Yangon, Myingyan and other cities, the growth of the industry has slowed down since the late 20th century due to international sanctions.

Water and Sanitation

While limited information is available pertaining to the country's water availability and quality and sanitation facilities, it is understood that the country is characterised by a lack of effective delivery of basic services such as water and sanitation. According to a United Nations Children's Fund (UNICEF) survey undertaken in 1995 and 1996, 59.7% of the total population has access to safe drinking water, while the rural urban proportions were 50 and 78.5% respectively. The common sources of drinking water are in the form of open wells, springs, rivers or ponds. Most of the villages do not have access to piped water supply and require the households to walk a certain distance to collect water. This task of collecting the water usually falls upon the women and children. The situation is reported to be aggravated during the dry months when due to the drying up of local sources, at times, women and children have to walk several miles for water, or even resort of consumption of contaminated water in situations where safe water is not readily available. The country is characterised by common practices of open defecation, especially in rural areas, and generally poor sanitation knowledge and standards.

Transport and Communication

The infrastructure in the country is reported to be severely inadequate. The main forms of transport are road, rail and water ways. The railways are reported to be old and rudimentary, having undergone minimal maintenance since their construction in the 19th century. Outside of the major cities, the highways are mostly unpaved. In terms of electricity, despite the large deposits of natural gas, the electricity supply in the country is from fossil fuels. However, hydroelectricity is increasingly accounting for a significant portion of the total power supply. Most of the hydropower projects are located on the five main rivers in the country, namely, Irrawaddy, Chindwin, Salween, Sittaung and Tenasserim. About 73% of the population lacks access to electricity and the consumption of electricity is one of the lowest in the world – 20 times less than the world average. Existing power infrastructure can only meet about half of the current demand, resulting in frequent blackouts and rationing of the electricity supply. Telecommunications and internet access are also very limited.

Education Profile

The country's education system is classified into two sectors: the basic education sub-sector and the higher education sub-sector. The basic education system comprises of 3 years of lower primary level, 2 years in upper primary level, 4 years at lower secondary level and 2 years in upper secondary level. This is followed by a matriculation examination. The education system is based on the United Kingdom's system. Almost all the schools are government operated, however, there has been an increase in the number of privately funded English language schools. Schooling is compulsory till the elementary school level. The following *Table 5.5* provides a summary of the literacy profile the country.

Table 5.5 *Literacy Rate of Myanmar*

Attribute	Number
Total Literacy Rate (15+ years)	92.68
Male Literacy Rate (15+ years)	95.09
Female Literacy Rate (15+ years)	90.37

Source: <http://data.worldbank.org/country/myanmar>

The high literacy rates, prevalent since independence are associated with the presence of Burmese schools as well as monastic schools, which play a major role in the education of poorer sections of society. While the overall literacy rate is reported to be high, as a result of widespread poverty, only a small percentage of children continue their formal education after primary school. Many schools are under-resourced, lacking essential equipment such as desks and chairs. During the devastating Cyclone Nargis, more than 4,000 schools were either damaged or completely destroyed, further limiting access to education for many children. Also, during the socialist regime, the education system is reported to have suffered in terms of the maintenance of infrastructure, teacher education and pay. Furthermore, while during this

period Burmese was made the medium for teaching at all schools, English remained the language at the higher education levels, which in turn resulted in a large proportion of population discontinuing their education.

Health Profile

As can be seen from the following *Table 5.6*, Myanmar has high rates of infant, under-five and maternal mortality. The country is also characterised by a high prevalence of HIV/AIDS, tuberculosis and malaria. Access to health care facilities is extremely poor outside of the major cities and towns, with only 0.5-3 % of the GDP being allocated to health. While the health care, provided by the government, is nominally free, public hospitals lack basic facilities and equipment and often require the patients to pay for their own treatment and medicine.

Table 5.6 *Health Profile of Myanmar*

Attribute	Number
Life Expectancy (years)	65.2
Infant mortality rate (per 1,000 live births) (2010)	50
Under-5 mortality rate (per 1,000 live births) (2010)	66
Neonatal mortality rate (per 1,000 live births) (2010)	32
Maternal mortality ratio (per 100,000 live births) (2010)	200
Fertility Rate (live births per woman) (2010-2015)	1.9

Source: http://www.unicef.org/eapro/MNH_Myanmar.pdf

The main diseases in the country pertain to water borne diseases such as diarrhoea, Hepatitis A and typhoid, which are attributed to the poor sanitation facilities in the country. Also due to the poor hygiene, health problems such as intestinal worms and skin diseases are common.

The top most causes of death in the country include, coronary heart disease, influenza and pneumonia, stroke, tuberculosis, lung diseases, HIV/AIDS, hypertension, malaria, diarrhoeal diseases, diabetes mellitus, low birth weight, cancer, birth trauma, kidney and liver diseases, asthma, peptic ulcer diseases, road traffic accidents, violence, Alzheimer/dementia, meningitis, rheumatic heart disease, anaemia, suicides, lymphomas, fires, malnutrition, maternal conditions, endocrine disorders, congenital anomalies, leukaemia, drowning, syphilis, drug use, Hepatitis B, Poisonings, skin diseases. Of these, the deaths by Hepatitis B, drug use, syphilis, peptic ulcer disease, rheumatic heart disease, and oral cancer are the highest in the world.

Bago Region Profile

Demographic Profile

The Bago region is located in the southern central Myanmar and is bordered by Mandalay and Magway division and the Union Territory of Nay Pyi Taw to the north, Mon and Kayin States and the Andaman Sea to the east, Yangon divisions to the south and Ayeyarwady region and Rakhine to the west (*Figure 5.8*).

Figure 5.8 Bago Region Map



Source: Bago_Region_Final_pdf

The following Table 5.7 provides an understanding of the brief demographic profile of the region.

Table 5.7 Demographic Profile of the Bago Region

Attribute	Bago
Districts	4
Townships	28
Wards	254
Village Tracts	1423
Villages	6564
Total Population	4,848,206
Area (km ²)	39,404.6
Population Density (persons per km ²)	123
Sex Ratio (females per thousand males)	920
Rural Population	40,303,376
Urban Population	817,830
Population in the age group 0-14 years	1379892

Source: Bago Region Profile Final.

As can be seen from the above table, the Bago region is characterized by a population of 4,848,206 individuals over an area of 39,404.6 km². It is geographically divided by the Pegu mountain range that runs from north to south through the middle of the region, into Bago East and West. The Bago West is identified as the part of the region which is sloped towards the Ayeyarwady River and forms a part of the Ayeyarwady Delta, while the Bago East is consisted mainly of the floodplains of the Sittaung River.

The population of the region is approximately 9.5% of the total population of the country and has a sex ratio of 920 females per thousand males, which is very close to the national sex ratio of 930. Of this population approximately 17% is reported to be comprised of urban population.

Social Groups

The population of the region is comprised of dominantly Bamar Buddhist, along with Kayins, Shans, Paos and Mons as well as people of South Asian and Chinese origin.

Land Use

The Bago region falls in the Ayeyarwady Delta. The land in the region is fertile and low lying and is characterised by a soil type of thick alluvium brought down by the Ayeyarwady River. Three main types of soil are reported to be found in the area, meadow gleyey clay soils, meadow swampy soils and saline gleyey soils.

In the Bago West, which is part of the Ayeyarwady Delta, the average farm size per household is 11.2 acres (approx. 4.5 ha) according to a UNDP report and is ranked amongst the highest in terms of farmland size per household. One of the possible reasons identified for this is that the process of settling of immigrants in the delta started only around 100 years ago, thereby making it easy for people to expand their lands. However, due to the high rate of population increase, the ratio of landless farmers in the delta reached non-

negligible level. Some people lost their tiller's right to cover school expense or medical payment. There is a big difference between land right holders and landless households in terms of household income. Average household income of the land right holders is more than double than that of landless households.

Education Profile

In terms of education profile of the region, the trends in Bago are reported to be comparable to that of Myanmar. It is reported that pre-school attendance amongst children aged 3-5 years is low, with only about a fifth of the children attending pre-school in the Bago East. On the other hand, the primary school enrollment rate in Bago East is 87% while that for Bago West is 81%. However, it is reported that of those enrolled in primary schools, only 51% in Bago West and 44% in Bago East complete schooling on time. Pyay District has three universities which are Pyay University (PU), Pyay Technological University (PTU) and Government Computer University (GCU) ⁽¹⁾.

Livelihood Profile

The Bago region is characterised by features of both mountains and floodplains, which also plays a role in the livelihood profile of the region. While the forest cover of the mountains serves an important purpose for teak production, the floodplains are used for rice production, and other crops such as betel nut, sugarcane, maize, sesame, black gram, green bean, pigeon pea, groundnut, sunflower, beans and pulses, rubber etc. Apart from this, the region also has a proportion of mining and industries, primarily for petroleum production and some processing of agriculture and forest products, including salt, ceramics, sugar, paper, plywood, distilleries and monosodium glutamate (MSG).

While most of the agricultural production is undertaken on small farms, the region plays a critical role in the rice production in the country, being the second largest producer of rice, after Ayeyarwady.

Social and Physical Infrastructure

Water and Sanitation

The main sources of drinking water for the region are in the form of private and public taps, deep wells, hand dug wells and open ponds. Most (81.3%) of the region is reported to have access to these services within a radius of 30 minutes.

However, in terms of sanitation facilities, according to the multiple Indicator Cluster Survey (MICS-2010) approximately 12% and 20% of the households in Bago West and Bago East, respectively, do not have access to improved sanitation and 2% and 6% reported practicing open defecation. The

⁽⁵⁾ http://www.unicef.org/myanmar/Bago_Region_Profile_Final.pdf, accessed 21 Oct 2014

Knowledge, Attitude and Practice (KAP-2011) Survey on Water and Sanitation revealed that the situation may actually be much worse, especially in some areas. For example, in Paukkhaung Township (Bago West), almost 44% of households were not using improved latrines and 10% were practicing open defecation.

Health Seeking Behavior

The health services in the region are provided partly by private health facilities (including private clinics, dispensaries, traditional doctors and auxiliary midwives) and partly by the Ministry of Health along with support from various international Non-governmental Organisations (NGOs).

The health services in the region are reported to be comparable to the national averages. However, children in Bago, especially Bago East, are less likely than the average Myanmar child to be born in a health facility where life-saving obstetric care would be available in case of complications. On the other hand, the immunisation rates are reported to be higher, while comparable to the national average. The use of oral rehydration therapy (ORT), to prevent life-threatening dehydration associated with diarrhea among children, is employed in only 59% of cases in Bago East.

Prevalence of diarrhea among children aged 0-59 months in Myanmar has increased from about 4% in 2003 to almost 7% in 2009-2010. While diarrhea prevalence has remained at about 5% in Bago West during the same period, it has increased from 3% to 11% in Bago East.

Furthermore, among those reached by the public health system, fewer than half the pregnant women in Bago (West and East) are likely to be tested for HIV and receive the test result. While use of ART for PMTCT (prevention of mother-to-child transmission) is higher in Bago than the national average, HIV-testing for infants born to HIV-positive mothers within the prescribed period of 2 months after birth is reported to be low, varying from 4% in the West to 14% in the East.

Areas of Cultural Significance

The Bago Region historically was the capital of the Mon ethnic group and was the capital of the independent Mon Kingdom of the same name. Apart from its political importance, the region has a significant religious significance, primarily stemming from the legend of Buddha travelling around Southeast Asia eight years after his enlightenment and saw a pair of "Hamsa" birds on a small piece of land where the Bago region is now. As a result of this, the city acquired various Buddha relics and is a major pilgrimage site with several sacred structures built in the 15th - 16th century. The region presently is characterized by ancient ruins and numerous restored pagodas, some of the main sites in the region are as follows:

- Shwemawdaw Paya: this is the tallest pagoda in the country at a height of 375 feet, it is also known as the Golden God Temple. It was originally

built in the 8th Century and has over time been enlarged on numerous occasions, usually following severe earthquakes. The majestic gold-encrusted pagoda takes on the shape of a spire, which was reportedly built by two merchants to house the strands of hair and teeth of the Buddha. This is reported to be one of the holiest sites in the region and is one of the pilgrimages in Buddhism;

- The Shwethalyaung Buddha: the Shwethayaung Buddha is the second largest Buddha in the world with a length of 180 feet and height of 54 feet and is reported to have been built more than 1,000 years ago. The reclining Buddha depicts Gautum Buddha on the eve of his entry into Nirvana.
- Kanbawzathadi Palace: the Palace is the home of the 16th century royal king Bayinnaung, who was the founder of the Second Myanmar Empire. Though the site burnt down hundreds of years ago, the golden structure has been thoroughly excavated, revealing structure after structure of this nearly 10-acre complex, and is now almost entirely rebuilt. The palace grounds are adorned with traditional art, statues, and paintings, and beautiful gold embroidered designs on the maroon bases of the palace pillars.
- Maha Kalyani Sima: this hall was built in the 15th century and has served as the Sacred Hall of Ordination for Theravada Buddhists.
- Kyaikpun Paya: Another of Bago's famous Buddha images, the Kyaikpun Paya, depicts four enormous and different images of Buddha. Each are nearly 100 feet (30 meters) tall and are sitting in meditation pose in golden robes almost back-to-back against a cube-shaped pillar, facing the four cardinal directions of the compass.

5.3.4

Summary

From the literature review of desktop information presented above, it is revealed that significant information gaps existed on the biological and human environment within PSC H. These data gaps would require to be filled in for the understanding of potentially significant impacts from the Project and derivation of appropriate mitigation measures to control such impacts to the environmental and social receptors. Thus, the baseline surveys of the following aspects were conducted prior to the commencement of the Project to address the key environmental, social and health issues:

1. Biological Environment

- Habitat mapping and vegetation surveys;
- Terrestrial fauna surveys, including avifauna (birds), mammals, herpetofauna (amphibians and reptiles) and butterflies; and
- Aquatic fauna.

2. Human Environment

- Household survey; and
- Stakeholder consultation.

The methodology and findings of surveys for biological and human environment are detailed in the following *Sections 4.4-5*.

5.4 ***BASELINE SURVEYS FOR BIOLOGICAL ENVIRONMENT – TERRESTRIAL ECOLOGY***

This section describes the biological environment of the Study Area for the proposed seismic survey. The baseline information has been gathered during focussed baseline field surveys conducted during the dry season in January 2015. The discussion is limited to those biological components either recorded or likely to be found within the Study Area. These include the following:

- Habitats and Vegetation;
- Avifauna (Birds);
- Herpetofauna (Amphibians and Reptiles);
- Mammals;
- Butterflies; and
- Aquatic fauna.

Each of the above are discussed in turn below.

5.4.1 ***Habitats and Vegetation***

Methodology

Field survey focusing on habitat and vegetation (including trees) within the Study Area was performed in January 2015 to establish the general terrestrial ecological profile of the Study Area. Habitats were mapped based on publicly available aerial photos and field ground-truthing. Representative areas of each habitat type were surveyed on foot. Plant species of each habitat type encountered and their relative abundance were recorded with special attention to rare or protected species.

Results

The area surveyed within the Study Area was found to comprise four (4) key habitat types, including forest, cultivated land, developed area and reservoir (*Figure 5.9*). Lengths of seismic lines that overlapped with each of these habitats are presented in *Table 5.8*.

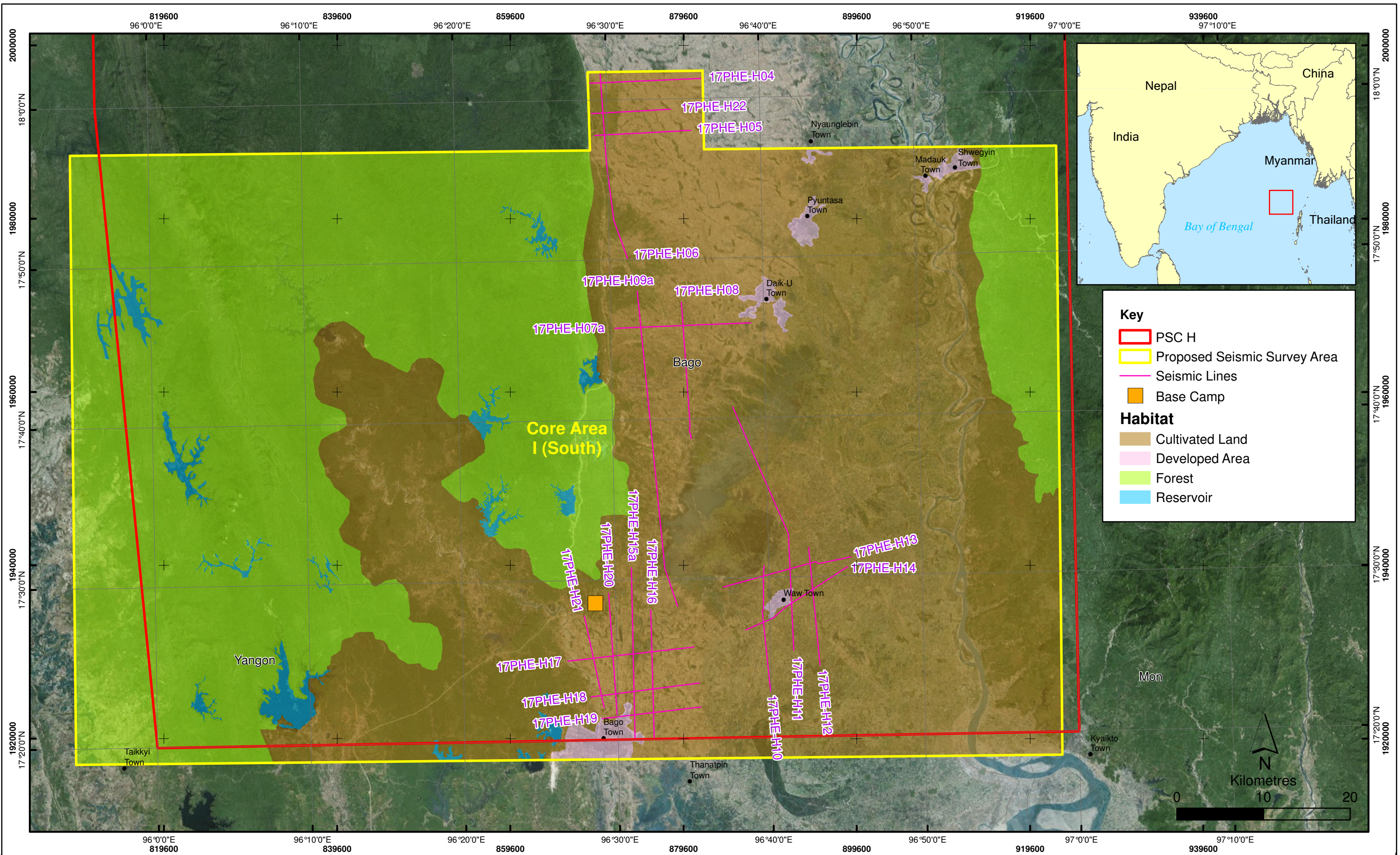


Figure 5.9

Habitat of Core Area I in PSC H

File: T:\GIS\CONTRACT\0273740\Mxd\2017\0273740_Block_H_South_Habitat.mxd
 Date: 3/11/2017

Environmental
 Resources
 Management



Cultivated land was the main habitat type along the seismic survey lines cover 99.3% of the total length. Developed area is the other habitat type along the lines, covering 0.7% of the total length only.

Table 5.8 *Estimated Length (Total and Percentage) of the Seismic Line that overlapped with each Habitat Type*

Habitat	Length (km)	Percentage along the Proposed Seismic Line (%)
Cultivated Land	305	99.3
Developed Area	2	0.7
TOTAL	307	100

A total of 73 plant species were recorded within the Study Area (see *Annex A*). The highest number of plant species was recorded in forest habitat, followed by cultivated land and developed area. Amongst the species recorded, the tree species *Dipterocarpus alatus*, is being considered as an endangered species in the 2015 IUCN Red List of Threatened Species ⁽¹⁾. This species has been recorded in Bangladesh, Cambodia, India, Philippines, Thailand and Vietnam and is known to be threatened due to habitat loss. Within the Study Area, this species is recorded at the forest habitat type. In addition, the Dahat Teak (*Tectona hamiltoniana*) which was recorded in cultivated land of the Study Area is considered as an endangered species in Myanmar. Other plant species recorded are regarded as common and widespread species with no recognised conservation interest. The photos of representative plant species recorded are shown in *Figure 5.10*.

The following sections present a description of the vegetation of each habitat type along with representative photos.

Figure 5.10 *Photos of Representative Plant Species*



Bombax ceiba



Cynodon dactylon

⁽¹⁾ The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 23 February 2015.



Mitragyna parvifolia



Thyrsostachys regia

Forest

Forest habitat was found to be mainly restricted to the areas with hilly terrain and was relatively undisturbed from human activities (see Habitat Map in *Figure 5.9*). No forest habitat overlapped with the proposed seismic survey lines.

Photographic record of the forest is shown in *Figure 5.11*. A total of 40 plant species were recorded in the forest, of which 31 were tree species (see *Annex A*). The dominant plant species recorded in the forest was the tree species *Lannea coromandelica*. Amongst the species recorded, the tree species *Dipterocarpus alatus*, is being considered as an endangered species in the 2015 IUCN Red List of Threatened Species ⁽¹⁾. Other plant species are regarded as common and widespread species within no recognised conservation interest.

As a conservative approach, all forests within the Study Area are considered as with high ecological value / receptor sensitivity with regard to its naturalness and size, as well as the presence of a suite of species of recognised conservation importance reported within it (please refer to findings of the avifauna, herpetofauna and mammal surveys in later section).

⁽¹⁾ IUCN (2015) *Op. cit.*

Figure 5.11 Representative Photo of Forest Habitat Type



Cultivated Land

Cultivated habitat was the second largest habitat type found within the Study Area (see Habitat Map in *Figure 5.9*). This habitat was mainly restricted to low terrain areas which accounted for 99.7% of the Study Area. Cultivated land is regarded as modified habitat with low ecological value / receptor sensitivity.

Agricultural land is mainly paddy field cultivated with Asian Rice (*Oryza sativa L*). A total of 11 plant species was recorded and plant species of recognised conservation interest was not found, except for the Dahat Teak (*Tectona hamiltoniana*) which is considered as an endangered species in Myanmar.

Representative photo of agricultural land is shown in *Figure 5.12* below.

Figure 5.12 *Representative Photo of Cultivated Land Habitat Type*



Developed Area

Developed area covered 0.3% of the seismic survey lines (see Habitat Map in *Figure 5.9*). It is mainly the town areas of Bago, Waw and Yedashe etc. The developed area is regarded as man-made, disturbed habitat with low ecological value / receptor sensitivity. A photographic record of developed area is shown in *Figure 5.13*.

A total of 14 plant species was found within the developed area of the Study Area (see *Annex A*). The plant species in the developed area was dominated by flowering plants and Mango Tree (*Mangifera indica* L.), Neem (*Azadirachta indica*) and Banana Tree (*Musa* spp) were commonly found. No plant species of recognised conservation interest was recorded within this habitat type.

Figure 5.13 Representative Photo of Developed Area



Reservoir

A few reservoirs were also observed within the Study Area which provided aquatic habitats (Figure 5.9). No reservoir overlapped with the proposed seismic survey lines.

A total of four (4) plant species was recorded within this habitat type and none of them are considered of recognised conservation interest. This habitat is considered as with low ecological value / receptor sensitivity with regard to its man-made nature.

A photographic record of river is shown in Figure 5.14.

Figure 5.14 *Representative Photo of Reservoir Habitat Type*



5.4.2 *Avifauna (Bird)*

Methodology

The avifauna (bird) communities of each habitat types within the Study Area were surveyed using the qualitative transect count method. During the survey, all birds seen or heard from either sides of the transect were identified to species where possible with their relative abundance noted. Signs of breeding (eg nests, recently fledged juveniles) within the Study Area were also recorded, if any. Observations were made using binoculars and photographic records were taken, if possible. Special attention was paid to egretry, wetland dependent and migratory birds.

Results

A total of 76 bird species were recorded during the survey period within the Study Area (see *Annex B*). Barn Swallow (*Hirundo rustica*), Common Myna (*Acridotheres tristis*) and House Sparrow (*Passer domesticus*) were common bird species found in the Study Area. The abundance of bird was noted to be higher in cultivated land and developed area while the species richness was the highest in forest habitat with a total of 35 species recorded.

According to the 2015 IUCN Red List of Threatened Species ⁽¹⁾, two (2) bird species, Grey-headed Parakeet (*Psittacula finschii*) and Hooded Treepie

⁽¹⁾ IUCN (2015) *Op. cit.*

(*Crypsirina cucullata*), are considered as near-threatened species. These species were found at the forest habitat of the Study Area.

Grey-headed Parakeet (*Psittacula finschii*) is a native species in Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Thailand and Vietnam ⁽¹⁾. Globally, this species is suspected to be undergoing a moderately rapid population decline due to habitat loss and trapping pressure. In Myanmar, this species has, however, been described as common in deciduous forest and partly cultivated areas.

Hooded Treepie (*Crypsirina cucullata*) is endemic to the dry zone of central Myanmar ⁽²⁾. It was formerly considered as common, however, the population has declined sharply as a result of habitat loss through agricultural development. This species is noted to occur in occurs in dry dipterocarp forest, dry thorn scrub forest, secondary growth and the edge of agricultural land in the lowlands to 1,000 m elevation. Recent surveys indicated that this species remained locally common in extensive areas of suitable habitat.

In addition to the above, two endemic and protected bird species in Myanmar, Burmese Bushlark (*Mirafra microptera*) and White-throated Babbler (*Turdoides gularis*), were recorded at forest habitat and cultivated land within the Study Area, respectively. The population trends of these species are noted to be stable in Myanmar and are listed as least concern species on the 2015 IUCN Red List of Threatened Species ⁽³⁾.

Other bird species recorded are regarded as common and widespread species within no recognised conservation interest. Selected photo records of identified bird species are shown in *Figure 5.15*.

Figure 5.15 *Photo Records of identified Bird Species*



Black Drongo *Dicurus macrocerus*



Watercock *Gallinix cinerea*

⁽¹⁾ IUCN (2015) *Op. cit.*

⁽²⁾ BirdLife International (2012) *Crypsirina cucullata*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 23 February 2015.

⁽³⁾ IUCN (2015) *Op. cit.*



Siberian Stonechat *Saxicola maura*



White-throated Babbler *Turdoides gularis*

5.4.3 *Herpetofauna (Amphibians and Reptiles)*

Methodology

Herpetofauna survey was conducted through direct observation and active searching in all habitat types in potential hiding places such as amongst leaf litter, inside holes, under stones and logs within the Study Area. Particular attention was given to streams and watercourses. Auditory detection of species-specific calls was also used to survey frogs and toads. During the surveys, all reptiles and amphibians sighted and heard were recorded. Interviews were also conducted with villagers to gather information of the herpetofauna species they found within the Study Area.

Results

During the herpetofauna survey, six (6) amphibian species and 10 reptiles species were record within the Study Area through observation and interview (see *Annex C*). It is important to note, however, that data obtained through interviews has not been verified through observation by the survey team. Selected photo record of identified herpetofauna is shown in *Figure 5.16*.

The species richness of herpetofauna was the highest in forest and cultivated land within the Study Area. Common herpetofauna species recorded included Water Snake (*Xenochrophis* sp.), Common Toad (*Bufo melanostictus*), Cricket Frog (*Fejervarya limnocharis*), Groaning Frog (*Humerana humeralis*) and Spotted Tree Frog (*Polypedates maculatus*). According to villagers, the following species of recognised conservation interest were found within the Study Area:

- Burmese Python (*Python molurus*): this snake species is considered as a vulnerable species in the 2015 IUCN Red List of Threatened Species ⁽¹⁾. Although it has a known wide distribution range throughout Southeast Asia, there is evidence of extensive and widespread population decline of this species which is believed to be related to harvesting for its skin, traditional medicine and pet trade, as well as habitat degradation. The Burmese Python is mostly found in forest areas. Within the Study Area, it

⁽¹⁾ IUCN (2015) *Op. cit.*

is reported by the villagers in all four habitat types (i.e. forest, cultivated land, developed area and reservoir).

- Indian Black Turtle (*Melanochelys trijuga*): this species is considered as lower risk / near threatened in the 2015 IUCN Red List of Threatened Species ⁽¹⁾. The population of this species in Myanmar is even presumed to be vulnerable or endangered. It is reported by the villagers to be found in the forest habitat type with the Study Area.

Beside the above species, other herpetofauna species recorded are regarded as common and widespread species within no recognised conservation interest.

Figure 5.16 *Cricket Frog (Fejervarya limnocharis) observed at Reservoir*



5.4.4 *Mammals*

Methodology

As most mammals often occur at low densities, all sightings, tracks, and signs of mammals (including droppings) were actively searched along the survey transects during the field survey. Interviews were also conducted with villagers to gather information of the mammal species they found within the Study Area.

⁽¹⁾ IUCN (2015) *Op. cit.*

Results

Twenty (20) mammal species were recorded within the Study Area through observation and interview (see *Annex D*). It is important to note, however, that data obtained through the interviews has not been verified through observation by the survey team. Amongst the recorded mammal species, the Pallas's Squirrel (*Callosciurus erythraeus*) was considered to be common species which was observed within the Study Area during the field visit. Most mammal species was reported within the forest of the Study Area.

According to villagers, the following mammal species of recognised conservation interest were found within the forest habitat of the Study Area:

- Asian Elephant (*Elephas maximus*): this species is considered as an endangered species in the 2015 IUCN Red List of Threatened Species because of population size reduction. The main threats include habitat loss/degradation and poaching. It is believed that this species has an overall population decline of at least 50% over the last three generations (60 - 75 years). It is widespread with isolated populations in Asia, including Bangladesh, Bhutan, India, Nepal, Sri Lanka, Cambodia, China, Indonesia (Kalimantan and Sumatra) Laos, Malaysia (Peninsular Malaysia and Sabah), Myanmar, Thailand, and Vietnam. During the field visit, footprint of elephant was observed in forest area (*Figure 5.17*).
- Binturong (*Arctictis binturong*): this species is considered as a vulnerable species in the 2015 IUCN Red List of Threatened Species because of population decline. It has been affected by over-exploitation, shrinkage in distribution, habitat destruction and degradation, and wildlife trade. Habitat loss is reported to be the predominant factor of the population decline. It has a known wide distribution range throughout south and southeast Asia, including Bangladesh, Bhutan, Myanmar, China, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand and Vietnam.
- Chinese Pangolin (*Manis pentadactyl*) has previously been observed in forest of the Study Area. This species is considered as a critically endangered species in the 2015 IUCN Red List of Threatened Species ⁽¹⁾ and is also protected by the *Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)*. The population of this specie is noted to be drastically declined due to high levels of poaching for meat and scales, both targeted and untargeted, across its range. It is reported that this species can be found in a wide range of habitats including primary and secondary tropical forests, limestone forests, bamboo forests, broad-leaf and coniferous forests, grasslands and agricultural fields. The status of this species in Bangladesh, Bhutan, Myanmar and Thailand is unknown.
- Dhole (*Cuon alpinus*): this species is considered as an endangered species in the 2015 IUCN Red List of Threatened Species because of population decline.

⁽¹⁾ *Ibid.*

It is estimated that fewer than 2,500 mature individuals remain in the wild and the declining trend is expected to continue. The main threats include ongoing habitat loss, depletion of prey base, interspecific competition, persecution and possibly disease transfer from domestic and feral dogs. It has been recorded in India, Bhutan, Bangladesh, Myanmar, Laos, Cambodia, Vietnam and Thailand.

- Greater Slow Loris (*Nycticebus coucang*): this species is considered as a vulnerable species in the 2015 IUCN Red List of Threatened Species because of population decline. The decline is mainly due to harvesting for pet trade and extensive habitat loss. The species occurs in Indonesia, West Malaysia, southern peninsular Thailand and Singapore.
- Hog Badger (*Arctonyx collaris*): this species is considered as a near threatened species in the 2015 IUCN Red List of Threatened Species because of population decline. Although it is widespread in Central to Southeast Asia, it is severely threatened in some areas including Laos, Vietnam, southeastern China by exploitation. The population in Myanmar may also be severely threatened, but more research and monitoring is needed to quantitatively determine the effect of exploitation on the population.
- Marbled Cat (*Pardofelis marmorata*): this species is considered as a vulnerable species in the 2015 IUCN Red List of Threatened Species because of population decline. It is forest-dependent and hence habitat loss due to deforestation is a severe threat to this species. It occurs at low densities and the estimated population size is likely to be fewer than 10,000 mature individuals. The species occurs in Bhutan, Brunei Darussalam, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.
- Sun Bear (*Helarctos malayanus*): this species is considered as a vulnerable species in the 2015 IUCN Red List of Threatened Species because of population decline. It is forest-dependent and hence habitat loss/fragmentation due to deforestation is a severe threat to this species. It is believed that the population has declined more than 30% over the last three (3) generations (30 years) and is expected to continue. The main threat is a combination of habitat loss and hunting. The species occurs widely in South and Southeast Asia, including Bangladesh, Brunei Darussalam, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam.
- Sunda Pangolin (*Manis javanica*): this species is considered as a critically endangered species in the 2015 IUCN Red List of Threatened Species because of high levels of hunting and poaching for its meat and scales to China. It is believed that the population has declined by 80% in three generations (21 years) and is expected to continue at the same rate. It is widely distributed in Southeast Asia, including Myanmar, southern China, Laos, Thailand, Vietnam, Cambodia, Malaysia and Indonesia. However, the population in central and southern Myanmar is thought to be eradicated from lowland areas due to human agricultural expansion and hunting.

Figure 5.17 *Footprint of Elephant observed at Forest Habitat*



5.4.5 *Butterflies*

Methodology

Butterflies at different habitats within the Study Area were surveyed using qualitative transect count method. Butterflies from either side of the survey transect were identified with their relative abundance noted.

Results

In total, 21 butterfly species were recorded within the Study Area (see Annex E). It was noted that the relative abundance of butterfly was higher in cultivated land and developed area while the species richness was the highest at cultivated land. Plain Tiger (*Danaus chrysippus chrysippus*), Common Tiger (*Danaus genutia genutia*), Common Mormon (*Papilio polytes romulus*), Lime Butterfly (*Papilio demoleus demoleus*), Common Grass Yellow (*Eurema hecabe hecabe*) and Lemon Emigrant (*Catopsilia pomona Pomona*) were common species recorded within the Study Area. No butterfly species of recognised conservation interest was found within the Study Area. Selected photo records of identified butterfly species are shown in Figure 5.18.

Figure 5.18 Photo records of identified butterfly species



Peacock Pansy *Junonia almana almana*
(Linnaeus, 1758)



Grey Pansy *Junonia atlites atlites* (Linnaeus,
1758)

5.4.6 Aquatic Fauna

Methodology

Fishes were collected with the help of local fishermen within the Study Area by using local fishing gears (e.g. fish traps, gill nets etc) to obtain a qualitative species list. Fish species which could not be identified in the field were preserved in 10% formalin solution and sent to laboratory for later identification.

Results

A total of 23 fish species were recorded from the aquatic habitats of the Study Area (see Annex F). Photo records of identified aquatic fauna species are shown in Figure 5.19. Commercially important fish species including Bronze Featherback (*Notopterus notopterus*), Catla (*Catla catla*) and Common Carp (*Cyprinus carpio*) were recorded within the Study Area. Amongst the fish species recorded, Common Carp (*Cyprinus carpio*) and Mrigal Carp (*Cirrhinus cirrhosis*) are considered as vulnerable fish species by the 2015 IUCN Red List of Threatened Species ⁽¹⁾. Common Carp is noted to be threatened by river regulation and hybridisation with introduced stocks while Mrigal Carp is an introduced species in Myanmar. In addition, Butter Catfish (*Ompok bimaculatus*) and Wallago (*Wallago attu*) were considered as near threatened in the 2015 IUCN Red List of Threatened Species ⁽²⁾. Butter Catfish (*Ompok bimaculatus*) is, however, reported to be relatively abundant throughout its distribution and no empirical data on declines in its entire range is available. For Wallago (*Wallago attu*), it is also considered as widely distributed and hence has a very large population although it is noted to be overexploited as a food fish.

Other fish species were considered as common and widespread with no recognised conservation interest.

⁽¹⁾ IUCN (2015) *Op. cit.*

⁽²⁾ IUCN (2015) *Op. cit.*

Figure 5.19 *Photo Records of identified Aquatic Fauna Species*



Snakehead Murrel *Channa striata*



Common carp *Cyprinus carpio*



Asian swamp eel *Monopterus albus*



Freshwater garfish *Xenentodon cancila*

5.5 **HUMAN ENVIRONMENT – STAKEHOLDER ENGAGEMENT AND CONSULTATION MEETINGS**

5.5.1 **Approach and Methodology**

For the purpose of establishing the human environment baseline, a phased participatory approach was adopted as is discussed in the following sub sections. Through this approach an attempt was made to integrate the local understanding and perspective into the impact assessment process and the identification of the mitigation measures. The purpose of such an approach was to allow for:

- The triangulation of the information available from secondary sources through the information made available by the local community, both qualitative and quantitative;
- Formulation of the socio-economic baseline on the basis of a combination of primary and secondary qualitative and quantitative data;
- An understanding to be developed of the community's perception towards the industries, the past interaction with similar projects and the experiences of the same; and

- An understanding to be developed of the local community's perception of the Project and its activities and the possible impacts from the same and the desirable mitigation measures

In keeping with this approach, the study was divided into the following stages.

Definition of Project Area

The Project Area for the purpose of the social impact assessment was limited to the villages where the seismic survey will be carried out. This was done with an understanding that most of the impacts associated with the Project are supposed to be localised. The baseline section captures the information pertaining to the villages identified in the Project Area.

Secondary Data Collection

For the purpose of secondary data collection for the baseline, the information available in the public domain was collected and reviewed. This, along with the primary data collected was used to develop the social baseline for the Project. The secondary data collection and review was undertaken across the Study period. However, to start with this was primarily to understand the preliminary socio-economic profile of the region, critical issues related to livelihood, gender, ethnic issues (if any), dependency on land, presence of civil society and NGOs in the area etc. Information specific to the Project Area is limited and generic in the public domain (especially available online). Nevertheless, it has informed the development of survey and consultation tools to be used for the purpose of baseline data collection and subsequently informing the impact assessment process for the Project.

Formulation of the Primary data collection tools

On the basis of the understanding thus developed on the Project, the tools for the purpose of the primary data collection for the impact assessment of the Project were identified. These tools included both qualitative and quantitative tools such as Focus Group Discussion (FGD) checklists and household and community survey tools. The purpose of these tools was to allow for a triangulation of the information available from the secondary sources as well as capture the individual perceptions/viewpoints of the various stakeholder groups towards the project, its activities and its possible impacts and mitigation measures.

The community and household (HH) survey tools were aimed at allowing for an understanding to be developed of the village profile and the community's perceptions towards the Project and its activities. The FGD Checklists on the other hand were identified for the purpose of understanding the specific impacts on land use and activities such as fishing due to the Project activities and the perceptions of the various stakeholder groups. These tools were aimed at developing an understanding of the following:

- Previous instances of land acquisition in the area and the impacts associated with it in the long run;
- Changing patterns of land use and livelihood profiles in the villages owing to the oil and gas sector in the area;
- Nature of interaction with Project;
- Tradeoffs between the negative and positive aspects of the Project in the area;
- Sharing of development benefits with the villages and expectations of the community, both directly and indirectly affected; and
- Gender based impacts in the villages.

Stakeholder Identification and Analysis

The stakeholders were identified and an understanding was developed of the individual concerns, expectations and influences of the stakeholders on the Project. The purpose of such an understanding was to allow for a proper assessment and mitigation of the impacts. On the basis of this understanding, an exercise of stakeholder mapping was undertaken, the purpose of which was to:

- Identify each stakeholder group;
- Study their profile and the nature of the stakes;
- Understand each group's specific issues, concerns as well as expectations from the Project; and
- Gauge their influence on the Project.

On the basis of such an understanding, the stakeholders were categorised into High Influence/Priority, Medium Influence/ Priority and Low Influence/Priority on the basis of their influence/power as well as interest in the Project.

Compilation of the Socio-Economic Baseline

On the basis of the information thus made available from primary and secondary sources, the following socio-economic information for the Project Area was generated:

- Demographic profile of the population;
- Socio-economic profile of the affected households/communities;
- Current land use;

- Land ownership and size of holdings;
- Local physical and social infrastructure; and
- Livelihood, health and welfare characteristics of the community

Social Impact Assessment and Formulation of Mitigation Plans

On the basis of the baseline thus established, an impact assessment was undertaken in accordance with the national guidelines and with reference to the applicable reference framework. As part of this impact assessment, a process of prediction, evaluation and mitigation of impacts was undertaken. The impacts were evaluated as positive and negative, short-term and long-term and direct or indirect. The criteria for the ratings of impacts are provided in the following *Section 5*.

On the basis of the baseline data and the impact assessment, a number of management plans were formulated for the Project. The details of these are provided in the following *Section 5*.

5.5.2 *Results and Findings*

This section provides the results of the primary data collection undertaken in January 2015, in the form of the socio-economic baseline of the area.

Project Area Profile

This section provides an understanding of the Project Area identified, which is understood to comprise of the area falling with the PSC H and its immediate vicinity, where the survey activities are to be undertaken. This Project Area is reported to be comprised of the following village tracts.

Table 5.9 *Village Tracts within the Project Area*

Village Tract	Villages
Ah Le Ywar	Ah Le Ywar
Aye Ka Yit	Aye Ka Yit
Eain Chay Lay Se	Aung Bar Lay
Hpa Yar Pyo	Hpa Yar Pyo
Kyaik Hla	Kyaik Hla
Myo Ma Lay Ward	Kyaung Su
	San Dwin Kone
NyungPin Thar	NyungPin Thar
Pidaukkhin	Pidaukkhin
Shan Ywar	Hpa Aung
Sin Sa Khan	Shwe Nyaung Pin
Tha Bauk Kan	Tha Bauk Kan
ThaPyayTan	ThaPyayTan

The following sections provide an understanding of the Project Area socio-economic profile in terms of the village tracts and the villages identified. This profile is based on the secondary information available on the region and

the primary data collected through community and sample households surveys and focus group discussions undertaken in the community

Demographic Profile

The following *Table 5.10* provides an understanding of the demographic profile of the villages in the Project Area.

Table 5.10 *Demographic Profile of the Project Area*

Village Name	Total population	Total HH	Number of HH Surveyed	Population Surveyed	Sex ratio
Ah Le Ywar	1,331	320	5	22	1,000
Aung Bar Lay			4	20	818
Aye Ka Yit	3008	721	3	15	1,143
Hpa Aung	834	185	10	45	1,647
Hpa Yar Pyo	3,082	628	1	6	1,000
Kyaik Hla	4,245	864	5	34	789
Kyaung Su (2)			1	9	500
NyungPin Thar	2,806	676	8	38	850
Pidaukkhin	2,552	706	3	17	1,000
San Dwin Kone	4,689	1,011	3	22	833
Shwe Nyaung Pin	2,121	481	5	29	813
Tha Bauk Kan	2,195	503	3	10	1,500
ThaPyayTan	1,937	495	9	36	1,000
Grand Total	28,800	6,590	60	303	980

Source: Community and HH Survey, 2015

As has been mentioned earlier, the Project Area is characterized by 13 villages in 12 village tracts. Of these 13 villages, community surveys were undertaken in 11 villages. The total population was reported to be 28,800 individuals across 6,590 households with an average household size of 4.37 individuals per household.

In the 13 villages, as part of the ESIA, household level surveys were undertaken across 60 households, with a population of 303 individuals. These households were reported to have an average household size of 5.05 individuals per household which is higher than that of the villages in the area. The households surveyed are characterized by a negative sex ratio of 980 females per thousand males, which is lower than the sex ratio of the villages in the Project Area which is a positive sex ratio of 1,106 females per thousand.

The villages in the Project Area are comprised of a population mostly of the ethnic group Bamars, with a small representation of Shan, Kay, Chinese and Indians. In terms of religion the population surveyed is comprised of Buddhist.

Table 5.11 *Dependent Population in the Households Surveyed*

Village Name	0-14 years	65 years +	Widows
Ah Le Ywar	4		
Aung Bar Lay	5	2	
Aye Ka Yit		1	
Hpa Aung	5	3	12
Hpa Yar Pyo			
Kyaik Hla	5	1	
Kyaung Su (2)			
NyungPin Thar	3	5	8
Pidaukkhin	3	3	
San Dwin Kone	3	3	4
Shwe Nyaung Pin	5	1	4
Tha Bauk Kan	1		
ThaPyayTan	9		
Grand Total	43	19	28

Source: HH Survey, 2015

Amongst the 60 households surveyed, a proportion of the population is identified as dependents on the basis of their socio-economic status in the society (Table 5.11). This population is primarily comprised of widows, elders (above 65 years of age and those below 14 years of age, the households surveyed did not report any disabled.

Of the 303 individuals, 62 individuals are reported to be in the non-productive age groups (below 14 years and above 65 years of age). Also 28 individuals of the population surveyed were reported to be widow(er)s. The total dependent population in the households surveyed is reported to be 82 individuals or 27.06% of the total population.

Land Use and Ownership

As part of the survey undertaken, an attempt was made to develop an understanding of the land use in the Project Area. The following Table 5.12 provides an understanding of the total land and the number of plots farmed.

Table 5.12 *Land Use in the Households Surveyed*

Row Labels	Total Land Acres	Average of total land (acre)	Households with titled plots	Total Plots Farmed	Average No. of Plots Farmed
Ah Le Ywar	49.40	9.88	4.00	47.50	11.88
Aung Bar Lay	13.34	3.34	3.00	10.00	10.00
Aye Ka Yit	64.24	21.41	3.00	64.00	21.33
Hpa Aung	43.62	4.36	10.00	42.50	8.50
Hpa Yar Pyo	4.00	4.00	1.00	4.00	4.00
Kyaik Hla	37.30	7.46	5.00	36.50	7.30
Kyaung Su (2)	0.50	0.50	1.00	0.50	0.50
NyungPin Thar	39.78	4.97	7.00	34.50	4.93
Pidaukkhin	515.03	171.68	3.00	39.78	13.26
San Dwin Kone	10.20	3.40	3.00	10.00	10.00
Shwe Nyaung Pin	18.17	3.63	3.00	17.00	8.50
Tha Bauk Kan	48.53	16.18	3.00	48.00	24.00

Row Labels	Total Land Acres	Average of total land (acre)	Households with titled plots	Total Plots Farmed	Average No. of Plots Farmed
ThaPyayTan	111.53	12.39	9.00	94.00	10.44
Grand Total	955.63	15.93	55.00	448.28	10.19

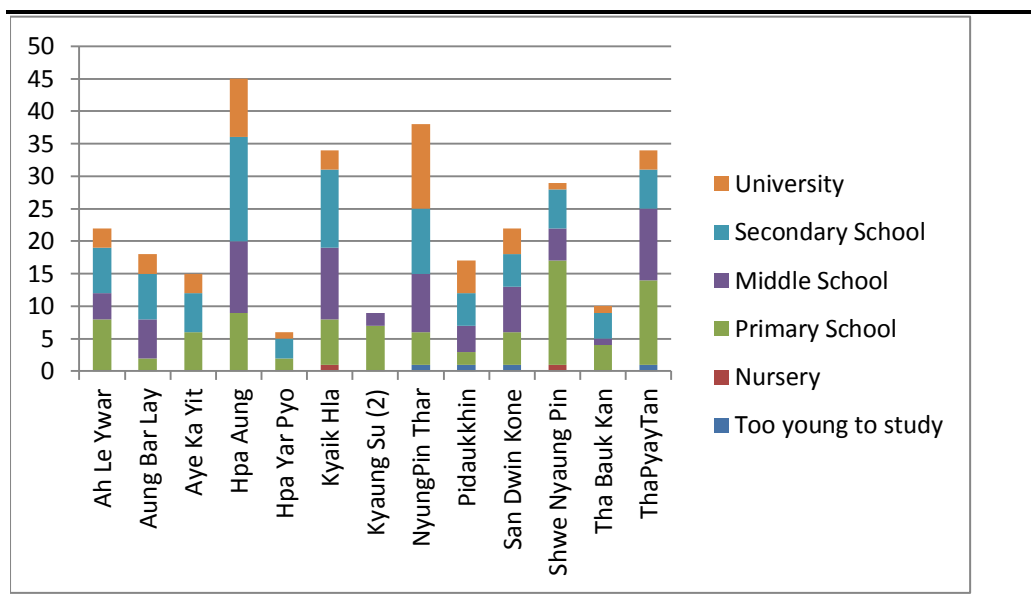
Source: HH survey, 2015

Amongst the 60 households surveyed, the total land available for agriculture was reported to be 955.63 acres, with the average acres cultivated being 15.93 acres per household. Of the 13 villages, Pdiaukkhin and Aye Ka Yit were reported to have the highest number of plots farmed, while the villages Aye Ka Yit and Tha Bauk Kan were reported to have the highest average number of plots farmed. Of the 60 households, 55 households reported to having titled plots.

Education Profile

As can be seen from the following Figure 5.20, majority of the population (159 individuals of the 303) reported having education till the middle school level.

Figure 5.20 Education Levels of the Population Surveyed



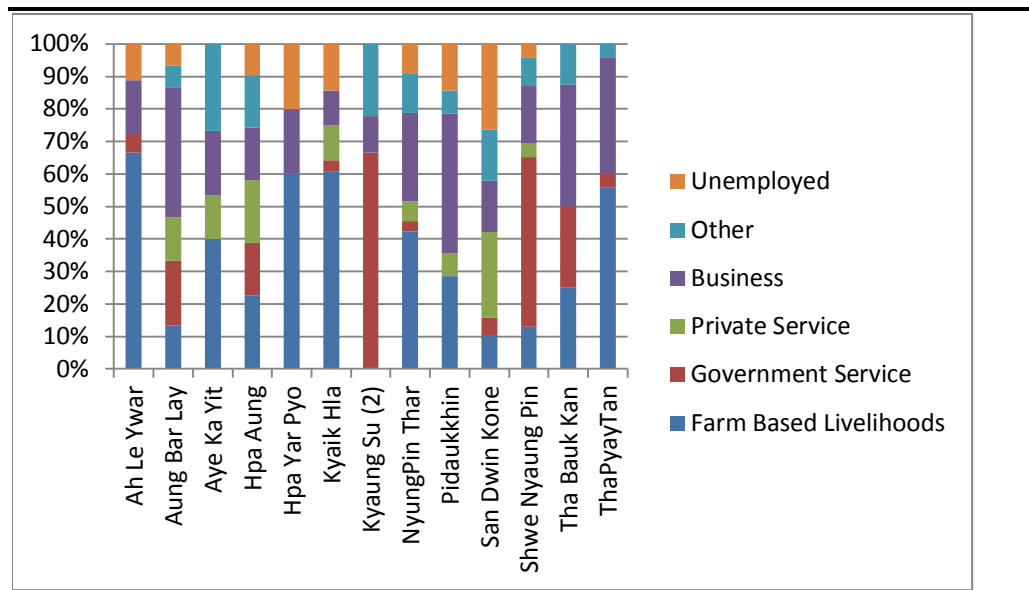
Source: Household Survey 2015

On the other hand, 136 households of the 303 reported having an education level of secondary school and above, including university education.

Livelihood Profile

This section provides an understanding of the livelihood profile of the household surveyed, as can be seen in the following Figure 5.21.

Figure 5.21 Livelihood Profile of the Population Surveyed



Source: Household Survey, 2015

Of the 303 individuals, livelihood information is available for 243, of which 86 reported to be dependent upon farm based livelihoods (including agriculture and livestock rearing). Further, 33 individuals reported a dependence on government service employment, another 22 reported working in the private sector and 56 reported to having their own business. The following subsections provide an understanding of the farm based livelihoods, which form the prominent source of income for the households surveyed.

Agriculture and Farm Based Activities

As has been mentioned above, agriculture and livestock holdings are the key source of livelihood for the households surveyed, which is in keeping with the trends reported in the region. The key crops grown in the Project Area are reported to include rice and peanuts. The following Table 5.13 provides an understanding of the production cycle of the main crops.

Table 5.13 Seasonal Calendar for Main Crops

Crop	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rained Rice	Sowing Period						■						
	Harvesting Period											■	■
Summer Rice	Sowing Period	■											
	Harvesting Period				■	■						■	■
Peanut	Sowing Period									■	■		
	Harvesting Period											■	■

Source: Farmer FGD, 2015

While rice cultivation is reported to be ideal for the tropical moist soils in the area, peanuts are reported to be favored for Sandy Loamy soil.

The crop yield in the area for rice is reported to be approximately 20 to 50 baskets per acres. The market rate for rice is about 420,000 MMK per 100 baskets during the cultivating season and 600,000 MMK in the ploughing season. However, as has been discussed earlier, despite the increased value in the ploughing season, most of the farmers are reported to sell their crop just after harvest due to issues such as storage and need for money, with most of the farmers reporting engaging in sale of 60-70% of the produce.

Agriculture activity is understood to be an activity that is undertaken by the entire household, with a division of labour along gender and age lines. The children are usually involved during breaks from their schools and are mostly involved in processes such as weeding. Women are involved in sowing, weeding and harvesting while men undertake activities such as ploughing, spreading the seeds, paddy processing and pesticide spraying.

Table 5.14 Livestock Holdings in the Households Surveyed

Village Name	Cows	Poultry	Pigs
Ah Le Ywar	2	75	8
Aung Bar Lay		3	
Aye Ka Yit		10	1
Hpa Aung	2	84	31
Hpa Yar Pyo			
Kyaik Hla	5	50	4
Kyaung Su (2)			
NyungPin Thar		362	2
Pidaukkhin	4	6	2
San Dwin Kone			
Shwe Nyaung Pin			7
Tha Bauk Kan	3	10	6
ThaPyayTan	4	48	25
Grand Total	20	648	86

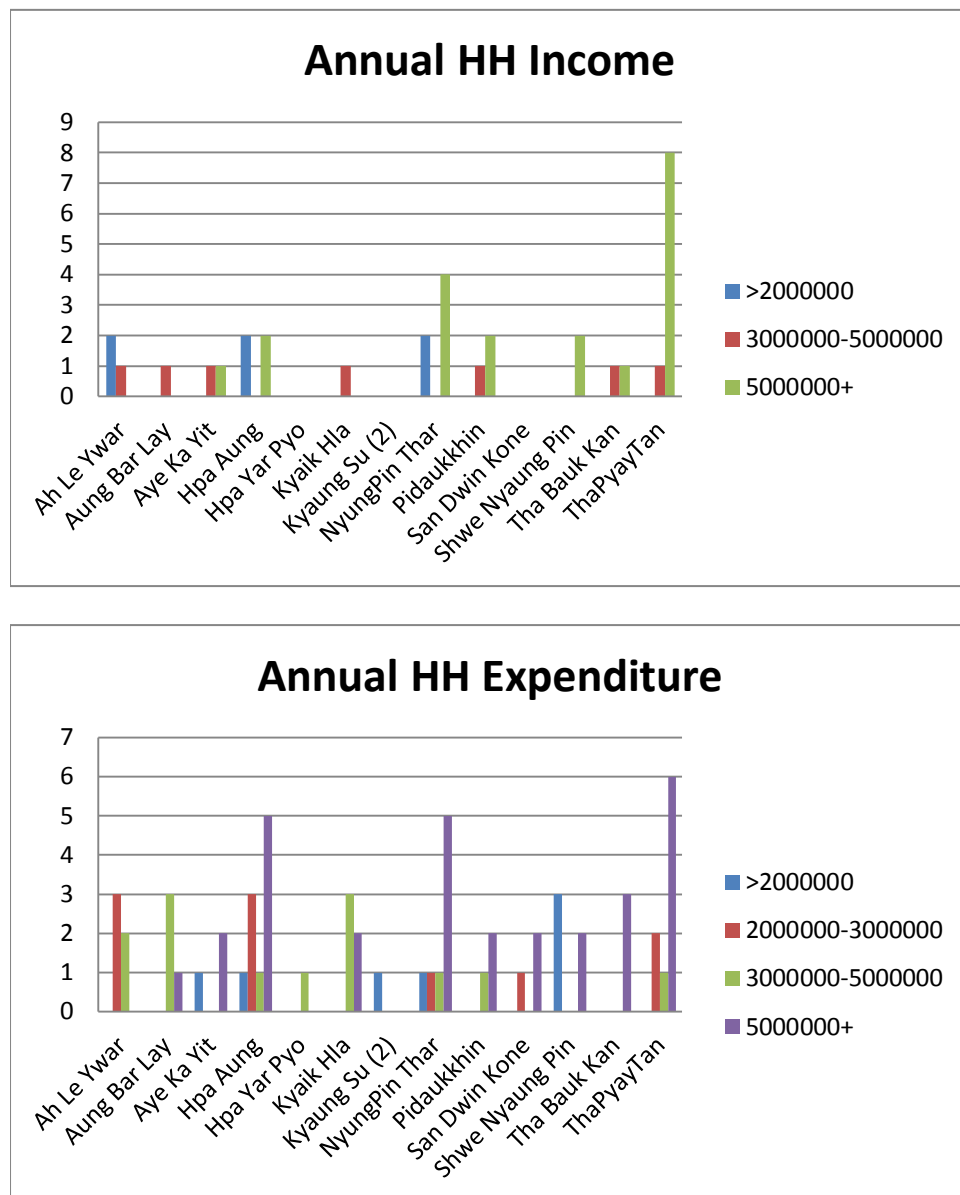
Source: Household Survey, 2015

Apart from agriculture, 30 households also reported a dependence on livestock holdings, primarily in the form of poultry, pigs and cattle (Table 5.14). However, most of these livestock holdings are reported to be primarily for the purpose of self-consumption or as draft animals for the field, with only eight (8) households reporting an income from poultry and pigs.

Income and Expenditure

Information pertaining to the annual income of the households was only available for 33 of the 60 households surveyed. According to the information made available during the household surveyed, most of the households (20 of the 33 households or 60.6% of the households) reported an income of more than 5,000,000 kyats, while six (6) households reported an annual income of less than 2,000,000 kyats (Figure 5.22).

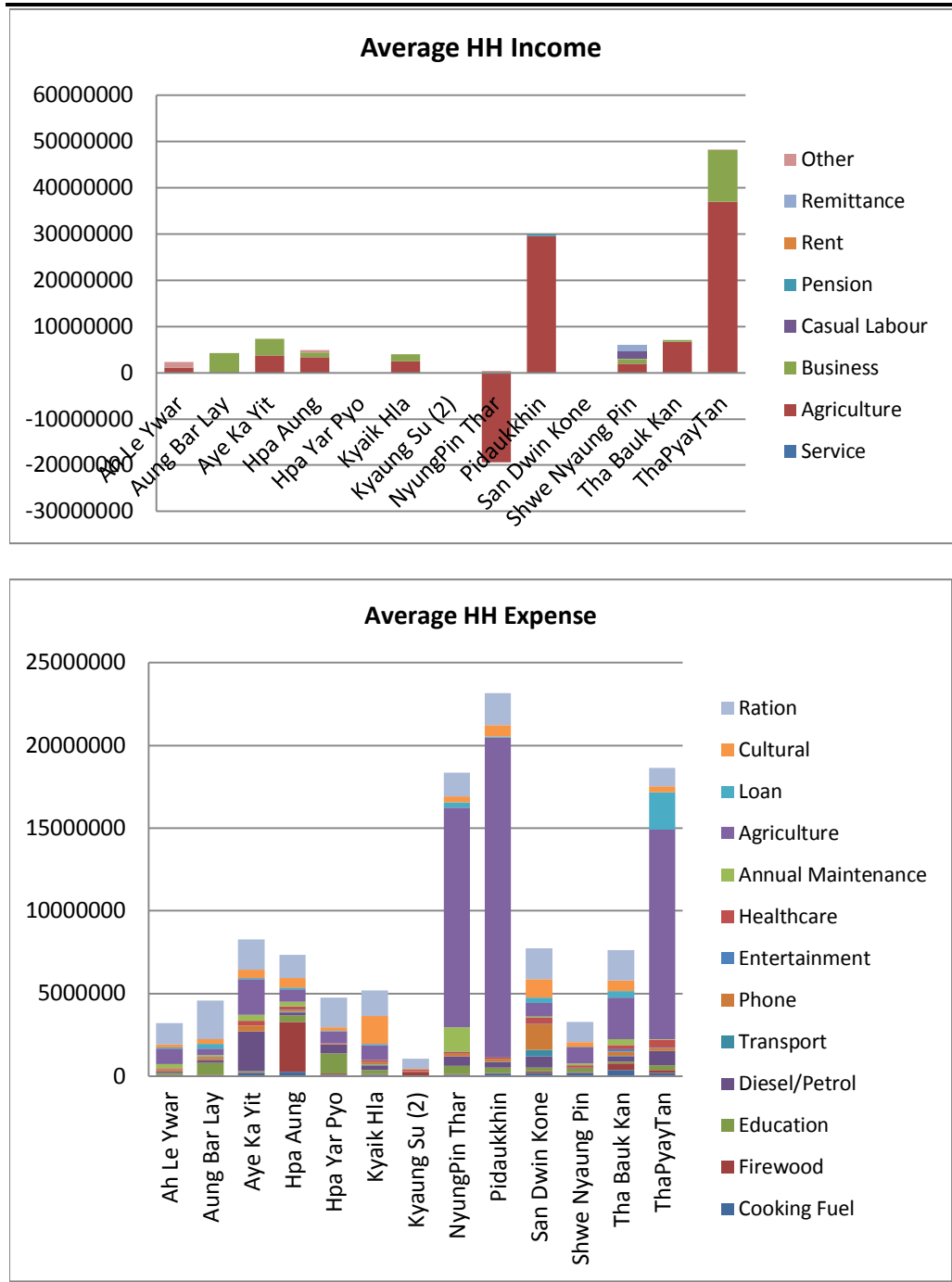
Figure 5.22 Annual Income and Expenditure of the households Surveyed



Source: Household Survey, 2015

On the other hand, 30 households reported an annual expenditure of more than 5,000,000 kyats, while seven (7) households reported an annual expense of less than 2,000,000 kyats. The following *Figure 5.23* provides an understanding of the average expenditure and income across the various heads.

Figure 5.23 *Average household Expense and Income*



Source: Household Survey, 2015

As can be seen from the above figure, the highest average income is from agriculture and business. On the other hand the highest average expense per household is reported from ration, agriculture, education and cultural/religious expenses.

It should be noted that one (1) household in NyungPin Thar reported a loss of 19,300,000 kyat in agriculture in the previous year due to a crop failure, which is reflected in the income from that household.

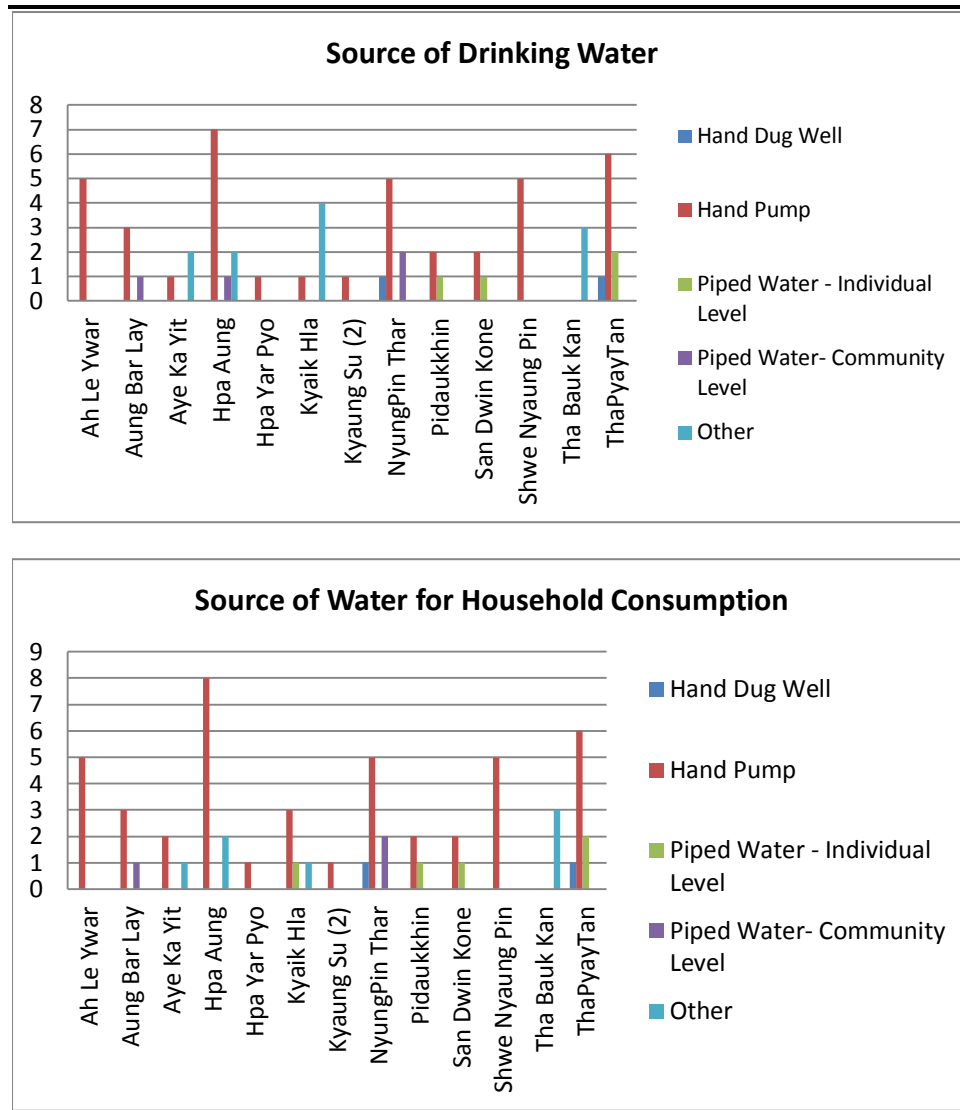
Social and Physical Infrastructure

Physical infrastructure includes infrastructure which are essential for maintenance and supply of basic services and amenities resulting in economic and social well-being. On the other hand, social infrastructure is one of the most important indicators of human development in any society, with the indices of health and education facilities occupying a central place in policy formulation and development planning.

Water and Sanitation

As can be seen from the following *Figure 5.24*, most of the households surveyed reported having access to water for household consumption and drinking water through hand pumps, with only eight (8) households in Aung Bar Lay, Kyaik Hla, NyungPin Thar, Pidaukkhin and San Dwin Kone and ThaPyayTan reporting having access to piped water supply at the community and individual household level.

Figure 5.24 Source of Water for Drinking and Household Consumption Purpose



Source: Household Survey, 2015

In terms of the months of availability, 53 households reported having perennial supply of water. The remaining households reported facing water scarcity for two (2) months from March to April. Most of the households (57 of the 60 households) reported having access to water at the household level, while only one (1) household in Kyaik Hla reported having access to drinking water at a distance of 100 m including water requirement for household purposes. Most of the households (56 of 60) reported the water quality to be good.

All the 60 households reported having access to personal latrines with septic tanks.

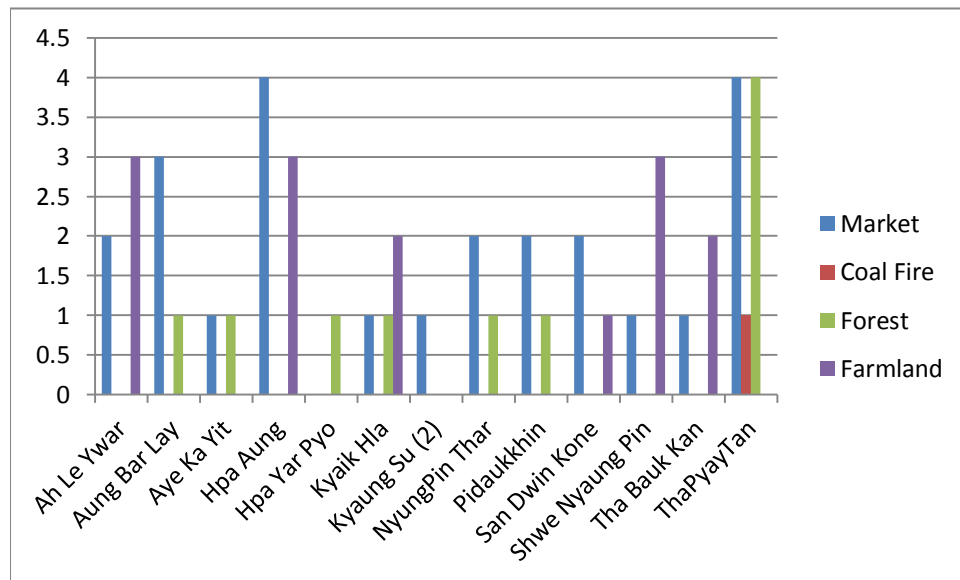
Access to Electricity and Cooking Fuel

According to information made available during the survey, 49 of the 60 households reported having access to electricity, with the villages Ah Le Ywa,

Kyaung Su and Tha Bauk Kan not reporting any household with access to electricity.

In terms of cooking fuel, 37 of the 60 households reported firewood as the cooking fuel. However, information pertaining to the cooking fuel used by the remaining 23 households was not made available during the survey. The following *Figure 5.25* provides an understanding of the sources of firewood reported by the households surveyed.

Figure 5.25 *Source of Firewood*



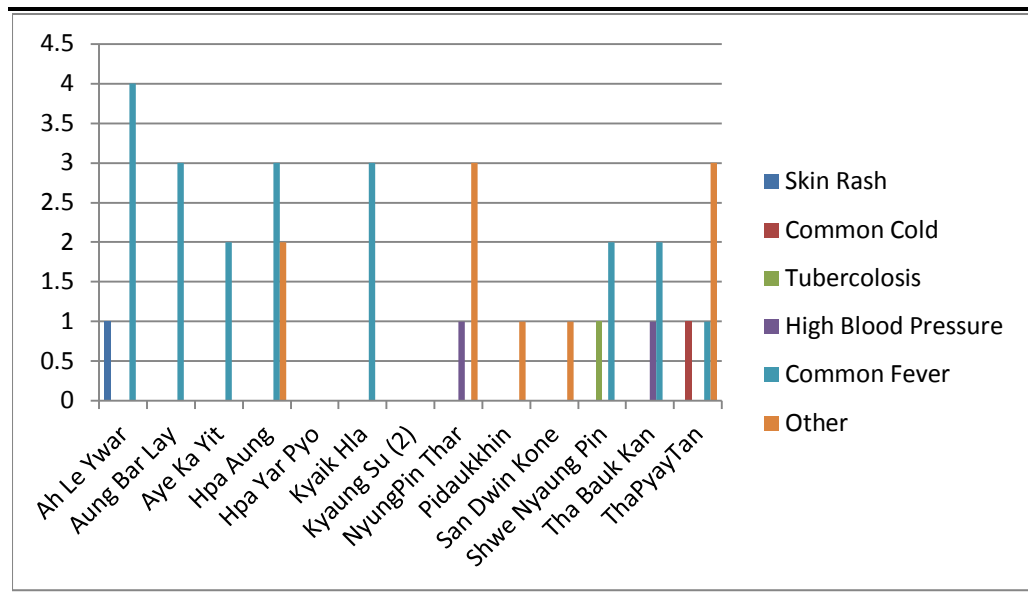
Source: Household Survey, 2015

24 households reported dependence on the market for their firewood supply, while 10 households reported depending on the neighbouring forest for the firewood. For the 11 households for whom information is available, six (6) reported having access to firewood at a distance of less than 5 miles. Most of the households (28 of 48) reported having a requirement of one (1) cart of firewood annually.

Access to Health Services and Health Seeking Behavior

According to the information available, it is understood that the overall health services available in the region are provided partly by private health facilities (including private clinics, dispensaries, traditional doctors and auxiliary midwives) and partly by the Ministry of Health along with support from various international NGOs. In keeping with this, the households surveyed reported a dependence on primarily private health facilities, which are mostly located in the townships and village tracts. The following *Figure 5.26* provides an understanding of the illnesses reported by the community in the last year.

Figure 5.26 Illnesses reported in the Last Year (2014)



Source: Household Survey, 2015

As can be seen from the above figure, the most common illnesses reported in the last year were common fever and cold, with the village Shw Nyaung Pin reporting a case of tuberculosis, and Ah Le Ywa reporting a case of skin rashes. Most of the households reported the illnesses to have occurred in the months of October-December. For the purpose of the treatment of these illnesses, most of the households (27 of the 35 households) reported to having gone to private facilities.

Access to Credit and Markets

In terms of access to credit facilities, the households surveyed reported maximum dependence on bank and informal credit systems, with 33 households reporting a dependence on banks.

The main reasons for undertaking loans were reported to include field preparation and buying seeds (56 households) and medical expenses, marriage and buying food (27 households each). This can also be seen in the fact that of the 46 households who reported an ongoing loan, 31 reported having taken the loan for field preparation.

In terms of access to market facilities, most of the households (53 of the 60) reported a dependence on the local market within their village for their daily needs. These markets are reported to be located within a distance of for most of the households surveyed (49 of the 53 households). On the other hand, for the purpose of buying and selling of seeds, agricultural implements and produce, the households reported to be dependent upon markets located in the larger villages or townships. Thirty-nine (39) of the 60 households reported to having to travel more than 15 minutes to access these markets.

Civil Society Organizations and Non-Government Organizations

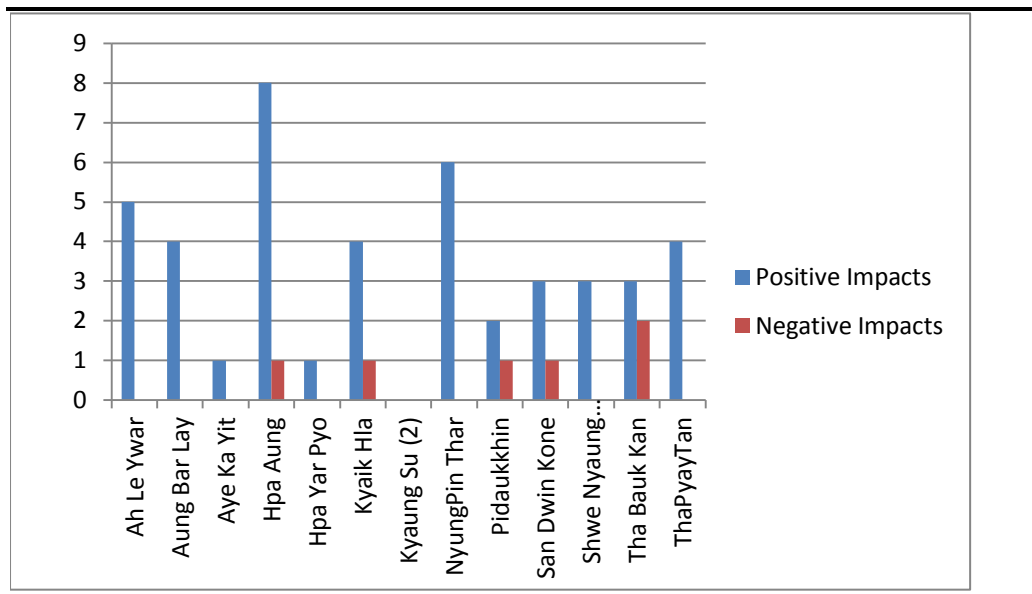
In terms of civil society organizations, 34 households reported to be a member of a community group. These groups are primarily active during social and cultural occasions.

Apart from these, one Korean NGO was reported to be active in the area. However, further details on the functioning of this NGO are presently unavailable.

Knowledge about the Project

Of the 60 households, 59 reported to not having information regarding the project. The households identified the Project Proponent as the most desirable source of information regarding the project, apart from the government.

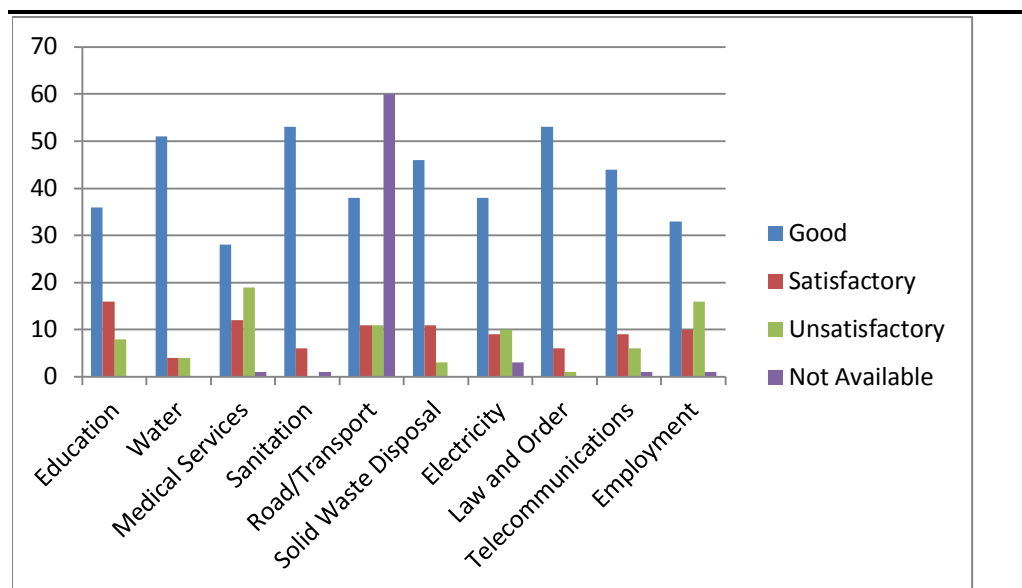
Figure 5.27 *Anticipated Impacts from the Project*



Source: Household Survey, 2015

As can be seen from the above Figure 5.27, most of the households (44 of the 60 households) reportedly expected the Project to have positive impacts for the community. The following Figure 5.28 provides an understanding of the expectation from the Project, in terms of the present availability of services.

Figure 5.28 *Expectations from the Project*



Source: Household Survey, 2015

As can be seen from the above figure, the services such as road and transport, electricity, medical services and employment were reported to be either unavailable or of an unsatisfactory nature in the villages.

Stakeholder Identification and Analysis

This sub section summarizes the stakeholder identification and analysis undertaken as part of the Project. This sub section provides the list of Project stakeholders identified, consisting of individuals, groups and organization that are affected or may be influenced by the proposed Project in the area and sorts them according to their impact on the Project and the impact the Project will have on them. This information is then used for the formulation of the Stakeholder Engagement Plan (SEP) for the Project.

The importance of such an analysis lies in the role played by such an understanding in the assessment of the socio-political environment surrounding the Project and its activities. It allows for the:

- Identification of key stakeholders, their primary groupings and sub groupings;
- Identification of the interests, concerns and potential risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Key groups/individuals to be pin pointed who need to informed about the Project activities at various stages,;
- Identifying stakeholders (those who are likely to have an adverse impact on the project) and taking appropriate measures to combat their influence;

- Identification of the impact and influence of the Project on the stakeholders and of the stakeholders on the Project; and
- Generation of information essential to the planning, implementation and monitoring of the Project.

The process of stakeholder identification and analysis thus allows for the formulation of a robust engagement strategy, which in turn allows for the concerned stakeholders to be involved in the process of identification of areas of concerns as well as formulation of mitigation measures. This in turn allows for the stakeholders to develop an understanding of the Project operations as well as the maintenance of positive relations between the stakeholders and the Project proponents.

Stakeholder Identification

A stakeholder is “a person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization’s actions, objectives, and policies”. As part of this subsection, an attempt has also been made to identify and analysis the stakeholder groups likely to be impacted due to the activities for the Project, which are listed below.

Table 5.15 Stakeholder Groups

Primary Stakeholders	Secondary Stakeholders
<ul style="list-style-type: none"> • Local community • Farmers • Vulnerable Groups, including women, elderly, handicapped etc. • Fishing groups 	<ul style="list-style-type: none"> • Government Ministries • Local Authorities • Village Level Institutions • NGOs and Civil Society Organizations • Local Media • Political Parties

Stakeholder Mapping

“Stakeholder mapping” is a process of examining the relative influence that different individuals and groups have over a Project as well as the influence of the Project over them. The purpose of a stakeholder mapping is to:

- Identify each stakeholder group;
- Study their profile and the nature of the stakes;
- Understand each group’s specific issues, concerns as well as expectations from the Project; and
- Gauge their influence on the Project.

On the basis of such an understanding, the stakeholders are categorised into High Influence/Priority, Medium Influence/ Priority and Low Influence/Priority. The stakeholders who are categorised as high influence

are those who have a high influence on the Project or are likely to be heavily impacted by the Project activities, and are thus high up on the Project proponent's priority list for engagement and consultation. Similarly, the stakeholders categorised as medium influence are those who have a moderate influence on the Project or even though they are to be impacted by the Project, it is unlikely to be substantial and these stakeholders are thus neither high nor low in the Project proponent's list for engagement. On the other hand, the stakeholders with low influences are those who have a minimal influence on the decision making process or are to be minimally impacted by the Project and are thus low in the Project proponent's engagement list.

The following table provides a brief profile of the various stakeholders identified with their key concerns in terms of the Project activities and their degree of influence.

Table 5.16 Stakeholder Mapping

Stakeholders	Stakeholder Profile	Level of Influence
Primary Stakeholders		
Local community	This stakeholder group is comprised of the local community in the project, as identified in the social baseline. This group is comprised of the community in the 13 villages in the area, across 12 village tracts, namely, Ah Le Ywar, Aung Bar Lay, Aye Ka Yi, Hpa Aung, Hpa Yar Pyo, Kyaik Hla, Kyaung Su (2), NyungPin Thar, Pidaukkhin, San Dwin Kone, Shwe Nyaung Pin, Tha Bauk Kan and ThaPyayTan. The total population in these villages is reported to be 28,800 and is comprised of Bamars, Shan, Kayin, Indians and Chinese	High
Farmers	This stakeholder group is comprised of individuals and households who undertake agriculture in the Project Area and its surroundings and are likely to be impacted by the project activities	Medium
Vulnerable Groups, including women, elderly, handicapped etc.	This stakeholder group is comprised of those members of the community who due to their socio-economic status are perceived to be more susceptible to the impacts from the project and will required special considerations including the disabled, widows nad elderly	High
Fishing groups	This stakeholder group is comprised of those individuals and households who undertake fishing in the Ayeyarwady river and the other surface water bodies in the area.	High
Secondary Stakeholders		
Government Ministries	This stakeholder group is comprised of the central and region level government departments. These authorities may influence the project in terms of establishing policies, and implementation of the project. This stakeholder group comprises of ministries such as: <ul style="list-style-type: none"> • Ministry of Environment Conservation and Forestry • Ministry of Agriculture and Irrigation • Ministry of Labour • Ministry of Social Welfare, Relief and Resettlements 	High
Local Authorities	this stakeholder group is comprised of the local government bodies, who have the power to regulate or otherwise influence the Project in terms of establishing policy, granting permits and approvals for the Project, monitoring and enforcing compliance with the applicable rules and regulations and making available the necessary	High

Stakeholders	Stakeholder Profile	Level of Influence
	<p>infrastructure and resources for the Project. These departments are also store house of relevant information both for the impact assessment as well as to help implement management plans. The authorities which are likely to have the maximum influence on the Project include the authorities such as:</p> <ul style="list-style-type: none"> • Township Administration • Deputy Township Administration • Community Development Office • City Development Office • Township Education Office • Township Health Office • Township Police Office • Township Land Department 	
Village Level Institutions	This stakeholder group is comprised of institutions including the health and education institutions at the village level	Low
NGOs and Civil Society Organizations	This group includes all other people in society who may have an interest in the Project and its social and environmental aspects and non-governmental organisations representing their interests. It includes members of the wider general public in the state and district, civil society organisations such as religious groups, cooperatives, professional associations, cultural groups and citizens' associations, environmental and social groups and universities and other academic and research institutions undertaking work relevant to the Project, who may have views on the Project or information that will be useful for the assessment of Project impacts.	Medium
Local Media		High
Members of Parliament	This stakeholder group comprises of the representatives of the Bago region in the parliament. It is important to engage with these stakeholders from an early stage of the Project, as they play a critical role in the formulation of the government policies and norms at the local, regional and national level.	High

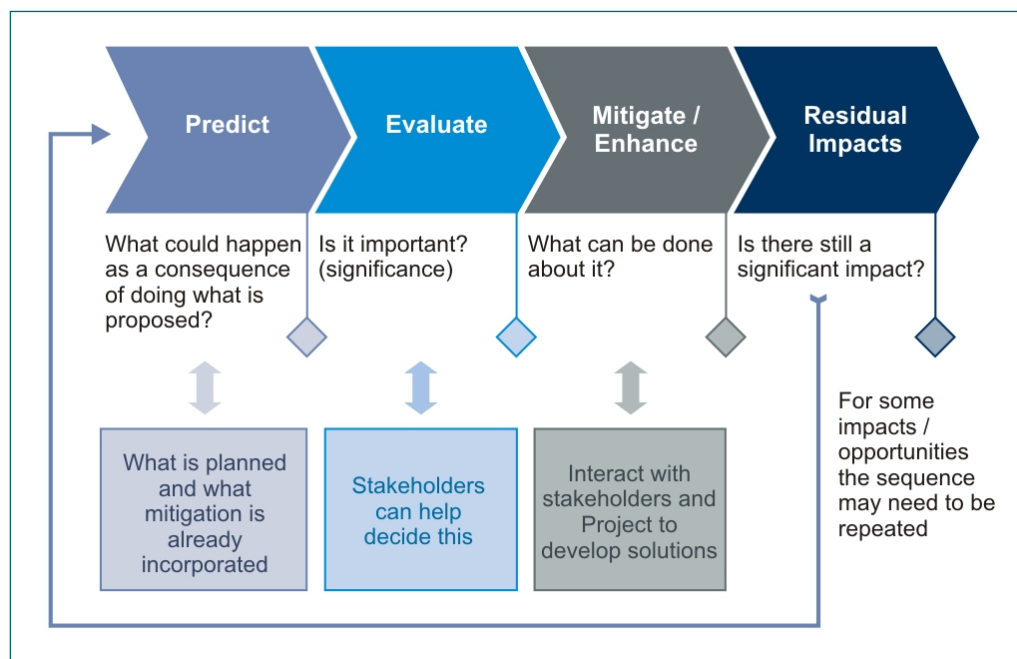
6.1

IMPACT ASSESSMENT METHODOLOGY AND APPROACH

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process (IAP). The principal impact assessment (IA) steps are summarized 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



Prediction of Impacts

Prediction of impacts is essentially an objective exercise to determine what could potentially happen to the environment as a consequence of the Project and its associated activities. This is essentially 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 IA process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

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	A descriptor indicating 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., between occupation of a plot of land and the habitats which are affected).
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., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).
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).

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 the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the ‘likelihood’ factor is considered, together with the other impact characteristics, when assigning a magnitude designation.

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 Significances*

		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 5.1* 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 IA 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.

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 IA, 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 IA 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 IA 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.

A Environmental Management Plan, which is a summary of all actions which the Project Proponent has committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the EIA report. The Environmental 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. Entries in the matrix cells are coloured to indicate whether:

- An interaction is not reasonably expected (white);
- An interaction is reasonably possible but none of the resulting impacts are likely to lead to significant effects (grey);
- An interaction is reasonably possible and at least one of the resulting impacts is likely to lead to an effect that is significant (black); or
- An interaction will possibly lead to positive impacts (green).

For the purpose of the scoping exercise, seismic activities are divided into the following phases for seismic activities:

- Preparation/mobilisation phase;
- Seismic survey phase;
- Close-Out phase; and
- Accidental events.

Table 6.4 Scoping Matrix for Seismic Surveys

Project Activity/ Hazards	Physical												Biological					Socio/Economic Resources											
	Ambient Air Quality	Global Climate	Ambient Noise	Vibration	Ground Water Quality	Surface Water Quality	Hydrology	Hydrogeology	Soil	Topography	Landscape and Visual Character	Use of Natural Resources	Sediment	Terrestrial Habitat	Terrestrial Flora	Terrestrial Fauna	Aquatic Habitat (freshwater)	Aquatic Flora & Fauna (freshwater)	Designated Areas	Community Health and Safety	Indigenous People	Demographic Pattern (including livelihood)	Employment and Income	Transportation	Occupational Health and Safety	Education and Skills	Infrastructure Services	Cultural Heritage	
Seismic Exploration																													
Preparation & Mobilisation																													
Labour, equipment and services supply																													
Site preparation/ clearance	Grey		Grey	Grey	Grey	Grey		Grey		Grey			Black	Black	Black	Black	Grey	Grey		Black			Green	Black	Black	Black	Black	Black	
Transportation of equipment, materials and waste	Grey		Grey	Grey																Black				Black	Black	Black	Black	Black	
Mobile Power Generation																											Grey		
Disposal of waste					Black	Black			Black			Black	Black	Black	Black	Black	Black	Black		Black							Black	Black	
Sewage and wastewater discharge					Black	Black					Black	Black	Black	Black	Black	Black	Black	Black		Black								Black	
Seismic Surveying																													
Labour, equipment and services supply																													
Transportation of equipment, supplies and workforce	Grey		Grey	Grey																Black				Grey	Black	Black	Black	Black	
Mobile power generation	Grey		Grey	Grey												Black				Black							Grey		
Vibroseis operation			Black	Black																			Black	Black			Black	Black	
Laying of receivers and cables for data collection																	Grey			Grey				Grey					
Retrieval of cables and receivers (similar to laying cables but less significance in scale)																													
Waste disposal					Black	Black			Black			Black	Black	Black	Black	Black	Black	Black		Black							Black	Black	
Sewage and wastewater discharge					Black	Black					Black	Black	Black	Black	Black	Black	Black	Black		Black								Black	
Close-Out Phase																													
Labour, equipment and services supply																													
Transportation of equipment, materials, waste and workforce	Grey		Grey	Grey																Black				Black	Black	Black	Black	Black	
Disposal of waste					Black	Black			Black			Black	Black	Black	Black	Black	Black	Black		Black							Black	Black	
Sewage and wastewater discharge					Black	Black					Black	Black	Black	Black	Black	Black	Black	Black		Black								Black	
Accidental Events																													
Spills/leaks					Black	Black			Black			Black	Black	Black	Black	Black	Black	Black		Black							Black	Black	
Fires and explosions	Black	Grey	Grey	Grey	Black	Black			Grey		Black	Black	Black	Black	Black	Black	Black	Black		Black			Black	Black	Black	Black	Black	Black	
Vehicle accidents																													

- An interaction is not reasonably expected (white);
- An interaction is reasonably possible but none of the resulting impacts are likely to lead to significant effects (grey);
- An interaction is reasonably possible and at least one of the resulting impacts is likely to lead to an effect that is significant (black); or
- An interaction will possibly lead to positive impacts (green).

The prioritisation of impacts indicates that the majority of identified interactions of the seismic surveys with the environment and social receptors are not expected to be significant. For activities predicted to have no significant impact (ie those in white in the Matrix), no detailed quantification or further assessment will be conducted under the ESIA.

For activities where an interaction is reasonably possible but none of the resulting impacts would be considered likely to lead to significant effects, this evaluation recommends that they be reviewed and confirmed within the detailed ESIA.

Those interactions from seismic survey which have the potential to generate **significant** impacts are:

Environmental Impacts of Seismic Survey

Preparation / Mobilisation Phase

- Impacts from labour (including hunting), equipment and services supply on terrestrial and aquatic flora and fauna;
- Impacts from site preparation / clearance on terrestrial habitats and associated flora and fauna;
- Impacts from mobile power generation on terrestrial fauna;
- Impacts from waste disposal on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna; and
- Impacts from sewage and wastewater discharge on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna.

Seismic Survey Phase

- Impacts from labour (including hunting), equipment and services supply on terrestrial and aquatic flora and fauna;
- Impacts from mobile power generation on terrestrial fauna;
- Impacts from waste disposal on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna;
- Impacts from sewage and wastewater discharge on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna; and

- Impacts from Vibroseis operation on airborne noise.

Close-Out Phase

- Impacts from labour (including hunting), equipment and services supply on terrestrial and aquatic flora and fauna;
- Impacts from waste disposal on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna; and
- Impacts from sewage and wastewater discharge on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna.

Accidental Events

- Impacts from spills/leaks on on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna
- Impacts from fires and explosions on air quality, ground water quality, surface water quality, landscape and visual character, use of natural resources, terrestrial habitats and aquatic habitats as well as their associated flora and fauna.

Social Impacts of Seismic Survey

Preparation / Mobilisation Phase

- Impacts from labour (including hunting), equipment and services supply on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from site preparation / clearance on employment and income and cultural heritage;
- Impacts from transportation of materials, equipment and wastes on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from waste disposal on community health and safety and infrastructure services; and
- Impacts from sewage and wastewater discharge on community health and safety and infrastructure services.

Seismic Survey Phase

- Impacts from labour (including hunting), equipment and services supply on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from transportation of equipment, supplies and workforce on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from waste disposal on community health and safety and infrastructure services;
- Impacts from sewage and wastewater discharge on community health and safety and infrastructure services; and
- Impacts from Vibroseis operation on cultural heritage and employment and income.

Close-Out Phase

- Impacts from labour (including hunting), equipment and services supply on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from transportation of equipment, materials, waste and workforce on community health and safety, transportation, occupational health and safety and infrastructure services;
- Impacts from waste disposal on community health and safety and infrastructure services; and
- Impacts from sewage and wastewater discharge on community health and safety and infrastructure services.

Accidental Events

- Impacts from spills/leaks on on community health and safety and occupational health and safety;
- Impacts from fires and explosions on community health and safety, employment and income, occupational health and safety and cultural heritage;
- Impacts from vehicle accident on community health and safety and occupational health and safety; and
- Impacts from equipment/infrastructure damage on employment and income.

6.4 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION

Drawing on the outcomes of scoping, the remaining sections of this chapter presents the assessment of the potential impacts to the environment associated with the seismic survey. The assessment is presented in the order of impacts as identified during scoping. Each phase of the Project is assessed separately.

Each of these is discussed below:

Preparation / Mobilisation Phase

6.5 IMPACTS FROM LABOUR (INCLUDING HUNTING), EQUIPMENT AND SERVICES SUPPLY ON TERRESTRIAL AND AQUATIC FLORA AND FAUNA

6.5.1 *Source of Impact*

Hunting may increase in the surrounding areas as a result of worker influx into the area and increased traffic may result in increase in animal strike on roads. Hunting, poaching and wildlife trade are critical issues for the conservation of biodiversity globally; unsustainable hunting to obtain meat, animal parts or live individuals for the pet trade has caused population declines and local extinction of many species and threatens some species with global extinction. During surveys, terrestrial wildlife were recorded in forest habitat which are known targets for hunting including species of conservation interest such as Chinese Pangolin (Critically Endangered) and Sunda Pangolin (Critically Endangered). Mammals in forest habitat also include Red Muntjac, Wild Pig, Common Palm Civet and Leopard Cat, which are potential bush meat species.

6.5.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts to fauna due to increased traffic will include:

- Project activities in day light working hours
- Minimisation of night-time driving.

6.5.3 *Significance of Impacts*

In the absence of controls on workforce, loss of fauna due to hunting/ poaching (intentional take) have potential to be of up to **Moderate** significance depending on species taken.

For impacts to fauna due to increased traffic volume for equipment and services supply, the impact significance is predicted to be **Minor** since mammal species which are susceptible to vehicle strike are mostly found in forest area away from the roads.

Table 6.5 *Assessment of Impacts on Terrestrial and Aquatic Fauna (Labour)*

Impact	Loss of fauna due to impacts (eg hunting) from labour				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Loss of fauna individuals dependent on hunting effort.				
Frequency	Intermittent.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

Table 6.6 *Assessment of Impacts on Terrestrial and Aquatic Fauna (Equipment and Service Supply)*

Impact	Loss of fauna due to impacts from increased traffic volume				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Loss of fauna individuals dependent on hunting effort.				
Frequency	Intermittent.				
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*

- A Biodiversity Action Plan will be developed by Pacific Hunt or a third party administered under the Environmental and Social Management Plan, whereby management and mitigation measures will be provided covering all aspects of biodiversity that may be affected by the Project.
- A HSE coordinator will be employed for the duration of the seismic survey. They will be employed by Pacific Hunt or a third party and will not be employed directly by the seismic contractor. It will be their job to supervise all activities in relation to biodiversity and to make sure that all mitigation measures are employed during each phase of the seismic survey.
- Work areas will be clearly demarcated and any activities outside these areas will be prohibited except under a permit system where necessary and for entry and exit this will occur along designated access routes.
- Induction training for personnel is recommended to include a mandatory segment on biodiversity. In this induction details of key requirements will be provided to include ban on fishing and hunting. Details of the induction training on biodiversity are provided in Annex G.

- Prohibit workers from uncontrolled interaction and commerce with the local community in terms of buying and selling goods particularly Non-Timber Forest Products (NTFP), bushmeat and wildlife (pets, souvenirs).
- Prohibit staff from introducing pets, livestock and other animals.
- Work with local authorities and communities through the stakeholder engagement plan to monitor and control hunting and poaching arising from new access in the project area.
- A monitoring programme will be established to ensure mitigation measures are being implemented effectively.

6.5.5 *Significance of Residual Impacts*

Based on the assumption that Pacific Hunt will be able control and mitigate the impacts arising directly from its own workforce (including contractors), species mortality due to poaching by Project staff/ workers is evaluated to be **Negligible** and due to increased traffic volume is expected to be **Minor**.

6.6 *IMPACTS FROM SITE PREPARATION/ CLEARANCE ON TERRESTRIAL HABITATS AND ASSOCIATED FLORA AND FAUNA*

6.6.1 *Source of Impact*

Construction of the base camp will be undertaken during the preparation / mobilisation phase. Depending on location of the base camp, there may be a need to cut vegetation, which will be greater in extent in more densely vegetated areas in forest habitats and less in open areas such as cultivated land, although potentially impacting on planted crops. This clearance may affect the tree species *Dipterocarpus alatus* and *Tectona hamiltoniana* which are considered as endangered by IUCN (2015)⁽¹⁾ and in Myanmar, respectively

The presence of workforce and associated disturbance such as from noise will likely result in temporary displacement of terrestrial fauna away from works areas if in the forest habitat. Affected fauna are likely to include the 19 mammal species recorded in forest habitat such as Red Muntjac, Common Palm Civet, Wild Pig, Squirrels and Leopard Cat.

6.6.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts will include:

- On the basis that vegetation clearance will be by hand, if any, for the construction of the base camp, it is assumed felling of large perennial vegetation (i.e. large trees), such as the tree species *Dipterocarpus alatus* and

⁽¹⁾ It is assumed that domestic wastewater generation per person per day is 80% of water consumption per day (80% of 0.15 m³ = 0.12 m³). Total volume of domestic wastewater generation per day will thus be 0.12 m³ / person / day x 140 people = 16.8 m³ per day.

Tectona hamiltoniana which are considered as endangered by IUCN (2015)⁽¹⁾ and in Myanmar.

6.6.3 Significance of Impacts

Impacts on terrestrial flora from clearance of vegetation for the base camp are expected to be local in extent, short-term in duration, reversible and small magnitude. Given sensitivity of potentially affected habitats are low for cultivated land and developed area and high for forest, the significance is ranked as **Minor** cultivated land and developed area and **Moderate** for forest. However, if not properly managed there is potential for **Major** impacts.

Based on the assumption that vegetation will be by hand, impact of habitat fragmentation and edge effects in the forest is evaluated as **Minor**.

Disturbance and displacement-causing activities will only be temporary in nature and limited in extent and duration. As such the magnitude is considered small. Given terrestrial fauna are typically mobile and will move away from a source of disturbance, sensitivity is considered moderate. Significance of potential impacts to fauna is ranked as **Minor**. Nevertheless due to the potential for adverse worker-wildlife interactions, further management measures are recommended.

Table 6.7 Assessment of Impacts on Habitat and Flora (Site Preparation)

Impact	Cutting of vegetation at base camp.				
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term		Permanent
Impact Extent	Local	Regional		International	
Impact Scale	Cutting within the footprint of the base camp.				
Frequency	One time activity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate		Major

Table 6.8 Assessment of Impacts on Terrestrial Fauna (Site Preparation)

Impact	Disturbances to fauna and potential habitat fragmentation effects.				
Impact Nature	Negative	Positive		Neutral	
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term		Permanent
Impact Extent	Local	Regional		International	
Impact Scale	At base camp				
Frequency	Disturbance: During construction of base camp.				

⁽¹⁾ It is assumed that domestic wastewater generation per person per day is 80% of water consumption per day (80% of 0.15 m³ = 0.12 m³). Total volume of domestic wastewater generation per day will thus be 0.12 m³ / person / day x 140 people = 16.8 m³ per day.

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*

- A Biodiversity Action Plan will be developed by Pacific Hunt or a third party to be administered under the Environmental and Social Management Plan, whereby management and mitigation measures will be provided covering all aspects of biodiversity that may be affected by the Project.
- As part of training under the plan, induction training for personnel is recommended to include a mandatory segment on biodiversity. Details of the induction training on biodiversity are provided in Annex G. In this induction details of key requirements will be provided to include:
 - Outline vegetation clearance procedures including species not to cut, and the minimum size of tree that should be felled (20 cm diameter at breast height (dbh)).
 - What to do in the advent of disturbing species (eg elephant, gibbon, snakes) (both from an occupational safety and biodiversity perspective)
- The HSE Coordinator will accompany field teams into forest areas to help identify vegetation that should be retained or is ok to remove.
- Minimise clearing of vegetation within the base camp ie leave in place smaller vegetation, topsoil, root stock, seeds.
- A monitoring programme will be established to ensure mitigation measures are being implemented effectively.

6.6.5 *Significance of Residual Impacts*

Provided that the mitigations are followed, the residual impact of site preparation and clearance of access route is expected to be **Minor**.

6.7 *IMPACTS FROM MOBILE POWER GENERATION ON TERRESTRIAL FAUNA*

6.7.1 *Source of Impact*

Use of mobile power generators will give rise to noise emissions and vibration which in turn will have the potential to modify the movement and behaviour of terrestrial fauna. The most common response to disturbance is active avoidance of an area with associated ecological effects (e.g. move from an individual's territory, disturbance of breeding activities etc.).

6.7.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts of mobile power generation will include:

- Specifications of power generator
- Project activities limited to day light hours

6.7.3 *Significance of Impacts*

While disturbance effects have the potential to occur, they will be temporary in nature and local in scale. The impact magnitude is expected to be small. The sensitivity of terrestrial fauna in forest habitat is considered to range from low to high. Provided that the existing/in place controls are followed, the impact of disturbance to terrestrial fauna due to mobile power generation is ranked of **Minor** significance.

Table 6.9 *Assessment of Impacts on Terrestrial Fauna (Mobile Power Generation)*

Impact	Disturbances to fauna.				
Impact Nature	Negative	Positive		Neutral	
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional		International	
Impact Scale	Exact extent of indirect affects unknown but considered local				
Frequency	Continuous				
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*

The assessment indicates impacts associated with mobile power generations are expected to be minor, hence no further mitigation is required.

6.7.5 *Significance of Residual Impacts*

The residual impact of mobile power generation to terrestrial fauna is expected to be **Minor**.

6.8 *IMPACTS FROM WASTE DISPOSAL ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA*

6.8.1 *Source of Impact*

Project activities and workforce accommodated at the base camp will generate some quantities of general refuses, recyclable wastes and other wastes (eg packaging materials and papers).

Improper waste disposal has the potential to lead to contamination of soil and ground water through leachate or direct contamination of surface water and water quality impacts to aquatic fauna.

6.8.2 Existing/ In Place Controls

Measures to control/ minimise adverse impacts of waste disposal will include:

- Planning material requirements at design stage to reduce unnecessary generated refuses.
- Pacific Hunt HSE Management System requires Waste Management Plan for the Project.

6.8.3 Significance of Impacts

Provided that proper disposal mechanism for waste will be implemented in accordance with Pacific Hunt HSE Management System requirements and all waste will be removed from site and responsibly disposed by approved waste contractor, the significance of waste disposal is ranked as **Minor**.

Table 6.10 *Assessment of Impacts from Waste Disposal on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna*

Impact	Impacts on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna.				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Exact extent of indirect affects unknown but considered local				
Frequency	Continuous				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

6.8.4 Additional Mitigation, Management and Monitoring

Since the significance of impacts is considered minor with exiting control measures, additional measures are not considered necessary. However, as industrial best practices for the minimisation of the potential impacts from waste disposal due to Project activities, the following mitigation measures are recommended to be implemented:

- A Waste Management Plan will be developed by Pacific Hunt or a third party separately from but administered under the Environmental and Social Management Plan. The plan will identify and estimate generated volumes of different waste types and set out procedures for responsible management and disposal and will be regularly audited.
- Induction training for personnel (including contracted local workers) is recommended to include:

- Waste management system

6.8.5 *Significance of Residual Impacts*

Provided the mitigations are followed, the residual impact of surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats and their associated flora and fauna in the Project Area is ranked as **Negligible**.

6.9 *IMPACTS FROM SEWAGE AND WASTEWATER DISCHARGE ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA*

6.9.1 *Source of Impact*

It is estimated that up to 140 workers for the seismic surveys will be required. Black and grey water will arise from the construction workforce and from drainage from cooking and cleaning activities from the base camp. The amount of domestic wastewater generated is estimated to be not more than 16.8 m³ per day during the period when the number of seismic workers is at its maximum (i.e. 140 people) ⁽¹⁾. The amount of sewage generated is estimated to be 0.08 m³/ person / day and a total of 11.2 m³ will thus be generated daily for a maximum of 140 workers.

Discharged wastewater is generally characterized as having a high concentration of solids (suspended and dissolved), biochemical oxygen demand (BOD) and chemical oxygen demand (COD), nutrients (ammonia) and faecal coliform counts. Potential impacts associated with mismanagement of sewage and other wastewaters include contamination of surface waters and water supplies, which may result in localised land/ecological contamination and impacts to health.

6.9.2 *Existing/ In Place Controls*

Measures to control/ minimise adverse impacts to water and soil quality and associated impacts will include:

- Provision of service tank for sewage from toilet facilities.
- Provision of water pit for greywater from kitchen.
- Service tank and water pit are separated from drainage and stormwater.
- Waste treatment facilities will be properly designed and installed.

⁽¹⁾ It is assumed that domestic wastewater generation per person per day is 80% of water consumption per day (80% of 0.15 m³ = 0.12 m³). Total volume of domestic wastewater generation per day will thus be 0.12 m³ / person / day x 140 people = 16.8 m³ per day.

- Waste treatment facilities will be well maintained to allow effective operation.

6.9.3 Significance of Impacts

The existing area has no sewerage collection and treatment systems. The water pit and service tank will serve as a septic system which allows for aerobic digestion of organic matter. Effluent from the tanks will pass into groundwater aquifers. Groundwater effluent will be subject to dilution by existing groundwater flows. The duration of the impact will be for the duration of the seismic survey activities and potential for impacts to groundwater will be local in nature. On the assumption that tanks and pit are regularly monitored and maintained to ensure proper functioning, the impact significance is ranked as **Minor**.

Table 6.11 Significance of Impacts on Water and Soil Quality from Wastewater and Sewage

Impact	Operational impacts on water and soil quality from wastewater and sewage				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term	Long-term		Permanent
Impact Extent	Local		Regional		International
Impact Scale	The scale of the impact is estimated to be point-based source from the Project area.				
Frequency	Throughout the life time of the worker camp.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate		Major

6.9.4 Additional Mitigation, Management and Monitoring

The assessment indicates impacts from wastewater and sewage are expected to be minor, hence additional mitigation measures are not recommended.

6.9.5 Significance of Residual Impacts

With the implementation of in place controls, the residual impact of wastewater and sewage is ranked as **Minor**.

Seismic Survey Phase

6.10 ***IMPACTS FROM LABOUR (INCLUDING HUNTING), EQUIPMENT AND SERVICES SUPPLY ON TERRESTRIAL AND AQUATIC FLORA AND FAUNA***

6.10.1 ***Significance of Residual Impacts***

The impacts, controls and mitigations and residual impact significance during the seismic survey phase are as previously assessed in *Section 6.5*.

6.11 ***IMPACTS FROM MOBILE POWER GENERATION ON TERRESTRIAL FAUNA***

6.11.1 ***Significance of Residual Impacts***

The in place controls, impacts and residual impact significance during the seismic survey phase are as previously assessed in *Section 6.7*.

6.12 ***IMPACTS FROM VIBROSEIS OPERATION ON AIRBORNE NOISE***

6.12.1 ***Sources of Impacts***

During the seismic survey, noise will be generated from transportation of equipment, material, and personnel, and from operation of Vibroseis trucks. Note that the noise from the Vibroseis trucks will primarily be generated by the engines, similar to any other large vehicle (i.e. a tractor). The noise generated by the actual vibration/impact of the vibrating baseplate is not significant in comparison. The sensitive receptors/resources that may be affected by potential impacts to noise and vibration in the Project area are nearby residences/communities, as well as some wildlife.

6.12.2 ***Existing / In Place Controls***

- Well-maintained equipment to be operated on-site;
- Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components;
- Shut down or throttled down between work periods for machines and plant items (e.g. trucks) that may be in intermittent use;
- Reduce the number of equipment operating simultaneously as far as practicable;
- Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable;
- Locate noisy plant as far away from receptors as practicable; and
- Avoid transportation of materials on- and off-site through existing community areas.

6.12.3 Significance of Impacts

Based on methodology from the US Department of Transportation for estimation of construction and equipment noise, noise levels at various distances from a source can be calculated using Equation 6-5 as follows:

$$L_{eq}(equipment) = L_w - 20 * \log_{10}(D/D_0) \quad \text{Eq. 6-5}$$

Where

- $L_{eq}(equipment)$ = the A-weighted, equivalent sound level at a receptor resulting from the operation of a single piece of equipment at distance D (dB(A))
- L_w = Noise emission level of the particular piece of equipment at reference distance D_0 (dB(A))
- D = Distance from the receptor to the piece of equipment (m)
- D_0 = Reference distance where the source noise emission level was measured

Source: FHWA¹

The equation above assumes that there is no buffer from vegetation or topography between a source and a receptor and is therefore considered to represent a worst-case scenario.

For the Project, it is necessary to calculate the overall noise level produced by the simultaneous operation of several pieces of equipment. The overall noise level at a receptor is simply the sum (on an energy basis) of the individual contributions of each piece of equipment. Mathematically, the overall noise level at a receptor from several sources can be calculated using Equation 6-6:

$$L_{eq}(total) = 10 * \log_{10} \left(\sum_{i=1}^n 10^{L_{eq}(equipment)_i / 10} \right) \quad \text{Eq. 6-6}$$

Where

- $L_{eq}(total)$ = the A-weighted, overall equivalent sound level obtained by summing the individual equipment noise levels on an energy basis
- n = Number of sources
- $L_{eq}(equipment)_i$ = the A-weighted, equivalent sound level at a receptor resulting from the operation of a single piece of equipment at distance D from ith source, dB(A). Obtained from Equation 6-5.

Maximum noise levels generated by the various pieces of equipment present during the seismic survey are listed in Table 6.12.

Table 6.12 Noise Level from Survey Equipment

Source	Maximum Unit dB(A) at Source
Pickup Truck	75
Generator	81
Vibroseis Trucks (Vehicle Noise - equivalent to Tractor))	84

Source: US Federal Highway Administration, US Department of Transportation, 2008; reference distance 50 ft (15.24 m); (https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm)

The unit noise levels produced from survey equipment and vehicles, namely pickup trucks, generators, and Vibroseis trucks, are estimated to be at most 75 dB(A), 81 dB(A), and 84 dB(A), respectively, at 15 m from the source. The further the distance from the noise source, the less noise is detected. Table 6.13 presents the maximum combined noise from the survey equipment and vehicles, assuming simultaneous operation of 1 pickup truck, 1 generator, and 4 vibroseis trucks, based on calculations using Equation 6-6.

Myanmar’s National Environmental Quality (Emission) Guidelines states that noise impacts should not exceed 55 dB(A) in the day time at residential, institutional or educational receptors. Survey activities are scheduled for daylight hours, thus vehicle noise will not contribute to noise levels at night when the ambient noise is the lowest. The daytime noise levels may be exceeded during the survey operation at residences that are within 750 m of the survey operations. However, the noise levels will be intermittent, and the survey will take place over a short duration in each location before moving onwards through the planned seismic route. In addition, the estimated noise levels represent a worst-case condition: the trees, other vegetation, and the topography surrounding the Project will lead to a far more rapid attenuation.

Given the above, it is expected that the noise impact would be minor in nature.

Table 6.13 Noise Decay for Survey Vehicles and Equipment

Distance from Source (m)	Noise Level (dB(A))			Leq (Total)
	Pickup Truck	Generator	Generator	
15.24	75.00	81.00	88.77	89.60
50.00	64.68	70.68	78.45	79.28
75.00	61.16	67.16	74.93	75.75
100.00	58.66	64.66	72.43	75.75
150.00	55.14	61.14	68.91	69.73
200.00	52.64	58.64	66.41	67.23
500.00	44.68	50.68	58.45	59.28
750.00	44.68	50.68	54.93	55.75
1000.00	38.66	44.66	52.43	53.26

Table 6.14 Significance of Noise Impact from Vibroseis Operations

Impact	Noise Impact from Vibroseis operations			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect		Induced
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional		International
Impact Scale	Maximum noise levels produced from survey vehicles and equipment are estimated to be at most 90 dB(A) at 15 m from the source, 79 dB(A) at 50 m from the source, 76 dB(A) at 100 m from the source, 59 dB(A) at 500 m from the source, and 56 dB(A) at 750 m from the source..			

Frequency	Occur during the Vibroseis operation				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major

6.12.4 Additional Mitigation, Management and Monitoring

The assessment indicates impacts from noise of Vibroseis operation are expected to be minor, hence additional mitigation measures are not recommended.

6.12.5 Significance of Residual Impacts

With the implementation of in place controls, the residual impact of wastewater and sewage is ranked as **Minor**.

6.13 IMPACTS FROM WASTE DISPOSAL ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA

6.13.1 Significance of Residual Impacts

The in place controls, impacts and residual impact significance during the seismic survey phase are as previously assessed in *Section 6.8*.

6.14 IMPACTS FROM SEWAGE AND WASTEWATER DISCHARGE ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA.

6.14.1 Source of Impact

Sources of impact are as described in *Section 6.9*. In addition, sources of wastewater will include from sewage from workers in the seismic survey area.

6.14.2 Existing/ In Place Controls

Existing / in place controls are as described in *Section 6.9*.

6.14.3 Significance of Impacts

Impact significance is as described in *Section 6.9*.

6.14.4 Additional Mitigation, Management and Monitoring

It is recommended that portable toilet facilities be provided with collection of resultant sanitary waste to be carried out by an approved contractor for proper disposal.

Induction training and briefings for personnel (including contracted local workers) is recommended to include:

- Available provided sanitary facilities

6.14.5 *Significance of Residual Impacts*

Provided mitigations are implemented, the residual impact will be as described in *Section 6.9*.

Close-out Phase

6.15 **IMPACTS FROM LABOUR (INCLUDING HUNTING), EQUIPMENT AND SERVICES SUPPLY ON TERRESTRIAL AND AQUATIC FLORA AND FAUNA;**

6.15.1 *Significance of Residual Impacts*

The impacts, controls and mitigations and residual impact will be as described in *Section 6.5*.

6.16 **IMPACTS FROM WASTE DISPOSAL ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA**

6.16.1 *Significance of Residual Impacts*

The impacts, controls and mitigations and residual impact will be as described in *Section 6.8*.

6.17 **IMPACTS FROM SEWAGE AND WASTEWATER DISCHARGE ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA.**

6.17.1 *Significance of Residual Impacts*

The impacts, controls and mitigations and residual impact will be as described in *Section 6.9*.

Accidental Events

6.18 **IMPACTS FROM SPILLS/LEAKS ON SURFACE WATER QUALITY, GROUND WATER QUALITY, SOIL, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA**

6.18.1 *Source of Impact*

The Project will source fuel locally and will not build and operate any fuel storage or refuelling facilities. Sources of impact from the Project thus include spillage of diesel fuel during refueling or emergency servicing of equipment.

Uncontrolled spills and leaks of fuel, chemicals or other pollutants have the potential to contaminate surface water, ground water and soil. Exposure to aquatic communities or uptake of contaminants through plant roots close to works areas could occur and could lead to direct lethal/non-lethal effects on vegetation and aquatic organisms.

6.18.2 *Existing/ In Place Controls*

There are no existing / in place controls for impacts from spills / leaks.

6.18.3 *Significance of Impacts*

Accidents or malpractice may lead to contamination of water and soil with associated impacts and is a significant environmental risk but one that can be managed and controlled. A major spill such as from loss of containment at the storage facilities is considered unlikely but a small spill is considered likely over the life of the Project. The magnitude of impact is considered small for small spills and medium for larger spills. Resource sensitivity is considered low for cultivated land and developed area, medium for reservoir and high for forest. Impacts from spills are considered to be of **Moderate** significance for both small and large spills given that small spills are more likely to occur and can happen in any types of habitat while large spills are likely to occur at storage facilities which will be located in developed area and thus away from forest with high sensitivity.

Table 6.15 *Assessment of Impacts on Water, Soil, Habitats, Flora and Fauna (Accidental Spillage and Leaks)*

Impact	Impacts from spills/leaks on water, soil, habitats, flora and fauna.				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Point source at works/refuelling area. Impact on water and soil is considered local.				
Frequency	Throughout the Seismic Survey				
Likelihood	Unlikely for large spills, likely for small spills				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

6.18.4 *Additional Mitigation, Management and Monitoring*

- Trucks would only be refuelled at designated staging areas and on existing roads/trails or source line/road intersections during seismic survey operations.
- All construction plants and machinery (e.g., trucks) will be maintained in good working order to avoid leakage or spillage of contaminants.

- Routine servicing of plant and equipment will be carried out off-site prior to mobilisation or within workshop facilities equipped with bunded areas and oil interceptor.
- Spill kits and shovels will be available onsite at all times for any accidental leakage of fuel or other hazardous substances during Project activities; it must be ensured that no such substance enters into groundwater or surface water resources.
- If emergency servicing of equipment is required in the field, spill kits and drip trays will be available.
- Any contaminated soil will be removed from site and disposed of in accordance with the waste management plan.
- Oils and other service fluids will be removed off-site by the seismic survey team and disposed in accordance with the waste management plan.
- The location, type and quantity of any fuel or chemical spill will be reported to HSE coordinator immediately.

6.18.5 *Significance of Residual Impacts*

Provided that mitigations are in place to prevent and control spillage/leak risk, residual risk is ranked as **Minor**.

6.19 *IMPACTS FROM FIRES AND EXPLOSIONS ON AIR QUALITY, GROUND WATER QUALITY, SURFACE WATER QUALITY, LANDSCAPE AND VISUAL CHARACTER, USE OF NATURAL RESOURCES, TERRESTRIAL HABITATS AND AQUATIC HABITATS AS WELL AS THEIR ASSOCIATED FLORA AND FAUNA.*

6.19.1 *Source of Impact*

Accidental events may result from a number of Project activities, however, those that result in fire (e.g. serious traffic accident) have the potential to cause wide scale significant detrimental impacts on forest habitat within the Project area, which may take years to recover. In addition, an increase in the number of people who smoke (ie workers) could increase the potential for ignition and uncontrolled fires from discarded cigarettes in the Project Area. Other sources of ignition include sparks from machinery and vehicle exhausts. Due to the dry climatic conditions that are prevalent in the year, forest habitat is dry and therefore fire hazard will typically be significant.

6.19.2 *Existing/ In Place Controls*

There are no in place controls at the present time.

6.19.3 *Significance of Impacts*

Impacts from fire outbreaks have been evaluated to result in impacts of up to **Major significance**. This is mostly due to the fact that large habitat area could be lost and low-mobility species including potentially Chinese Pangolin (Critically Endangered), Sunda Pangolin (Critically Endangered) and Indian Black Turtle (Lower Risk / Near Threatened) will be adversely impacted by such events if the event occurs in secondary forest habitat. However, the likelihood of such events occurring is considered unlikely, and as such, with the proper mitigation and control measures in place, the residual impacts can be reduced.

Table 6.16 *Assessment of Impacts on Air, Visual Character, Water, Soil, Habitats, Flora and Fauna (Fire and Uncontrolled Explosions)*

Impact	Impacts from fire and explosions on air, water, soil, habitats, flora and fauna.				
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional		International	
Impact Scale	Potentially wide scale				
Frequency	Throughout the Seismic Survey				
Likelihood	Unlikely for large fires				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	

6.19.4 *Additional Mitigation, Management and Monitoring*

- As administered under the Emergency Preparedness Plan, a Fire Risk Management Plan will be developed including communications protocols and measures to control any fires that do arise and as well as identify where fire control measures should be located.
- Induction training for personnel is recommended to include a mandatory segment on fire safety and actions in the event of a fire.
- All seismic teams will carry first-attack fire-fighting equipment such as fire extinguisher, shovel and communications equipment to respond to small spot fires and communicate with the operations headquarters in the event of a fire.
- Restrict smoking to controlled areas only.
- Conduct fire training and response drills.

6.19.5 *Significance of Residual Impacts*

With measures to manage fire risk, it is considered the residual risk can be reduced to **Minor**.

6.20 *SOCIAL IMPACT ASSESSMENT AND MITIGATION*

The following section provides an understanding of the social impacts from the seismic survey for the Project.

6.21 *COMMUNITY AND OCCUPATIONAL HEALTH AND SAFETY*

6.21.1 *Source of Impact*

This section provides an analysis of the potential impacts which may directly affect the health and safety of the community within the Project Area, according to the various phases of the Project life.

Preparation and Mobilisation

The preparation and mobilisation phase of the Project is likely to result in an influx of migrant workers in the area which will be involved in works such as construction of the base camp. This may place additional pressure on the existing infrastructure and services, especially the social services and healthcare. It is understood that during this phase, there will be requirement of 20 skilled workers and some unskilled workers. The influx of migrant workers may also result in a change in the socio-cultural composition of the area, which in turn may result in conflict and unrest in the society. These workers are likely to be accommodated in the base camp area. Furthermore, the sewage and waste discharge from the base camp may result in a negative impact on the health of the community and workers if not managed properly.

There is expected to be a minor increase in traffic within the local area for the duration of the Project as Project vehicles will be utilised to transport staff, equipment and waste within the local area. While only a slight increase in overall traffic volume is expected, there is the possibility that a vehicle-related collision or other such incident could occur which may constitute significant impact if a member of the local community or the workforce were to be injured.

Waste disposal, sewage and wastewater discharge from the Project may lead to potential contamination of soil, surface water and ground water if undertaken improperly. This may in-turn affect the health and safety of the community and workforce who may in contact with these media. Readers are referred to *Section 6.8* and *Section 6.9* for environmental issues related to waste disposal and discharge of sewage and wastewater.

Seismic Surveying

There is expected to be a minor increase in traffic within the local area for the duration of the Project as Project vehicles will be utilised to transport staff, equipment and waste within the local area. While only a slight increase in overall traffic volume is expected, there is the possibility that a vehicle-related collision or other such incident could occur which may constitute significant impact if a member of the local community or workforce were to be injured.

Waste disposal from the Project may lead to potential contamination of soil, surface water and ground water if undertaken improperly. This may in-turn affect the health and safety of the community and workforce who may in contact with these media. Readers are referred to *Section 6.8* for environmental issues related to waste disposal.

Furthermore, the sewage and waste discharge from the base camp may result in a negative impact on the health of the community and the workers if not managed properly. Readers are referred to *Section 6.9* for environmental issues related to discharge of sewage and wastewater.

Close-out Phase

Following the completion of the survey activities, there will be a demobilization and transportation of the Project employees, equipment and the waste generated. This may result in a minor increase in traffic within the local area for the duration of the phase as Project vehicles will be utilised to transport staff, equipment and waste within the local area. While only a slight increase in overall traffic volume is expected, there is the possibility that a vehicle-related collision or other such incident could occur which may constitute significant impact if a member of the local community or the workforce were to be injured.

Waste disposal, sewage and wastewater discharge from the Project may lead to potential contamination of soil, surface water and ground water if undertaken improperly. This may in-turn affect the health and safety of the community and workforce who may in contact with these media. Readers are referred to *Section 6.8* and *Section 6.9* for environmental issues related to waste disposal and discharge of sewage and wastewater.

6.21.2 *Existing/In Place Controls*

For controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8* and *6.9*.

6.21.3 *Significance of Impacts*

In the absence of adequate mitigation measures, the impacts on community and occupational health and safety are likely to be **Major**.

Table 6.17 Assessment of Impacts on Community and Occupational Health and Safety

Impact	Community and Occupational Health and Safety				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Affect workforce and local community in Project Area				
Frequency	Intermittent.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

6.21.4 Additional Mitigation, Management and Monitoring

In order to adequately mitigate the potential impacts on the health and safety of the workers and the community, the following mitigation measures will be put in place:

- Proper road safety measures must be adopted including proper signage with relators and paints.
- Timings of traffic movements must synchronise with local community needs and the villages falling in heavy traffic movements must be consulted and speed limits must be fixed.
- If there is any damage to the existing road must be repaired immediately for uninterrupted traffic movements and road blockage.
- There must be ensured availability of break services of heavy vehicles during constriction stage to avoid traffic jams.
- If there are any accidents, the affect family must be given compensation as per country regulations and company policy (in case it is better than the country regulations). Further root cause analysis must be undertaken with and proper records must be maintained, based on the recent surveys. Improper road signage, high speed, diving under the influence of intoxicants such as alcohols, continuous diving without taking proper rest, talking on mobile while driving were identified as some of key factors responsible to accidents. Therefore the company must make policy with respect to the same which will be applicable to all the works including subcontractor and other supply chain such as labour and logistics.
- The base camp should be placed at a distance from the village settlements.
- All the workers should have pre-employment medical check-ups and establish that only healthy were employed at site.
- Regular heath check-ups and health survey of the community must be undertaken to keep record of the changes in the health status. If there are

changes in disease pattern, required actions must be taken in collaboration with health department.

- For additional controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8 and 6.9*.
- A traffic management plan will be developed for the Project and will be implemented by the HSE team for the Project.

6.21.5 *Significance of Residual Impacts*

Based on the assumption that the company will be able to control and mitigate the impacts arising from its project activities, the impacts on the health and safety of the community and the workforce are likely to be **Minor**.

6.22 *IMPACT ON LIVELIHOOD PROFILE OF THE COMMUNITY*

6.22.1 *Source of Impact*

The Project is likely to result in the generation of economic opportunities in the form of the labour requirement during all phase of the seismic survey activities. According to the information presently available, it is understood that approximately 140 workers will be required and if unskilled workforce and local subcontractors are needed, the local community will be given preference.

In addition, the Project is also likely to result in the creation of indirect opportunities due to the influx of the migrant workers in the area through increase in business of local shops and markets, establishment of small shops, rent etc.

6.22.2 *Existing/In Place Controls*

For the purpose of the unskilled workforce and the local subcontractors required, the local community will be given preference.

6.22.3 *Significance of Impacts*

In the absence of adequate mitigation measures, the significance of the impacts on the livelihood profile of the local community is likely to be **Positive**.

Table 6.18 *Assessment of Impacts on Livelihood Profile of the Community*

Impact	Change in Livelihood Profile of the Community			
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	

Impact Scale	Generation of direct and indirect economic opportunities for the local community. The Project is likely to require 300 unskilled workers in the planning and mobilization phase and approx. 60 unskilled workers in the seismic survey phase.				
Frequency	Through the life of the project				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	

6.22.4 *Additional Mitigation, Management and Monitoring*

So as to maximize the benefits in terms of economic opportunity generation, additional measures such as preference to the vulnerable groups according to the skill requirements of the Project is recommended.

6.22.5 *Significance of Residual Impacts*

The potential impacts from the project on the livelihood profile of the community are expected to be **Positive**.

6.23 *IMPACT ON TRANSPORT AND INFRASTRUCTURE SERVICES*

6.23.1 *Source of Impact*

Preparation and Mobilisation

The impacts on the transport and infrastructure services in this phase of the Project are likely to pertain to the impacts due to transportation of labour, equipment, materials and waste. During this phase there is expected to be a minor increase in traffic within the local area. The key means of transport are to be the existing roads and river transport in the Sittaung River.

Furthermore, presently no new road construction is envisaged but a detailed assessment of the condition and traffic on the existing roads is yet to be undertaken. The increase in traffic on the existing roads may result in vehicle-related collision or other such incident could occur which may constitute significant impact if a member of the local community or the workforce were to be injured.

Readers are referred to *Section 6.8* and *Section 6.9* for management issues related to waste disposal and discharge of sewage and wastewater.

Seismic Surveying

During this phase of the Project, the main impacts on the transportation and infrastructure services is likely to be resultant from the movement of labour, equipment and waste material. It is understood that the Project will be using existing access roads and will not be creating a new one. Readers are also referred to *Section 6.8* and *Section 6.9* for management issues related to waste disposal and discharge of sewage and wastewater.

Apart from this, there is a potential of vibrations to be generated from the seismic survey which may damage local infrastructure such as roads, bridges, pipelines or buildings.

Close-out Phase

During this phase of the Project, the main impacts on the transportation and infrastructure services is likely to be resultant from the movement of labour, equipment and waste material. Readers are also referred to *Section 6.8* and *Section 6.9* for management issues related to waste disposal and discharge of sewage and wastewater.

6.23.2 Existing/In Place Controls

- Maintain a minimum setback distance from infrastructure to reduce potential impacts of vibration to infrastructure.
- Advance notice will be provided to the local residents and any road closures will be undertaken in consultation with the local government authorities.
- For controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8* and *6.9*.

6.23.3 Significance of Impacts

The significance of the impacts on transportation and infrastructure services are likely to be **Negligible** to **Minor**.

Table 6.19 Assessment of Impacts on Infrastructure and Transportation Services

Impact	Impact on infrastructure and transportation services				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Impact on infrastructure due to vibration generated from the survey and the transportation of labour, equipment and waste.				
Frequency	Through the life of the project				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	

6.23.4 Additional Mitigation, Management and Monitoring

Since the significance of impacts is considered negligible to minor with exiting control measures, additional measures are not considered necessary. However, as industrial best practices for the minimisation of the potential impacts on the infrastructure and transportation services due to Project

activities, the following mitigation measures are recommended to be implemented:

- Proper road safety measures must be adopted including proper signage with relators and paints.
- Timings of traffic movements must synchronise with local community needs and the villages falling in heavy traffic movements must be consulted and speed limits must be fixed.
- If there is any damage to the existing road must be repaired immediately for uninterrupted traffic movements and road blockage.
- There must be ensured availability of break services of heavy vehicles during constriction stage to avoid traffic jams
- Maintaining minimum setback distances from the surrounding infrastructure are recommended.
- For additional controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8 and 6.9.*

Table 6.20 *Recommended Offset Distances for Vibrator*

Sensitive Area/Obstruction	Minimum Setback Distance for Vibroseis (m)
- Telecommunications lines	2
- Telephone lines	
- Domestic Septic Tank or Mound	15
- Irrigation canal	20
- High pressure pipeline	
- Oil and gas wells	
- Dugouts	25
- Railways	40
- Monastery/school/medical nursing place/government offices	50
- Cemetery	50
- Residence, barn, or building	50
- Dams (earth or concrete)	50
- Water wells, developed spring, observation well	100
- Archaeological and Cultural Sites	
- Surface flow lines, except H2S flow lines	25
- Must be more than 50 m from production facilities (e.g. compressors, storage tanks, etc)	
- Buried flow lines and H2S flow lines	10
- Main pipelines and gas lines	25
- Well head	10

6.23.5 *Significance of Residual Impacts*

Based on the assumption that the company will be able to effectively implement the mitigation measures identified, the potential impacts on the infrastructure and transportation services are likely to be **Negligible**.

6.24 *IMPACT DUE TO LOSS OF LAND AND CROP LOSS*

6.24.1 *Source of Impact*

It is understood that the seismic survey may affect the existing land use of the area through occupancy of the area for the construction and operation of the base camp as well as during receiver/geophone line laydown and Vibroseis operation. The transportation will happen on the existing roads and the waterways of the Sittaung River, and no new land will be required for the construction of the access road.

Land use affected by the base camp is expected to be developed area while those by receiver/geophone line laydown and Vibroseis operation will mostly be cultivated area.

6.24.2 *Existing/In Place Controls*

- Crop compensation will be considered for the Project. Price appraisals for crop damage will be provided by respective township government departments and will be approved by district administrator. A Compensation Committee will be organized, and composed of officials from MOGE, Pacific Hunt and local township authorities. Damage measurement, calculation and payment will be carried out systematically.
- A detailed compensation plan will be prepared after discussion with township/district/region authorities. The compensation approval process will be handled by a Compensation Committee.
- Pacific Hunt will seek MOGE's support to coordinate with respective ministries, departments, local authorities and affected villagers on the crop compensation for any damage caused by the seismic survey operations.
- The Project is not expected to cause any damage to trees or forest during the survey. However, in case any accidental damage to trees or forest takes place due to the Project activities, Pacific Hunt will compensate accordingly. The amount of compensation and specific procedures will be carried out under advice of MOGE, who will liaise directly with the Forest Department and other relevant departments and receive instructions and requirements accordingly.

6.24.3 *Significance of Impacts*

The seismic survey will be conducted within the right-of-way of existing roads and will be progress in sequence along the seismic survey lines. As such,

only minimal and temporary disturbance is expected to existing land uses from receiver/geophone laydown due to receiver/geophone line laydown, and Vibroseis operation. The base camp is expected to be located in developed area with no effects on existing land use. Lease conditions will be agreed with land owner of the base camp area before commencement of base camp construction.

Provided the above and proper implementation of procedures for land and crop compensation, the significance of the impacts of land loss and crop loss is due to the Project is thus considered as **Minor**.

Table 6.21 *Assessment of Impacts owing to land loss and crop loss*

Impact	Loss of Land and crop loss				
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	The local community in the 13 villages in the Project Area				
Frequency	In the land accessibility phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major	

6.24.4 *Additional Mitigation, Management and Monitoring*

No additional measures are recommended given the minor impact expected.

6.24.5 *Significance of Residual Impacts*

The potential impacts from the land loss for the project are likely to be **Minor**.

6.25 *IMPACTS ON SOURCE WATER VULNERABILITY*

6.25.1 *Source of Impact*

It is understood that the water for the Project activities across the various phases and for the base camp will be sourced from the local water sources. The water sources identified within the block will be shared between the community and the Project. However, since there is no requirement of using water for drilling in Vibroseis, issue of water shortage due to the Project is unlikely to occur.

Also, wastes disposal and waste water discharges from the Project may lead to contamination of surface water and groundwater that are used by the community.

6.25.2 *Existing/In Place Controls*

As part of the Project design, the requirements for acceptable water quality standards and wastewater discharge standards will be maintained. For controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8 and 6.9*.

6.25.3 *Significance of Impacts*

The significance of the impacts due to water vulnerability in the Project is considered to be **Minor**.

Table 6.22 *Assessment of Impacts due to Source Water Vulnerability*

Impact	Source Water Vulnerability				
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional		International	
Impact Scale	local community in the project area				
Frequency	Through the life of the project				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	

6.25.4 *Additional Mitigation, Management and Monitoring*

For the purpose of minimizing the impacts on the source water due to the water requirement for the Project, the following additional controls are identified:

- For additional controls related to waste disposal and sewage and wastewater discharges, readers are referred to *Sections 6.8 and 6.9*.
- The local community will be engaged and a water use agreement will be formulated, which would minimize the pressure on the source water and ensure adequate water availability for the community.

6.25.5 *Significance of Residual Impacts*

The potential impacts on the source water for the project are likely to be **Minor**.

6.26 *IMPACTS ON CULTURAL HERITAGE*

6.26.1 *Source of Impact*

The planned activities including construction of base camp and vibration from Vibroseis truck may lead to direct physical impacts to the cultural heritage

resources which may exist in the area. These resources may also be impacted by accidental events such as fire and explosions.

6.26.2 Existing/ In Place Controls

As part of the Project design, Project facilities / activities will be located away from sensitive cultural heritage resources. For instance, no known monuments, historic buildings and living heritage sites such as cemeteries are located within the proposed workforce camps which are existing facilities.

6.26.3 Significance of Impacts

The significance of the impacts on the cultural heritage is considered to be **Minor** or **Moderate**

Table 6.23 Assessment of Impacts on Cultural Heritage

Impact	Impact on Cultural Heritage				
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term		Permanent
Impact Extent	Local	Regional		International	
Impact Scale	The local community in the 6 villages in the project area and the region				
Frequency	The entire life of the project				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate		Major

6.26.4 Additional Mitigation, Management and Monitoring

For the purpose of minimizing the impacts on the cultural heritage in the area, the following mitigation measures are recommended.

- The Project will meet the international best practice for the documentation and protection of the cultural heritage and in case of chance finds;
- The Project will consider retaining professionals to assist in the identification and protection of cultural heritage;
- In case the removal of nonreplicable cultural heritage is required, the same will be undertaken in consultation with the affected communities and in keeping with the regulatory requirements for the same;
- The Project will ensure that the access to cultural heritage by the local community is not disrupted, and if required, alternative access routes will be provided.
- A proper protocol or Standard Operating Procedures (SOP) may be developed and people at Project site location trained to act suitably in

consonance with the regulatory requirement and beliefs and faith of the community, if any.

- Maintain a minimum setback distance from sensitive areas.

6.26.5 *Significance of Residual Impacts*

The potential impacts on cultural heritage for the project are likely to be **Minor**.

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. The IFC (2012) defines cumulative impacts as those generally recognised as important on the basis of scientific concerns and or concerns from Affected Communities ⁽¹⁾. Examples given include reduction of water flows in a watershed due to multiple withdrawals, increases in sediment load, increases in traffic congestion and accidents due to increases in vehicular traffic.

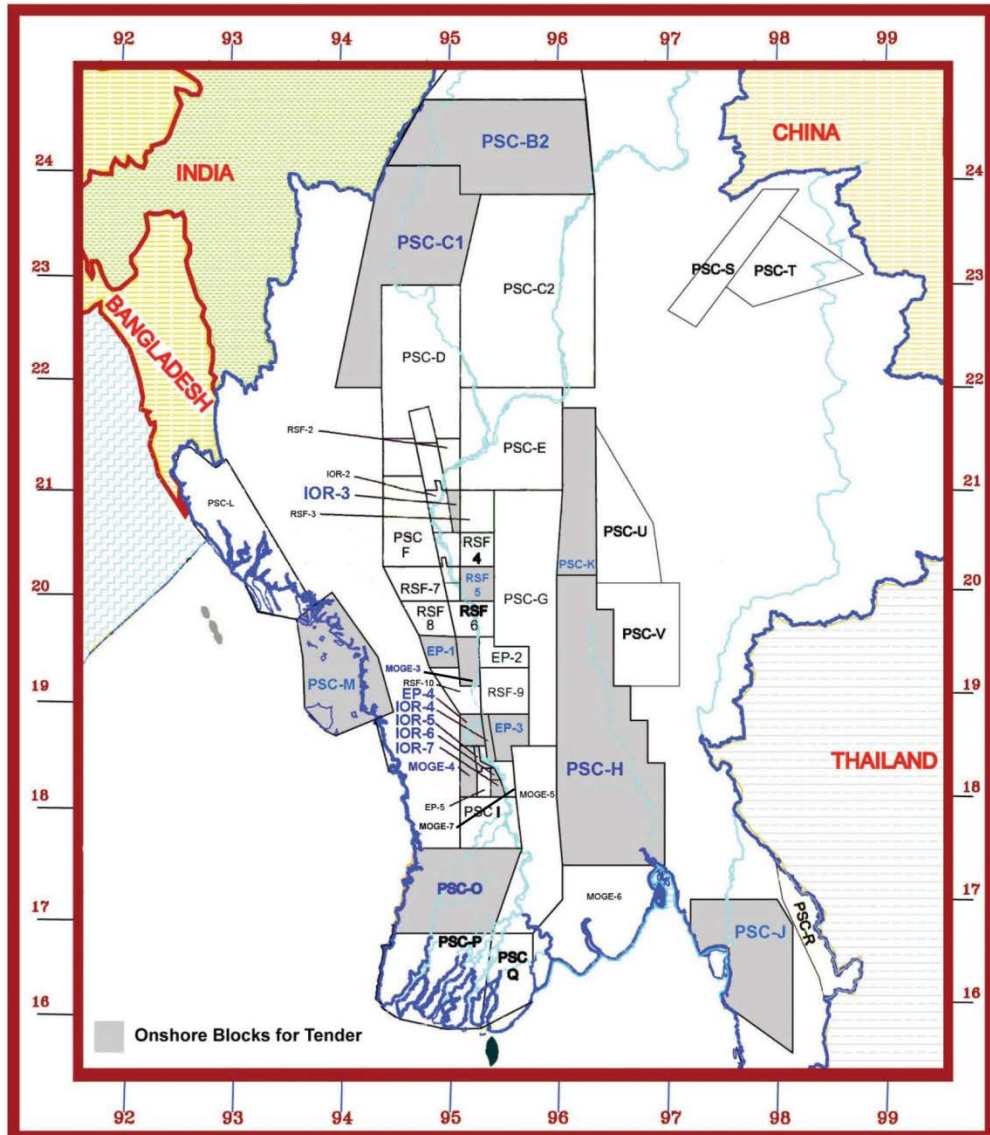
Cumulative impacts summarised in this section refer to the additional impacts that may be generated by other developments or activities in the vicinity of the Project Area that when added to the impacts of the proposed seismic survey combine to cause a greater impact. Such impacts may arise due to spatial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

As indicated in *Figure 7.1*, PSC H is surrounded by other onshore blocks including Block K, Block G and Block V. It is understood that seismic surveys may be carried out concurrently at these blocks and their seismic survey areas may overlapped slightly with that of PSC H at the boundary between the blocks. However, as assessed in *Section 6*, it is expected that the environmental and social impacts from seismic surveys, if properly mitigated, will be localised within the onshore blocks and restricted to environment / communities within them. As such, it is not expected that seismic surveys at adjacent blocks, if undertaken concurrently, will lead to cumulative impacts to the physical, biological or human environment within PSC H.

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

Figure 7.1 Locations of Onshore Blocks, Myanmar

THE REPUBLIC OF THE UNION OF MYANMAR
INTERNATIONAL BIDDING ROUND FOR ONSHORE BLOCKS - 2013



This document provides the Environmental and Social Management Plan (ESMP) for all phases of the Project. This ESMP 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 Pacific Hunt Energy (Pacific Hunt) has committed. In addition, this ESMP is used to ensure compliance with statutory requirements and corporate HSE policies.

8.1

SUMMARY OF IMPACTS AND MITIGATION MEASURES

Through the Project development and the ESIA process, Pacific Hunt has made commitments to actions to ensure or improve environmental and social performance. These commitments are not recommendations; they are binding commitments on the part of the Project. The commitments take a number of forms as summarised in *Table 8.1* with the specific actions intended to address a particular environmental or social issue.

A summary of the Project impacts and the committed mitigation measures are presented in *Table 8.1* below. Schedule and responsibility of implementation of these mitigation measures are identified as necessary. Additional details on the key elements for the overall environmental and social management of the Project are also presented below.

The estimated cost for implementation of the committed mitigation measures is US\$ 200,000.

Table 8.1 Summary of the Key Impacts and Control/Mitigation Measures

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impacts	Monitoring	Timing/Frequency	Responsible Party	Related Plans
Environmental Impacts						
Impacts from Labour (including Hunting), Equipment and Services Supply on terrestrial and Aquatic Flora and Fauna	<ul style="list-style-type: none"> A Biodiversity Action Plan will be developed by Pacific Hunt or a third party administered under the Environmental and Social Management Plan, whereby management and mitigation measures will be provided covering all aspects of biodiversity that may be affected by the Project. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Biodiversity Action Plan
	<ul style="list-style-type: none"> Project activities in day light working hours Minimisation of night-time driving. A HSE coordinator will be employed for the duration of the seismic survey. They will be employed by Pacific Hunt or a third party and will not be employed directly by the seismic contractor. It will be their job to supervise all activities in relation to biodiversity and to make sure that all mitigation measures are employed during each phase of the seismic survey. Work areas will be clearly demarcated and any activities outside these areas will be prohibited except under a permit system where necessary and for entry and exit this will occur along designated access routes. Induction training for personnel will include a mandatory segment on biodiversity. In this induction details of key requirements will be provided to include ban on fishing and hunting. Prohibit workers from uncontrolled interaction and commerce with the local community in terms of buying and selling goods particularly Non-Timber Forest Products (NTFP), bushmeat and wildlife (pets, souvenirs). Prohibit staff from introducing pets, livestock and other animals. Work with local authorities and communities through the stakeholder engagement plan to monitor and control hunting and poaching arising from new access in the project area. A monitoring programme will be established to ensure mitigation measures are being implemented effectively. 		Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	Biodiversity Action Plan and Environmental Monitoring Plan
Impacts from Site Preparation / Clearance and Creation of Access Routes on Terrestrial Habitats and Associated Flora and Fauna	<ul style="list-style-type: none"> A Biodiversity Action Plan will be developed by Pacific Hunt or a third party to be administered under the Environmental and Social Management Plan, whereby management and mitigation measures will be provided covering all aspects of biodiversity that may be affected by the Project. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Biodiversity Action Plan

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impacts	Monitoring	Timing/Frequency	Responsible Party	Related Plans
	<ul style="list-style-type: none"> Avoid felling of large perennial vegetation (i.e. large trees), such as the tree species <i>Dipterocarpus alatus</i> and <i>Tectona hamiltoniana</i> which are considered as endangered by IUCN (2015)(1) and in Myanmar. As part of training under the plan, induction training for personnel will include a mandatory segment on biodiversity. Details of the induction training on biodiversity are provided in Annex G. In this induction details of key requirements will be provided to include: <ul style="list-style-type: none"> Outline vegetation clearance procedures including species not to cut, and the minimum size of tree that should be felled (20 cm diameter at breast height (dbh)). What to do in the advent of disturbing species (eg elephant, gibbon, snakes) (both from an occupational safety and biodiversity perspective) The HSE Coordinator will accompany field teams into forest areas to help identify vegetation that should be retained or is ok to remove during cutting of seismic survey lines. Minimise clearing of vegetation along seismic lines ie leave in place smaller vegetation, topsoil, root stock, seeds. A monitoring programme will be established to ensure mitigation measures are being implemented effectively. 		Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	Biodiversity Action Plan and Environmental Monitoring Plan
Impacts from Mobile Power Generation on Terrestrial Fauna	<ul style="list-style-type: none"> Specifications of power generator Project activities limited to day light hours 	Minor	Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	N/A
Impacts from Waste Disposal on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna	<ul style="list-style-type: none"> Planning material requirements the at design stage to reduce unnecessary generated waste. Pacific Hunt HSE Management System requires Waste Management Plan for the project. A Waste Management Plan will be developed by Pacific Hunt or a third party separately from but administered under the Environmental and Social Management Plan. The plan will identify and estimate generated volumes of different waste types and set out procedures for responsible management and disposal and will be regularly audited. 	Negligible	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Waste Management Plan
	<ul style="list-style-type: none"> Induction training for personnel (including contracted local workers) will include: <ul style="list-style-type: none"> Waste management system 	Negligible	Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	Waste Management Plan
Impacts from Sewage and Wastewater Discharge on Surface Water Quality, Ground Water Quality, Soil, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna	<ul style="list-style-type: none"> Provision of service tank for sewage from toilet facilities Provision of water pit for greywater from kitchen Service tank and water pit are separated from drainage and stormwater. Wastewater treatment facilities will be properly designed and installed Wastewater treatment facilities will be well maintained to allow effective operation. 	Minor	Inspection & Compliance Audit	Design and Implementation Phase	Pacific Hunt HSE Team	Waste Management Plan

(1) IUCN (2015) *Op. cit.*

Potential Impact/Issue	Control /Mitigation Measures	Significance of Residual Impacts	Monitoring	Timing/Frequency	Responsible Party	Related Plans
Impacts from Vibroseis operation on airborne noise	<ul style="list-style-type: none"> Well-maintained equipment to be operated on-site; Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components; Shut down or throttled down between work periods for machines and plant items (e.g. trucks) that may be in intermittent use; Reduce the number of equipment operating simultaneously as far as practicable; Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable; Locate noisy plant as far away from receptors as practicable; and Avoid transportation of materials on- and off-site through existing community areas. 	Minor	Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	N/A
Impacts from spills/leaks on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	<ul style="list-style-type: none"> Trucks would only be refuelled at designated staging areas and on existing roads/trails or source line/road intersections during seismic survey operations. All construction plants and machinery (e.g., trucks) will be maintained in good working order to avoid leakage or spillage of contaminants. Routine servicing of plant and equipment will be carried out off-site prior to mobilisation or within workshop facilities equipped with bunded areas and oil interceptor. Spill kits and shovels will be available onsite at all times for any accidental leakage of fuel or other hazardous substances during Project activities; it must be ensured that no such substance enters into groundwater or surface water resources. If emergency servicing of equipment is required in the field, spill kits and drip trays will be available. Any contaminated soil will be removed from site and disposed of in accordance with the waste management plan. Oils and other service fluids will be removed off-site by the seismic survey team and disposed in accordance with the waste management plan. The location, type and quantity of any fuel or chemical spill will be reported to HSE coordinator immediately. 	Minor	Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	Emergency Preparedness Plan
Impacts from Fires and Explosions on Air Quality, Ground Water Quality, Surface Water Quality, Landscape and Visual Character, Use of Natural Resources, Terrestrial Habitats and Aquatic Habitats as well as their Associated Flora and Fauna.	<ul style="list-style-type: none"> As administered under the Emergency Preparedness Plan, a Fire Risk Management Plan will be developed including communications protocols and measures to control any fires that do arise and as well as identify where fire control measures should be located. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Emergency Preparedness Plan and Fire Risk Management Plan
	<ul style="list-style-type: none"> Induction training for personnel will include a mandatory segment on fire safety and actions in the event of a fire. All seismic teams will carry first-attack fire-fighting equipment such as fire extinguisher, shovel and communications equipment to respond to small spot fires and communicate with the operations headquarters in the event of a fire. Restrict smoking to controlled areas only. Conduct fire training and response drills. 		Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE Team	
Social Impacts						

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impacts	Monitoring	Timing/Frequency	Responsible Party	Related Plans
Impacts due to Los of Land and Crop Loss	<ul style="list-style-type: none"> • Crop compensation will be considered for the Project. Price appraisals for crop damage will be provided by respective township government departments and will be approved by district administrator. A Compensation Committee will be organized, and composed of officials from MOGE, Pacific Hunt and local township authorities. Damage measurement, calculation and payment will be carried out systematically. • A detailed compensation plan will be prepared after discussion with township/district/region authorities. The compensation approval process will be handled by a Compensation Committee. • Pacific Hunt will seek MOGE's support to coordinate with respective ministries, departments, local authorities and affected villagers on the crop compensation for any damage caused by the seismic survey operations. • The Project is not expected to cause any damage to trees or forest during the survey. However, in case any accidental damage to trees or forest takes place due to the Project activities, Pacific Hunt will compensate accordingly. The amount of compensation and specific procedures will be carried out under advice of MOGE, who will liaise directly with the Forest Department and other relevant departments and receive instructions and requirements accordingly. 	Minor	Compliance Audit	Design Phase	Pacific Hunt CSR Team	Livelihood Restoration Plan
Community and Occupational Health and Safety	<ul style="list-style-type: none"> • A Traffic Management Plan will be developed for the Project and will be implemented by the HSE team for the Project. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Traffic Management Plan
	<ul style="list-style-type: none"> • Proper road safety measures must be adopted including proper signage with relators and paints. 		Road Safety Policy	Prior to the commencement of the planning and mobilization phase	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • Timings of traffic movements must synchronise with local community needs and the villages falling in heavy traffic movements must be consulted and speed limits must be fixed. 		N/A	Monthly	Pacific Hunt HSE Team	Traffic Management Plan
	<ul style="list-style-type: none"> • If there is any damage to the existing road must be repaired immediately for uninterrupted traffic movements and road blockage. 		Visual Inspection/Records of repairs	Monthly	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • There must be ensured availability of break services of heavy vehicles during constriction stage to avoid traffic jams. 		Visual Inspection	Monthly	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • If there are any accidents, the affect family must be given compensation as per country regulations and company policy (in case it is better than the country regulations). Further root cause analysis must be undertaken with and proper records must be maintained, based on the recent surveys. Improper road signage, high speed, diving under the influence of intoxicants such as alcohols, continuous diving without taking proper rest, talking on mobile while driving were identified as some of key factors responsible to accidents. Therefore the company must make policy with respect to the same which will be applicable to all the works including subcontractor and other supply chain such as labour and logistics. 		Records of accidents and compensation paid/ grievance records	Monthly	Pacific Hunt HSE Team/CSR Team	N/A
	<ul style="list-style-type: none"> • Undertake a root cause analysis of any accidents which take place 		Root cause analysis reports	Monthly	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • Develop a policy for safety measures to be undertaken while driving, 		Road safety policy	Prior to the commencement of the planning and mobilization phase	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • The labour camps should be placed at a distance from the village settlements 		Visual inspection	Prior to the commencement of the planning and mobilization phase	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> • All the workers should have pre-employment medical check-ups and establish that only healthy were employed at site. 		Medical records	Quarterly	Pacific Hunt HSE Team	N/A
<ul style="list-style-type: none"> • Undertake regular heath check-ups and health survey of the community. 	Health survey reports	Quarterly	Pacific Hunt HSE Team	N/A		

Potential Impact/Issue	Control /Mitigation Measures	Significance of Residual Impacts	Monitoring	Timing/Frequency	Responsible Party	Related Plans
Impact on Livelihood Profile of the Community	<ul style="list-style-type: none"> Preference to the vulnerable groups according to the skill requirements of the Project 	Positive	Employment records	Quarterly	Pacific Hunt CSR Team	N/A
Impact on Transport and Infrastructure Services	<ul style="list-style-type: none"> Proper road safety measures must be adopted including proper signage with reflectors and paints. Maintain a minimum setback distance from infrastructure to reduce potential impacts of vibration to infrastructure. Advance notice will be provided to the local residents and any road closures will be undertaken in consultation with the local government authorities. 	Negligible	Road Safety Policy	Prior to the commencement of the planning and mobilization phase	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> Synchronize traffic movements with the local community needs. 		N/A	Monthly	Pacific Hunt HSE Team	Traffic Management Plan
	<ul style="list-style-type: none"> Immediate repair of any damage to existing roads 		Visual Inspection/Records of repairs	Monthly	Pacific Hunt HSE Team	N/A
	<ul style="list-style-type: none"> Ensure availability of break services of heavy vehicles 		Visual Inspection	Monthly	Pacific Hunt HSE Team	N/A
Impacts on Source Water Vulnerability	<ul style="list-style-type: none"> As part of the Project design, the requirements for acceptable water quality standards and wastewater discharge standards will be maintained. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE Team	Waste Management Plan
	<ul style="list-style-type: none"> The local community will be engaged and a water use agreement will be formulated, which would minimize the pressure on the source water and ensure adequate water availability for the community. 		Compliance Audit	Design Phase	Pacific Hunt CSR Team	N/A
Impacts on Culture Heritage	<ul style="list-style-type: none"> As part of the Project design, Project facilities / activities will be located away from sensitive cultural heritage resources. A proper protocol or Standard Operating Procedures (SOP) may be developed and people at Project site location trained to act suitably in consonance with the regulatory requirement and beliefs and faith of the community, if any. 	Minor	Compliance Audit	Design Phase	Pacific Hunt HSE / CSR Team	Culture Heritage SOP
	<ul style="list-style-type: none"> The Project will meet the international best practice for the documentation and protection of the cultural heritage and in case of chance finds. The Project will consider retaining professionals to assist in the identification and protection of cultural heritage; In case the removal of nonreplicable cultural heritage is required, the same will be undertaken in consultation with the affected communities and in keeping with the regulatory requirements for the same; The Project will ensure that the access to cultural heritage by the local community is not disrupted, and if required, alternative access routes will be provided. Maintain a minimum setback distance from sensitive areas. 		Inspection & Compliance Audit	Implementation Phase	Pacific Hunt HSE / CSR Team	Culture Heritage SOP

8.1.1 *Environmental Management Organisation*

Pacific Hunt is committed to providing resources essential to the implementation and control of the ESMP. Resources include the appropriate human resources and specialised skills. The structure for the organisation responsible for environmental and social management and implementation of the ESMP is depicted in *Table 8.2*.

Table 8.2 *Environmental Management Organisation Roles and Responsibilities*

Position	Responsibility
<i>Pacific Hunt Energy</i>	
General Manager	Oversee and coordinate all activities pertaining to the Project; ultimately responsible for environmental and social issues. Ensure delivery by the asset of its environmental, social and operational targets. Ensure effective communication with all stakeholders.
Operations Manager	Technical aspects of the Project including contractor supervision during operations. Responsible for the execution of Emergency Response Plan including Oil Spill Contingency Plan.
Construction Manager	Technical aspects of the Project including subcontractor supervision during Project implementation.
HSE Coordinator	Ensuring that the Project and subcontractors operate in accordance with applicable regulatory environmental and social requirements and plans. Monitor implementation of environmental and social protection measures, and assist with technical input into oil spill response requirements.
Community Liaison Officer	Liaise with local communities, farmer and government regulators on the project's behalf. Implement environmental and social awareness and education programmes with communities.
<i>Contractor</i>	
Project Manager	Responsible for subcontractor technical performance and compliance.
HSE Manager	Ensure that environment and social regulatory requirements are met and that ESMP requirements are properly implemented.

Supervision of subcontractor activities will be conducted by Pacific Hunt General Manager and Operations Manager. This will be accomplished through management controls over strategic project aspects and interaction with subcontractor staff where project activities take place. The Pacific Hunt organisation will be staffed at a level to allow for continuous effective supervision of subcontractor activities and work products.

The construction manager and HSE coordinator will be placed locally at the Project site to supervise contractors during construction while the operations

manager and HSE coordinator will supervise contractors during operational activities. The organisation includes a Community Liaison Officer (CLO) whose role is crucial to the successful implementation of the ESMP and the continuation of liaison with the local community.

8.1.2 *Training and Awareness*

Pacific Hunt will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions. The Project recognises that it is important that employees at each relevant function and level are aware of the Project's environmental and social policy; potential impacts of their activities; and roles and responsibilities in achieving conformance with the policy and procedures.

This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities;
- Necessity of conforming to the requirements of the ESIA and ESMP, in order to avoid or reduce those impacts; and
- Roles and responsibilities to achieve that conformity, including with regard to change management and emergency response.

The HSE coordinator is responsible for coordinating training, maintaining employee-training records, and ensuring that these are monitored and reviewed on a regular basis. The HSE Manager will also periodically verify that staff are performing competently through discussion and observation.

Employees responsible for performing site inspections will receive training by drawing on external resources as necessary. Training will be coordinated by the HSE coordinator prior to Project's implementation. Upon completion of training and once deemed competent by management, staff will be ready to train other people.

Similarly the Project will require that each of the contractors institute training programmes for its personnel. Each contractor is responsible for site HSE awareness training for personnel working on the job sites. The contractors are also responsible for identification of any additional training requirements to maintain required competency levels.

The contractor training program will be subject to approval by the Project and it will be audited to ensure that:

- Training programs are adequate;
- All personnel requiring training have been trained; and
- Competency is being verified.

8.1.3 *Inspection*

HSE inspections will be conducted by subcontractors on a daily basis. The results of the inspection and monitoring activities will be reported to Pacific Hunt on a weekly basis or more frequently if requested by the HSE coordinator or the Operations Manager.

8.1.4 *Monitoring*

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts.

As a minimum, the following biological monitoring should be undertaken:

- Habitat mapping and vegetation surveys
- Terrestrial fauna surveys, including avifauna (birds), mammals, herpetofauna (amphibians and reptiles) and butterflies
- Aquatic fauna

The monitoring methodology should follow that adopted for the ESIA Study.

Monitoring should be undertaken during the following periods of the seismic survey:

- At least two weeks before the preparation / mobilisation phase for baseline data collection;
- Once during the preparation / mobilisation phase for monitoring impacts from this phase;
- Once during the seismic survey phase for monitoring impacts from this phase;
- Once during the close-out phase for monitoring impacts from this phase; and
- Once following the rehabilitation activities after the seismic survey to monitor the success of habitat restoration.

In addition to the above, a programme will be developed to monitor for compliance with relevant regulatory standards. This programme will also ensure that subcontractors are meeting contractual obligations with respect to work practices and design specifications (eg Project emission standards). Monitoring will be carried out by the Pacific Hunt and/or by an appointed third party.

A detailed Environmental Monitoring Plan is developed to present the background, objective, methodology and reporting requirements of the monitoring programme, which is appended in *Annex G*.

The estimated cost for implementation of the committed monitoring measures is US\$ 50,000.

8.1.5 *Compliance Auditing*

Beyond the routine inspection and monitoring activities conducted, compliance audits will be carried out internally by Pacific Hunt to ensure compliance with regulatory requirements as well as their own HSE standards and policies. Audits to be conducted will also cover the subcontractor self-reported monitoring and inspection activities. The audit shall be performed by qualified staff and the results shall be communicated to the General Manager and management board.

The audit will include a review of compliance with the requirements of the ESIA and of this ESMP and include, at minimum, the following:

- Completeness of EHS documentation, including planning documents and inspection records;
- Conformance with monitoring requirements;
- Efficacy of activities to address any non-conformance with monitoring requirements; and
- Training activities and record keeping.

There will be a cycle of audits into specific areas of the Project such as waste management, and effectiveness of local content plans and discharge controls. The frequency of audits will be risk based and will vary with the stage of the project (more frequent during construction and in the early stages of the project) and will depend on the results of previous audits.

8.1.6 *Corrective Action*

Impacts will be identified and associated risks addressed before an incident occurs. Investigating a 'near miss' or actual incident after it occurs can be used to obtain valuable lessons and information that can be used to prevent similar or more serious occurrences in the future.

Pacific Hunt will implement a formal non-compliance and corrective action tracking procedure for investigating cause and identifying corrective actions in response to accidents or environmental or social non-compliances. This will ensure coordinated action between Pacific Hunt and its subcontractors. The HSE coordinator will be responsible for keeping records of corrective actions and for overseeing the modification of environmental or social protection procedures and/or training programs to avoid repetition of non-conformances and non-compliances.

8.2

MANAGEMENT PLANS

The goal of this ESMP is to ensure full compliance with the Project's policies and with mitigation, monitoring and other commitments made in the ESIA Report. While this ESMP should also be treated as a high-level, framework document, it is linked to a number of detailed management plans as described below which are developed to lay out the specifications for compliance with specific environmental and social elements.

8.2.1

Related Management Plans

A range of management plans is developed to provide assurances that the outcomes of the ESIA are able to be implemented. These management plans detail the management and mitigation measures required to be implemented, the time frame and responsibilities for their implementation, detailed training requirements, inspections/audits to check implementation, and reporting requirements. The key management plans are outlined in *Table 8.3* with information on how these relate to the activities and impacts being discussed in the ESIA Report, including reference to who has lead responsibility. These management plans are appended in *Annex G*.

Table 8.3 ESMP Hierarchy of Key Plans

Plan Name	Includes	Plan Owner
ESMP	Overarching plan linking to other Management Plan	Pacific Hunt
Biodiversity Action Plan	Management and mitigation measures will be described covering all aspects of biodiversity that may be affected by the Project.	Pacific Hunt or a third party administered under the Environmental and Social Management Plan
Terrestrial Habitat Reinstatement Plan	The plan will identify provisions for sourcing native species from nursery and procedures for replanting. It will also identify priority areas for rehabilitation including at for instance de-facto protected areas such as near monastery and near cultural heritage location if trees or vegetation are planned to be cleared from these locations. Rehabilitation of vegetation on seismic lines will also be provided.	Pacific Hunt or a third party administered under the Environmental and Social Management Plan
Waste Management Plan	Project-related waste handling procedures for hazardous and non-hazardous wastes.	Pacific Hunt
Emergency Preparedness Plan	Administration (policy, purpose, distribution, definitions, etc), organization of emergency areas (command centres, medical stations, etc), roles and responsibilities, communication systems, emergency response procedures, emergency resources, training and updating, checklists (role and action list and equipment checklist) and business continuity and contingency.	Pacific Hunt
Spill Response Plan	As part of the ERP, describes the spill preventative measures and spill response procedures	Pacific Hunt
Fire Risk Management Plan	As part of the ERP, including communications protocols and measures to control any fires that do arise and as well as identify where fire control measures should be located.	Pacific Hunt
Traffic Management Plan	Controls over prescribed routes, driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures and vetting procedures.	Pacific Hunt

Plan Name	Includes	Plan Owner
Environmental Monitoring Plan	Details on terrestrial ecology monitoring.	Pacific Hunt or a third party administered under the Environmental and Social Management Plan
Culture Heritage Standard Operating Procedures	Standard Operating Procedures (SOP) to act suitably in consonance with the regulatory requirement and beliefs and faith of the community, if any, for culture heritage.	Pacific Hunt
Livelihood Restoration Plan	Developed based on the assessment of various livelihood restoration options available and preferred by the community and reflective of the needs of the community. The LRP should also have clear reporting and monitoring indicators and the implementation mechanism including the institutional mechanism for the implementation of the same.	Pacific Hunt

8.2.2

Contractor Environmental Management Plan(s)

The Project will engage contractors to carry out Project activities. The contractors are responsible for performing all work:

- In compliance with relevant national and international HSE legislation and regulations, and with other requirements to which the project subscribes;
- In conformance with the Project's ESMP; and
- In accordance with contractual technical and quality specifications.

The Project will also provide specifications for environmental and social compliance and performance (through this ESIA and ESMP and the associated plans) and, as a contractual requirement, the contractor will develop and provide to the Project its own specific management plans demonstrating how they intend to comply with the stipulated requirements.

Contractors must also provide documentation detailing their plans for:

- Implementing the measures required in the ESIA and this ESMP;
- Local content;
- Logistics; and
- Community relations.

The contractor management plans must conform to the requirements of the Project's overarching plans. Contractor plans will be reviewed and approved

by Pacific Hunt and incorporated into, and form part of, the Project's overall ESMP.

Contractors will be required to self-monitor against their plan and the contractor's compliance with the plan will be routinely monitored by Pacific Hunt directly or by third-parties. Contractors will be required to submit regular reports of monitoring activities and the project will review these on a regular basis. An external assurance process will be conducted on an annual basis the results of which will be disclosed at completion of the process.

As a contractual requirement, the subcontractors are required to provide sufficient resources to manage HSE aspects of the work to be performed. This includes providing resources to ensure compliance of next tier subcontractors and a process for emergency stop-work orders in response to monitoring triggers.

8.3 **EMERGENCY PREPAREDNESS AND RESPONSE**

Pacific Hunt has developed plans and procedures to identify the potential for and response to environmental accidents and health and safety emergency situations and for preventing and mitigating potentially adverse environmental and social impacts that may be associated with them.

Emergency preparedness and response will be reviewed by Pacific Hunt on at least an annual basis and after the occurrence of any accidents or emergency situations to ensure that lessons learnt inform continuous improvement. Emergency exercises will be undertaken on a regular basis to confirm adequacy of response strategies. Investigations of accidents or incidents will follow formal documented procedures.

The Emergency Response Plan of the Project is attached in *Annex G*.

8.4 **GRIEVANCE MECHANISM**

Pacific Hunt will adhere to their Grievance Mechanism which is included in *Annex G*.

The primary purpose of this Grievance Mechanism is to establish a formal process allowing people, communities or groups to raise complaints regarding any impact related to Project activities and to ensure that these complaints are addressed and resolved in a timely manner.

This section presents a summary of the consultation undertaken in the development of the EIA, including description of:

- Regulatory and corporate requirements;
- Objectives of consultation;
- Approach and scope of engagement for the impact assessment;
- Format and content of consultation meetings;
- Key issues raised during consultation;
- Further disclosure and consultation; and
- Approach for developing a grievance mechanism.

9.1 *PURPOSE OF THE CONSULTATION*

The specific objectives for stakeholder engagement were to:

- Inform relevant stakeholders about Pacific Hunt 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 the potential Project impacts, perceptions and concerns and discuss appropriate mitigation measures.

9.2 *POTENTIAL IMPACTS*

Seismic surveys generally require access to stakeholder land for numerous parties due to the length and linear nature of the surveys. As the area of PSC H is characterised as covering areas of cultivated land with presence of settlements and townships, it is expected that some impacts from land access may occur, including possible temporary loss of crop.

9.2.1 *Identification of Relevant Stakeholders*

The process of identifying potentially affected stakeholders started with scoping which was conducted for the PPR submitted to MOGE and MONREC. The purpose of scoping was to identify relevant issues and 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 GAD representatives as well as previous Project experience.

The first step in establishing a dialogue is identifying the Project stakeholders. Stakeholders are persons or groups who are directly or indirectly affected by a project, and those who may have interests in and/ or the ability to influence a project's outcomes (either positively or negatively).

9.2.2 Overall Approach and Scope of Engagement for the Impact Assessment

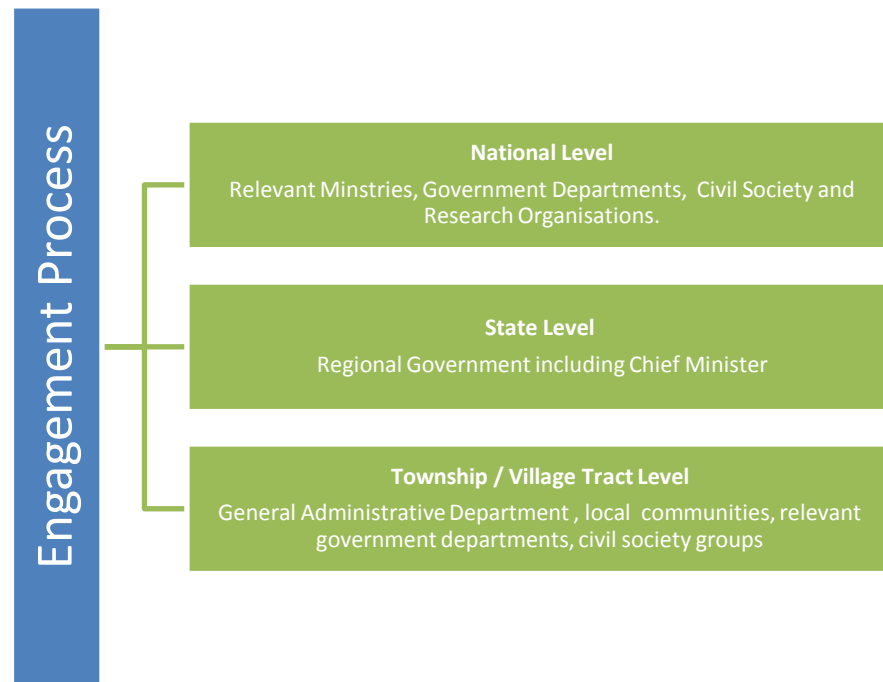
Stakeholder engagement was conducted across administrative levels, subject to permissions of responsible authorities. *Figure 9.1* provides an overview of the levels engaged including: District and Township levels, supported by representative discussion with the village tract leader in the town hall meeting.

A consultation team consisting of ERM and REM, accompanied by Pacific Hunt representatives conducted meetings and consultations at the three administrative levels. The team was also accompanied by a MOGE representative.

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 Pacific Hunt, to seek clarity on the EIA 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 EIA Study.

Figure 9.1 Engagement at Three levels with Key Stakeholders



State Level

Stakeholder engagement at the state 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.

Township / Village Tract Level

Engagement for the EIA was focused on Waw and Yedashe Township which were considered to be relevant to the Project. Project team met with GAD officers of Township levels in Waw and Yedashe. The purpose of engagement was to make the township level aware of the Project, seek an understanding of specific issues and stakeholder concerns, discuss potential impacts and mitigation measures and obtain district and township level social and environmental data.

The key stakeholders engaged with included;

- GAD (District and Township)
- Representatives from the related Departments
- Village Tract/ Quarter Leaders and Elders
- Local Communities

Town hall meetings were also conducted in village levels during the EIA investigation phase.

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 farmers and boat owners.
- **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 below.

Consultation Approach

The stakeholder consultation meetings were structured as followed:

- **Introductions and information disclosure:** Introduce Pacific Hunt, the Project, the EIA, the proposed stakeholder engagement process, the potential environmental and social impacts and mitigation to help the stakeholders understand the Project and Pacific Hunt's intentions for engagement.
- **Question and answer session for all stakeholders in the town hall meeting** to raise concerns, comments or ask questions to which Pacific Hunt can directly respond.
- **Data collection:** Collection of more in-depth information through FGDs with key stakeholder groups in the town hall meeting.

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:

- **Focus Group Discussion:** refers to a discussion carried out amongst a group of people (6-8) from a similar background/profile on a specific topic while being guided by a moderator. The primary purpose of such discussions is to gather an insight into the thought process of the group in regards to a particular issue. Apart from FGDs, interview with either the community or individual representatives are also undertaken as part of the engagement process. This method of consultation is imperative for the vulnerable groups due to the fact that, in the present scenario; consultations with the entire community have an attached risk of the dominant group's views being propagated. Hence, in order to ensure that not only the

vulnerable groups are provided with an opportunity to voice their opinions but also the issues/ concerns pertaining to them specifically receive adequate attention, Focus group Discussions are to be undertaken.

As part of the ESIA for the Project, FGDs were undertaken with different stakeholder group representatives within the Project Site, including women, farmers, community leaders, youth, vulnerable groups etc.

- **Participatory Rural Appraisal (PRA) techniques:** these include a wide range of tools which allow for the direct involvement of the community in the analysis and interpretation of the social setting in a rural environment. The PRA techniques identified for the purpose of the ESIA of the Project include seasonality mapping and were undertaken in **villages near the Project Site.**
- **Structured in-depth interviews:** Structured in-depth interviews were held with key local and regional officials, experts and representatives with a deep understanding of public health, agriculture and governance (including law and order). Special attention was given to collecting in-depth interview data from officials with knowledge of local and regional land tenure, land use and planning (zoning, planned developments), proximity of the Project Site to residential and economic locations and archaeological and historical properties, as well as transport access and availability of utilities and services. This included NGOs and civil society organisations working in the area on specific interventions directly or in coordination with the Government.

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 EIA.

9.3

DISCLOSURE

As per the requirements of the EIA Procedure, the Pacific Hunt disclosed information on the Project in four newspapers (One in English and three in Myanmar) (*Annex H*). Project information and the EIA are also available on the Pacific Hunt's website (<http://www.pacifichuntenergy.com/operations/environmental.html>).

9.4

SUMMARY OF CONSULTATIONS AND ACTIVITIES UNDERTAKEN

As part of the ESIA process for the Project, engagement was undertaken with the Ministry, local authorities including the MOGE and the local community. In the meetings with the ministry and the local authorities an understanding was developed of the proposed Project activities and the ESIA process for the

same. In these meetings the local stakeholders who need to be engaged with as part of the ESIA process were identified.

The consultations were undertaken as per the guidance of the MOGE representative, township administrators and villages in the proposed block. For the purpose of these consultations, an MOGE representative was also present with the field team.

Through these engagement activities an attempt was made to develop an understanding of the socio-economic profile, including the livelihood profile, the agricultural patterns in the area, access to health services, water supply and transportation and the village development plans and presence of local civil society organizations in the area.

As part of these engagement activities, a verbal understanding was also provided to the local community representatives of the proposed Project and its activities and the purpose of the engagement activities.

Apart from this engagement primary data collection was also undertaken as part of the impact assessment in the form of surveys and focus group discussions, in consultation with MOGE and the local authorities.

For the purpose of the primary data collection, household and community surveys were undertaken in the 13 villages. A total of 60 household surveys and 11 community surveys were undertaken across 13 villages.

During these surveys and consultations, the local community was given an understanding of the purpose of the consultations and the expectations from the same, in addition to the Project information disclosed. An attempt was made to develop an understanding of the perception of the stakeholder groups of the Project and the concerns and expectations from the same. These concerns and expectations were then taken into account while assessing the impacts from the Project activities and the identification of the proposed mitigation measures.

The date, time, location, stakeholder and purpose of each meeting is provided in *Table 9.1*. Some photos of the meeting are also provided in *Figures 9.2, 9.3 and 9.4*.

Table 9.1 *Consultation Activities Undertaken*

Date, time, location	Stakeholder	Purpose of Engagement
21 January, 2015 (13:00 to 14:00)	Lewe Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Request permission for further stakeholder consultations
22 January, 2015 (11:00 to 12:00)	Yedashe Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Request permission for further stakeholder

Date, time, location	Stakeholder	Purpose of Engagement
		consultations
23 January, 2015 (10:00 to 12:00)	Local communities from Ta Pyay Tan, Nyung Pin Thar, Pa Dauk Khin, and Khin Tan Kyi villages at Yedashe	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Undertake household surveys.
24 January 2015 (10:00 10:30)	Waw Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Request permission for further stakeholder consultations
25 January 2015 (08:00 to 08:30)	Daik-U Township GAD officer	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Request permission for further stakeholder consultations
25 January 2015 (13:00 to 17:00)	Local communities from Hpa Aung, Ah Lel Ywar and San Dwin Kone villages at Nyaung Lay Pin Township and Shwe Nyaung Pin, Ein Chay Lay Se and Aungbarlay at Daik-U township	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Undertake household surveys.
26 January 2015 (13:30 to 14:30)	Local communities from Ahkayit, Kyaikhla, Phyarpyo, and Thabaukkan at Waw township	<ul style="list-style-type: none"> • Present information on Project impacts and EIA findings. • Gather information on Potential Affected Communities and Peoples. • Undertake household surveys.

Figure 9.2 Stakeholder Consultation Meeting at Yedashe Township



Figure 9.3 Interview of Individual Household



Figure 9.4 *Focus Group Discussion with Women Group*



9.5 **KEY FINDINGS OF CONSULTATIONS**

As part of the engagement undertaken with the local stakeholders in the form of focus group discussions during the impact assessment process, certain key concerns and expectations of the local community were identified:

- **Impact on Land Availability:** One of the key concerns of the local community was in terms of the impact of the Project activities on the availability of land in the area and the agriculture undertaken by the community. From the information made available it is understood that agriculture is the primary source of livelihood for a majority of the local community. Thus the Project activities are likely to result in a reduction of the land available for agriculture, which in turn would impact the income and livelihood sources for the community. This impact is likely to be heightened for those households who are solely dependent upon agriculture, whose majority land holdings are impacted by the Project and those who do not have alternative land available. This potential impact is being addressed in *Section 6.24* for loss of land and crop.
- **Community Development Activities:** In keeping with this understanding of the impact of the Project activities on the livelihood of the community, the community identified certain areas of expectations from the Project in terms of financial and/or technical assistance for undertaking agriculture and other livelihood activities, especially in terms of providing irrigation facilities, assistance for the purchase of agricultural machinery and subsidizing the purchase of fertilizers and seeds. Pacific Hunt has thus developed a CSR programme as presented in *Section 9.6*.

Since the first half of 2017 Pacific Hunt has conducted several public consultations on PSC H visiting local authorities and villages that are located closest to the seismic lines. The purpose of these meetings has been to discuss the upcoming Project and make sure local authorities and communities are aware of the Project. During these consultations, Pacific Hunt have also addressed people's questions and concerns as well as found out about the villages and village tracts' specific development needs. As of mid-October 2017, Pacific Hunt has collected specific needs in Bago and Waw townships, and expect to finish collecting similar data in Daik-U and Kyauktaga by the end of November 2017.

Pacific Hunt is currently finalizing the Year 1 CSR plan for PSC H. The current plan focuses on providing clean drinking water in schools located in the Project affected area. Having access to clean drinking water not only prevents the spread of diseases and improves health, but creates the opportunity for school children to focus better on their studies. The clean drinking water initiative is based on the provision of Life Straw Community water filters to schools. The filters remove over 99% of viruses, bacteria and protozoan cysts, and can purify 70,000-100,000 liters of water over several years.

Several villages in Bago and Waw townships have also expressed other school and education related requests. Many have requested for desks and benches for schools, while others have requested for school fencing or roof repairs. Pacific Hunt is currently investigating the costs of these projects. Even if all the requests could not be realized during the first year, there is a possibility they will be carried out during Year 2.

In addition, during the public consultations it was found that several villages and/or village tracts in the region are missing clinics or other medical facilities. While distances may not always be long, sometimes there is not enough time to go seek help in a nearby village. This inspired Pacific Hunt to provide first aid and emergency labour training in villages without medical facilities. The plan is to provide 2-day training courses in each topic for ten attendees. Furthermore, first aid kits will be donated to the villages.

Finally, some villages have requested for road improvements between other villages in the village tract. Pacific Hunt is currently investigating the cost of this, and expect to include the road improvements in the CSR plan as it improves road safety in the area as well as enable better mobility between villages.

The CSR budget for two years of CSR programme is estimated to be USD 200,000.

Annex A

Plant Species Recorded within the Study Area

No.	Scientific Name	Family	Local/Common Name(s)	Growth Form ⁽¹⁾	IUCN Red List Status ⁽²⁾	Protection Status in Myanmar / Southeast Asia ⁽³⁾	Remark	Cultivated Land	Developed Area	Forest	Reservoir
1	<i>Abelmoschus canus</i> Rottboellia striata Nees ex Steud.	Graminae	Kaing myet	G	-	NA	Common	V		V	
2	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae	Yonpade	S	-	NA	Common	V			
3	<i>Abelmoschus hirsuta</i> Nees.	Graminae	Myet pauk	G	-	NA	Common	V			
4	<i>Abutilon indicum</i> (L.) Sweet.	Malvaceae	Bauk- khway	H	-	NA	Common	V			
5	<i>Acacia megaladena</i> Desv.	Mimosaceae	Subok	S/T	-	NA	Common		V		
6	<i>Albizia lebbek</i> (L.) Benth.	Mimosaceae	Kokko	T	-	NA	Common		V		
7	<i>Albizia procera</i> (Roxb.) Benth.	Mimosaceae	Sit	T	-	NA	Common			V	
8	<i>Allophylus aporeticus</i> (Voigt) Kurz	Sapindaceae	Zaung gale	S	-	NA	Common	V			
9	<i>Anthocephalus cadamba</i> Miq	Rubeaceae	Mau	T	-	NA	Common			V	
10	<i>Anthocephalus morindaefolius</i> Korth.	Rubiaceae	Ma U	T	-	NA	Common			V	
11	<i>Azadirachta indica</i> A.Juss	Meliaceae	Tama	T	-	NA	Common	V	V		
12	<i>Bambusa bambos</i> Voss	Poaceae	Kyakat-wa/ Spring Bamboo	S	-	NA	Common			V	
13	<i>Bombax ceiba</i> L.	Bombacaceae	Letpan	T	-	NA	Common			V	
14	<i>Bridelia ovata</i> Decne.	Euphorbiaceae	Seikche	T	-	NA	Common			V	
15	<i>Careya arborea</i> Roxb.	Lecythidaceae	Bambwe	T	-	NA	Common			V	
16	<i>Cassia italica</i> (Mill.) Lam.	Caesalpiniaceae	Dangywe	H/S	-	NA	Common	V			
17	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Myin-hkwa	H	LC	NA	Abundant	V	V		
18	<i>Chromolaena odorata</i> (L.) R.M. King & H.	Asteraceae	Bezatz	S	-	NA	Common			V	
19	<i>Citrus hystrix</i> DC.	Rutaceae	Shauk nu	T	-	NA	Common	V			
20	<i>Cocos nucifera</i> L.	Arecaceae	Ohn	T	-	NA	Common		V		
21	<i>Colocasia esculenta</i> (L.)	Araceae	Pein	H	LC	NA	Common				V
22	<i>Cymbopogon nardus</i> (L.) Rendle	Poaceae	Sabalin-hmwe	G	-	NA	Common	V			
23	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Mye-sa	G	-	NA	Abundant		V		
24	<i>Dalbergia kurzii</i> Prain	Fabaceae	Thit pok	T	LC	NA	Common			V	
25	<i>Decaspermum parviflorum</i> (Lam.) A.J. Scott	Myrtaceae	Taung Thabye	T/ S	-	NA	Common			V	
26	<i>Dendrocalamus giganteus</i> Munro.	Poaceae	Wa-bo	G/ B	LC	NA	Common			V	
27	<i>Dillenia elata</i> Pierre	Dilleniaceae	Zinbyun	T	-	NA	Common			V	
28	<i>Dioscorea sativa</i> L.	Dioscoreaceae	Kadu-u	S/ Cl	-	NA	Common				V
29	<i>Dipterocarpus alatus</i> Roxb.	Dipterocarpaceae	Kanyin	T	EN	NA	Common			V	
30	<i>Dipterocarpus tuberculatus</i> Roxb.	Dipterocarpaceae	In	T	LR/ LC	NA	Common			V	
31	<i>Eclipta alba</i> Hassk	Asteraceae	Kyeik hman	H	DD	NA	Common	V			
32	<i>Eichhorina crassipes</i> Solms.	Pontederiaceae	Beda-pin; common water hyacinth	H	-	NA	Common				V
33	<i>Emblica officinalis</i> Gaertn.	Euphorbiaceae	Zibyu	T	-	NA	Common			V	
34	<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	U ca lit	T	-	NA	Common		V		
35	<i>Ficus clavata</i> Wall.	Moraceae	Tha Phan	T/S	-	NA	Common			V	
36	<i>Ficus hispida</i> L. f.	Moraceae	Kha-aung	T	-	NA	Common			V	
37	<i>Gigantochloa rostrata</i> Wong	Poaceae	Waya	G/ B	-	NA	Common			V	
38	<i>Glochidion hongkongense</i> Muell.Arg.	Euphorbiaceae	Thit maleinma	T	-	NA	Common			V	
39	<i>Gmelina arborea</i> Roxb.	Verbenaceae	Yemane	T	-	NA	Common				
40	<i>Heterophragma adenophylla</i> (Wall.) Seem. ex Benth.& Hook	Bignoniaceae	Phet than	T	-	NA	Common			V	
41	<i>Hyptis suaveolens</i> (L.) Poit	Lamiaceae	Nan-Saw / Hyptis	S	-	NA	Common		V		
42	<i>Indigofera atropurpurea</i> Buch.-Ham.	Fabaceae	Me yaing	H/S	-	NA	Common		V		
43	<i>Ipomea aquatica</i> Forssk.	Convolvulaceae	Kazun-galay	Cl	-	NA	Common				V
44	<i>Jussiaea suffruticosa</i> Linn.	Onagraceae	Taw Lay Nyin	H	-	NA	Common			V	

No.	Scientific Name	Family	Local/Common Name(s)	Growth Form ⁽¹⁾	IUCN Red List Status ⁽²⁾	Protection Status in Myanmar / Southeast Asia ⁽³⁾	Remark	Cultivated Land	Developed Area	Forest	Reservoir
45	<i>Lagerstroemia tomentosa</i> Presl	Lythraceae	Leza	T	-	NA	Common			V	
46	<i>Lansea coromandelica</i> (Houtt.) Merr	Anacardiaceae	Nabe	T	-	NA	Common			V	
47	<i>Mangifera indica</i> L.	Anacardiaceae	Thayet	T	DD	NA	Abundant		V		
48	<i>Mimosa pudica</i> L.	Fabaceae	Hti-ka-yone; sensitive plant	H	LC	NA	Abundant	V			
50	<i>Mitragyna parvifolia</i>	Rubiaceae	Binga	T	-	NA	Common			V	
51	<i>Musa sapientum</i> L.	Musaceae	Nget-pyaw	H	-	NA	Common		V	V	
52	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Kyaung sha	T	-	NA	Common			V	
53	<i>Premna latifolia</i> Roxb.	Verbenaceae	Kyat-Yoe	T	-	NA	Common			V	
54	<i>Rauwolfia serpentina</i> L.	Apocynaceae	Bonmayaza	S	-	NA	Common	V			
55	<i>Shorea obtusa</i> Wall	Dipterocarpaceae	Thit Yin	T	LR/ LC	NA	Common			V	
56	<i>Shorea siamensis</i> (Kurz) Miq.	Dipterocarpaceae	Ingyin	T	LR/ LC	NA	Common			V	
57	<i>Sida acuta</i> Burm. F.	Malvaceae	Wet-chay-pane, Tapyer-Si / Common wirre weed	S	-	NA	Common	V			
58	<i>Spondias mangifera</i> Willd.	Anacardiaceae	Gwe	T	-	NA	Common			V	
59	<i>Stereospermum colais</i> (Buch.-Ham.ex Dillwyn) Mabb.	Bignoniaceae	Than tay	T	-	NA	Common			V	
60	<i>Tamarindus indica</i> L.	Caesalpiniceae	Magyi	T	-	NA	Common		V		
61	<i>Tectona grandis</i> L.f.	Verbenaceae	Kyun	T	-	NA	Common			V	
62	<i>Tectona hamiltoniana</i>	Verbenaceae	Pway/ Dahat teak	T	-	Mostly endangered ⁽³⁾	Common	V			
63	<i>Tephrosia purpurea</i>	Fabaceae	Tapin-shwe-hti/ Fish poison	S	-	NA	Common		V		
64	<i>Terminalia bellerica</i> Roxb.	Combretaceae	Thit seint	T	-	NA	Common			V	
65	<i>Terminalia chebula</i> Retz.	Combretaceae	Phan Kha	T	-	NA	Common			V	
66	<i>Terminalia crenulata</i> (Heyne) Roth	Combretaceae	Htauk Kyant	T	-	NA	Common			V	
67	<i>Tetradium glabrifolium</i>	Rutaceae	Kyet Ma Oak	T/S	-	NA	Common			V	
68	<i>Thyrsostachys regia</i> Bennet	Poaceae	Htiyo-wa	G	-	NA	Common			V	
69	<i>Urena lobata</i> L.	Malvaceae	Katsine/Wetchipane	H/S	-	NA	Common	V			
70	<i>Victoria</i> sp.	Nymphaeaceae	Kya pan	Cl	LR	NA	Common	V			
71	<i>Waltheria indica</i> L.	Sterculiaceae	Bauk-hpyaw, Bauk-hpyu	S	-	NA	Common		V		
72	<i>Xylia xylocarpa</i>	Mimosaceae	Pyinkado	T	-	NA	Common			V	
73	<i>Ziziphus jujuba</i> lamk	Rhamnaceae	Zee/ red date	T	LC	NA	Common	V			

Notes:

CR - Critically Endangered
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VU - Vulnerable
NT - Near Threatened
LR = Lower Risk
LC = Least Concern
DD - Data Deficient
NA - Not Applicable

T = Tree
ST = Small
H = Herb
S = Shrub
Cl = Climber
G = Grass
B = Bamboo

Annex B

Bird Species Recorded within the Study Area

No.	Scientific Name	Common Name(s)	Family	IUCN Red List Status	Protection Status in Myanmar / Southeast Asia	Commonness	Cultivated Land	Developed Area	Forest	Reservoir
1	<i>Gallus gallus</i>	Red junglefowl	PHASIANIDAE	LC	NA	Common			V	
2	<i>Lophura leucomelanos</i>	Kalij Pheasant	PHASIANIDAE	LC	NA	Common			V	
3	<i>Milvus migrans</i>	Black kite	ACCIPITRIDAE	LC	NA	Common			V	
4	<i>Nisaetus limmaeetus</i>	Changeable Hawk-Eagle	ACCIPITRIDAE	-	NA	Common			V	
5	<i>Accipiter badius</i>	Shikra	ACCIPITRIDAE	LC	NA	Common			V	
6	<i>Circus melanoleucos</i>	Pied Harrier	ACCIPITRIDAE	LC	NA	Common			V	
7	<i>Flaco tinnunculus</i>	Common kestrel	FALCONIDAE	-	NA	Common			V	
8	<i>Bubulcus coromandus</i>	Eastern Cattle Egret	ARDEIDAE	-	NA	Common				V
9	<i>Egretta intermedia</i>	Intermediate Egret	ARDEIDAE	-	NA	Common				V
10	<i>Ardea alba</i>	Great Egret	ARDEIDAE	LC	NA	Common				V
11	<i>Egretta garzetta</i>	Little Egret	ARDEIDAE	LC	NA	Common				V
12	<i>Ardeola bacchus</i>	Chinese pond-heron	ARDEIDAE	LC	NA	Common				V
13	Gallicrex cinerea	Watercock	RALLIDAE	LC	NA	Common				V
14	<i>Phalacrocorax niger</i>	Little Cormorant	PHALACROCORACIDAE	LC	NA	Common				V
15	<i>Anthracoceros albrostris</i>	Oriental Pied Hornbill	PHALACROCORACIDAE	LC	NA	Scarce			V	
16	<i>Dryocopus javensis</i>	White-bellied Woodpecker	PICIDAE	LC	NA	Common			V	
17	<i>Micropternus brachyurus</i>	Rufous Woodpecker	PICIDAE	LC	NA	Common			V	
18	<i>Chrysocolaptes lucidus</i>	Greater Flameback	PICIDAE	LC	NA	Common			V	
19	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	COLUMBIDAE	LC	NA	Common			V	
20	<i>Metopidius indicus</i>	Bronze-winged Jacana	JACANIDAE	LC	NA	Common	V	V		
21	<i>Streptopelia tranquebarica</i>	Red-Collared Dove	COLUMBIDAE	LC	NA	Common		V		
22	<i>Columba livia</i>	Common Pigeon	COLUMBIDAE	LC	NA	Common		V		
23	<i>Cacomantis merulinus</i>	Plaintive Cuckoo	CUCULIDAE	LC	NA	Common			V	
24	<i>Centropus sinensis</i>	Greater Coucal	CUCULIDAE	LC	NA	Common			V	
25	<i>Athene brama</i>	Spotted Owlet	STRIGIDAE	LC	NA	Common			V	
26	<i>Glaucidium cuculoides</i>	Asian Barred Owlet	STRIGIDAE	LC	NA	Common			V	
27	<i>Cypsiurus balasienis</i>	Asian Palm-swift	APODIDAE	LC	NA	Common	V			
28	<i>Hirundo rustica</i>	Barn Swallow	HIRUNDINIDAE	LC	NA	Common	V			
29	<i>Vanellus indicus</i>	Red-wattled Lapwing	CHARADRIIDAE	LC	NA	Common	V			
30	<i>Vanellus malabaricus</i>	River Lapwing/ Yellow-wattled Lapwing	CHARADRIIDAE	-	NA	Common	V			
31	<i>Psittacula finschii</i>	Grey-headed Parakeet	PSITTACIDAE	NT	CITES Appendix II	Common			V	
32	<i>Lanius cristatus</i>	Brown Shrike	LANIIDAE	LC	NA	Common			V	
33	<i>Lanius tephronotus</i>	Grey-back Shrike	LANIIDAE	LC	NA	Common			V	
34	<i>Lanius collurio</i>	Burmese Shrike	LANIIDAE	LC	NA	Common			V	
35	<i>Oriolus xanthornus</i>	Black-hooded Oriole	ORIOLIDAE	LC	NA	Common			V	
36	<i>Dicrurus macrocerus</i>	Black Drongo	DICRURIDAE	LR	NA	Common			V	
37	<i>Dicrurus leucophaeus</i>	Ashy Drongo	DICRURIDAE	LC	NA	Common			V	
38	<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo	DICRURIDAE	LC	NA	Common			V	
39	<i>Dendrocitta vagabunda</i>	Rufous Treepie	CORVIDAE	LC	NA	Common			V	
40	<i>Crypsirina cucullata</i>	Hooded Treepie	CORVIDAE	NT	NA	Common			V	
41	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	HALCYONIDAE	LC	NA	Common				
42	<i>Alcedo atthis</i>	Common Kingfisher	HALCYONIDAE	LC	NA	Common				V
43	<i>Coracias benghalensis</i>	Indian Roller	CORACIIDAE	LC	NA	Common		V		
44	<i>Merops orientalis</i>	Little green bee-eater	MEROPIDAE	LC	NA	Common		V		
45	<i>Upupa epops</i>	Common Hoopoe	UPUPIDAE	LC	NA	Common	V			
46	<i>Psilopogon lineatus</i>	Lineated Barbet	MEGALAIMIDAE	LC	NA	Common	V			
47	<i>Psilopogon haemacephalus</i>	Coppersmith Barbet	MEGALAIMIDAE	LC	NA	Common	V			
48	<i>Corvus splendens</i>	House Crow	CORVINAE	LC	NA	Common		V		

No.	Scientific Name	Common Name(s)	Family	IUCN Red List Status	Protection Status in Myanmar / Southeast Asia	Commonness	Cultivated Land	Developed Area	Forest	Reservoir
49	<i>Artamus fuscus</i>	Ashy Woodswallow	ARTAMIDAE	LC	NA	Common			V	
50	<i>Mirafra erythrocephala</i>	Burmese Bushlark	ALAUDIDAE	LC	Protected	Common			V	
51	<i>Aegithina tiphia</i>	Common Iora	AEGITHININAE	LC	NA	Common			V	
52	<i>Coracina macei</i>	Large Cuckoo-shrike	CAMPEPHAGIDAE	LC	NA	Common			V	
53	<i>Copsychus saularis</i>	Oriental Magpie-Robin	MUSCICAPIDAE	LC	NA	Common			V	
54	<i>Phoenicurus aureoreus</i>	Daurian Redstart	MUSCICAPIDAE	LC	NA	Common			V	
55	<i>Pyconotus jocosus</i>	Red-Whiskered Bulbul	PYCNONTIDAE	LC	NA	Common	V			
56	<i>Pycnonotus cafer</i>	Red-Vented Bul Bul	PYCNONTIDAE	LC	NA	Abundant	V			
57	<i>Pycnonotus blanfordi</i>	Streak-eared Bul Bul	PYCNONTIDAE	LC	NA	Common	V			
58	<i>Pycnonotus flaviventris</i>	Black-crested Bul Bul	PYCNONTIDAE	-	NA	Common	V			
59	<i>Sitta frontalis</i>	Velvet-Fronted Nuthatch	SITTIDAE	LC	NA	Common	V			
60	<i>Sturnus contra</i>	Asian Pied Starling	STURNIDAE	LC	NA	Common	V			
61	<i>Acridotheres burmannicus</i>	Vinous-breasted Myna	STURNIDAE	-	NA	Common	V			
62	<i>Acridotheres tristis</i>	Common Myna	STURNIDAE	LC	NA	Common	V			
63	<i>Acridotheres fuscus</i>	Jungle Myna	STURNIDAE	LC	NA	Common	V			
64	<i>Gracula religiosa</i>	Hill Myna	STURNIDAE	LC	CITES Appendix II	Common			V	
65	<i>Acridotheres cristatellus</i>	Crested Myna	STURNIDAE	LC	NA	Common			V	
66	<i>Saxicola maurus</i>	Siberian Stonechat	SAXICOLIDAE	-	NA	Common			V	
67	<i>Saxicola caprata</i>	Pie Bushchat	MUSCICAPIDAE	LC	NA	Common	V			
68	<i>Prinia flaviventris</i>	Yellow-bellied Prinia	CISTICOLIDAE	LC	NA	Common	V			
69	<i>Turdoides gularis</i>	White-throated Babbler	TIMALIDAE	LC	Protected	Common	V			
70	<i>Orthotomus sutorius</i>	Common Tailorbird	SYLVIIDAE	LC	NA	Common	V			
71	<i>Passer montanus</i>	Eurasian Tree-sparrow	PASSERIDAE	LC	NA	Common	V			
72	<i>Passer domesticus</i>	House Sparrow	PASSERIDAE	LC	NA	Abundant	V			
73	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	CHLOROPSEIDAE	LC	NA	Common	V			
74	<i>Motacilla alba</i>	White Wagtail	MOTACILLINAE	LC	NA	Common	V			
75	<i>Lonchura punctulata</i>	Scaly-breasted Munia	ESTRILDINAE	LC	NA	Common	V			
76	<i>Lonchura atricapilla</i>	Chestnut Munia	ESTRILDINAE	LC	NA	Common	V			

Notes:

CR - Critically Endangered

EN - Endangered

VU - Vulnerable

NT - Near Threatened

LR = Lower Risk

LC = Least Concern

DD - Data Deficient

NA - Not Applicable

Annex C

Herpetofauna Species
Recorded within the Study
Area

No.	Group	Scientific Name	Common Name(s)	Family	Remark	IUCN Red List Status	Protection Status in Myanmar / Southeast Asia	Commonness	Cultivated Land	Developed Area	Forest	Reservoir
1	Snake	<i>Ahaetulla nasuta</i>	Common Whip Snake	Colubridae	Interview	LC	NA	scarce			V	
2		<i>Amphiesma stolata</i>	Striped Keelback	Colubridae	Interview	LC	NA	scarce			V	
3		<i>Bungarus fasciatus</i>	Banded Krait	Elapidae	Interview	LC	NA	scarce	V			
4		<i>Enhydrius enhydrius</i>	Striped Water Snake	Colubridae	Interview	LR	NA	common			V	
5		<i>Melanochelys trijuga</i>	Indian Black Turtle	Geoemydidae	Interview	LR/NT	CITES Appendix II; Protected	scarce			V	
6		<i>Naja kaouthia</i>	Monocellate cobra	Elapidae	Interview	LC	NA	scarce	V	V	V	V
7		<i>Ptyas korros</i>	Indochinese Rat Snake	Colubridae	Interview	LC	NA	scarce			V	
8		<i>Python molurus</i>	Burmese Python	Pythonidae	Interview	NT	CITES Appendix II; Protected	scarce	V	V	V	V
9		<i>Xenochrophis piscator</i>	Checkered Keelback	Colubridae	Interview	-	NA	common			V	
10		<i>Xenochrophis</i> sp.	Water snake	Colubridae	Observed	-	NA	common	V	V	V	V
11	Frog	<i>Bufo melanostictus</i>	Common Toad	Bufonidae	Observed	LC	NA	common	V	V		
12		<i>Fejervarya limnocharis</i>	Cricket Frog / Asian Grass Frog	Dicroglossidae	Observed	LC	NA	common	V			
13		<i>Fejervarya tigrina</i>	Indian Bull Frog	Dicroglossidae	Interview	-	NA	scarce	V			V
14		<i>Humerana humeralis</i>	Groaning Frog	Ranidae	Observed	LC	NA	common	V			
15		<i>Kaloula pulchra</i>	Painted Bull Frog	Microhylidae	Interview	LC	NA	scarce		V		
16		<i>Polypedates maculatus</i>	Spotted Tree Frog / Himalayan Tree Frog	Rhacophoridae	Interview	LC	NA	common	V			

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NA - Not Applicable

Annex D

Mammal Species Recorded within the Study Area

No.	Scientific Name	Common Name(s)	Family	Remark	IUCN Red List Status	Protection Status in Myanmar / Southeast Asia	Commonness	Cultivated Land	Developed Area	Forest	Reservoir
1	<i>Echinosorex gymmurus</i>	Moonrat	Erinaceidae	Interview	-	NA	common	V		V	
2	<i>Nycticebus coucang</i>	Greater Slow Loris	Lorisidae	Interview	VU	Appendix I of CITES; Protected in by law in Malaysia, Thailand and Indonesia	occasional			V	
3	<i>Macaca mulatta</i>	Rhesus Macaque	Cercopithecidae	Observed	LC	CITES Appendix II; Schedule III in the Bangladesh Wildlife (Preservation) (Amendment) Act, 1974; Schedule I, Part I in the Indian Wildlife (Protection) Act (amended up to 2002); Category II of the Chinese Wildlife Protection Act (1989); protected with all other primates in the Nepalese National Parks and Wildlife Conservation Act, 1973.	occasional				
4	<i>Callosciurus erythraeus</i>	Pallas's squirrel	Sciuridae	Observed	LC	NA	common	V	V	V	
5	<i>Manis javanica</i>	Sunda Pangolin	Manidae	Interview	CR	CITES Appendix II; Wildlife and Protected Areas Law (1994) Completely Protected Animal in Myanmar	occasional			V	
6	<i>Manis pentadactyla</i>	Chinese Pangolin	Manidae	Interview	CR	CITES Appendix II; Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)	occasional			V	
7	<i>Hystrix brachyura</i>	Malayan Porcupine	Histricidae	Interview	LC	Schedule II of the Indian Wildlife Protection Act	occasional			V	
8	<i>Canis aureus</i>	Golden jackal	Carnidae	Interview	LC	NA	occasional			V	
9	<i>Cuon alpinus</i>	Dhole	CANIDAE	Interview	EN	CITES - Appendix II	occasional			V	
10	<i>Helarctos malayanus</i>	Sun Bear	URSIDAE	Interview	VU	CITES Appendix I	occasional			V	
11	<i>Arctonyx collaris</i>	Hog Badger	Mustelidae	Interview	NT	NA	common			V	
12	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Viverridae	Interview	LC	NA	common			V	
13	<i>Viverricula indica</i>	Small Indian Civet	VIVERRIDAE	Interview	LC	Totally protected under the Wildlife Act of 1994	common			V	
14	<i>Prionailurus bengalensis</i>	Leopard Cat	FELIDAE	Interview	LC	CITES Appendix II	occasional			V	
15	<i>Pardofelis marmorata</i>	Marbled cat	FELIDAE	Interview	VU	CITES Appendix I	occasional			V	
16	<i>Arctictis binturong</i>	Binturong	VIVERRIDAE	Interview	VU	NA	occasional			V	
17	<i>Felis chaus</i>	Jungle Cat	FELIDAE	Interview	LC	NA	common			V	
18	<i>Elephas maximus</i>	Asian Elephant	Elephantidae	Interview	EN	CITES Appendix I	scarce			V	
19	<i>Sus scrofa</i>	Eurasian Wild pig	Suidae	Interview	LC	NA	common			V	
20	<i>Muntiacus muntjak</i>	Red Muntjac	Cervidae	Interview	LC	Seasonally Protected	scarce			V	

Notes:

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VU - Vulnerable

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LC = Least Concern

DD - Data Deficient

NA - Not Applicable

Annex E

Butterfly Species Recorded within the Study Area

No.	Scientific Name	Common Name(s)	Family	Remark	IUCN Status	Protection Status in Myanmar / Southeast Asia	Commonness	Agricultural Land	Developed area	Forest	Water body
1	<i>Danaus chrysippus chrysippus</i> (Linnaeus, 1758)	Plain Tiger	Danaidae	Observed	NA	NA	Very Common	V	V		
2	<i>Danaus genutia genutia</i> (Cramer, 1779)	Common Tiger	Danaidae	Observed	NA	NA	Very Common	V			
3	<i>Euploea core godarti</i> (Lucas, 1853)	Common Indian Crow	Danaidae	Observed	LC	NA	Common	V	V	V	
4	<i>Tirumala limniace limniace</i> (Cramer, 1775)	Blue Tiger	Danaidae	Observed	NA	NA	Common	V			
5	<i>Papilio memnon agenor</i> (Linnaeus, 1758)	Great Mormon	Papilionidae	Observed	NA	NA	Not Rare	V		V	
6	<i>Papilio polytes romulus</i> (Cramer, 1775)	Common Mormon	Papilionidae	Observed	NA	NA	Very Common	V	V		
7	<i>Papilio demoleus demoleus</i> (Linnaeus, 1758)	Lime Butterfly	Papilionidae	Observed	NA	NA	Very Common	V	V	V	
8	<i>Junonia almana almana</i> (Linnaeus, 1758)	Peacock Pansy	Nymphalidae	Observed	LC	NA	Common	V	V		
9	<i>Junonia atlites atlites</i> (Linnaeus, 1758)	Grey Pansy	Nymphalidae	Observed	NA	NA	Common	V			
10	<i>Athyma perius perius</i> (Linnaeus, 1758)	Common Sergeant	Nymphalidae	Observed	NA	NA	Common	V		V	
11	<i>Phalanta phalantha phalantha</i> (Drury, 1773)	Common Leopard	Nymphalidae	Observed	NA	NA	Common	V			
12	<i>Pareronia anais anais</i> (Lesson, 1837)	Common Wanderer	Pieridae	Observed	NA	NA	Common	V			
13	<i>Eurema hecabe hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	Pieridae	Observed	NA	NA	Very Common	V	V	V	
14	<i>Catopsilia scylla comelius</i> (Fabricius, 1787)	Orange Emigrant	Pieridae	Observed	NA	NA	Common	V			
15	<i>Hebomoia glaucippe glaucippe</i> (Linnaeus, 1758)	Great Orange Tip	Pieridae	Observed	NA	NA	Common	V	V		
16	<i>Catopsilia pomona pomona</i> (Fabricius, 1775)	Lemon Emigrant	Pieridae	Observed	NA	NA	Very Common	V		V	
17	<i>Pareronia valeria lutescens</i> (Butler, 1879)	Common Wanderer	Pieridae	Observed	NA	NA	Uncommon	V			
18	<i>Leptosia nina nina</i> (Fabricius, 1793)	Psyche	Pieridae	Observed	NA	NA	Common	V	V		
19	<i>Delias descambesi descambesi</i> (Boisduval, 1836)	Redspot Jezebel	Pieridae	Observed	NA	NA	Common	V		V	
20	<i>Pareronia valeria lutescens</i> (Butler, 1879)	Wanderer	Pieridae	Observed	NA	NA	Uncommon	V			
21	<i>Ixias marianne</i> (Cramer, 1779)	White Orange Tip	Pieridae	Observed	NA	NA	Common	V	V		

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Annex F

Fish Species Recorded within the Study Area

No	Scientific name	Common name(s)	Family	Local name	IUCN Red List status ⁽¹⁾	Protection Status in Myanmar / Southeast Asia	Commonnes	Sampling Location
1	<i>Channa striata</i>	Snakehead Murrel	Channidae	Nga Yant	LC	NA	common	Moyingyi Ramsar site
2	<i>Heteropneustes fossilis</i>	Stinging catfish	Heteropneustidae	Nga Kyee	LC	NA	common	Kyiksakaw market
3	<i>Notopterus notopterus</i>	Bronze featherback	Notopteridae	Nga Phere	LC	NA	common	Moyingyi Ramsar site
4	<i>Catla catla</i>	Catla	Cyprinidae	Nga Thinn Gaunn Pwa	LC	NA	common	Kyiksakaw market
5	<i>Lepidocephalichthys berdmorei</i>	Burmese loach	Cobitidae	Nga Thaelae Doe	LC	NA	common	Kyiksakaw market
6	<i>Wallago attu</i>	Wallago	Siluridae	Nga Bat	NT	NA	common	Moyingyi Ramsar site
7	<i>Osteobrama alfredianus</i>	Rohtee	Cyprinidae	Nga Phan Ma	-	NA	common	Kyiksakaw market
8	<i>Clarias batrachus</i>	Philippine catfish	Clariidae	Nga Khu	LC	NA	common	Moyingyi Ramsar site
9	<i>Xenentodon cancila</i>	Freshwater garfish	Belontiidae	Nga Phaun Yoe	LC	NA	occasional	Moyingyi Ramsar site
10	<i>Mystus vittatus</i>	Striped dwarf catfish	Bagridae	Nga Zin Yainn	LC	NA	common	Kyiksakaw market
11	<i>Ompok bimaculatus</i>	Butter catfish	Siluridae	Nga Nu Than	NT	NA	common	Moyingyi Ramsar site
12	<i>Glossogobius giuris</i>	Tank goby	Gobiidae	Ka Tha Poe	LC	NA	occasional	Pyin Bone Gyi market
13	<i>Macrogathus zebrinus</i>	Zebra spiny eel	Mastacembelidae	Nga Myay Htoe	LC	NA	common	Pyin Bone Gyi market
14	<i>Anabas testudineus</i>	Climbing perch	Anabantidae	Nga Pyay Ma	DD	NA	common	Pyin Bone Gyi market
15	<i>Oreochromis niloticus</i>	Nile tilapia	Cichlidae	Telarr Pi Yarr	-	NA	common	Pyin Bone Gyi market
16	<i>Systemus rubripinnis</i>	Javaen barb	Cyprinidae	Nga Khone Ma	DD	NA	common	Pyin Bone Gyi market
17	<i>Monopterus albus</i>	Swamp eel	Synbranchidae	Nga Shint Ni	LC	NA	common	Pyin Bone Gyi market
18	<i>Cyprinus carpio</i>	Common carp	Cyprinidae	Shwe War Nga Kyinn	VU	NA	occasional	Moyingyi Ramsar site
19	<i>Cirrhinus cirrhosus</i>	Mrigal Carp	Cyprinidae	Nga Kyinn	VU	NA	common	Moyingyi Ramsar site
20	<i>Parambassis ranga</i>	Indian glassy fish	Ambassidae	Nga Zin Zet	LC	NA	common	Pyin Bone Gyi market
21	<i>Channa orientalis</i>	Walking snakehead	Channidae	Nga Yant Gaungto	-	NA	common	Pyin Bone Gyi market
22	<i>Silonia silondia</i>	Silond catfish	Schilbeidae	Nga Myuin	LC	NA	common	Pyin Bone Gyi market
23	<i>Mastacembelus unicolor</i>	-	Mastacembelidae	Nga Myay Htoe Pyauk	-	NA	common	Pyin Bone Gyi market

Notes:

CR - Critically Endangered

EN - Endangered

VU - Vulnerable

NT - Near Threatened

LR = Lower Risk

LC = Least Concern

DD - Data Deficient

NA - Not Applicable

Annex G

Management Plans under the ESMP



PACIFIC HUNT ENERGY

PACIFIC HUNT ENERGY ENVIRONMENTAL MANAGEMENT PLAN FOR SEISMIC ACQUISITION ON PSC H, MYANMAR

Project description

A total of 307.3 line kilometres of 2-dimensional seismic acquisition are planned through PSC H. The block is located in the Bago Region, and consists of farmland, forest and inhabited areas. The 19 seismic lines run across farmland and inhabited areas avoiding and diverting around forest areas. The project is focused in the southern part of the block namely in Bago, Daik U, Kyauktaga and Waw townships.

The seismic campaign will be carried out using Vibroseis. In a Vibroseis survey, specially designed vehicles lift their weight onto a large plate, in contact with the ground, which is then vibrated over a period of time (typically 6-14 seconds), through a sweep of frequencies. All receiver equipment, geophones, cables, line boxes and recording instrument, are identical on a Vibroseis survey to those used on an impulsive source survey. The additional equipment as on a Vibroseis survey are a Vibrator, usually mounted on a truck or buggy and additional electronic equipment of a vibrator controllers in each Vibroseis truck , sweep generator and a correlator with the recording instrument. Vibroseis does not make use of explosives and is ideal for populated areas.

The seismic campaign has been planned in a way that it will have the lightest possible footprint in the surrounding environment. The seismic lines avoid forested areas, including the Moyingyi Wetland Bird Sanctuary and the Bago Yomas protected area, which means impacts on biodiversity are estimated to be minimal. The Vibroseis trucks will make use of existing roads, and no roads will be built for the purpose of seismic acquisition. While in order to complete seismic acquisition vibroseis trucks will drive across farmland, it is not expected to cause damage to the environment or biodiversity. The width of the lines is limited to approximately 5 meters. Appropriate crop compensation will be paid to the land owners, whose land is affected by the seismic campaign. Vibroseis trucks are not designed to run across water bodies but will stop at a safe distance from them. Because of this, the acquisition is estimated not to have adverse impacts on the biodiversity and state of water bodies. Vegetation clearance is expected to be minimal, if any, due to the nature of the operational area. Should any vegetation clearance be needed, it is expected to focus on soft clearing leaving the roots in place, and proper terrestrial habitat reinstatement procedures will be applied.

As part of the project, the seismic contractor will set up one basecamp, which is designed to house up to 140 people. If accommodation is needed further away from the base camp, renting hotel or motel rooms is expected. The camp will be located in Bago Township near the Win Ga Baw, Ma Yin and Hpa Yar Ka Lay village tracts, approximately 20 kilometers north from the city Bago. The camp is to be located slightly outside any villages to avoid unnecessary disturbance to the local residents.



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The camp set-up is scheduled to begin in November 2017, while seismic acquisition is scheduled to be finished by the end of March 2018. Pacific Hunt Energy will not have a camp on PSC H during seismic acquisition.

The following figure shows the planned location of the seismic contractor's basecamp.

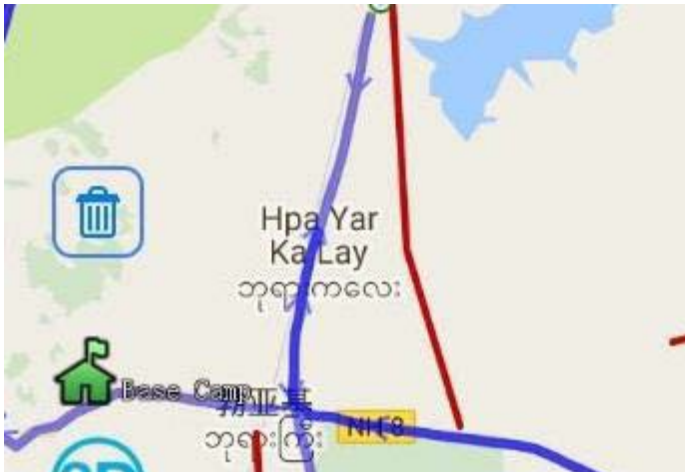


Figure 1. Planned location of the BGP basecamp on PSC H.

Environmental monitoring

During seismic acquisition environmental monitoring will take place in order to ensure that any adverse impacts to the surrounding nature are kept to a minimum. Environmental monitoring will be performed by a qualified person, who is familiar with the unique Myanmar environment, and is able to identify vegetation and animals correctly. Depending on the area of operations, seismic crew may be accompanied by a qualified environmental consultant/expert either at all times or when deemed necessary. However, because the acquisition takes place in non-forested areas, not much contact is expected with wildlife and especially with large mammals. The knowledge of local villagers will be used to take note of animals' nests if found on farmland, for example.

Furthermore, employees and contractors are expected to complete HSE training prior to starting field operations. The training shall include topics such as waste management, proper vegetation clearance and what do when encountering wildlife.

In order for environmental management and monitoring to be effective, it needs to be integrated in the company policy. Everyone in Pacific Hunt Energy is committed to doing the right thing. As a company we are committed to operating in a sustainable way so that future generations are able to enjoy the same multiple dimensions of the surrounding environment as we do. Our goal is to have the lightest possible environmental footprint as possible, with a policy of zero long term



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harm. In practice this means that everyone is encouraged to speak their mind if they spot an animal's nest near line clearance, or if they notice someone leaving garbage behind, for example.

Time Frame and Monitoring Frequency

Seismic acquisition on PSC H is expected to begin in the last quarter of 2017 and to last no longer than until the end of March 2018. As it is not expected that the project requires new roads but can make use of current roads, monitoring is expected to begin fully upon commencing seismic surveying. However, as part of the drilling ESIA commitments, environmental baseline studies will be performed on PSC H. The timing of these studies is expected to fall in line with the commencement of seismic field operations. The outcomes of these environmental baseline studies may also be made use of in environmental monitoring.

Monitoring will either be ongoing, or as deemed necessary by environmental specialist familiar with the area. It is expected that by providing proper training in advance to the seismic contractor, it is possible to avoid harming the environment even without the continuous presence of an environmental expert.

Monitoring reports will be submitted to the Ministry of Natural Resources and Environmental Conservation six-monthly starting from the commencement of field operations, or after finishing field activities, whichever is sooner. Thus, it is expected that the first environmental monitoring report will be submitted in April 2017, after seismic acquisition has finished. The report should cover up to five months of field operations.

Analytical Methods & Parameters

Flora

Pacific Hunt Energy has planned the seismic campaign on PSC H in a way that only minimal vegetation clearing will be needed, if any. However, should any clearing be required for the successful completion of seismic surveying, the following measures will be taken in order to minimize any adverse impacts and to make sure the environment can 'recover' to its natural state as soon as possible. When an environmental expert is not available to supervise the operations, seismic crews should be self-monitoring their operations:

- Trees with diameter of 20cm (approx. 8 inches) or less at breast height will not be felled.
- Trees and other vegetation that provides shelter for endangered animals will not be cut.
- If a tree, bush or other vegetation provides shelter to a non-endangered animal, the nest should be carefully moved to a similar environment if the said vegetation should be felled or cut off.
- If possible, removing vegetation, which provides shelter to animals or have animal nests, should be left intact.
- Create walking paths where they will have the least impact on the environment i.e. the least clearance of vegetation is needed



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- Leave smaller vegetation, soil, seeds etc. intact
- Removal of root stock shall be kept to a minimum.
- Vegetation should be cut by hand when possible in order to avoid unnecessary disturbance to the nearby fauna.
- Clearance around shot holes should be minimized as far as practicable.
- Access roads should not exceed the width of 5 meters where possible.
- Clearing of vegetation shall be avoided near cultural heritage sites and monasteries
- Avoid using chemical herbicides or other substances during environmental restoration as they may have adverse impacts on the natural environment.

Two endangered tree species may be come across on PSC H namely, Kanyin (*Dipterocarpus alatus*) and Dahat teak (*Tectona hamiltoniana*), even though it is unlikely that the trees would be encountered in the rural and urban areas of the block. It is mandatory that no endangered trees will be felled as part of the seismic acquisition on PSC H. In order to avoid this from happening, seismic crews will be familiarized with the species. If a tree cannot be surely identified, and environmental specialist should be alarmed to identify it before felling. Figure 2 and Figure 3 show the endangered tree species found on PSC H. Refer to the environmental and social impact assessments for a full list of identified species on PSC H.



*Figure 2. Kanyin
(Dipterocarpus alatus)*



*Figure 3. Dahat teak
(Tectona hamiltoniana)*

Other

- All equipment must be collected after finishing seismic acquisition. No equipment or garbage shall be left behind.



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Fauna

PSC H consists of rural and urban areas together with forests. However, the forest is not planned to be entered during this 2-dimensional seismic campaign, and because of this only very limited contact with fauna is expected. Contact with large mammals (e.g. elephants) on the project areas is not expected at all. Should contact with fauna anyhow occur, the below presented guidelines must be followed. Many animals encountered in Myanmar have a status as an endangered species, either in Myanmar or globally. In order to avoid harming any fauna during seismic acquisition, the following measures shall be implemented.

- No contact with wild animals is allowed.
- No disturbing animals in their natural habitat is allowed.
- When encountering large or dangerous wild animals such as elephants or snakes during operations, one should back away calmly. Discontinue operations if need be and report to supervisor/PHE representative as soon as possible.
- It is forbidden to attempt to kill an animal in order to be able to continue operations the area.
- If possible, continue work further away from the animal.
- No fishing, hunting or poaching is allowed. Several species have been classified as endangered or threatened in Myanmar. Some of these species may be sought after in the black market, or elsewhere if their conservation status is unknown to the poacher. Any observations of hunting by seismic crews or PHE personnel are to be reported to the HSE manager immediately.
- Do not introduce pets, livestock or other animals to the area as may disturb the natural balance of the environment.
- Seismic crews shall keep track of endangered species and/or large mammals, which are easy to identify. Coordinates together with date, time and number of animals of any sightings should be tracked. These sightings shall later be included in environmental monitoring reports.

Other

- No leaving trash behind as it may affect biodiversity in the area or cause unnecessary deaths of animals if consumed
- No purchasing or selling of natural products in the area including souvenirs made of wood, bushmeat and wildlife
- Inform your supervisor and/or a PHE representative of any breaches or possible you may notice
- If you are not sure whether something is allowed, consult a PHE representative before proceeding



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The above mentioned mitigation measures shall be recorded either by the supervising environmental expert, or the seismic crew. All the records will be compiled and will be made use of in the environmental monitoring reports.

Refer to the environmental and social impact assessments for a full list of identified species and their protection status on PSC H.

Adverse Impacts and Mitigation

In general, seismic acquisition has only a light impact on the environment. This is due to the mobile nature of seismic acquisition as the operations constantly move forward along the seismic lines. Any disturbing noises or vibrations are temporary in any location. However, if managed poorly seismic acquisition may have adverse impacts on the environment through fires, uncontrolled explosions, or spills and leaks. Table 1 below shows potential adverse impacts, which seismic survey may cause.

Seismic survey potential impact identified in ESIA	Significance of Impact	Residual Impact Assessed
Impacts from labour (including hunting), equipment and services supply on terrestrial and aquatic flora and fauna	Moderate	Negligable to Minor
Impacts from site preparation / clearance and creation of access routes on terrestrial habitats and associated flora and fauna	Negligable to Moderate	Minor
Impacts from mobile power generation on terrestrial fauna	Minor	Minor
Impacts from waste disposal on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	Minor	Negligable
Impacts from sewage and wastewater discharge on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	Minor	Minor
Impacts from spills/leaks on on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	Moderate	Minor
Impacts from fires and explosions on air quality, ground water quality, surface water quality, landscape and visual character, use of natural resources, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	Major	Minor

Table 1. Potential impacts caused by seismic acquisition and their significance

With the correct mitigation measures it is possible to lessen the risk of occurrence and/or the severity of the impact. Table 2 addresses mitigation measures to lessen certain potential adverse impacts.

Potential adverse impact	Recommended mitigation measures
Impacts from labour, equipment services supply on terrestrial and aquatic flora and fauna	<ul style="list-style-type: none"> Seismic crews to attend proper HSE induction training prior to commencement of field operations



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	<ul style="list-style-type: none"> • Limiting operations to day time
Impacts from site preparation / clearance, and creation of access routes on terrestrial habitats and associated flora and fauna	<ul style="list-style-type: none"> • Using existing access roads • Limiting the width of new access roads to a maximum of 5 meters • Crews should access areas on foot as far as practicable and follow a narrow path • Felling of large trees will be avoided, and no endangered trees will be cut down
Impacts from mobile power generation on terrestrial fauna	<ul style="list-style-type: none"> • Limiting operations to day time • Specifications/selection of power generator
Impacts from waste disposal on surface water quality, ground water quality, soil, terrestrial habitats and aquatic habitats as well as their associated flora and fauna	<ul style="list-style-type: none"> • Collection of all waste from the environment • Zero trash left behind policy Seismic teams to collect gab wires and any other equipment, no trash left behind policy • Seismic team shall check the shot holes, and collect residues as far as practicable • Refer to PHE waste management plan for further details
Impacts from sewage water and waste water discharge on surface water quality, ground water quality, soil, terrestrial habitats and their associated flora and fauna	<ul style="list-style-type: none"> • Service tanks for camp toilet sewage water • Water pit(s) for grey water from the camp kitchen • Service tank(s) and water pit(s) to be kept separated from drainage and storm water • Installing and designing waste treatment facilities properly • Maintaining waste water treatment facilities to ensure effective and proper operation of the facilities • Limiting the quantities of shot hole fluids to small amounts of water
Impacts from spills and leaks on surface water quality, ground water quality, soil, terrestrial habitats and their associated flora and fauna	<ul style="list-style-type: none"> • Shot holes don't require drilling fluids • Fuel is sourced locally and there are no need for fuel storage



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	<ul style="list-style-type: none"> • Spill control plan for minor spills
Impacts from fires and accidental explosions on air quality, ground water quality, surface water quality, landscape and visual character, use of natural resources, terrestrial and aquatic habitats and their associated flora and fauna	<ul style="list-style-type: none"> • Fire safety training is part of HSE induction • Availability of firefighting equipment • Refer to fire management plan for more details
Impacts from light disturbance to fauna	<ul style="list-style-type: none"> • Minimisation of night time driving • Limiting project activities to daylight working hours
Impacts from vibroseis trucks and increased traffic	<ul style="list-style-type: none"> • Minimisation of night time driving • Minimisation of unnecessary idling • Safe driving practices • Progressing in schedule and avoiding delays in acquisition

Table 2. Mitigation measures to address certain potential adverse impacts

Additional mitigation measures may be adopted as per environmental specialist’s comments, in order to make sure that any adverse impacts are kept to a minimum and that only the lightest possible footprint is left, with zero long term harm.

Budget

Budget for the execution of the Environmental Management Plan will be finalized upon hiring a reputable ecologist and/or environmental consultant.

Representative Images of PSC H



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For detailed procedures please refer to the following Pacific Hunt Energy management plans:

- Terrestrial habitat reinstatement plan
- Waste management plan
- Traffic management plan
- Fire management plan
- Noise management plan
- Biodiversity action plan



PACIFIC HUNT ENERGY

STAKEHOLDER ENGAGEMENT PLAN

The aim of Pacific Hunt Energy (PHE) is to create and maintain a positive relationship between stakeholders and the operator, and its contractors and subcontractors.

Our commitment is to work toward a transparent relationship with stakeholders and provide information of the project, so that stakeholders will develop an understanding of the project. This includes being open to discussion, and answering to questions and concerns.

Areas of Influence

Throughout the life course of any hydrocarbon exploration project, the areas of effect will change several times. In most cases, stakeholders' contact or interactions with the project will be temporary with the exception of (semi-)permanent set-ups.

Zone 1: Major

The areas, on which Pacific Hunt Energy's operations will have the most influence are areas (villages) closest to permanent camp sites, and areas where exploration drilling takes place. These are the most permanent type of set ups in PHE's operations. Within Zone 1, contact, interactions and/or impacts are the most frequent. Examples of such contact include increased traffic and temporary noise. However, PHE aims to choose locations for (semi-)permanent set ups carefully, so that, without jeopardizing its core activities, any unnecessary adverse impacts may be avoided.

Example of Zone 1: Basecamp in the proximity of Lawtha village on PSC C-1

Zone 2: Moderate

Zone 2 refers to areas in which stakeholders are in touch with the project relatively frequently. Impacts in these areas aren't expected to be notable, but rather frequent in nature.

Example of Zone 2: villages near (semi-)permanent set ups from which daily essentials are procured.

Zone 3: Minor

Zone 3 consists of areas in which interactions and impacts on stakeholders are temporary and limited in time. While impacts may be notable at the time of occurrence, they are not prolonged but exposure times are short and occasional.

Example of Zone 3: Areas near seismic lines. In most cases, interaction with one area should not last longer than a day or a couple days at a maximum.

Zone 4: Negligible

In Zone 4 contact with the project or project proponent are rare, occasional at most. This due to the zone being located far from the core of the operations. For this reason, impacts, positive or negative, are negligible in zone 4.



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Stakeholders & Management Procedures

A stakeholder is “a person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization’s actions, objectives, and policies”.

Stakeholders can be divided into two main groups, primary and secondary stakeholders. Primary stakeholders are: local communities, farmers & vulnerable groups including, but not limited to, women, elderly and handicapped. Secondary stakeholders are: government ministries, local authorities, village level institutions, NGOs and civil society organizations, local media & political parties. The amount of influence stakeholders have on the project varies by stakeholder group. The amount and type of impacts the project has on stakeholders varies by stakeholder group.

Below we’ve divided stakeholders into four different groups starting with those who will be affected by the project the most. Commercial stakeholders could have been included in the Affected Communities but given that the different impacts on and relevant themes to the groups, they have been separated.

Affected Communities

Inhabitants near the project areas

Local labour and job seekers

Local service providers

Representatives of the local communities (e.g. village elders)

Special groups (e.g. women’s group, children and the elderly)

Potential impacts/themes: increased job opportunities, visual and auditory impacts, impacts on local schooling, air quality and environment.

The communities located closest to operational sites are ones who deserve the most attention. Because of this, PHE has appointed experienced personnel in managing community relations. This “managing” consists of providing information of the upcoming operations, listening to their questions and concerns as well as addressing the questions and concerns. Pacific Hunt Energy has been provided with an opportunity to operate in the proximity of villages and communities and they least we can do is to listen how we could improve the local resident’s lives. Public consultations are in the core of PHE operations, and it is our aim to make as many of the locals’ wishes come true as possible, whether it is an employment opportunity or provision of clean drinking water for young school children.

Commercial Stakeholders

Local businesses

Service & product providers

Workers’ unions



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Potential impacts: increased business, increased income, visual and auditory impacts from the project, concern for workers' rights etc.

Pacific Hunt Energy is committed to using local businesses for procuring relevant services and products when possible. The company is also committed to paying an appropriate wage, which is in line with local standards for all locally recruited staff and labour. While presence of a foreign company may increase local prices, the company shall try to make sure its presence will not increase inflation of prices near its operational areas.

Government Authorities

Local authorities (e.g. township and village administrators)

Governments (local & national)

MOGE

MONREC, MOEE and other relevant ministries

Potential impacts/themes: improvements in the country's electrification, improvements in the locals' lives, concern for the environment, impacts on the country's income and economy, concern for fair business and fair treatment of people

While impacts caused by PHE's projects on government authorities are different than on those living near the operational sites, they are equally important. Pacific Hunt Energy is committed to obeying the local and international laws and regulations applicable to its operations in Myanmar and all over the world. Any information provided to government authorities shall be truthful, and correct at the time provision. Maintaining an open dialogue will enable successful cooperation.

Civil Society

Non-governmental organizations (NGOs)

Local religious authorities and representatives (e.g. monks)

Potential impacts/themes: concern for fair treatment of local inhabitants, concern for the environment, introduction of alternative routes to places of worship etc.

Pacific Hunt Energy aims to maintain a good line of communication with the civil society, and is ready to address their questions and concerns. The line of good communication requires actions from both parties. PHE is willing to take part in workshops and meetings with members of civil society, and acknowledges that such communication may bring new ideas and knowledge. The company is also willing to invite members of the civil society to express their thoughts.

The above examples reveal a myriad of various potential impacts that PHE's projects may have on different stakeholder groups. At the same time, several themes arise in multiple groups.



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While successful interaction with different stakeholder requires different actions, they shall all be encountered with respect. An open dialogue is vital for good communication, and PHE is committed to encouraging stakeholders to express their opinions, concerns and suggestions, and to answer their questions truthfully.

Community and public consultations are always conducted prior to the commencement of operations. Further consultations will be carried out if there are notable changes in the project, after any accidents that have affected any of the above mentioned stakeholder groups, and at other times when considered necessary. A record of meetings shall be kept, and minutes will be collected at meetings regardless of the stakeholder groups present. When it comes to relations with government authorities, contact will also be kept through progress reports, monitoring reports, phone calls and other means deemed necessary.

While maintaining a good relationship with stakeholders is the responsibility of all PHE employees, the main responsibility for maintaining good relationships with local communities is on the Local Communications Manager. Country Manager and Government Relations Manager hold the main responsibility for maintaining good communication with government entities.

Interaction with some groups will unavoidably be more frequent than others but in order to keep all stakeholder up to date, Pacific Hunt Energy releases relevant information of its operations on its website and on other media outlets. Furthermore, various stakeholder groups have been and shall continue to be provided with details for direct communication with PHE.

Grievance Mechanism

Pacific Hunt Energy is committed to responding timely to any complaints about its operations. All cases will be handled individually and privately. The company can be approached in the proximity of operational and camp areas but entering the operational and camp sites without authorization is prohibited, and could cause danger to both parties. The company can also be contacted via email at infomyanmar@pacifichuntenergy.com

It is recommended that as much details about the case will be provided when contacting the operator to enable speedier response.

Regulations & Code of Conduct

Pacific Hunt Energy is committed to fair business conduct, and to applying applicable laws, whether local or international in its every day operations. This includes strict zero tolerance to any bribery and/or corruption.

Pacific Hunt Energy has shared its code of responsible business on its website www.pacifichuntenergy.com



PACIFIC HUNT ENERGY

Terrestrial Habitat Reinstatement Plan

Introduction

Pacific Hunt Energy (PHE) is the operator of onshore Blocks PSC C-1 and PSC H Myanmar and carries out field activities on behalf of its partners YIG and MOGE.

PHE is currently undertaking exploration activities including geological and geophysical surface and drilling activities. This plan addresses PHE's plan for ensuring the reinstatement of Terrestrial habitat in both blocks where habitat has been disturbed by PHE's activities.

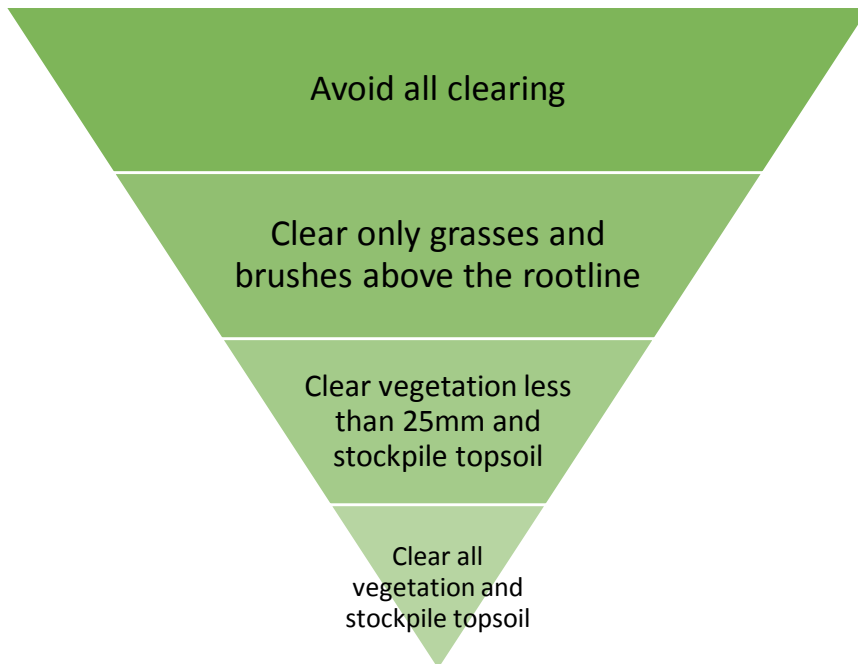
PSC H is located in the Bago region of southern Myanmar, where land use is primarily farm and crop land. While crop compensation is of importance, the terrestrial habitat value of the Sittaung River Valley is relatively low. PSC C-1, on the other hand, is located in the northwest region of Myanmar where the dominant vegetation is predominantly sparsely inhabited river valleys and forests, including wildlife reserves. This area is of high value in terms of its habitat value.

Despite the two blocks having significantly different ecological value, PHE will maintain similar standards of habitat preservation and reinstatement.

Habitat Preservation

Wherever possible, PHE and its contractors will avoid unnecessary clearing of vegetation for the purposes of its operations. The chart below shows the hierarchy of habitat treatment to be employed by PHE and its contractors.

Clearing will not take place in areas at risk of high erosion.





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Soft Clearing

Where it is not possible to avoid all clearing, preference will be given to clearing soft vegetation only, by cutting back two inches above the root level. By leaving the vegetation roots in place, the plants are more likely to grow back quicker.

The cleared vegetation matter may contain valuable seed stock, and should be stockpiled to the side of the cleared areas, ready to be re-spread at the cessation of activities. This soft clearing method will allow a clear path for operations while allowing the potential for quick regrowth via the in situ root stock.

Hard Clearing

Where it is not possible to leave root stock in place, clearing will take place of all materials while leaving large trees in place. Topsoil, which is rich seed, root stock and microorganisms, will be stripped as close to the construction date as practicable.

The cleared vegetation including all plants and topsoil shall be pushed into windrows to one or both sides of the cleared path. Topsoil will be stored in low-profile dumps less than 2 m in height to avoid compaction, and assist with maintenance of viable seed, soil microorganisms, and soil nutrients. Soil and vegetation stockpiles will be placed so as to avoid the need for any further disturbance until required for rehabilitation.

Dust from soil stripping and earthworks will be managed where practicable, water will be used for dust suppression, if required.

Where practicable topsoil will be stripped to an approximate depth of no more than 5 cm. Where practicable recovered topsoil will be stored in windrows and used for direct lay or stockpiled separately on a suitable storage site for later rehabilitation.

Where it is absolutely unavoidable to clear larger trees, those trees will be stockpiled near the site of clearing for later redistribution for ground fauna habitat.

Habitat Reinstatement

As soon as practicable after the completion of operations, cleared areas will be rehabilitated. If the cleared areas have been heavily compacted, the surface should be ripped on the contour to the depth of any machinery induced compaction. Surface drainage patterns will be re-established to be consistent with that occurring prior to disturbance.

Stockpiled topsoil and plant material will then be spread back over the cleared areas. It is important to do this as soon as practicable to reduce the loss of soil biological components.

Topsoil should be re-spread as close as possible to the area from which it was removed to maintain the natural diversity and distribution of plant species.

If large trees have been felled, these will be lain across the rehabilitated area to encourage small ground fauna to return to the reinstated areas.

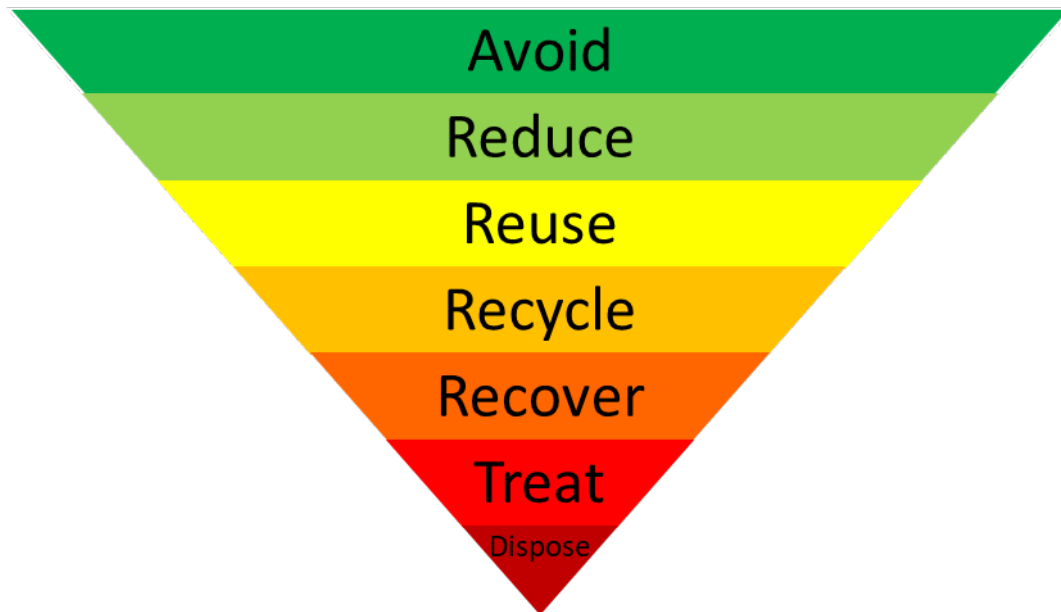


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WASTE MANAGEMENT PLAN

Pacific Hunt Energy (PHE) and its contractors will take all necessary steps to ensure that any waste is kept to a minimum and that segregation and recycling methods are utilised as primary methods of managing waste when possible. The location and layout of the operational area and camp areas will take into account the need to control waste generation and protection of the environment. International best practices (e.g. IFC) will be adopted.

Pacific Hunt Energy recognizes the importance of waste hierarchy, which is presented below.



When the primary actions are not possible, Pacific Hunt Energy will take the following measures of control.

- All waste disposal shall be in accordance with the local laws and regulations.
- No garbage shall be left behind on the operational area as far as reasonably practicable but it must be disposed of appropriately at camp site or elsewhere.



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- Skips must be provided for disposal of domestic waste, and covered sumps or tanks must be provided for sewage and grey water from the laundry, kitchen and shower blocks.
- Oil pans must be large enough to contain expected volumes of drilling mud. They should be located in such a way as to avoid the risk of flooding and therefore possible pollution of surface water. Oil pans shall be lined to prevent possible contamination of ground water.
- An area should be assigned specifically for engine maintenance to vehicles and equipment, or any other process where there is a chance of spillage of waste oil.
- Waste oil should be drained into suitable containers for later appropriate disposal. Any spills must be contained, reported and cleaned up, with appropriate disposal of contaminated soil. All such incidents must be reported to the Rig Manager and relevant PHE personnel with records established using the Incident Report form.
- Highly toxic, corrosive, flammable and oxidising chemicals must be appropriately segregated from other products, and clearly identified with signage. Bunding should be considered if larger quantities of liquid products are being used.
- Garbage bins must be provided with lids and liners to contain garbage and prevent animals and birds from scattering scraps. Garbage bags will be tied off and placed in a suitable waste skip.
- A waste management program will be maintained to ensure minimisation of waste discharge, recycling of materials and disposal of waste products.
- On completion of the field operations, the operational area and camp will be cleared of all waste using suitable disposal methods. All pits must be backfilled and rig sumps should be fenced and allowed to dry out. Rig sump residue of a toxic nature must be removed, as with any liner before backfill is completed.

WASTE DISPOSAL PROCEDURES

Asbestos – Synthetic Mineral Fibres

- Qualified personnel must carry out all work relating to the disposal of synthetic mineral or asbestos fibres. If fibres of the above nature are encountered, the area



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must be made safe and all further work near the site is to cease, with Pacific Hunt Energy management notified immediately.

Camp, Personal, Food and Industrial Waste

- Personal and food waste is to be placed in garbage bags, tied off, and collected in a waste skip so as not to create a health risk through contamination, or being scattered by animals.
- All sharps, including syringes and broken glass are to be segregated and placed inside hard plastic or metal containers in order to prevent puncture wounds on other personnel who may handle the waste. Syringes must be disposed of through the appropriate medical facility.
- No waste is to be disposed of in other than approved locations. Waste is to be placed in either a designated skip or returned to approved dump sites.
- If the waste is considered to be hazardous, the Rig Manager / other relevant PHE personnel must be consulted regarding the suitable means of disposal.

Contaminated Absorbent

- Soil, or other material contaminated by hydrocarbon or other toxic chemical, is to be disposed of only after consulting with the Rig Manager.
- Rags, paper and other general waste are not included.

Domestic Waste Disposal

- Sewage will be collected in a sealed tank and removed by an approved disposal contractor for disposal.
- Grey water will be collected in a suitable tank or covered sump.

Disused Redundant Equipment & Tyres

- All such items must be disposed of at a suitable waste depot, at the discretion of the depot attendant.

General Waste

- General waste is to be placed in packages. For example in heavy bags, or bins and disposed of in a designated skip or a waste disposal depot. It must be kept in a condition that prevents health hazards and scattering by animals.
- Concrete and plastics are to be separated in bins and disposed of at the proper points at a waste disposal depot.

Lead Acid Storage Batteries

- All lead acid batteries are to be first emptied of acid into plastic containers and disposed of at a waste depot. Acid stored for disposal must be in a container marked as such and can only be disposed of after consulting Pacific Hunt Energy



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management.

Mud and Cutting Disposal

- Water based drill mud and general rig location drainage will be placed into an adequately sealed sump.
- Oil based muds will not be disposed of unless approved as environmentally safe by the appropriate government authorities. Normally oil based muds would be removed for disposal or rebuilding. If oil based muds are to be used, specific handling/disposal instructions will be issued.
- Drill cuttings will be disposed of directly into the sump except where hydrocarbon based muds are used or if there are high concentrations of hydrocarbons associated with the cuttings. Should these situations occur, specific handling/disposal instructions will be issued.
- Remove all residual garbage and equipment from the location at the completion of operations.

Recycling and Waste Segregation

- Glass, metals and plastics are to be collected in separate bins in camp and operational areas, which will then be taken to an appropriate recycling facility for final disposal.

Waste Related to Seismic Acquisition

- Cab wires /cables must not be left behind but be collected for appropriate disposal or reuse.
- The shot hole shall be checked after shooting and any residue must be collected as far as reasonably practicable in order to minimize waste generation and damage to the environment in the area.
- Minimize the amount of fluids (water) to the shot hole.

Waste Register

- A register of generated waste shall be kept up to date in order to enable real time monitoring.
- The register shall cover waste identification and volumes, MSDSs where applicable and other measurements deemed necessary.

Waste Storage

- Waste storage facility shall be clearly marked and segregated from the rest of the camp site.
- Extra care must be placed on avoiding hazardous waste from coming to contact with air, soil, or water.



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- Hazardous waste shall be clearly separated in order avoid any accidental contact with other waste. However, the storage area must allow for inspections between containers in order to spot any leaks or spills.

Wellsite Trash Disposal

- No waste materials or garbage or scrap of any kind shall be disposed of at the wellsite. All waste materials, garbage and scrap will be placed in waste containers and removed by an approved disposal contractor for disposal.
- All used chemical containers/drums are to be thoroughly washed and cleaned internally prior to disposal. Wash water should be drained to the sump pit.

Waste Oil and Minor Oil Spills

- Waste oil is to be collected in drums or buckets and placed in waste oil drums that are kept closed to atmosphere and free of excessive residue on the outside.
- Oil soaked rags will be disposed of into a suitably closed container to prevent the potential of fire.
- In case of oil spills in an uncontrolled operational area (e.g. a vehicle breakdown), a bucket or other container should be placed under the leak in order to start the oil collection. The leak should then be tapped. The oil spill should then be cleaned by collecting the contaminated soil, which then needs to be disposed of by taking it a facility that has the capability to accept such waste. These steps are to be taken only if safe to do so.
- If an oil spill causes a negative impact on land/soil that provides a person their livelihood, please refer to the livelihood restoration plan.
- Cleaning of oil spills must be included in personnel training.
- Vehicles should be equipped with spill containment and clean-up equipment.



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SPILL MANAGEMENT PLAN

Pacific Hunt Energy will work in a responsible manner to prevent hydrocarbon or chemical spills wherever possible, and in doing so, Pacific Hunt Energy accepts their duty to comply with government and local legislation and guidelines.

In the event that a spill does occur, the following steps will be implemented to immediately rectify the situation:

1. Identify hazardous substance.
2. Contain substance.
3. Control mechanism of spill.
4. Instigate clean-up in approved manner.
5. Complete an Incident report.
6. Remediate area.

Where there occurs a significant chemical / hydrocarbon spill which could cause long term environmental or health damage, the control of this situation will be as per a Spill Control Procedure, and guidelines and reporting methods outlined in company or government policy. Specialist resources may be engaged for this purpose if deemed necessary.

Internal records will reflect minor spills via Incident reports and feature in biannual monitoring reports.

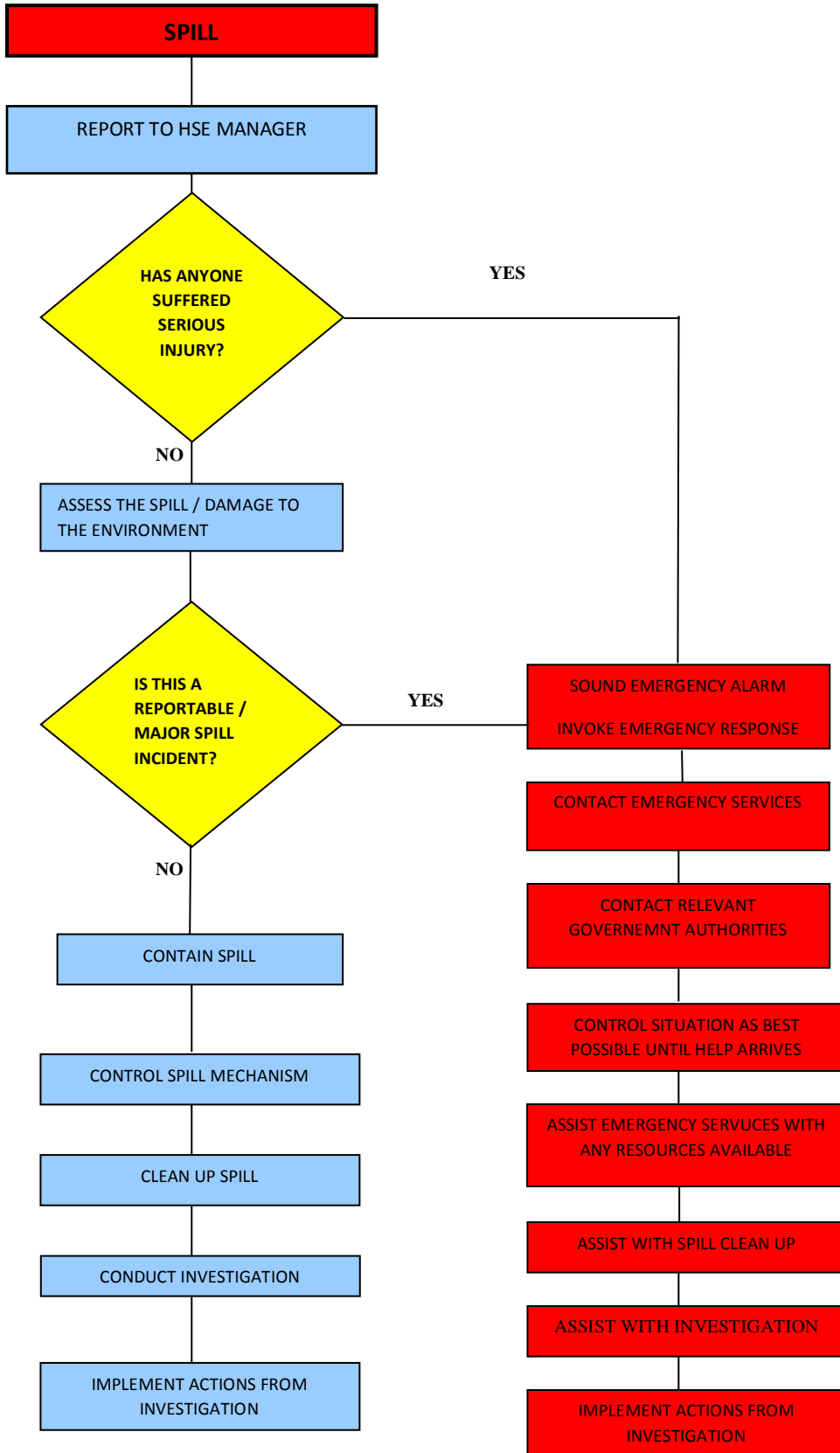
Implementation of this plan will be a line management responsibility, with employees receiving training regarding company procedure through awareness programs and management recommendations.

Employees have the responsibility of maintaining the plant and equipment in a manner consistent with company policy, to ensure that leaks and spills of oil and grease are prevented.



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Incident Resulting in Spill





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EMERGENCY RESPONSE PLAN

This Emergency Response Plan has been developed to detail organizational responsibilities, actions, reporting requirements and resources available to ensure that in case of an emergency on any of Pacific Hunt Energy's operational sites, they can be dealt with effectively, safely and timely. This plan presents the procedures used to deal with emergencies, the roles and duties of personnel, and external measures, which may be used to handle the emergency.

This plan is true at the timing of writing, but it may be modified or updated to reflect changed or new circumstances.

This plan shall be used as a guide for all types of emergencies that occur on Pacific Hunt Energy's operational sites.

Hierarchy of Protection

Pacific Hunt Energy values the safety of its employees, contractors, visitors, and other stakeholders higher than anything. Based on this core value, the hierarchy of protection in case emergencies is as follows:

- 1) Safety of people
- 2) Protection of the environment
- 3) Continuing of commercial operations.

Commercial operations shall only be continued if deemed safe to do so.

Preparedness and Planning for Emergencies

The first step to avoiding emergencies is to prevent hazards, accidents, occurrences, and other situations, which could lead to or develop into emergencies. Pacific Hunt Energy has adopted a set of safe operating procedures, which are used to prevent hazardous situations. Furthermore, before commencing field operations, employees are expected to take part in HSE induction training. Further training sessions will be held as determined by HSE Manager and always after accidents, near misses or similar. These sessions may be either general in nature or have a specific focus, e.g. a fire drill.

As operations proceed and further information is gathered, the documentation can be used to improve the implementation of this emergency response plan. Identifying relevant possible support personnel and organizations together with collecting and maintaining a record of their contact details will aid in the execution of this plan in case of emergency.

Further measures, which may be used to establish and maintain the Company's preparedness for emergencies:



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- Prepare emergency contact lists, and maps of operational and camp sites identifying muster points, locations of firefighting equipment, and first aid kits
- Establish and maintain a safe and effective evacuation route and assembly locations
- Establish an Emergency Alert communication system, which all site employees are familiar with
- Have appropriate and adequate firefighting equipment (extinguishers and signage) available
- Establish a reliable communications system (radios, satellite phones, etc.)
- Appoint a key person to take control during an emergency (e.g. Safety Manager)
- Instruct workplace personnel in these procedures and ensure that they are fully aware of them
- Maintain training records of all HSE and emergency training
- Implement registration of site visitors prior to allowing them to enter Pacific Hunt Energy premises
- Maintain an up-to-date daily lists of all personnel on the operational site including visitors
- Conduct regular safety training and emergency drills to ensure the procedures are effective and that all employees are familiar with them.
- Establish and maintain appropriate first aid resources and presence of first aid responders
- Identify local clinics, hospitals, and doctors
- Identify and liaise with the local emergency services

Employee Responsibilities

Site Manager (E.g. Camp Manager or Rig Manager)

- Review and approve the Emergency Response Plan
- Ensure the plan is effective and required training and drills are conducted
- Notify all incidents to the appropriate regulator within reasonable timeframes
- Review all emergency drill follow-up reports and implement changes as required

Safety Manager

- Notify and coordinate emergency services if required
- Liaise with all relevant stakeholders in the event of an emergency
- Assume the role of key contact person for emergency reporting
- Assume control of the situation in emergencies or in cases of other occurrences
- Arrange to meet and provide advice and information to external emergency response personnel at the scene of an emergency
- Maintain contact with Site Manager as required
- Collect role call information at the allocated muster point(s) and ensure all persons are accounted for



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- Ensure all persons are evacuated in the event of an evacuation
- Provide leadership and direction for workers at Pacific Hunt Energy premises
- Appoint personnel for certain tasks to assist in emergencies if required
- Participate in drills and treat as a real life emergency
- Secure the scene for investigation purposes
- Oversee the incident reporting and investigation process and ensure adequate investigation is undertaken

Safety Supervisors

- Inform the Safety Manager immediately or as soon as safe to do so in case of an emergency
- Act as a contact person for persons located within their work area
- Sweep the work areas to ensure all personnel have safely evacuated and report to the Safety Manager
- Direct employees, visitors, and others who may be present on the site to the muster point
- Take role call for personnel in work area and report to the Safety Manager
- Liaise with the Safety Manager and undertake instructions and duties as directed
- Provide assistance and support at the location of the emergency
- Initiate the incident reporting and investigation process
- Assist in securing the scene for the investigation process
- Participate in drills as required and treat as real life emergency
- Assist the Safety Manager in the post-drill meeting

Workers

- Cease all activities when requested during an emergency event
- Proceed to the designated muster point, including during a drill
- Cease non-emergency related radio communication during an emergency
- Respond to all instruction and direction given during an emergency
- Participate in all emergency drills and familiarize themselves with the locations of Muster Points

Emergency Response

In case of an emergency one shall:

Contact the Site Manager, Safety Manager, or Safety Supervisor or any site contact listed on the emergency contact list displayed on noticeboards. When reporting an emergency, the following details must be provided upon your best knowledge and understanding of the situation:

- Your name and contact number
- Worksite location



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- Nature of emergency
- Location of the emergency
- Details of incident

If evacuation is required, initiate evacuation by activating the correct evacuation sign, and following with the below procedures if applicable:

- Move any plant or equipment out of the immediate area if necessary, and if safe to do so
- Shut down all nearby flammable equipment
- Account for other personnel and treat any other injuries
- Continue to control the event if there is no danger to personnel

Always make sure all employees, contractors, and registered visitors have been evacuated to a safe place, and have been accounted for.

Evacuating Office and Camp Sites

Sound the evacuation siren in order to signal others of an emergency and their need to evacuate as soon as possible. Evacuation shall begin immediately, or as soon as safe to do so, after hearing the evacuation alarm or being told to evacuate by Site and/or Safety Manager. Safety Supervisors are required to assist the Site and/or Safety Manager. When hearing the evacuation alarm, make your way quickly but safely to Muster Point 1 or if Muster Point 1 is not safe to enter, to Muster Point 2. Alert others to do the same. Wait at the designated Muster Point until you are directed to leave the area. Site and/or Safety Manager will advise everyone of when it is safe to return to work.

EVACUATION SIREN: 3 x 3 Second blast on air horn

Evacuating Operational Sites

Inform others of the situation by calling "Emergency, emergency, emergency."

- Inform the Site and/or Safety Manager of the nature of the emergency and number and type of injuries, if applicable.
- Safety Manager, or if they are not available the Safety Supervisor, will make a decision whether or not to announce an evacuation or if an emergency service is required.
- If the Safety Manager, or if they are not available the Safety Supervisor, chooses to evacuate they will announce the evacuation by calling on the designated radio channel "Evacuate, evacuate, evacuate" or if radio is not available, sound the emergency horn.
- The Safety Manager (or delegate) will send a Safety Supervisor or other responsible person to take charge of the Muster Point, while the Safety Manager carries out a search on the operational site.
- The Safety Manager or delegate will liaise with any emergency services that come on-site.



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- The Safety Manager is to inform the Site Manager of the emergency who then reports to the headquarters.
- The Safety Manager will appoint Safety Supervisors to assist as is deemed appropriate.
- The Warden in charge of the emergency assembly point will account for those onsite by referring to the Daily Risk Assessment Form and or Site sign on Register.
- If the Warden finds there are people unaccounted for, the Warden must so advise the Chief Warden as soon as possible.
- All Power Serve workers will have a first aid kit in their vehicle and a fire extinguisher. The emergency evacuation procedures for each work group will be identified in the daily risk assessment but will usually be back to the access track and then the entry gate and then back to the site office, if required. Each Work Group Supervisor shall be responsible for evacuation of their work group.

EVACUATION SIREN: 3 x 3 Second blast on air horn

Procedures to Improve Your Own Safety

- Familiarize yourself with the operational and camp sites
- Make sure you know where the Muster Points are located
- Learn the routes to the Muster Points
- Make sure to be know the evacuation and emergency alarms
- Make sure you know where first aid kits are located and who are the first aid responders in your work area
- Make sure you know where to find firefighting equipment

Emergency Procedures

An emergency is an unexpected incident, which is likely to have adverse impacts on people, work site and the equipment on the site and/or the environment. In case of an emergency, acting fast but in a controlled manner is required to stabilize and correct the situation back to normal. Returning to work is only allowed after it is safe to do so. Examples of possible emergencies include:

- Fire and explosion
- Major spills or leaks
- Medical injuries (e.g. heart attack)
- Road accidents
- Natural disasters (e.g. flooding)

Recording of People

Safety of people is the most important objective when reacting to emergencies. Because of that it is important to know, who are on Pacific Hunt Energy premises at all times. The Site Manager shall ensure that all employees, contractors and visitors are recorded upon entering and exiting the



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premises. The records shall be up to date at all times, and they will be used to call the roll on Muster Points in case of emergency.

Communication in Case of Emergency

In the event of an emergency, communication shall be via radio, satellite phones and in person. A list of emergency contacts will be prepared and distributed in all Pacific Hunt Energy premises. The Site and Safety Managers must be notified of emergencies immediately. The Safety Manager shall assess the situation and notify others accordingly. Safety Supervisor(s) shall notify the public and other stakeholders if applicable.

Muster Points

The Site Manager, or a person nominated by them, will make sure that emergency access and egress is available to everyone registered to be present on the Premises. Two Muster Points will be nominated in all operative field locations. The Muster Points will be clearly marked as Muster Points, and their locations will also be recorded in maps presenting the site facilities. The locations of Muster Points will be indicated to all employees and visitors.

First Aid

First aid facilities or equipment will be available at all permanent Pacific Hunt Energy premises. Company vehicles will be equipped with first aid kits accordingly. First aid kits shall be placed so that they are easily accessible and unlocked. The locations of first aid kits and possible first aid rooms shall be recorded in maps presenting the site facilities. First aid kits shall be kept clean and restocked as necessary.

Firefighting Equipment

Firefighting equipment shall be available in all permanent field locations, and in work vehicles as deemed necessary by the Safety Manager. The equipment shall be easily accessible, and the locations shall be marked on maps presenting the site facilities. Lists of persons trained to use firefighting equipment shall be available. Firefighting equipment must be tested and tagged accordingly by a competent person at regular intervals. Used fire extinguishers and other firefighting equipment must be removed from service promptly, and replaced immediately with an unused one.

Medical Emergencies

Medical emergencies can be caused by several different factors. They include but are not necessarily limited to:

- A medical condition (pre-existent or new)
- Person involved in an isolated incident (e.g. falling down the stairs)
- Injuries due to natural conditions
- Injuries due to a human caused event (e.g. exposure to a hazardous material)

In case of a medical emergency, follow the below procedures:



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- Notify supervisor and/or Safety Manager and site doctor if present, or ask a co-worker to do so.
- If safe to do so, remain at the scene of the emergency until help arrives.
- Do not move the injured person unless moving them could save their life.
- Keep the injured person warm and make sure nothing is blocking their breathing.
- Keep company to the injured person and stay calm regardless of the severity of the incident
- Provide first aid to the extent of our competency and/or training

In case the injured is not breathing, remember Doctor's ABCD:

- DANGER – Before helping, check for danger to you or others
- RESPONSE – Check for response from the injured
- SEND – Send for help
- AIRWAY – Check, clear and open airway
- BREATHING – Look, listen and feel for normal breathing
- CPR – Commence compressions: 30 compressions to two breaths, 100 compressions per min
- DEFIBRILLATE – Follow the instructions in the packaging and apply automatic external defibrillator if available.
- Continue CPR until signs of life return or help arrives. If you get tired during CPR, ask a co-worker to help.

In case of a medical emergency, always make sure all personnel have been accounted for.

Fire Related Emergencies

If safe to do so, follow the RACE procedure in case of a fire.

- RESCUE – Any person(s) in immediate danger.
- ALARM – Sound the alarm and follow emergency procedures.
- CONTAIN – Contain the fire by closing doors and windows is working indoors.
- EXTINGUISH – Attempt to extinguish the fire if you are trained to use the firefighting equipment present on the site.

There are three things that are required for a fire to keep burning:

- Fuel (something to burn)
- Oxygen (drawn from the surrounding air)
- Heat (generated by the process of combustion)













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If one or more of these three things is eliminated, the fire will go out. The three ways to put out a fire are:

- Removing the fuel
- Restricting oxygen supply i.e. the supply of air
- Reducing the temperature

In case of a fire, always make sure all personnel has been accounted for.

Refer to the below table to familiarize yourself with the correct types of fire extinguishers for different types of fires.

ID SIGN	TYPICAL APPEARANCE	EXTINGUISHER TYPE (Cylinder Contains)	CLASS A Wood, Paper Textiles etc. (Normal Combustibles)	CLASS B Flammable Liquids Petrol, Paints	CLASS E Electrical Fires	CLASS F Cooking Oil, Animal Fats, Vegetable Oil
		DRY POWDER CHEMICAL	YES	YES	YES	NO
		Co2 CARBON DIOXIDE	NO	YES	YES	NO
		WATER	YES	NO	NO	NO
		FOAM	YES	YES	NO	NO
		WET CHEMICAL	YES	NO	NO	YES

Source: QLD Compliance Solutions

Electric Emergencies

Always establish a safe area before helping the injured.

- If the injured person is in contact with a live apparatus, the power source must be isolated prior to attempting to help the injured.
- Secure the site to prevent others from getting injured.



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Assess the condition of the injured person, and attempt to stabilize it by giving first aid suited to your level of training. Apply basic life support (CPR) if needed. Remember Doctor's ABCD:

- DANGER
- RESPONSE
- SEND
- AIRWAY
- BREATHS
- COMPRESSIONS
- DEFIBRILLATOR

Continue CPR until signs of life appear or help arrives. If you get tired during CPR, ask a co-worker to help.

Transportation to the nearest medical facility

- Safety Manager, or Safety Supervisor if so instructed by the Safety Manager, to arrange transportation to the nearest suitable medical facility
- Do not allow the person to drive to the facility.
- The injured should not be left alone but should be accompanied on the way to the medical facility, and during the visit to the medical facility.

Take notes of the incident

- The Safety Manager shall obtain and record relevant information of the incident, and record it. This may include interviewing workers or others.
- Make sure the notes are taken to the medical facility together with the injured person. Pass the information to the medical staff upon arrival

Notify the medical facility

- The Safety Manager, or a person appointed by them, shall be in touch with the medical facility and inform them of the incident, and that a person is on their way, if possible.

After recovering from the accident, transportation from the hospital shall be arranged for the injured. The worker is only allowed to return to work after it is safe for them to do so.

All electric incidents shall be investigated.

A map(s) of (semi-)permanent facilities to be added to this plan after completing the set-up.



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FIRE MANAGEMENT PLAN

Pacific Hunt Energy Corp. (Pacific Hunt Energy/PHE) takes health, safety and environment (HSE) very seriously. We aim to have zero injuries and keep everyone safe, every day. What matters the most, is that everyone gets to end the work day in the same condition as they started it. Pacific Hunt Energy will take all necessary steps to ensure no one is harmed by its operations.

RISKS ON SEISMIC AREA

The areas the most at risk during seismic survey include areas near explosions and appointed smoking areas. Seismic acquisition can only be conducted during the dry season in Myanmar, which poses a great risk for fires, especially at the end of the dry season when surroundings are very dry, and particularly in forested areas. Fires can be sparked by poorly dumped cigarette butts as well as by any sparks from equipment that has not been maintained well.

Fire-related risks on a seismic site include, but are not limited to:

- Machinery malfunction
- Sparks from explosions
- Poorly stored machinery, materials, chemicals or other materials
- Untidy work areas
- Cooking on camp site
- Cigarettes
- Electrical fires
- Gas fires

Impacts caused by accidental fires are expected to be minor to the near-by communities.

RISKS ON DRILLING AREAS

Areas where petroleum products are being drilled face several fire hazards including handling of flammable materials, hot work and malfunctioning electric appliances. A majority of the planned drilling campaign are expected to fall on the dry season, which poses a great risk for fires if sparks or flames get in touch with the dry natural environment.

Fire-related risks on a drill site include, but are not limited to:

- Handling of flammable materials such as petroleum products
- Machinery malfunction
- Explosions
- Poorly stored machinery, materials, chemicals or other materials
- Untidy work areas
- Hot work and welding
- Cigarettes
- Electrical fires
- Frictional heat



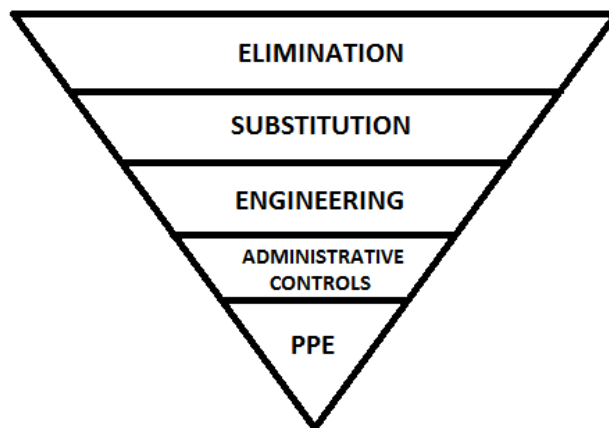
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The lack of a fire department near the project area poses a great risk. Because of this Pacific Hunt Energy is required to pay extra attention to fire safety. A substantial amount of fire extinguishers, blankets and other fire protection equipment must be present.

Impacts caused by accidental fires are expected to be minor to the near-by communities.

HOW TO MANAGE HAZARDS AND RISKS?

While all risks cannot be eliminated completely, there are several measures that can be taken to reduce the likelihood of accidents, the potential outcomes of risks. Focus should be on elimination but in cases when it is not possible, working practices should be substituted with safer ones. When substitution is not possible engineering controls can be used to isolate the hazard from people. An example of this is allowing smoking on only designated smoking areas or fencing the operations area so that the public cannot accidentally enter it. Furthermore administrative controls e.g. signs and safety meetings can be used to change the way people work. Finally, people within the operations area, whether working or visiting, should be equipped with required personal protective equipment (PPE). The hierarchy of controls is illustrated by Picture 1 below.



Picture 1. Hierarchy of controls showing the most effective ways to prevent hazards from top to bottom.

Camps

- All sites and camps must be equipped with necessary safety equipment at all times. This includes the correct type of fire extinguishers (CO₂, dry powder, foam and water), alarms, horns and first aid kits.
- Furthermore, camps and offices will be equipped with smoke detectors that must be kept in working order at all times.
- Camps and accommodation should be kept in order with good housekeeping.
- Use non ~~volatile~~ cleaning solvents to water ~~cleaning spills~~ -soluble de
- Attention should be paid to the materials used at camps. For example, fabrics should not be easily flammable and walls, doors and other fixtures should be fire-resistant.
- All exits should be kept clear of any obstacles in order to enable easy exit in case of emergency.
- Extra care should be paid when using hot kitchen appliances.
- Do not start a fire or a bonfire at camp site.
- Muster Point #1 is located at



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- Muster Point #2 is located at

Drill Site

- Fire protection equipment will always be available at pre-agreed locations.
- Do not start a fire or a bonfire at drill site.

Muster points

- Muster point will be marked clearly with signs on the drill site.
- Muster points will also be covered in HSE induction training prior to commencement of operations.

Fire-fighting Equipment

- Fire-fighting equipment will always be on available at pre-agreed locations. This includes the correct type of fire extinguishers (CO₂, dry powder, foam and water), alarms, horns and first aid kits.
- Fire alarms shall be both audible and visible.
- Fire protection equipment will be regularly inspected and serviced accordingly. It will also be made sure that the equipment has not expired.
- All site employees shall undergo fire safety training including suppression of fire using fire extinguishers. Extra care should be paid to user-friendliness when purchasing fire-fighting equipment.
- All company vehicles must be equipped with fire extinguishers.
- A record of all the fire protection equipment will be maintained by the Safety Manager.
- The below table shows which type of fire extinguisher to use:

TYPE OF FIRE	TYPE OF FIRE EXTINGUISHER TO USE
Blasting agents aka oxidizers	Flood with water from bottom to top, do not try to smother
Combustible metals	Depends on the type of metal, generally dry powder in box, or a suitable Class D fire extinguisher
Electrical fires	Carbon dioxide or dry chemical Class E fire extinguisher, do not use water
Flammable gases	Dry powder Class C fire extinguisher, use water to cool down the valve so that it can be turned off
Flammable liquids	Foam equipment or dry chemical or carbon dioxide Class B fire extinguisher
Ordinary combustibles (e.g. wood & clothing)	Sand, water, fire blanket etc. to cut off oxygen supply



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Fire Training

- All operator's employees who will stay on campsite for prolonged periods and a minimum of one representative of a company, whose operations may propose a fire hazard shall undergo fire safety training including handling of flammable materials, and suppression of fire.
- Fire drills will be conducted when deemed necessary by the HSE manager. .

First Aid

- At least one first aid responder will always be present at the base camp

Flammable Materials and Gases

- Flammable materials and gases must clearly be marked as such with signage.
- Flammable materials and gases must be stored away from any possible sources of ignition or oxidising materials.
- Flammable materials and gases should be stored away from doorways and vents.
- Store flammable gases upright, also during transport.
- Fire-fighting equipment should be placed near or in the storage area of flammable materials.
- Any leaks or spills that can safely be cleared, must be cleared immediately with instructions provided in the Waste Management Policy.
- Electronic devices that may pose a risk of spark must not be used in the flammable materials storage.

Hot Work

- Welding and other hot work shall be restricted to designated welding stations when possible.
- In case welding or other hot work is performed outside the designated welding station, one must have easy access to a fire extinguisher. Fire watch shall take place for one hour after the completion of the job.
- A person performing hot work must hold a permit and/or a certificate to do.
- A person equipped with correct PPE and a fire extinguisher should be on fire watch when hot work takes place outside the designated hot work area.

Safety Audits

- Regular safety audits will be conducted. This includes a pre-audit before employees or contractors arrive, audits of electric, gas and oil storage areas, and mechanical areas.
- Required safety checks also include making sure adequate signage is in place, and storage and electric procedures, and guidelines for cleanliness are followed.

Safety Meetings

- Daily safety meetings will be held before the crew begins their work.
- Before any new members start working on the site, it is made sure they are familiarized with the location of fire extinguishers, first aid kits and muster points.
- The locations of muster points, fire extinguishers and other relevant equipment will be presented on posters in the camp and operation site so that they can be reviewed by staff regularly.



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Seismic Acquisition

- Explosives together with electric wires and other equipment pose a risk for starting a fire. The risk increases when operating during the dry season, and especially at the end of the dry season.
- Proper fire-fighting equipment should be available on the field and the seismic crews should be trained to use it.
- Seismic crew should check behind them at regular intervals for fires.
- When marking coordinates, use tags, flags or other such indicators. Do not burn the lines.
- Do not attempt to fight a fire that is in imminent danger of contact with explosives.
- Do not start fires or bonfires in the operational area.
- Vibroseis vehicles should be equipped with fire extinguishers.
- Explosives and detonators must be stored separately
- Seismic crew should check their surroundings for any possible fires caused by sparks, for example, prior to moving to the next shot hole location.
- Smoking is strictly forbidden on duty and/or when handling explosives

Smoking

- Smoking is only allowed at designated smoking areas.
- Extra care shall be paid to putting out the cigarette.
- Cigarette butts must be placed in containers designated for them.

Vehicle Safety

- Smoking is not permitted in any company vehicles.
- All company vehicles including boats and heavy equipment such as bulldozers must be equipped with fire extinguishers.
- When operating a vehicle in a forest area or in an area with tall or dry grass, check the vehicle for any residue that might catch fire when heated. Turn off the engine, and also look under the vehicle. Remove any possible residue.

Workshop

- Use non-volatile cleaning and washing inside or in areas in which ventilation is inadequate
- Label all containers. Provide Material Safety Data Sheets (MSDS) for each hazardous product and post near product storage area.
- Workshops are non-smoking areas and must be marked as such.

NOTES

Any person unwilling to follow this Fire Safety Management Plan, may have his contract and/or employment terminated upon management consideration.

The Fire Management Plan and the Fire Safety Protocol applies to all employees of Pacific Hunt Energy, its contractors, subcontractors, visitors and the general public.

The following areas should always be marked with No Smoking signs:

1. Flammable materials/gases storage.



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2. Battery storage areas and battery boxes.
3. Oxygen and acetylene bottle vicinity.
4. All food preparation, handling and storage areas.
5. Accommodation areas
6. Dining areas

In order to maintain high safety standards, follow the below orders in case of fire or other emergency.

In the event of a fire or other emergency incident occurring at this site or camp, the following procedure should be followed:

- If the fire is small and easily contained, **use the appropriate fire extinguisher** to put the fire out, then report immediately to the Camp Manager.
- If in any doubt or the fire is established, **sound the alarm** & initiate evacuation.
- Check rooms and **assist other personnel** to evacuate if they are having difficulty.
- Proceed to **Muster Point #1** if it is safe to do so, or **Muster Point #2** if the former is in a hazardous position in relation to the fire.
- The Camp Manager or designated replacement will conduct a **head count** to determine if all personnel are safe. He will also send someone to raise the alarm with the Rig Manager.
- **Provide first aid** or medical treatment to anyone injured as a result of the fire or evacuation.
- If personnel are missing, a **search and rescue** attempt will be initiated as appropriate, as well as a fire fighting team if practical, to try and extinguish the fire.



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- All personnel not directly involved with emergency teams must **remain at the muster point** until help arrives, or assist as directed by the Camp Manager, Rig Manager or other person in charge.
- Make arrangements to **evacuate any seriously injured personnel.**



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TRAFFIC MANAGEMENT PLAN

Pacific Hunt Energy relies on the utilization of motor vehicles in order to maintain continuous and well running operations. However, the operations are not run in isolation and vehicles must travel through local settlements before arriving to our operational site. Due to traffic's impact on local communities and in order to guarantee safety of all our employees, it is vital to have a traffic management plan in place. This traffic management plan discusses good traffic practices and ways to support safe and reliable road conduct.

It is important to remember that no job is so urgent that one does not have the time to do it safely. It is our priority that our employees, contractors, subcontractors and visitors alongside other road users will get to their destinations safe and unharmed.

This Traffic Management Plan is applicable to Pacific Hunt Energy's operations on onshore blocks PSC C-1 and PSC H in Myanmar. All contractors and subcontractors are expected to act in accordance with this Traffic Management Plan.

Accidents

- All accidents must be reported to the HSE and Rig managers as soon as safe to do so.
- HSE manager shall prepare reports of each incident, and keep a record of them. Accidents will be discussed in toolbox talks and refresher training will be provided.

Breaks

- Drivers should take breaks of 15 minutes every two hours, and breaks of 30 minutes every four hours.

Cameras

- Dash cameras may be installed in vehicles if considered necessary.

Driver Qualifications

- Any person operating a PHE motor vehicle must hold a valid driver's license for the said vehicle type.
- Where possible Myanmar local drivers will be used. Expatriates are actively discouraged from driving vehicles in Myanmar.
- All drivers must have attended PHE driver training and induction prior to operating a company vehicle.

Driver Training and Induction

- Everyone operating a company vehicle must undergo training and induction organized by the HSE Manager
- Refreshers will be conducted regularly, after any issues have been brought up, and always after an accident or a near miss.



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Good Conduct

- As the drivers represent the company to the public, good road conduct is expected of everyone operating a motor vehicle.
- Expressions of road rage (e.g. excessive honking or cutting off other vehicles dangerously close) are not tolerated, and do not represent company values.

Night-time Transport

- Driving on common roads should be avoided after dark unless in case of an emergency.
- Driving through villages and other populated areas should be restricted to daytime.

Speed Limits on Site

- Speed limit inside gated operational sites is 20 km/h or less.

Traffic Rules & Road Safety

- Local traffic rules must be obeyed including speed limits. If no local speed limits are available, appropriate speed limits will be decided for each route and journey.
- Speed must be adjusted when driving through settlements or otherwise populous areas.
- Seat belts must be available in all motor vehicles and they must be worn by the driver and all passengers.

Traffic Volumes

- The HSE Manager for each operation will prepare and manage a log of all vehicles on site, their operations and schedules. Management of the fleet and use of the vehicles will be the responsibility of the PHE HSE Manager on each operation

Vehicle Maintenance

- Vehicles must be visually checked after each journey.
- The driver must conduct a thorough check of vehicles once a week
- The vehicle operator should inspect the vehicle always prior to long distance journeys, and make sure required items are on board (e.g. spare tyre, water & first aid kit)
- If a problem is suspected or detected, actions to repair the vehicle should be taken as soon as possible.
- A mechanic shall inspect all vehicles after completion of operations.

Vehicle Requirements

- Vehicles required to travel off sealed roads must be 4WD.
- Vehicles must be deemed safe for road use.
- All vehicles must be equipped with fire extinguishers and first aid kits.



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Vehicle Usage Logs

- Vehicle usage logs must be kept up to date. The log must contain the following information: name of the driver, name(s) of the passenger(s), who authorized the vehicle usage, date, time of departure, time of arrival, place of departure, destination, route, breaks, any malfunctions or issues occurred, other possible notes.



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CULTURAL HERITAGE STANDARD OPERATING PROCEDURES FOR SEISMIC ACQUISITION

These Cultural Heritage Standard Operating Procedures have been developed in order to minimize any impacts caused by our seismic operations on valuable cultural sites in our operating areas, and are applicable to any type of methods used to conduct seismic acquisition.

Myanmar is predominantly Buddhist, and pagodas alongside monasteries can be found widely around the country. These are the most common but not the only cultural heritage sites in Myanmar.

Community Access to Cultural Heritage Site

- Access to cultural heritage sites will be provided during field operations. If operations block safe access to a heritage marker, alternative route or access point (including the possibility of a new road) will be provided as agreed in consultations with the community. However, if it is not possible to provide a safe alternative route to the site, other measures will be discussed with the local community.

Critical Cultural Heritage Sites

- Contact with legally, whether nationally or internationally, recognized cultural heritage sites is strongly discouraged. This includes UNESCO World Heritage Sites.
- Altering, removing or causing damage to such sites shall be avoided to the maximum.

Detonation of Explosives

- The explosive set-off distances presented in the table below will be followed during any seismic campaign involving the use of explosives. The table may be adjusted accordingly depending on the size of the explosive and the shot hole depth.



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Constraint	Minimum horizontal distance (m)		
	0.5kg	1.5kg	2.0kg
Explosives in 21m deep single shot hole			
Place of worship	150	170	200
Religious monument and archaeological sites	150	170	200
Cemeteries	50	50	50

Identification of Cultural Heritage Sites

- Most cultural heritage sites are expected to be relatively easy to identify by PHE staff. When this is not possible, and when there is reason to believe that a cultural heritage site might be close to an operational area, the local residents should be consulted.
- If a situation so requires, a competent professional may be used to help identify a possible cultural heritage site.

If a Cultural Heritage Site Suffers Damage Despite of Safety Measures

- If explosives will be set off in the vicinity of a cultural heritage site, even though there is reason to believe that the distance is adequate, it is recommended that an inspection of the heritage marker will be conducted together with a local representative, for example the head monk. The current condition of the site should be documented in pictures and in writing. Detailed photographs will be taken of any cultural heritage sites within a 400m radius including photographs of any existing damage to the structures before and after seismic acquisition.
-
- If the operator is blamed for damaging the site, the documentation recorded in the inspection may be referred to reaffirm whether the damage was already there or whether it is new.
- If the operator is deemed to be responsible for the damage, they shall implement restoration measures.
- The above is also applicable to damage caused by a vibroseis vehicle.

Legislation

- National legislation regarding protection of cultural heritage sites will be implemented.



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Mapping of Cultural Heritage Sites

- Any cultural heritage sites will encountered in the proximity of operational areas will recorded and maps may be made for future reference.

Protection of Cultural Heritage Sites

- Priority should be given to planning the route of the vibroseis truck in a way that it will pass cultural heritage sites at a safe distance.
- If diversion is not possible, then an acquisition gap will occur in order to maintain safe distance

Public Consultation

- Public consultation should always take place when operating near cultural heritage sites. Even when operations are carried out at a 'safe' distance, it is recommended to advise local residents, who use or have used the cultural heritage marker, of the upcoming operational location and advise them that acquisition is carried out at a safe distance. If any questions or concerns arise, they should be addressed promptly.
 - Meeting minutes must be taken and the presence of attendees recorded.
 - A high representative for the said cultural heritage site should be present in any consultations.
- Relevant local or national authorities may be consulted as well if deemed necessary.

Removal of Cultural Heritage Site

- Removal of a cultural heritage site should always be considered as the last option, and other options should be given priority if only reasonably practicable. Most cultural heritage sites are best protected in their place.
- Different measures shall apply to 'common' (non-critical) and 'unique' (critical) cultural heritage sites. The difference thus being whether the site is replicable or not.
- Removal of a common cultural heritage site may be acceptable if the following conditions are met:
 - The cultural heritage site must be maintained in a functional form by mitigation of any adverse impacts and by implementation of mitigation measures.
 - If restoration is not possible in situ, restore the site in a different location.Losses of tangible cultural heritage will be compensated for if the minimization of adverse impacts and the maintenance of functionality of the cultural heritage site are not.



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LIVELIHOOD RESTORATION PLAN

Project Description

Pacific Hunt Energy Corp. (Pacific Hunt Energy/Pacific Hunt/PHE/the Company) will be conducting seismic acquisition on onshore PSC C-1 and PSC H starting in late 2017. Seismic acquisition is conducted using a surface seismic source of energy, which generates energy waves through the ground and records the returning waves through receivers on the surface.

As the area on which seismic acquisition takes place is quite vast, it will cover various types of land such as cultivated land, forest, roads and other areas. While the acquisition is ongoing, access to some areas will be either limited or completely lost due to safety reasons. This is likely to temporarily affect people's livelihoods and it is our responsibility to make up for any lost income, or other products.

Pacific Hunt Energy is committed to disclosing relevant information of its operations in the area to the local residents and other stakeholders, and to consulting them prior to the project start. Further consultations may be performed upon need.

What kind of impacts may take place and when

Seismic acquisition on is estimated to last approximately five months from start to finish during the dry season. The acquisition project consists of the following phases:

- Land accessibility phase
- Preparation and mobilization
- Seismic survey
- Close out phase and demobilization

Each operational phase comes with different possible impacts on people's livelihoods. During the land accessibility phase new roads may be built, which may run through land areas that provide income to some residents. The main source of livelihood in the area is farming. During seismic acquisition the main cause for lost livelihood or income is losing access to land partially or completely, as seismic survey may be performed on cultivated land. Other sources of lost livelihoods include accidents (traffic, contaminated water source etc.)

How to restore livelihoods

Livelihoods may be lost temporarily due to seismic acquisition. When this is caused by PHE, it is our responsibility to make up for and to restore any losses.

Involuntary resettlement refers to both physical resettlement and to economic displaced caused by project related land acquisition. We recognize that in an optimal situation operations are not carried out in an area, which may damage someone's livelihood. However, this is not always possible. We



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will try to minimize any unnecessary use of cultivated land, or other vital areas to people's livelihoods, in our operations in order to protect people's livelihoods. Alternative methods for carrying out the project will be considered where reasonably practicable.

The losses to livelihoods will be compensated in a manner that is in line with applicable laws and regulations. Pacific Hunt will form a crop compensation committee together with Myanma Oil and Gas Enterprise (MOGE) and local authorities in order to negotiate a fair compensatory rate for each type of crop with the local farmers. In case of any new land needs to be acquired during the seismic acquisition campaign, the level of crop compensation and/or other livelihood restoration options will be renegotiated. The level of compensation shall not only cover losses caused during the crop season in question but also possible future losses.

The compensation shall be fair and will be paid in cash. Upon the discretion of the crop compensation committee, part or all of the crop compensation may be paid in farming supplies such as seeds and machinery. The decision of the type of crop compensation will be made on individual basis so that level of compensation can be estimated reliably.

In case a farmer's whole land area is affected during seismic acquisition, priority will be given to providing him/her employment instead of a mere cash compensation. Also other farmers whose land has been affected may be offered employment to make up for lost livelihood.

Loss of livelihood may also affect local residents other than farmers, and it is to be taken equally seriously. In these cases compensatory measures are different from crop compensation as focus will be on providing employment to make up for a lost livelihood. A cash compensation is not always enough as besides pay, employment also provides ways to support one's skills and capabilities thus offering meaningful content to one's everyday life.

Improving livelihoods

Livelihoods of those living in the project area may also be improved by company conduct. Pacific Hunt Energy is committed to supporting local procurement where, and when possible. This includes purchasing goods and services from local businesses and people. Pacific Hunt Energy, its employees and the employees of its contractors are committed to paying a fair price for any services or products bought in the area in order to support the wellbeing of the local communities.

Pacific Hunt Energy is also committed to hiring local workforce, when possible for suitable jobs. Examples of such jobs include manual labour (carrying equipment), clearing access roads, building access roads, cooking, drilling shot holes, laying geophones, camp site construction, fly camping mobilization and demobilisation and camp-site cleaning. A fair compensation for the job will be agreed on together with the worker prior to beginning working for PHE.

Our CSR projects in the proximity of our projects will carefully consider ways to improve the lives of the local residents in the project area.



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Monitoring

Each case of lost or partially lost livelihood will be recorded by Pacific Hunt Energy in order to keep track of progress, and to make sure all cases are handled fairly and thoroughly. This will also enable us to make sure everyone gets compensated in an equitable manner. The records will be kept in company database and it will be accessible for regular review.

Monitoring any impacts on people's livelihoods should be an ongoing effort. Initial evaluations should be conducted and finished before starting operations. However, monitoring should continue during the project's active phases. This allows us to find out about any unexpected cases of lost livelihoods or if the size of a loss has been calculated incorrectly. Monitoring meetings should also be conducted after finishing operations in the area.

Having an up-to-date record of paid crop and livelihood compensations will also allow us to follow good bookkeeping and auditing measures. All transactions shall be recorded to PHE bookkeeping. All crop compensatory transactions shall be approved by MOGE. We also are committed to obeying all applicable local and national laws and regulations.

A suggested record format can be found on Annex. 1.

Pacific Hunt Energy Livelihood Standard Guidelines

- PHE aims to minimize any negative impacts on the environment including, but not limited to, forests, rivers, and agricultural land as reasonably possible.
- Any losses on livelihood or income caused by the project proponent's operations will be fairly compensated.
 - This includes crop compensation for having been allowed to operate on a farmer's land.
- Should any property or belongings of any stakeholder get damaged or destroyed caused by the actions of the project proponent or its contractors, they shall be replaced or made up for in a way agreed by both parties.
- Support local procurement where possible



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Annex 1. Suggested format for recording lost livelihoods and measures taken to restore it.

Name	Location (village + house)	Has the ownership of the land in question been confirmed? (if applicable)	Occupation + type (full time/part time) before loss of livelihood	Losses caused by seismic acquisition (in detail)	Reason for loss of livelihood (in detail, including time)	Description of livelihood restoration method	Date of compensation



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NOISE MANAGEMENT PLAN

There are several ways petroleum industry contributes to noise generation. As an exploration project moves on to the field operational phase, traffic in the area increases, explosives may be set off as a part of seismic acquisition, drilling machinery is running and so forth. However, there are measures operators can take into account in order to minimize their noise pollution. In this Noise Management Plan Pacific Hunt Energy discusses the methods it is committed to using in order to limit its noise generation.

Prolonged exposure to loud noises may not only affect one's physiological health (hearing) but it may also have an impact on one's mental health by increasing stress levels or lowering the quality of sleep. Noise mainly affects those working around the noise source but loud noises can also travel and thus cause irritation also to those outside the immediate operational area, for example to nearby inhabitants. Noise is a common hazard in the workplace and the most used way to lessen the risk is to wear personal protective equipment (PPE), however this only improves the situation of those working in the area.

The best way to lessen noise contamination is to eliminate the source. However, this is not always possible. Below we will introduce the hierarchy of reducing noise hazards on the workplace.

1. Eliminate the noise
 - a. If possible, change the process in a way that it doesn't create any noise.
2. Substitute the noise
 - a. If possible, change the production process to a different, quieter option.
3. Isolate the noise
 - a. Is it possible to muffle the sound or create an encasing that lessens the noise hazard?
4. Engineer out the noise
 - a. If possible, relocate the noise hazard to a place where it doesn't affect the workers or other people nearby.
5. Implement administrative controls
 - a. Use signs and inductions as a way to inform of a potential noise hazard and advise to wear PPE.
6. Provide personal protective equipment (PPE)
 - a. Provide PPE to all employees and visitors in a noisy area. Supervise the use of PPE and make sure the PPE is worn correctly. Provide instruction and training on the proper use of PPE.

Administrative controls and PPE should only be treated as supportive control measures, and not be solely relied on in controlling the noise hazard.



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Hearing protection is recommended above 85dB and double protection is recommended above 105dB. Take note that noise level doubles every 3dB meaning that the time that one can spend in such noisy environment halves. Table 1 presents maximum exposure times to various decibels levels without any hearing protection.

Table 1.

Noise Exposure		
Noise Level dB(A)	Exposure Time	Example of Noise
80	16 hours	City traffic
82	12 hours	Lathe
85	8 hours	Handsaw
88	4 hours	Forklift
91	2 hours	
94	1 hour	Table saw
97	30 minutes	Chipping concrete
100	15 minutes	Bulldozer
103	7.5 minutes	Impact wrench
106	3.8 minutes	
109	1.9 minutes	
112	57 seconds	
115	28.8 seconds	Diesel truck accelerating
118	14.4 seconds	
121	7.2 seconds	Oxygen torch
124	3.6 seconds	
127	1.8 seconds	
130	0.9 seconds	Jack hammer



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Additional Control Measures

- Selecting equipment with lower sound levels.
- Implementing an effective route to record and respond to complaints from local residents.

Camps

- Camps will be set up away from the immediate vicinity of local villages in order to avoid the noise traveling from the camp to the village.
- Quiet hours will take place between 11pm and 6am when it is recommended to avoid excessive noise generation.

Drilling Operations

- Before drilling operations begin, baseline noise assessments should be carried out if the drill site is near a populated area.
- Noise walls may be considered in order to contain the noise if drill site is close to local settlements.
- Priority will be given to quieter equipment if equal is available.

Employees' Exposure to Loud Noises

- Some employees may continuously be exposed to loud conditions. However, the time and decibel levels shall not exceed the recommended noise exposure levels, with or without PPE.
- Regular breaks in quiet areas shall be arranged.

Helicopters

- Any non-emergency helicopter transportation will be limited to daytime. However, in emergencies helicopters may be needed to be used at night-time.

Night-time Operations

- Noisy operations will be limited to daytime when reasonably practicable in order to avoid causing extra disturbance to the local inhabitants.
- It is recommended to keep night-time operations at 45dB or lower in populated areas.

Operating in Environmentally Sensitive Areas

- A wildlife expert will monitor any environmentally sensitive areas so that noisy operations can be avoided in the vicinity of animal nests, and during breeding season of endangered species.
- Usage of motor vehicles in environmentally sensitive areas will be limited to a bare minimum in order to lessen noise disturbance.



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Operating in Rural Areas

- If operations take place in a rural, predominantly quiet area, it is important to pay extra attention to noise generation as noise may have greater impacts on those not used to a high noise levels as opposed those living in large cities.

PPE

- Personal protective equipment (PPE) will be provided to all employees who might be exposed to loud noises. PPE will also be provided to other personnel and any visitors who may be exposed to loud noises or high noise levels.
- Training on the proper wear and usage of PPE will be provided in advance of exposure to loud noises.

Seismic Acquisition

- Shot holes should be tightly damped in order muffle the sound.
- Noise impacts will be considered when choosing parameters.
- Seismic acquisition will be limited to daytime only.
- Simultaneous seismic operations in nearby areas will be avoided as far as reasonably practicable.
- The lowest vibrator level that will produce the required level of data will be used.

Transportation

- Motor-vehicle transportation will be limited to daytime as far as reasonably practicable.
- Night-time transportation is allowed in emergencies. However, extra care must be paid to road safety.
- Transportation routes will be planned in a way that they avoid densely populated areas in order to avoid creating additional noise pollution. If alternative routes are not available, drivers will be instructed to drive slower and avoid honking in order to lessen the noise generation.

Annex H

Newspaper Disclosure

ည်

ရေနံရှာဖွေတိုင်းတာရေးလုပ်ငန်းများဆောင်ရွက်ရန် ပြည်သူများအား ချပြရှင်းလင်း

ကျောက်တံခါး စက်တင်ဘာ ၉

ပဲခူးတိုင်းဒေသကြီး ကျောက်တံခါးမြို့နယ်အတွင်း၌ လျှပ်စစ်နှင့် စွမ်းအင်ဝန်ကြီးဌာန မြန်မာ့ရေနံနှင့်သဘာဝဓာတ်ငွေ့လုပ်ငန်းနှင့် အကျိုးတူပူးပေါင်းဆောင်ရွက်လျက်ရှိ သော Pacific Hunt Energy ကုမ္ပဏီက ရေနံရှာဖွေတိုင်းတာရေးလုပ်ငန်းများ ဆောင်ရွက်သွားမည်ဖြစ်ကြောင်း သိရသည်။

အဆိုပါ လုပ်ငန်းများနှင့်ပတ်သက်၍ သက်ဆိုင်ရာတာဝန်ရှိသူများနှင့် ပြည်သူများ အား ချပြရှင်းလင်းဆွေးနွေးပွဲကို မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန အစည်း ဝေးခန်းမ၌ စက်တင်ဘာ ၈ ရက်က ပြုလုပ်ခဲ့သည်။

ရှင်းလင်းပွဲတွင် မြို့နယ်အုပ်ချုပ်ရေးမှူး ဦးဝေမောင်က အမှာစကားပြောကြားပြီး Pacific Hunt Energy ကုမ္ပဏီမှ တာဝန်ရှိသူများက ပဲခူးတိုင်းဒေသကြီးအတွင်း ဖြူး၊ ကျောက်တံခါး၊ ဒိုက်ဦး၊ ဝေါနှင့် ပဲခူးမြို့နယ် စုစုပေါင်း မြို့နယ်ငါးခု၌ ရေနံလုပ်ကွက် PSCH တွင် ယခုနှစ် ဒီဇင်ဘာလမှစ၍ ၂၀၁၈ ခုနှစ်အတွင်း ဘူမိဗေဒဆိုင်ရာအချက် အလက်များ ရှာဖွေခြင်းလုပ်ငန်းများ စတင်ဆောင်ရွက်သွားမည်ဖြစ်ပြီး ရေနံလုပ်ကွက် များ၌ ရေနံရှာဖွေတွေ့ရှိသောနေရာများတွင် ရေနံများ ထုတ်လုပ်တူးဖော်သွားမည်ဖြစ် ကြောင်း ရှင်းလင်းပြောကြားသည်။

ရေနံရှာဖွေရေးနှင့် တူးဖော်ရေးလုပ်ငန်းများကြောင့် ဒေသခံပြည်သူများ၏ ပျက်စီး သွားသော သီးနှံလျော်ကြေး၊ မြေလျော်ကြေးများကို ရပ်ကွက်၊ ကျေးရွာနှင့် မြို့နယ် လယ်ယာမြေစီမံခန့်ခွဲမှုကော်မတီများနှင့် ပေါင်းစပ်ညှိနှိုင်းပြီး တိုင်းဒေသကြီးသို့ တင်ပြကာ ဒေသပေါက်ဈေးများဖြင့် ဒေသခံပြည်သူများအား နှစ်နှာမှစ၍စေဘဲ လျော်ကြေးငွေများ ပေးအပ်သွားမည်ဖြစ်ကြောင်း ကုမ္ပဏီတာဝန်ရှိသူက ရှင်းလင်း ပြောကြားသည်။

ထို့အတူ ဒေသခံပြည်သူများ၏ လမ်းပန်းဆက်သွယ်ရေး၊ လျှပ်စစ်မီးရရှိရေး တို့ကိုလည်း ဦးစားပေး ဆောင်ရွက်သွားမည်ဖြစ်ကြောင်း ပြောကြားကာ တက် ရောက်လာကြသော ဒေသခံပြည်သူများ၊ ရပ်/ကျေးအုပ်ချုပ်ရေးမှူးများနှင့် ရေနံ ရှာဖွေရေးကုမ္ပဏီမှ တာဝန်ရှိသူများက လုပ်ငန်းကိစ္စရပ်များ အပြန်အလှန် ညှိနှိုင်း ဆွေးနွေးခဲ့ကြောင်း သိရသည်။

ခင်ကို(ကျောက်တံခါး)

များ
ခြေ
သုံး
က်
က်
ဆွေး
ကာ
င်င်
လာ
င်န်း
ရေး
ရှင်း

Pacific Hunt Energy Prepares for Exploration Campaigns

Pacific Hunt Energy Corp., a Canadian oil & gas company, has been awarded onshore Blocks PSC C-1 and PSC H in the country's 2nd Onshore Bidding Round. Production Sharing Contracts with Myanmar Oil and Gas Enterprise were signed in September, 2014. Initial exploration program includes seismic acquisition and exploration wells drilling. 2D Land Seismic acquisition on both blocks will be performed by to BGP Inc., CNPC, one of the world's leading geophysical service companies. The seismic land survey for both blocks total over 465 line km and is scheduled to commence in 4th Quarter 2017.

Pacific Hunt Energy Corp. is also planning exploration drilling campaigns on onshore blocks PSC C-1 (Sagaing Region) and PSC H (Bago Region). During these campaigns exploration wells will be drilled with the intent to confirm the presence of hydrocarbon reservoirs.

The first of the two planned drilling campaigns on block PSC C-1 is expected to begin in the last quarter of 2018. The second campaign is scheduled to begin at the end of 2019. On PSC H two drilling campaigns are planned, as well. The first one is expected to begin in the last quarter of 2018. The second campaign is planned to begin in the fourth quarter of 2019.

In order to be compliant with local laws and regulations, and in order to fulfil the commitments of the EIA Procedure (2015), Pacific Hunt Energy has contracted an independent third party consultant, ARTELIA, to perform Environmental Impact Assessments (EIA) on both PSC C-1 and PSC H. During the EIA process public consultations will be conducted especially in the Bago and Sagaing regions.

Successful development of the projects can help to satisfy growing energy needs in Myanmar.

For more information, please visit: www.pacifichuntenergy.com

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Pacific Hunt Energy မှ ရေနံရှာဖွေရေး

လုပ်ငန်းများဆောင်ရွက်ရန် ပြင်ဆင်ခြင်း

ကနေဒါနိုင်ငံမှ Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းသည် မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း(MOGE)နှင့် ထုတ်လုပ်မှုအပေါ် ခွဲဝေခံစားရေး (PSC)စာချုပ်ကို (၂၀၁၄)ခုနှစ်၊ စက်တင်ဘာလတွင်ချုပ်ဆိုကာ ကုန်းတွင်း လုပ်ကွက်နှစ်ခုဖြစ်သော PSC C-1 နှင့် PSC H တို့ကို လုပ်ကိုင်ခွင့် ရရှိခဲ့ပါသည်။ ကုန်းတွင်းပိုင်းလုပ်ကွက်နှစ်ခုစလုံးတွင် 2D ဆိုက်စမစ် တိုင်းတာ ရေးလိုင်း ကိုလိုမီတာ(၄၆၅)ကျော်ဆောင်ရွက်ရန် ဘူမိဗေဒဝန်ဆောင်မှု ကုမ္ပဏီတစ်ခု ဖြစ်သော CNPC ၏ BGP Inc မှတာဝန်ယူဆောင်ရွက်ရန် စီစဉ် ထားပါသည်။ Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းမှ ကုန်းတွင်းလုပ်ကွက် PSC C-1 (စစ်ကိုင်းတိုင်းဒေသကြီး)နှင့် PSC H (ပဲခူးတိုင်းဒေသကြီး)တို့တွင် ရေနံရှာဖွေတူးဖော်ခြင်းများပြုလုပ်ရန် စီစဉ်နေပါသည်။ ကုန်းတွင်းပိုင်းလုပ်ငန်း PSC C-1 နှင့် PSC H တို့တွင် ပထမအကြိမ် တွင်းတူးဖော်ရေးလုပ်ငန်းများကို (၂၀၁၈)ခုနှစ်နောက်ဆုံး (၃)လတွင် စတင်ပြုလုပ်၍ ဒုတိယအကြိမ်အဖြစ်(၂၀၁၉) ခုနှစ်အကုန်တွင် စတင်ရန်စီစဉ်ထားပါသည်။ Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းသည် တွင်းတူးဖော်ခြင်းလုပ်ငန်းများ မဆောင်ရွက်မီ နိုင်ငံတော်မှ ချမှတ်ထားသော ဥပဒေ၊ စည်းမျဉ်းများနှင့် သဘာဝပတ်ဝန်းကျင်သက်ရောက်မှု (EIA) အကဲဖြတ်အဖွဲ့၏(၂၀၁၅)ခုနှစ် လုပ်ထုံးလုပ်နည်းများအတိုင်း ဆောင်ရွက်နိုင်ရန် လွတ်လပ်သော အတိုင်ပင်ခံ အဖွဲ့အစည်းတစ်ခုဖြစ်သော ARTELIA နှင့် စာချုပ်ချုပ်ဆို၍ PSC C-1 နှင့် PSC H တို့တွင် လုပ်ကိုင်ဆောင်ရွက် မည်ဖြစ်ပါသည်။ အထူးသဖြင့် ပဲခူးတိုင်းဒေသကြီးနှင့် စစ်ကိုင်းတိုင်းဒေသကြီးမှ ဒေသခံများနှင့် ညှိနှိုင်းဆွေးနွေးတိုင်ပင် လုပ်ဆောင်သွားမည်ဖြစ်ပါသည်။ အသေးစိတ်သိရှိလိုပါက www.pacifichuntenergy.com တွင် ဝင်ရောက် ကြည့်ရှုလေ့လာနိုင်ပါသည်။

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Pacific Hunt မှ ပဲခူးနှင့်စစ်ကိုင်းတိုင်းတို့တွင် ရေနံရှာဖွေရန် စီစဉ်

ကနေဒါနိုင်ငံမှ Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းမှ ပဲခူးနှင့် စစ်ကိုင်းတိုင်းဒေသကြီးတို့တွင် ရေနံရှာဖွေရေးလုပ်ငန်းများပြုလုပ်ရန် စီစဉ်နေကြောင်း သိရသည်။

Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းသည် မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်းနှင့် ထုတ်လုပ်မှုအပေါ် ခွဲဝေခံစားရေးစာချုပ်ကို ၂၀၁၄ ခုနှစ် စက်တင်ဘာတွင် စာချုပ်ချုပ်ဆိုကာ ကုန်းတွင်းလုပ်ကွက်နှစ်ခုဖြစ်သော PSC C-1 နှင့် PSC H တို့ကိုလုပ်ကိုင်ခွင့်ရရှိခဲ့ခြင်းဖြစ်သည့်အတွက် တူးဖော်ခြင်းလုပ်ငန်းများကို ပြုလုပ်ရန်စီစဉ်နေခြင်းဖြစ်ကြောင်း သိရသည်။

ကုန်းတွင်းပိုင်းလုပ်ကွက်နှစ်ခုစလုံးတွင် 2D ဆိုက်စမစ်တိုင်းတာရေးလိုင်း ကီလိုမီတာ ၄၆၅ ကျော်ဆောင်ရွက်ရန် ဘူမိဗေဒဝန်ဆောင်မှုကုမ္ပဏီတစ်ခုဖြစ်သော CNPC ၏ BGP Inc မှ တာဝန်ယူဆောင်ရွက်ရန် စီစဉ်ထားကြောင်း သိရသည်။

Pacific Hunt စွမ်းအင်ကော်ပိုရေးရှင်းမှ ကုန်းတွင်းလုပ်ကွက် PSC C-1 (စစ်ကိုင်းတိုင်းဒေသကြီး) နှင့် PSC H (ပဲခူးတိုင်းဒေသကြီး) တို့တွင် ရေနံရှာဖွေတူးဖော်ခြင်းပြုလုပ်ရန် စီစဉ်နေခြင်းအတွက် ပထမအကြိမ်အဖြစ် တူးဖော်ရေးလုပ်ငန်းများကို ၂၀၁၈ ခုနှစ် နောက်ဆုံးသုံးလတွင် စတင်ပြုလုပ်၍ ဒုတိယအကြိမ်အဖြစ် ၂၀၁၉ ခုနှစ်အကုန်တွင် စတင်ရန်စီစဉ်ထားကြောင်း သိရသည်။

Annex I

Response to ECD
Comments on the Draft
ESIA Report

Response to Comments
Initial comment and suggestions for EIA report of Pacific Hunt Co., Ltd Onshore Block H

No.	Company		Subject	Suggest/Remark	Consultants' Response
1.		1	Executive Summary		
2.		(a)	The report does not include Executive Summary in Myanmar language	Need to include Executive Summary in Myanmar language that include detail summary of each section; Project description, policy, laws and international guidelines, environmental impacts, mitigation measures, stakeholder consultations as well as stakeholder's concern and responses according to Section 35 of the EIA Procedure.	Executive summary in Myanmar Language is added as Section 1.
3.		2	Introduction		
4.		(a)	Page 1, Section 1, Title 1.2, we noticed that Singapore address and phone numbers are provide in the detail information of Project Proponent.	Need to describe detail information of Project Proponent (address, phone number) from Myanmar in addition	Details of Project Proponent contacts in Myanmar is added to Section 2.2
5.		(b)	Page (3), Table 1.1, in spite of 14 specialists mentioned, there is no information regarding their expertise, degrees, and experiences.	Need to describe specialists' expertise, degrees, experiences and responsibility in the ESIA.	Specialist details are added to Table 2.1.
6.		3	Policy, Legal and Institutional Framework		
7.		(a)	Need to amend "Section 2 Policy, Legal and Institutional Framework" because the IEE is prepared before EIA Procedure (2015) (for example Chapter 2. Pending EIA requirement in Myanmar, Chapter 2.3) -We noticed that there are no relevant laws to the Project in Table 2.1. -We noticed the need to add relevant laws.	Need to add the following relevant laws; - Environmental Conservation Law 2012 (Section 7, 14, 15, 24, 25, 29) - Environmental Conservation Rules 2015 (rule 69) - EIA Procedures 2015 (from Section 87, 102 to 110, 113, 115) - Public Health Law 1972 - National Environmental Quality (Emission) Guidelines -The protection of rights of National Races Law 2015 Section 5 -The Prevention and Control of Communicable Diseases Law 1995 - The control of Smoking and Consumption of Tobacco Product Law, 2006 (Section 9)	Table 3.1 is revised to include the relevant laws. Text is updated to include the EIA Procedure (2015) in Section 3.2.1.

No.	Company		Subject	Suggest/Remark	Consultants' Response
				<ul style="list-style-type: none"> - The Myanmar Fire Force Law, 2015 (Section 25) - The Protection and Prevention of Antique Objective Law, 2015 (Section 12) - The Protection and Prevention of Ancient Monument Law 2015 Section 12, 20 (f) (C), 15 (C) - Myanmar Investment Law 2016 - 51 (a) (b) (c) (d), 65 (g) (i) (j) (k) (l) (m) (o) (p) (q) -The Development of Employees and Expertise (Skill), 2013 (Section 5, 14, 30) - The Factories Act, 1951 (Before notification that this project is oilfield issued by MOEE) - The Warfare of Labors of Oilfield Act 1951 (After notification) - The Workmen Compensate Act 1951 - Labor Organization Law 2012 - Labor Dispute Resolution Law 2011 -Minimum Wages Law, 2013 -Payment of Wages Law, 2016 (3, 4, 8, 7 (ii), 9, 10 (a) to (e)) - Social Security Law 2012 - 11, 16 (a), 18 (a), 51 (a) (b), 54 - Leaves and Holidays Act, 1951 - The Explosive Act - The Explosive Substances Act - Fresh Water Fisheries Law, 1991 (Section 40) - The Motor Vehicles Law, 1993 (Section 40) - The Motor Vehicles Law, 2015 and Rule, 1987 - Myanmar Insurance Law, 1993 (Section 16) - Forest Law, 1992 (Section 12) - The Farmland Law, 2012 (Section 30) - The Protection and Prevention of Cultural Heritage Area, 2015 (Section 20, 23, 29 (b)) - Employment and Skill Development Law, 2013 - The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013 (Section 16, 17, 23, 27) - Import and Export Law, 2012 (Section 7) - Conservation of Rivers, Creeks and Water Resources Law, 2006 (Section 24 (b), 21 (a) (b), 19, 11 (a) (b)) - No need to describe repealed laws - Need to describe correctly update law name and released year - Need to describe Legal Commitment, and include 	

No.	Company		Subject	Suggest/Remark	Consultants' Response
				the related laws to follow. - Need to replace "Pending EIA Requirement in Myanmar" in Chapter 2, and "MOECAAF" in Chapter 2.3, Chapter 2.3.1, Chapter 2.3.3	
8.		(b)	Section 2.1 - Although Pacific Hunt Environmental Policy is describe in Corporate Environmental and Social Policy, this Policy only describes Health and Security.	To include Environmental and Social Policy of Pacific Hunt Co., Ltd.	Pacific Hunt HSE Policy is included in Figure 3.1.
9.		(c)		Need to describe EQEG 2015	National Environmental Quality (Emissions) Guidelines (NEQEG) is described in Section 3.2.2.
10.		(d)		Need to follow guideline from Ramsar Convention because Moyingyi Wetland Area is located in Block H.	Ramsar Convention is added to Section 3.3.3.
11.		(e)		Need to inform related GAD office and Department of Historical Research if ancient thing is found during operation	The requirement is included in Section 3.2. In addition, "Cultural heritage standard operating procedures" is added in Annex G.
12.		3	Commitment		
13.		(a)	There is no information that state the following; 1) EIA was true and accurate 2) EIA was implemented according to the EIA Procedures and related laws 3) Project will follow the commitment from EIA Report, mitigation measures, and plans.	Need to describe the following commitments by the Project Proponent in the EIA report; 1) EIA was true and accurate 2) EIA was implemented according to the EIA Procedures and related laws 3) Project will follow the commitment from EIA Report, mitigation measures, and plans.	The commitment is confirmed in the Executive Summary of the EIA Report.
14.		4	Project Description and Alternatives		
15.		(a)	Page (23), Section (3.1) only mentioned Taungu-Pyinmana area for location of Block H in the Project Background	<ul style="list-style-type: none"> Need to describe the detail location of Block H (for example; District, Township, Village tract etc.) Need to describe Block Boundary Coordinate as well 	Section 4.1 and Table 4.1 are revised to provide location of PSC H. Section 4.2 is revised to provide township crossed by the survey lines.

No.	Company		Subject	Suggest/Remark	Consultants' Response
16.		(b)	Section 3.1.1, noticed in the Fuel Consumption that the Project will use 150 to 300 gallon of diesel per day, and fuel will store in MOGE storage area or new station.	<p>Need to describe detailed location of fuel store area.</p> <p>Need to follow Good International Industry Practice on Environmental, Health and Safety (IFC) of fuel storage</p> <ul style="list-style-type: none"> • Secondary containment, constructed of impervious and chemically resistant material, shall be provided that is capable of containing 110% of the largest tank or 25% of the combined tank volumes, whichever is larger. • Fuel shall not be stored in underground tanks. • Fuel shall be transferred between vehicles and storage tanks on an impervious surface sloped to a collection structure 	No fuel storage is planned to be built for the Project. Fuel will be sourced locally.
17.		(c)	Section 3.2 –No information of locations of seismic survey lines in the Proposed Location	Need to describe seismic survey line locations, coordinate and distance of start point and end point, and the Location Maps of Seismic Survey Line, Locations and Maps of staff quarters and related facilities	<p>Seismic line locations are described in Section 4.2, Figure 4.1 and Figure 4.2.</p> <p>Base camp location is indicated in Figure 4.4.</p>
18.		(d)	Section 3.4, it is noticed that the survey is proposed to commence in the 3 rd Quarter of 2015.	<ul style="list-style-type: none"> • Need to describe detail timeline (schedule) of seismic survey • Need to confirm whether seismic survey is already done at the moment 	<p>Detailed timeline is presented in Table 4.2.</p> <p>The seismic survey is not done as of 6 November 2017.</p>
19.		(e)	Section 3.6, We noticed that the camp that MOGE built will be used as a Base Camp in Preparation/ Mobilization Phase with limited information in the report.	<ul style="list-style-type: none"> • Need to describe the plan to accommodate 400 workers and how many workers will stay in the Base Camp. Indicate location of Base Camp and how many will be built. • Need to describe the current environmental situation of Base Camp location. 	Base camp location is indicated in Figure 4.4a. The base camp is located on developed area as indicated in Section 4.5 and Figure 4.4b. Not more than 140 people will stay in the base camp.
20.		(f)	No information is provide on Drilling Technique, Drilling Chemical and Drilling Fluid	Need to describe the Drilling Techniques, type and amount of Drilling Chemical and Drilling Fluid.	No drilling will be conducted as now Vibroseis is used and no shot hole needed to be drilled.
21.		(g)	If explosives will be use, need to describe types and amount of explosives sources (exporting country), storage techniques and place.	If explosives will be used, need to describe types and amount of explosives, sources (exporting country), storage techniques, storage place and distance from villages, labors etc.	Vibroseis is used and there is no requirement on use of explosive.
22.		5	Description of the Surrounding Environment		

No.	Company		Subject	Suggest/Remark	Consultants' Response
23.		(a)	In Section 4.3.2 Biological Environment Section, it is stated that "It is assumed that the proposed seismic survey will avoid the Moyingyi Wetland".	Seismic survey line, road construction and building of the Project are not allowed within Moyingyi Wetland	Noted and confirmed in Section 5.3.2 that the proposed seismic survey and the associated facilities will avoid the Moyingyi Wetland.
24.		(c)	In Section 4.5 Human Environment, there is no information on the villages that the workers will stay, and there is limited information on impact on villages during seismic survey.	Need to consider and assess social impact to village from the base camp that the 400 workers will stay.	The workers, if not locally from the area, will stay in the base camp indicated in Figure 4.4. The estimated number of work that will stay in the base camp is 140 as indicated in Section 4.5. Assessment of the influx of 140 worker, who will stay in the base camp, is provided in Section 6.21.
25.		5	Impact Assessment and Mitigation Measures		
26.		(a)	In Section 5.22, we noticed that Mitigation measures for Impact from Fuel leakage/ spillage are not in line with GIIP on HSE General Guideline (IFC) in title of Impacts from spills/ leaks on surface water quality, ground water quality, soil, terrestrial habitats, aquatic habitats as well as their associated flora and fauna	When fuel store, need to follow the GIIP on HSE (IFC) for fuel storage; - Secondary containment, constructed of impervious and chemically resistant material, shall be provided that is capable of containing 110% of the largest tank or 25% of the combined tank volumes, whichever is larger. - Fuel shall not be stored in underground tanks. - Fuel shall be transferred between vehicles and storage tanks on an impervious surface sloped to a collection structure	No fuel storage is planned to be built for the Project since fuel will be sourced locally. As such, the GIPI on HSE for fuel storage will not be relevant for the Project.
27.		(b)	In Section 5.5, we noticed suggestion for training related to Biodiversity including "induction training for personal is recommended to include a mandatory segment on biodiversity" in the title of Impacts from labor including handling, equipment and services apply on terrestrial and aquatic flora and fauna.	Because Moyingyi Wetland Area is located in Block H, it is required to describe the training plan to workers and technical experts on protected animals and plants (trees), seasonal protected animals and plants (trees), the guidelines to avoid animal and plants protected by the Forest Law and Wildlife Law.	Training plan is added to Annex G.
28.		(c)	Section 5.6, we noticed that	-Need to implement Biodiversity Action Plan	Training plan is added to Annex G. It should, however, be

No.	Company		Subject	Suggest/Remark	Consultants' Response
			"recommends training on tree species that should not be cut" in Section of Impacts from site preparation/ clearance and creation of access routes on terrestrial habitats and associated flora and fauna	because Dipteracerpus alatus and Tecroha hamiltoniana are included in the IUCN list (2015) -Need to describe the plan of training and awareness relevant to tree species that should not be cut	noted that Pacific Hunt is not planned to fell any trees for the survey which will now be undertaken on cultivated land or along existing paths / roads. The base camp will be located on developed land.
29.		(d)	Page (150), Section 5.28.2, we noticed that there is no way to minimize and control for Lost of Land and Crop.	<ul style="list-style-type: none"> - Need to describe lands, agricultural fields, plantations that overlapped with the seismic survey line - Need to describe the approval from the land owner - Need to describe land acquisition and crop compensation plan related to the Project 	<p>Section 6.24.1 is revised. Land use affected by the base camp is expected to be developed area while those by receiver/geophone line laydown and Vibroseis operation will mostly be cultivated area.</p> <p>The land and crop loss compensation is added to Section 6.24.2 and Section 4.13.</p>
30.		6	Public Consultation and Disclosure		
31.		(a)	Page (181) of Chapter-8, although it is described that Public Consultation was held in 4 villages of Yatharshey Township and 4 villages of Wal Township, it does not describe the consultation in detail.	Need to describe the date, place and attendance lists, discussion with organization, public concerns, suggestions from public consultation, feedback from stakeholder, and photo records etc.	Details of consultation and community surveys undertaken as part of the EIA investigation are provided in Section 9.2 and Section 9.4, with key findings presented in Section 9.5.
32.		(b)	There is no information on disclosure about the Public Consultation of the proposed project to media.	Need to describe the disclosures about the Public Consultation of proposed project to media	Disclosure to media is described in Section 9.3 and Annex H.
33.		(c)	Need to describe the disclosure plan to Township GAD office, and Village Track GAD offices which are within Block H.	Need to implement the disclosure plan to Township GAD and Village Track GAD which are within Block H	Details of consultation are provided in Section 9.2 and Section 9.4 regarding disclosure of Project information as part of the EIA investigation. Disclosure implemented as part of the CSR programme is presented in Section 9.6.
34.		(e)	No information on CSR Plan and CSR Budget in the EIA Report.	Need to describe the CSR Program considering public needs and CSR Budget in the EIA Report.	CSR programme and budget is added to Section 9.6.
35.		6	Environmental Management Plan		
36.		(a)	In Section (7.2), it is	Need to describe Pacific Hunt HSE-MS manual and	The Environmental Management Plan of Pacific Hunt is

No.	Company		Subject	Suggest/Remark	Consultants' Response
			mentioned that an HSE Management System will be implemented and Pacific Hunt Environmental Policy (that mentioned in Figure 7.9) as part of that HSE Management System. Pacific Hunt Environmental Policy only describes Health and Safety, and does not include environment and social.	procedures.	appended in Annex G. Pacific Hunt HSE Policy is updated in Figure 3.1
37.		(b)	We notice that words like 'we suggest that', 'will be avoided' etc. in the EMP. For example (i) training for personnel is recommended. And (ii) it is assumed felling of large perennial vegetation...which are considered as endangered by IUCN...will be avoided.	Need to revise to 'implement', 'avoid' instead of 'recommended' and 'will be avoided'	Revised accordingly.
38.		(c)	Although the Environmental Management Plan is describes in Table (7.5), it does not describe the Budget of EMP.	Need to describe the Budget to implement the EMP.	EMP budget is added to Section 8.1 and Section 8.1.4.
39.		(d)	Table (7.5), although the Monitoring Plan describes in general, there is no information on Time Frame, Monitoring Frequency, Analytical Parameters, target fauna / flora for monitoring and Analytical Methods and Budget for Monitoring plan.	In Monitoring plan, need to describe separately the Time Frame, Monitoring Frequency, Analytical Parameters, target fauna / flora for monitoring and Analytical Methods and Budget for Monitoring plan.	Monitoring budget is added to Section 8.1.4. Details on monitoring are added to Annex G.
40.		(e)	Although the following sub-plans will be implemented to minimize the environmental impact, it does not describe as the appendix in the EIA Report. -Biodiversity Action Plan	Need to describe in the appendix the following plans to be implemented by Pacific Hunt Co.,Ltd. -Biodiversity Action Plan -Waste Management Plan -Environmental Monitoring Plan -Terrestrial Habitat Reinstatement Plan -Emergency Preparedness Plan	Detailed management plans are added in Annex G.

No.	Company		Subject	Suggest/Remark	Consultants' Response
			-Waste Management Plan -Environmental Monitoring Plan -Terrestrial Habitat Reinstatement Plan -Emergency Preparedness Plan -Fire Risk Management Plan -Livelihood Restoration Plan -Traffic Management Plan -Culture Heritage SOP	-Fire Risk Management Plan -Livelihood Restoration Plan -Traffic Management Plan -Culture Heritage SOP	
41.		(f)	Page (205), although the Monitoring Plan is described in general, there is no information on Time Frame, Monitoring Frequency, Analytical Parameters, target fauna / flora for monitoring and Analytical Methods and Budget for Monitoring plan.	Need to describe separately the Time Frame, Monitoring Frequency, Analytical Parameters, target fauna / flora for monitoring and Analytical Methods and Budget for Monitoring plan.	Details on monitoring are added to Annex G.
42.		(g)	We noticed that there is no information on Grievance Mechanism.	Need to describe Grievance Mechanism structure, responsible person, responsible organization and their duties if grievance is received from local people.	Grievance mechanism is added to the Stakeholder Engagement Plan in Annex G and describe in Section 8.4.
43.		14	General		
44.		(a)	Need to disclosure the project report in company website, and describe that Web Link in Scoping Report		Disclosure to media and company website are described in Section 9.3 and Annex H.
45.		(b)	Need to describe separately the Commitment List by the Project Proponent		The commitment is confirmed in the Executive Summary of the EIA Report.
46.		(c)	Need to consider suggestions and comments from stakeholders		Noted and confirmed in Section 9.5.