

Monitoring Report of Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign (Construction and Installation Phase) in 2018

PTTEP South Asia Limited (PTTEP SA)



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Executive Summary

Executive Summary

REM-UAE Laboratory and Consultant Company Limited conducted the compliance audit as per implementation of environmental mitigation measures and monitoring program for Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign.

The objective of the audit was to evaluate the effectiveness of implementation as per Environmental Management Plan, including both mitigation measure and monitoring program, defined in the EIA report. Reporting includes specific comply requirements, any potential problems or obstacles and propose recommendations for improvement in order to ensure the effectiveness of the existing environmental prevention and mitigation measures.

The evaluation process includes (1) meeting with PTTEP SA personnel, (2) site observation and interview with PTTEP SA's representatives, and (3) document review.

1. Project Overview

PTTEP SA was granted the petroleum Production Sharing Contract (PSC) for Block MOGE-3, which is in Magway Region, in Central Myanmar. Block MOGE-3 encompasses 1,217 km², and is in the south of Magway Region, in the Dry Zone in the central Myanmar lowlands. PTTEP SA plans to drill four (4) exploration drilling wells during 2018-2019 located in Thayet Township, Magway Region, Myanmar.

Four wellsites were started to construction and installation phase in 2018 and drilling phase will commence in 2019. The wellsites name are listed as below;

- Padaukpin wellsite – Aung Myay-1 (AMY-1)
- Sakangyi wellsite – Pyae Sone Kywe-1 (PSK-1)
- Ngabatkya wellsite – Aung Chan Thar-1 (ACT-1)
- Moenatkone wellsite – Aung Pyae Hlyan-1 (APH-1)

2. Construction and Installation Phase

PTTEP SA has 4 wellsites that has a similar construction plan. The wellsites and central campsite was levelled and elevated by cut and fill methods and compacted by using bulldozers, dump trucks, water trucks and graders. The compacted pad was approximately 500 mm thick.

A barbed wire fence was installed around wellsites to protect from entering of animals and unauthorized person. Security guards were employed and assign at each site 24 hours per day, 7 days per week with 3 shifts throughout construction phase.

All of the materials for construction wellsites and facilities were provided by the civil engineering contractor. This contract was issued to a local construction company which is DARE Company Limited as per MOGE and PTTEP SA's policy of ensuring that the economic benefits of the project are concentrated within the Province. The civil

engineering contractor obtained fill materials from local extraction sites operating under permit from the relevant local authorities.

It is the responsibility of the civil engineering contractor to source the fill materials and the materials must also be of a high-quality grade for use as un-surfaced road building material and acceptable to PTTEP SA for construction of the well pad.

3. Facilities and Utilities

1) Access Road

PTTEP SA used existing local roads for transportation as much as possible to each wellsites. However, due to the wellsites being in an agricultural area, the new access roads were constructed to connect the wellsite to the existing main roads for transportation of drilling rig and drilling equipment. PTTEP SA considered the impact to the nearby villages and design the road accordingly. The land required for the access roads would follow land acquisition committee consideration and decision for compensation and access route. PTTEP SA considered the final access road route depending on the land compensation committee consideration and approval. PTTEP SA obtained permission from the relevant local authorities and land owners prior to construction of the access roads.

2) Central Campsite and Accommodation Areas

PTTEP SA constructed the Central Campsite (CCS) nearby Thayet Township. The container cabin is providing for workers' accommodation. The detail of facilities that providing within CCS as below.

2.1) Potable Water

During the exploration drilling phase, the drinking/consumption water (~600 liters of water bottled) required daily and another 600 liters to be used for hygienic purposes. Water source during the exploration drilling phase transport from nearest village tube well.

2.2) Drainage Control within Central Campsite

There are no potentially harmful chemicals stored at the central campsite that could drain offsite. The fuel tank for the camp generator was placed on an impermeable membrane and banded to contain potential fuel leaks. The spill kits and absorbents were provided at the central campsite site to clean up any potential fuel or oil spills during vehicle maintenance or use.

2.3) Central Camp Site Sewage System

A set of concrete septic tanks were built into the work camp pad at the outer edges and there is the capacity of 8000 litres (8 m³). No pump out of septic sludge is required as the concrete septic tanks and any sewage sludge would be left in septic tanks onsite at the end of the drilling campaign.

Wastewater from the campsite, including both grey water and black water, were treated separately. Grey water was treated in a soak pit and Black water was treated in septic tank and soak pit.

A waste management plan was prepared that defines waste types, disposal methods and locations consistent with waste management laws and regulations.

2.4) Central Campsite Power

The central campsite is as a container types with the power being generated from portable diesel engine generator. The engines are running 24 hours a day to power up the lighting, equipment and other necessity. For cooking, cylinder gas also to be considered.

All power for the base camp site is providing by the camp's 100 KVA diesel power generator. Estimated fuel consumption is 0.5 m³ per day during full accommodation. On-site fuel storage capacity consists of one 25 m³ tank. Estimated total fuel usage is about 30 m³ (based on 60 days of drilling).

4. Emissions, Discharges and Waste Generation

1) Emission

1.1) Air Emission

- Dust: During construction and upgrading of access roads and wellsites construction, the main air quality issue would be control of dust. Standard operating procedures require the civil engineer contractor to ensure daily or as required sprinkling of water on all non-sealed surfaces to subdue the amount of dust. The standard operation procedure was limited the speed of traffic on site and to restrict speed of traffic on portions of the road that have not yet been sealed. Daily consultations by the construction contractor with the local villages would be ensure that any significant problems were identified and resolved.
- Combustion emission: Combustion product from construction phase was diesel combustion. Diesel combustion from the on-site electrical power generation units and from vehicles were emitted greenhouse gases. The amount of emissions would be varying with time, depend on the operational activity and power demand.

1.2) Noise

During the civil work phase, noise would primarily be generated from project vehicles, generators, and construction equipment such as bulldozer, backhoe, grader, dump trucks and others.

2) Discharges and Waste Generation

The PTTEP SA exploration program would handle waste according to PTTEP SA Standards. All wastes were classified and segregated before appropriate disposal.

2.1) Containers

All wastes would be collected, stored, and segregated in arranged containers. Containers used for medical waste shall be marked prominently with universal warning signs and/or the word "Medical waste".

2.2) Non-Hazardous Waste

Both the wellsites and the accommodation campsite will generate non-hazardous waste, consisting of "domestic" garbage such as food scraps, plastic packaging, paper, cardboard, tin cans and glass. In addition, there would be "industrial" waste such as wooden cases, large glass containers, ferrous and non-ferrous metal items, plastic and metal drums and containers, plastic and cardboard packaging. The amount of non-hazardous waste from the workers is expected to be 1 kg / per / day. Therefore, the generated non-hazardous waste for construction phase is estimated to be 50 kg/day.

A waste management plan was prepared to defines waste types, disposal methods and locations consistent with waste management laws and regulations. All general waste (solid waste) was disposed as per local Thayet Township municipal regulations.

2.3) Hazardous Waste

The wellsites and accommodation campsite combined would generate a low volume of hazardous waste. The estimated amount of hazardous waste based on previous projects is expected to be 500 kg per month.

Any hazardous waste was transferred to Yangon for disposal of at an approved waste disposal area (YCDC) or DOWA waste management facility.

5. Safety, Security, Health and Environment Management System

PTTEP SA is fully committed to providing a safe, secured and healthy workplace and conducting its operations in a manner that protects the environment. These commitments are in accordance with PTTEP's Corporate Vision, Mission, and Values and PTTEP Myanmar Asset's SSHE Policy. Proactive individual involvement, responsibility and accountability are expected of all employees, contractors and third-party personnel. PTTEP Myanmar Asset's SSHE Management System (SSHE MS) is designed to align all stakeholders' efforts to enable attainment of these principles.

All levels of line management at PTTEP Myanmar asset are responsible for implementing and maintaining its SSHE policy and SSHE MS. Both documents are reviewed and revised at regular intervals.

6. Compliance Status

6.1 General Mitigation Measures Implementation Compliance

The results determined that the project have completely complied on the mitigation measures requirements for the finished and on-going operations while some activities (12.5%) do not have operation during the audit.

- PTTEP SA concerns the safety, security, health and environment of the employees and wellbeing of the environment. The company addresses this regulation to the contract employees and contractor to comply with the requirements; the mitigation must be followed with the Company's SSHE Policy.

- PTTEP SA compiled these mitigation and monitoring measures strictly and monitoring report of the project will submit to MOGE and ECD at the end of the year in order to inform all activities.
- The letter about the project activities was sent to local government. Moreover, PTTEP SA had two times of public consultation with stakeholder already. Another plan of public consultation with stakeholder will conduct if needed. PTTEP SA will refer to the grievance mechanism if there is any compliance from stakeholder and community.
- PTTEP SA apply grievance handling guideline for immediately action in case any complaints raised from the stakeholder. However, there was no complaint from previous activity in 2018.
- If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the wellsites. However, there was no encountered any objects, fossils or archaeological from previous activity in 2018.
- All private land was permitted by land owners or authorized persons prior to start any activity. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision.

6.2 Environmental Mitigation Measures Compliance Result in Construction and Installation Phase

The results determined that the project have fully complied on the environmental mitigation measures for all activities operated in Construction and Installation Phase during the audit, however about 2.3 % of all mitigation measure do not have operation during the audit.

1) Topography

PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

2) Air Quality

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation of speed limitation 20 km/hr inside operation site and 50 km/hr along the access road. And speed limitation was communicated to all worker in daily tool box talk before working by the header of contractor/safety officer. The truck was covered during transport material to the wellsites. And almost of truck was used for transport material within wellsites. Moreover, the contractor had provided staffs for cleaning during transportation. The contractor provided water spraying within the wellsites and along the access road 3 times per day and increase the frequency to suitable the weather. No needed to clean tires of the vehicles before leaving site due to the access road as the laterite road and there were a few houses of community around the wellsites. And vehicle of the project used dust flap.

The contractor provided PPE sufficiently for all workers and controlled to use PPE during working. And PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.

3) Noise

PTTEP SA enjoined the contractor to conduct in mitigation of noise impact such as transportation was conducted to minimize impact from sensitive environmental areas, the construction was conducted only in daytime from 7.00 - 18.00 hr, clearing and tree cutting were conducted as necessary.

No need to use noise barrier due to construction area far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. And PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles in good condition.

4) Surface Water Hydrology

PTTEP SA avoided the construction of wellsites that can be obstruct of natural water flow around the project area. Resulting to no construction activity obstructs natural water way.

5) Surface Water Quality

PTTEP SA designed layout of the wellsites, the access road and campsite before starting the construction to minimize areas requiring soil stabilization. The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. Water drainage ditch around the wellsites was constructed as specify in the measure.

PTTEP SA reiterated staffs and constructors to strictly keep clean both within wellsites and avoid water source nearby the wellsites. Moreover, PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined. Moreover, the contractor provided storage area for construction materials, chemical and oil within wellsites.

6) Soil quality

PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. And water drainage ditch around the wellsites was constructed to control water run-off.

7) Flora and Fauna

PTTEP SA controlled contractors to carry out clearing and tree cutting as necessary. And wellsites was constructed as specify in layout of wellsites. Fence was installed around the wellsites to separate the project area and nearby area. The security guard was at temporary resting 24 hr. to restrict people and vehicles.

PTTEP SA avoided to construction of wellsites that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way. Moreover, PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.

8) Land Use

Purchase of land access road/well pad and camp site were transparented and faired compensation by the MOGE. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision. Moreover, no hand back the land after project completion due to land access road/well pad and camp site was purchased by government of Myanmar. In addition, PTTEP SA informed lead of community by letter about transportation of

equipment, transportation route, time of project activities including safety plan before project start. All private land was permitted by land owners or authorized persons prior to start any activity.

9) Transport

The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe condition to user.

10) Water Use

Groundwater well was drilled at Padaukpin wellsites. And PTTEP SA was follow procedure of well drilling for groundwater. Moreover, the contractor has own water source for using in project area which not be affect to water used of community.

11) Drainage and Flooding

The civil engineer of PTTEP SA has responsibility to control contractor throughout the construction period. And PTTEP SA avoided to construct the wellsites that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.

12) Waste Management

PTTEP SA developed waste management plan and controlled the contractor to implement. The local government of Thayet township municipal was the responsible agency for managing waste to disposal. Separate waste containers were provided within wellsites. The contractor provided storage area for construction material and PTTEP SA strictly enforced good housekeeping practices within wellsites and surrounding for all workers. Toilet with septic tank was provided sufficiently for all staffs in order to treat wastewater before discharged to environment.

13) Socio-Economy

The contractor hired temporary workers in local area, according to the job description. And the contractor purchased goods/consumers in local area.

14) Historical, Archaeological and Cultural Resources

If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the wellsites.

15) Tourism and Recreational experience

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time. The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation. The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe to user.

16) Public and Occupational Health

PTTEP SA strictly implement and follow mitigation measures for impacts to air quality, noise level and waste management. The contractor provided PPE sufficiently for all workers and controlled to use PPE during working. The noise barrier is not required due to the construction area is far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. Resulting from the mitigation measure implementation, there was no any complaint from surrounding community.

6.3 Environmental Mitigation Measures Compliance Result in Unplanned Events

The results determined that the project have completely complied on the environmental mitigation measures that have the operations during the audit period. Some mitigation measure (27.9 % of all mitigation measures) do not have the operation during the audit period. Details described below

1) Blowout

Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.

2) Fire or Explosion (not associated with Blowout)

Fire extinguishers were provided within wellsites including inspection once a month. Moreover, the assembly point, an emergency respond procedure and firefighting training were provided. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

3) Fuel, Chemical or Hazardous Waste/Materials Spill

PTTEP SA developed waste management plan and controlled the contractor to implement. Separate waste containers were provided at wellsites. The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. In addition, spill contingency plan, Emergency respond procedure and training were provided for implementation. SDS for chemical substances was not required within wellsites during construction and installation phase. However, if there is chemical used in any operation such as drilling, well testing and production phase, the project will conduct as specify in the measure. PTTEP SA designed area proportionally. The non-contaminated area was compacted soil ground. For contaminated area which were drilling rig and cutting pit, the project paved with concrete and waterproofing membrane for cutting pit. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

4) Transportation Accidents

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow its requirements such as speed limit, loading of truck and transportation's time. The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.

PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles. The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation. The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe condition to user.

Emergency respond procedure, ambulance, medical personnel and training were provided to respond in emergency case. Moreover, the contractor cooperated with nearby hospital to support in serious injuries or emergencies case.

6.4 Environmental Monitoring Result

The results of Environmental Impact Monitoring determined that the project have completely complied (100%) with all monitoring program.

1) Air Quality Monitoring

Air quality was monitored by REM-UAE Laboratory and Consultant Company Limited during October 20-22, 2018 for 4 wellsites (Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsites) at 3 stations; Padaukpin station (A1), Moenatkone station (A2) and Ngabatkyia station (A3). The results of average 24 hours PM_{10} , average 24 hours $PM_{2.5}$, average 1 hr Nitrogen Dioxide (NO_2), average 24 hrs Sulphur Dioxide (SO_2) and average 8 hrs Ozone (O_3) were complied with Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO Air quality guideline (2006) and amendment. However, average 24 hrs H_2S was not specified in the standard.

2) Noise Level Monitoring

Noise level was monitored by REM-UAE Laboratory and Consultant Company Limited during October 20-22, 2018 for 4 wellsites (Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsites) at 3 stations ; Padaukpin station (N1), Moenatkone station (N2) and Ngabatkyia station (N3). For Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO guideline for community noise (1999) were not specify the standard for L_{Aeq} 24 hours, L_{Amax} and L_{Adn} .

3) Social Monitoring

Social monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsites in 2018 were done by PTTEP SA. There was no any complaint from the community throughout the project operation.

4) Public and Occupational Health and Safety Monitoring

Public and Occupational health and safety monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsites in 2018 were done by PTTEP SA. There were 5 incident cases from project activity throughout the project operation in 2018. PTTEP SA had strictly follow PTTEP SA's procedure for all case such as record data, find cause of accidents and performed mitigation measures.

Chapter1
Introduction

Chapter 1

Introduction

1.1 Introduction

The Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign (“the Project”) is an existing development operated by PTTEP South Asia Limited (PTTEP SA), a subsidiary of PTTEP. PTTEP SA plans to drill four (4) exploration drilling wells in Block MOGE-3 located in Thayet Township, Magway Region, Myanmar during 2018-2019. The Environmental Impact Assessment (EIA) Report for Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign was submitted to Myanmar Oil and Gas Enterprise (MOGE) and Environmental Conservation Department (ECD) on 28th September 2018, according to the submission letter no. PTTEP SA 13253/01-2967/2018 (Appendix A-1). After that ECD called reviewed team meeting on 1st November 2018 and requested PTTEP SA to revise the EIA report. Then PTTEP SA submitted the revised EIA report on 23rd November 2018 (Appendix A-2). EIA report was approved 1st November 2019 by MOGE and ECD according to the approval letter number MD – (15) 3/6 (2631) 2019 and EIA-2/ Petroleum (2301/2019) respectively (Appendix A3). As per commitment in EIA Report, PTTEP SA has the responsibility to follow the environmental impact monitoring and mitigation measures including submission of the monitoring report to MOGE and ECD. Therefore, PTTEP SA, as the project owner, has assigned a qualified third party, REM-UAE Laboratory and Consultant Company Limited to perform compliance audit of the mitigation measures and perform the monitoring as a frequency specified in the EIA’s environmental management plan and report the results to MOGE and ECD as prescribing in EIA.

In this monitoring report, environmental impact monitoring and mitigation measures implementation compliance are covered for Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign during Construction Phase.

1.2 Objective

The main objectives of this report are:

- 1) To evaluate the effectiveness of implementation of the Environmental Impact Assessment, including both mitigation measures and monitoring program as per commitment in EIA Report and
- 2) To report any potential problems or obstacles and propose recommendation for improvement in order to ensure the effectiveness of the prevention and mitigation measures.

1.3 Briefly Information of The Project

1.3.1 General Information and Background

- 1) Project Name Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign
- 2) Project Location Block MOGE-3 lies within Thayet and Kamma Townships in Thayet District of Magway Region
- 3) Project Owner PTTEP South Asia Limited
- 4) Report Preparation REM-UAE Laboratory and Consultant Company Limited
- 5) Project Start Date: Project was started in 2018

1.3.2 Project Location

Block MOGE-3 lies within Thayet and Kamma Townships in Thayet District of Magway Region. The block encompasses 1,217 square kilometers (km²) and is located in the Southern part of Magway region in the dry, central zone of the Myanmar lowlands. The block boundaries of MOGE-3 are shown in Table 1-1.

Table 1-1 Coordinates of Block MOGE-3 Boundary

Corner point	Coordinates (UTM Datum WGS 1984)		
	Zone	East (X)	North (Y)
A	46N	705437.87	2164705.93
B	46N	729049.83	2164991.86
C	46N	731479.28	2111501.61
D	46N	710428.60	2111249.24
E	46N	709319.72	2131534.74

Four drilling locations were selected to operate in 2018-2019 for drilling campaign. Four drilling locations are shown in Table 1-2 and Figure 1-1.

Table 1-2 Coordinates of Four Drilling Location within Block MOGE-3

Wellsite	Coordinates (UTM Datum WGS 1984)		
	Zone	East (X)	North (Y)
Moenatkone wellsite – Aung Pyae Hlyan-1 (APH-1)	46N	709266.43	2158633.42
Ngabatkyia wellsite – Aung Chan Thar-1 (ACT-1)	46N	708668.74	2149921.69
Padaukpin wellsite – Aung Myay-1 (AMY-1)	46N	718230.84	2143521.79
Sakangyi wellsite – Pyae Sone Kywe-1 (PSK-1)	46N	721062.26	2143376.77

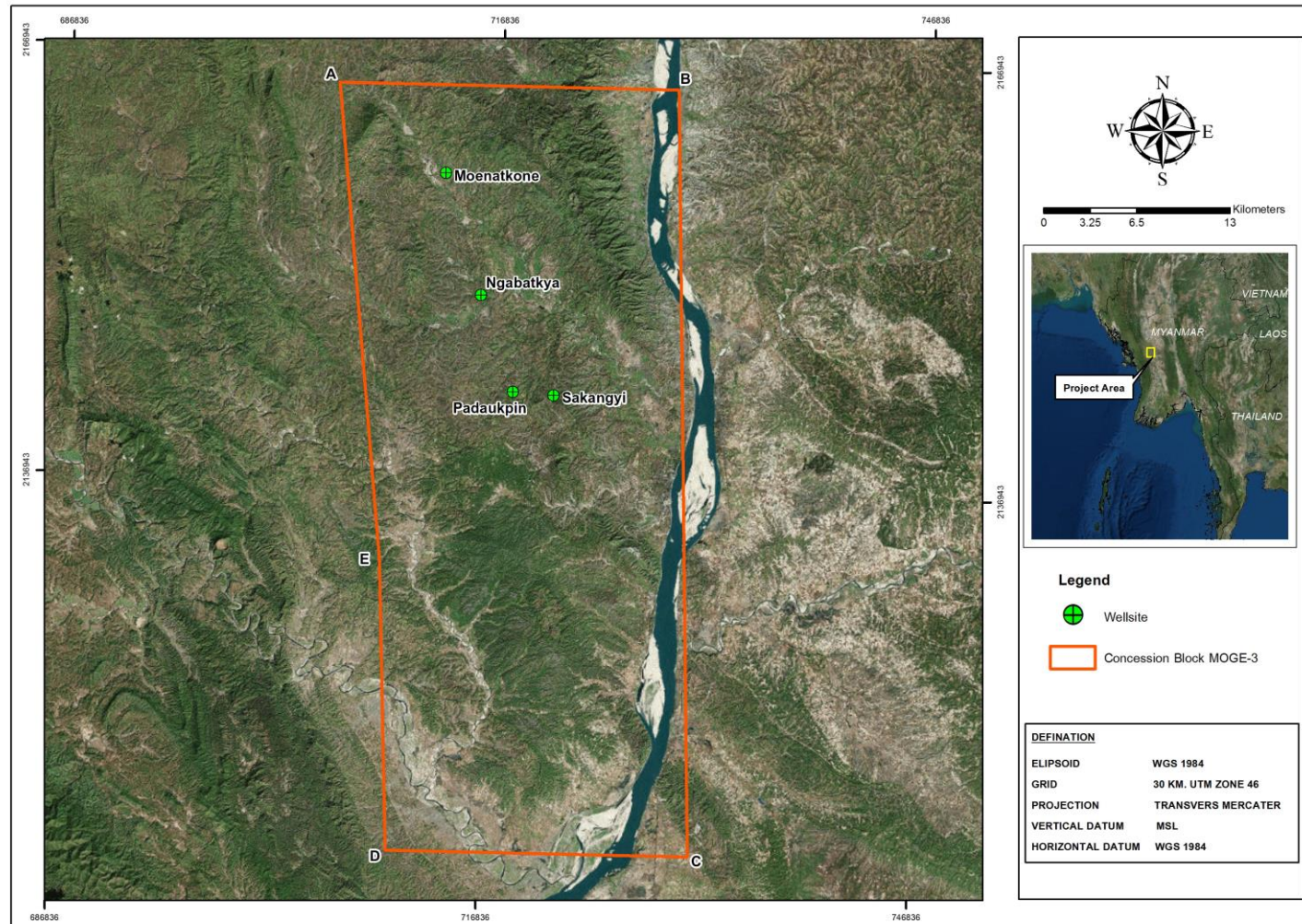


Figure 1-1 Four Drilling Location within Block MOGE-3

1.3.3 Status of Current Operation

Four drilling locations were started to construction and installation phase in 2018. The progress of each location is summarized as Table 1-3.

Table 1-3 Operational status of Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign

Wellsite	Activity in 2018
Moenatkone wellsite – Aung Pyae Hlyan-1 (APH-1)	Site Preparation and access road construction
Ngabatkyia wellsite – Aung Chan Thar-1 (ACT-1)	Site Preparation and access road construction
Padaukpin wellsite – Aung Myay-1 (AMY-1)	Site Preparation, access road construction and drilling pad construction
Sakangyi wellsite – Pyae Sone Kywe-1 (PSK-1)	Site clearing

Remark : PTTEP SA, 2018.

The example for construction activity of each location as shown in Figure 1-2 to Figure 1-5.



Figure 1-2 Moenatkone (MNK) Wellsite in Site Preparation and access road construction



Figure 1-3 Ngabatkyia (NBK) Wellsite in Site Preparation and access road construction



Figure 1-4 Padaukpin (PDP) Wellsite in Site Preparation, access road construction and drilling pad construction



Figure 1-5 Sakangyi (SGK) Wellsite in Site clearing

1.4 Layout and Facilities in Construction and Installation Phase

1.4.1 Layout of Wellsite and Access Road

1) Layout of Wellsite

The wellsite layout for Moenatkone, Ngabatkya, Padaukpin and Sakangyi are shown in Figure 1-6 to Figure 1-9.

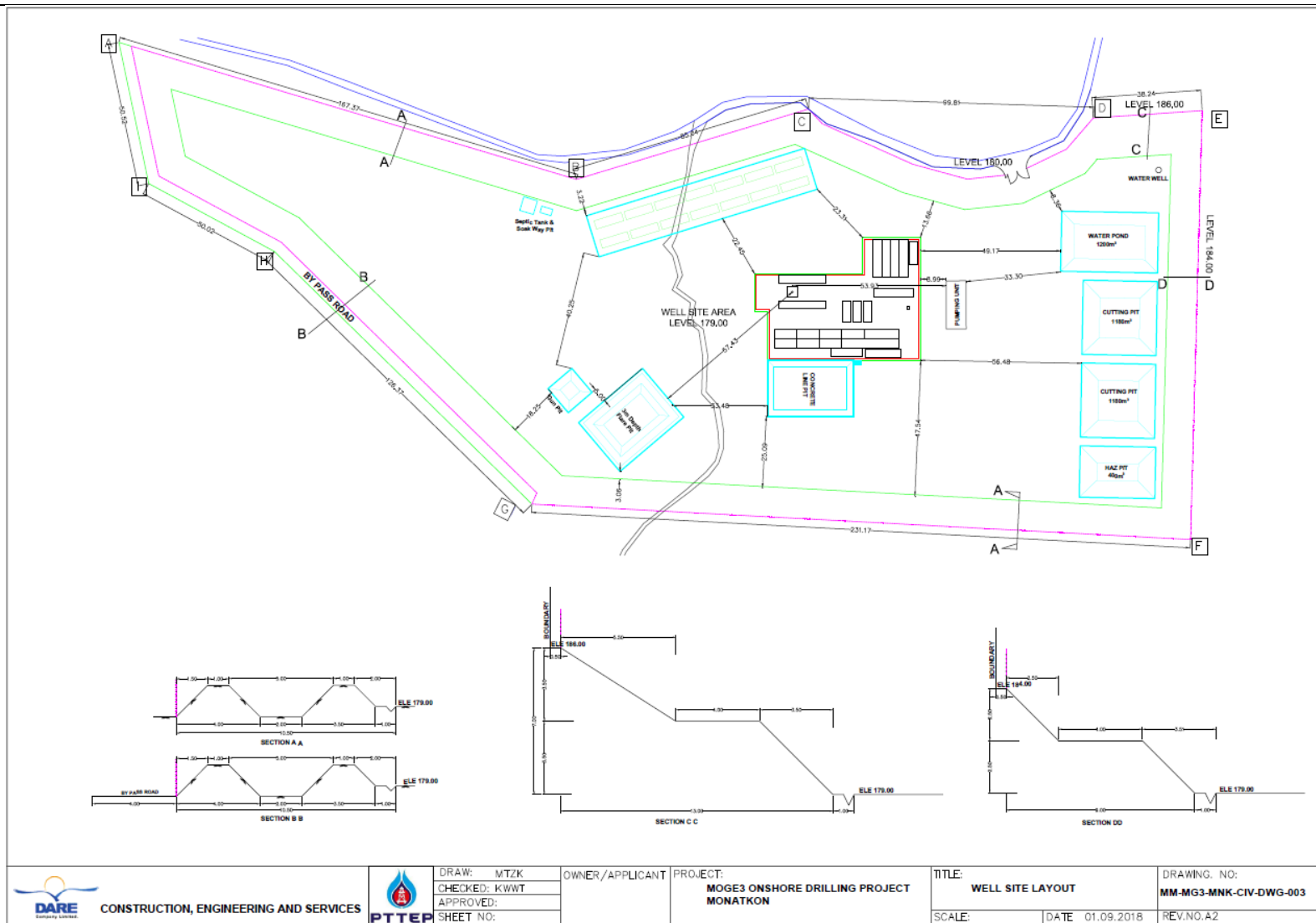


Figure 1-6 Moenatkone Wellsite Layout

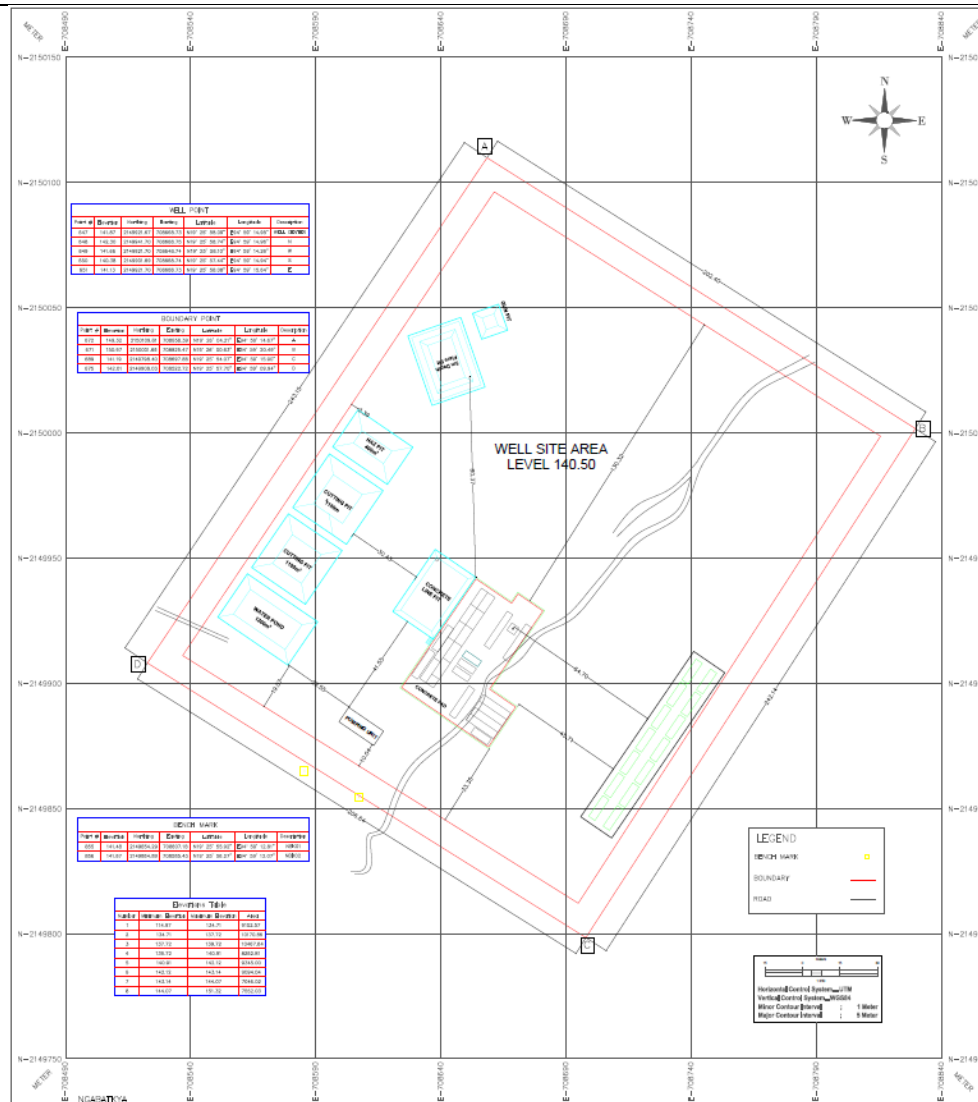


Figure 1-7 Ngabatkya Wellsite Layout

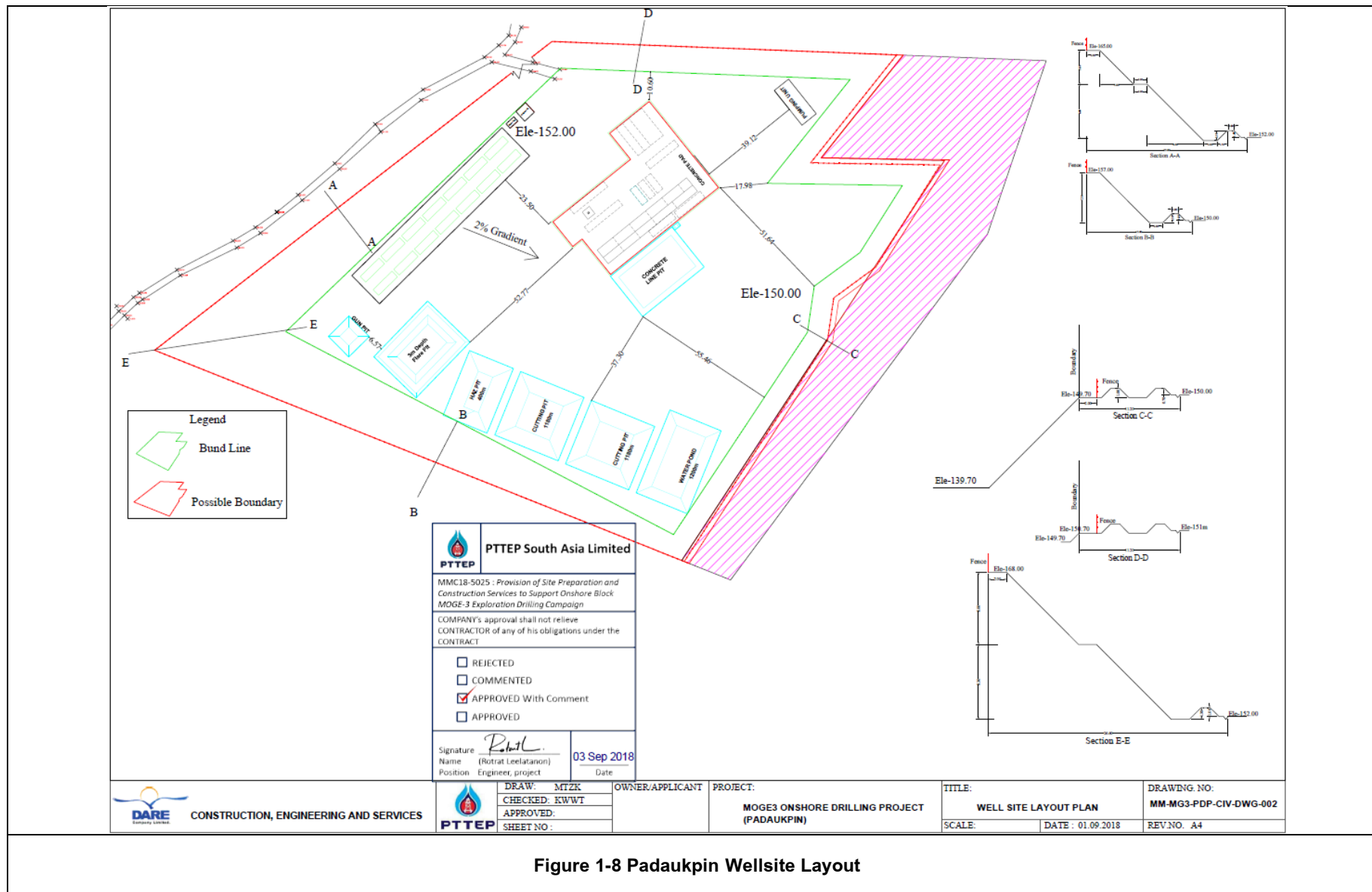
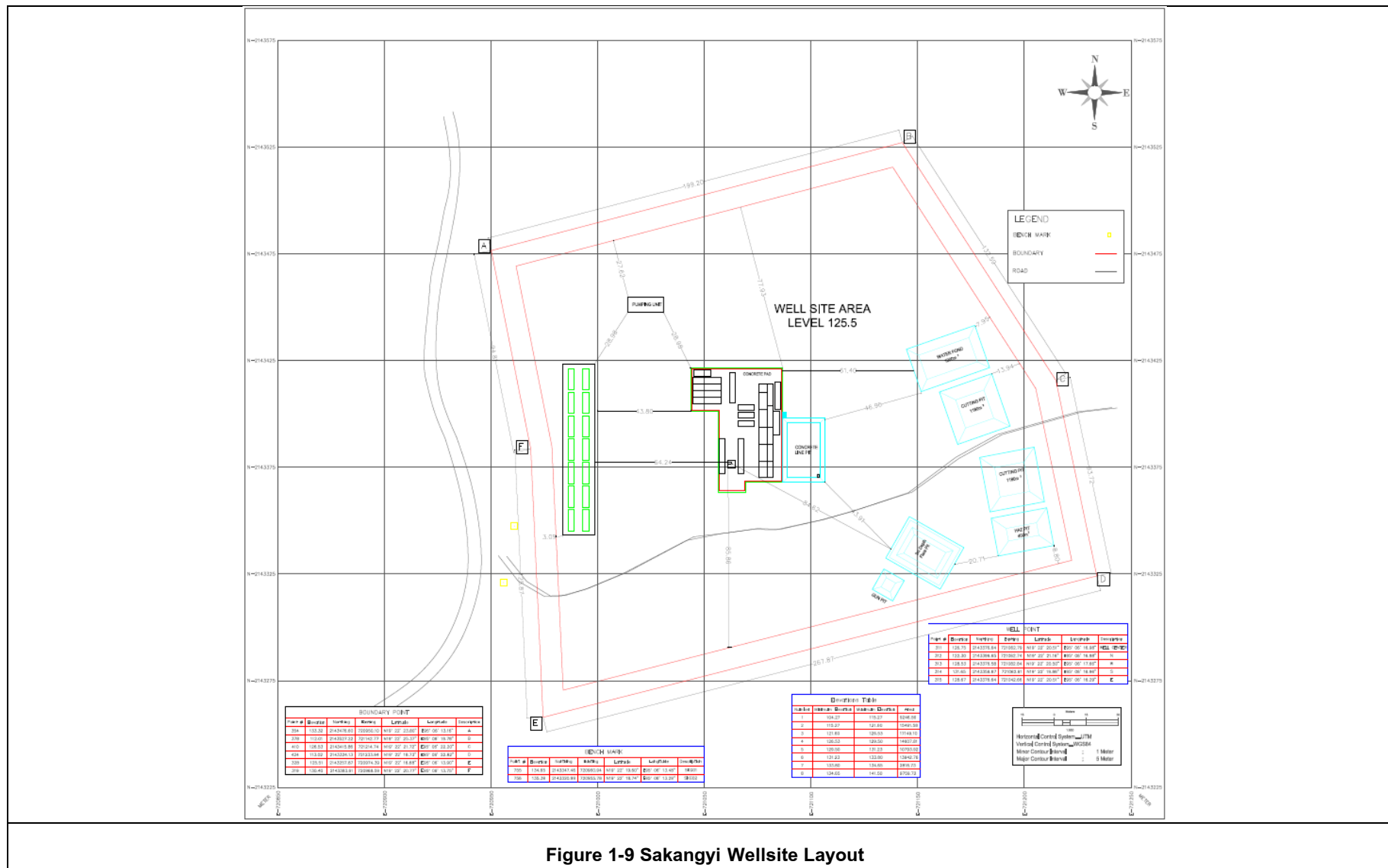


Figure 1-8 Padaukpin Wellsite Layout



2) Access Road

PTTEP SA used existing local roads for transportation as much as possible to each wellsite. However, due to the wellsites being located in an agricultural area, the new access roads were constructed to connect the wellsites to the existing main roads for transportation of drilling rig and drilling equipment. PTTEP SA considered the impact to the nearby villages and design the road accordingly. The land required for the access roads would follow land acquisition committee consideration and decision for compensation and access route. PTTEP SA considered the final access road route depending on the land compensation committee consideration and approval. PTTEP SA obtained permission from the relevant local authorities and contracted with land owners prior to construction of the access roads.

The well locations can be accessed by car from Thayet. But most of the earth road cannot be used in the rainy season. Therefore, new access roads were designed as single lane, un-surfaced roads, constructed of compacted laterite and selected material. The roads constructed 5 m with side slopes of 2:1, constructed with 200 mm of compacted laterite and 200 selected materials.

1.4.2 Facilities in Basecamp, Central Campsite and Accommodation Areas

PTTEP SA constructed the Central Campsite. The container cabin is providing for workers' accommodation. The detail of facilities are providing within Central Campsite as below.

1) Potable Water

During the civil works phase, the drinking/consumption water (~300 liters daily bottled) was trucked to the camp and another 200 liters to be used for hygienic purposes either to be sourced from water well or to be trucked.

The under-ground water well were drilled at wellsites for source of water. During civil works or exploration drilling phase, the under-ground water well will be used if it is sufficient. If tube type wells are not successful or water is not suitable for use. Water will be sourced and transported by tanker from nearby reservoirs/rivers. Local authorities will be consulted before water hauling activities.

2) Drainage Control within Central Campsite

There are no potentially harmful chemicals stored at the central campsite that could drain offsite. The fuel tank for the camp generator was placed on an impermeable membrane and banded to contain potential fuel leaks. The spill kits and absorbents were provided at the central campsite site to clean up any potential fuel or oil spills during vehicle maintenance or use.

3) Central Camp Site Sewage System

A set of concrete septic tanks were built into the work camp pad at the outer edges and there is the capacity of 8000 litres (8 m³). Pumping out of septic sludge is not required as the concrete septic tanks and any sewage sludge would be left in septic tanks onsite at the end of the drilling campaign.

Wastewater from the campsite, including both grey water and black water, were treated separately. Grey water was treated in a soak pit and Black water was treated in septic tank and soak pit.

A waste management plan was prepared that defines waste types, disposal methods and locations consistent with waste management laws and regulations.

4) Central Campsite Power

The central campsite is a container types with the power being generated from portable diesel engine generator. The engines are running 24 hours a day to power up the lighting, equipment and other necessity. For cooking, cylinder gas also to be considered.

All power for the base camp site is providing by the camp's 100 KVA diesel-fueled generators. Estimated fuel consumption is 0.5 m³ per day during full accommodation. On-site fuel storage capacity consists of one 25 m³ tank. Estimated total fuel usage is about 30 m³ (based on 60 days of drilling).

Currently, Central Campsite is in site preparation for drilling phase as shown in Figure 1-10.



1.5 Construction and Installation Phase of Wellsite and Central Campsite and Access Road

Each wellsite has a similar construction plan. The wellsites and central campsite was levelled and elevated by cut and fill methods and compacted using bulldozers, dump trucks, water trucks and graders. The compacted pad was approximately 500 mm thick.

A barbed wire fence to keep animals and unauthorized persons from entering the site will surround the well pad and central campsite pad areas. Security guards was employed and stay on each site 24 hours per day, 7 days per week throughout rig mobilization, set up, drilling and well testing until the site is abandoned.

Dimensions of the wellsite and accommodation camp site to be constructed are summarized in Table 1- 4.

Table 1-4 Dimensions of the wellsite and accommodation camp site

Site	Dimensions	Area	Estimated Fill
Wellsite	240 m x 200 m x (500 mm thick)	48,000 m ²	24,000 m ³ *
Central Campsite	100 m x 100 m x 500 mm thick	10,000 m ²	5,000 m ³

Remark: * Estimate based on an average of 500 mm thick.

All materials for construction of wellsite and facilities were provided by the civil engineering contractor. This contract was issued to a local construction company as per MOGE and PTTEP SA's policy of ensuring that the economic benefits of the project are concentrated within the Province. The civil engineering contractor obtain fill materials from local extraction sites operating under permit from the relevant local authorities.

It is the responsibility of the civil engineering contractor to source the fill materials and the materials must also be of a high-quality grade for use as un-surfaced road building material and acceptable to PTTEP SA for construction of the well pad.

1.6 Emissions, Discharges and Waste Generation

Emissions, discharges and waste generation was conformed to applicable government regulations in Myanmar such as Myanmar Environmental Conservation Law (2012).

1.6.1 Emission

1) Air Emission

1.1) Dust

During construction and upgrading of access roads and well site construction, the main air quality issue would be control of dust. Standard operating procedures require the civil engineer contractor to ensure daily or as required sprinkling of water on all non-sealed surfaces to subdue the amount of dust. The standard operation procedure was limited the speed of traffic on site and to restrict speed of traffic on portions of the road that have not yet been sealed. Daily consultations by the construction contractor with the local villages would be ensure that any significant problems were identified and resolved.

1.2) Combustion emission

Combustion product from construction phase was diesel combustion. Diesel combustion from the on-site electrical power generation units and from vehicles were emitted greenhouse gases. The amount of emissions would be varying with time, depend on the operational activity and power demand.

2) Noise

During the civil work phase, noise would primarily be generated from project vehicles, generators, and construction equipment such as bulldozer, backhoe, grader, dump trucks and others.

1.6.2 Discharge and Waste generation

PTTEP SA has handled waste according to PTTEP SA Standards. All wastes were classified and segregated before sending to disposal. All wastes were collected, stored, and segregated in arranged containers such as non-hazardous waste, plastic waste, metal waste and hazardous waste as shown in Figure 1-11.



Figure 1-11 Separate waste container

The construction contractor provided storage area for all wastes and PTTEP SA strictly enforced good housekeeping practices within wellsite and Central Campsite.

For non-hazardous waste, waste management plan was prepared that defines waste types, disposal methods and locations consistent with waste management laws and regulations. The local government of Thayet township municipal was the responsible agency for managing waste to disposal.

For Hazardous Waste, the wellsite and accommodation campsite were generated a low volume of hazardous waste. Any hazardous waste was transferred to Yangon for disposal of at an approved waste disposal area (YCDC) or DOWA waste management facility.

The medical waste was transferred to Yangon for disposal of at an approved waste disposal area (YCDC) or handover to medical service company for dispose at approved hospital.

1.7 Safety, Security, Health and Environment Management System

1.7.1 PTTEP Corporate Vision and Mission

All levels of line management at PTTEPI are responsible for implementing and maintaining its SSHE policy and SSHE MS. Both documents are reviewed and revised at regular intervals.

- **Vision Mission and Corporate Values**

Vision: "Energy Partner of Choice" through Competitive Performance and Innovation for Long-term Value Creation."

Mission: "PTTEP operates globally to provide reliable energy supply and sustainable value to all stakeholders."

1.7.2 PTTEP Myanmar Asset Safety Security Health and Environment (SSHE)

PTTEP Myanmar Asset is committed to safe Exploration and Production (E&P) Operations in Myanmar with an ultimate goal of "Target Zero - Nobody Gets Hurts in Our Operations" which covers (1) Zero Injury, (2) Zero Major Accident (e.g. zero major hydrocarbon leak, vehicle accident, ship collision), and (3) Zero Spill or External Complaint (e.g. zero complaint by authorities/ communities/ sea users).

To accomplish this, PTTEP Myanmar Asset implements Safety, Security, Health and Environmental Management System (SSHE-MS) that outlines the main principles and accountabilities to drive for continuous improvement. We are committed to:

- Comply with Myanmar SSHE laws, other applicable requirements and PTTEP Standards.
- Perform hazard identification and SSHE risk assessments so that risks are As Low As Reasonably Practicable (ALARP).
- Hold employees accountable for SSHE performance by setting and monitoring SSHE Plans and KPIs.
- Prevent operational and process incidents by implementing asset integrity programs and monitoring of Safety Critical Elements addressed in Safety Cases and complying with Management of Change (MOC) Standard.
- Work with contractors and suppliers to achieve PTTEP's SSHE requirement.
- Ensure all employees and contractors are assessed and maintain the required level of job and SSHE competency.
- Apply "Stop Work Authority Policy" for unsafe work by implementing Behavior-Based Safety (BBS) programs to improve positive SSHE culture.
- Implement security management for potential threats to safeguard personnel, assets, information and reputation.
- Promote occupational health and hygiene in the workplace by conducting health risk assessments, medical
- Surveillances, education and regular industrial hygiene monitoring.
- Prevent environmental impacts by strictly following the mitigation measures stated in Environmental Impact Assessment.

- Promote sustainable development by implementing waste management, greenhouse gas reduction and energy efficiency programs.
- Report, investigate and analyse SSHE incidents to prevent recurrence and close out corrective actions with evidence.
- Ensure that emergency and crisis management plans are proactive and effective.
- Ensure policy and SSHE Management System compliance through regular SSHE audits and Senior Management visits with corrective actions follow up for continuous improvement.

Strong leadership and commitment is a key successful implementation of this policy which is required from PTTEP employees and contractors at all levels.

1.7.3 SSHE Management System Manual

PTTEP SA's SSHE Management System Manual objective is to serve as practical interpretation of Company SSHE policy with respect to their moral obligations for SSHE issues for all persons working on, visiting or affected by operations at sites for which PTTEP SA has responsibility.

The manual covers details on the are as specified in Table 1-5. The document is designed to serve as a comprehensive guide for all Operational Assets to develop its own SSHE management system and related documents. This document also provides an overview of SSHE management system approach.

It should be noted that PTTEP SA currently does not have its own internal SSHE policies, however PTTEP International Limited (PTTEPI) Myanmar Asset policies will be applied. For this project, PTTEP SA will adopt all of PTTEPI's relevant SSHE policies and procedures. Throughout this chapter, SSHE policies, procedures and documents was referred to as belonging to PTTEP SA, however they actually belong to PTTEPI and are being adopted by PTTEP SA for this project. The detail Plan and Procedure have been submitted at EIA report.

Table 1-5 PTTEPI SSHE Management System

Document Code	Document
Myanmar-0550-STD-014	SSHE Regulatory Compliance Standard
11027-PDR-SSHE-505_37-R01	Myanmar Asset Land Transport Safety Procedure
11027-PDR-SSHE-503/01-R02	Myanmar Asset Waste Management Procedure
11027-PDR-SSHE-502-006-R00	Myanmar Asset Emergency Management Plan
11027-PDR-SSHE-501-005-R00	Myanmar Asset Crisis Management Plan
11027-PDR-SSHE-564-002-R00	Myanmar Asset Alcohol and Drugs Testing Procedure
11027-PDR-SSHE-530-004-R00	Myanmar Asset Security Management Procedure
11027-PDR-SSHE-501/03-R02	Myanmar Asset Spill Contingency Plan
Myanmar-SSHE-11027-PDR-508	Fitness to Work Procedure
Myanmar-0550-MNL-004	Land Campaign Blowout Contingency Plan
11027-PDR-SSHE-501-005-R00	Myanmar Asset Crisis Management Plan
11027-PDR-SSHE-340-003-R01	SSHE Training and Competency Procedure
Myanmar 13036-PDR-078	PTTEPI SSHE Requirements for Contractors
11027-PDR-SSHE-501-007-R02	MOGE-3 Operations Medical Emergency Response Plan (MERP)

1.8 Environmental Impact Monitoring and Mitigation Measure Implementation Compliance

Environmental Mitigation Measures Implementation Compliance audit result, Environmental Impact Monitoring result and Environmental Mitigation Measures Compliance Audit and Environmental Impact Monitoring conclusion as shown in Chapter 2, Chapter 3 and Chapter 4, respectively.

Chapter 2
Environmental Mitigation Measures
Implementation Compliance Audit

Chapter 2

Environmental Mitigation Measures Implementation Compliance Audit

Environmental Mitigation Measures Implementation Compliance audit was carried out by REM-UAE Laboratory and Consultant Company Limited together with representatives from PTTEP SA. The auditor team experience is summarized in Table 2-1.

Table 2-1 Auditor Team Experience

Name	Position	Education	Experience
1. Mr Nopparat Wonganurakchai	Environmental (audit team leader)	<ul style="list-style-type: none"> B.Sc. (Environmental Science), Silapakorn University M.Sc. (Environmental Science), Burapha University 	20 years experience in field of Oil and Gas, Petrochemical industry, pipeline and etc.
2. Mr Nattakarn Ployvilert	Environmental	<ul style="list-style-type: none"> B.Sc. (Environmental Science), Chandrakasem Rajabhat University 	1 year experience in field of Oil and Gas.

The audit conducted against the mitigation measures specified in EIA as detailed in Appendix B.

Audit was performed at Moenatkone, Ngabatkya, Padaukpin and Sakangyi during October 20- 21, 2018 in construction and installation phase (Figure 2-1) and document checking by setting 4 levels of evaluation as follows;

- Completely complied on the Mitigation Measures (✓) refers the project can completely comply with the measure without any barriers.
- Mostly complied on the Mitigation Measures (✓) refers the project can mostly comply with the measure without any barriers.
- Do not complied on the Mitigation Measures (✗) refers the project cannot comply with the measure because of some barriers.
- Do not have situation follows the Mitigation Measures (NA) refers during the project operations do not have any of situation follow the Mitigation Measures



In case found that the project does not comply with the mitigation measures, REM-UAE Laboratory and Consultant Company Limited will identify the cause of problems, barriers and solutions ways. The details are shown in Table 2-2 to Table 2-4 and conclusion as below;

- The results determined that the project completely complied on the general mitigation Measures Implementation Compliance with 87.5% and 12.5% do not have situation follows the Mitigation Measures (NA).
- The results determined that the project completely complied on the environmental mitigation measures implementation compliance in Construction and Installation Phase with 97.7% and 2.3% do not have situation follows the Mitigation Measures (NA).
- The results determined that the project completely complied on the environmental mitigation measures implementation compliance in unplanned event with 72.1% and 27.9% do not have situation follows the Mitigation Measures (NA).

Table 2-2 General Mitigation Measures Implementation Compliance Result Summary

Mitigation Measures	Status	Details	Remarks
General Measures			
1. Mitigation and monitoring measures set forth in this document must be incorporated into contractual agreements for all contractors, including: design, construction, and operation in order to obtain practical and effective execution of the project.	✓	PTTEP SA concerns the safety, security, health and environment of the employees and wellbeing of the environment. The company addresses this regulation to the contract employees and contractor to comply with the requirements; the mitigation must be followed with the Company's SSHE Policy.	Appendix E-1
2. Report compliance with these mitigation and monitoring measures to MOGE in congruence with schedule.	✓	PTTEP SA compiled these mitigation and monitoring measures strictly and monitoring report of the project will submit to MOGE and ECD at the end of the year in order to inform all activities. This monitoring report as the first report for Myanmar Onshore Block MOGE- 3 Exploration Drilling Campaign (Construction and Installation Phase) in 2018 that was sent to MOGE and ECD as specified in the mitigation measure.	-
3. Provide stakeholder relation plans to explain about the project when needed for communication of construction and drilling activities.	✓	The letter was sent to local government about the activities of project such as date on activity, transportation of equipment, transportation route and security compliance. Moreover, PTTEP SA had two times of public consultation with stakeholder already. Another plan of public consultation with stakeholder will conduct if needed. PTTEP SA will refer to the grievance mechanism if there is any compliance from stakeholder and community.	Appendix F-1 and F-3
4. Operator must set up a contact point to receive any complaints from the stakeholder regarding its exploration activities. Further, the Operator must provide assistance and rectify the cause of such complaints as determined appropriate, as soon as possible.	✓	PTTEP SA provided grievance handling guideline to receive any complaints from the stakeholder and resolve the complaint in the immediate.	Appendix F-1

Table 2-2 General Mitigation Measures Implementation Compliance Result Summary

Mitigation Measures	Status	Details	Remarks
5. If impacts and/ or damages result from project activities, the Operator must implement all necessary measures to mitigate these impacts and/ or damages as soon as possible.	✓	PTTEP SA provided grievance handling guideline to receive any complaints from the stakeholder and resolve the complaint in the immediate. And there was no complaint from previous activity in 2018.	Appendix F-1
6. MOGE will investigate complaints lodged by people living in the surrounding area concerning any disturbance by project activities, or any damage of public infrastructure resulting from project operations. The Operator will inform the public within 30 days if the investigation proves that the Operator did not comply with mitigation and monitoring measures.	✓	PTTEP SA provided grievance handling guideline to handle any complaints from the stakeholder and resolve the complaint in the immediate. And there was no complaint from previous activity in 2018.	Appendix F-1
7. During the project period, if archaeological finds or fossils are encountered in the project area, the project team must immediately report the findings to the appropriate government office, e.g. District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum. In addition, the project team must cooperate with the government agencies in an effort to verify the findings in the project area. If it is proven that these findings are archaeological finds or fossils, the Operator must follow the regulations strictly.	NA	If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the well site. However, there was no encountered any objects, fossils or archaeological from previous activity in 2018.	-
8. The Operator will start operations only when the Operator has received the necessary approval, permit or agreement from the landowner or responsible agency. Moreover, the Operator will improve or construct access roads when approved by the authorized local government agencies and/ or landowner. All activities will operate under the control of MOGE.	✓	All private land was permitted by land owners or authorized persons prior to start any activity. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
Physical Environmental Impact Assessment						
1. Topography	1.1 Well Site and Camp Construction	1.1.1 Disturbance to local topography	1.1.1.1 Limit construction activities to well sites and access roads only.	✓	PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security Health and Environment Management System (SSHE- MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1 and E-4
2. Air Quality	2.1 Well Site and Camp Construction	2.1.1 Deterioration of air quality due to dust.	2.1.1.1 Minimize land clearance to a minimum especially during the dry season.	✓	PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security Health and Environment Management System (SSHE- MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1 and E-4
			2.1.1.2 Limit vehicle speed on access road and site.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation of speed limitation 20 km/hr inside operation site and 50 km/hr along the access road. The speed limitation signs should provide along access road. However, speed limitation was communicated to all worker in daily tool box talk before working by the header of contractor/safety officer.	Appendix D

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			2.1.1.3 Cover trucks transporting materials with tarpaulins or plastic to prevent any loose material from blowing away and to prevent dust dispersion.	✓	The truck was covered during transport material to the well site. And almost of truck was used for transport material within well site. Moreover, the contractor had provided staffs for cleaning during transportation.	-
			2.1.1.4 Spray water on roads when needed to keep dust down.	✓	The contractor provided water spraying within the well site and along the access road 3 times per day and increase the frequency to suitable the weather.	Figure 2-2
			2.1.1.5 Clean tires of the vehicles before leaving site if needed.	✓	No needed to clean tires of the vehicles before leaving site due to the access road as the laterite road and there were a few houses of community around the well site. However, the contractor provided water spraying within the well site and along the access road to minimize impact of dust dispersion from transportation.	Figure 2-2
			2.1.1.6 Provide personal protective equipment to exposed field workers.	✓	The contractor provided PPE sufficiently for all workers and controlled to use PPE during working.	Figure 2-3
			2.1.1.7 Use vehicles with dust flaps.	✓	Vehicle of the project used dust flap.	Figure 2-4

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
	2.2 Equipment use during Site and Road Construction	2.2.1. Deterioration of air quality due to vehicles emissions.	2.2.1.1 Ensure all machinery and vehicles are properly checked and inspected	✓	PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.	Appendix E-3
	2.3 Equipment use during Site and Road Construction	2.3.1 GHG Release contributing to climate change	2.3.1.1 Turn off all vehicles and equipment when not in use as well as prohibit vehicles from idling.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation. Moreover, training program in defensive driving was provided for contractor.	Appendix D and E-4
3. Noise	3.1 Use of machines/engines during construction and transportation	3.1.1 Increase in noise levels from machines/engines	3.1.1.1 Minimize vehicles and rig transportation from sensitive environmental areas.	✓	The contractor conducted the transportation to minimize impact from sensitive environmental areas.	-
			3.1.1.2 Minimize construction activities and Vehicle/ rig movements in night time.	✓	The contractor operated the construction work only during daytime from 7.00 - 18.00 hr.	Appendix E-5
			3.1.1.3 Limit vegetation removal to a minimum.	✓	PTTEP SA controlled contractors to carry out clearing and tree cutting activities as necessary.	-
			3.1.1.4 Turn equipment off when not in use.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation. Moreover, training program in defensive driving was provided for contractor.	Appendix D and E-4
			3.1.1.5 Use enclosures when possible to contain noise on site.	✓	No need to use noise barrier due to construction area far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. And PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.	Figure 2-5 and Appendix E-3

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			3.1.1.6 Implement transportation plan to avoid traffic issue that make noise pollution.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow its requirements. Moreover, the contractor provided journey management plan and journey management record.	Appendix D
			3.1.1.7 Materials should be lowered when practical and not dropped while transferring.	✓	The truck was covered and tightened equipment during transportation to the well site. And PTTEP SA enjoined the contractor to follow regulation of speed limitation. Moreover, the contractor had provided staffs for cleaning during transportation.	-
4. Surface Water Hydrology	4.1 Construction of roads and well / camp sites	4.1.1 Alteration of surface water hydrology	4.1.1.1 Avoid construction of well sites in areas that may cause obstacles to water drainage.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-
			4.1.1.2 Construct water drainage lines (culverts/ causeway) to maintain natural drainage. The required permission will be obtained from MOGE and all relevant agencies.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
5. Surface Water Quality	5.1 Construction of roads and well / camp sites and site runoff and drainage	5.1.1 Degradation of surface water quality from runoff/drainage	5.1.1.1 The proposed drill site and campsite will be orientated and designed to minimize areas requiring soil stabilization.	✓	PTTEP SA designed layout of the well site, the access road and campsite before starting the construction to minimize areas requiring soil stabilization.	Appendix G
			5.1.1.2 Provide drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil.	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil.	Figure 2-6
			5.1.1.3 Provide drainage and sediment traps around project area to reduce suspended particles in runoff from the well site and to contain minor oil spills.	✓	Water drainage ditch around the well site was constructed as specify in the measure.	Figure 2-7
			5.1.1.4 Avoid construction of the well pad in areas where such construction obstructs water drainage.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			5.1.1.5 Prohibit workers from cleaning machines/equipment in/near a water source.	✓	PTTEP SA encourage staffs and contractors not to use and discharging of water to nearby water source. Moreover, PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			5.1.1.6 Prohibit workers and contractors discharging or discarding project waste, chemicals, and oil into public water sources.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			5.1.1.7 Provide a suitable storage area for construction materials (such as soil, sand, and stone), chemicals (i.e., paint and thinner), and oil (i.e., fuel and lubricating oil).	✓	The contractor provided storage area for construction materials, chemical and oil within well site.	Figure 2-9

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
6. Soil quality	6.1 Construction of roads and well / camp sites	6.1.1 Degradation of soil quality through compaction or erosion during construction.	6.1.1.1 Limit soil compaction only to well sites and access roads.	✓	PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security, Health and Environment Management System (SSHE- MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1 and E-4
			6.1.1.2 Exposed site areas should be kept to a minimum during construction.	✓	PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security, Health and Environment Management System (SSHE- MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1 and E-4
			6.1.1.3 Provide effective construction site run-off control and design.	✓	Water drainage ditch around the well site was constructed to control water run-off.	Figure 2-7
Ecological Environmental Impact Assessment						
7. Flora and Fauna	7.1 Site Clearing for Construction of roads and well / camp sites	7.1.1 Degradation or destruction of natural habitat	7.1.1.1 High valued habitat to be avoided where practicable in the design process.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			7.1.1.2 Remove vegetation in project areas only (roads, camp site, well site).	✓	PTTEP SA controlled contractors to carry out clearing and tree cutting as necessary. And well site was constructed as specify in layout of well site.	Figure 2-8 and Appendix G-1

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
	7.2 Construction of roads and well / camp sites	7.2.1 Habitat degradation from construction	7.1.1.3 Mark well sites clearly and prohibit vehicles from moving off site onto surrounding land.	✓	Fence was installed around the well site to separate the project area and nearby area. The security guard was assigned 24 hr. to check unauthorized people and vehicles coming into wellsites.	Figure 2-10, Figure 2-11 and Figure 2-12
			7.2.1.1 Minimize noisy construction work during daytime hours only.	✓	The contractor conducted the construction only during daytime from 7.00 - 18.00 hr.	Appendix E-5
			7.2.1.2 Limit vegetation removal to a minimum.	✓	PTTEP SA controlled contractors to carry out clearing and tree cutting as necessary. And well site was constructed as specify in layout of well site.	Figure 2-8 and Appendix G-1
			7.2.1.3 Limit to cut the tree only in well site and access road.	✓	PTTEP SA controlled contractors to carry out clearing and tree cutting as necessary. And well site was constructed as specify in layout of well site.	Figure 2-8 and Appendix G-1
			7.2.1.4 Contractors and personnel will not be allowed off site where they could cause unnecessary disturbance to vegetation or wildlife.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			7.2.1.5 Hunting and trapping will be specifically prohibited.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
	7.3 Site Runoff and Drainage	7.3.1 Habitat degradation of aquatic biota	7.3.1.1 Avoid the construction of the well pads in areas where such construction obstructs a water route.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-
			7.3.1.2 Mark well sites clearly and prohibit vehicles from moving off site onto surrounding land.	✓	Fence was installed around the well site to separate the project area and nearby area. The security guard was assigned 24 hr. to check unauthorized people and vehicles coming into wellsites.	Figure 2-10, Figure 2-11 and Figure 2-12
			7.3.1.3 Contractors and personnel will not be allowed off site where they could cause unnecessary disturbance to aquatic biota. In addition, fishing will be specifically prohibited.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			7.3.1.4 Provide a suitable storage area for construction materials (such as soil, sand, and stone), chemicals (i.e., paint and thinner), and oil (i.e., fuel and lubricating oil).	✓	The contractor provided storage area for construction materials, chemical and oil within well site.	Figure 2-9

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			7.3.1.5 Provide drip pans and absorbents at fuel storage area to contain any spillage.	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil.	Figure 2-6
			7.3.1.6 Strictly implement and follow mitigation measures for impacts to soil and surface water hydrology and quality.	✓	PTTEP SA strictly implement and follow mitigation measures for impacts to soil and surface water hydrology and quality as shown in content 4, and 6.	-
Social Impact Assessment						
8. Land Use	8.1 Purchase of land access road/well pad and camp site	8.1.1 Change of traditional use.	8.1.1.1 Transparent and fair compensation to land owners and users	✓	Purchase of land access road/well pad and camp site were transparented and faired compensation by the MOGE.	Appendix F-4
			8.1.1.2 Ensure all permissions are obtained from landowners and local authorities.	✓	All private land was permitted by land owners or authorized persons prior to start any activity. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision.	Appendix F-4
			8.1.1.3 Notify surrounding landowners before on location and time of project activities.	✓	PTTEP SA informed lead of community by letter about transportation of equipments, transportation route, time of project activities including safety plan before project start.	-
			8.1.1.4 Hand back the land with agreed condition after project completion.	✓	No hand back the land after project completion due to land access road/well pad and camp site was purchased by government of Myanmar.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
9. Transport	9.1 Construction Activities	9.1.1 Damage to roads	9.1.1.1 Check and restore for any damage from project activities to local roads.	✓	The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe to user.	Figure 2-13
10. Water Use	10.1 Use of water public utility for construction and domestic use	10.1.1 Compete for water use of communities	10.1.1.1 Inform authority for drilling a ground water well.	✓	PTTEP SA was follow procedure of well drilling for groundwater.	-
			10.1.1.2 PTTEP SA to drill their own ground water wells on site.	✓	Groundwater well is drilling within Padaukpin well site.	-
			10.1.1.3 Potable water and industrial water, if taken by tube wells or tanker from nearby reservoirs/rivers, should not affect the availability of water to locals.	✓	The contractor has own water source for using in project area which not be affect to water used of community.	-
11. Drainage and Flooding	11.1 Surface runoff from roads, site and camp site	11.1.1 Increase runoff and change local drainage patterns	11.1.1.1 Obtain approval from MOGE and appropriate government offices before constructing, upgrading or reroute access roads.	✓	Purchase of land access road/well pad and camp site were transparented and faired compensation by the MOGE. And the letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3 and F-4

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			11.1.1.2 Follow civil engineer's recommendation on well site and access road construction design.	✓	The civil engineer of PTTEP SA has responsibility to control contractor throughout the construction period.	-
			11.1.1.3 Avoid construction of well sites in areas that may cause obstacles to water drainage.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-
			11.1.1.4 Water drainage lines (culverts /causeway) will be constructed to maintain natural drainage. The required permission will be obtained from all relevant agencies.	✓	PTTEP SA avoided to construction of well site that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.	-
12. Waste Management	12.1 Non Hazardous waste management	12.1.1 Domestic waste result in windblown litter, attract vermin and be a vector for disease	12.1.1.1 A PTTEP SA Waste Management Plan for this drilling campaign will be developed.	✓	PTTEP SA developed waste management plan and controlled the contractor to implement. The local government of Thayet township municipal was the responsible agency for managing waste to disposal.	Appendix C

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			12.1.1.2 Store hazardous waste in appropriately designed areas and safe containers that are suitable for transporting/transferring.	✓	PTTEP SA developed waste management plan and controlled the contractor to implement.	Figure 2-14 and Appendix C
			12.1.1.3 Ensure treatment and disposal according to accepted international standard.	✓	PTTEP SA developed waste management plan and controlled the contractor to implement.	Appendix C
			12.1.1.4 Enforce "Good Housekeeping" practices.	✓	The contractor provided storage area for construction material and PTTEP SA strictly enforced good housekeeping practices within well site and surrounding for all workers.	Figure 2-9
			12.1.1.5 Domestic and general waste to be segregated and stored using suitability labeled.	✓	PTTEP SA developed waste management plan and controlled the contractor to implement. Separate waste containers were provided within well site.	Figure 2-14 And Appendix C
			12.1.1.6 Dispose of waste in labelled containers for possible recycling	✓	PTTEP SA developed waste management plan and controlled the contractor to implement. Separate waste containers were provided within well site.	Figure 2-14 And Appendix C
			12.1.1.7 Implement requirements for waste management and related laws	✓	PTTEP SA developed waste management plan and controlled the contractor to implement.	Appendix C

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
13. Socio-Economy			12.1.1.8 Install septic tanks and soak away pit for holding sewage.	✓	Toilet with septic tank was provided sufficiently for all staffs in order to treat wastewater before release to environment.	Figure 2-15
			12.1.1.9 Non-hazardous wastes will be taken to an approved waste site	✓	PTTEP SA developed waste management plan and controlled the contractor to implement.	Appendix C
	13.1 Services Supply for Construction Activities	13.1.1 Employment/income and procurement opportunities for people, business and services in surrounding area	13.1.1.1 Employ qualified local workers.	✓	The contractor hired temporary workers in local area, according to the job description.	Appendix F-2
			13.1.1.2 Purchase local supplies and services, whenever possible.	✓	The contractor purchased goods/consumers in local area.	-
			13.1.1.3 Terms of contract for recruitment of manpower in these project needs to include emphasis on hiring locals, especially for unskilled and semi-skilled workforce.	✓	The contractor hired temporary workers in local area, according to the job description.	Appendix F-2
	13.2 In-migration of labour and social interaction	13.2.1 Potential conflict between workers from other regions and local communities	13.2.1.1 Restrict workers to within project boundaries and do not allow local interaction within the communities.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
Cultural Impact Assessment						
14. Historical, Archaeological and Cultural Resources	14.1 Construction of access road/well pad and camp site	14.1.1 Archaeological/ fossil finds within project area.	14.1.1.1 Watch for artefacts during site construction and inform the Local Authorities before commencement of drilling.	✓	Currently, there was no drilling activity. So, information to the local authorities before commencement of drilling was not implemented. However, the letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3
			14.1.1.2 Report to the Thayet GAD if any archaeological evidence is discovered at the well sites or access roads. Through consultation, a plan to proceed will be developed	NA	If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the well site.	-
			14.1.1.3 If artefacts are found during the construction phase, PTTEP SA will inform the responsible local office immediately.	NA	If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the well site.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			14.1.1.4 Consult with local authorities to identify culturally important festivals and plan transportation, construction and drilling activities to avoid impact.	✓	The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3
Visual Impact Assessment						
15. Tourism and Recreational experience	15.1 Well Site, Road and Camp Construction	15.1.1 Disturbance and reduction of tourism and recreational experience	15.1.1.1 Post and enforce speed limit	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation of speed limitation 20 km/hr inside operation site and 50 km/hr along the access road. The speed limitation signs should provide along access road. However, speed limitation was communicated to all worker in daily tool box talk before working by the header of contractor/safety officer.	Appendix D
			15.1.1.2 Consult with local authority before major movement.	✓	The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			15.1.1.3 Notify the local authority on the oversized load and put an escort in front of this convoy with horn and hazard lights.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time.	Appendix D
			15.1.1.4 Restrict/ avoid movement of heavy equipment during rush hours.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time.	Appendix D
			15.1.1.5 Provide traffic signs or flags at junction of access roads and main roads.	✓	The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation.	Figure 2-16 and Figure 2-17
			15.1.1.6 Investigate any complaints and handle appropriately. Keep records of complaints and follow-up.	✓	PTTEP SA provided grievance handling guideline to receive any complaints from the stakeholder and resolve the complaint in the immediate. And there was no complaint from previous activity in 2018.	Appendix F-1
			15.1.1.7 Obtain approval from MOGE and/or appropriate government offices before constructing, upgrading or reroute access roads.	✓	The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			15.1.1.8 Strictly enforce training programs to reduce transport incident cases by its contractors.	✓	Training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-4
			15.1.1.9 Restore any damage to roads if caused by contractor or company.	✓	The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe to user.	Figure 2-13
			15.1.1.10 Restrict local traffic in well site area.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time.	Appendix D
			15.1.1.11 When project complete, hand back the land with agreed conditions.	✓	No hand back the land after project completion due to land access road/well pad and camp site was purchased by government of Myanmar.	-
Health Impact Assessment						
16. Public and Occupational Health	16.1 Well Site, Road and Camp Construction	16.1.1 Respiratory irritation and Exacerbation of asthma impact from dust	16.1.1.1 Implement construction and installation phase mitigation measures in 2.1.	✓	PTTEP SA strictly implement and follow mitigation measures for impacts to air quality as shown in content 2.1.	-
	16.2 Vehicle and Equipment Use during construction	16.2.1 Hearing impairment for workers and annoyance for public.	16.2.1.1 Implement construction and installation phase mitigation measures in 3.1.	✓	PTTEP SA strictly implement and follow mitigation measures for impacts to noise level as shown in content 3.1.	-

Table 2-3 Environmental Mitigation Measures Implementation Compliance Result Summary in Construction and Installation Phase

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			16.2.1.2 Provide PPE to workers on site.	✓	The contractor provided PPE sufficiently for all workers and controlled to use PPE during working.	Figure 2-3
			16.2.1.3 Should complaints over noise be received, consideration will be given to the provision of noise barriers.	✓	No need to use noise barrier due to construction area far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. And there was no complaint from previous activity in 2018.	Figure 2-5
	16.3 Non-Hazardous Waste Management	16.3.1 Food safety, Increase in vector-borne diseases: malaria, typhus and dengue and others.	16.3.1.1 Implement construction and installation phase mitigation measures in 12.1.	✓	PTTEP SA strictly implement and follow mitigation measures for waste management as shown in content 12.1.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
1. Blowout	1.1 Drilling	1.1.1 Release of uncontrolled volumes of hydrocarbons, Fire and Explosion	1.1.1.1 Examination of existing wells to identify shallow gas hazards.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.2 Drilling and Well Control Standard Operating Procedures and extensive SSHE Management System procedures and operational controls in place.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.3 Internal hazardous operations reviews and "Table Top Drilling" exercises to test procedures and individual personnel performances against the drilling plan.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.4 Select proper drill fluid formulation, provide well kill fluids/systems, loss control and weighting agents.	NA	Currently, there was no drilling activity. However, if there is drilling activity, the project will conduct as specify in the measure.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			1.1.1.5 Very careful monitoring of down hole conditions and mud returns.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.6 Use of appropriate, high quality materials in well construction (casing and cement grades).	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.7 Provide a blowout preventer (BOP) stack that is sized appropriately in proportion to the maximum formation pressure; and test as per procedures.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.8 Follow PTTEP SA's Emergency Response Plan and Blow Out Contingency Plan	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			1.1.1.9 PTTEP SA's SSHE Integrated Management System Procedures and operational controls will be in place to prevent a blowout/explosion.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
2. Fire or Explosion (not associated with Blowout)	2.1 Fuel Storage and Ignition Sources	2.1.1 Possible explosion or fire of drilling rig or at campsite, or fuel storage area	2.1.1.1 PTTEP SA's SSHE Integrated Management System Procedures and operational controls to prevent a fire/explosion.	✓	Training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-2 and E-4
			2.1.1.2 PTTEP SA's Emergency Response Plan including specific management procedures to mitigate the impacts if a fire/explosion occurs.	✓	Training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-2 and E-4
			2.1.1.3 Install fire extinguishers, alarms and windsocks (to be audible and visible from whole site).	✓	Fire extinguishers were provided within well site including inspection once a month. Moreover, the assembly point, an emergency respond procedure and firefighting training were provided.	Figure 2-18, Figure 2-19, Figure 2-20, Appendix E-2 and E-4
			2.1.1.4 Pre- arranged call out support from local fire brigades	✓	Emergency respond procedure and firefighting training were provided to respond fire/explosion case. Moreover, the contractor cooperated with local fire brigades to support fire/ explosion case.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
3. Fuel, Chemical or Hazardous Waste/Materials Spill	3.1 Storage of Fuel, chemicals, hazardous materials or waste	3.1.1 Potential risk of spills to the environment affecting air quality, soil quality, surface water, groundwater, biota and people	3.1.1.1 Chemicals, Hydrocarbons and hazardous materials or waste will be securely stored and use governed by safe operating procedures.	✓	PTTEP SA developed waste management plan and controlled the contractor to implement. Separate waste containers were provided within well site.	Figure 2-14 And Appendix C
			3.1.1.2 Spill containment and recovery equipment will be available near storage areas.	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. However, spill contingency plan and training were provided.	Figure 2-6 and Appendix E-6
			3.1.1.3 Procedures for response to Chemicals, Hydrocarbons and hazardous materials or waste spills will be included in PTTEP SA's ERP and Spill Contingency Plan.	✓	Spill contingency plan was provided. Training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1, E-2, E-4 and E-6
			3.1.1.4 SDS Sheets will be posted in areas where Chemicals, Hydrocarbons and hazardous materials or waste is stored and with the SSHE Officer.	NA	SDS Sheet was not provided within well site, due to no chemical used in construction and installation phase. However, if there is chemical used in any operation such as drilling, well testing and production phase, the project will conduct as specify in the measure.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			3.1.1.5 Construct drainage system around well sites and concrete rig pad which mud tanks, shakers, generators and fuel tanks sit on to divert any spills into the concrete pit.	✓	The contractor is constructing drainage system and concrete rig pad in construction and installation phase to support this measure.	-
			3.1.1.6 Use oil catch pans under vehicles when performing maintenance. Conduct maintenance only on impervious floor (e.g. tarpaulin sheet).	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil.	Figure 2-6
			3.1.1.7 Provide drip pans and absorbents to contain any spillage.	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil.	Figure 2-6
			3.1.1.8 Provide spill cleanup kits and training for designated rapid response teams to clean up any spills. In the event of oil or chemical spill, implement ERP.	✓	The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. However, Emergency respond procedure and training were provided.	Figure 2-6 and Appendix E-2
			3.1.1.9 Prohibit workers from cleaning machines/equipment in/near a public water source.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			3.1.1.10 Prohibit workers and contractors discharging or discarding project waste, chemicals, and oil into public water sources.	✓	PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.	Appendix E-4
			3.1.1.11 Maintain oil traps along perimeter drainage around concrete pad to prevent any spills from flowing off site.	✓	The contractor is constructing oil trap, drainage system and concrete rig pad in construction and installation phase. However, if construction complete and the project use them all in any operation such as drilling, well testing and production phase, the project will be maintenance as specify in the measure.	-
			3.1.1.12 Isolate any area(s) that might be contaminated from non-contaminated areas.	✓	PTTEP SA designed area proportionally. The non- contaminated area was compacted soil ground. For contaminated area which were drilling rig and cutting pit, the project paved with concrete and waterproofing membrane for cutting pit.	-
			3.1.1.13 Store Chemicals and hazardous materials on concrete pad.	NA	No chemical used in construction and installation phase. However, if there is chemical used in any operation such as drilling, well testing and production phase, the project will conduct as specify in the measure.	-

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			3.1.1.14 Procedures for response to chemical spills will be included in PTTEP SA's ERP.	✓	Training program on Safety, Security, Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1, E-2 and E-4
			3.1.1.15 Deposit treated cuttings into the cuttings pit, where they are to be temporarily held before bioremediation onsite after the rig move out from location or sent for disposal at approved waste management facility.	NA	Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.	-
			3.1.1.16 Implement transportation plan.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation. Moreover, the contractor provided journey management plan and journey management record.	Appendix D
4. Transportation Accidents	4.1 Vehicle and Equipment Use	4.1.1 Possible injury or death to personnel; and localized contamination of environment	4.1.1.1 Follow SSHE Integrated Management System Procedures.	✓	Training program on Safety, Security, Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1, E-2 and E-4

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			4.1.1.2 Limit the speed of project vehicles, according to the road condition.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation of speed limitation 20 km/hr inside operation site and 50 km/hr along the access road. The speed limitation signs should provide along access road. However, speed limitation was communicated to all worker in daily tool box talk before working by the header of contractor/safety officer.	Appendix D
			4.1.1.3 Maintain construction equipment and vehicles.	✓	PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.	Appendix E-3
			4.1.1.4 Notify the local authority on the oversized load and put an escort in front of this convoy with horn and hazard lights.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time.	Appendix D
			4.1.1.5 Consult with community leaders on plan and transportation route before movement of large equipment.	✓	The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, transportation route and security compliance before start.	Appendix F-3
			4.1.1.6 Restrict/ avoid movement of heavy equipment during rush hours.	✓	PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time.	Appendix D

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			4.1.1.7 Provide traffic signs or flags at junction of access road and main road.	✓	The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation.	Figure 2-16 and Figure 2-17
			4.1.1.8 Investigate any complaints and handle appropriately. Keep records of complaints and follow-up.	✓	PTTEP SA provided grievance handling guideline to receive any complaints from the stakeholder and resolve the complaint in the immediate.	Appendix F-1
			4.1.1.9 Strictly enforce training programs to reduce transport and drilling incidents by its contractors.	✓	Training program on Safety, Security, Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-4
			4.1.1.10 Restore any damage to roads caused by project vehicles.	✓	The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe to user.	Figure 2-13
			4.1.1.11 Implement emergency response training, fire training and response drills.	✓	Training program on Safety, Security, Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1, E-2 and E-4

Table 2-4 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Status	Details	Remarks
			4.1.1.12 Prohibit trespassers from entering the construction site.	✓	Fence was installed around the well site to separate the project area and nearby area. The security guard was assigned 24 hr. to check unauthorized people and vehicles coming into wellsites.	Figure 2-10, Figure 2-11 and Figure 2-12
			4.1.1.13 Referral system with external medical facilities for serious injuries or emergencies	✓	Emergency respond procedure, ambulance, medical personnel and training were provided to respond in emergency case. Moreover, the contractor cooperated with nearby hospital (eg. Thayet Township Hospital) to support in serious injuries or emergencies case.	Figure 2-21, Appendix E-1, E-2 and E-4
5. Earthquakes	5.1 Physical shifting of earths surface	5.1.1 Potential physical disruption cause building collapse, blowouts, fires or spills	5.1.1.1 Implement PTTEP SA' s Emergency Response Plan.	✓	Training program on Safety, Security, Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.	Appendix E-1, E-2 and E-4



Figure 2-2 Water Spray within construction area and the access road.



Figure 2-3 All worker used PPE during working.



Figure 2-4 Vehicle used dust flap.



Figure 2-5 Soundproof Generator



Figure 2-6 Drip pan and absorbent material.



Figure 2-7 Water drainage around the well site.



Figure 2-8 Limit to cut the tree only in wellsite.



Figure 2-9 Storage area of construction material.



Figure 2-10 Fence around Project area



Figure 2-11 Security guard of the project.



Figure 2-12 Prohibit unauthorized person.



Figure 2-13 Access road was in good condition.



Figure 2-14 Separate waste container



Figure 2-15 Toilet with septic tank



Figure 2-16 Example of Warning signs at the access road



Figure 2-17 Staffs for facilitate the traffic during transportation



Figure 2-18 Fire extinguisher was provided within wellsite



Figure 2-19 Inspection of fire extinguishers



Figure 2-20 Assembly point in front of well site



Figure 2-21 Ambulance and medical personnel were provided in emergency case.

Chapter 3
Environmental Monitoring Results

Chapter 3

Environmental Monitoring Results

Environmental monitoring was conducted as specified in EIA which the project has assigned REM-UAE Laboratory and Consultant Company Limited to performed the environmental monitoring. This chapter presents the environmental monitoring results of Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign during Construction and Installation Phase in 2018, the detail is presented as follow;

3.1 Environmental Monitoring Plan

Environmental monitoring for Myanmar Onshore Block MOGE- 3 Exploration Drilling Campaign during Construction and Installation Phase in 2018 is shown in Table 3-1.

Table 3-1 Environmental Monitoring Plan of Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign during Construction and Installation Phase

Environmental Quality	Parameter	Period/Frequency	Location	Implemented	
				Complied	Not complied
1. Air Quality	<ul style="list-style-type: none"> PM-10 PM-2.5 NO₂ SO₂ O₃ H₂S 	<p>Duration : 1 day continuously</p> <p>Frequency :</p> <ul style="list-style-type: none"> Once during construction and installation phase As within 1 km of a community regular monitoring will be required. In case of any complaint regarding air quality, an additional air quality measurement may be conducted in response to specific complaints (if necessary) 	<p>Nearest sensitive receptor or downwind of complaint area (if necessary)</p> <p><u>Padaukpin (PDP) and Sakangyi (SKG) well site :</u></p> <ul style="list-style-type: none"> - Padaukpin station (A1) <p><u>Moenatkone (MNK) well site :</u></p> <ul style="list-style-type: none"> - Moenatkone station (A2) <p><u>Ngabatkyia (NBK) well site :</u></p> <ul style="list-style-type: none"> - Ngabatkyia station (A3) 	<ul style="list-style-type: none"> Monitored by REM- UAE Laboratory and Consultant Co., Ltd. on October 20-22, 2018. The result as shown in Section 3.2. 	-
2. Noise	<ul style="list-style-type: none"> L_{Aeq} 24 hrs L_{Amax} L_{Adn} 	<p>Duration : 1 day continuously</p> <p>Frequency :</p> <ul style="list-style-type: none"> Once during construction and installation phase If within 1 km of a community regular monitoring will be required In case of a complaint regarding noise from project site, an additional noise measurement may be conducted (if necessary) 	<p>100 meter from Well Site Construction / Sensitive Receptor</p> <p><u>Padaukpin (PDP) and Sakangyi (SKG) well site :</u></p> <ul style="list-style-type: none"> - Padaukpin station (N1) <p><u>Moenatkone (MNK) well site :</u></p> <ul style="list-style-type: none"> - Monatkan station (N2) <p><u>Ngabatkyia (NBK) well site :</u></p> <ul style="list-style-type: none"> - Ngabatkyia station (N3) 	<ul style="list-style-type: none"> Monitored by REM- UAE Laboratory and Consultant Co., Ltd. on October 20-22, 2018. The result as shown in Section 3.3. 	-

Table 3-1 Environmental Monitoring Plan of Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign during Construction and Installation Phase

Environmental Quality	Parameter	Period/Frequency	Location	Implemented	
				Complied	Not complied
3. Social	<ul style="list-style-type: none"> Complaint Monitoring and solving 	<ul style="list-style-type: none"> Throughout construction and installation phase 	<ul style="list-style-type: none"> Project area, community around project area, and transportation route 	<ul style="list-style-type: none"> Monitored by PTTEP SA throughout construction and installation phase 2018. The result as shown in Section 3.4. 	-
4. Public and Occupational Health and Safety	<ul style="list-style-type: none"> Accidental statistics cause of accidents Mitigation measures 	<ul style="list-style-type: none"> Throughout construction and installation phase 	<ul style="list-style-type: none"> Project area, community around project area, and transportation route 	<ul style="list-style-type: none"> Monitored by PTTEP SA throughout construction and installation phase 2018. The result as shown in Section 3.5. 	-

3.2 Air Quality Monitoring

Air quality monitoring was conducted for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkya (NBK) well site in 2018 by REM-UAE Laboratory and Consultant Company Limited. The detail as shown in Table 3-2.

Table 3-2 Air Quality Monitoring Plan

Environmental Quality	Parameter	Location	Period
Air Quality	• PM-10	<u>Padaukpin (PDP) and Sakangyi (SKG) well site :</u>	October 20-21, 2018
	• PM-2.5	- Padaukpin station (A1)	
	• NO ₂	<u>Moenatkone (MNK) well site :</u>	
	• SO ₂	- Moenatkone station (A2)	October 21-22, 2018
	• O ₃	<u>Ngabatkya (NBK) well site :</u>	
	• H ₂ S	- Ngabatkya station (A3)	

3.2.1 Air Quality Monitoring Station

Air quality monitoring station as shown in Table 3-3 and Figure 3-1.

Table 3-3 Coordinate of Air Quality Monitoring Stations

Monitoring Station	Coordinates (UTM Datum WGS 84)		
	Zone	East (X)	North (Y)
Padaukpin (PDP) and Sakangyi (SKG) well site			
1. Padaukpin station (A1)	46N	718880	2144694
Moenatkone (MNK) well site			
1. Moenatkone station (A2)	46N	711576	2159310
Ngabatkya (NBK) well site			
1. Ngabatkya station (A3)	46N	709358	2148404

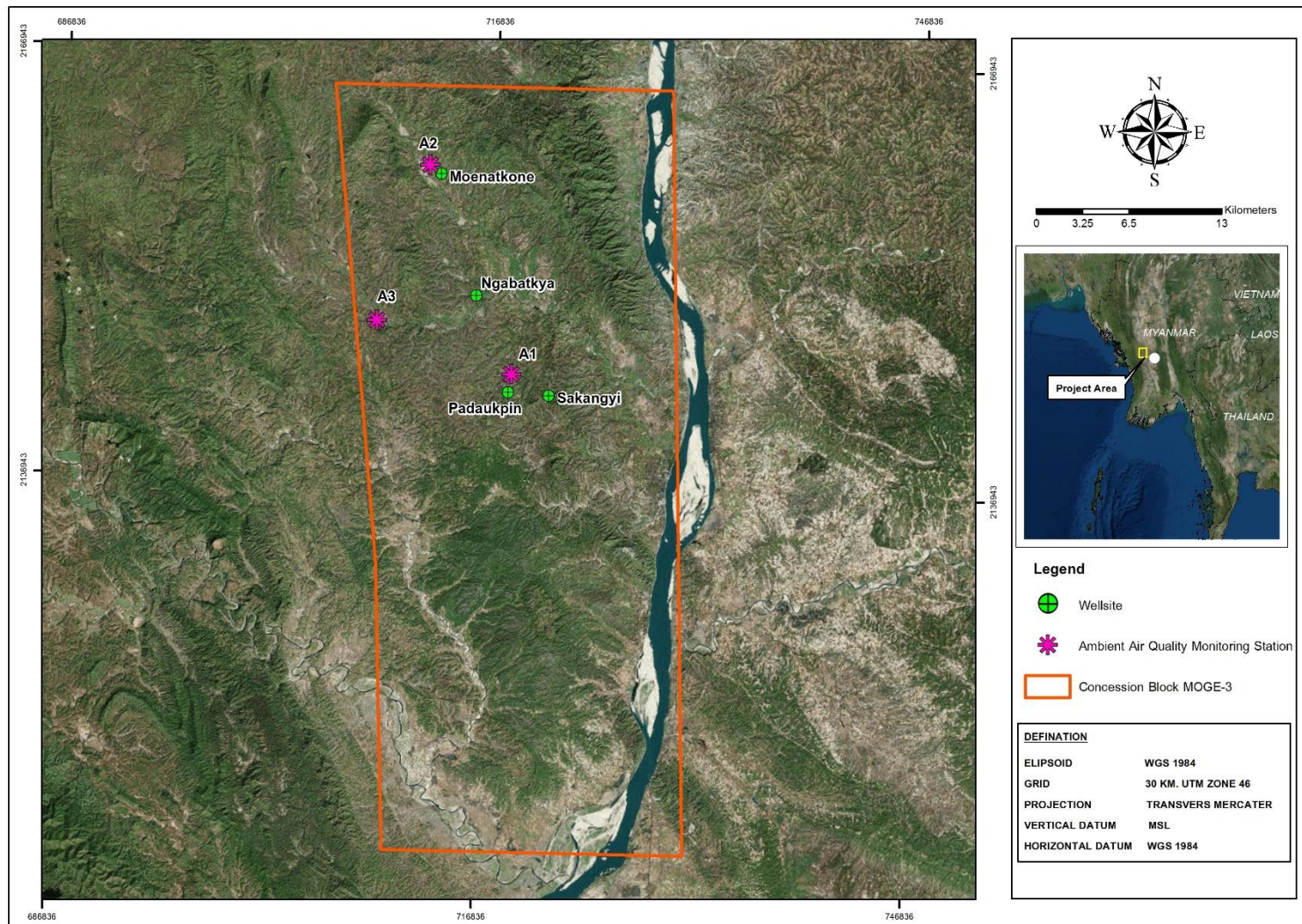


Figure 3-1 Air Quality Monitoring Station

3.2.2 Air Quality Monitoring Method

Sampling method, analysis method and standard methods of air quality are shown in Table 3-4.

Table 3-4 Sampling Method, Analysis Method and Standard Methods of Air Quality

Parameters	Sampling Method	Analysis Method	Standard Methods
1. Particulate matter Less than 10 μm (PM-10) Average 24 hr	High Volume PM-10 Air Sampler	Gravimetric Method	40 CFR-Chapter I-Part 50, Appendix J
2. Particulate matter Less than 2.5 μm (PM-2.5) Average 24 hr	High Volume PM-10 Air Sampler	Gravimetric Method	40 CFR-Chapter I-Part 50, Appendix J
3. Nitrogen Dioxide (NO_2) Average 1 hr	NO_2 Analyzer	Chemiluminescence Method	40 CFR-Chapter I-Part 50, Appendix F
4. Sulphur Dioxide (SO_2) Average 1 hr	SO_2 Analyzer	UV-Fluorescence Method	40 CFR-Chapter I-Part 50, Appendix A-1
5. Ozone (O_3)	O_3 Analyzer	Chemiluminescence Method	40 CFR-Chapter I-Part 50, Appendix D
6. H_2S	Low Volume Sampling	methylene blue method	APHA701

Air quality monitoring in 2018, for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG) and Moenatkone(MNK) well site were conducted during October 20-21, 2018 and Ngabatkyia (NBK) well site was conducted during October 21-22, 2018 as shown in Figure 3-2.



Padaukpin station (A1)



Moenatkone station (A2)

Figure 3-2 Air Quality Monitoring in construction and installation phase 2018



Ngabatkyia station (A3)

Figure 3-2 (Cont.) Air Quality Monitoring in construction and installation phase 2018

3.2.3 Air Quality Monitoring Results

Result of air quality monitoring in 2018 for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site as below.

Referring to analysis report number T18AG273-0001-T18AG273-0003, the results of average 24 hours PM_{10} , average 24 hours $PM_{2.5}$, average 1 hr Nitrogen Dioxide (NO_2), average 24 hrs Sulphur Dioxide (SO_2) and average 8 hrs Ozone (O_3) were complied with Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO Air quality guideline (2006) and amendment. However, average 24 hrs H_2S was not specified in the standard. Detail of the result as shown in Table 3-5.

The details of analysis report, certificate for laboratory instrument and approval registration certificate of laboratory are shown in Appendix H, I and J.

Table 3-5 Air Quality Monitoring Results

Parameter	Result ^{1/}			Standard ^{2/}	Standard ^{3/}	Unit
	Padaukpin station (A1)	Moenatkone station (A2)	Ngabatkyia station (A3)			
Date	Oct 20-21, 2018	Oct 20-21, 2018	Oct 21-22, 2018	-	-	-
1. Average 24 hours PM_{10}	34	24	25	50	50	$\mu g/m^3$
2. Average 24 hours $PM_{2.5}$	12	17	5	25	25	$\mu g/m^3$
3. Average 1 hour NO_2	5.3-11.3	2.8-9.4	4.7-8.8	200	200	$\mu g/m^3$
4. Average 24 hours SO_2	2.9	4.8	4.6	20	20	$\mu g/m^3$
5. Average 8 hours O_3	58.1-64.1	64.6-83.3	60.9-70.7	100	100	$\mu g/m^3$
6. Average 24 hours H_2S	<0.001	<0.001	<0.001	- ^{4/}	- ^{4/}	mg/m^3

Remark: ^{1/} Reference condition is 25 degree celsius at 1 atmosphere

^{2/} Myanmar National Environmental Quality (Emission) Guidelines (2015)

^{3/} WHO Air quality guideline (2006) and amendment

^{4/} Not specify in the standard

3.2.4 Comparison of Air Quality Monitoring

Comparison of air quality monitoring results between construction and installation phase and baseline in EIA which were monitored at 3 stations; Padaukpin station (A1), Moenatkone station (A2) and Ngabatkya station (A3) found that average 24 hours PM_{10} , average 24 hours $PM_{2.5}$, average 1 hr Nitrogen Dioxide (NO_2), average 24 hrs Sulphur Dioxide (SO_2) and average 24 hrs H_2S had trended to decrease while average 8 hrs Ozone (O_3) had trended to increase. However, all of the results are complied with Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO Air quality guideline (2006) and amendment. Nevertheless, average 24 hrs H_2S was not specified in the standard. Detail of the result as shown in Table 3-6.

Table 3-6 Comparison of Air Quality Monitoring Results

Monitoring Station	Date	Results					
		Average 24 hours PM ₁₀	Average 24 hours PM _{2.5}	Average 1 hour NO ₂	Average 24 hours SO ₂	Average 8 hours O ₃	Average 24 hours H ₂ S
1. Padaukpin station (A1)	Baseline (February 6-11, 2018) ^{1/}	68	54	12	57	30	0.013
	Construction and Installation Phase (October 20-21, 2018)	34	12	5.3-11.3	2.9	58.1-64.1	<0.001
2. Moenatkone station (A2)	Baseline (February 6-11, 2018) ^{1/}	109	90	24	44	27	0.019
	Construction and Installation Phase (October 20-21, 2018)	24	17	2.8-9.4	4.8	64.6-83.3	<0.001
3. Ngabatkya station (A3)	Baseline (February 6-11, 2018) ^{1/}	93	73	21	24	27	0.021
	Construction and Installation Phase (October 21-22, 2018)	25	5	4.7-8.8	4.6	60.9-70.7	<0.001
Standard ^{2/}		50	25	200	20	100	- ^{4/}
Standard ^{3/}		50	25	200	20	100	- ^{4/}
Unit		µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³

Remark: ^{1/} Baseline data received from EIA report for Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign

^{2/} Myanmar National Environmental Quality (Emission) Guidelines (2015)

^{3/} WHO Air quality guideline (2006) and amendment

^{4/} Not specify in the standard

3.3 Noise Level Monitoring

Noise level was conducted for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkya (NBK) well site in 2018 by REM-UAE Laboratory and Consultant Company Limited. The detail as shown in Table 3-7.

Table 3-7 Noise Level Monitoring Plan

Environmental Quality	Parameter	Location	Period
Noise level	<ul style="list-style-type: none"> L_{Aeq} 24 hrs L_{Amax} L_{Adn} 	<u>Padaukpin (PDP) and Sakangyi (SKG) well site :</u>	October 20-21, 2018
		- Padaukpin station (N1)	
		<u>Moenatkone (MNK) well site :</u>	October 21-22, 2018
		- Moenatkone station (N2)	
		<u>Ngabatkya (NBK) well site :</u>	October 21-22, 2018
		- Ngabatkya station (N3)	

3.3.1 Noise Level Monitoring Station

Noise level monitoring station as shown in Table 3-8 and Figure 3-3.

Table 3-8 Coordinate of Noise Level Monitoring Stations

Monitoring Station	Coordinates (UTM Datum WGS 84)		
	Zone	East (X)	North (Y)
Padaukpin (PDP) and Sakangyi (SKG) well site			
1. Padaukpin station (N1)	46N	718964	2144684
Moenatkone (MNK) well site			
1. Moenatkone station (N2)	46N	711581	2159354
Ngabatkya (NBK) well site			
1. Ngabatkya station (N3)	46N	709430	2148392

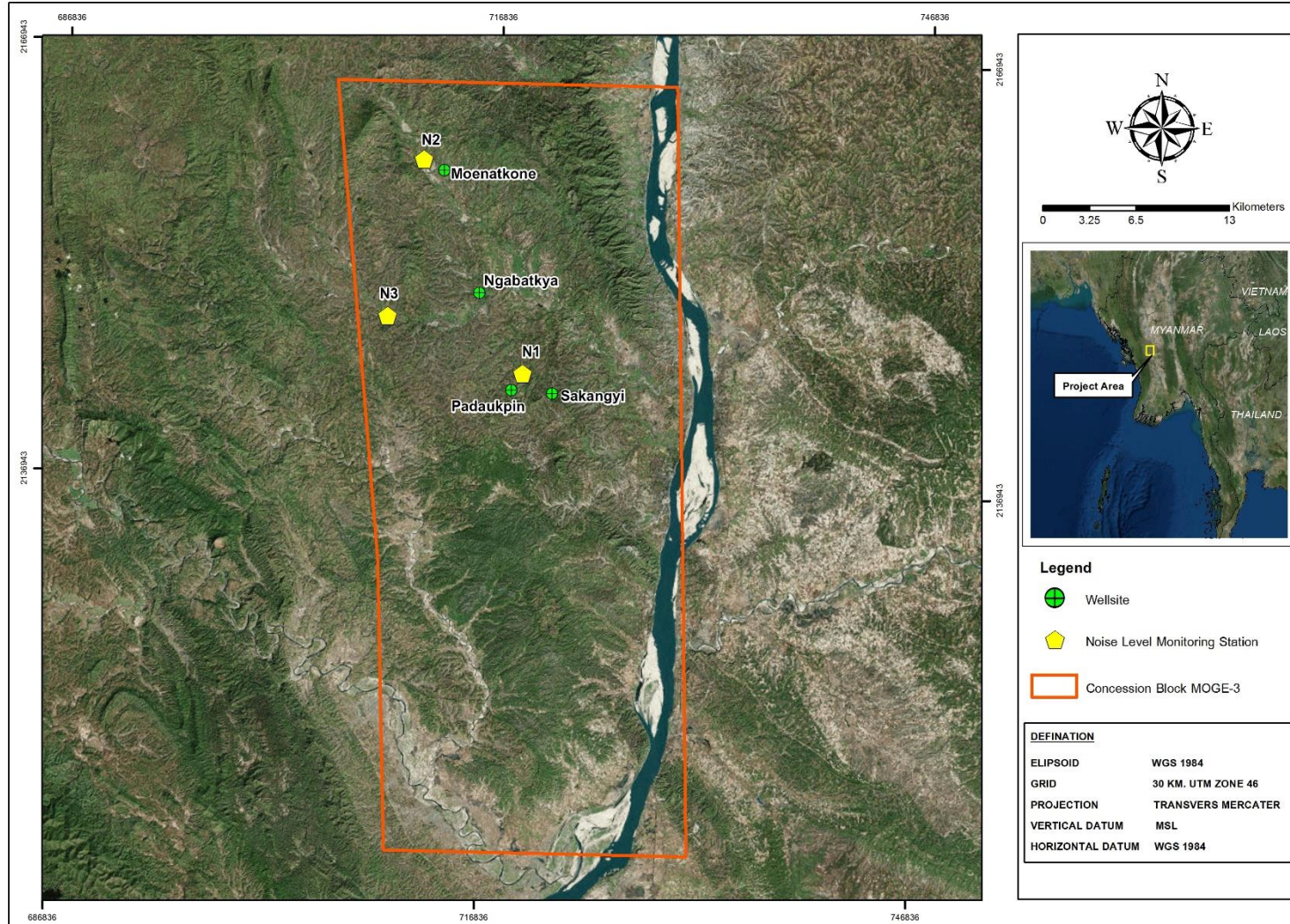


Figure 3-3 Noise Level Monitoring Station

3.3.2 Noise Level Monitoring Method

Sampling method, analysis method and standard methods of noise level are shown in Table 3-9.

Table 3-9 Sampling Method, Analysis Method and Standard Methods of Noise Level

Parameter	Sampling Method	Analytical Method	Standard Method
1. Noise Level			
<ul style="list-style-type: none"> - L_{Aeq} 24 hours - L_{Amax} - L_{Adn} 	Integrated Sound Level Meter	Integrated Sound Level Meter	ISO 1996/1

Noise level monitoring in 2018, for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG) and Moenatkone (MNK) well site were conducted during October 20-21, 2018 and Ngabatkyia (NBK) well site was conducted during October 21-22, 2018 as shown in Figure 3-4.



Padaukpin station (N1)



Moenatkone station (N2)



Ngabatkyia station (N3)

Figure 3-4 Noise Level Monitoring in construction and installation phase 2018

3.3.3 Noise Level Monitoring Results

Result of noise level monitoring in 2018 for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site as below.

Referring to analysis report number T18AG273-0001-T18AG273-0003, the results of L_{Aeq} 24 hours, L_{Amax} and L_{Adn} of 3 stations which are Padaukpin station (N1), Moenatkone station (N2) and Ngabatkyia station (N3) during October 20-22, 2018 are shown in Table 3-10. For Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO guideline for community noise (1999) were not specify the standard for L_{Aeq} 24 hours, L_{Amax} and L_{Adn} .

The details of analysis report, certificate for laboratory instrument and approval registration certificate of laboratory are shown in Appendix H, I and J.

Table 3-10 Noise Level Monitoring Results

Parameter	Result			Standard ^{1/}	Standard ^{2/}	Unit
	Padaukpin station (N1)	Moenatkone station (N2)	Ngabatkyia station (N3)			
Date	Oct 20-21, 2018	Oct 20-21, 2018	Oct 21-22, 2018	-	-	-
1. L_{Aeq} 24 hours	57.2	52.9	51.0	- ^{3/}	- ^{3/}	dB(A)
2. L_{Amax}	55.3-92.8	53.7-87.3	51.8-88.3	- ^{3/}	- ^{3/}	dB(A)
3. L_{Adn}	62.6	58.6	54.1	- ^{3/}	- ^{3/}	dB(A)

Remark: ^{1/} Myanmar National Environmental Quality (Emission) Guidelines (2015)

^{2/} WHO guideline for community noise (1999)

^{3/} Not specify in the standard

3.3.4 Comparison of Noise Level Monitoring

Comparison of present noise level monitoring results which monitored during Oct 20-22, 2018 with the previous results (baseline in EIA) found that L_{Amax} in construction and installation phases 2018 had trended to decrease at Padaukpin station (N1) while Moenatkone station (N2) and Ngabatkyia station (N3) had trended to increase. There were no comparison for L_{Aeq} 24 hours and L_{Adn} due to no monitoring results in baseline EIA. Moreover, Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO guideline for community noise (1999) were not specify the standard for L_{Aeq} 24 hours, L_{Amax} and L_{Adn} as shown in Table 3-11.

Table 3-11 Comparison of Noise Level Monitoring Results

Monitoring Station	Date	Results		
		L _{Aeq} 24 hours	L _{Amax}	L _{Adn}
1. Padaukpin station (N1)	Baseline (February 6-11, 2018) ^{1/}	– ^{2/}	99	– ^{2/}
	Construction and Installation Phase (October 20-21, 2018)	57.2	55.3-92.8	62.6
2. Moenatkone station (N2)	Baseline (February 6-11, 2018) ^{1/}	– ^{2/}	77	– ^{2/}
	Construction and Installation Phase (October 20-21, 2018)	52.9	53.7-87.3	58.6
3. Ngabatkyia station (N3)	Baseline (February 6-11, 2018) ^{1/}	– ^{2/}	71	– ^{2/}
	Construction and Installation Phase (October 20-21, 2018)	51.0	51.8-88.3	54.1
Standard ^{3/}		– ^{5/}	– ^{5/}	– ^{5/}
Standard ^{4/}		– ^{5/}	– ^{5/}	– ^{5/}
Unit		dB(A)	dB(A)	dB(A)

Remark: ^{1/} Baseline data received from EIA report for Myanmar Onshore Block MOGE-3 Exploration Drilling Campaign

^{2/} Not monitoring

^{3/} Myanmar National Environmental Quality (Emission) Guidelines (2015)

^{4/} WHO guideline for community noise (1999)

^{5/} Not specify in the standard

3.4 Social Monitoring

Social monitoring was conducted for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site in 2018 by PTTEP SA. The detail as shown in Table 3-12.

Table 3-12 Social Monitoring Plan

Environmental Quality	Parameter	Location	Period
Social	<ul style="list-style-type: none"> Complaint Monitoring and solving 	Project area, community around project area, and transportation route	Throughout construction and installation phase in 2018
		<ul style="list-style-type: none"> Padaukpin (PDP) well site Sakangyi (SKG) well site Moenatkone (MNK) well site Ngabatkyia (NBK) well site 	

3.4.1 Social Monitoring Methods

Social monitoring is the investigation of complaints from the community. PTTEP SA have implemented the grievance handling guideline to handle in case of any complaints from the stakeholder and resolve the complaint in the immediate (Appendix F-1). If any damage occurs, PTTEP SA will be responsible to solve and track them. In addition, problem's cause will be analyzed to prevent same problem occurring again. The Grievance Handling Process of PTTEP SA as shown in Figure 3-5.



Figure 3-5 Grievance Handling Process

3.4.2 Social Monitoring Result

Social monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site in 2018 were done by PTTEP SA. There was no any complaints from the community throughout the project operation.

3.5 Public and Occupational Health and Safety Monitoring

Public and Occupational Health and Safety monitoring was conducted for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site in 2018 by PTTEP SA. The detail as shown in Table 3-13.

Table 3-13 Public and Occupational Health and Safety monitoring Plan

Environmental Quality	Parameter	Location	Period
Public and Occupational Health and Safety	• Accidental statistics	Project area, community around project area, and transportation route	Throughout construction and installation phase in 2018
	• cause of accidents	- Padaukpin (PDP) well site	
	• Mitigation measures	- Sakangyi (SKG) well site	
		- Moenatkone (MNK) well site	
		- Ngabatkyia (NBK) well site	

3.5.1 Public and Occupational Health and Safety Method

PTTEP SA provided SSHE Management System Manual and training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan. Public and Occupational health and safety monitoring was conducted by recording the accident during working time; including causes, accident level, and performed mitigation measures. Monitoring program and report were conducted throughout operation period following the specified measures in EIA report.

3.5.2 Public and Occupational health and safety monitoring Results

Public and Occupational health and safety monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) well site in 2018 were done by PTTEP SA. There were 5 incident cases from project activity throughout the project operation in 2018. The details are summarized in Table 3-14 and Appendix E-7.

Table 3-14 The incident record

No.	Location	Date of incident	Summary of incident	Corrective action
1.	CONTRACTOR Base Camp	09 Sep 2018	The worker went for coffee shop in front of the contractor camp and got bitten by local dog.	1. Remind to all workers about risk of dog bite in the daily toolbox talk. 2. Site doctor to share about Rabies awareness to all workers at the camp.
2.	Central Campsite	09 Sep 2018	Worker got injuries during soil testing at Central Campsite. Worker palm got hit between weight and stop flange.	1. Review the soil test JSA and add this hazard on to it. 2. Communicate and promote hand injury prevention program to crew in the project.
3.	CONTRACTOR Base Camp	26 Sep 2018	Main gate barrier post broken while closing the gate during tool box talk morning and fall down on the ground.	1. To repair the broken support on the wooden barrier gate. 2. To develop check list for wooden barrier gate inspection and implement to use it.
4.	MNK access road	14 Oct 2018	Dump truck stuck in the soft soil.	1. To revise the JSA and to add the potential hazard of the soft soil after raining. 2. Task supervisor & Safety Officer to communicate the new revision of the JSA to all drivers and driver helper.
5.	Padukpin well site	21 Oct 2018	While one labor is using the grinder machine, grinder disc touched with power cable of grinder and cut the power cable.	1. Provide hazards identification and control measures to Sub contractor and the assigned crews. 2. To assign competent person for hot activities or provide training to new crew.

Remark : PTTEP SA, 2018

Chapter 4

Environmental Mitigation Measures Compliance

Audit and Environmental Monitoring Result

Chapter 4 Environmental Mitigation Measures Compliance Audit and Environmental Monitoring Result

From the monitoring of environmental mitigation measures compliance audit and environmental monitoring during construction and installation phase 2018 of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkya (NBK) wellsite, it was found that the project has implemented the mitigation measures specified in EIA report and the results are summarized as following details:

4.1 Environmental Mitigation Measures Compliance Audit Conclusion

Environmental Mitigation Measures Implementation Compliance audit was carried out by REM-UAE Laboratory and Consultant Company Limited together with representatives from PTTEP SA. The audit conducted against the mitigation measures specified in EIA report.

Audit and document checking by setting 4 levels of evaluation as follows;

- Completely complied on the Mitigation Measures (✓) refers the project can complete comply with the measure without any barriers.
- Mostly complied on the Mitigation Measures (✓) refers the project can mostly comply with the measure without any barriers.
- Do not complied on the Mitigation Measures (✗) refers the project cannot comply with the measure because of some barriers.
- Do not have situation follows the Mitigation Measures (NA) refers during the project operations do not have any of situation follow the Mitigation Measures

In case the project does not comply with the mitigation measures, REM- UAE Laboratory and Consultant Company Limited will identify the cause of problems, barriers and solutions ways.

4.1.1 General Mitigation Measures Implementation Compliance

- PTTEP SA concerns the safety, security, health and environment of the employees and wellbeing of the environment. The company addresses this regulation to the contract employees and contractor to comply with the requirements; the mitigation must be followed with the Company's SSHE Policy.
- PTTEP SA compiled these mitigation and monitoring measures strictly and monitoring report of the project will submit to MOGE and ECD at the end of the year in order to inform all activities.
- The letter was sent to local government about the activities of project. Moreover, PTTEP SA had two times of public consultation with stakeholder already. Another plan of public

consultation with stakeholder will conduct if needed. PTTEP SA will refer to the grievance mechanism if there is any compliance from stakeholder and community.

- PTTEP SA provided grievance handling guideline to receive any complaints from the stakeholder and resolve the complaint in the immediate. And there was no complaint from previous activity in 2018.
- If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the wellsite. However, there was no encountered any objects, fossils or archaeological from previous activity in 2018.
- All private land was permitted by land owners or authorized persons prior to start any activity. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision.

The results determined that the project completely complied on the general mitigation Measures for finished and on-going work while some mitigation measure (12.5% of total mitigation measure) were specified as NA due to there were no activity (Do not have situation) during the audit. The results are shown in Figure 4-1.

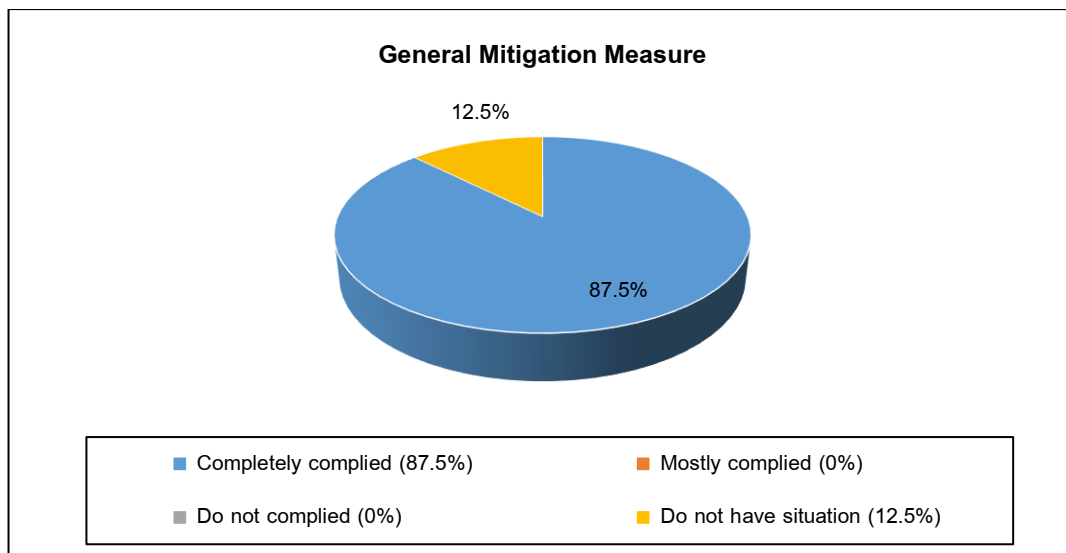


Figure 4-1 The Results of General Mitigation Measures Implementation Compliance

4.1.2 Environmental Mitigation Measures Implementation Compliance Result Summary

1) Topography

PTTEP SA enjoined the contractor to construct only in a limited area and route to the area. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

2) Air Quality

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation of speed limitation 20 km/hr inside operation site and 50 km/hr along the access road. And speed limitation was communicated to all workers in daily tool box talk before working by the header of contractor/safety officer. The truck was covered during transport material to the wellsite. And almost of truck was used for transport material within wellsite. Moreover, the contractor had provided staffs for cleaning during transportation.

The contractor provided water spraying within the wellsite and along the access road 3 times per day and increase the frequency to suitable the weather. No needed to clean tires of the vehicles before leaving site due to the access road as the laterite road and there were a few houses of community around the wellsite. And vehicle of the project used dust flap.

The contractor provided PPE sufficiently for all workers and controlled to use PPE during working. And PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.

3) Noise

PTTEP SA enforced the contractor to conduct in mitigation of noise impact such as transportation was conducted to minimize impact from sensitive environmental areas, the construction was conducted only during daytime from 7.00 - 18.00 hr, clearing and tree cutting were conducted as necessary.

No need to use noise barrier due to construction area far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. And PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles.

4) Surface Water Hydrology

PTTEP SA avoided to construction of wellsite that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.

5) Surface Water Quality

PTTEP SA designed layout of the wellsite, the access road and campsite before starting the construction to minimize areas requiring soil stabilization. The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. Water drainage ditch around the wellsite was constructed as specify in the measure.

PTTEP SA reiterated staffs and constructors to strictly keep clean both within wellsite and avoid water source nearby the wellsite. Moreover, PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined. Moreover, the contractor provided storage area for construction materials, chemical and oil within wellsite.

6) Soil quality

PTTEP SA enforced the contractor to construct only in a limited area and route to the area. And water drainage ditch around the wellsite was constructed to control water run-off.

7) Flora and Fauna

PTTEP SA controlled contractors to carry out clearing and tree cutting as necessary. And wellsite was constructed as specify in layout of wellsite. Fence was installed around the wellsite to separate the project area and nearby area. The security guard was at temporary resting 24 hr. to restrict people and vehicles. PTTEP SA avoided to construction of wellsite that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way. Moreover, PTTEP SA has provided training program to contractors on regulation and prohibition including control the performed as defined.

8) Land Use

Purchase of land access road/well pad and camp site were transparented and faired compensation by the MOGE. For access roads, the upgrade of existing road and construction of new road was considered and approved by local administrative officers and land owners under MOGE supervision. Moreover, no hand back the land after project completion due to land access road/well pad and camp site was purchased by government of Myanmar. In addition, PTTEP SA informed lead of community by letter about transportation of equipment, transportation route, time of project activities including safety plan before project start. All private land was permitted by land owners or authorized persons prior to start any activity.

9) Transport

The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe condition to user.

10) Water Use

Groundwater well was drilled at Padaukpin wellsite. And PTTEP SA was follow procedure of well drilling for groundwater. Moreover, the contractor has own water source for using in project area which not be affect to water used of community.

11) Drainage and Flooding

The civil engineer of PTTEP SA has responsibility to control contractor throughout the construction period. And PTTEP SA avoided to construct the wellsite that can be obstruct of natural water flow around the project area. However, no construction activity obstructs natural water way.

12) Waste Management

PTTEP SA developed waste management plan and controlled the contractor to implement. The local government of Thayet Township municipal was the responsible agency for managing waste to disposal. Separate waste containers were provided within wellsite. The contractor provided storage area for construction material and PTTEP SA strictly enforced good housekeeping practices within wellsite and surrounding for all workers. Toilet with septic tank was provided sufficiently for all staffs in order to treat wastewater before discharge to environment.

13) Socio-Economy

The contractor hired temporary workers in local area, according to the job description. And the contractor purchased goods/consumers in local area.

14) Historical, Archaeological and Cultural Resources

If any objects, fossils or archaeological are encountered in the project area, PTTEP SA will stop all drilling activities and inform the government agencies such as District and Township Administrator, Local Archeological Department, Fossil Research Center and Geological Museum immediately to examine at the wellsite.

15) Tourism and Recreational experience

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow regulation such as speed limit, loading of truck and transportation's time. The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation. The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe to user.

16) Public and Occupational Health

PTTEP SA strictly implement and follow mitigation measures for impacts to air quality, noise level and waste management. The contractor provided PPE sufficiently for all workers and controlled to use PPE during working. The noise barrier is not required due to construction area is far away from sensitive area. Moreover, the soundproof generator was used to minimize noise disturbance. Resulting from the mitigation measure implementation, there was no any complaint from surrounding community.

The results determined that the project completely complied on the environmental mitigation measures implementation for Construction and Installation Phase. Some mitigation measures (2.3% of all mitigation measures) do not have the operation during the audit period. Detail are shown in Figure 4-2.

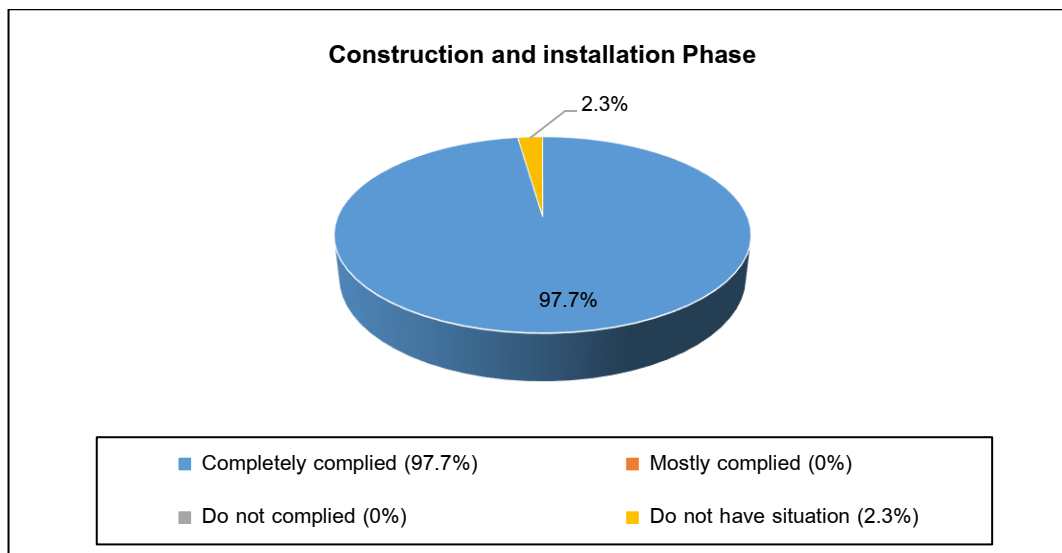


Figure 4-2 The Results of Environmental Mitigation Measures Implementation Compliance in Construction and Installation Phase

4.1.3 Environmental Mitigation Measures Implementation Compliance Result Summary in Unplanned Event

1) Blowout

Currently, there was no drilling activity yet. However, if there is drilling activity, the project will conduct as specify in the measure.

2) Fire or Explosion (not associated with Blowout)

Fire extinguishers were provided within wellsite including inspection once a month. Moreover, the assembly point, an emergency respond procedure and firefighting training were provided. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

3) Fuel, Chemical or Hazardous Waste/Materials Spill

PTTEP SA developed waste management plan and controlled the contractor to implement. Separate waste containers were provided within wellsite. The contractor provided drip pans and absorbents to contain any spillage from vehicle and machinery while transferring fuel or changing of engine oil. In addition, spill contingency plan, Emergency respond procedure and training were provided for implementation. SDS for chemical substances was not required within wellsite, during construction and installation phase. However, if there is chemical used in any operation such as drilling, well testing and production phase, the project will conduct as specify in the measure. PTTEP SA designed area proportionally. The non-contaminated area

was compacted soil ground. For contaminated area which were drilling rig and cutting pit, the project paved with concrete and waterproofing membrane for cutting pit. Moreover, training program on Safety, Security Health and Environment Management System (SSHE-MS) and other concerned safety standards have been provided to the contractor for follow with the PTTEP SA's plan.

4) Transportation Accidents

PTTEP SA prepared land transport safety procedure and enjoined the contractor to follow its requirements such as speed limit, loading of truck and transportation's time. The letter was sent to local government about the construction activities of project such as date on activity, transportation of equipment, route of transportation and security compliance before start.

PTTEP SA specified the contractor to regularly check and maintain the machines and vehicles. The contractor installed warning sign along the access road and provided staffs for facilitate the traffic during transportation. The access road was in good condition and ready for use. In case of the road was damaged from project activity, the contractor will repair to prevent unsafe condition to user.

Emergency respond procedure, ambulance, medical personnel and training were provided to respond in emergency case. Moreover, the contractor cooperated with nearby hospital to support in serious injuries or emergencies case.

The results determined that the project completely complied on the environmental mitigation measures implementation for unplanned event. However, some identified unplanned events (27.9%) do not have situation follows the Mitigation Measures (NA). The results are shown in Figure 4-3.

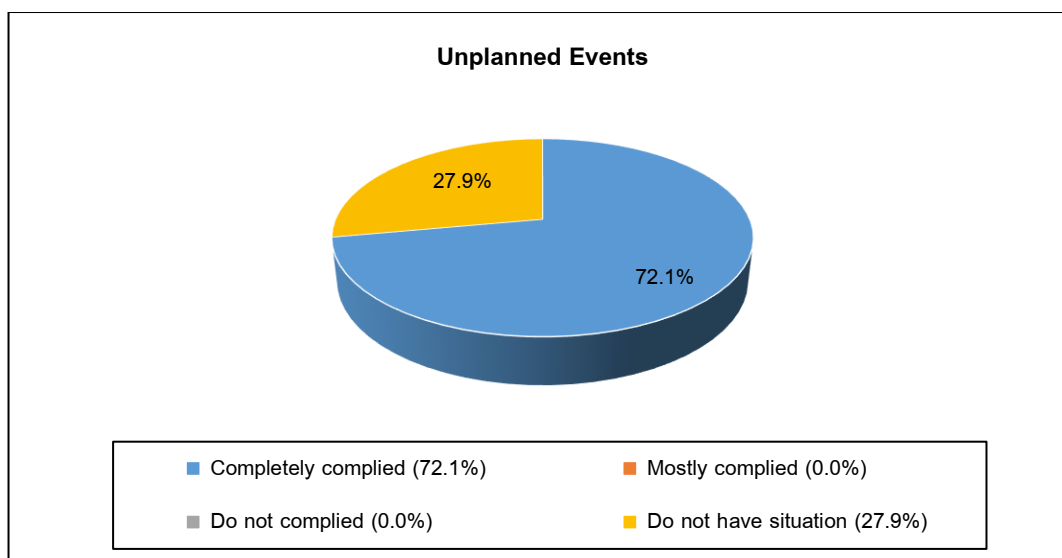


Figure 4-3 The Results of Environmental Mitigation Measures Implementation Compliance in Unplanned Events

4.2 Environmental Monitoring Results

Environmental monitoring programs implemented during project's period is provided as follow

1) Air Quality Monitoring

Air quality was monitored by REM-UAE Laboratory and Consultant Company Limited during October 20-22, 2018 for 4 wellsites (Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsite) at 3 stations ; Padaukpin station (A1), Moenatkone station (A2) and Ngabatkyia station (A3). The results of average 24 hours PM_{10} , average 24 hours $PM_{2.5}$, average 1 hr Nitrogen Dioxide (NO_2), average 24 hrs Sulphur Dioxide (SO_2) and average 8 hrs Ozone (O_3) were complied with Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO Air quality guideline (2006) and amendment. However, average 24 hrs H_2S was not specified in the standard.

2) Noise Level Monitoring

Noise level was monitored by REM-UAE Laboratory and Consultant Company Limited during October 20-22, 2018 for 4 wellsites (Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsite) at 3 stations ; Padaukpin station (N1), Moenatkone station (N2) and Ngabatkyia station (N3). For Myanmar National Environmental Quality (Emission) Guidelines (2015) and WHO guideline for community noise (1999) were not specify the standard for L_{Aeq} 24 hours, L_{Amax} and L_{Adn} .

3) Social Monitoring

Social monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsite in 2018 were done by PTTEP SA. There was no any complaint from the community throughout the project operation.

4) Public and Occupational Health and Safety Monitoring

Public and Occupational health and safety monitoring results for construction and installation phase of Padaukpin (PDP), Sakangyi (SKG), Moenatkone (MNK) and Ngabatkyia (NBK) wellsite in 2018 were done by PTTEP SA. There were 5 incident cases from project activity throughout the project operation in 2018. PTTEP SA had strictly follow PTTEP SA's procedure for all case such as record data, find cause of accidents and performed mitigation measures.

The results of Environmental Monitoring determined that the project completely complied with 100% as shown in Figure 4-4.

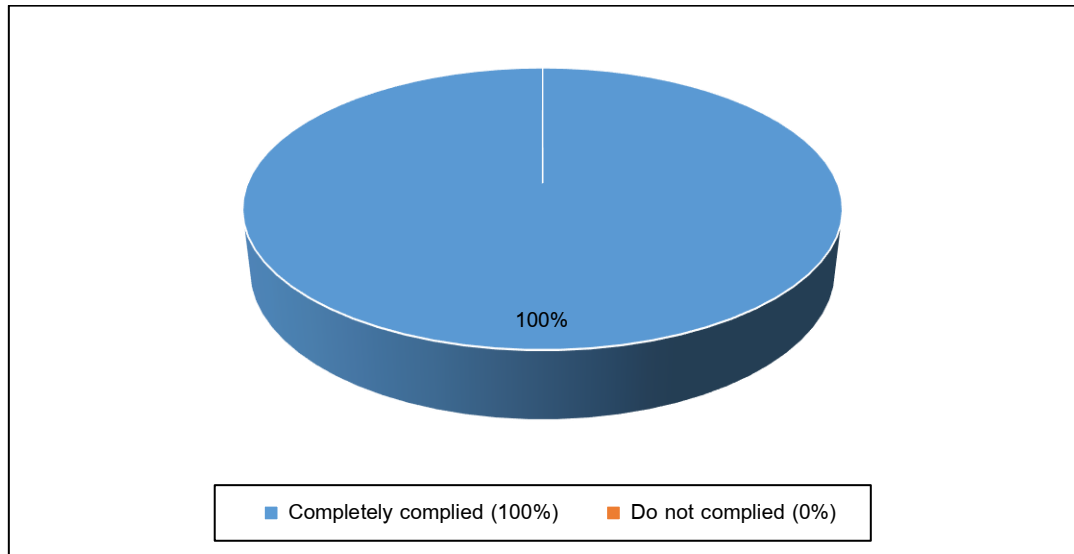


Figure 4-4 Summary of Monitoring Measure Implementation Results