



PTTEP

PTT Exploration and Production Public Company Limited

5th Six Monthly Environmental Monitoring Report (December 2024)

PTTEP International Limited (Yangon Branch), Yadana Asset

Yadana Asset, Block M5 M6

Yangon, Myanmar

December 2024

Environmental Monitoring Report for Yadana Asset Facilities

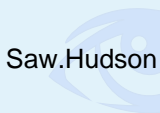


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<i>Visa</i>	 <p>Digitally signed by Saw.Hudson DN: cn=Saw.Hudson Date: 2025.01.03 10:36:49 +06'30'</p>	 <p>Reviewed and digitally signed by Tun Win Tun 2025.01.13 09:09:22 +06'30'</p>	

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1. Executive Summary

This report complies with Myanmar's Environmental Impact Assessment (EIA) Procedure 2015 and follows the Environmental Management Plan (EMP) for the Yadana facilities approved by ECD in September 2018. It details the semi-annual monitoring programs for offshore, onshore, Thaketa Logistics base, and the Yangon head office, all in line with the EMP.

The report covers environmental monitoring measures, including noise, produced sand, and wastewater analysis. It also includes verification audits, significant company improvements like standardizing offshore environmental monitoring surveys, greenhouse gas (GHG) emissions reduction activities, a methane emission survey, and CSR activities performed in 2024. There were no instances of non-compliance, major accidents, or incidents related to the environment and safety within Yadana assets during the reporting period.

2. Introduction

Following the withdrawal of the previous operator, TotalEnergies Exploration and Production Myanmar (TEEPM), from the country on 20th July 2022, Yadana asset was officially transferred to PTTEP International Limited on 20th July 2022, and it was named PTTEP International Limited (Yangon branch). The current partnership of Yadana project is MOGE (37%), and PTTEP (63 %) and this joint venture will be until the end of July 2028.

The first, the second, the third and the fourth six monthly environmental monitoring reports after the transfer was submitted to ECD via MOGE in August 2022, March 2023, October 2023 and July 2024 respectively. This is the 5th monitoring report prepared based on the available information and data collected during the reporting period between June – Dec 2024. This six-monthly environmental monitoring report entails the monitoring activities onshore and offshore of Yadana assets during June 2024 and December 2024. The monitoring activities will cover offshore activities like produced sand analysis and onshore activities such as Noise, Storm water drainage of PLC/MS, Thaketa logistics base, and Yangon Head Office as in previous reports. All

these aspects monitored complied with EQEG based on the Environmental Management report which was approved in September 2018.

On 7th September 2023, ECD issued ECC of existing Yadana facilities for Yadana asset and it was already expired on the date of ECC received. Therefore, the summary ECC report for the extension was submitted to ECD and ECD replied their comments to revise the report which is in progress for the revision.

Contact details of the Project proponent is provided below;

Name: Saw HUDSON	Address:No. 5, Sacred Tooth Relic Lake Avenue,
Position: Environment Engineer	Punn Pin Gone Quarter No.5,
PTTEP International Limited, Yadana Asset	Mayangone Township, Yangon,
Email: saw.hudson@pttep.com	The Republic of the Union of Myanmar.
	Phone: 95 (1) 650977, 650989, 660466 ext.3129

3. Monitoring Activities in Offshore and Onshore

3.1 Monitoring in Offshore

In this monitoring report, the monitoring measures of produced water highlighted that the produced water is not discharged on board as they are injected into the injection well YAD 1f. The amount of produced sand is almost not available because only sludge came out from the sand removal package currently. The internal laboratory analysis results are attached for the record as in below table and figure.

Environmental Aspects	Monitoring Parameters	Duration / Frequency of Monitoring	Location of Monitoring	Implementation	Date of Monitoring	Remark
1. Cuttings (Water-Based Mud, WBM)	There is no drilling campaign plan between January 2024 and present.					
2. Produced water	Produced water is reinjected in well WP1 f. There is no produced water discharged to the sea directly.					
3. Produced sand	Required by NEQG <ul style="list-style-type: none"> • OOC % 	<ul style="list-style-type: none"> • Analysis/monitoring as required (i.e., frequency depends on sand production volumes and intervals) 	<ul style="list-style-type: none"> • Processing Platform 	Method <ul style="list-style-type: none"> • Record produced sand volume. • Produced sand samples will be collected for analysis according to international guidelines and requirements such as USEPA. 	Yadana Asset	There is a negligible volume of sludge collected monthly from sand removal packages. As per below test result, there is no indication of sand observed in the test.



PTTEP Myanmar

Yadana (Off-Shore) Laboratory

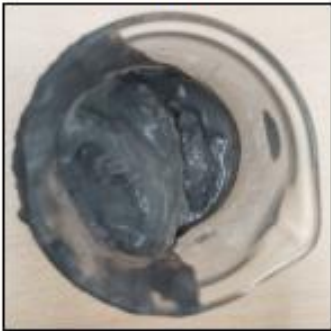
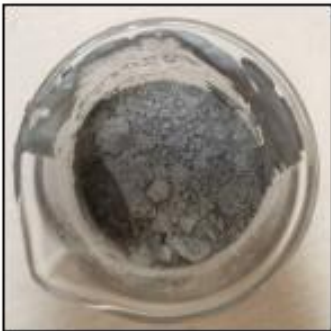

To: Production Superintendent
From: Lab Technician





CC: OY/P Supervisor

Subject: Sludge Sample from Sand Removal Package

Date: 12-Oct-2024

The sludge sample from the Sand Removal Package was received on 09-Oct-2024 (collected on 08-Oct-2024-night shift). The sample was analyzed, and the test results are as shown below:

Sludge from sand removal Package		
Test	Photo	Comment
Original sample		Grey, oily smell, wet at room temperature
Dried sample		Light grey, oily smell, fine particles
With magnet		No sample was attracted by magnet

In the water at RT		A few samples were dissolved, a few floated-on top, and most samples sank.
In Toluene at RT		Solvent turned to little turbid, and some sample was dissolved in Toluene solvent
After treatment with Toluene at RT and filtering and drying in the oven		
In HCl solution at RT		Many bubbles were observed, and some of them were dissolved into the acid solution.



After treatment with HCl acid solution at RT and the residue after filtering and drying in the oven.		
--	---	--

The below table describes the amount of sludge sample:

Sample	Sludge sample from Sand removal package A
% Toluene Soluble in original sample	3.5
% Acid Soluble in original sample	26.7
% Residue in original sample	69.8

Conclusion: Based on the visual inspection there is no sand indication from dried sample and final fine particle result. Further detail analysis can't be carried out in PP Lab due to the limitation of facilities.

Test done by:
Cherry Thwin
PP Lab Chemist

Figure 1: Produced Sand Laboratory Result

3.2 Monitoring in Onshore Facilities (including Thaketa Base)

Monitoring measures for onshore facilities such as noise and stormwater drainage are regularly monitored as in below table.

Environmental Aspects	Monitoring Parameters	Duration/Frequency of Monitoring	Implementation	Monitoring Date	Remark
Noise	Required by EQEG <ul style="list-style-type: none"> One Hour LAeq (dBA) 	<ul style="list-style-type: none"> In event of or to response complaints 	<ul style="list-style-type: none"> Standard noise sampling methods. Compare results with data from nearest baseline station and EQEG 	PTTEP Yadana Asset	See the noise maps

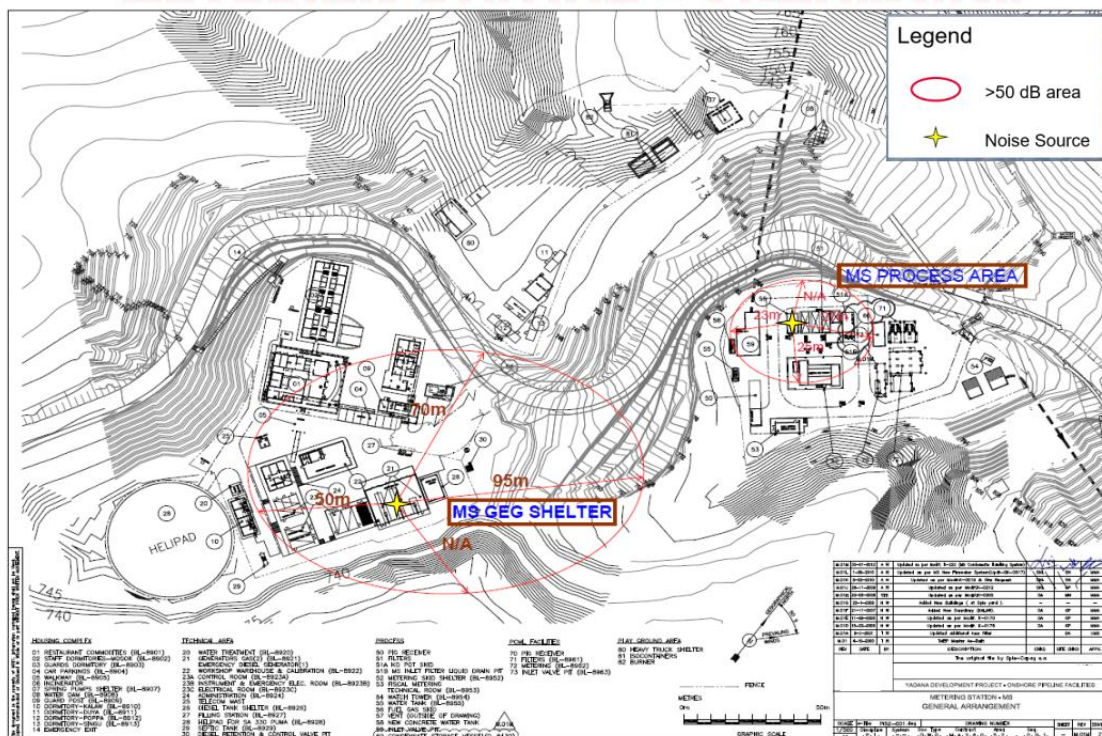
METERING STATION – 28-NOV-2024



1



METERING STATION – 27-NOV-2024



2



Figure 2: Noise Map of PLC and MS

Yangon Head Office and Thaketa Logistic Bases

The provided diagrams below illustrate noise maps for both the Yangon and Thaketa bases. The noise source is the generators located at the Thaketa and Yangon head offices, which are reserved exclusively for emergency use, such as during power outages. Over the past six months, there have been no significant maintenance activities or new infrastructure installations at the Thaketa base. The updated noise map of the Yangon office and the previous noise map of Thaketa are included for reference, with noise monitoring conducted every five years. An update to the Thaketa noise map is planned for Q1 2025. It is noteworthy that there have been no grievances or complaints from neighboring communities or residents during the reporting period.

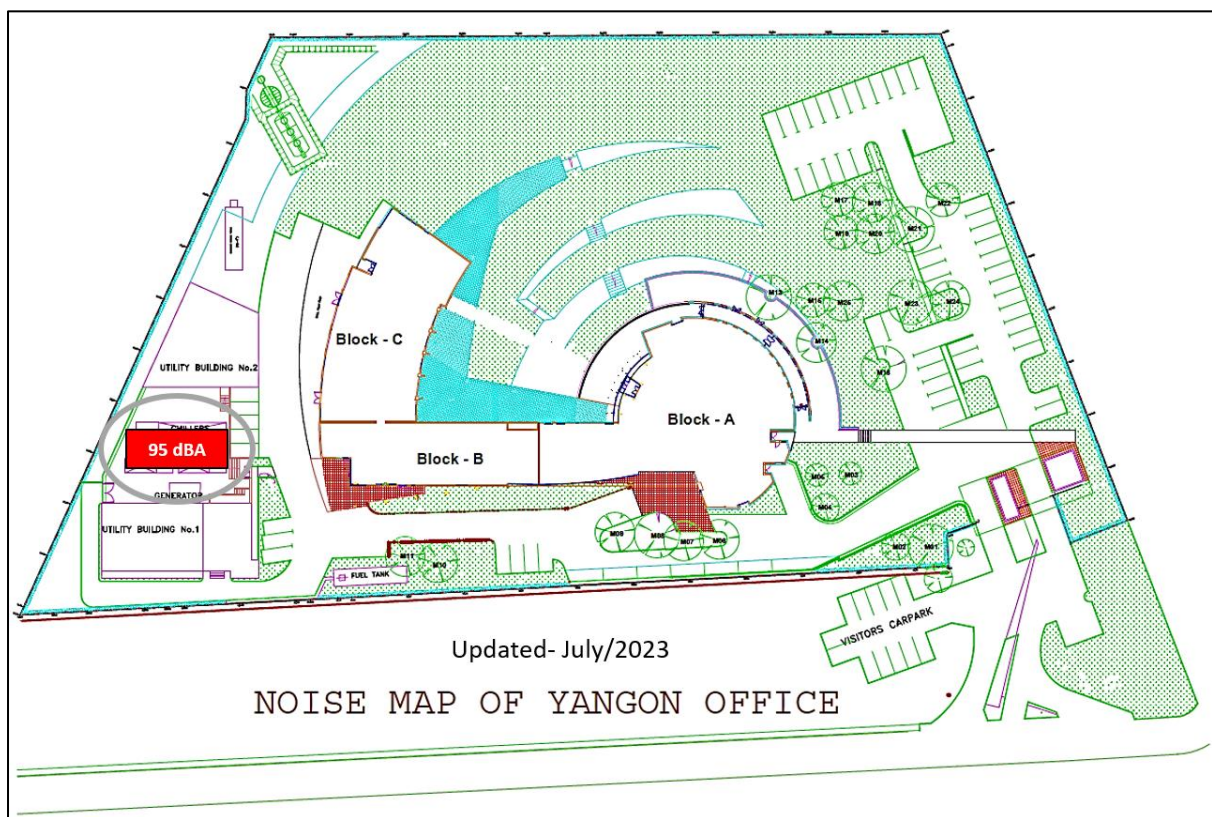
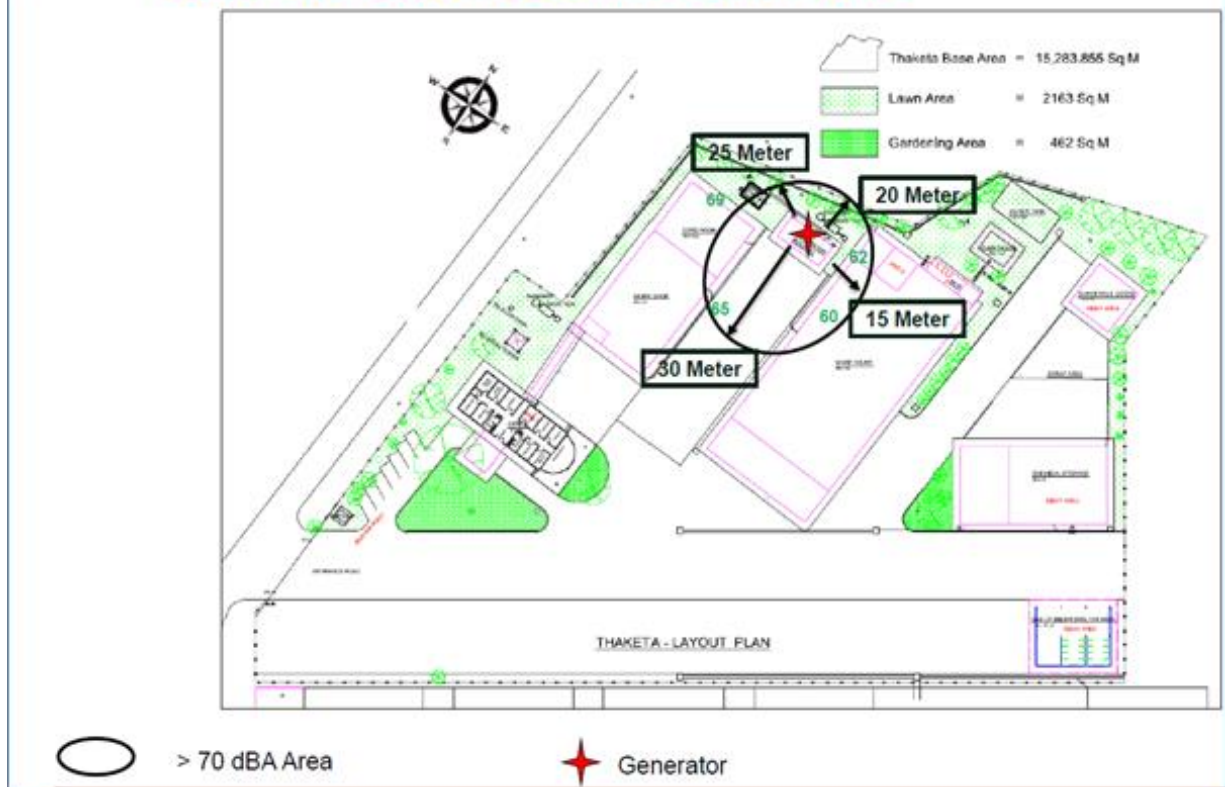


Figure 3:Noise Map of Yangon Head Office

THAKETA LOGISTICS BASE 2-MAY-2019



THAKETA LOGISTICS BASE – 2-MAY-2019



Figure 4: Noise Map of Thaketa Base

3.2.2 Stormwater and Sanitary Wastewater Monitoring

PLCMS Sites

The samples of the stormwater for the inlet and outlet of PLC/MS sites are sent to local laboratory for oil and grease in August 2024 and the analysis results shows that oil and grease are within EQEG standards.

Yangon Head Office

The primary wastewater, which primarily consists of utility water from the Yangon Head Office, undergoes treatment in the sewage treatment system before being released into the nearby drainage. Each month, a sample of the discharged effluent is collected and analyzed in a local laboratory. The picture below displays the sample result from October 2024. It has been observed that all parameters except oil and grease are in line with YCDC and EQEG standards. The exceeding results of oil and grease will be further checked and fixed accordingly by the general service team of Yangon Head office.



Advanced Medical & Diagnostics Trading Ltd.

Yangon Office : No. 20-A Ywar Lae Lane, Za-North Ward, Thingangyun Township, Yangon.
01-571656, 01-565797, 09-443176248, 09-443112672
Mandalay Office : No. MA 28, 59th street, Between 41st and 42nd street, Ye' Mon Taung
Ward, Mahar Aung Myay Township, Mandalay.
02-2848201, 02-2848202, 02-2848203, 02-2848204
Email : amd@amdmyanmar.com
Website : www.amdmyanmar.com


WASTE WATER ANALYTICAL RESULT


ISO 9001: 2015
Certified No. 64818
Form No: Amd-WTQ-08 (Rev: 2)

Client : PTTEP International Limited
Type of Sample : Wastewater Outlet
Date of Received : 23.10.2024
Date of analysis : 23.10.2024
Date of Issued : 31.10.2024

Sr.	Item	Result	YCDC Target range
1.	Dissolved Oxygen (DO)	3.32	> 1 ppm
2.	pH effluent water	5.70	6<pH<9.6
3.	Biochemical Oxygen Demand (BOD ₅) (5days at 20°C) (mg/L)	29	20-60 ppm
4.	Chemical Oxygen Demand (COD) (Adaptation of the USEPA 410.4 approved method) (mg/L)	71	<200 ppm
5.	Total suspended solids (TSS)	37	< 500 ppm
6.	Nitrate (NO ₃ -N)	9.0	N/A

Remark: Results valid for the received sample only.

Tested By
Signature : 
Name : Aung Ko Tun
Position : Laboratory Technician

Approved By
Signature : 
Name : Ei Phyu Phyu
Position : Laboratory In-charge



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Email : amd@amdmyanmar.com
Website : www.amdmyanmar.com


WASTE WATER ANALYTICAL RESULT

ISO 9001: 2015
Certified No. 64818
Form No: Amd-WTQ-09 (Rev: 2)

Client : PTTEP International Limited
Type of Sample: : Waste Water Outlet
Date of Received : 23.10.2024
Date of analysis : 23.10.2024
Date of Issued : 31.10.2024

Sr.	Item	Result	National Environmental Quality (Emission) Guidelines
1.	Total Phosphorus	1.6	2 ppm
2.	Oil & Grease	15	10 ppm
3.	Total Nitrogen	3.5	10 ppm
4.	Total Coliform Count	>1100 MPN/100ml	400 MPN/100 ml

Remark: Results valid for the received sample only.

Tested By
Signature : 
Name : Aung Ko Tun
Position : Laboratory Technician


Approved By
Signature : 
Name : Ei Phyu Phyu
Position : Laboratory In-Charge

Figure 5: Laboratory result of YGN Wastewater

Thaketa Logistic Base

The Thaketa logistics base is located within the MOGE compound, alongside other companies' facilities and the MOGE office. Its stormwater drainage system is connected to MOGE's workshop drainage system and the Thaketa base network. Domestic water from a tube well is treated and regularly analyzed by a contracted local laboratory. The primary activities at the Thaketa logistics base involve storing goods and transferring stocks to offshore and onshore facilities. Despite the presence of neighboring facilities, such as MOGE's car workshop, PTTEP Zawtika's pipe storage facilities, and MPI's storage yard, wastewater from the inlet and outlet points are sent to the laboratory for monitoring oil and grease every six months. According to the most recent laboratory results, the inlet water result shows more than the outlet water's result which remains within the national EQEG limits, as shown in the attached pictures.



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WASTE WATER ANALYTICAL RESULT

ISO 9001: 2015

Certified No. 64818

Form No: Amd-WTQ-08 (Rev: 2)

Client : PTTEP Yadanar Asset Thaketa Base

Type of Sample : Waste Water Inlet

Date of Received : 10.12.2024

Date of analysis : 11.12.2024

Date of Issued : 24.12.2024

Sr.	Item	Result	YCDC Target range
1.	Oil & Grease	20	N/A

Remark: Results valid for the received sample only.

Tested By

Signature : 

Name : Aung Ko Tun

Position : Laboratory Technician

Approved By

Signature : 

Name : Ei Phyu Phyu

Position : Laboratory In-Charge



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WASTE WATER ANALYTICAL RESULT

ISO 9001: 2015
Certified No. 64818
Form No: Amd-WTQ-08 (Rev: 2)

Client : PTTEP Yadanar Asset Thaketa Base
Type of Sample : Waste Water Outlet
Date of Received : 10.12.2024
Date of analysis : 11.12.2024
Date of Issued : 24.12.2024

Sr.	Item	Result	YCDC Target range
1.	Oil & Grease	9	N/A

Remark: Results valid for the received sample only.

Tested By
Signature : 
Name : Aung Ko Tun
Position : Laboratory Technician


Approved By
Signature : 
Name : Ei Phyu Phyu
Position : Laboratory In-Charge

Figure 6: Laboratory result of Thaketa logistics base stormwater from Inlet and Outlet

4. Non-Compliance with Environmental Management Plan

During the reporting period from June 2024 – December 2024, there was no non-compliance with EMP approved in September 2018.

5. Accidents or Incidents related to Health Safety and Environment

There was no accidents or incidents related to health safety and environment occurred during the reporting period from June 2024 – December 2024.

6. Verification Audit

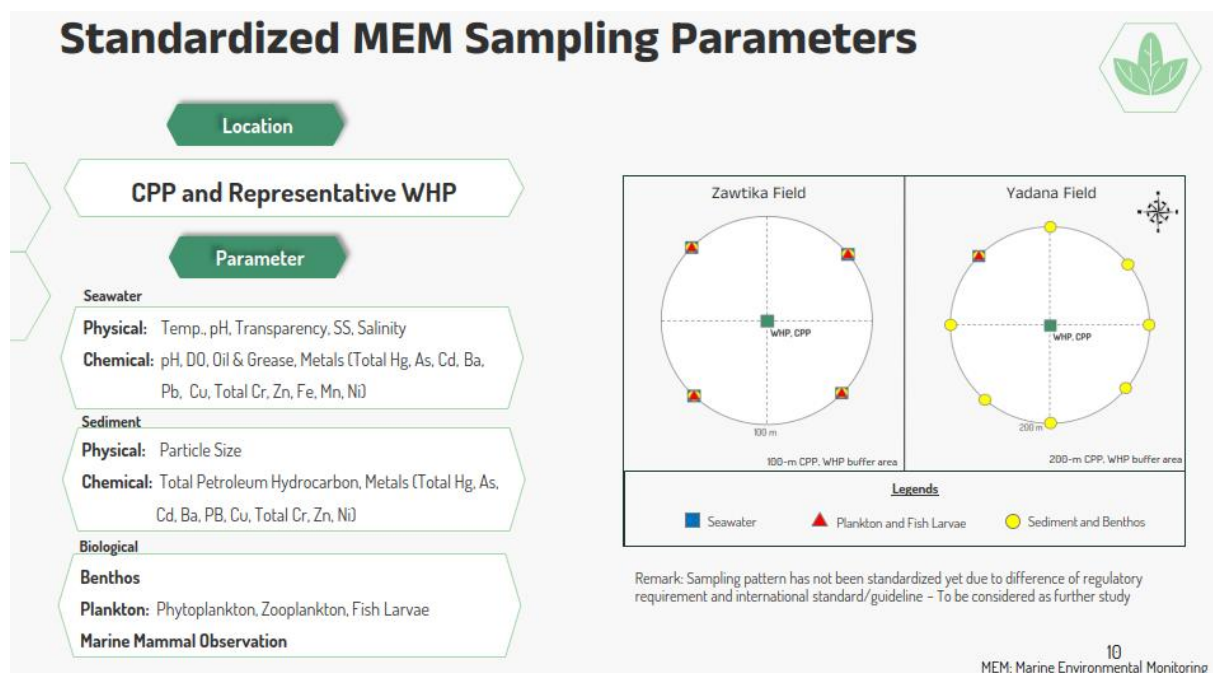
The existing Yadana's environmental management plan is in line with the international standards like ISO 14001, ISO 45001 and ISO 50001. PTTEP Corporate has decided to go through ISO attestation certification instead of ISO 14001 audit in 2024. The ISO attestation audit will be performed by third party based on Corporate arrangement three yearly basis. In fact, ISO attestation audit will review the SSHE Management System policies and practices and evaluate them against the requirements of the international standard for ISO 14001 and ISO 45001. The objectives of the review are to confirm that the SSHE MS design continues to be aligned with the intent of the ISO 14001 and ISO 45001 requirements. In addition, the internal environmental and industrial hygiene audit was performed for all sites in June and July 2024 so that the audit helps maintain high standards of environmental responsibility and sustainability.

7. Major Improvements in PTTEP International Limited (Yangon Branch)

7.1 Standardize Document and Implementation of Offshore Environmental Monitoring for Myanmar Asset (Zawtika and Yadana)

Offshore environmental monitoring surveys (EMoS) are crucial for assessing the health and impact of marine environments of Yadana asset. These surveys involve collecting data on water quality, marine life, and seabed conditions to ensure sustainable operations. The primary goal is to detect any adverse effects early, comply with environmental regulations, and protect marine ecosystems.

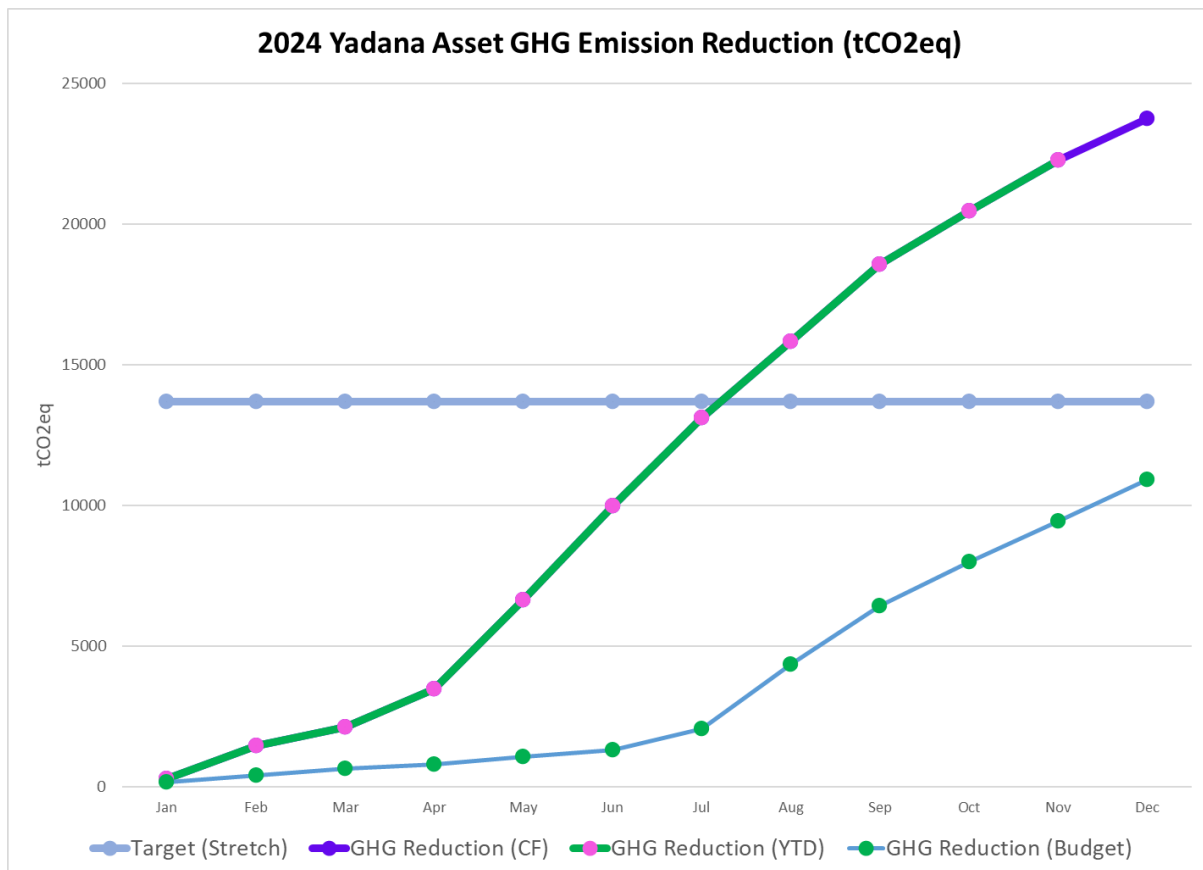
Yadana asset previous operator's environmental monitoring survey methodology and parameters used for laboratory analysis are different to PTTEP's corporate guideline. Therefore, offshore marine monitoring survey practices and implementation of Yadana and Zawtika asset are reviewed and aligned based on Corporate's guideline. Hereunder is the alignment and standardization of marine environmental monitoring survey in terms of sampling parameters and designs of Yadana and Zawtika project.



In March 2024, the marine environmental monitoring campaign was performed in Yadana offshore. The frequency of monitoring is five yearly basis based on Oil and Gas best practices. Therefore, the next EMoS will be in 2028 when Yadana and Zawtika's EMoS to be combined.

7.2 GHG Emission reduction initiatives

PTTEP is dedicated to achieving the global sustainability goal of Net Zero by 2050 to combat climate change. To meet this commitment, PTT groups will establish annual Key Performance Indicators (KPIs) for reducing GHG emissions. A short-term target has been set for 2030: a 25% reduction in GHG emission intensity. The Yadana asset's GHG emissions reduction performance is monitored annually. The GHG emission reduction target or KPI for 2024 is 13,675 tCO₂eq which represents 100%, and the year-to-date closing figure for 2024 is 23,754 tCO₂eq, the percentage of emission saving achieved is approximately 173.70%. The picture below shows the Yadana asset's GHG emissions reduction performance from January to December 2024. The initiatives for GHG emission reduction at the Yadana asset include optimizing flaring and fuel gas consumption.



7.3 Yadana Asset Methane Emission Survey to fulfill 2050 Net Zero Commitment

Methane has a Global Warming Potential (GWP) about 25 times greater than carbon dioxide over a 100-year period. Identifying and reducing methane emissions not only benefits the environment by reducing greenhouse gases but also improves process safety and economics.

In October 2023, PTTEP joined the Oil & Gas Methane Partnership 2.0 (OGMP 2.0) to enhance methane emissions management and support the Net Zero commitment. OGMP 2.0, a UNEP program, helps the oil and gas industry manage methane emissions according to international standards, providing a protocol for accurate and transparent methane emission reporting.

In October 2024, the Yadana asset conducted a methane emission survey at offshore and onshore sites to identify leaks or vent sources, establish a methane emission baseline, and improve the methane emission inventory. The survey's methodology, equipment used, and results are shown in the following figure. Thanks to efficient maintenance programs and effective site management, only a few minor leaks were found and fixed.



7.4 CSR Activities performed during 2024

Yadana Project's CSR activities started in 1995 in 13 villages, focusing on access to healthcare, education, and skill development as well as promotion of local economy within livestock breeding and agricultural sectors. Over the years the activities expanded by adding microfinance services

and access to energy by solar. The coverage had reached to 33 villages in 2012. There are more than 45,000 inhabitants residing within 33 project villages, among which most of the population in the pipeline area is Myanmar. Most of them belong to the Dawei ethics sub-group, while other groups present in the area are Karen and Mon. Main sources of income for the people in the project area are fishing, agriculture, and livestock breeding.

After the smooth transfer of Yadana project from TotalEnergies to PTTEP in July 2022, CSR programs have been adjusted to align with 4 themes: Basic needs, Education, Culture and Environment as in the figure.



The following slide displays the CSR performances during 2024.

2024 Performances



Environment: 5500 trees planted
>1200 Kg end-of-life fishing gears collected
Env. awareness raising to 930 pax



34 Public infra & utility projects



Skill development:

387 youths trained including 45 HVD scholarship students studying at IRPC Collage, Thailand. ~70% employment



Infrastructure & Utility Projects (Accumulated)		2024
712		34
Playgrounds	54	1
Community & Religious facilities	16	1
Roads	57	1
Bridges	89	1
Water Supply	101	7
Hospital & Clinics	34	0
Renovation - Village Clinics	55	19
New School Buildings	71	0
School Renovation	235	4



26-Nov-2024



Energy Partner of Choice

9. Conclusions

During the reporting period between June and December 2024, the regular environmental monitoring activities such as noise, stormwater and wastewater were carried out on offshore and onshore sites respectively. In addition, as a significant improvement, the standardizing of offshore environmental monitoring survey of Yadana and Zawtika assets, GHG emission reduction activities, Yadana Asset Methane Emission Survey and CSR activities performed during 2024 are reported. Within the reporting period, there are no non-compliant environmental and safety incidents. During the monitoring process, it was observed that different laboratory result for the same parameter can differ due to several factors such as sample handling and preparation, analytical methods, calibration and maintenance equipment, Reagents and Standards used and the protocol adopted. To avoid such limitations, it's important to follow standardized procedures, ensure proper training for laboratory personnel, and regularly calibrate and maintain equipment. Additionally, inter-laboratory comparisons and proficiency testing can help identify and address sources of variability.