



# 2024 TNFD Report

The Taskforce on Nature-related  
Financial Disclosures

July 2024



## CONTENTS

INTRODUCTION	1
TNFD RECOMMENDATIONS	2
ABOUT THIS REPORT	2
1. GOVERNANCE	3
1.1 THE BOARD'S OVERSIGHT AND MANAGEMENT RESPONSIBILITIES	3
1.2 HUMAN RIGHTS MANAGEMENT AND ENGAGEMENT ACTIVITIES	5
2. STRATEGY	10
2.1 NATURE-RELATED ISSUES IN DIRECT OPERATIONS	10
2.2 NATURE-RELATED ISSUES IN VALUE CHAIN	16
3. RISK AND IMPACT MANAGEMENT	17
3.1 CORPORATE RISK IDENTIFICATION PROCESSES	17
3.2 NATURE-RELATED RISK IDENTIFICATION PROCESSES	17
3.3 NATURE RISK MANAGEMENT AND MITIGATION ACTIONS	18
4. METRICS AND TARGETS	27
4.1 TARGETS AND GOALS	27
4.2 PERFORMANCE METRICS	29

LIST OF TABLES		
TABLE 1	PTTEP'S NATURE-RELATED GOVERNANCE ROLES & RESPONSIBILITIES	4
TABLE 2	PTTEP'S HUMAN RIGHTS ISSUES RELATED TO ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	8
TABLE 3	SUMMARY OF PTTEP BIODIVERSITY AND ECOSYSTEM SERVICES (BES) RISK ASSESSMENT	11
TABLE 4	PTTEP'S PRIORITY LOCATIONS IN CLOSE PROXIMITY TO CRITICAL BIODIVERSITY AREAS 11	
TABLE 5	NATURE/BIODIVERSITY-RELATED RISKS FOR SINPHUHORM, ZAWTIKA, AND YADANA	14
TABLE 6	ECOSYSTEM SERVICE PRIORITIZATION FOR SINPHUHORM, ZAWTIKA, AND YADANA	15
TABLE 7	SUMMARY OF PTT BIODIVERSITY AND ECOSYSTEM SERVICES RISK ASSESSMENT	16
TABLE 8	PTTEP'S BES MANAGEMENT PROJECT AND ACTIONS	20
TABLE 9	PTTEP'S SPENDING FOR BES MANAGEMENT AND CONTRIBUTION TO ASSOCIATIONS/AUTHORITIES IMPLEMENTING NATURE-RELATED INITIATIVES	26
TABLE 10	NATURE-RELATED STRATEGY GOALS, TARGETS AND PROGRESSES	28
TABLE 11	PTTEP'S NATURE RELATED METRICS	30

## LIST OF FIGURES

FIGURE 1	PTTEP NATURE-RELATED GOVERNANCE STRUCTURE	4
FIGURE 2	PTTEP HUMAN RIGHTS MANAGEMENT SYSTEM	6
FIGURE 3	PTTEP GOVERNANCE BODIES ON HUMAN RIGHTS	7
FIGURE 4	BIODIVERSITY ASSESSMENT STEPS FOR OWN OPERATION.	18
FIGURE 5	PTTEP'S USE OF MITIGATION HIERARCHY FOR BES MANAGEMENT	19

## ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AI	Artificial intelligence
AIS	Alien Invasive Species
ARV	AI and Robotics Ventures Company Limited
AZE	Alliance for Zero Extinction
BES	Biodiversity and Ecosystem Services
BoD	Board of Directors
BOMP	Biodiversity Offset Management Plan
CEO	Chief Executive Officer
CGSC	Corporate Governance and Sustainability Committee
CO2	Carbon Dioxide
CRP	Corporate Risk Profile
CSR	Corporate Social Responsibility
DNP	The Department of National Parks, Wildlife, and Plant Conservation
E&P	Exploration and Production
EGAT	Electricity Generating Authority of Thailand
EIA(s)	Environmental Impact Assessment(s)
EMS	Environmental Management System
ESG	Environment, Social, and Governance
GBF	Global Biodiversity Framework
GCNT	Global Compact Network Thailand
GHG	Greenhouse Gas
GoT	Gulf of Thailand
GRC	Governance, Risk Management, and Compliance
H.T.M.S.	His Thai Majesty's Ship
IBAT	Integrated Biodiversity Assessment Tool
IFC	The International Finance Corporation
ILO	The International Labour Organization's
IOGP	The International Association of Oil & Gas Producers
IPIECA	International Petroleum Industry Environmental Conservation Association
ISMS	Issue and Stakeholder Management System
ISO	The International Organization for Standardization
ISSB	International Sustainability Standards Board
IUCN	International Union for Conservation of Nature

<b>Acronyms</b>	<b>Description</b>
KBA(s)	Key Biodiversity Area(s)
M&A	Mergers and acquisitions
MAB	Man and the Biosphere
MC	Management Committee
MFLF	The Mae Fah Luang Foundation under Royal Patronage
MOU	Memorandum of Understanding
NNL	No-Net Loss
OEMS	Operational Excellence Management System
OHI	Ocean Health Index
PA(s)	Protected Area(s)
RDF	Royal Forest Department
SDG(s)	Sustainable Development Goal(s)
SSHE	Safety, Security, Health and Environment
SSHE CC	The Safety, Security, Health and Environment Council
SSHE MS	Safety, Security, Health and Environment Management System
TBCSD	Thailand Business Council for Sustainable Development
TCFD	The Task Force on Climate-related Financial Disclosures
TGO	The Greenhouse Gas Management Organization
TNFD	The Taskforce on Nature-related Financial Disclosures
TNR	Taninthayi Nature Reserve
T-VER	Thailand Voluntary Emission Reduction Program
UDHR	The Universal Declaration of Human Rights
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGC	United Nations Global Compact
UNGP	The United Nations Guiding Principles on Business and Human Rights
USD	United States dollar
WWF	World Wide Fund for Nature

## INTRODUCTION

As a Thai national company focusing on petroleum exploration and production, PTT Exploration and Production Public Company Limited (PTTEP) is a publicly traded company with a core mission to ensure a reliable supply of energy while delivering sustainable value to all its stakeholders throughout its global operations.

Guided by a vision of becoming an "Energy Partner of Choice", PTTEP strives for competitive performance and fosters innovation, enabling long-term value creation. Deeply rooted in the principles of sustainability, the Company pursues continuous growth and attractive returns while minimizing its environmental footprint and societal impact through responsible and ethical operational practices.

PTTEP recognizes the importance of energy security and aims to meet this need through a holistic approach that balances economic objectives with environmental stewardship and social responsibility. By aligning its operations with stakeholder expectations, PTTEP endeavors to provide reliable energy resources while proactively addressing concerns related to the industry's impact on the planet and local communities.

PTTEP recognizes that the Company relies heavily on natural resources and ecosystems, while the operations have significant environmental impacts. The Taskforce on Nature-related Financial Disclosures (TNFD) framework is highly relevant for energy services companies such as PTTEP. TNFD provides guidance on disclosing and managing dependencies on nature, environmental impacts, and associated risks - allowing companies to enhance sustainability, comply with regulations, improve access to capital, strengthen reputation and social license to operate, and boost operational resilience. By adopting TNFD recommendations, PTTEP can transparently report on nature-related issues aligned with stakeholder expectations and enhance understanding of biodiversity related-risks and their actions to global efforts in preserving ecosystems and promoting sustainability in long-term.

This report, developed in collaboration with ERM, an international sustainability consulting firm with expertise in climate and nature topics, marks PTTEP's first disclosure aligned with the TNFD framework, recognizing the critical importance of nature and biodiversity to long-term business resilience. The disclosure provides stakeholders with decision-useful information on how PTTEP identifies, assesses, and responds to material nature-related dependencies, impacts, risks and opportunities, guided by rigorous analysis using the best available data, research and expertise. The disclosure aligns with TNFD's core concepts, including the prioritization of nature-positive outcomes, the upholding of human rights as it is the fundamental reality that nature degradation is strongly linked to violations of human rights, impacts on indigenous people, local communities, and affected communities. In addition, the material topics in this report were informed by stakeholder engagement. PTTEP acknowledges its nature journey is ongoing and commits to continuously improving disclosures and practices as the TNFD framework evolves, as safeguarding nature is fundamental to long-term value creation. Feedback is welcomed as the Company advances its nature-positive ambitions.

## TNFD RECOMMENDATIONS

The TNFD is a pioneering initiative that brings together diverse stakeholders from the public sector, private sector, and civil society organizations. Its groundbreaking recommendations provide companies and financial institutions with a robust framework for managing and reporting on nature-related issues. This framework aligns seamlessly with global policy objectives, particularly Target 15 of the Global Biodiversity Framework (GBF), underscoring TNFD's unwavering commitment to promoting corporate transparency on nature-related risks and impacts.

The recommendations encompass 14 comprehensive disclosures that address dependencies, impacts, risks, and opportunities associated with nature. TNFD has strategically aligned its language, structure, and approach with well-established frameworks, such as the Task Force on Climate-related Financial Disclosures (TCFD) and the International Sustainability Standards Board (ISSB). This alignment ensures a cohesive integration of climate- and nature-related reporting, fostering a holistic understanding of environmental risks and opportunities.

Moreover, TNFD acknowledges the diverse perspectives on materiality and caters to the information needs of both capital providers and broader stakeholders. This inclusive approach ensures that the disclosures are not only relevant to investors but also address the concerns of various stakeholder groups, thus promoting a more comprehensive and equitable consideration of nature-related issues.

## ABOUT THIS REPORT

This is PTTEP's first full length TNFD report, developed jointly with ERM, a sustainability consultancy. The report describes nature-related management practices and performance of PTTEP. This report is published in July 2024, covering the reporting period for calendar year 2023.

In this report, the content is divided into four pillars in accordance with TNFD recommendations: Governance, Strategy, Risk and Impact Management, and Metrics and Targets.



# 1. GOVERNANCE

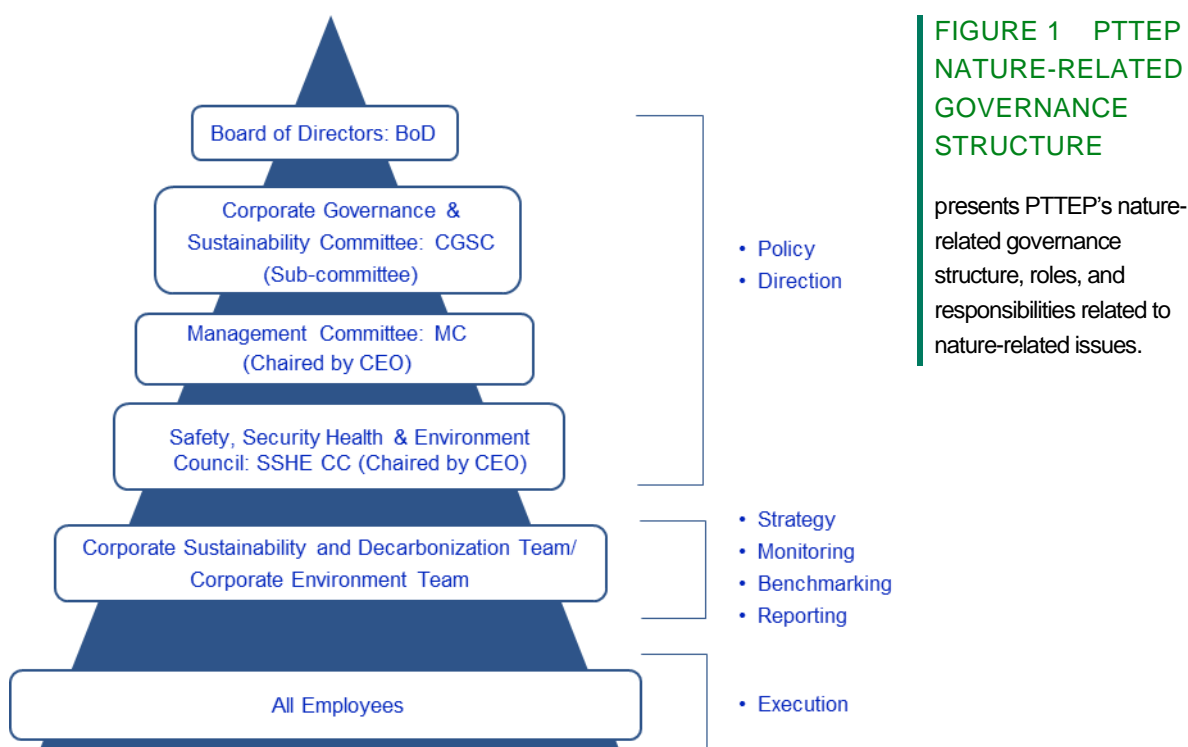
## 1.1 THE BOARD'S OVERSIGHT AND MANAGEMENT RESPONSIBILITIES

PTTEP has robust governance structures and clear lines of accountability to ensure it meets its sustainability, climate change, and biodiversity and ecosystem services commitments. The Board of Directors is responsible for approving the corporate sustainability policy, strategy, framework, and targets, with guidance from the Corporate Governance and Sustainability Committee (CGSC). The CGSC oversees and reviews the performance and effectiveness of PTTEP's sustainability roadmap including nature-related issues in term of dependencies, impacts, risks, and opportunities to PTTEP. This allows the committee to monitor the Company's progress toward achieving its stated sustainability goals as well as nature-related implementations. The CGSC regular meeting agenda covers update on the progress of sustainability issues, including nature-related issues, and status of the current implementations of sustainability initiatives. Strong governance through the Board and CGSC enables PTTEP to effectively deliver on its sustainability, climate change and nature-related objectives.

PTTEP's Management Committee (MC) oversees sustainability performance and supports efforts to close any gaps in underperforming areas, ensuring that sustainability objectives are achieved. The committee reviews the materiality of sustainability issues, integrating nature-related considerations linked to PTTEP's dependencies, impacts, risks, and opportunities. Additionally, to ensure effective implementation of the Company's strategies, the MC is responsible for allocating appropriate resources, including funding and manpower.

The Safety, Security, Health and Environment Management Council (SSHE CC) plays a crucial role in integrating nature-related considerations into the Company's operations and strategies. SSHE CC oversees the management of safety, security, health, and environment matters within PTTEP. Moreover, the SSHE CC manages and monitors the performance of nature-related issues, dependencies, impacts, risks, opportunities, and targets including provides recommendations to address gaps, ensuring that PTTEP stays on track with its environmental roadmaps including those nature-related. The assessment and management of nature's impacts are embedded into PTTEP's core business planning and decision-making processes.

The structure of governance body as well as roles and responsibilities for nature-related issues are shown in **Figure 1** and **Table 1** below.



**TABLE 1 PTTEP'S NATURE-RELATED GOVERNANCE ROLES & RESPONSIBILITIES**

ROLE	RESPONSIBILITY	MEETING FREQUENCY
Board of Directors: BoD	<ul style="list-style-type: none"> <li>• Approve the corporate sustainability annual policies and strategies, including frameworks and targets.</li> <li>• Oversee the nature-related strategy and relevant policies.</li> </ul>	Monthly
Corporate Governance and Sustainability Committee: CGSC (Sub-committee)	<ul style="list-style-type: none"> <li>• Oversee the corporate sustainability strategy and framework including nature-related issues in term of dependencies, impacts, risks, and opportunities to PTTEP.</li> <li>• Oversee the corporate sustainability reporting processes including risk management processes and use of internal and external audit.</li> <li>• Provide directions and monitor nature-related implementation including nature-related roadmap and its performance.</li> </ul>	At least 4 times per year
Management Committee: MC (Chaired by CEO)	<ul style="list-style-type: none"> <li>• Monitor the achievement of sustainability performance including nature-related dependencies, impacts, risks, and opportunities, and supports underperforming gap closing with recommendations.</li> <li>• Review sustainability material issues (including nature-related issues and policies) on the strategies, business directions, investment plans, budget, and human resources of PTTEP and its subsidiaries.</li> </ul>	Weekly

ROLE	RESPONSIBILITY	MEETING FREQUENCY
	<ul style="list-style-type: none"> <li>Review and approve the organization's sustainability reports, ensuring that they accurately and comprehensively reflect the organization's sustainability performance, commitments, and future goals.</li> <li>Ensure adequate resource allocation (funding, manpower, etc.) for effective implementation of the strategy.</li> </ul>	
Safety, Security, Health and Environment Council: SSHE CC (Chaired by CEO)	<ul style="list-style-type: none"> <li>Oversee the management of safety, security, health, and environment including nature-related issues of PTTEP under the umbrella of corporate strategy including sustainability strategy.</li> <li>Review and approve the safety, security, health, and environment related section of PTTEP sustainability reports, ensuring accurate and transparent disclosure of performance data, risks, and mitigation strategies.</li> <li>Conduct/manage nature-related issues, dependencies, impacts, risks and opportunities, and targets, to monitor the performance and effectiveness of the sustainability and environment roadmaps.</li> </ul>	Quarterly
Corporate Sustainability and Decarbonization Team/ Corporate Environment Team	<ul style="list-style-type: none"> <li>Deploy sustainability including nature-related strategies, defines clear roles and ensures effective implementation within their area of responsibility.</li> </ul>	Regularly
All Employees	<ul style="list-style-type: none"> <li>Comply with PTTEP's sustainability including nature-related requirements.</li> <li>Support sustainability including nature-related strategy implementation related to their areas of responsibility.</li> </ul>	Regularly

## 1.2 HUMAN RIGHTS MANAGEMENT AND ENGAGEMENT ACTIVITIES

PTTEP recognizes that it must incorporate human rights considerations into its management of nature-related issues. PTTEP is committed to safeguarding fundamental human rights and preventing abuses across all aspects of its operations, including its supply chain. The Company adheres to international human rights standards while considering local contexts. To mitigate human rights infringements affecting employees, contractors, suppliers, communities, and vulnerable groups in its direct operations, PTTEP has implemented a Human Rights Policy and corresponding management system. Furthermore, PTTEP contributes to societal well-being by ensuring energy security, which is essential for enhancing quality of life.

PTTEP Human Rights policy and management system are guided by international human rights standards, including the United Nations Universal Declaration of Human Rights (UDHR), the United Nations Guiding Principles on Business and Human Rights (UNGP), the UN Declaration on the Rights of Indigenous Peoples,

the United Nations Global Compact (UNGC), and the International Labour Organization Declaration on Fundamental Principles and Rights at Work (ILO).

PTTEP mandates that all its internal operations, including employees, direct activities, products, and services, adhere to its human rights commitment. Additionally, the Company actively encourages external parties such as suppliers, contractors, and business partners to align with these principles. This approach ensures a comprehensive implementation of human rights practices throughout PTTEP's business ecosystem.

### Human Rights Management

PTTEP has integrated a rigorous Human Rights Due Diligence Process into its overarching Human Rights Management System that consists of 6 interconnected steps aligning with multiple international frameworks as shown in the **Figure 2**.



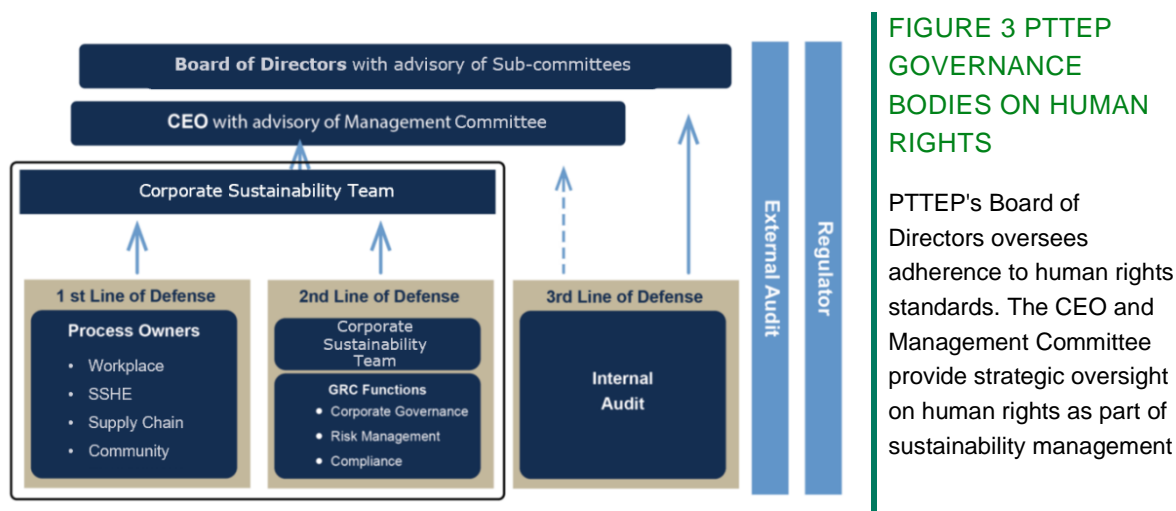
**FIGURE 2 PTTEP  
HUMAN RIGHTS  
MANAGEMENT  
SYSTEM**

1. **Commit:** Commit to supporting the Global Compact and making its ten principles part of the strategy, culture, and day-to-day operations of the Company, with oversight provided by transparent governance structures under the PTT Group Sustainability Management Framework and PTT Way of Conduct. PTTEP ensures that employees at all levels understand and follow PTTEP human rights requirements as stated in in-house training packages.
2. **Assess:** Assess human rights risks and potential impact to operations and business activities at country, industry, and site levels, on an ongoing basis in order to refine strategies, and policies.
3. **Integrate:** Develop and execute risk management plan by applying relevant PTTEP's standards, guidelines and management systems such as Operational Excellence Management System (OEMS), Governance, Risk Management, and Compliance (GRC), Safety, Security, Health and Environment Management system (SSHE MS), Issue and Stakeholder Management System (ISMS) in order to integrate execution into business as usual.
4. **Measure:** Schedule a follow-up according to risk management plan including audit to ensure the effectiveness of the execution. This include establishing channels for affected individuals or group to send their inquiry, concerns or a formal complaint as well as defining effective grievance management mechanism considering accessibility, stakeholder context (e.g., minorities and indigenous), steps to protect grievance filling parties and process to ensure the proper functioning of the mechanism.
5. **Remedy:** Establish a process to provide timely and effective remedy for any harm caused to people's human rights until resolving human rights complaints about PTTEP business.
6. **Report:** Disclose related operation results, as well as progress and outcome of risk management implementation to the stakeholders.

PTTEP's due diligence covers human rights-related risk assessment, mitigation plan and measures for medium-to-high risks and monitoring of such risks. PTTEP's human rights risk assessment is to be conducted every three years with an annual review. This process begins with key functions, including Safety Security

Health and Environment, Corporate Social Responsibility, Human Resource, Stakeholder Management, Risk Management, Supply Chain, and Domestic and International Assets, completing the risk register by adding human rights cases and corresponding mitigation measures. Next, the risk register undergoes validation to identify salient human rights issues. Once these issues are identified, additional measures are determined to lower the associated risks. Finally, these salient issues are integrated into Enterprise Risk Management, ensuring they are addressed comprehensively.

According to **Figure 3**, the human right risks identified as High will be reported to Management Committee level through a Three Lines of Defense Model that embeds human rights risk management across operations. The process owners manage risks as the first line, while the Corporate Sustainability Team and GRC Functions as the second line ensure that risk and control are effectively managed, enabling PTTEP to uphold its human rights commitments. The Third Line of Defense comprising Internal Audit Division and/or other independent audit teams provides an independent assurance by evaluating the compliance and effectiveness of the Company's management systems, control, and governance processes.



### Human Rights Risk Assessment and Stakeholder Engagement

PTTEP's Human Rights Management System clearly defines the required identification of potential human rights issues, which are classified into five main groups based on the involvement of: personnel, communities, supply chain, environment, and security factors. The nature-related identification process has implemented on human right risk assessment covering indigenous people, local communities and related stakeholders who may be affected by PTTEP operations.

With the aim of proactively and systematically identifying and mitigating human rights risks directly or indirectly associated with our activities for both onshore and offshore assets throughout the E&P value chain, ranging from investment (M&A), seismic survey, exploration and appraisal drilling, development and production, employment practices, supply chain management, to security management, PTTEP's human rights risk assessment process, integrated as part of the enterprise risk assessment, is carried out annually with 100% of PTTEP's operations, contractors, and tier-1 suppliers as well as joint ventures.

In addition, this approach is rooted in policies for community relations and human rights including its related guidelines, supported by robust Environmental Impact Assessment (EIA) processes. EIAs support the right to a clean environment by identifying risks, proposing solutions, providing transparent information about potential impacts, and enabling public participation in environmental decision-making. The Company has developed specialized practices for engaging local and indigenous communities about project impacts, benefits, and plans, with a key focus on obtaining free, prior, and informed consent from all impacted groups. PTTEP ensures



equal accessibility and engagement opportunities, particularly for indigenous communities and affected peoples in the consultation processes that directly inform project design.


As part of its commitment to responsible operations, PTTEP conducts public hearings and stakeholder engagements for all projects, with local community participation being an integral part of comprehensive EIAs. Through these assessments, the Company systematically gathers and incorporates community inputs on livelihood impacts, resource dependence, cultural heritage, and mitigation measures. This process ensures that community concerns and cultural needs are fully considered in project development.

To implement these policies effectively, PTTEP has developed guidelines for stakeholder management, involuntary resettlement, grievance and issue handling and human rights management system. These tools address critical social impacts such as community relocation, indigenous peoples' rights, and cultural heritage preservation. By employing this multifaceted strategy, PTTEP strives to conduct its operations responsibly, minimizing negative impacts while fostering positive and mutually beneficial relationships with the communities in which it operates. The Company's approach demonstrates its commitment to ensuring that its projects not only meet operational goals but also contribute positively to the society and culture around PTTEP operational areas.

**Table 2** highlights the mitigation measures for addressing the human rights issues related to environmental impacts from PTTEP's operations as outlined in PTTEP's Human Rights Management System Guideline.

**TABLE 2 PTTEP'S HUMAN RIGHTS ISSUES RELATED TO ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Human Rights Issue related to Environmental Impact	Relevance	Mitigation Measures
Community Health and Safety 	PTTEP is responsible for protecting local communities from hazards caused and/or exacerbated by project activities (including flooding, landslides, contamination or other natural or human-made hazards), disease, and the accidental collapse or failure of project structural elements such as dams. Project-related activities may directly, or cumulatively change community exposure to hazards.	<ul style="list-style-type: none"> <li>• Ensure risks and impacts to community's health and safety are properly assessed for all company's activities.</li> <li>• Ensure adequate preventive measures and/or mitigation are developed to address the issues and minimize negative impacts.</li> <li>• Engage with local communities regarding actual and potential impacts of pollution related to health risks as well as actual and proposed mitigation measures.</li> <li>• Monitor impacts and evaluate effectiveness of impact mitigation measures.</li> </ul>
Access to Water and Sanitation 	The assessment of water-related risks is mandatory to identify sanitation impacts when withdrawing water from local sources and/or discharging wastewater from its operations. There is a risk that the Company exerts pressure on water-stressed	<ul style="list-style-type: none"> <li>• Ensure that water use and water supply, supporting communities and the project, are assessed for water stress levels.</li> <li>• Ensure that the Company's activities do not adversely impact water quality and quantity of, and access to water bodies that support surrounding communities.</li> </ul>

Human Rights Issue related to Environmental Impact	Relevance	Mitigation Measures
	<p>areas, limiting the community's ability to access sufficient amount of clean water. The Company also focuses on efficiency of water use in water-stressed area to ensure no impact to the community.</p> <p>The Company should also ensure that water discharged from operations does not pollute water sources that support surrounding communities.</p>	<ul style="list-style-type: none"> <li>• Ensure that appropriate measures are implemented to prevent or mitigate water conflicts with local communities.</li> </ul>
<p>Land Acquisition and Resettlement</p> 	<p>Land acquisition for project development and operations by the Company can have consequences for the homes, shelters, and sources of livelihood in a community, such as those dependent on land-based or marine activities like fishing or farming.</p> <p>In addition, it can contribute to biodiversity loss.</p>	<ul style="list-style-type: none"> <li>• Set direction to give the highest priority to avoiding loss of natural ecosystems, second to restoring ecosystems, and finally, if the former two actions are not effective or possible, to offset for losses targeting for net gain in ecosystem services over time.</li> <li>• Support or participate in local initiatives on effective natural resources management and biodiversity conservation.</li> <li>• Engage with local communities and relevant stakeholders (e.g., local government agents) to fully understand the concerns or discuss about the nature of the areas that would help with managing impacts on biodiversity.</li> <li>• Support or participate in local initiatives on effective natural resources management and biodiversity conservation.</li> </ul>



## 2. STRATEGY

PTTEP has implemented an Environmental Management System (EMS) that is integrated into its Safety, Security, Health and Environment Management System (SSHE MS). The SSHE MS is also aligned with the International Association of Oil & Gas Producers (IOGP)'s guidelines as well as international standards like ISO 14001:2015 Environmental management System and ISO 45001:2018 Occupational Health and Safety Management System. The EMS covers all exploration, production, decommissioning, transportation, waste management, logistics, and supply chain activities for PTTEP's operational control assets that are certified by a third party and internally verified annually through SSHE internal audit. Prior to new projects, PTTEP requires EIAs that include Health and Social Impact Assessments, with public disclosure. To minimize its environmental footprint, PTTEP sets mitigation measures to minimize and prevent their impacts from operation activities covering climate change, waste, and biodiversity for nature-related aspect which are in line with long-term sustainability (ESG) targets.

PTTEP understands the importance of adhering to all relevant laws and regulations and acknowledges its responsibility to the community, society, and the environment in all its operational areas. This commitment aims to minimize both direct and indirect impacts, including those related to nature.

Through the set of targets oriented around net positive impacts, no net loss in protected areas, avoidance of heritage sites, and no gross deforestation, PTTEP aims to minimize its environmental footprint and make measurable contributions to biodiversity and ecosystem services protection as well as sustainable mitigation action through BES Management System, which follow a mitigation hierarchy of avoid, mitigate, restore, and offset as detailed in section 3 Risk and Impact Management of this report.

### 2.1 NATURE-RELATED ISSUES IN DIRECT OPERATIONS

PTTEP recognizes that there are biodiversity risks associated with the Company's business activities, especially considering the nature of oil and gas upstream sector. The Company conducts Biodiversity and Ecosystem Services (BES) Risk Assessment to assess nature-related risks, including the risk on water scarcity. The assessment of nature-related risks supports PTTEP in the understanding of the impacts of its operation on nature and provides a starting step in mitigation and remediation effort to create a net positive outcome on biodiversity.

A BES risk assessment was initially conducted in 2017 covering 11 sites. In 2023, an additional site was included in the assessment. The assessments cover in total 12 sites under PTTEP's operational control, involving screening for proximity to critical biodiversity. **Table 3** shows the summary of the BES risk assessment. Sinphuhorm, Zawtika, and Yadana sites were identified as medium-risk locations with potential impacts on BES. **Table 4** illustrates their locations.


In addition, PTTEP is expanding the BES risk assessment in 2024 to cover 16 sites, which involves screening for proximity to Protected Areas (PAs) and Key Biodiversity Areas (KBAs).

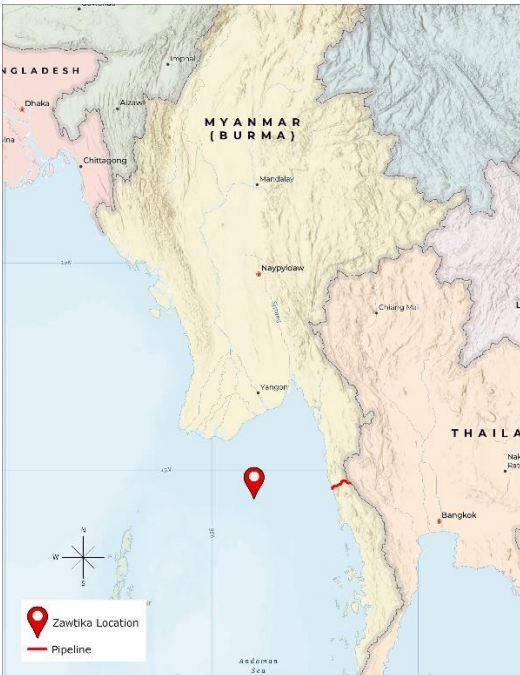
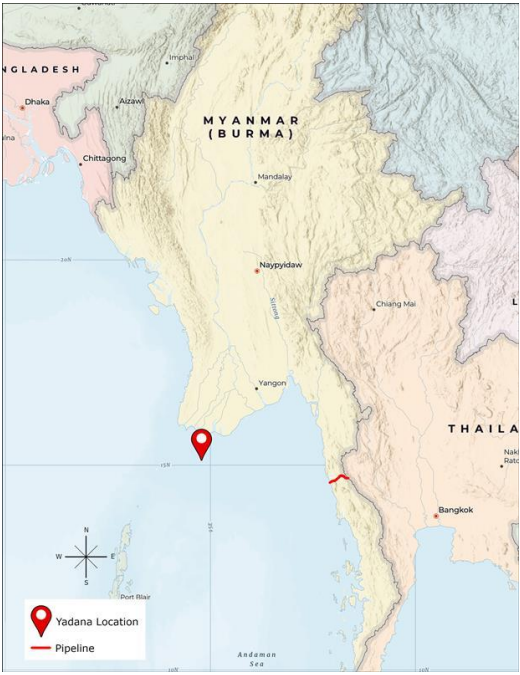


TABLE 3 SUMMARY OF PTTEP BES RISK ASSESSMENT

	Number of sites	Areas (Hectares)
Total number of sites and areas used for operational activities	12	26,437
Total number of sites and areas conducted for biodiversity impact assessments for sites used for operational activities	12	26,437
Total number of sites and areas in close proximity to critical biodiversity	3	143
Total number of sites and areas that have a biodiversity management plan	3	143

TABLE 4 PTTEP'S PRIORITY LOCATIONS IN CLOSE PROXIMITY TO CRITICAL BIODIVERSITY AREAS

Location	Site name	Business Site
	Sinphuhorm, Thailand	The Sinphuhorm Project is located in Udon Thani and Khon Kaen provinces, Thailand. PTTEP is the operator with 80.48 percent direct and indirect participating interests. The natural gas is supplied through the pipeline to EGAT's Nam Phong Power Plant.

Location	Site name	Business Site
	Zawtika, Myanmar	<p>The Zawtika Project is a gas project located in the Gulf of Moattama, Myanmar. PTTEP holds 80 percent participating interest and is the operator. The gas produced from this project supplies to Thai market and domestic consumption in Myanmar.</p> <p>To transport natural gas from Zawtika Project to Thailand, PTTEP and the joint venture partners constructed and operated an offshore and onshore pipeline from the project to the Thai border.</p>
	Yadana, Myanmar	<p>The Yadana Project is a gas field located in the Gulf of Mottama, Myanmar. PTTEP holds 37.0842 percent as the operator.</p> <p>To transport natural gas from Yadana Project to Thailand, PTTEP and the joint venture partners constructed and operated an offshore and onshore pipeline from the project to the Thai border.</p>

The three sites were additionally assessed on the specific BES risk via WWF Biodiversity Risk Filter tool. Sinphuhorm and Zawtika were found to be vulnerable to certain natural hazards such as extreme heat and tropical cyclones. Sinphuhorm site is also at risk of water scarcity, air pollution and fire hazard. The Yadana site faces some reputation risks in relation to protected area and key biodiversity areas. All three sites have some pressures on biodiversity especially impacts from land, freshwater and sea use change, and pollution. PTTEP plans to conduct BES value assessment for project activities located in high-risk sites. The Biodiversity Action Plan and its offset programs for Sinphuhorm and Zawtika had been developed and issued in 2022,

despite the fact that both sites are medium-risk sites. In addition, the Yadana site will be evaluated on its potential impacts on biodiversity and ecosystem services in greater details in 2024. The risk management section will provide a detailed explanation of PTTEP's overall BES risk management processes and steps.

**Table 5** below provides further details on the specific BES risks identified across the three assessed sites, Sinphuhorm, Zawtika and Yadana based on WWF Biodiversity Risk Filter Tool.

TABLE 5 NATURE/BIODIVERSITY-RELATED RISKS FOR SINPHUHORM, ZAWTIKA, AND YADANA

		Risk Types	Risk Level		
			Sinphuhorm	Zawtika & Yadana*	
				On-shore	Off-shore
Scape Physical Risk	1. Provisioning Services	1.1 Water Scarcity	●	●	N/A
		1.2 Limited Timber Availability	●	●	N/A
		1.3 Limited Wild Flora & Fauna Availability	○	○	N/A
		1.4 Limited Marine Fish Availability	N/A	N/A	○
	2. Regulating & Supporting Services - Enabling	2.1 Soil Condition	○	○	N/A
		2.2 Water Condition	●	●	●
		2.3 Air Condition	●	●	N/A
		2.4 Ecosystem Condition	○	○	○
		2.5 Pollination	○	○	N/A
	3. Regulating Services - Mitigating	3.1 Landslides	●	●	N/A
		3.2 Fire Hazard	●	●	N/A
		3.3 Plant/Forest/Aquatic Pests and Diseases	○	○	N/A
		3.4 Herbicide Resistance	○	○	N/A
		3.5 Extreme Heat	●	●	N/A
		3.6 Tropical Cyclones	●	●	N/A
	4. Cultural Services	4.1 Tourism Attractiveness	○	○	○
	5. Pressures on Biodiversity	5.1 Land, Freshwater and Sea Use Change	●	●	●
		5.2 Tree Cover Loss	●	●	N/A
		5.3 Invasives	●	●	●
		5.4 Pollution	●	●	●
Scape Reputational Risk	6. Environmental Factors	6.1 Protected/Conserved Areas	●	●	●
		6.2 Key Biodiversity Areas	●	●	●
		6.3 Other Important Delineated Areas	●	●	●
		6.4 Ecosystem Condition	●	●	●
		6.5 Range Rarity	●	●	●
7. Socioeconomic Factors	7.1 Indigenous Peoples (IPs); Local Communities (LCs) Lands and Territories	N/A	N/A	N/A	

Risk Types		Risk Level		
		Sinphuhorm	Zawtika & Yadana*	
			On-shore	Off-shore
	7.2 Resource Scarcity: Food - Water - Air	●	●	N/A
	7.3 Labor/Human Rights	●	●	N/A
	7.4 Financial Inequality	●	●	N/A
8. Additional Reputational Factors	8.1 Media Scrutiny	●	●	N/A
	8.2 Political Situation	●	●	N/A
	8.3 Sites of International Interest	●	●	●
	8.4 Risk Preparation	●	●	N/A

Very High ●  
 High ●  
 Medium ●  
 Low ●  
 Very Low ●  
 No dependency/Impact ○

Not applicable due to unavailable dependency/impact data – N/A

\*Remark: Zawtika and Yadana, categorized as Oil, Gas & Consumable Fuels industry under WWF Biodiversity Risk Filter tool, share similar nature-related impacts and dependency due to their similarity of geographic location and project characteristics which cover both on-shore and off-shore activities

The prioritization processes were conducted by aiming at identifying those services for which project impacts would be most likely to result in adverse impacts on project affected communities and other beneficiaries. Importance of the ecosystem service and irreplaceability of the ecosystem service are used as matrix for the prioritization processes. The prioritization processes for ecosystem services for the Sinphuhorm and Zawtika were conducted in 2017 with data collected based on status before military coup while that for Yadana was conducted in 2023 in midst of the political situation in Myanmar. The results of the ecosystem service prioritization are shown in **Table 6** below.

**TABLE 6 ECOSYSTEM SERVICE PRIORITIZATION FOR SINPHUHORM, ZAWTIKA, AND YADANA**

Ecosystem Services	Site		
	Sinphuhorm	Zawtika	Yadana
<b>Provisioning Services</b>			
Food: wild meat	Low	Low	Moderate
Food: cultivated crops	Low	Low	Major
Native/wild plants and non-Timber Forest Products (NTFP)	Low	Low	Low
Livestock farming	Low	Low	Major
Timber and wood products	Low	Moderate	Moderate
Biomass fuel	Low	High	High

Ecosystem Services	Site		
	Sinphuhorm	Zawtika	Yadana
<b>Regulating Services</b>			
Erosion regulation	Moderate	Moderate	Moderate
<b>Cultural Services</b>			
Spiritual, religious or cultural value	Low	N/A	N/A
<b>Supporting Services</b>			
Non-use value of Biodiversity - High conservation species in the area are declining	N/A	Moderate	Moderate
Non-use value of Biodiversity - Project area removed the forest area; however, the underground pipeline is restored with revegetated with low growing grass/her/shrub/sapling vegetation on forested lands	N/A	Low	Low

Nature-related risks assessment and ecosystem services allow us to understand how and to what extent different nature issues can lead to financial impacts on PTTEP, such as increased operational costs, revenue loss, asset devaluation, damaged reputation, and legal liabilities. PTTEP will quantify the financial impacts of significant nature-related risks in future.

## 2.2 NATURE-RELATED ISSUES IN VALUE CHAIN

PTTEP's upstream and downstream activities in Thailand have been assessed for biodiversity and ecosystem services risks by focusing on PTT, which is one of the key suppliers and a key customer of PTTEP. From PTT location-specific assessment to identify risk and impact of its operation to the key biodiversity, one high risk area has been identified from its five total operating sites in Thailand: Khanom Natural Gas Separation Plant, in Nakhon Sri Thammarat Province. A summary of PTT biodiversity and ecosystem services risk assessment is shown in **Table 7** below.

**TABLE 7 SUMMARY OF PTT BIODIVERSITY AND ECOSYSTEM SERVICES RISK ASSESSMENT**

	Number of sites	Areas (Hectares)
Total number of sites and areas used for operational activities	5	208.16
Total number of sites and areas conducted for biodiversity impact assessments for sites used for operational activities	5	208.16
Total number of sites and areas in close proximity to critical biodiversity	1	7.52
Total number of sites and areas that have a biodiversity management plan	1	7.52

## 3. RISK AND IMPACT MANAGEMENT

### 3.1 CORPORATE RISK IDENTIFICATION PROCESSES

PTTEP's risk management processes follow the ISO 31000:2018 standard with five key steps: establishing context, risk assessment, risk treatment, monitoring and review, and communication and consultation. Risk management is integrated into core business activities like strategic planning, investment decisions, project management, operations, business continuity, and ESG management. It is implemented at both corporate and operational levels to ensure key risks are managed per the risk appetite, with allocated resources proportional to risk level. Progress on risk mitigation plans and key risk indicators are monitored. Following the Three Lines Model, the risk management unit advises the first line risk owners, coordinates with second line functions like compliance for regulatory monitoring, while the third line internal audit independently audits the performance of risk management implementation across the Company and provides recommendations.

In the corporate risk identification and assessment process, PTTEP considers both internal and external contexts that may impact the Company's objectives and strategies. Key risks identified by risk owners are consolidated into a Corporate Risk Profile (CRP) which is monitored and reported to management committees. PTTEP utilizes a web-based Risk Register System to facilitate risk identification, analysis, and communication across the organization. The Company continuously monitors emerging risks to update risk mitigation plans and adjust corporate strategy, accordingly, enhancing competitiveness and sustainable growth.

Apart from our corporate risk identification and assessment processes, PTTEP conducts and reviews a comprehensive materiality assessment annually. This rigorous process includes identifying potential risks and opportunities associated with each of PTTEP's material issues. In 2023, Biodiversity and Ecosystem Services Management was identified as one of our foundation issues, underscoring its significance to PTTEP's operations and stakeholders.

Risks associated with this material issue include the potential loss of biodiversity and ecosystem services, including habitat areas, which could have short and long-term consequences. Additionally, PTTEP recognizes the risk of decreased cultural and socioeconomic benefits related to biodiversity loss for local communities, both in the short and long term. Failure to properly manage biodiversity impacts could also result in increased financial losses due to remediation costs in the short term, as well as higher investment budgets required for BES programs over the short and long term.

On the other hand, responsible management of biodiversity and ecosystem services presents significant opportunities. By actively working to sustain and restore natural resources, biodiversity, and ecosystem services, PTTEP can contribute to improving the quality of life for local communities and society as a whole, both in the short and long term. Furthermore, minimizing the biodiversity impacts through responsible operations and effective mitigation measures can enhance the reputation and foster stakeholder trust, creating long-term value for the business.

### 3.2 NATURE-RELATED RISK IDENTIFICATION PROCESSES

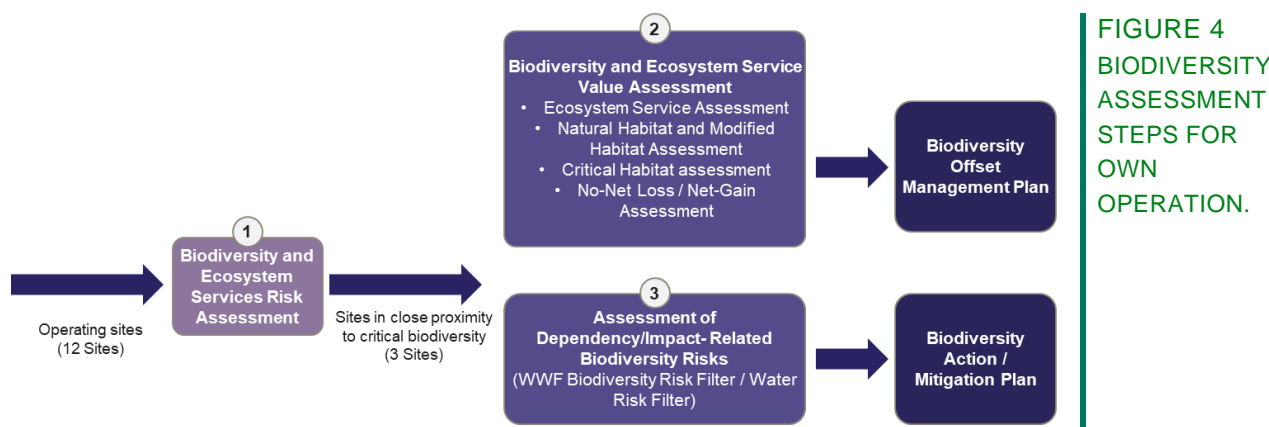
Through its 2023 materiality assessment, PTTEP identified Biodiversity and Ecosystem Services (BES) Management as a foundational material topic and Climate Change as a significant topic.

To further understand the BES risks, PTTEP conducts the BES Risk Assessment. The Company uses various assessment tools to ensure the extensiveness of the assessment, such as IPIECA Global Water Tool for Oil and Gas, WRI Aqueduct, and WWF Biodiversity and Water Risk Filter, Company water risk tool, EIA study on surface water and groundwater management and Integrated Biodiversity Assessment Tool (IBAT).

As described in **Figure 4**, the assessment process utilizes a location-specific methodology with integration of IBAT tool, considering project activities and operations situated near areas of key biodiversity importance to prioritize and classified the sites to high, medium and low risk based on the distance from the site location to



the areas identified as internationally and/or nationally recognized areas of high biodiversity. Siphuorm, Zawtika, and Yadana where they are identified as medium risk will be further assessed in the step 2 for Biodiversity and Ecosystem Services Value Assessment and step 3 for impact and dependency related biodiversity risk assessment via WWF biodiversity risk filter tool. The results of assessment via WWF biodiversity risk filter tool of all 3 sites can be referred to **Table 5**.



The results from these assessments are used to determine a Biodiversity Offset Management Plan aimed at achieving no net loss or net gain of biodiversity and ecosystem services. Currently, the Biodiversity Offset Management Plans were established for Siphuorm and Zawtika excluding Yadana (step 2 in **Figure 4**). In the future, the results from the assessment will also be integrated into PTTEP's company-wide risk management process to enhance the Company's risk management profile to be covered by all aspects of ESG risks.

For PTTEP's value chain, the Company conducted a location-specific biodiversity risk assessment focused on PTT, which serves as both a key supplier and main customer for PTTEP. Out of PTT's five operating sites in Thailand, this assessment identified the Khanom Natural Gas Separation Plant in Nakhon Sri Thammarat province as a high-risk area in terms of potential impacts on key biodiversity zones.

In addition to biodiversity risk assessment, PTTEP has conducted climate-related risk assessment with scenario analysis over short-, mid-, and long-term.

PTTEP recognizes the need for a more comprehensive approach. Going forward, PTTEP will continuously conduct further assessments to identify not only climate-related risk and BES risks but also potential impacts on natural ecosystems and dependencies on ecosystem services through BES Value Assessment as well as expanding the scope for the assessment to cover all own operation and value chain including adjacent areas to own operations, upstream activities, downstream activities as well as new asset acquisitions. The Company aims to continually refine the accuracy of its assessments by regularly monitoring and updating the tools and data used in the evaluation process. This proactive approach ensures timely incorporation of the latest information and methodologies, enabling PTTEP to make well-informed decisions that prioritize environmental sustainability while pursuing growth opportunities. The findings from these expanded assessments will be transparently disclosed in the Company's future TNFD reports.

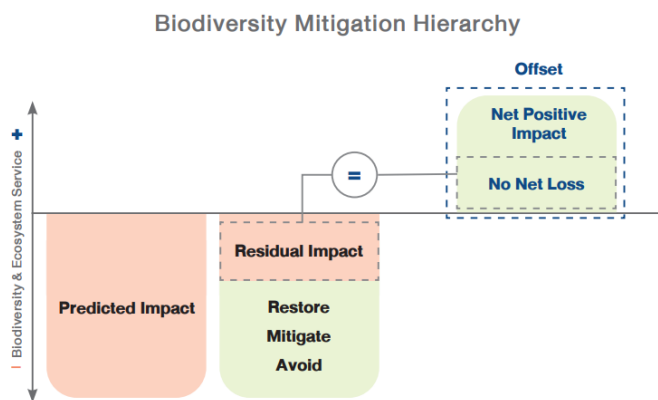
### 3.3 NATURE RISK MANAGEMENT AND MITIGATION ACTIONS

PTTEP developed the BES Management Guideline in line with IPIECA's "A Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector" and International Finance Corporation (IFC)'s Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The BES Management System aims to achieve ambitious environmental targets, including net positive impacts, prevention of loss in protected areas, and elimination of gross deforestation (refer to metrics and



target's part). The BES Management System follows a mitigation hierarchy of avoid, reduce and restore at all operational sites before offset. PTTEP improves BES value through offsetting programs, primarily under the Ocean for Life strategy and Decarbonization strategy on its forestation. PTTEP conducts biodiversity risk assessments integrated into Environmental Impact Assessments for all Exploration and Production projects. For high-risk projects, Biodiversity Action Plan and its offset programs are developed to prevent endangered species loss and protect ecosystem services in line with PTTEP commitments. PTTEP has taken the initiative to develop Biodiversity Offset Management Plan (BOMP) proactively for two medium-risk sites. Through these efforts, PTTEP strives to minimize its environmental footprint while making significant contributions to biodiversity protection and ecosystem preservation across its operations. **Figure 5** illustrates the use of mitigation hierarchy for BES Management.



**FIGURE 5 PTTEP'S USE OF MITIGATION HIERARCHY FOR BES MANAGEMENT**

PTTEP's Biodiversity and Ecosystem Services (BES) Management System follows a mitigation hierarchy at all operational sites

#### ***Avoid - Prevent impacts from occurring.***

PTTEP is committed to implementing avoidance measures, i.e., measures to 'design out' an impact or risk to prevent impacts expected on biodiversity and ecosystem services. Designing out also includes avoiding deforestation in the operational sites to meet our commitment of Achieving No Gross Deforestation and contributing towards the goals and targets in the Global Biodiversity Framework (GBF). The Company will also employ design criteria to evaluate all infrastructure development options and look at alternatives when significant impacts to BES are likely. The key good practice avoidance measures include:

- Avoid developing in nationally or internationally recognised areas of high biodiversity and ecosystem services value which include:
  - UNESCO World Heritage Sites
  - Wetlands listed in the Ramsar list of sites.
  - UNESCO Man and the Biosphere (MAB) reserves
  - Alliance for Zero Extinction (AZE) sites
- Avoid clearing forested areas for the development of project facilities.

#### ***Mitigate – Reduce the duration, intensity, or extent of impacts.***

PTTEP is committed to implementing mitigation measures in place in the event that avoidance cannot be fully implemented. These measures aim to reduce the severity of impacts on BES by restricting or managing the source of impact at production facilities that are under development or operation. PTTEP reduces BES risks by integrating the minimization measures into the EIA of all E&P projects as well as impose mitigating plan at projects with a BES risks.

Moreover, PTTEP updates the Vendor Sustainable Code of Conduct to ensure the effective protection and preservation of the BES and compliance with all commitments. The Code of Conduct was integrated as part of the pre-qualification system for vendor acknowledgment. To monitor the compliance of vendors and suppliers and increasing their awareness on BES risks, they will be tracked via the acknowledgment on the electronic system.

***Restore/ Regenerate- Rehabilitate degraded ecosystems.***

PTTEP seeks to restore/regenerate areas where impacts cannot be prevented in the operational areas and nearby as much as possible. PTTEP aims to restore or rehabilitate any biodiversity that may have been affected. This involves activities such as habitat restoration, reforestation, or the creation of artificial habitats to ensure the biodiversity and ecological functions are restored closely to a level comparable to the pre-development condition. PTTEP's reforestation considers about involving native species and approaches that positively contribute to local livelihood. These programs play a crucial role in fostering biodiversity and ecosystem development, promoting sustainability.

***Offset - Compensate for any residual, unavoidable impacts.***

The residual impacts remain after implementing avoidance, minimization, and restoration measures, the offset in the final step is to provide compensation or offset measures outside PTTEP's operational areas and nearby. This involves implementing conservation actions elsewhere to compensate for the remaining impacts. PTTEP will seek to assess the need for, and feasibility of achieving no net loss of biodiversity and net positive impact for its production facilities with negative biodiversity impacts through compensation/offset measures. Such measures will be developed in line with international best practice such as the Principles on Biodiversity Offsets developed by the BOMP.

***Transform - Contribute to system-wide change, notably to alter the drivers of nature loss.***

In addition, PTTEP has implemented some projects in a transformative action to address biodiversity loss by integrated ecosystem monitoring and conservation system that combines advanced technology, open data access, and community education. For example, the project that use survey drones, satellites, and Artificial Intelligence (AI) models to analyze forestation areas, enabling effective management of large green spaces for carbon credit calculation and wildfire risk identification. The initiative also includes the establishment of an aquatic animal hatchery learning center, serving to conserve aquatic species while promoting sustainable aquaculture practices as well as integrating cutting-edge technology, data transparency, and hands-on education to drive systemic change in monitoring and protecting both terrestrial and aquatic ecosystems.

The details of BES management projects and their actions show in **Table 8** below.

**TABLE 8 PTTEP'S BES MANAGEMENT PROJECT AND ACTIONS**

BES Management Project	Objective	Actions
Environmental Management Implementation [PTTEP All Own Operations]	To prevent activities or projects that could significantly harm biodiversity, PTTEP prioritizes avoiding operations in critical biodiversity areas, including UNESCO World Heritage sites, and ensures designs that do not result in gross deforestation.	Avoid:  Avoid operating in any UNESCO-designated World Heritage sites.  No Gross Deforestation for its exploration and production activities.

BES Management Project	Objective	Actions
<p>Environmental Management Implementation [PTTEP All Own Operations]</p>	<p>To reduce the severity of impacts on BES by restricting or managing the source of impact at production facilities that are under development or operation. The provided mitigation measures were set and implemented in place to reduce BES risks by integrating into environmental management plans.</p>	<p>Mitigate:</p> <p>Zero Waste to Landfills - to achieve zero waste to landfills by 2030 for all operating assets both in Thailand and overseas as well as conduct regular audits and reviews of the waste management practices at operating sites and those of waste treatment and disposal contractors.</p> <p>Spill Risk Management - To minimize environmental impact from potential spills through a comprehensive risk management approach.</p> <p>Decarbonization Strategy - To achieve the target of Net Zero GHG Emission by 2050, PTTEP implements the GHG emission reduction projects (scope 1 and 2) by means of flare/excess gas recovery and utilization, energy efficiency improvement, production efficiency improvement and methane leak reduction.</p>
<p>Water Resource Management [PTTEP All Own Operations]</p>	<p>To prevent the issues on water quality and water scarcity in neighboring communities. The Company also improves the water efficiency and water conservation and emphasize on the importance of leakage detection programs, maintenance, and the reduction of water losses from unnecessary activities.</p>	<p>Mitigate:</p> <p>Water Resource Conservation – PTTEP initiated water resources conservation and water bank projects with local communities in the water stress area and maintains the operations continually.</p> <p>Produced Water Management - To achieve zero produced water discharge in its Thai operations both onshore and offshore assets. This is accomplished by reinjecting the water into depleted oil and gas reservoirs and another technique, as described in its EIA.</p>
<p>Rig to Reef</p>	<p>To maintain and enhance marine biodiversity and ecosystem services by repurposing offshore petroleum rigs as artificial reefs, benefiting both marine life and nearby coastal communities.</p>	<p>Restore:</p> <p>The project will restore the marine biodiversity and ecosystem services around the reef area.</p>

BES Management Project	Objective	Actions
Riparian Restoration Program	<ul style="list-style-type: none"> <li>To increase biodiversity and related ecosystem services within riparian corridors and increase habitat connectivity.</li> <li>To improve water quality to support dependent biodiversity.</li> <li>To improve watershed hydrology and stability/resilience.</li> </ul>	<p>Restore/Offset:</p> <p>To provide financial support for the riparian restoration programs.</p> <p>PTTEP is in the process of preparing action plans for implementing these programs.</p>
Reforestation Project of Zawtika Asset	<ul style="list-style-type: none"> <li>To restore the ecological system for the TNR Project.</li> </ul>	<p>Restore/Offset:</p> <p>PTTEP resumed providing financial support for the ecological restoration programs in the TNR and offset area in 2023.</p>
Alien Invasive Species (AIS) Control Program	<ul style="list-style-type: none"> <li>To increase native flora diversity and habitat for associated species.</li> <li>To prevent the spread of AIS to currently unimpacted outlying areas.</li> </ul>	<p>Regenerate/Offset:</p> <p>To provide financial support for the AIS control programs.</p> <p>PTTEP is in the process of preparing action plans for implementing these programs.</p>
Reforestation Project of Sinphuhorm Asset	<p>To reforest in degraded/deforested areas by using native trees and shrubs with local authorities and communities including raising awareness on biodiversity and participating in the restoration of the ecosystem.</p>	<p>Offset:</p> <p>PTTEP provides financial support for reforestation projects such as in Khoi Nang Waterfall Forest Park in Udon Thani Province, Phan Don and Pa Do Reserved Forests in Udon Thani Province, and Khok Sung-Ban Dong Forest in Khon Kaen Province).</p>
Terrestrial Forestation under Decarbonization Strategy	<p>To align with Thailand's 30x30 target to protect and conserve 30 percent of land and sea and expedite greenhouse gas offsetting to achieve PTTEP's Net Zero Greenhouse Gas Emissions in 2050 through reforestation projects (CO<sub>2</sub> removal initiatives) with various organizations.</p>	<p>Offset:</p> <p>PTTEP signed a Memorandum of Understanding (MOU) for the "Two-Million-Rai Reforestation Project of PTT Group." As part of the Company's contribution, PTTEP has collaborated on reforestation initiatives with several organizations, including the Royal Forest Department (RDF), the Department of National Parks, Wildlife, and Plant Conservation (DNP), and the</p>

BES Management Project	Objective	Actions
		Mae Fah Luang Foundation under Royal Patronage (MFLF).
Sustainable Community around the Ocean initiatives under Ocean for Life Strategy	To increase biodiversity and restore resources in the Thai seas, while creating jobs and improving community income for communities around our operation areas, covering 17 provinces in the Gulf of Thailand (GoT) through several CSR projects.	<p>Offset:</p> <ul style="list-style-type: none"> <li>• Mangrove Forestation - to create coastal nurseries by expanding mangrove forests to cover 45,000 rais of land, the project serves as a natural carbon sink, increases benthos species, and establishes a forest and environment conservation network.</li> <li>• Conservation Area &amp; Fish Home - to promote, preserve, and increase the abundance of various marine life in the 17 provinces along the GoT, while bolstering local economic strengths, the project involves marking coastal conservation areas with buoys and building fish homes at aquatic animal learning centers. These initiatives aim to increase marine biodiversity and provide sustainable income for fishing communities.</li> <li>• Aquatic Animal Hatchery Learning Center - to establish an aquatic animal hatchery learning center to conserve and promote economic aquatic animal aquaculture.</li> <li>• H.T.M.S. Underwater Learning Site Project - a man-made dive site, built to be a new home for corals and marine animals as well as to reduce impacts on the natural coral reefs that are recovering from coral bleaching.</li> </ul>
Sustainable Ocean Health and Blue Carbon Solutions initiatives under Ocean for Life Strategy	<ul style="list-style-type: none"> <li>• To conserve and rehabilitate the marine ecosystem.</li> <li>• To use PTTEP's strengths in offshore locations and advanced technology to support Thailand's</li> </ul>	<p>Transform:</p> <ul style="list-style-type: none"> <li>• Installation of telemetry marine monitoring stations at offshore petroleum platforms located in the GoT – to utilize offshore operation</li> </ul>

BES Management Project	Objective	Actions
	<p>Ocean Health Index (OHI) and to enhance carbon sink by terrestrial and mangrove forestation.</p>	<p>sites to collect meteorological data and oceanographic data to support the advancement of marine science studies and research in Thailand and promote the effective management of marine and coastal resources.</p> <ul style="list-style-type: none"> <li>• Development of ocean current mapping and seawater surface temperature study through the use of current mapper buoys and satellite tracking - To conduct scientific study of the ocean covering temperature and currents at the seawater surface through the use of current mapper buoys equipped with temperature sensor with location tracking by satellite technology.</li> <li>• Microplastic baseline and offshore monitoring in the Gulf of Thailand – to utilize offshore operational sites to create microplastic baseline data and quantity monitoring to define the marine debris situation in the GoT.</li> <li>• Coral bleaching and biodiversity monitoring in coral reef areas using drone’s multispectral imaging application – to gather data and ecosystem mapping development to track changes in coral bleaching.</li> <li>• Application of underwater camera &amp; AI software for aquatic animal identification under offshore petroleum platforms in the GoT - to monitor aquatic animals and to obtain the biodiversity baseline information.</li> </ul>

BES Management Project	Objective	Actions
Ocean Data Platform	To collect marine science data using PTTEP offshore platforms, including meteorological and oceanographic data, and information from other initiatives from the "Ocean for Life" strategy.	Transform:  PTTEP publicly discloses the ocean science data and information from Sustainable Ocean Health and Blue Carbon Solutions initiatives under the Ocean for Life Strategy, providing broad benefit to ocean scientists and agencies, researchers, and students. It may also lead to the development of various ocean conservation programs and prediction models for climate change and biodiversity.
Smart Forest Solution	To analyze forestation area through the use of survey drones, satellites, and proprietary AI models for enabling the monitoring and management of large green areas for carbon credit calculation and risk identification of possible wildfires.	Transform:  Smart Forest Solution, developed by VARUNA, under the group of AI and Robotics Ventures Company Limited (ARV), a subsidiary of PTTEP – To aid in the processing and management of forest areas, with a specific focus on reducing GHG emissions and enhancing CO <sub>2</sub> sequestration. It utilizes multispectral survey drones, satellite imagery, and AI technology to monitor and analyze changes in green areas and detect potential wildfires and hot spots, enabling precise planning for forest conservation and reforestation.

The actions mentioned in **Table 8** were implemented to minimize impact related to the BES management projects while enhancing and supporting the Company's commitment to achieving sustainable goals related to environmental matters on SDG 13: Climate Action, 14: Life Below Water and 15: Life on Land through the GHG management via Decarbonization Strategy, BES via Ocean for Life Strategy. In 2023, PTTEP invested over USD 148.6 million in nature-related initiatives. This investment included direct BES management spending of more than USD 148.4 million and contributions exceeding USD 0.2 million to various associations and authorities supporting nature-related initiatives, as shown in **Table 9**. In future analyses, the Company will also quantify the financial impacts of significant nature-related risks.

**TABLE 9 PTTEP'S SPENDING FOR BES MANAGEMENT AND CONTRIBUTION TO ASSOCIATIONS/AUTHORITIES IMPLEMENTING NATURE-RELATED INITIATIVES**

Natural Resource Management and Social Development Initiatives	2023 Investment (Million USD)
<b>BES Management Spending</b>	<b>148.4</b>
<ul style="list-style-type: none"> <li>• Environmental Management Expenditure (i.e., waste disposal, emission treatment, remediation cost, prevention and environmental management cost)</li> </ul>	113.9
<ul style="list-style-type: none"> <li>• Decarbonization Strategy Expenditure               <ul style="list-style-type: none"> <li>○ <i>GHG Emissions Reduction</i></li> <li>○ <i>Offsetting (i.e., forest conservation and restoration and study of blue carbon solutions)</i></li> </ul> </li> </ul>	22.0
<ul style="list-style-type: none"> <li>○ <i>GHG Emissions Reduction</i></li> <li>○ <i>Offsetting (i.e., forest conservation and restoration and study of blue carbon solutions)</i></li> </ul>	18.0
<ul style="list-style-type: none"> <li>○ <i>Offsetting (i.e., forest conservation and restoration and study of blue carbon solutions)</i></li> </ul>	4.0
<ul style="list-style-type: none"> <li>• Ocean for Life Strategy Expenditure               <ul style="list-style-type: none"> <li>○ <i>Sustainable Ocean Health and Blue Carbon Solutions workstream and PTTEP Ocean Data Platform</i></li> <li>○ <i>Sustainable Community around the Ocean workstream (i.e., Conservation Area &amp; Fish Home H.T.M.S. Underwater Learning Site Project, Aquatic Animal Hatchery Learning Center)</i></li> </ul> </li> </ul>	2.6
<ul style="list-style-type: none"> <li>○ <i>Sustainable Ocean Health and Blue Carbon Solutions workstream and PTTEP Ocean Data Platform</i></li> <li>○ <i>Sustainable Community around the Ocean workstream (i.e., Conservation Area &amp; Fish Home H.T.M.S. Underwater Learning Site Project, Aquatic Animal Hatchery Learning Center)</i></li> </ul>	1.2
<ul style="list-style-type: none"> <li>○ <i>Sustainable Community around the Ocean workstream (i.e., Conservation Area &amp; Fish Home H.T.M.S. Underwater Learning Site Project, Aquatic Animal Hatchery Learning Center)</i></li> </ul>	1.4
<ul style="list-style-type: none"> <li>• CSR Project Spending in 4 Aspects (Basic Needs, Education, Environment and Culture to Support Community around Operations               <ul style="list-style-type: none"> <li>○ <i>CSR projects and activities</i></li> <li>○ <i>Donations to support stakeholders' expectations</i></li> </ul> </li> </ul>	9.9
<ul style="list-style-type: none"> <li>○ <i>CSR projects and activities</i></li> <li>○ <i>Donations to support stakeholders' expectations</i></li> </ul>	8.0
<ul style="list-style-type: none"> <li>○ <i>Donations to support stakeholders' expectations</i></li> </ul>	1.9
<b>Association and Authority Contribution</b>	<b>0.2</b>
<ul style="list-style-type: none"> <li>• International Association of Oil and Gas Producers (IOGP)</li> <li>• International Petroleum Industry Environmental Conservation Association (IPIECA)</li> <li>• United Nations Global Compact (UNGC) via Global Compact Network Thailand (GCNT)</li> <li>• Thailand Business Council for Sustainable Development (TBCSD)</li> </ul>	

Apart from mitigation hierarchy, PTTEP takes a multi-pronged approach to environmental sustainability and mitigating ESG risks through technological innovations and active stakeholder engagement.

On the technology front, the Company invests in new technologies and research developments to minimize nature-related impacts and risks using available tools as of the present time. PTTEP has its climate-related



mitigation plans that include transitioning towards adopting lower-emission technologies, as detailed in the Annual Report 2023. For example, PTTEP has presently a total spending on technology and innovation development related to GHG management at USD 2.2 million and allocated capital expenditure budget to energy transition businesses amounting to USD 29.5 million.

Complementing these technological efforts is PTTEP's emphasis on stakeholder engagement and collaboration on biodiversity and ecosystem services. The Company monitors ocean health and biodiversity by working closely with governments, leading universities, independent sustainability organizations, and other stakeholders. A key initiative is the PTTEP ocean data platform, which integrates national databases to track underwater biodiversity, endangered marine species, and coastal ecosystem data gathered through advanced drone surveys. The data are to be used as the key inputs for researchers and related authorities to support ocean sustainability.

Moreover, PTTEP prioritizes engagement with its broader stakeholder base to address increasing ESG concerns and maintain high ESG performance standards. The Company employs a multi-stakeholder approach to identify and mitigate potential ESG risks proactively.

## 4. METRICS AND TARGETS

### 4.1 TARGETS AND GOALS

PTTEP recognizes the critical importance of adhering to applicable laws and regulations while also upholding its responsibilities to communities, society, and the environment across all operational sites. The Company is committed to minimizing both direct and indirect environmental impacts, addressing key issues such as spillage prevention, climate change mitigation, biodiversity protection, waste reduction, air quality improvement, and water resource management. Through these efforts, PTTEP has cultivated trust among its stakeholders and exemplified core values that prioritize the prudent use of natural resources, proactive environmental care, conservation practices, and sustainable operational management. This approach reflects PTTEP's dedication to balancing business objectives with environmental preservation and social responsibility, positioning the Company as a responsible leader in the energy sector.

To demonstrate its dedication to biodiversity and ecosystem services conservation and prevention of deforestation, PTTEP has set the following targets<sup>1</sup>, which are aligned with SDG 14: Life below Water and/or SDG 15: Life on Land as follows:

- Avoid operating in any UNESCO-designated World Heritage sites.
- Achieve No Gross Deforestation<sup>2</sup> for its exploration and production activities starting from 2021 onwards.
- Achieve Net Positive Impact on ocean biodiversity and ecosystem services value across all offshore operations by 2030, compared to base year 2019.
- Achieve No Net Loss of biodiversity in protected areas categorized as IUCN Category I-IV by 2044.
- Conserve and restore 256,000 rai of forestations by 2028.
- Achieve zero total waste to landfill by 2030.
- Establish 16,000 conservation networks by 2030.

<sup>1</sup> The first four target covering all PTTEP's own operations and adjacent areas, including existing and future operations globally, as well as all contractors, suppliers within PTTEP direct and indirect value chain for both PTTEP upstream and downstream activities.

<sup>2</sup> The Food and Agriculture Organization (FAO) defines a forest as natural forests and forest plantations that have tree canopy covers more than 10 percent and areas of more than 0.5 hectare. The trees should be a minimum height of 5 meters. Forests are determined both by the presence of trees and the absence of other predominant land uses.

Beyond biodiversity and ecosystem services, PTTEP also set ambitious goals for direct operations covering various nature-related topics and are aligned with SDG 6: Clean Water and Sanitation, SDG 12: Responsible Consumption and Production and/or SDG 13: Climate Action as follows:

- Avoid operation in areas at risk from water scarcity and ensure no negative impact on the community and water users.
- Achieve zero total waste to landfill by 2030.
- Achieve zero oil and chemical spill.
- Achieve Net Zero Greenhouse Gas Emissions (Scope 1 and Scope 2) by 2050.
- Reduce GHG emissions intensity by at least 30% within 2030 and 50% within 2040 (from base year 2020).

The overall nature-related goals, targets and progresses for PTTEP in year 2023 are illustrated in **Table 10**.

Additionally, PTTEP is committed to nature preservation through initiatives like the "Ocean for Life". This comprehensive strategy aims to restore and sustainably manage marine ecosystems, ensuring the vitality of marine resources crucial for coastal communities. By collaborating closely with local governments, agencies, educational institutions, and communities, PTTEP strives not only to mitigate climate impacts but also to enhance biodiversity and ecosystem services, safeguarding the marine biodiversity and promoting sustainability of the nearshore communities around our operation areas.

**TABLE 10 NATURE-RELATED STRATEGY GOALS, TARGETS AND PROGRESSES**

Target	2023 Progress
Net Positive Impact on ocean Biodiversity & Ecosystem Services (BES) value for all offshore operations by 2030, compared to 2019 base year	68% Progress to Net Positive Impact
Achieve No-Net Loss (NNL) of biodiversity in the International Union for Conservation of Nature (IUCN) Category I-IV protected areas by 2044.	Developed Biodiversity Offset Management Plan for the Zawtika Onshore Gas Transportation project in the Republic of the Union of Myanmar, located in an IUCN protected area, to define effective ways forward to achieve no-net loss.
Avoid operation in World Heritage sites as defined by UNESCO	None of new operating sites are located in any UNESCO-designated World Heritage sites
No Gross Deforestation for exploration and production projects from 2021 onwards	No deforestation from exploration and production activities since 2021
Conserve and restore 256,000 rai of forestations by 2028	Conserved and restored 29,537 rai of land forests
Achieve zero oil and chemical spill	Oil and chemical spill rate of 0.22 tonnes per million tonne production (better than IOGP avg. of 0.42)

Target	2023 Progress
Establish 16,000 conservation networks by 2030	Established 5,795 conservation networks (36% progress)
Achieve Net Zero Greenhouse Gas Emissions by 2050 for E&P business covering scope 1 and scope 2 under PTTEP's operational control	208.0 tonnes CO <sub>2</sub> equivalent/ thousand tonne production
Reduce GHG emissions intensity by at least 30% within 2030 and 50% within 2040 (from base year 2020)	GHG emissions reduction of 0.9 million tonnes of CO <sub>2</sub> equivalent
Achieve zero total waste to landfill by 2030	421 tonnes remaining to landfill disposal
No operation in areas at risk from water scarcity and ensure that there is no impact on the community and water users.	No PTTEP operations are located in areas at risk of water scarcity.

## 4.2 PERFORMANCE METRICS

In 2023, PTTEP reached the following achievements, demonstrating our strong commitment to conserve biodiversity and prevent deforestation.

- No gross deforestation in E&P in 2023.
- 68% net positive impact on ocean BES values for offshore operations.
- Myanmar Asset continued to provide funding for TNR Project to undertake on-site rehabilitation/restoration.
- BOMP for Yadana is in progress and planned to roll-out in Q4 2024.
- BOMP implementation for and Sinphuhorm, achieved 100% (383 rai) target for forest restoration in collaboration with the Royal Forest Department.
- 5,759 of conservation networks.
- Planted and maintained a 4,007 rai mangrove forest and is progressing towards T-VER registration with TGO, along with land forests covering 5,530 rai of land. Additionally, involved partnerships with the Mae Fah Luang Foundation, focusing on community engagement to conserve and restore 20,000 rai of community forests.
- Collaborated with Kasetsart University's Fisheries Faculty to monitor seagrass plantation survival rates in Surat Thani Province and partnered with the Department of Marine and Coastal Resources to evaluate CO<sub>2</sub> sequestration in seagrass area in Chumphon Province.
- More than 8,000 views of PTTEP's Ocean Data Platform that includes meteorological and oceanographic data and PTTEP's project implementation.

Please find more details on PTTEP's 2023 Annual Report.

**Table 11** shows further metrics from PTTEP's performance.

TABLE 11 PTTEP'S NATURE RELATED METRICS

Driver of Nature Change	Metric no.	Metric	Unit	2022			2023		
				Thailand	Oversea	Global	Thailand	Oversea	Global
Climate Change		Total GHG emissions: Scope 1	tCO <sub>2</sub> e	4,361,216	1,349,439	5,710,655	5,025,055	1,719,172	6,744,227
		Total GHG emissions: Scope 2		8,259	6,659	14,918	8,542	8,781	17,323
		Other relevant indirect GHG emissions: Scope 3 <i>Comprised of (1) business Travel, and (2) downstream transportation and distribution</i>		16,356	1,472	17,828	23,681	2,770	26,451
Land Use Change	C1.0/C1.1	Total surface area controlled/managed by the organisation	Hectare	11,117	1,315	12,432	24,637	1,800	26,437
	Additional	Total number of sites in close proximity to critical biodiversity area	No. of site	1	1	2	1	2	3
	Additional	Total areas in close proximity to critical biodiversity area	Hectare	5	66	71	5	138	143
Pollution	C2.1	Total volume of wastewater discharged	Million m <sup>3</sup>	8.64	4.96	13.6	13.19	2.98	16.17
		- Discharged to freshwater		0	0	0	0	0	0
		- Discharged to other water		8.64	4.96	13.6	13.19	2.98	16.17
	C2.2	Total volume of waste	Tonnes	232,492	1,013	233,505	422,144	15,648	437,792
		- Hazardous waste		50,592	917	51,509	49,674	1,048	50,722
		- Non-hazardous waste		181,900	96	181,996	372,470	14,600	387,070
		Total waste diverted from disposal		266,213.0	17.2	266,230.2	414,227.2	14,352.8	428,580.0
		Total hazardous waste diverted from disposal		42,990.0	0.1	42,990.1	42,967.0	5.0	42,972.0
		- Hazardous waste prepared for reused		0.0	0.1	0.1	0.0	4.0	4.0
- Hazardous waste prepared for recycling	42,990.0	0.0	42,990.0	42,967.0	1.0	42,968.0			
Pollution (Continued)	C2.2 (Continued)	- Hazardous waste prepared for other recovery operation	Tonnes	0.0	0.0	0.0	0.0	0.0	0.0
		Total non-hazardous waste diverted from disposal		223,223.0	17.1	223,240.1	371,260.2	14,347.8	385,608.0

Driver of Nature Change	Metric no.	Metric	Unit	2022			2023		
				Thailand	Oversea	Global	Thailand	Oversea	Global
		- Non-hazardous waste prepared for reused		0.0	0.1	0.1	0.0	0.4	0.4
		- Non-hazardous waste prepared for recycling		2,352.00	17	2,369.00	1,235.00	92	1,327.00
		- Non-hazardous waste prepared for other recovery operation		220,871.00	0	220,871.00	370,025.20	14,255.40	384,280.6
		Total waste directed to disposal		8,765.9	240.1	9,006	8,712.00	2,530	11,242
		Total hazardous waste directed to disposal		7,307.9	165.1	7,473	6,649	2,267	8,916
		- Hazardous waste incineration (w/energy recover)		6,488.9	20.4	6,509	4,663	30	4,693
		- Hazardous waste incineration (w/o energy recover)		649.9	0.3	650	1,780	2,088	3,868
		- Hazardous waste sent to landfill		0	116.7	117	0	140	140
		- Hazardous waste sent to other disposal operations		169.2	27.6	197	206	9	215
		Total non-hazardous waste directed to disposal		1,458	75	1,532	2,063	263	2,326
		- Non-hazardous waste incineration (w/energy recover)		776.6	0	777	717	0	717
		- Non-hazardous waste incineration (w/o energy recover)		608.4	0.2	609	1,261	43	1,304
		- Non-hazardous waste sent to landfill		73	74.8	148	63	218	281
Pollution (Continued)	C2.2 (Continued)	- Non-hazardous waste sent to other disposal operations	Tonnes	0	0	0	22	2	24
		Total Hazardous & Non-Hazardous drilling mud and cutting waste		221,174	0	221,174	304,463	14,210	318,673
	C2.4	Total Nitrogen oxides		10,842	6,513	17,355	18,692	10,628	29,320
		Total VOCs		15,024	9,570	24,594	16,560	10,851	27,411
		Total Sulfur oxides		714	488	1,202	1,399	864	2,263

Driver of Nature Change	Metric no.	Metric	Unit	2022			2023		
				Thailand	Oversea	Global	Thailand	Oversea	Global
	Additional	The number of hydrocarbon spills case	No. of case	6	2	8	7	3	10
	Additional	The volume of hydrocarbon spills	Tonnes	4.14	15.30	19.44	6.62	0.46	7.08
Natural Resource Use & Exploitation	C3.0	Total water withdrawal from all areas	Million m <sup>3</sup>	49.08	51.35	100.43	51.67	33.11	84.78
		- Total surface water withdrawal		0	0.03	0.03	0.02	0.03	0.05
		- Total groundwater withdrawal		0.54	0	0.54	0.39	0.02	0.41
		- Total seawater withdrawal		39.95	46.36	86.31	38.39	30.07	68.46
		- Total produced water		8.46	4.96	13.42	12.57	2.98	15.55
		- Total third-party water withdrawal		0.13	0.01	0.14	0.29	0.01	0.3
		Total water withdrawal from water stress areas		5.94	0	5.94	7.67	0	7.67
		- Total surface water withdrawal		0	0	0	0	0	0
		- Total groundwater withdrawal		0.54	0	0.54	0.39	0	0.39
		- Total seawater withdrawal		0	0	0	0	0	0
		- Total produced water		5.38	0	5.38	7.18	0	7.18
		- Total third-party water withdrawal		0.03	0	0.03	0.1	0	0.1
Natural Resource Use & Exploitation	C3.0	Total net freshwater consumption	Million m <sup>3</sup>	0.53			0.14		
		- Water withdrawal (excluding saltwater)		14.13			16.31		
		- Water discharge (excluding saltwater)		13.6			16.17		
		Total water consumption from water stress area		0.57			0.49		