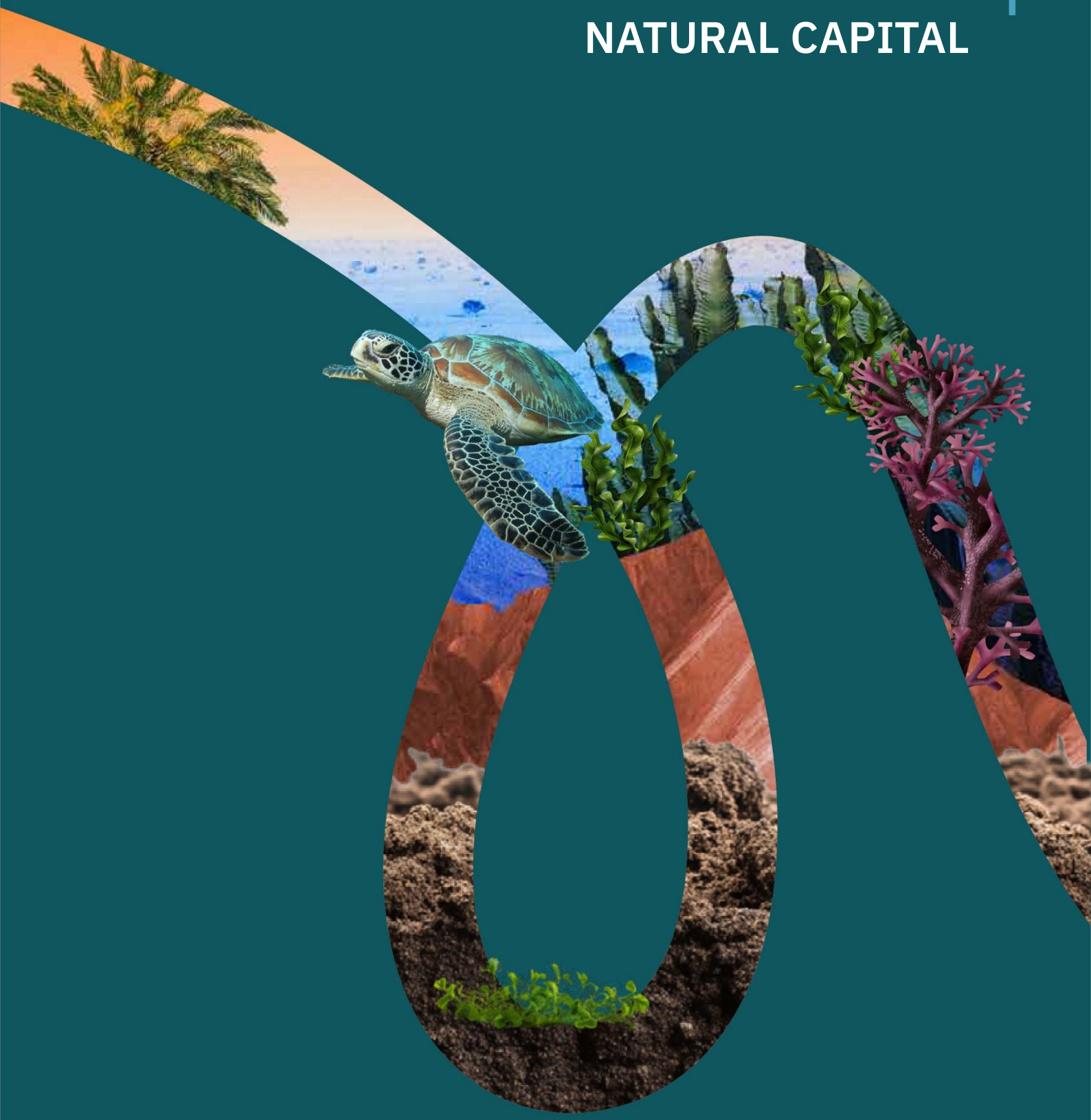
COMPONENT 1

POLICIES AND MARKET INCENTIVES IN SUPPORT OF NATURAL CAPITAL



THE INTEGRATION OF NATURAL CAPITAL ACCOUNTING IN PUBLIC AND PRIVATE SECTOR POLICY AND DECISION-MAKING FOR SUSTAINABLE LANDSCAPES

NATURAL CAPITAL

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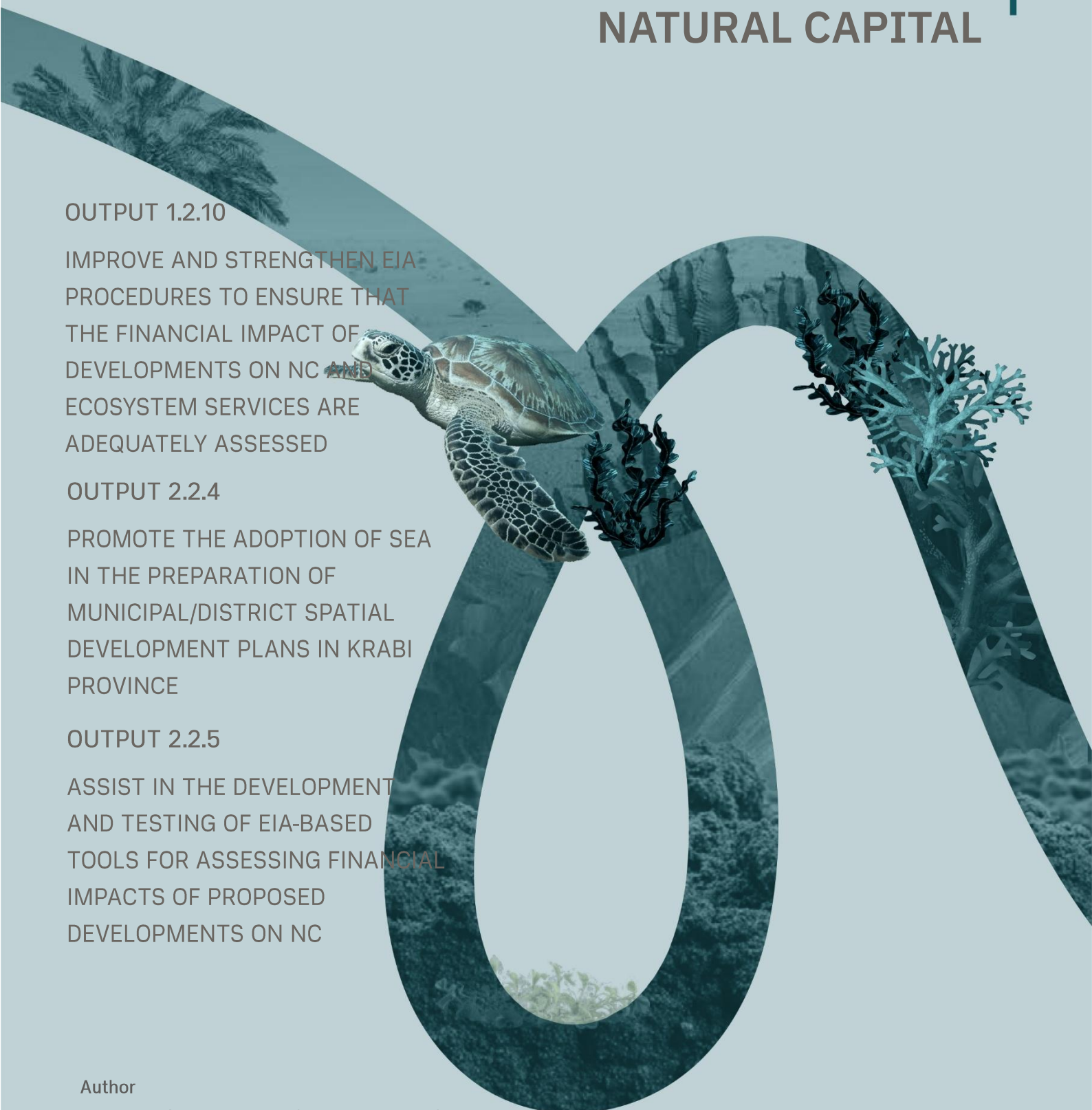

OUTPUT 1.2.10

IMPROVE AND STRENGTHEN EIA PROCEDURES TO ENSURE THAT THE FINANCIAL IMPACT OF DEVELOPMENTS ON NC AND ECOSYSTEM SERVICES ARE ADEQUATELY ASSESSED

OUTPUT 2.2.4

PROMOTE THE ADOPTION OF SEA IN THE PREPARATION OF MUNICIPAL/DISTRICT SPATIAL DEVELOPMENT PLANS IN KRABI PROVINCE

OUTPUT 2.2.5

ASSIST IN THE DEVELOPMENT AND TESTING OF EIA-BASED TOOLS FOR ASSESSING FINANCIAL IMPACTS OF PROPOSED DEVELOPMENTS ON NC

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Acknowledgement

This report was prepared under the overall guidance and support of the Office of Natural Resources and Environmental Policy and Planning (ONEP). We would like to express our sincere appreciation to Waste Water Control and Treatment Section, Division of Public Health and Environment, Ao Nang Subdistrict Administrative Organization (Ao Nang SAO), Krabi Province and Krabi Wastewater Management Office, Wastewater Management Authority (WMA) their constructive suggestions and valuable participation throughout the preparation of this report.

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Executive Summary

Over the past decade, Environmental Impact Assessment (EIA) has evolved to include environmental-economic considerations, particularly for water resource development projects. By assigning the requirement of valuation over the affected environmental assets. This reflects a growing recognition that natural resources have real economic worth, even when they are not priced in the market. As a result, environmental valuation has become an important tool for informing policy decisions and approving major development projects.

Thailand also uses a Strategic Environmental Assessment (SEA) system alongside EIA. Together, these two systems cover both project-level assessment, focused on preventing and reducing direct impacts and strategic-level planning, which looks at cumulative impacts and guides the overall direction of development.

In Ao Nang Sub-district, Mueang Krabi District, tourism growth has created serious wastewater problems. The main causes include inadequate treatment infrastructure, a large number of small operators without proper systems, limited budgets and staff, and difficulties enforcing regulations. These problems reflect a broader pattern of market failure, where the tourism sector uses natural resources without bearing the full environmental cost; highlighting the need for government intervention and environmental economic tools.

While EIA reporting guidelines exist for various project types; including water resource development, mining, highways, and industrial estates. By letting the Expert Review Committee on EIA (ERC) as a guideline for reviewing EIA reports. However, the integration of environmental economics into the EIA process has so far been limited to water resource development projects. To better fulfill the core objectives of EIA in safeguarding natural resources, the environment, and the quality of life of the public alongside economic development, it is necessary to revise and strengthen the EIA system through broader integration of environmental economics.

Recommendations for integrating environmental economics into the EIA process cover project types including water resource development, mining, highways and road systems, water transportation infrastructure, and buildings, land allocation, and community services. This integration should be embedded across the following key stages of the EIA reporting process: The screening and scoping stage, environmental valuation should be conducted at the outset for sensitive areas such as Class 1 Watersheds or internationally significant wetlands (Ramsar Sites). The environmental value data generated at this stage serves as a critical factor in the early decision of whether to proceed with or discontinue a project. The financial and economic feasibility analysis stage, environmental economics and natural capital play a central role in comparing project alternatives through cost-benefit analysis that incorporates externalities into calculations of social benefits and social costs. For example, a decision between constructing an expressway through a wetland versus rerouting around it must factor in the lost value of ecosystem services as part of the project's total cost.

The environmental mitigation measure formulation stage, environmental valuation supports the design of mitigation measures by assessing investment efficiency. If the value of ecosystem services lost, particularly those supporting the tourism sector, exceeds the cost of investing in a wastewater treatment system, such investment is considered economically justified.

Recommendations for developing a wastewater management plan aligned with EIA principles are as follows: (1) Strengthen the legal and enforcement of laws against legally licensed operators and regulation of unlicensed businesses through municipal ordinances to control wastewater sources, with a greater role for local administrative organizations in enforcing regulations and seriously addressing unlicensed operations; (2) Establish baseline data for impact assessment, including population figures, wastewater volumes, tourist numbers, tourism revenue, water quality, and ecosystem conditions all of which form the essential foundation for environmental valuation; (3) Conduct environmental valuation using methods as suggested; (4) Integrate social costs and social benefits into project decision-making; and (5) Invest in wastewater collection and treatment infrastructure while simultaneously building the capacity of local administrative organizations in both personnel and technology. This involves integrated operations between various agencies such as local administrative organizations, local government agencies, state enterprises, and the private sector, using the provincial governor's mechanism to drive and connect them.

Recommendations for developing a wastewater management plan aligned with SEA principles are as follows: (1) Plan tourism development and land use in accordance with the area's carrying capacity by setting limits on tourist numbers, entrepreneur numbers and wastewater volumes to prevent environmental overload; (2) Use baseline data to establish clear sustainability indicators, including population, wastewater, solid waste, and treatment system capacity; (3) Ensure that environmental dimensions are incorporated into the assessment of wastewater and solid waste solutions through cost-benefit analysis to compare alternatives; (4) Establish an independent committee to oversee the SEA planning process and eliminate conflicts of interest; and (5) Adopt a co-governance decentralization model, where the central government sets standards and provides budgetary support while local bodies carry out implementation and oversee operations on the ground.

A sustainable wastewater management plan must bring together EIA principles at the project level and SEA principles at the policy level, supported by environmental economic tools that value natural capital and ecosystem services. This is the foundation for balanced development, one that supports economic growth while protecting the environment. which help improve the effectiveness of decision making at the policy level.

1. Overview

1.1 Background and Significance

The United States was the first country to introduce the Environmental Impact Assessment (EIA) system in 1969. In Thailand, the first formal environmental legislation, the National Environmental Quality Promotion and Conservation Act B.E. 2518 (1975), required the submission of documents surveying environmental quality impacts and proposed remedial measures. However, the practical implementation and concrete formulation of these requirements took shape in 1981. The law was subsequently revised and enacted as the National Environmental Quality Promotion and Conservation Act B.E. 2535 (1992), which included clear and explicit provisions on the preparation of EIA reports (Department of Environmental Quality Promotion, 1999: 2–3). The current legislation is the National Environmental Quality Promotion and Conservation Act B.E. 2535 (1992), as amended by the National Environmental Quality Promotion and Conservation Act (No. 2) B.E. 2561 (2018). The amendment introduced restructuring of the National Environment Board, stricter pollution control and prevention measures, particularly targeting pollution sources and increased criminal and administrative penalties to better prepare for the evolving pollution landscape.

The primary environmental authority in Thailand is the Ministry of Natural Resources and Environment (MNRE), responsible for managing, conserving, and restoring natural resources. Its key agencies are organized into four functional groups: (1) Policy and Planning, comprising the National Environment Board (NEB), the Office of Natural Resources and Environmental Policy and Planning (ONEP), and the Thailand Greenhouse Gas Management Organization (TGO); (2) Pollution Management and Environmental Quality, comprising the Pollution Control Department (PCD) and the Department of Environmental Quality Promotion (DEQP); (3) Natural Resource Conservation, comprising the Department of National Parks, Wildlife and Plant Conservation (DNP), the Royal Forest Department (RFD), the Department of Marine and Coastal Resources (DMCR), and the Department of Mineral Resources (DMR); and (4) Water Resource Management, comprising the Office of the National Water Resources (ONWR), the Department of Water Resources (DWR), and the Department of Groundwater Resources (DGR). In addition, independent bodies and environmental non-governmental organizations such as the Thailand Environment Institute (TEI), the Seub Nakhasathien Foundation, Greenpeace Thailand, and the Green World Foundation have played a complementary role in advancing conservation efforts, environmental advocacy, and public awareness.

Environmental management policy in Thailand falls into three broad categories (Watcharin Chinnavoravattana, 2023): Command and Control Policy, Market-based Policy, and Research and Development Policy. The first approach sets legally binding emission standards to keep pollution within defined limits examples include environmental quality standards issued by the Pollution Control Department (PCD), EIA reports administered by ONEP, and Strategic Environmental Assessments (SEA) overseen by the National Economic and Social Development Council (NESDC). The second approach uses market mechanisms to limit the discharge of pollutants into public spaces and encourages broad participation in pollution control examples include emission taxes, the carbon market operated by TGO, the Thailand Voluntary Emission Reduction (T-VER) program, and the

Clean Development Mechanism (CDM). The third approach promotes government-supported research and development of pollution-reducing technologies such as renewable energy and modern vehicles through financial mechanisms like the Environmental Fund administered by ONEP.

Environmental economic instruments are mechanisms that apply cost-benefit principles and economic incentives to shift the behavior of producers and consumers toward reducing pollution, working alongside regulatory enforcement. Key underlying concepts include the Polluter Pays Principle (PPP), incentive-based approaches that encourage environmentally responsible behavior, and the internalization of external or environmental costs into market pricing. In Thailand, these instruments have continued to evolve and currently include fees and charges systems, subsidies and financial incentives, environmental taxes, and carbon credit trading markets. It is clear that environmental economic instruments play an important role in strengthening environmental law and improving societal efficiency by reflecting the environmental costs and providing meaningful incentives to change behavior and reduce pollution-generating activities.

Therefore, incorporating environmental economics principles into the EIA process helps to improve and strengthen EIA procedures, ensuring that any development that alters the environment must be managed so that the environment is restored to at least its original condition or better. Under this framework, any development decision or financial commitment must account for natural capital as an asset, and for ecosystem services as both stock and flow.

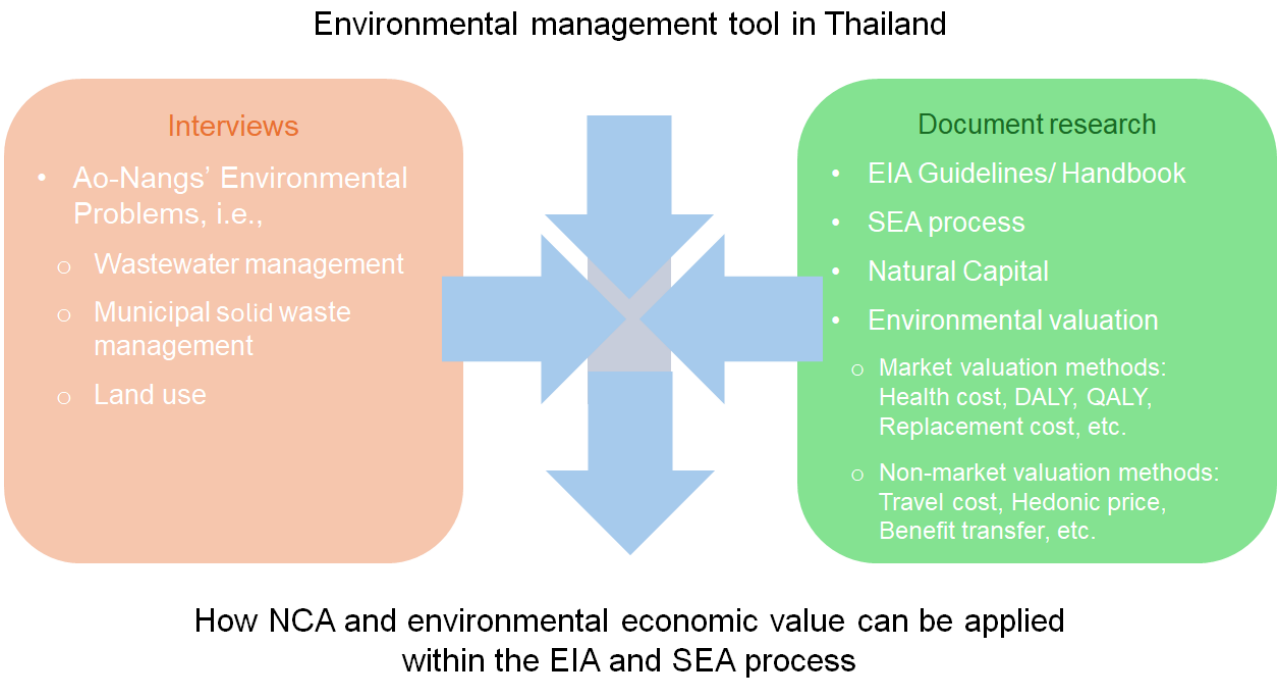
1.2 Study Objectives

This study aims to analyze approaches to environmental economic valuation within the Environmental Impact Assessment (EIA) process, with a particular focus on the linkage between environmental economics principles and natural resource management. The objective is to provide a comprehensive understanding of the importance of quantifying environmental damages and benefits in monetary terms.

1.3 Framework of study

Environmental Management tool reviews, document research, and interviews are foundational triads used to this study to apply Natural Capital Accounting (NCA) and environmental economic value within the EIA and SEA process. (as illustrated in Figure 1)

Figure 1 Framework of study



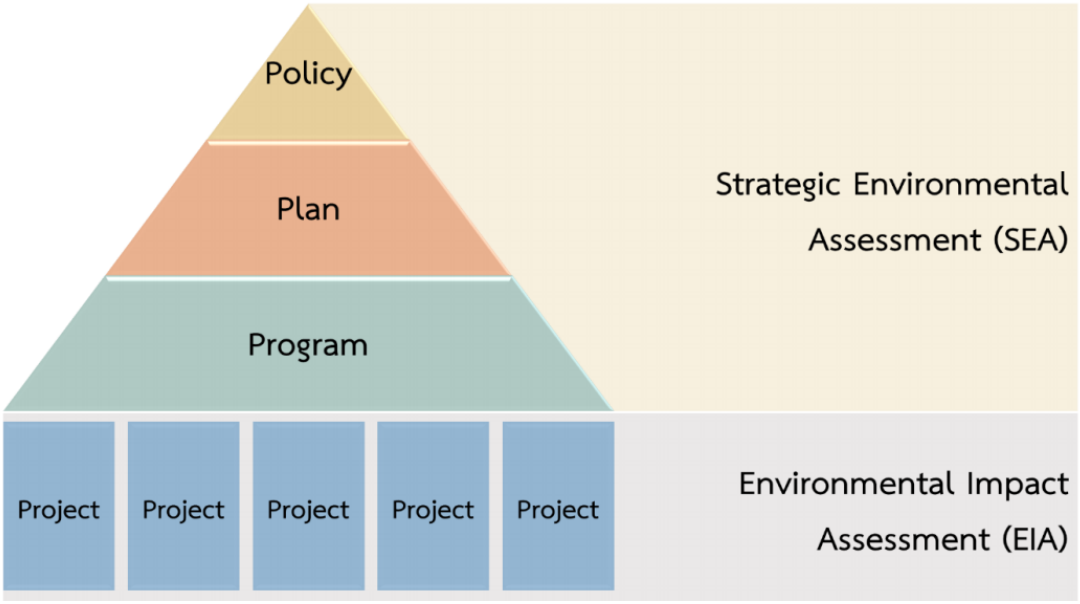
2. Environmental Impact Assessment and Strategic Environmental Assessment

2.1 The Environmental Assessment System

The development of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) in 2007 led to the formal designation of project types and sizes that could cause significant impacts on communities, particularly in terms of environmental quality, natural resources, and public health, thereby giving rise to the Environmental and Health Impact Assessment (EHIA). At the same time, the concept of Strategic Environmental Assessment (SEA) was introduced as a planning instrument for the formulation of sector-based and area-based policies, plans, and programs to support executive decision-making (Office of Natural Resources and Environmental Policy and Planning, 2024).

Both EIA and SEA serve as tools for planning and development in support of sustainable outcomes. SEA is a systematic process designed to support decision-making at the policy, plan, and program level, with an emphasis on stakeholder participation and the balanced integration of economic, social, and environmental considerations. EIA, by contrast, is a project-specific assessment tool. Put simply, SEA determines what should be done, while EIA ensures that what has been decided is done correctly and efficiently.

Figure 2 Differences between SEA and EIA



Note: In the initial stage, SEA in Thailand is utilized to support plan and program formulation.

Source: NESDC, 2021

2.2 The Environmental Impact Assessment System

2.2.1 Preparation of the EIA Report

The preparation of an EIA report involves studying the various environmental components and values associated with a project in order to prevent negative impacts and plan for sustainable resource management. This study covers four tiers:

1) **Physical Resources**, examining impacts on soil, water resources, topography, geology, air quality, noise, and vibration.
2) **Biological Resources**, examining changes affecting ecosystems, including forests, flora, wildlife, aquatic life, and coral reefs.
3) **Human Use Values**, examining how people make use of both physical and biological resources, covering land use, agriculture, industry, transportation, water use, flood protection, electricity use, and solid waste and sewage management.
4) **Quality of Life**, examining environmental impacts on humans, communities, and their socio-economic conditions, health, archaeological resources, occupational health and safety, tourism sites, cultural traditions, beliefs, values, and landscape aesthetics.

The EIA process under the National Environmental Quality Promotion and Conservation Act (No. 2) B.E. 2561 (2018) is divided into six stages (as illustrated in Figure 3):

Screening involves determining whether a project requires a full EIA report, or Initial Environmental Examination (IEE) report, or an EIA report applying to projects that may cause severe impacts on natural

resources, environmental quality, health, quality of life, or other significant cause to public or community or an Environmental and Health Impact Assessment (EHIA) as defined by law.

Figure 3 The Environmental Impact Assessment Process

Source: Office of Natural Resources and Environmental Policy and Planning, 2025

Scoping involves identifying the key issues to be studied, defining the study area, and identifying relevant stakeholders. Which determines from data that needs to be collected and methodologies which are most appropriate to ensure that the assessment comprehensively covers all significant environmental issues. ONEP has developed EIA Guidelines for various project types, including mining, highway and road systems, and water resource development projects.

Impact Assessment and EIA Report Preparation is the most critical stage of the process. The process comprises four components: (1) detailed study of the project, (2) detailed study of the environmental baseline, (3) environmental impact assessment, and (4) formulation of environmental monitoring and mitigation measures. The content, public participation process, study scope topics, report structure and format must all comply with the criteria, methods, and conditions prescribed by ONEP including all EIA report preparers are additionally required to be licensed by ONEP.

The report content under the project description section as specified in the EIA guidelines for each project type covers aspects such as location and general site conditions, project characteristics, preliminary design details, and planned activities across the project's operational phases. These details are essential for determining the different environments depending on the project type. For example, water resource development projects should include data on forestry, water use and management, and land use and agriculture; mining projects should include data on mineral reserves, mine planning and design, and ore processing. This stage is particularly important as it requires clearly identifying environmental issues to support both economic feasibility assessment and environmental valuation. Currently, however, economic and environmental economics analysis is only required for water resource development projects; other project types are only required to assess economic viability.

The environmental baseline study and environmental impact assessment sections are based on a four tiers framework of EIA system, covering physical resources, biological resources, human use values, and quality of life. The process generally follows two steps: impact identification of key and prediction of impact and evaluation and assessment of significance.

Review involves submitting the completed report to the Expert Review Committee (ERC) for technical verification of its accuracy and completeness.

Decision-Making is the stage at which the authorized government official uses the IEE, EIA, or EHIA report to inform the decision on whether to approve the project, incorporating the mitigation measures specified in the report as binding conditions of approval.

Monitoring and evaluation of project proponents are required to comply with all prescribed measures and submit periodic monitoring reports documenting the implementation of environmental mitigation and monitoring measures. These reports are made publicly accessible via an electronic platform through the Environmental Impact Assessment Information Center, or Smart EIA Plus.

Thailand's EIA system requires continuous improvement, including expanding the list of project types and thresholds that require the preparation of additional EIA reports. Further efforts are also needed to ensure that the mitigation and monitoring measures specified in EIA reports are clear, appropriate, effective, and practically implementable (ONEP, 2025, p. 6). In addition, the integration of environmental economics and natural capital assessment into EIA guidelines should be extended to a broader range of project types. At present, these approaches remain limited to water resource development projects (Item 32: Irrigation Projects). Expanding their application would contribute to a more comprehensive and complete EIA system.

2.2.2 The Environmental Impact Assessment Process

Environmental Impact Assessment (EIA) is one of a regulatory tool for preventing environmental impacts from development projects, operating under Thailand's environmental law, the National Environmental Quality Promotion and Conservation Act B.E. 2535 (1992), as amended by Act (No. 2) B.E. 2561 (2018), Part 4 on the Preparation of Environmental Impact Assessment Reports. The Act defines "environmental impact assessment" as the process of studying and evaluating potential impacts arising from the implementation of a project,

business operation, or any state-authorized activity that may directly or indirectly affect natural resources, environmental quality, health, quality of life, or other significant interests of the public or community conducted through a public participation process in order to formulate measures for preventing and mitigating such impacts. The resulting study is referred to as an Environmental Impact Assessment Report.

Since 1981, when the EIA system was first introduced with an initial list of 10 project types required to prepare environmental impact analysis reports, the system has developed considerably. At the present, the system covers 35 project types required to prepare EIA reports (see detail in Annex I), as follows:

No. 1 Mining operations under the Minerals Act

No. 2 Petroleum development under the Petroleum Act

No. 3 Petroleum and fuel oil pipeline transportation systems

No. 4 Industrial estates, industrial zones, or land allocation for industrial use

No. 5 Petrochemical industries with chemical production processes

No. 6 Petroleum refining industries

No. 7 Natural gas separation or conversion industries

No. 8 Chlor-alkaline industries and industries using chlorine (Cl_2) or hydrogen chloride (HCl)

No. 9 Cement manufacturing industries

No. 10 Pulp and paper manufacturing industries

No. 11 Industries producing active substances or agrochemicals through chemical processes

No. 12 Chemical fertilizer manufacturing industries

No. 13 Sugar industry operations

No. 14 Iron or steel industries

No. 15 Ore smelting, processing, or non-ferrous metal casting industries (other than iron/steel as in Item 14)

No. 16 Liquor, alcohol, beer, and wine manufacturing industries

No. 17 Centralized waste treatment facilities and landfill operations for waste or non-usable materials

No. 18 All types of thermal power plants, except those using municipal solid waste as fuel

No. 19 Expressway systems under the Expressway Act, or projects of similar nature

No. 20 Highways or roads under the Highway Act passing through designated areas

No. 21 Rail transport systems

No. 22 Cargo seaports

No. 23 Recreational and sports marinas

No. 24 Land reclamation in the sea or Songkhla Lake beyond the original shoreline, except for beach restoration

No. 25 Construction or expansion of structures in or adjacent to the sea

No. 26 Air transport systems

No. 27 High-rise or large-scale special buildings under the Building Control Act, with specified locations or uses

No. 28 Land subdivision for residential or commercial purposes under the Land Subdivision Act

No. 29 Hospitals or medical facilities under the Medical Facility Act

No. 30 Hotels or resorts under the Hotel Act

No. 31 Residential condominiums under the Building Control Act

No. 32 Irrigation projects

No. 33 All project types located in areas designated by the Cabinet as Class 1 Watershed Areas, with specified exceptions

No. 34 Inter-basin water diversion projects

No. 35 Water control gates in major rivers

The EIA report review process begins when a project proponent or owner prepares an EIA report in order to apply for authorization from the relevant government authority. The proponent submits the report to ONEP for verification of its compliance with prescribed criteria, methods, and conditions, as well as the completeness of documentation in accordance with the applicable EIA guidelines. The report is then reviewed and approved by the Expert Review Committee (ERC).

Since 1992, when the EIA system was formally introduced, the committee has been appointed by the National Environment Board. Its membership comprises specialists and experts across relevant fields, as well as officials holding statutory authorization powers (see detail in Annex II). There are nine Expert Review Committees (see detail in Annex III), covering the following project categories:

1) Mining projects
2) Petroleum development projects
3) Petroleum, petrochemical, and chemical industry projects
4) Energy projects
5) Industrial projects and supporting utility systems
6) Building, land allocation, and community service projects
7) Land and air infrastructure projects
8) Water transportation infrastructure projects
9) Water resource development projects

Each expert reviews EIA reports in accordance with the technical guidelines applicable to each project type. The outcome of the review process informs the formulation of environmental mitigation measures for the project. The ERC is responsible for reviewing and approving the EIA reports categorized by project characteristics and cover all of the 35 project types (as shown in Table 1). It should be noted that some project characteristics are more specific than the main project categories; certain characteristics fall within a broader category, while others have the potential to cause severe impacts and therefore require an EHIA report rather than a standard EIA.

Table 1 EIA Report Review by project characteristics and project type

Expert Review Committee	Project characteristics	Project Type
1) Mining Projects	Mining operations under the Minerals Act	No. 1
2) Petroleum Development Projects	Petroleum development under the Petroleum Act	No. 2
	Petroleum exploration by drilling	Part of No. 2
	Petroleum production	Part of No. 2
3) Petroleum, Petrochemical, and Chemical Industry Projects	Petrochemical industries with chemical production processes	No. 5
	Petroleum refining industries	No. 6
	Natural gas separation or conversion industries	No. 7
	Chlor-alkaline industries and industries using Cl_2 or HCl	No. 8
	Industries producing agrochemicals through chemical processes	No. 11
	Chemical fertilizer manufacturing industries	No. 12
4) Energy Projects	All types of thermal power plants, except those using municipal solid waste as fuel	No. 18
	Petroleum and fuel oil pipeline transportation systems	No. 3

Table 1 Continued

Expert Review Committee	Project characteristics	Project Type
5) Industrial Projects and Supporting Utility Systems	Industrial estates, zones, or land allocation for industrial use according to the relevant law	No. 4
	Cement manufacturing industries	No. 9
	Pulp and paper manufacturing industries	No. 10
	Sugar industry operations	No. 13
	Iron or steel industries	No. 14
	Non-ferrous ore smelting, processing, or metal casting (other than iron/steel per Item 14)	No. 15
	Liquor, alcohol, beer, and wine manufacturing industries	No. 16
	Centralized waste treatment facilities	Part of No. 17
	Landfill facilities for hazardous waste under the Factory Act (burning or landfilling hazardous waste, excluding cement kilns using hazardous waste as substitute raw material or supplementary fuel) (EHIA)	Part of No. 17
	Landfill facilities for non-hazardous waste under the Factory Act	Part of No. 17
	Coke production industries	Part of No. 14
	Nuclear facilities using nuclear reactors	Projects with potentially severe impacts; EHIA required
	Radioactive waste management facilities	Projects with potentially severe impacts; EHIA required

Table 1 Continued

Expert Review Committee	Project characteristics	Project Type
6) Building, Land Allocation, and Community Service Projects	High-rise or large-scale special buildings under the Building Control Act, with specified locations or uses	No. 27
	Land subdivision for residential or commercial purposes under the Land Subdivision Act	No. 28
	Hospitals or medical facilities under the Medical Facility Act	No. 29
	Hotels or resorts under the Hotel Act	No. 30
	Residential condominiums under the Building Control Act	No. 31
7) Land and Air Infrastructure Projects	Expressway systems under the Expressway Act, or projects of similar nature	No. 19
	Highways or roads under the Highway Act passing through designated areas	No. 20
	Rail transport systems	No. 21
	Air transport systems	No. 26
8) Water Transportation Infrastructure Projects	Cargo seaports	No. 22
	Recreational and sports marinas	No. 23
	Land reclamation in the sea or Songkhla Lake beyond the original shoreline, except for beach restoration	No. 24
	Construction or expansion of structures in or adjacent to the sea	No. 25
9) Water Resource Development Projects	Irrigation projects	No. 32
	Inter-basin water diversion projects	No. 34
	Water control gates in major rivers	No. 35
	Dams or reservoirs	Part of No. 33

Source: Adapted from ONEP (17 April 2026)

2.3 The Strategic Environmental Assessment System

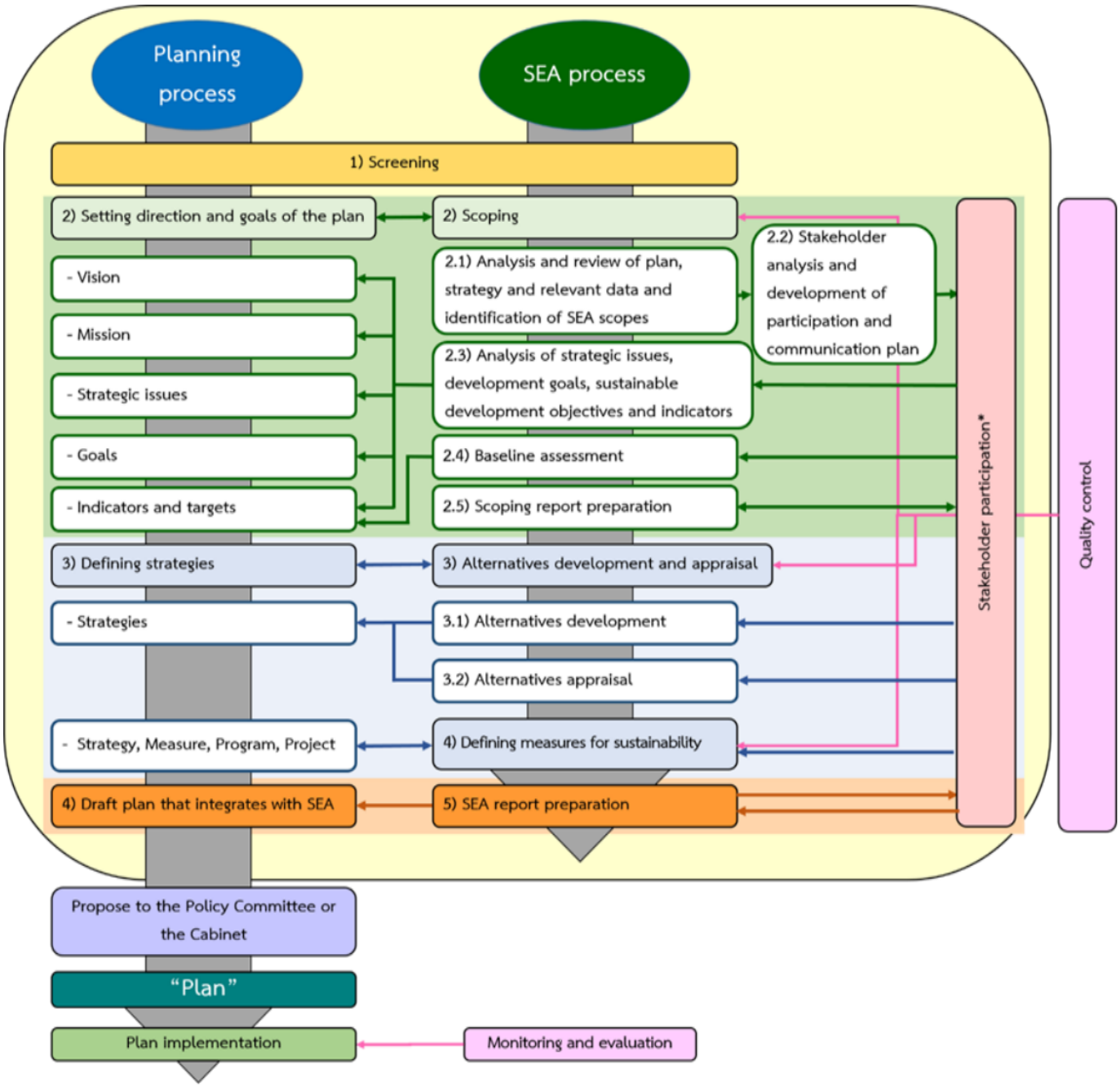
Strategic Environmental Assessment (SEA) is an environmental planning tool used to evaluate sustainability across economic, social, and environmental dimensions in the formulation of policies, strategies, and plans, or for large-scale projects with wide-ranging impacts on the environment and the public.

2.3.1 Preparation of the SEA Report

SEA reports are prepared in accordance with the SEA Guidelines (Revised Edition, 2021), developed by the National Economic and Social Development Council (NESDC). SEA is used as a decision-support tool for policy, plan, and strategy formulation, offering a broad view of potential spatial and systemic impacts. The SEA reporting process comprises five stages (as illustrated in Figure 4):

1) **Screening** identifying whether a policy, plan, or project has the potential to generate significant environmental impacts and therefore warrants an SEA.
2) **Scoping**, defining strategic issues, establishing sustainability indicators, and conducting stakeholder analysis in a manner that is contextually relevant and comprehensive. This stage ensures that the SEA report is focused and well-aligned with the specific context of the area. It involves the following sub-processes:
   (1) Defining the objectives and scope of the SEA report
   (2) Reviewing relevant plans and data
   (3) Conducting stakeholder analysis and developing a communication and participation plan
   (4) Analyzing and defining the strategic vision, sustainable development objectives, and indicators
   (5) Assessing baseline data
   (6) Preparing the scoping report
3) **Developing and Assessing Alternatives** constructing scenarios to compare development alternatives that appropriately balance economic growth, social development, and the conservation of natural resources and the environment. Each alternative is compared against a No Action Alternative to analyze direct, indirect, and cumulative impacts arising from the proposed policy or development. The findings support executive decision-making on the preferred alternative. This stage involves:
   (1) Developing alternatives
   (2) Assessing alternatives
4) **Formulating Measures for Sustainability** establishing monitoring and evaluation frameworks, and planning measures to mitigate negative impacts and enhance positive outcomes on an ongoing basis.
5) **Public Participation** ensures transparency throughout the SEA process by incorporating input from all stakeholders at every stage. This helps reduce conflict and builds broad-based acceptance of the resulting strategic development plan.

Figure 4 The Strategic Environmental Assessment Process



*Stakeholders' participation is a required process to support both planning and SEA processes.

Source: NESDC, 2026

2.3.2 The Strategic Environmental Assessment Process

At present, Thailand's SEA process does not yet specify which types of policies, plans, or projects are required to undergo an SEA, nor does it designate a responsible body for reviewing SEA reports. Although NESDC is responsible for developing the SEA process, conducting an SEA remains at the discretion of the plan-owning agency, and both the preparation and review of reports are voluntary. Project approval is ultimately subject to a Cabinet resolution (Pathawi Sirinaphakul, 2022: 132–134).

The institutional mechanisms driving SEA implementation in Thailand involve two groups: (1) the plan-owning agency, which includes the procurement committee for consulting contracts (or an internal working group if no consultant is engaged) and an SEA steering committee where applicable; and (2) the Sub-committee on Academic Affairs and Public Participation, operating under the SEA Development Committee (SEADC). The plan-owning agency is responsible for overseeing the quality and standards of the SEA report, while the sub-committee provides technical guidance, advice, and recommendations to the plan-owning agency (NESDC, 2024: 5–8).

Nevertheless, the SEA process has been applied to a number of significant policy and planning decisions, including the SEA for coal-fired power plant construction sites in southern Thailand (led by the Office of the Permanent Secretary, Ministry of Energy), the SEA for the spatial development master plan of Songkhla and Pattani provinces (led by NESDC), the SEA for the Dong Phayayen–Khao Yai Forest Complex World Heritage Site (led by the Department of National Parks, Wildlife and Plant Conservation), and a feasibility study on connecting Gulf of Thailand and Andaman Sea maritime transport routes (led by NESDC). In sum, SEA serves as a decision-support tool for formulating large-scale policies, plans, and projects applicable both on a sectoral basis and an area basis.

In addition, Cost-Benefit Analysis (CBA) is used as a methodological tool within the SEA process specifically during the stages of defining objectives and scope, reviewing relevant plans and data, assessing baseline data, and developing alternatives. These are precisely the stages at which environmental economic valuation can be meaningfully integrated into the process, as illustrated in Figure 5.

Figure 5 Methods and Tools in the Strategic Environmental Assessment Process

	Methods/techniques	Qualitative methodology	Quantitative methodology	Screening	Scoping		Alternative development and assessment						Setting of measures for sustainability	Participation	Monitoring
					Review of plan/ data	Setting of strategic issues	Development of alternatives	Identification of impacts	Projection of impacts	Impact analysis	Identification of cumulative	Comparison of alternatives			
1	Carrying capacity analysis	√	√	-	?	?	√	√	√	-	?	-	√	-	-
2	Causal effect diagrams	√	-	-	√	√	√	√	-	-	-	?	?	?	-
3	Checklist	√	√	√	√	-	-	-	√	√	-	√	√	?	√
4	Compatibility assessment	√	-	-	-	√	-	-	-	-	-	-	√	?	-
5	Cost - benefit analysis (CBA)	-	√	-	-	-	√	√	√	√	-	√	√	?	-
6	Ecological footprint analysis	-	√	-	√	-	√	√	√	-	?	-	√	-	-
7	Expert judgement	√	-	√	√	√	√	√	√	√	√	√	√	-	√
8	Geographic information system (GIS)	√	-	√	√	√	-	√	√	√	√	√	√	√	?
9	Guiding questions	√	-	√	√	√	√	√	√	√	√	√	√	√	√
10	Indicators	√	√	√	√	√	√	√	√	√	√	√	√	-	√
11	Land use partitioning analysis	√	-	-	-	-	-	-	√	√	?	?	√	-	-
12	Life cycle analysis (LCA)	-	√	-	-	-	√	√	-	√	√	√	√	√	-
13	Literature/ Case review	√	-	√	√	√	√	√	√	√	√	√	√	√	√
14	Matrices	-	√	√	-	√	?	√	√	√	-	-	√	√	√
15	Modelling	-	√	-	-	√	√	√	√	?	?	?	√	-	-
16	Multi - criteria analysis (MCA)	-	√	-	-	-	?	-	-	√	-	√	√	?	-
17	Network analysis	√	-	-	-	√	-	√	√	?	√	√	√	?	-
18	Overlay mapping	√	-	√	√	√	-	√	√	√	√	√	√	√	?
19	PESTEL analysis	√	-	-	-	√	-	-	-	-	-	-	-	-	-
20	Scoring/ Prioritize quadrant/ Rating - Ranking	√	√	-	-	-	-	√	-	√	-	√	-	-	-
21	Socio - ecological impact assessment	√	√	-	-	-	-	√	√	√	√	-	√	-	-
22	Public participation	√	√	?	√	√	√	√	√	√	?	?	√	√	?
23	Quality of life assessment (QoLA)	√	√	?	?	-	-	√	√	√	-	-	√	√	?
24	Risk assessment	√	√	?	-	-	-	-	√	√	?	?	√	-	-
25	Scenario/ Sensitivity analysis	√	√	-	-	-	√	-	√	√	?	?	√	-	-
26	SWOT analysis/ TOWS matrices	√	-	-	-	√	√	-	-	-	-	-	-	-	-
27	Trend analysis	√	√	-	√	-	?	√	√	√	?	?	√	-	?
28	Vulnerability analysis	√	-	-	-	-	√	√	-	√	-	-	-	-	-

Source: adapted from Souloutzoglou and Tasopoulou, 2020 and Therivel, 2004

Note: √ Applicable
? Partially applicable
- Not applicable

Source: NESDC, 2024

3. Environmental Economics Assessment

3.1 Environmental Economics

3.1.1 Environmental Value

Environmental and natural resource economics is the study of optimizing human economic activity within the constraints of the earth's ecosystem service capacity (Sompote Kunnoot, 2022). By nature, environmental goods and natural resources are not priced in the market, yet they carry inherent value (Somsakhaw Phetranon, 2010: 195) because market mechanisms alone cannot adequately manage environmental quality (Adis Israngkura, 1999). Environmental valuation is therefore necessary as a means of converting natural resource and environmental measurements into units comparable to those used in economic activity.

Although the environment is not priced in the market like ordinary goods, economics recognizes that most environmental assets can be valued. Such value reflects the benefits the environment provides to human well-being and indicates the relative importance people place on environmental goods compared to other commodities. Given that ecosystem services function both as inputs to production and as receptors for waste generated by economic development and projects, it is essential to prevent the depletion of non-renewable natural resources and to ensure that renewable natural resources are used sustainably so that stocks are not diminished. Environmental valuation addresses both resource types for non-renewable resources, the focus is on efficient use both now and in the future; for renewable resources, the focus is on drawing from yields while maintaining stocks at appropriate levels.

Furthermore, because environmental goods lack market prices, they require management through a combination of policy, law, and market mechanisms making environmental management a core public sector responsibility, informed by adequate environmental impact data. This is precisely where environmental valuation plays a critical role: project and investment analysis requires data expressed in monetary units, and environmental valuation provides exactly that, converting environmental conditions into monetary values that can be used in cost-benefit comparisons.

In the context of EIA, environmental valuation focuses primarily on the use value dimension that is, values associated with consumption and utilization. Valuation of the non-use value dimension, which relates to values derived from sentiment or existence, tends to be less precise. Accordingly, this study focuses on the valuation of environmental and natural resource impacts arising from direct use value and indirect use value encompassing both extractive/consumptive uses (where resources are physically removed) and non-extractive/non-consumptive uses (where resource quantities remain unchanged, though quality may decline) as well as natural capital and ecosystem services.

3.1.2 Natural Capital

Neoclassical economic growth theory traditionally recognized only two factors of production: labor and capital (Solow, 1956; Swan, 1956), with no explicit role for natural capital. However, as human populations and consumption demands have grown, the degradation of natural capital has become increasingly visible driven by the rapid expansion of natural resource use as raw material inputs in economic activities. Natural capital is therefore both a critical variable enabling economic growth and, simultaneously, a resource base that absorbs waste from land, forests, oceans, and the atmosphere. Sustainable economic development means maintaining the abundance of natural capital through both the sustainable use of natural resources as inputs and the sustainable use of the environment as a waste sink (Rapee Pholpanich and Sompote Kunnoot, 2018: 160–161).

Environmental valuation is grounded in neoclassical economic theory, which frames environmental problems as the result of market failure particularly in relation to externalities and the absence of clearly defined ownership over common resources. When natural resources lack clear market prices, stakeholders often overlook the costs associated with their degradation. Environmental valuation steps in to provide shadow prices, which are then used in Cost-Benefit Analysis (CBA) to support decision-making in selecting the most appropriate project alternative.

3.2 Environmental Valuation Methods

There are several environmental valuation methods, each with its own limitations, which means that the environmental cost data available for investment analysis is inherently partial rather than fully comprehensive. The emphasis is therefore placed on covering both the human use value dimension and the quality of life dimension as fully as possible. Detailed calculation procedures can be found in standard environmental economics texts. The key principles and a simplified overview of each method are presented below.

3.2.1 Travel Cost Model (TCM)

The Travel Cost Model (TCM) is an indirect valuation method that infers environmental value from the costs associated with related goods and activities. It is widely used to estimate recreational value by using visitor travel data to measure how changes in environmental quality affect demand for a particular site or recreational area. For example, infrastructure development that alters the environmental quality of Songkhla Lake can be valued through the travel expenditure and time costs incurred by visitors.

3.2.2 Hedonic Price Model (HPM)

The Hedonic Price Model (HPM) is an indirect valuation method that infers environmental value from the characteristics of market-priced goods most commonly real estate. The underlying assumption is that property prices are determined by a combination of attributes such as land area, floor space, number of bedrooms, and importantly, environmental quality factors such as air quality. By isolating the environmental component from other price determinants, it becomes possible to estimate the monetary value of environmental conditions. For example, if any of these attributes change, the resulting hedonic price reflects that change accordingly.

3.2.3 Contingent Valuation Method (CVM)

The Contingent Valuation Method (CVM) is a direct valuation approach based on structured interviews with members of the public. It is applicable across all types of environmental values both use values and non-use values by asking respondents to express how much they value a given environmental impact. For example: "How much would you be willing to pay (WTP) to prevent resort development within a national park?" or "How much compensation would you need to accept (Willingness to Accept Compensation: WTAC) for noise pollution caused by a nearby airport?"

3.2.4 Benefit Transfer

The Benefit Transfer method allows assessors to avoid conducting an original valuation by instead adapting environmental values that have already been estimated in other studies or locations. The transferred values are adjusted to reflect differences in environmental conditions or socioeconomic contexts for instance, by accounting for income differences across countries or adjusting for currency values.

3.2.5 Replacement Cost

The Replacement Cost method also referred to as the Mitigation Cost or Protection Cost method estimates environmental value using the actual expenditure required to prevent, mitigate, or replace environmental damage. In essence, it calculates the cost of creating a substitute that performs the same functions as the lost ecosystem service. For example: the value of a wetland that filters wastewater can be estimated by the cost of constructing an equivalent treatment facility; the value of a natural water source can be estimated by the price of water supply if that source were unavailable; the value of mangrove forests can be estimated by the storm damage costs that would occur without their protective buffer; and the value of clean air can be approximated by the cost of purchasing air purifiers to mitigate the effects of air pollution.

3.2.6 Disability-Adjusted Life Years (DALYs) and Quality-Adjusted Life Years (QALYs)

The DALYs and QALYs methods convert health impacts caused by environmental problems such as air pollution or wastewater into economic values.

They are widely used in health economics to measure the loss of healthy life years and quality of life.

DALYs measure the total years of healthy life lost through premature death (Years of Life Lost: YLL) and years lived with disability or illness (Years Lost due to Disability: YLD). These are then converted into monetary values for example, by multiplying DALYs by the average annual income of the affected population. As a reference point, 1 DALY was estimated to be worth 572,736 Thai Baht in 2019 (Deuja et al., 2022, p. 38). A practical application includes estimating the health damage costs from fine particulate matter (PM2.5) caused by rice field burning.

QALYs measure both the quantity and quality of life combined. One QALY represents one year of life lived in full health reflecting both the duration of life (quantity) and physical, mental, social, and moral well-being (quality). Viewed through the lens of human capital, health generates productivity, making QALYs a useful unit for

comparing the cost-effectiveness of various interventions for example, assessing whether a pollution reduction measure results in a meaningful improvement in life expectancy and health quality.

3.2.7 Income Change Method

The Income Change method measures the impact of environmental changes through their direct effect on the income of affected individuals or households. The underlying principle is that a change in environmental quality leads to a change in income, and that income change serves as a proxy for environmental value. For example, wastewater contamination may reduce fish catches and lower the income of fishing communities; air pollution may cause illness that reduces an individual's working capacity and earnings. This method requires actual income data from affected parties, not willingness-to-pay estimates.

3.2.8 Productivity Change Method

The Productivity Change method, also known as the Production Function approach, is used in cases where natural resources or environmental quality directly affect the production of market-priced goods such as in agriculture, fisheries, or forestry. Beyond providing direct use value to consumers, the environment also functions as an indirect input to production processes. When environmental conditions change whether improving or deteriorating the resulting shifts in output volume or production costs can be measured and monetized.

For example, to assess the value of reduced water inflow into a dam due to environmental degradation, an assessor would require 20 years of inflow data, estimates of water loss attributable to degradation, and the price of water for agricultural use. If insufficient water leads to lower crop yields, multiplying that yield reduction by the market price of the crop produces an estimate of the economic damage caused by environmental deterioration.

3.3 Environmental Economics Assessment for EIA-Required Projects

The environmental economics assessment focuses on valuing environmental and natural resource impacts within the use value dimension, with primary attention given to biological resource impacts and human use values. A review was conducted of EIA guidelines across various project types — including water resource development, mining, highways and road systems, water transportation infrastructure, industrial and utility support systems, industrial estates, sugar industries, thermal power plants, buildings, land allocation and community services, and petroleum, petrochemical, and chemical industries.

The review found that water resource development is currently the only project type with established environmental economics assessment guidelines. These guidelines cover the following elements:

(1) Clearly identifying which impacts can and cannot be monetized, with a thorough and detailed classification of both direct and indirect costs and benefits.

(2) Presenting the conceptual framework and valuation methodology for environmental impact assessment including assumptions, secondary data collection, valuation techniques, and detailed calculations. Items to be assessed include the loss of timber value based on incremental timber volume over the project's

lifetime, the loss of forest ecosystem value, and environmental management costs for preventing, mitigating, or replacing environmental damage. All data sources used in calculations must be clearly identified and credible, and the prices applied should be realistic and reflective of local conditions. Where an impact cannot be monetized, it should be expressed in qualitative terms that convey its significance, using appropriate economic tools and targeting the relevant stakeholder groups. A summary table of environmental impact valuation results should also be prepared for use in the broader environmental economic analysis.

(3) Analyzing the environmental economic viability of the project by incorporating environmental economics results into the project's overall cost-benefit framework. Key economic indicators to be assessed include the Economic Internal Rate of Return (EIRR), Net Present Value (NPV), and Benefit-Cost Ratio (B/C Ratio), calculated at a discount rate that reflects a viable investment threshold. All data sources and calculation methods must be clearly documented, with accompanying summary tables, and the overall investment viability should be clearly explained.

(4) Conducting a Sensitivity Analysis to test whether the project remains economically viable under changed conditions for example, scenarios involving a 10% increase in costs or decrease in benefits, or simultaneous 10% changes in both costs and benefits.

(5) In cases where the economic and environmental economics analysis of a government project yields an unfavorable result but the project is nonetheless necessary, the reasons and justification for proceeding must be clearly stated to inform the decision-making process.

For other project types where environmental impacts and associated data are sufficiently well-defined to support environmental economics assessment including mining, highways and road systems, water transportation infrastructure, and buildings, land allocation, and community services a degree of environmental cost accounting is already occurring. For example, mining project assessments incorporate environmental damage values by calculating the direct value of timber loss (based on the volume of trees cleared for mining operations multiplied by timber prices, including annual increment values over the concession period) and indirect environmental damage values such as soil loss, nutrient depletion, water loss, and atmospheric warming, using academically appropriate valuation methods (Table 2).

By contrast, project types where environmental impacts are less clearly defined making environmental economics assessment difficult to apply include industrial and utility support systems, thermal power plants, sugar industries, industrial estates, and petroleum, petrochemical, and chemical industries (Table 2).

Table 2 Identification of Environmentally Impactful Activities Suitable for Environmental Economics Assessment by Project Type

Project Type	Identification of Environmentally Impactful Activities	Impact Assessment	Environmental Economics Assessment
Water Resource Development	Forest clearing	Loss of timber value based on incremental timber volume (over the project lifetime); loss of forest ecosystem value; environmental management costs for preventing, mitigating, or replacing environmental damage	Already assessed; using data on timber value loss from incremental volume, forest ecosystem loss, and environmental management costs
Mining	Forest clearing	Economic, conservation, and environmental value of forests; level of impact on agricultural areas and damage to productivity	Should be assessed; using timber volume data and reduced agricultural productivity
Highways, Roads, and Expressway Systems	Road structures obstructing drainage	Loss of livelihood income in areas expected to be affected by flooding	Should be assessed; using data on reduced occupational income
Water Transportation Infrastructure	Forest clearing; dispersion and impact of seabed sediment on living organisms	Economic value of forests; loss of fishery and aquaculture areas	Should be assessed; using timber volume data and reduced income from fisheries and aquaculture
Buildings, Land Allocation, and Community Services	Impacts vary by project activity type: water use, wastewater and sewage management, drainage and flood prevention, solid waste management, energy and electricity, traffic, communications, land use	Assessment of wastewater volumes requiring treatment; health and environmental contamination impacts	Should be assessed; using data on wastewater volumes discharged from buildings

Table 2 Continued

Project Type	Identification of Environmentally Impactful Activities	Impact Assessment	Environmental Economics Assessment
Industrial Projects and Supporting Utility Systems	Impacts vary by project activity: land use, transportation, water use, drainage and flood prevention, waste management, and agriculture	Level of impact on agricultural activities in the study area; e.g., crop farming, livestock, aquaculture, fisheries	Not ready to consider economic value in its assessed data may be insufficient for environmental cost estimation
Thermal Power Plants	Impacts vary by project activity: land use, transportation, water use, drainage and flood prevention, and livelihoods	Level of impact on livelihoods; e.g., agriculture, livestock, aquaculture, fisheries	Not ready to consider economic value in its assessed data may be insufficient for environmental cost estimation
Sugar Industries	Impacts vary by project activity: land use, transportation and traffic, water use, drainage and flood prevention, electricity use, waste management, and agriculture	Level of impact on agricultural areas e.g., crop farming, livestock, aquaculture, fisheries	Not ready to consider economic value in its assessed data may be insufficient for environmental cost estimation
Industrial Estates	Impacts vary by project activity: land use, water use, drainage and flood prevention, electricity use, transportation, and green areas and buffer zones	Not clearly specified	Not ready to consider economic value in its assessed data may not be available for environmental cost estimation
Petroleum, Petrochemical, and Chemical Industries	Impacts vary by project activity: land use, transportation, water use, drainage and flood prevention, and electricity use	Not clearly specified	Not ready to consider economic value in its assessed data may not be available for environmental cost estimation

3.4 Guidelines for Selecting Project Types for Environmental Economics Assessment

The preceding analysis leads to the conclusion that determining which project types are suitable for environmental economics assessment should be guided by at least two principles: (1) the environmentally impactful activities must be clearly identifiable and supported by sufficient data for environmental economics assessment; and (2) the environmental valuation methods to be applied must be practically implementable.

A key observation is that identifying which issues or impactful activities can and cannot be monetized is itself a relatively straightforward exercise. The project investment analysis framework remains conventional, but with environmental costs and benefits incorporated as part of the overall project cost-benefit structure.

The project types selected for environmental economics assessment are: water resource development (as it already has established guidelines and a dedicated ERC), mining, highways and road systems, water transportation infrastructure, and buildings, land allocation, and community services.

3.5 Criteria and Guidelines for Environmental Economics Assessment by Project Type

The criteria and guidelines for environmental economics assessment focus on the use value dimension covering both direct use value and indirect use value of natural resources and the environment. Assessment subjects must be clearly defined, with due consideration given to data availability and the simplicity of the valuation method. These guidelines are intended to be flexible and adapted to the specific context of each project type; they are not rigid prescriptions. Details by project type are as follows:

3.5.1 Water Resource Development

- Loss of timber value from incremental timber volume (over the project lifetime), which reduces natural capital stock assessed using the Production Change method, based on timber volume data and market prices.
- Loss of forest ecosystem value, which diminishes ecosystem service capacity assessed using the Travel Cost Method, based on travel expenditure and time costs that reflect the recreational value of the forest that would be lost if it were destroyed; or using the Income Change method, based on the loss of income and expenditure associated with the loss of non-timber forest product collection.
- Environmental management costs for preventing, mitigating, or replacing environmental damage assessed using the Replacement Cost method, based on the cost of reforestation to replace the destroyed forest.

3.5.2 Mining

- Economic, conservation, and environmental value of forests assessed using the Production Function method, based on timber volume and market prices.
- Level of impact on agricultural areas and damage to productivity assessed using the Income Change method, based on the value of income lost due to reduced agricultural output.

3.5.3 Highways, Roads, and Expressway Systems

- Loss of livelihood income in flood-affected areas assessed using the Income Change method, based on the value of reduced occupational income.
- Loss of forest ecosystem value assessed using the Productivity Change method, based on data showing reduced agricultural productivity caused by pollution.

3.5.4 Water Transportation Infrastructure

- Loss of timber value from incremental timber volume (over the project lifetime) assessed using the Production Change method, based on timber volume and market prices.
- Loss of fishery and aquaculture areas assessed using the Income Change method, based on the value of reduced income from fisheries and aquaculture activities.

3.5.5 Buildings, Land Allocation, and Community Services

- Impacts on aquatic ecosystems from wastewater discharged by buildings, assessed for ecosystem service value using the Replacement Cost method, based on the cost of restoring natural water bodies through measures such as phytoremediation, aeration, and canal dredging to remove sediment, which reflects the value of restoring water quality to pre-discharge conditions; or using the Income Change method, based on the value of reduced occupational income.

For project types including industrial and utility support systems, thermal power plants, sugar industries, industrial estates, and petroleum, petrochemical, and chemical industries, specific emission standards and dedicated regulatory frameworks already exist. Project owners are already required to monitor compliance with environmental mitigation and prevention measures.

Table 3 Criteria and Guidelines for Environmental Economics Assessment by Project Type

Project Type	Environmental Impact to be Assessed	Valuation Method	Assessment Guideline
Water Resource Development	Loss of timber value from incremental timber volume	Production Change	Timber volume and market price
	Loss of forest ecosystem value	Travel Cost Method	Recreational value of forest resources lost to destruction, measured through travel expenditure and time costs
		Income Change	Value of income and expenditure lost from the absence of non-timber forest product collection
	Environmental management costs for preventing, mitigating, or replacing damage	Replacement Cost	Ecosystem service valuation using reforestation costs, reflecting the value lost if the forest is destroyed
Mining	Economic, conservation, and environmental value of forests	Production Change	Timber volume and market price)
	Impact on agricultural areas and damage to productivity	Income Change	Value of income lost from reduced agricultural output
Highways, Roads, and Expressway Systems	Loss of livelihood income in flood-affected areas	Income Change	Value of reduced occupational income
	Loss of forest ecosystem value	Production Change	Reduced agricultural productivity caused by pollution
Water Transportation Infrastructure	Loss of timber value from incremental timber volume (over project lifetime)	Production Change	Timber volume and market price
	Loss of fishery and aquaculture areas	Income Change	Value of reduced income from fisheries and aquaculture
Buildings, Land Allocation, and Community Services	Impact on aquatic ecosystems from building wastewater discharge	Replacement Cost	Ecosystem service valuation using the cost of restoring natural water bodies; e.g., phytoremediation, aeration, canal dredging; reflecting the water filtration value of wetlands
		Income Change	Value of reduced occupational income

Regarding the feasibility criteria for environmental economics assessment particularly the selection of an appropriate discount rate this should reflect the opportunity cost of the project, which varies by context. For example, urban real estate development carries a higher opportunity cost than rural landfill projects, and private sector projects generally apply higher opportunity costs than public sector ones. This consideration also underpins the Sensitivity Analysis, which tests how results change under different scenarios. The number of years used in the assessment should correspond to the project's benefit-generating period or operational lifespan, generally determined by the useful life of major machinery and structures in accordance with the Government Accounting Standards of the Comptroller General's Department or relevant agency directives such as the Royal Irrigation Department's order on the useful life of fixed assets.

3.6 Summary of Criteria, Guidelines, and Recommendations for Appropriate Environmental Valuation in the Context of Environmental Impact Assessment (EIA)

The criteria and guidelines for environmental economic valuation should cover the use value dimension, encompassing both direct and indirect use values of natural resources and the environment (see Section 3.5 for details). Examples include the loss of timber value resulting from logging which reduces natural capital stock and the loss of ecosystem services providing recreational and tourism value which reduces the flow of benefits if the ecosystem is destroyed. Indirect use value, which is typically linked to ecosystem services, includes the loss of a wetland's water filtration function reducing the flow of clean water if wastewater is discharged into public waterways.

Since environmental economic valuation currently remains limited to water resource development projects, embedding it into the EIA process more broadly will require deliberate procedural reform. The following recommendations are proposed:

1) Revise the project classification process to give greater weight to the natural resource and environmental significance of sensitive areas that may be affected such as Class 1 Watersheds, environmentally protected areas, conservation areas under the Ministry of Natural Resources and Environment, cultural heritage sites, and Ramsar Sites. Environmental value data generated at this stage should serve as a decisive factor in early go/no-go decisions. Currently, only one project classification is based on sensitive area designation (Item 33: projects in Cabinet-designated Class 1 Watershed Areas); all other project types are classified by project nature. This area-based approach is illustrated by the example of choosing between routing an expressway through a wetland versus rerouting around it; the lost ecosystem service value must be factored into the project cost when assessing economic viability.

2) Apply environmental economic valuation tools to expand monetary environmental calculations across five project types: water resource development, mining, highways and road systems, water transportation infrastructure, and buildings, land allocation, and community services.

3) Revise EIA report guidelines to place greater emphasis on quantitative analysis of natural resource and environmental losses to generate data suitable for environmental valuation. Current guidelines tend to focus primarily on baseline data collection and descriptive analysis. Impact assessment and environmental

economic valuation content (see Section 3.5) should be added to the relevant sections of the EIA guidelines specifically in the chapter on potential environmental impacts from project activities, under the sub-sections on biological resource impacts and human use value impacts.

4) Use environmental valuation to inform mitigation measures by assessing investment efficiency. If the value of ecosystem service losses, particularly those supporting the tourism sector, exceeds the cost of investing in a wastewater treatment system, that investment is considered economically justified.

5) Update the composition of the Expert Review Committees (ERCs) to include environmental economics specialists in the ERCs for mining projects, land and air infrastructure projects, water transportation infrastructure projects, and buildings, land allocation, and community service projects.

6) Build capacity among practitioners to enable practical application of the environmental economic valuation criteria and guidelines, through workshops covering natural capital as an asset, ecosystem services as stock and flow, and environmental valuation methods as they apply to the EIA guidelines for both impact assessment and valuation techniques.

7) Strengthen penalties for intentional avoidance of EIA requirements for example, deliberately sizing a land subdivision project below the threshold of 500 plots or 100 rai that triggers the EIA requirement under the land subdivision regulations.

8) Increase budget allocations for monitoring the implementation of environmental mitigation and monitoring measures, and for the preparation of environmental monitoring reports (Monitor Reports).

9) Introduce EIA auditing to generate feedback data for improving the EIA process, particularly data relevant to environmental economics assessment, including impactful activities, assessments of various impact dimensions, and losses of natural resources and the environment.

(10) Redefine the role of ONEP to act as the contracting authority for engaging consultants to prepare EIA reports, with project owners required to pay an annual fee covering report preparation, report review, and monitoring of compliance with the measures attached to the approved report with fee rates determined according to project size.

3.7 Recommendations for Appropriate Environmental Valuation in the Context of Strategic Environmental Assessment (SEA)

The scope of environmental economic valuation under SEA should focus on the use value dimension, consistent with the same foundational principles outlined in the EIA recommendations above. The following process improvements are proposed:

(1) SEA should be guided by the principle and objective of assessing the carrying capacity of an area to support economic and social activities, with the aim of achieving balanced development across economic, environmental, social, and other relevant dimensions; including legal and technological considerations.

(2) Impact data represents information that the Office of the National Economic and Social Development Council (NESDC) can use to conduct environmental valuation. In some cases, existing studies already provide the necessary data, while in others, available data can be applied to estimate environmental values for example, income losses from flooding or the economic value of forest loss.

(3) An independent committee established to oversee the SEA planning process, in order to eliminate conflicts of interest between project owners seeking approval and the requirement that strategic environmental assessments be grounded in high-quality academic data and subjected to rigorous review.

(4) A co-governance decentralization model should be adopted, whereby the central government sets standards and provides budgetary support, while local bodies carry out implementation and oversee local operations.

4. Wastewater Management Plan according to EIA Recommendations

At the provincial level, and in the case of Krabi Province specifically, the EIA system operates through a decentralization arrangement in which authority has been delegated from the central ONEP office to the Krabi Provincial Office of Natural Resources and Environment. A provincial-level ERC serves as the review mechanism, but only for building, land allocation, and community service projects reflecting the presence of an environmentally protected area covering Ao Luek, Mueang Krabi, Nuea Khlong, Khlong Thom, and Ko Lanta districts.

Ao Nang Sub-district, Mueang Krabi District, is also one of the South's most significant mass tourism destinations, known for its dramatic limestone cliffs, sandy beaches, and open sea vistas surrounded by islands. It serves as a major hub for boat connections, piers, and tourism amenities including accommodation, restaurants, retail shops, tour operators, and longtail boat services catering to large volumes of visitors during the high season from November to April. This concentration of tourism activity has given rise to wastewater problems that are now affecting marine ecosystems and, in turn, feeding back negatively into the tourism sector itself.

The key natural resource and environmental assets of Ao Nang or what the EIA system classifies as biological resources include forested areas and significant tree species, wetlands and mangroves, and rare flora such as cycads. Fauna of conservation concern include dugongs, coral reefs, and seagrass beds. The area's principal ecosystem services, which represent its spatial development potential and fall under the human use value dimension of the EIA framework, are beach tourism and marine wildlife tourism.

The main wastewater challenges and obstacles are: (1) many operators particularly small businesses — lack wastewater treatment systems; (2) existing treatment infrastructure is insufficient in both capacity and coverage, reflecting a public utilities system that has not kept pace with the area's growth; (3) legal and enforcement limitations; (4) budget constraints for wastewater treatment projects, compounded by treatment fee revenues that are insufficient to sustain operations; (5) a shortage of personnel and limited institutional capacity; (6) low public awareness of environmental responsibility and persistent behaviors of littering and discharging wastewater into public spaces; and (7) policy shortcomings and misaligned incentives for example, flat-rate treatment fees that are unfair to operators who have invested in compliant treatment systems. (Based on interviews with agencies and stakeholders conducted between September and November 2025.)

The following recommendations are proposed for developing a wastewater management plan for Ao Nang Sub-district, Mueang Krabi District, in alignment with EIA principles:

1) Strengthening legal and enforcement frameworks by expanding the authority of local bodies to enforce regulations against legally licensed operators and take meaningful action against unlicensed operations using municipal ordinances. For example, the provincial ERC should assess wastewater volumes from buildings and conduct ecosystem service valuations using the cost of restoring natural water bodies through phytoremediation, aeration, and canal dredging to remove sediment — as a reflection of wetland water filtration value.

2) Ensuring that environmental impact assessments are supported by adequate resource and impact data as foundational inputs for environmental valuation using appropriate tools and methods. In order to provide data for planning the sustainable and balanced use of natural resources and the environment preventing overexploitation.

To this end, the following baseline and contextual data should be collected for Ao Nang Sub-district: socioeconomic baseline data such as the number of affected residents, occupational profiles, income from livelihoods, tourist numbers, and tourism revenue; natural resource data such as the status of threatened and endangered species, coral reefs, and seagrass beds; and environmental data such as estimated water use and projected wastewater volumes from buildings, land subdivisions, and community services used for residential and commercial purposes, along with surface water quality, groundwater quality, coastal water quality, and the cost of restoring community mangrove forests. Data from provincial-level Natural Capital Accounting should also be systematically collected and utilized.

3) Integrating environmental economic values into project investment analysis, where social benefit is defined as the sum of financial revenue and external benefits, and social cost as the sum of financial cost and external costs. This framework underpins the calculation of Economic Net Present Value (ENPV), the Social Benefit to Social Cost Ratio (SB/SC Ratio), and the Economic Internal Rate of Return (EIRR). From an environmental economics perspective, the net social surplus, the excess of social benefit over social cost, represents the true net benefit or genuine profit of a project. For example, a wastewater treatment facility addresses the problem of externalities by reducing pollution and generating social benefits such as reduced damage to water resources and ecosystems, improved environmental quality that supports the tourism sector, and reduced waterborne disease, leading to better public health outcomes.

4) Creating incentives for the conservation of natural resources and the environment, particularly in relation to wastewater management. Local authorities should charge treatment fees based on actual wastewater volumes generated, and consider reduced waste collection fees for those who practice waste separation.

5) Developing public utility infrastructure by constructing or expanding wastewater treatment facilities and collection systems, while simultaneously strengthening local administrative organizations through additional staffing, adequate budgetary support, and the development of expertise in wastewater treatment technology. This involves integrated operations between various agencies such as local administrative organizations, local government agencies, state enterprises, and the private sector, using the provincial governor's mechanism to drive and connect them.

5. Wastewater Management Plan according to SEA Recommendations

Tourism is the primary economic activity in Ao Nang Sub-district, Mueang Krabi District yet it is also generating significant environmental pressures, particularly in relation to wastewater and solid waste. The following recommendations are proposed for developing a wastewater management plan in alignment with SEA principles:

1) Addressing the wastewater situation in Ao Nang, which is directly affecting both the tourism sector and marine ecosystems. Untreated or insufficiently treated wastewater is flowing into the sea along Ao Nang Beach, particularly during the high season while the existing local treatment system cannot handle total wastewater volumes. The result is landscape degradation and odor problems that directly damage the area's tourism image. There is therefore a clear need for wastewater treatment planning that is aligned with the carrying capacity of Ao Nang. This involves setting limits on tourist numbers, entrepreneur numbers and wastewater volumes to ensure that the treatment system does not fail under peak visitor loads. This aligns with the application of SEA principles as an integrated component of district or provincial spatial development planning corresponding to the Screening stage of the SEA process, which identifies policies, plans, or projects with potentially significant impacts.

2) Establishing a baseline data foundation for the design of policies, plans, or projects. Essential data for Ao Nang Sub-district should include population figures, per capita wastewater generation rates, per capita solid waste generation rates, wastewater and waste sources, treatment system capacity, and coverage of the centralized wastewater system. This data enables an understanding of the local context, an analysis of the problem situation, its causes, the area's potential, and the needs of stakeholders including analysis from provincial-level Natural Capital Accounting to inform wastewater management strategies. This corresponds to the Scoping stage of SEA, which defines strategic issues and sustainability indicators.

3) Ensuring that environmental dimensions are incorporated into the assessment of wastewater and solid waste solutions, for example by including the cost of restoring natural water bodies through phytoremediation, aeration, and canal dredging as a reflection of wetland water filtration value; assessed using the Replacement Cost method; and by valuing marine wildlife tourism using the Travel Cost Method, consistent with the recommendations in Chapter 4. The primary long-term solution is comprehensive wastewater treatment planning, which can be implemented alongside efforts to improve in-canal treatment efficiency and solid waste management, using the Ao Nang Water Quality Management Center as a model for clean water development, complemented by waste management charters, Green Hotel and Green Hotel Plus standards, and the hotel waste responsibility program; all working toward the goal of elevating the area to a globally recognized sustainable tourism destination. This corresponds to the Developing and Assessing Alternatives stage of SEA, in which scenarios are constructed to identify the most appropriate development pathway.

4) Applying the SEA process to the governance of large-scale development plans. Although NESDC is responsible for developing the SEA process at the national level, in practice the plan-owning agency oversees SEA report preparation to ensure quality and compliance; typically by engaging consultants; while the Sub-committee on Academic Affairs and Public Participation provides technical guidance and recommendations.

Plan-owning agencies can therefore establish procurement committees, plan oversight committees, and independent committees to supervise the SEA preparation process, thereby eliminating conflicts of interest.

5) Adopting a co-governance decentralization model for area-level SEA processes. In practical terms, this means devolving a portion of authority to the provincial level while retaining central government support; enabling the SEA process to be effectively grounded in local realities. Provinces and local bodies hold contextual knowledge and factual data that the central government does not, but they typically lack the budgetary resources required; particularly for wastewater treatment infrastructure, which demands substantial investment. Maintaining consistent national standards is essential in this arrangement; for example, the criteria and rates for wastewater treatment fees must adhere to the Polluter Pays Principle, ensuring equity across different areas.

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Annex I Projects, undertakings, or operations required to prepare the Environmental Impact Assessment report

No.	Type of projects, undertakings, or operations	Size	Stage
1.	Mining under the law on minerals: 1.1 mining types as follows: 1.1.1 coal mining; 1.1.2 potash mining; 1.1.3 rock salt mining; 1.1.4 limestone quarry for cement industry; 1.1.5 all types of metal mining; 1.2 underground mining; 1.3 mining types using explosives; 1.4 all mining types located in the following areas: 1.4.1 Class 1 Watershed Area designated by the Cabinet resolution; 1.4.2 additional conservation forests designated by the Cabinet resolution; 1.4.3 Ramsar Site; 1.4.4 area within 2 kilometers from an ancient monument, archaeological site, historical site or historical park under the laws on ancient monuments, antiques, objects of art and national museums, or a world heritage site inscribed on the World Heritage List according to the World Heritage Convention.	All sizes	when applying for a mining concession
2.	Petroleum development under the law on petroleum: 2.1 petroleum exploration by drilling; 2.2 petroleum production except production in the exploration areas and production on land continuously as required in an environmental impact assessment report and the original production right ends when there is petroleum in residue, and there is no production change to be different from the beginning.	All sizes	when applying for approval from a competent or permitting agency
3.	Petroleum and fuel pipeline transportation system, except: (1) onshore natural gas pipeline transportation system of which a maximum operating pressure is less than or equal to twenty bars and a pipeline diameter is less than or equal to sixteen inches for the entire	All sizes	when applying for a permit or approval from a competent agency, as the case may be

No.	Type of projects, undertakings, or operations	Size	Stage
	project, in any area, except for the areas where the Cabinet resolution or the specific laws specify otherwise; (2) onshore natural gas pipeline transportation system of which a maximum operating pressure is more than twenty bars or a pipeline diameter is more than sixteen inches, which is entirely located in an industrial estate under the law on Industrial Estate Authority of Thailand		
4.	Industrial estate under the law on Industrial Estate Authority of Thailand or other similar projects or projects of land allocation for industrial development	All sizes	when applying for authorization or permission of the project, as the case may be
5.	Petrochemical industry using chemical process in production	Production Capacity of 100 tons per day or more	when applying for permission for construction or operation, as the case may be
6.	Petroleum refining industry	All sizes	when applying for permission for construction or operation, as the case may be
7.	Natural gas separation industry or natural gas reforming industry as follows: 7.1 natural gas separation; 7.2 natural gas reforming by adjusting structure or changing status of gas to liquid; 7.3 natural gas reforming by changing status of liquid back to gas, using sea water or natural water resources to provide heat in order to change the status.	All sizes	when applying for permission for construction or operation, as the case may be
8.	Chlor-alkali industry and industry using chlorine (Cl_2) or hydrogen chloride (HCl) as follows: 8.1 chlor-alkali industry using sodium chloride (NaCl) as a raw material to produce the production of chlorine (Cl_2), sodium hydroxide (NaOH), sodium hypochlorite (NaOCl), hydrochloric acid (HCl), sodium carbonate (Na_2CO_3) and bleaching powder; 8.2 industry using chlorine (Cl_2) or hydrogen chloride (HCl) as a raw material to produce the production of sodium hypochlorite (NaOCl), hydrochloric acid (HCl),	Production capacity of each product, or combined, of 100 tons per day or more	when applying for permission for construction or operation, as the case may be

No.	Type of projects, undertakings, or operations	Size	Stage
	sodium carbonate (Na_2CO_3) and bleaching powder		
9.	Cement industry	All sizes	when applying for permission for construction or operation, as the case may be
10.	Pulp mill industry	Production capacity of 50 tons per day or more	when applying for permission for construction or operation, as the case may be
11.	Industry producing active ingredient or pesticide using chemical process in production	All sizes	when applying for permission for construction or operation, as the case may be
12.	Chemical fertilizer industry using chemical process in production	All sizes	when applying for permission for construction or operation, as the case may be
13.	Sugar industry as follows: 13.1 Producing raw sugar, white sugar or refined sugar; 13.2 Producing glucose, dextrose, fructose or other similar products	All sizes Production capacity of 20 tons per day or more	when applying for permission for construction or operation, as the case may be
14.	Iron or steel industry	Production capacity of each product, or combined, of 100 tons per day or more	when applying for permission for construction or operation, as the case may be
15.	Non-ferrous metals smelting or dressing or melting industry	Production capacity of 50 tons per day or more	when applying for permission for construction or operation, as the case may be
16.	Industry producing liquor, alcohol, including beer and wine: 16.1 liquor and alcohol industry; 16.2 wine industry; 16.3 beer industry.	 Production capacity of 40,000 litres per month or more (calculated at 28 degrees) Production capacity of 600,000 litres per month or more Production capacity of 600,000 litres per month or more	when applying for permission for construction or operation, as the case may be

No.	Type of projects, undertakings, or operations	Size	Stage
17.	Central waste treatment plant only for industrial waste under the law on factory	All sizes	when applying for permission for construction or operation, as the case may be
18.	All types of thermal power plants, except waste-to-energy plants. Waste-to-energy plants that are exempted shall not be located in the following areas: 18.1 Class 1 or Class 2 Watershed Area designated by the Cabinet resolution; 18.2 environmentally protected area under a Notification of Ministry of Natural Resources and Environment; 18.3 conservation forest areas under the Cabinet resolution; 18.4 Ramsar Site; 18.5 areas where air pollution level exceeds 80 percent of the National Ambient Air Quality Standards.	Productivity of electricity of 10 megawatts or more	when applying for permission for construction or operation, as the case may be
19.	Expressway system under the law on Expressway Authority of Thailand or other similar projects	All sizes	when applying for authorization or permission of the project, as the case may be
20.	Highway or road as defined by the law on highways, passing through the following areas: 20.1 wildlife sanctuaries or non-hunting areas under the law on wildlife conservation and protection; 20.2 national parks under the law on national parks; 20.3 Class 2 Watershed Area designated by the Cabinet resolution; 20.4 mangrove forest areas designted as the national forests; 20.5 coastal areas within 50 meters of the highest natural sea-level rise; 20.6 areas in or within 2 kilometers from Ramsar Site or world heritage site inscribed on the World Heritage List according to the World Heritage Convention; 20.7 areas within 1 kilometer from an ancient monument, archaeological site, historic site or historic park under the laws on ancient monuments, antiques, objects of art and national museums, except for those town planning roads under the law on town planning.	All sizes	when applying for authorization or permission of the project, as the case may be
21.	Rail mass transit system	All sizes	when applying for

No.	Type of projects, undertakings, or operations	Size	Stage
			authorization or permission of the project, as the case may be
22.	Ports, except projects, undertakings, or operations undertaken for national security under the law on National Security Council that are approved by the Cabinet.	Capacity for vessels of 500 gross tons or more; berth length of 100 meters or more, but not up to 300 meters; or total port area of 1,000 square meters or more, but not up to 10,000 square meters	when applying for authorization or permission of the project, as the case may be
23.	Recreational ports	Capacity for 50 vessels or more or total port area of 1,000 square meters or more	when applying for authorization or permission of the project, as the case may be
24.	Land reclamation in the sea	Lower than 300 rai	when applying for authorization or permission of the project, as the case may be
25.	Construction or expansion of a structure around or in the sea: 25.1 groin, jetty, and training wall; 25.2 offshore breakwater.	All sizes	when applying for authorization or permission of the project, as the case may be
26.	Aviation Transportation System, only for construction or expansion of airports or temporary takeoff and landing areas for aircrafts under the law on air navigation.	Runway length of 1,100 meters or more, but not up to 3,000 meters.	when applying for authorization or permission of the project, as the case may be
27.	High-rise or extra large building under the law on building control with the locations or utilization purposes as follows: 27.1 located adjacent to a riverbank as indicated in Annex 2, seashore, lake, or beach, or near or in a national park or historical park, which may impact environmental quality; 27.2 buildings used for retail or wholesale business 27.3 buildings used as an office or place of business of a private sector	Height of 23.00 meters or more; or total floor area of all floors or of each individual floor area in the same building of 10,000 square meters or more	when applying for a construction permit; or when notifying the local competent official, in the case of notifying a local competent official under the law on building control without applying for a permit, as the case may be
28.	Land allocation for residential or commercial purposes under the law on land allocation	500 land plots or more or total allocated area of more than 100 rai	when applying for a land allocation permit under the law on land allocation

No.	Type of projects, undertakings, or operations	Size	Stage
29.	Hospitals or sanatoriums under the law on sanatoriums 29.1 in the case of being located within 50 meters from a river indicated in Annex 2, seashore, lake or beach; 29.2 other types not specified in 29.1	30 in-patient beds or more 60 in-patient beds or more	when applying for a construction permit; or when notifying the local competent official, in the case of notifying a local competent official under the law on building control without applying for a permit, as the case may be
30.	Hotels or resorts under the law on hotels	80 units or more or usable area of 4,000 square meters or more	when applying for a construction permit; or when notifying the local competent official, in the case of notifying a local competent official under the law on building control without applying for a permit, as the case may be
31.	Residential building under the law on building control	80 units or more or usable area of 4,000 square meters or more	when applying for a construction permit; or when notifying the local competent official, in the case of notifying a local competent official under the law on building control without applying for a permit, as the case may be
32.	Irrigation	Irrigated area of 80,000 rai or more	when applying for authorization or permission of the project, as the case may be
33.	All types of projects, undertakings, or operations located in the areas which the Cabinet's resolution designates as Class 1 Watershed Area, except the followings: 33.1 projects, undertakings, or operations for community development and land arrangement as approved by the Cabinet; 33.2 projects, undertakings, or operations in community forests under the law on community forests; 33.3 projects, undertakings, or operations of a government agency that had entered the area for benefits before this Notification took effect, and its actions have	All sizes	when applying for authorization or permission of the project, as the case may be

No.	Type of projects, undertakings, or operations	Size	Stage
	been consistent with the original objectives and did not expand the area to be different from the beginning.		
34.	Transbasin diversion as follows: 34.1 transbasin diversion of main river basins, with an exception of temporary diversion in the case of a disaster or where there is an impact on national security; 34.2 international transbasin diversion, with an exception of temporary diversion in the case of a disaster or where there is an impact on national security.	All sizes	when applying for authorization or permission of the project, as the case may be
35.	Sluice gate in principal rivers	All sizes	when applying for authorization or permission of the project, as the case may be

Annex II Composition of the Expert Review Committee for Environmental Impact Assessment Reports

The Notification of the National Environment Board on Criteria, Methods, and Conditions for the Appointment of Expert Review Committees for EIA Reports, dated 31 October 2020 and approved at the 5th Meeting of the National Environment Board on 23 September 2020, specifies the composition of each Expert Review Committee, organized by area of expertise, as follows:

(1) Secretary-General of the Office of Natural Resources and Environmental Policy and Planning	As a Chairperson
(2) Officials holding statutory authorization powers relevant to the project, business, or operation concerned	As a Committee members
(3) Up to 9 nominated specialists or experts in relevant fields	As a Committee members
(4) An ONEP official	As a Committee member and Secretary
(5) Two ONEP officials	As a Committee members and Assistant Secretaries

Annex III The National Environment Board has issued orders appointing nine Expert Review Committees to review EIA reports, as summarized below:

ERC	Projects Reviewed
1) Mining Projects	Mining operations under the Minerals Act
2) Petroleum Development Projects	Petroleum development under the Petroleum Act, - petroleum exploration by drilling - petroleum production
3) Petroleum, Petrochemical, and Chemical Industry Projects	- Petrochemical industries with chemical production processes - petroleum refining industries - natural gas separation or conversion industries; chlor-alkaline industries and industries using Cl_2 or HCl - industries producing agrochemicals through chemical processes - chemical fertilizer manufacturing industries
4) Energy Projects	- All types of thermal power plants, except those using municipal solid waste as fuel - petroleum and fuel oil pipeline transportation systems
5) Industrial Projects and Supporting Utility Systems	- Industrial estates, industrial zones, or land allocation for industrial use under relevant laws - cement manufacturing industries - pulp and paper manufacturing industries - sugar industry operations - iron or steel industries - ore smelting, processing, or metal casting industries - liquor, alcohol, beer, and wine manufacturing industries - centralized waste treatment facilities - landfill facilities for hazardous waste under the Factory Act involving burning or landfilling, except cement kilns using hazardous waste as substitute raw material or supplementary fuel (EHIA) - landfill facilities for non-hazardous waste under the Factory Act - coke manufacturing industries - nuclear facilities using nuclear reactors - radioactive waste management facilities
6) Building, Land Allocation, and Community Service Projects	- High-rise or large-scale special buildings under the Building Control Act with specified location or use characteristics - land subdivision for residential or commercial purposes under the Land Subdivision Act

ERC	Projects Reviewed
	- hospitals or medical facilities under the Medical Facility Act - hotels or resorts under the Hotel Act - residential condominiums under the Building Control Act
7) Land and Air Infrastructure Projects	- Expressway systems under the Expressway Act, or projects of similar nature - highways and roads under the Highway Act passing through designated areas - rail transport systems - air transport systems
8) Water Transportation Infrastructure Projects	- Cargo seaports - recreational and sports marinas - land reclamation in the sea or Songkhla Lake beyond the original shoreline, except for beach restoration - construction or expansion of structures in or adjacent to the sea
9) Water Resource Development Projects	- Irrigation projects - inter-basin water diversion - water control gates in major rivers - dams or reservoirs
All Expert Review Committees (depending on project type) are also responsible for reviewing EIA reports for all project types located in Cabinet-designated Class 1 Watershed Areas, as well as any other projects assigned to them.	

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