

Environmental Assessment and Review Framework

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Thailand: Lower East Chao Phraya Irrigation System Improvement – Climate Adaptive Strengthening Investment Project

Prepared by the Royal Irrigation Department (RID), Government of Thailand for the Asian Development Bank (ADB).

CURRENCY EQUIVALENTS

(as of 1 November 2025)

Currency unit	–	Baht (THB)
THB 1.00	=	\$ 0.0309
\$1.00	=	THB 32.33

ABBREVIATIONS

ADB	–	Asian Development Bank
BMA	–	Bangkok Metropolitan Administration
CODI	–	Community Organization Development Institute
EA	–	executing agency
EHS	–	environmental health and safety
EIA	–	environmental impact assessment
EMP	–	environmental management plan
EWS	–	early warning system
GIS	–	geographic information system
GRM	–	grievance redress mechanism
IEE	–	initial environmental examination
MOF	–	Ministry of Finance
MONRE	–	Ministry of Natural Resources and Environment
NEQA	–	National Environmental Quality Act
NESDC	–	National Economic and Social Development Council
ONWR	–	Office of the National Water Resources
O&M	–	Operation and Maintenance
PCR	–	physical cultural resources
PDMO	–	Public Debt Management Office
PIU	–	project implementation unit
PMU	–	project management unit
RID	–	Royal Irrigation Department
SPS	–	safeguard policy statement (ADB)
TOR	–	terms of reference
UNESCO	–	United Nations Educational, Scientific and Cultural Organization

WEIGHTS AND MEASURES

dB(A)	–	A-weighted Decibel
km	–	kilometer
km ²	–	square kilometer
LAeq	–	Equivalent Continuous Level 'A weighting' - 'A'-weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies
m	–	meter
°C	–	degree celsius
PM10	–	particulate matter 10 micrometers or less
PM2.5	–	particulate matter 2.5 micrometers or less
µg/m ³	–	microgram per cubic meter

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Contents

I.	INTRODUCTION	1
A.	Background	1
B.	Environmental Safeguard Requirements of the Project	8
II.	ASSESSMENT OF LEGAL FRAMEWORK	9
A.	ADB Safeguard Policy Statement	9
B.	National Environmental Impact Assessment Regulation	12
C.	Other National Environmental Laws, Rules and Regulations	16
D.	Applicable Environmental Standards	29
E.	International Environmental Agreements	33
F.	Gaps Analysis between ADB SPS and Government Environmental Requirements	37
G.	Specific Requirements for the Project	44
III.	ENVIRONMENTAL ASSESSMENT FOR MFF TRANCHES	45
IV.	GENERAL ANTICIPATED ENVIRONMENTAL IMPACTS	52
V.	CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM	59
A.	Consultation	59
B.	Information Disclosure	61
C.	Grievance Redress Mechanism	61
VI.	INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES	63
A.	Executing and Implementing Agencies	63
B.	Project Management and Implementation Units	66
C.	Project Consultants	69
D.	Contractors	70
E.	Roles and Responsibilities	70
F.	Capacity Development	76
G.	Indicative Costs	76
VII.	MONITORING AND REPORTING	78

Appendices

Appendix 1: List of Civil Works, Goods, and Nonconsulting Services Packages in the Procurement Plan	0
Appendix 2: Suggested Outline of Initial Environmental Examination Report	4
Appendix 3: Basic Outline of an Environmental Due Diligence Report	0
Appendix 4: Sample Environmental Code of Conduct	1
Appendix 5: Suggested Outline of Site-Specific Environmental Management Plans/ Site-Specific Health and Safety Management Plans	3
Appendix 6: ONEP Letter to RID	8
Appendix 7: Sample Construction Site Checklist for EMP Monitoring	12
Appendix 8: Suggested Outline of Asbestos Management Plan	14
Appendix 9: Indicative Terms of Reference for Environmental Safeguards Officers/Specialists of the PMU, PIUs, PMCSC and Contractor	15
Appendix 10: Sample Daily Monitoring Sheet for Contractor	0
Appendix 11: Sample Inspection Checklist for Implementing Entities (on behalf of PMU / PIU, PMCSC)	2
Appendix 12: Suggested Outline of Semi-Annual Environmental Monitoring Report	5
Appendix 13: Suggested Outline of a Post-Construction Environmental Audit Report (PCEAR)	6

I. INTRODUCTION

A. Background

1. The Lower East Chao Phraya Irrigation System Improvement Project (hereinafter referred to as “project” or “overall project”) is one of the nine large-scale plans under the comprehensive investment program prepared by the Government of Thailand to alleviate the flood issues in the Lower Chao Phraya River Basin. The project will be supported by ADB under a Multitranche Financing Facility (MFF), which will be implemented in three tranches over eight-year period.

2. The project includes modernization of irrigation and drainage infrastructure and other supporting outputs in the Lower East Chao Phraya area. The project is aligned with the following impact: Economic impacts from climate-induced floods and droughts reduced.¹ The project will have the following outcome: Resilience and preparedness to climate-induced risk in the Lower East Chao Phraya strengthened. The project will comprise the following three outputs:

- (i) Output 1: Modernized climate-resilient irrigation and drainage infrastructure established. Output 1 will upgrade existing irrigation canals, regulation structures, and pumping stations to function as dual-purpose irrigation and flood-conveyance systems, creating climate-resilient assets that mitigate both flood and drought risks. Physical modernization will include re-sectioning and stabilizing canal cross-sections, and constructing or upgrading flow-control structures, pumping stations, and operations buildings to enhance structural resilience and hydraulic performance. These improvements will increase the system’s flood-conveyance capacity from 210 m³/s to 400 m³/s, reducing downstream flood levels in the Lower Chao Phraya River and Bangkok.² Enlarged waterways will also expand storage capacity, improving water availability for irrigation and other uses during dry periods. The project will (i) upgrade approximately 473 km canals (both banks), 311 km under the loan funds and 162 km under domestic financing and (ii) construct or upgrade 16 structures, 11 under loan funds and 5 under domestic financing;
- (ii) Output 2: Climate smart and efficient water management capacity strengthened. Output 2 will establish and upgrade digital systems to improve operational efficiency, strengthen climate-risk management, and modernize irrigation network operations. A comprehensive decision-support system (DSS) will be developed for real-time flow monitoring, flood forecasting, early warning, and optimized irrigation and drainage operations. The output will also modernize the hydrometeorological observation network, strengthen institutional frameworks, and build RID’s capacity for digital O&M and asset management. Activities include: (i) upgrading flow-forecasting and early-warning systems; (ii) establishing a functional asset management system and institutionalizing O&M planning and execution processes; (iii) enhancing staff competencies in digitized water management; and (iv) adopting a strategy to advance women’s participation and leadership within RID; and
- (iii) Output 3: Community resilience and livelihood supported. Output 3 will build on

¹ Government of Thailand. 2022. Thailand 2nd Updated Nationally Determined Contributions. Bangkok.

² United Nation Development Programme/Green Climate Fund are implementing the *Enhancing climate resilience in Thailand through effective water management and sustainable agriculture project* in the upstream Chao Phraya watershed, which include soil improvement and erosion control.

ongoing government initiatives to empower communities and strengthen resilience at the local level. Effective gender-responsive CBDRM³ and early warning system (EWS) will be established in communities at risk to reduce losses caused by disasters triggered by natural hazards and contribute to livelihood development, and indirectly food security. Extensive training on livelihood development and diversification will be provided, specifically for the most vulnerable groups in the communities. In close cooperation with the DDPM of the Ministry of Interior, CBDRM groups will be established in the communities and provided with the necessary equipment to effectively operate, including community EWS linked to RID's DSS. Technical training on DSS, O&M, and EWS operations will be provided by RID and local governments. Training will also be provided to benefit communities by developing opportunities for livelihood diversification and improving existing agricultural activities to reduce flood risks. Cultural and gender aspects, the roles of women's community organizations, and local employment opportunities will be assessed and integrated. Specifically, this output will: (i) make CBDRM programs operational in communities around irrigation canals, (ii) allow affected households in RID right-of-way become legal land users, (iii) increase women in leadership/decision-making positions in CBDRM groups, and (iv) increase knowledge on livelihood enhancement and business development among farmers and Micro, Small, and Medium Enterprises (MSMEs), including female farmers and women-owned MSMEs.

3. **Implementation Arrangements.** The Royal Irrigation Department (RID) is the Executing Agency of the MFF. A project management unit (PMU) will be established under the Medium Scale Water Resources Development Division of RID with close cooperation with the Treasury Department, the Ministry of Interior, and other relevant agencies. The PMU will have the overall responsibility for project management and implementation, including safeguards compliance. Project implementation units (PIUs) will be established to manage day-to-day implementation at the project site level. The project will engage a project management and construction supervision consultant (PMSCS) to support the PMU and PIUs. The implementation arrangements are discussed in detail in Chapter VII.

4. **Project Components.** The indicative procurement plan of the project components is attached as Appendix 1. The project components will include civil works, goods, consulting services, and non-consulting services. The following components will involve civil works:

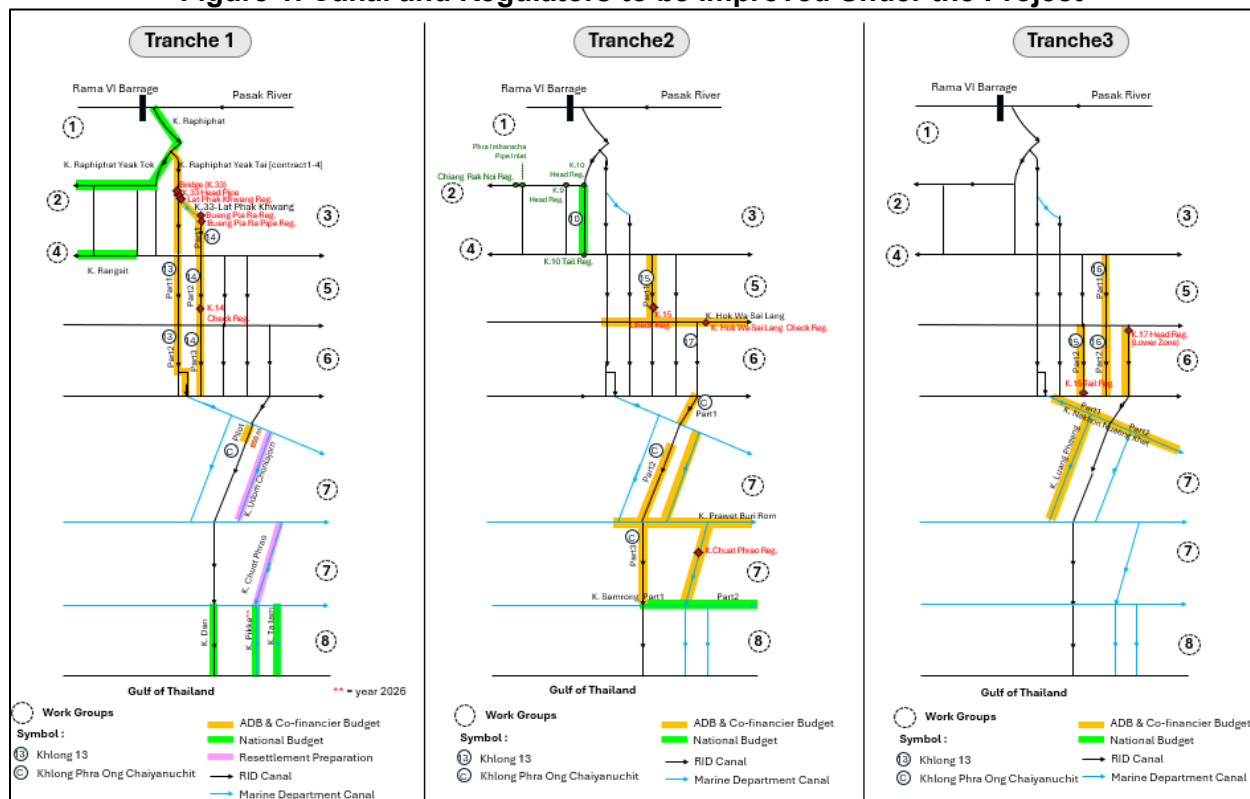
- (i) Upgrade of approximately 296 kilometers of existing canals by dredging to increase the cross-sectional area of these canals and by constructing retaining walls on either or both sides of these canals under Output 1;
- (ii) Construction and/or upgrade of 12 flow regulator structures under Output 1; and

³ Gender-responsive CBDRM considers and addresses differentiated needs and vulnerabilities of women and girls particularly those from vulnerable groups, during disaster prevention and response. It includes mechanisms for women's participation in consultation and decision-making. The program will ensure: (i) participation of women in planning, training, and implementation of pilot activities; (ii) women's participation and leadership in the CBDRM committees; (iii) actions that enhance women's safety, agency, and capacity to lead preparedness, response, and recovery; (iv) incorporation of gender considerations into early warning, maintenance, and community flood- and drought – response planning; and (v) GBV prevention measures within community preparedness and response systems.

- (iii) Upgrade or modernization of existing hydromet observation networks under Output 2.

5. A schematic presentation of the tranche-wise civil works in existing canals and regulators under Output 1 is shown in Figure 1. The project site locations for each tranche are provided in

Figure 1. Canal and Regulators to be Improved Under the Project



Source: Royal Irrigation Department

Figure 2: Improvement Works in Tranche 1

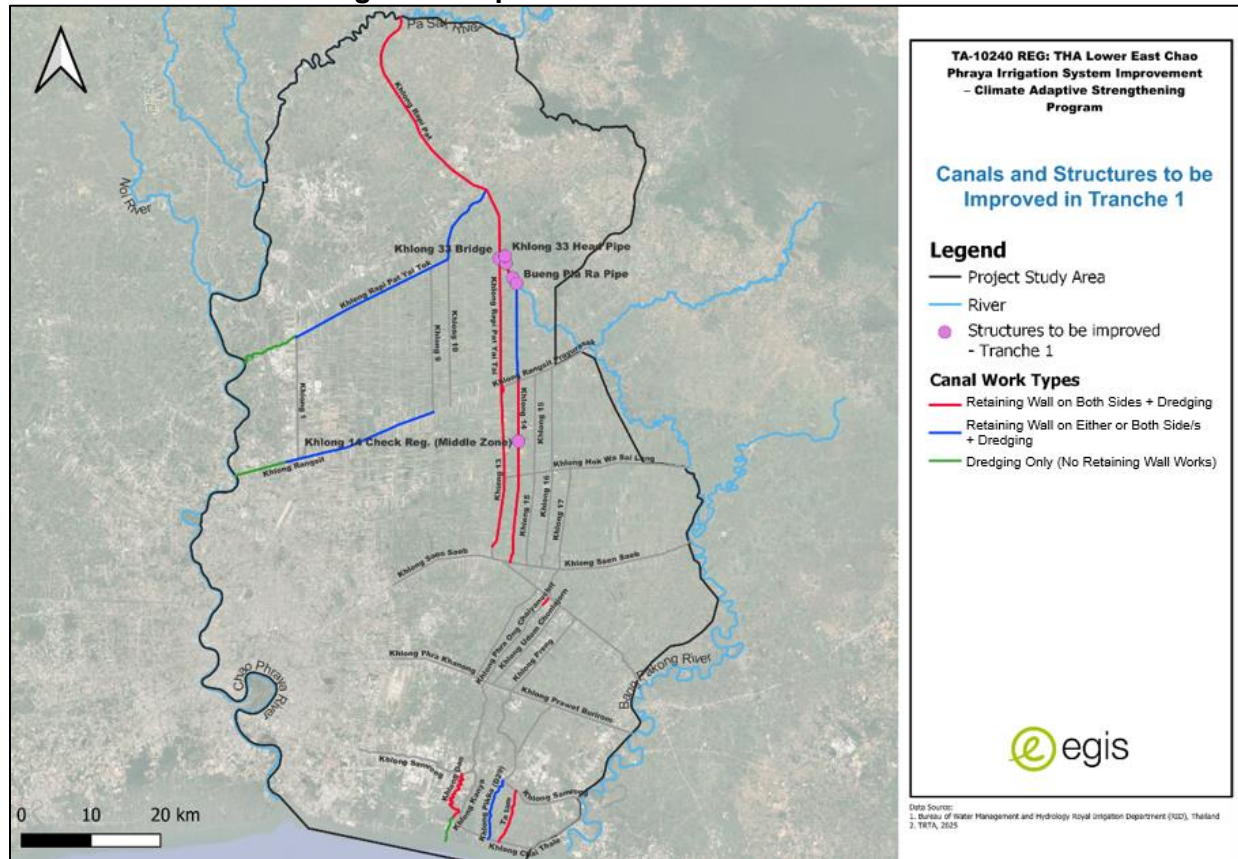


Figure 3: Improvement Works in Tranche 2

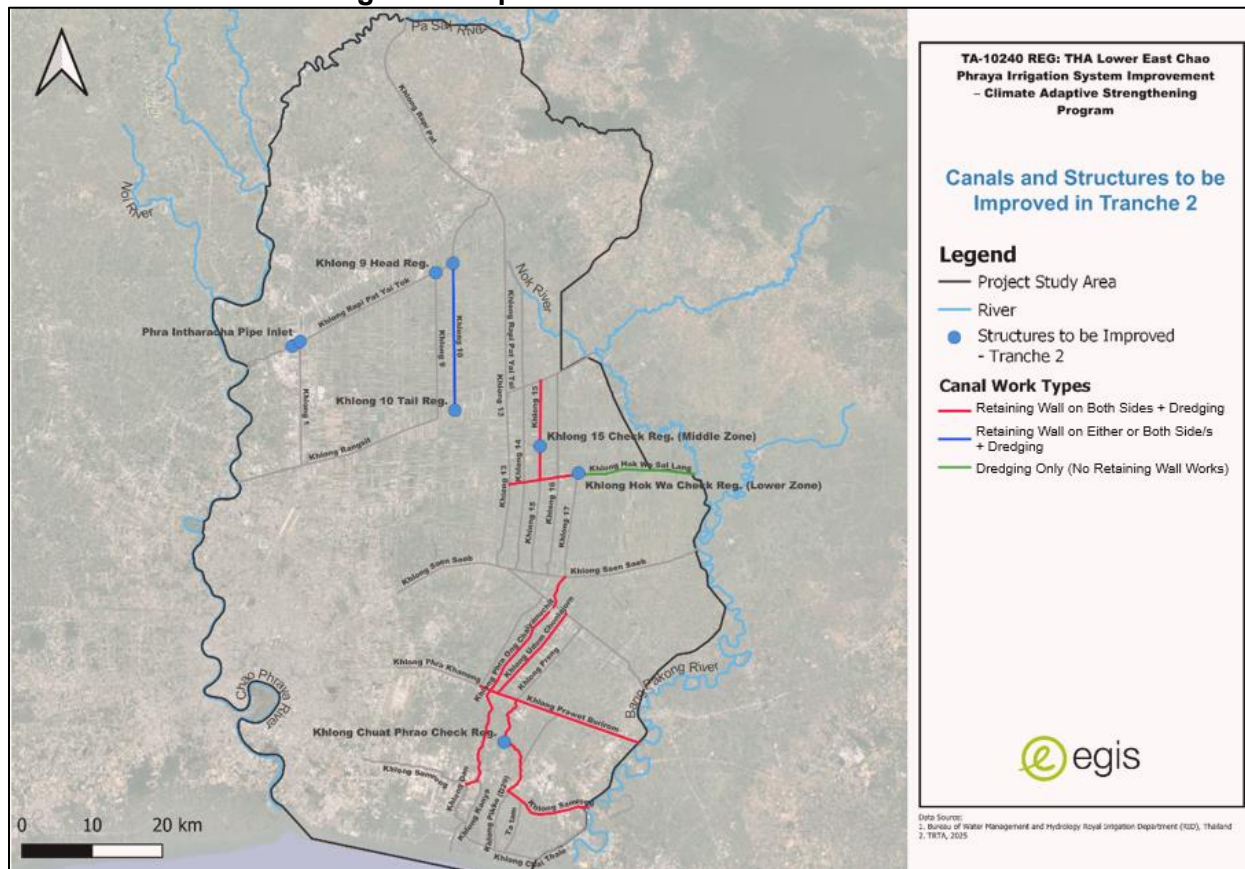
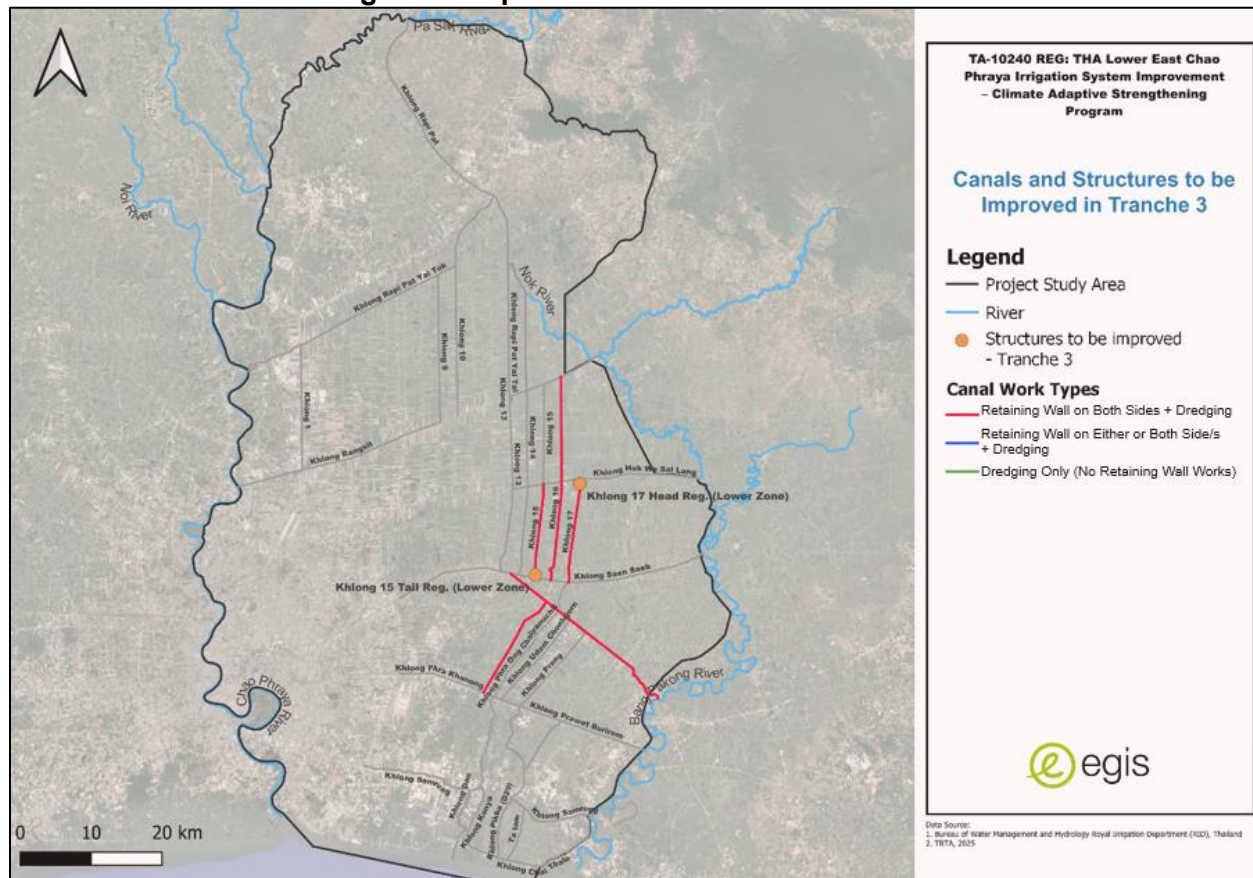
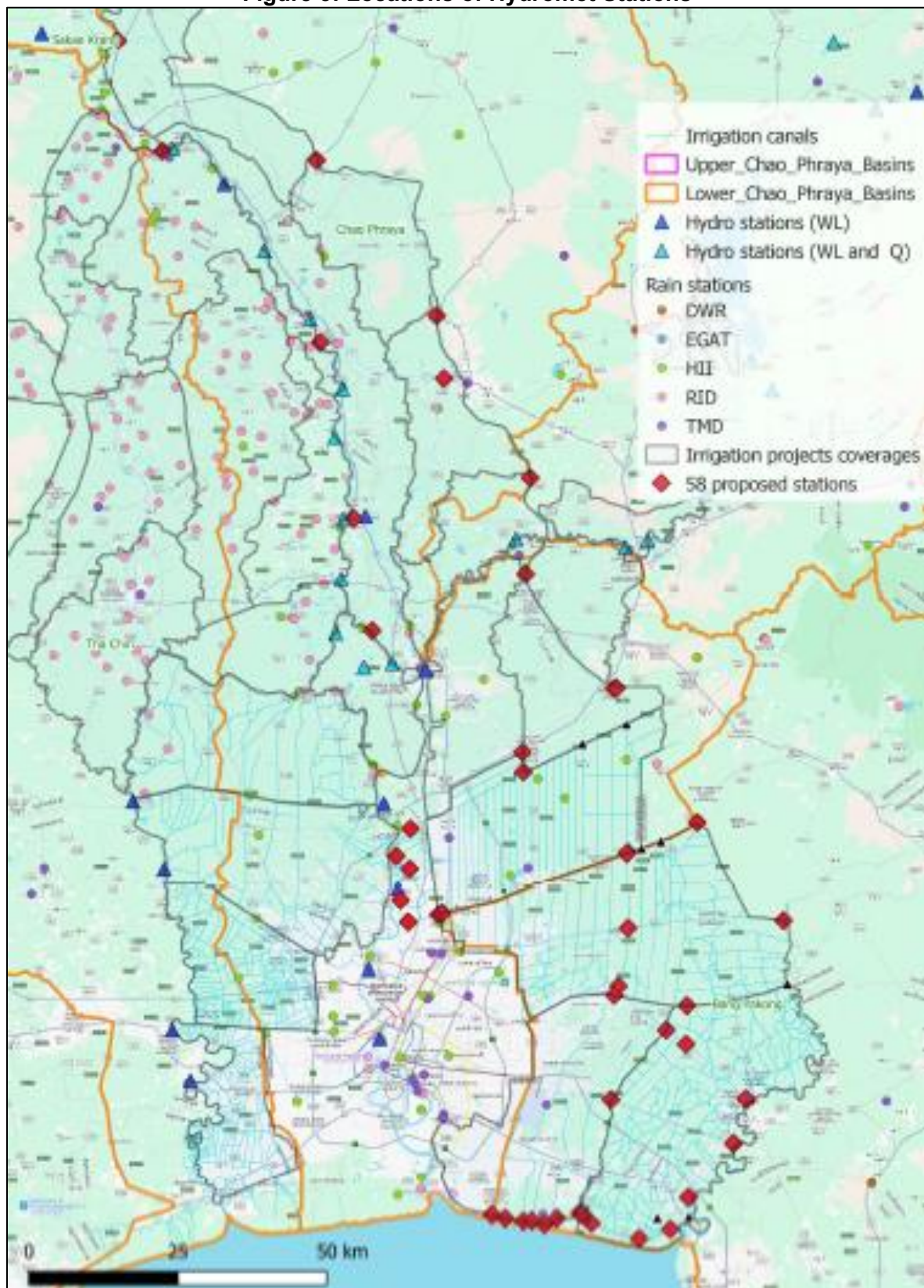


Figure 4: Improvement Works in Tranche 3



7. A schematic presentation of the hydromet stations to be improved under the Output 2 of the project is presented in Figure 5. This is preliminary information and will be updated once the locations of the new hydromets are identified.

Figure 5: Locations of Hydromet Stations



Source: Royal Irrigation Department

B. Environmental Safeguard Requirements of the Project

1. Environmental Assessment and Review Framework

8. This environmental assessment and review framework (EARF) is prepared to meet the requirements of ADB Safeguard Policy Statement (SPS) for MFFs. The purpose of the EARF is to ensure that the project components and activities implemented under the different tranches comply with ADB safeguard objectives, principles and requirements.

9. The EARF:

- (i) describes the project and the preliminary list of project components under each tranche;
- (ii) specifies the environmental laws, rules and regulations, statutory clearances to be obtained and applicable environmental standards;
- (iii) describes the procedure to be used in preparing environmental assessment report to meet ADB SPS requirements for the MFF and its subsequent tranches;
- (iv) explains the general anticipated environmental impacts of the project and recommends general mitigation and monitoring measures;
- (v) specifies requirements for construction impacts, sediment management, waste management, asbestos management, and physical cultural resources (PCRs);⁴
- (vi) specifies requirements for meaningful consultation with affected person and other stakeholders, grievance redressal mechanism, and information disclosure;
- (vii) provides safeguards institutional arrangements, roles, and responsibilities;
- (viii) indicates capacity development for the project management and implementing agencies and other stakeholders; and
- (ix) specifies monitoring and reporting requirements including sample checklists and templates.

2. Environmental Categorization per ADB SPS

10. ADB has classified the project as environmental category B per ADB SPS.⁵ Initial environmental examination (IEE) for Output 1 and an environmental due diligence report (EDDR) for Output 2 have been prepared based on available information as of the ADB loan processing stage. The environmental screening conducted as part of the preparation of the IEE and EDDR confirmed that project components will not have potential impacts that are considered irreversible,

⁴ Movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level.

⁵ Per ADB SPS, a project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories: (i) **Category A**. A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required. (ii) **Category B**. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required. (iii) **Category C**. A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed. (iv) **Category FI**. A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

diverse, and unprecedented which can trigger the higher classification of Category A for Environment. Any change in scope, location or design during implementation that may trigger Category A will be considered for funding under any of the tranches. Any activity that will directly affect environmentally sensitive areas will be relocated or assessed for suitable alternatives to lessen the potential environmental impacts.

11. The MFF will not include and/or involve any activities listed in ADB's Prohibited Investment Activities List.⁶

II. ASSESSMENT OF LEGAL FRAMEWORK

12. ADB will not finance any project if it does not comply with ADB SPS nor will it finance any project if it does not comply with Government of Thailand environmental laws, rules and regulations. Where discrepancy between ADB and Government of Thailand policies exist, ADB's policy will prevail.

A. ADB Safeguard Policy Statement

13. ADB SPS requires borrowers to meet a set of requirements when delivering environmental safeguards for projects supported by ADB.⁷ The objectives are to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process. The project is required to comply with the policy principles, as summarized below.

14. **Screening and Categorization.** A project is to be screened for its potential environmental impacts and is assigned to a specific category (footnote 5). Categorization is to be based on the most environmental sensitive component of the project. However, in the case of the MFF, all components need to be assessed and confirmed that none of these components can trigger Category A. If a particular project component is assessed to trigger Category A, the implementing agency shall examine alternatives to the component's location/s, designs, technologies, and subcomponents that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization.

15. **Environmental Assessment.** Environmental assessment shall include description of environmental baseline to provide an understanding of current conditions forming the benchmark against which project impacts are assessed. Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including design and planning stage, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration. The "no action" or "without project" alternative will also be considered.

16. The structure and content of the typical IEE report is provided in **Error! Reference source not found.** The IEE prepared during the ADB loan processing stage will be updated if there is a change in scope, location, design, or updating of environmental assessments based on the results of technical studies. The IEE will also be reviewed and updated during the processing of

⁶ See Appendix 5 of ADB SPS.

⁷ ADB SPS Safeguard Requirements 1 is a set of requirement aimed to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. This set of requirements is triggered if a project is likely to have potential environmental risks and impacts. There are 11 key policy principles that need to be considered to ensure the requirements of addressing these impacts and risks are met.

subsequent tranches.

17. For Output 2, which will involve small civil works to install the hydromet stations that will be covered by the goods procurement package, has been considered as Category C for Environment per ADB SPS. An EDDR considering selected existing hydromet stations has been prepared to review the environmental implications and provide specific mitigation measures consistent with the environmental code of construction practice (ECOCPP) (Appendix 4) to be applied during the upgrade and installation of the hydromet stations.

18. **Environmental Audit.** When the project involves existing activities or facilities, PMU is responsible to ensure that relevant external experts will perform environmental audits to determine the existence of any areas where the project may cause or is causing environmental risks or impacts. If the project does not foresee any new major expansion, the audit constitutes the environmental assessment for the project. As the project aims to rehabilitate the existing water conveyance system (i.e. existing regulators and canals), the IEE prepared for Output 1 constitutes environmental assessment covering these existing facilities.

19. **Physical Cultural Resources.** The PMU will identify all physical cultural resources (PCRs) in the project area. If the project is likely to affect the PCRs, the PMU will engage qualified and experienced experts to assess the project's potential impacts using field-based surveys. If there is high likelihood that PCRs are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the environmental management plan (EMP).

20. **Environmental Planning and Management.** The EMP will describe and address the potential impacts and risks identified by the environmental assessment. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks. The EMP shall include the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. The EMP as part of the IEE shall be updated in every subsequent tranche.

21. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the project the PMU will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines.⁸ These standards contain performance levels and measures that are normally acceptable and applicable to the project. When the national regulations differ from these levels and measures, the project shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

22. **Occupational Health and Safety.** The PMU⁹ will ensure that workers¹⁰ are provided with a safe and healthy working environment, considering risks and specific classes of hazards in the

⁸ World Bank Group. 2007. *Environmental, Health, and Safety General Guidelines*. Washington, D.C.

⁹ In case where responsibility is delegated to project contractors during construction phase, PMU shall ensure that the responsibilities on occupational health and safety as described herein are included in the contract documents.

¹⁰ Including nonemployee workers engaged by PMU through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

project work areas, such as but not limited to physical, chemical, biological, and radiological hazards. PMU will ensure that the contractors shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

23. The PMU will ensure to apply preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines¹¹ and International Labor Organization (ILO).¹²

24. **Community Health and Safety.** The PMU will ensure to identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

25. **Consultation and Participation.** PMU will carry out meaningful consultation¹³ with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. The consultation process and its results are to be documented and reflected in the environmental assessment report.

26. **Grievance Redress Mechanism.** PMU will establish a grievance redress mechanism (GRM) to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance. The GRM will be scaled to the risks and adverse impacts of the project. As of the ADB loan processing for the project, a GRM meeting both environmental and social safeguard requirements of ADB SPS has been prepared and discussed in detail in Chapter VI. PMU will officially issue the GRM establishment before loan effectiveness.

27. **Monitoring and Reporting.** The PMU will monitor and measure the effectiveness of mitigation measures and document the implementation of the EMP. If necessary, PMU will identify the necessary corrective actions, and reflect them in a corrective action plan. PMU will prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with

¹¹ <https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-occupational-health-and-safety-en.pdf>

¹² <https://www.ilo.org/dyn/normlex/en/f?p=1000%3A12000%3A%3A%3A%3A%3A%3A>

¹³ Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

implementation of the EMP and compliance issues and corrective actions, if any. Reporting on semi-annual basis will continue until ADB issues a project completion report.

28. The PMU shall ensure that relevant information (whether positive or negative) about environmental safeguard issues is made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the general public, so they can provide meaningful inputs into project design and implementation.

29. ADB will post the following safeguard documents on its website:

- (i) this EARF before ADB project appraisal;
- (ii) draft IEE upon receipt during the MFF processing stage;
- (iii) updated IEE based on tranche-specific information;^{14, 15}
- (iv) environmental due diligence reports; and
- (v) environmental monitoring reports, including corrective action plan prepared, if any.

30. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during project implementation, to meet ADB SPS requirement on unanticipated impacts, the PMU will update the IEE and EMP, or prepare a new environmental assessment report with EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

B. National Environmental Impact Assessment Regulation

31. **The Enhancement and Conservation of the National Environmental Quality Act (NEQA), B.E. 2535 (1992) [with amendments in The Enhancement and Conservation of the NEQA, B.E. 2561 (2018)].** This Act is the primary law that provides the specific regulations on environmental impact assessment of projects or undertaking in the country. It provides the general guidelines and processes on screening projects based on industry- or activity-specific classifications, preparation of required environmental assessment reports, review and approval process, timelines, etc. The Act also provides the process of public participation of the stakeholders related to the project.

32. **Notification of the Ministry of Natural Resources and Environment on Projects, Undertakings, or Operations Required to Provide an Environmental Impact Assessment Report and Rules, Procedure, and Conditions in Providing an Environmental Impact Assessment Report [B.E. 2561 (2018)]** with updates issued or notified in B.E.2562 (2019), and B.E. 2564 (2021). These Notifications provide supplemental or supporting implementing rules and regulations for the NEQA as amended or updated. Amendment and/or updating of the Notification is done as the need arise due to circumstances. They provide the classification of projects and activities with the corresponding required environmental assessment as stipulated in the NEQA as amended. Depending on the types and sizes of projects and activities, the following are the various kinds of environmental assessment reports that need to be prepared by the respective project proponents:

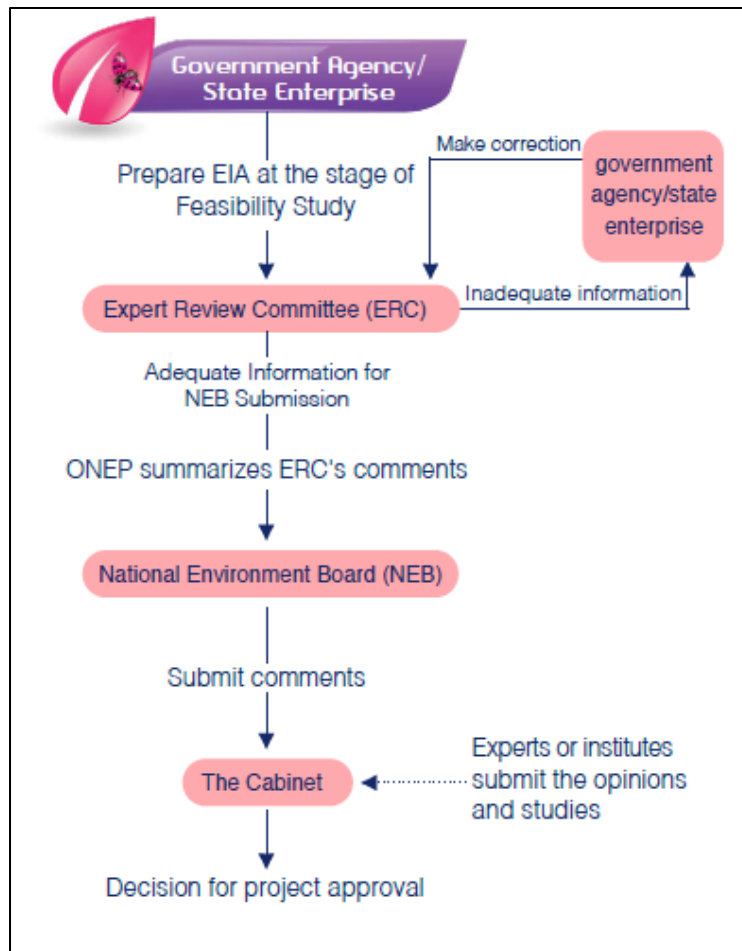
- (i) Environmental checklist;

¹⁴ The draft IEE will include detailed plan on required updating due to ongoing studies that will not be completed by the time ADB approves the MFF and future studies that will be conducted during implementation.

¹⁵ For each subsequent tranche, if the entire scope of the MFF remains unchanged since the approval of the previous tranche, the safeguard documents covering the entire scope of the MFF are assessed for validity. If valid, the same documents are used; otherwise, the documents are updated.

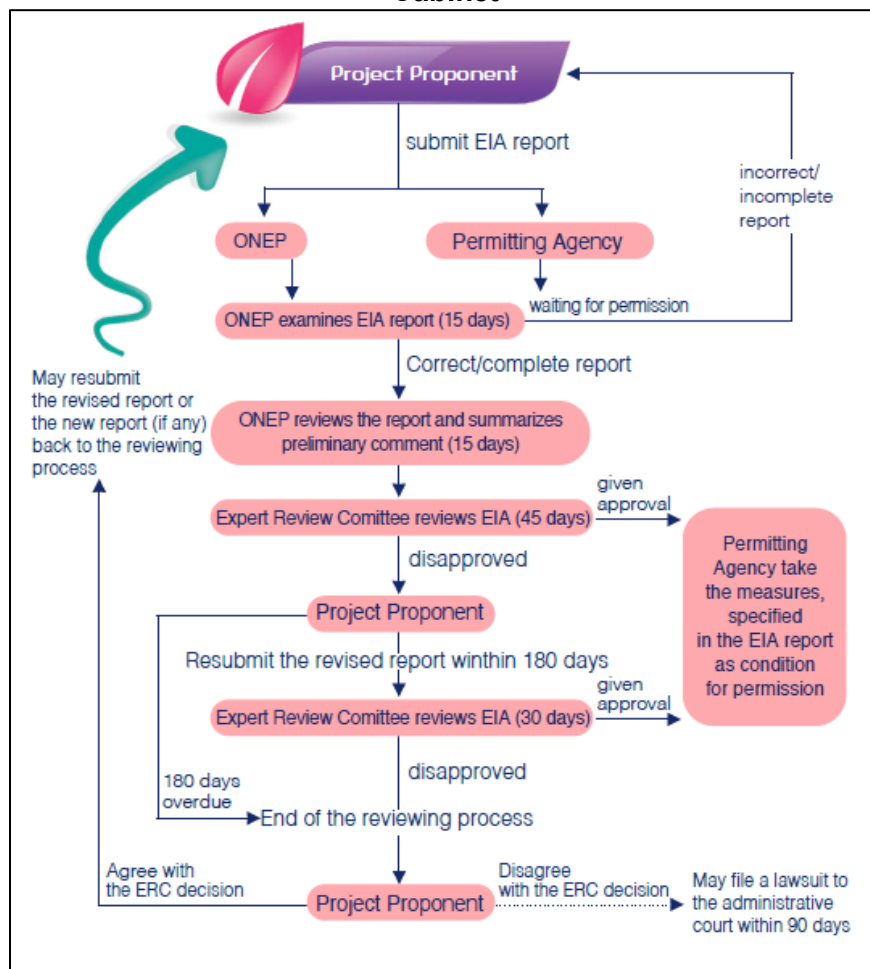
- (ii) Initial Environmental Examination (IEE) report;
 - (iii) EIA report; and
 - (iv) Environmental and Health Impact Assessment (EHIA).
33. The Notifications also provide the suggested outline and contents of each of the reports.
34. Procedurally, an EIA report is prepared by consultant/s registered with the Office of Natural Resources and Environmental Policy and Planning (ONEP) in accordance with the guidelines published by ONEP. Required assessment covers aspects of physical environment, biological environment, socio-economic environment, and cultural environment, including physical cultural resources. The assessment should include evaluation of project activities, and ensuring these activities will comply with national environmental requirements, standards and other government commitments to international environmental agreements. The assessment also requires the conduct of public consultations as early as the project preparation stage.
35. ONEP reviews the EIA report and submits its preliminary comments to an Expert Review Committee (ERC) appointed by the National Environment Board (NEB). The ERC will review and approve or disapprove the EIA report after receiving the EIA report from ONEP. If the ERC fails to provide feedback, the submitted EIA report is considered approved. The figures below show the flow charts of various scenarios on the EIA approval process depending on the level of impacts and on whether or not a project requires approval by the Cabinet.

Figure 6: Approval Process for Projects, Undertakings, or Operations Requiring the Approval by the Cabinet



Source: Environmental Impact Assessment in Thailand. 4th Ed. Office of Natural Resources and Environmental Policy and Planning. Ministry of Natural Resources and Environment. September 2021.

Figure 7: Approval Process for Projects, Undertakings, or Operations Requiring EIA But Not Requiring Approval by the Cabinet



Source: Environmental Impact Assessment in Thailand. 4th Ed. Office of Natural Resources and Environmental Policy and Planning. Ministry of Natural Resources and Environment. September 2021.

C. Other National Environmental Laws, Rules and Regulations

37. The legal framework on environmental protection, management of natural resources and public consultation is summarized in Table 1.

Table 1. Other Relevant Laws, Regulations and Standards

Legislations	Description and Relevance to the Project
Environmental Quality	
Constitution of The Kingdom of Thailand 2017(B.E.2560)	The Constitution contains provisions related to the conservation of natural resources. The acquisition of rights and access to natural resources and the environment are important factors in the livelihood of the people. Article 43 stipulates that "individuals and communities have the right to 1. preserve, restore or promote wisdom, art, culture, traditions and fine traditions both locally and nationally. 2. manage, maintain and utilize natural resources, the environment and biodiversity in a balanced and sustainable manner in accordance with the law. In terms of the duties, a person has the duty to cooperate and support the conservation and protection of the environment, natural resource, biodiversity and cultural heritage (Section 4 and Section 50 (8)) while the State has the duty to conserve, protect, maintain, restore, manage, and use or arrange the utilization of natural resources, the environment and biodiversity in a balanced and sustainable manner with the participation of the people and relevant local communities in the implementation and benefit from such activities as prescribed by law (Article 57 (2)). Applicability to the Project. The development of project including rehabilitation and construction of regulators, construction of retaining walls, and dredging of canals; which have potential impact to physical resources, biological resources, human use values and quality of life and values, including, but not limited to, water quality and water use. The development of the project has to be in line with conservation and protection of natural resources as mandated by the Constitution.
National Environmental Quality Promotion and Conservation Act B.E.2535 (1992) and its amendments Also referred to as the National Environmental Quality Act (NEQA)	1. The Act has the objective of encouraging the public and private organizations to participate in promoting and maintaining environmental quality by determining the authority and duties of government departments, state enterprises and local governments to coordinate and participate in environmental protection as well as to formulate pollution control measures, wastewater treatment system, exhaust air treatment system, and clearly define the responsibilities of the polluters. 2. Environmental Quality Standards. National Environment Board has the power to publish notification prescribing air, noise, vibration and water quality standards (clause 32). For the benefit of environmental quality conservation, the Ministry is authorized to prescribe list of projects which require to prepare environmental impact assessment (clause 48). 3. Environmental Quality Management Planning. The Minister has the power to publish notification prescribing environmental quality management plan and announce in the Government Gazette. Relevant government departments shall carry out their

Legislations	Description and Relevance to the Project
	powers and duties to implement the plan. The environmental quality management plan can be classified as a short-term medium-term and long-term plan. The environmental quality management plan consists of work plans for - management of air, water and other environmental quality – pollution control from sources – conservation of natural environment, natural resources - management of the national budget and funds necessary for the implementation of the plan and enactment and issuance of regulations, local ordinances, regulations, orders and notices necessary for the implementation of the plan (Section 36). 4. Conservation and Environmental Protection Areas. Any watershed area or has a natural ecosystem that is different from other areas or has a natural ecosystem that may be destroyed or affected by various activities. or an area of natural or artistic value that deserves to be conserved and the area has not yet been declared as a conservation area. The Minister shall have the power to issue Ministerial Regulation designating the area as an Environmental Protection Area (clause 43). 5. Environmental Impact Assessment. The Minister shall have the power to issue notification specifying any project, undertaking, or operation of the State or which the State will give any person permission to operate, requires preparation of environmental impact assessment report. Rules, procedures, and conditions to prepare environmental impact assessment report shall be prescribed in the Minister's notification. Preparation of environmental impact assessment report for a project, undertaking or operation of the State or which the State will give any person permission to operate, that may seriously impact natural resources, environmental quality, health, sanitary, quality of life or other important interests of people, communities, or environment, an operator or person asking for permission shall assess health impact and hold a public participation in accordance with the rules, procedure, and conditions prescribed in the Minister's notification (clause 48). 6. Effluent Standards from Pollution Sources. The Minister shall have the power to publish notification prescribing emission or effluent standards to control wastewater discharge, air emission or discharge of any wastes or pollutants from point sources to environment (clause 55) . 7. Pollution Control Area. Any area affected by pollution with the tendency to deteriorate health of the public or environmental quality, the National Environment Board shall have the power to publish notification to designate such an area as Pollution Control Area which allows any actions to be taken to reduce, minimize or control pollution (clause 59). 8. Air, Noise and Water Pollution. The Minister has the power to publish notification to specify point sources subject to emission control in conformity with prescribed emission/effluent standards (clause 68 and 69). Applicability to the Project. Development of the project to enhance drainage and flood water conveyance system through improvement of canal networks from Rama 6 headwork down to the gulf of Thailand comprising construction of retaining wall, dredging,

Legislations	Description and Relevance to the Project
	strengthening stability of canal embankment, construction/upgrading of regulators and pumping stations. These construction activities will have potential impacts to ambient air quality, noise quality, vibration, waste management, and agricultural activities, including fishery. The project needs to comply with environmental quality standards and environmental requirements set forth under the act.
Notification of the Ministry of Natural Resources and Environment on Projects, Undertakings, or Operations Required to Provide an Environmental Impact Assessment Report and Rules, Procedure, and Conditions in Providing an Environmental Impact Assessment Report 2023 (B.E.2566)	Projects, undertakings or operations which require preparation of IEE or EIA report have been grouped separately (clause 3). The IEE report shall include sections with description including (i) An introduction, (ii) project description, (iii) existing environmental conditions(physical resources, biological resources, human use values and quality of life and values), (iv) Impacts assessment, (v) Mitigation measures and impact monitoring, and (vi) reference documents (clause 7). The EIA report (Main Report) shall include sections with more detailed description including (i) An introduction, (ii) Project description, (iii) Existing environmental conditions(physical resources, biological resources, human use values and quality of life and values as well as results of socio-economic and public participation), (iv) Impacts assessment, (v) Mitigation measures and impact monitoring, and (vi) Reference documents. Project undertaken by government agency or undertaken together with private sector requires preparation of executive summary report (clause 8(1),8(2), 8(3)). Preparation of IEE or EIA report shall be carried out by licensed entity (clause 11). Applicability to the Project. The notification provides a list of projects by type, size and locations which require preparation of IEE or EIA. The nature of the project is included in this list. The project is required to ensure it complies with this notification.
Notification of the Ministry of Natural Resources and Environment on Projects, Undertakings, or Operations Which May Seriously Impact Natural Resources, Environmental Quality, Health, Sanitation, Life Quality of People in a Community that are Required to Provide an Environmental Impact Assessment Report and Rules, Procedure, and Conditions in Providing an Environmental Impact	Projects, undertakings or operations which require preparation of EIA report have been prepared by the authority for reference (clause 3). The EIA report(Main Report) shall include sections with more detailed description including (i) an introduction, (ii) project description, (iii) existing environmental conditions (physical resources, biological resources, human use values and quality of life and values as well as results of socio-economic and public participation), (iv) Impacts assessment, (v) Mitigation measures and impact monitoring and (vi) Reference documents.

Legislations	Description and Relevance to the Project
Assessment Report 2023 (B.E.2566)	Project undertaken by government agency or undertaken together with private sector requires preparation of executive summary report (clause 5(1),5(2), 5(3)). Preparation of IEE or EIA report shall be carried out by licensed entity (clause 8) Applicability to the Project. The notification provides a list of projects by type, size and locations which require preparation of EHIA. The nature of the project is included in this list. The project is required to ensure it complies with this notification.
Natural Resources	
The Promotion of Marine and Coastal Resources Management Act, B.E. 2558 (2015)	Protection of Marine and Coastal resources: Any person causes severe damage to marine and coastal resources, the Director-General or a person assigned by the Director-General shall have the power to order such person to temporarily stop an action or activity causing damage to marine and coastal resources as appropriate (clause 17). In the interest of the preservation, conservation and revival of mangrove forest areas to remain in natural condition, the Minister shall have the power to issue the Ministerial Regulation designating any mangrove forest area to be a conserved mangrove forest area (clause 18). An area designated to be a conserved mangrove forest area shall be an area that is neither in the area of national park under the law on national park or the area of wildlife sanctuary or non-hunting area under the law on the conservation and protection of wildlife or the area covered by ownership or possessory right under the Land Code of a person who is not a State agency. In the interest of the preservation, conservation and revival of the marine and coastal resources, which are not mangrove forest areas, to remain in natural condition and have surrounding conditions and ecosystem in pristine condition, the Minister shall have the power to issue the Ministerial Regulation to designate the area with the following characteristics to become a marine and coastal resources protected area: (i) An area with marine and coastal resources in pristine condition which merits preservation to be in its original natural condition. (ii) An area that is a habitat of animals and plants in its pristine natural condition. (iii) An area with significance for marine ecosystem which merits conservation. An area designated as a marine and coastal resources protected area shall not be an area in a conservation area or an area permitted to practice aquaculture under the law on fisheries (clause 20). To prevent the coastal erosion problem and prevent damage to the life and property of the population, the Minister shall have the power to issue the Ministerial Regulation to designate an area that measures for the prevention of coastal erosion shall be used. Applicability to the Project. Development of the project to enhance drainage system through improvement of canal networks from Rama 6 headwork downs to the gulf of Thailand in temporary disruption of flows and temporary change in quality of water along the canals during the construction period. These temporary

Legislations	Description and Relevance to the Project
	disturbances needs to be mitigated to ensure the protection of any mangrove forest areas and other receptors in the coastal area that will be affected by the project construction activities, if any.
Royal Ordinance on Fisheries B.E. 2558 (2015)	The provisions of this Royal Ordinance aim to reorganize fisheries in Thailand and in waters at large with a view to preventing illegal, unreported and unregulated (IUU) fishing to preserve aquatic animal resources as a sustainable source of food for humanity and preserve the environment in an appropriate state along the line of approaches, criteria and standards recognized internationally. <u>Conservation and Management Measures.</u> No person shall catch aquatic animals in an aquatic species sanctuary as prescribed by the Minister or by the provincial fisheries committee subject to the approval of the Minister, except for the purposes of academic advancement or for the purposes of the nurturing of aquatic animal breeds for which permission in writing has been granted by the Director-General or a person assigned by the Director-General (clause 56). No person shall engage in the following acts: (i) Releasing, pouring, disposing of, discharging or causing the passage of hazardous matters as prescribed by the Minister into a fishing ground. (ii) Acting in whichever way to cause the intoxication of aquatic animals in a fishing ground (iii) Releasing, pouring, disposing of, discharging or causing the passage of anything into a fishing ground in a manner harmful to aquatic animals. (iv) Causing fishing ground to be polluted such that it becomes harmful to aquatic animals (clause 58). Any person intentionally or through negligence causes a fishing ground to be polluted in a manner that may harm aquatic animals shall bear all the expenses incurred in rescuing or preventing the loss of aquatic animals' lives, and in restoring the fishing ground back to its natural state as prescribed by the Director-General (clause 59). No person shall install, place or build a damn, weir, dike, fence, built structure, tool fitted with nets or any other fishing tool in a fishing ground, and thereby blocking the passage of aquatic animals or preempting the natural growth of aquatic animals, unless permission in writing has been obtained from the competent official. The provisions under paragraph one shall not apply to undertakings implemented for the purposes of public disaster prevention or for official purposes relating to irrigation (clause 63). <u>Aquaculture Promotion.</u> It shall be a duty of the Department of Fisheries to promote, develop and provide guidance with respect to aquaculture to achieve standards pursuant to paragraph one without compromising the state of the ecological environment and the abundance of aquatic animal resources (clause 74) Applicability to the Project. Once completed, the project will inherently support agricultural and aquaculture activities in the area, including in the vicinity of coastal area. The canals and other project infrastructures will be the conduit of water that can be utilized in

Legislations	Description and Relevance to the Project
	these economic activities. During construction, project activities may likely disturb these activities and may pollute the waterbodies due to potential discharges. The project should ensure that all mitigation measures need to be put in place during the construction period to prevent or avoid adverse impacts. Project shall aware not to discharge any hazard material into fishing ground in coastal area under clause 58 of the Act.
Water Resources	
Water Resources Act B.E. 2561(2018)	This Act provides allocation, use, development, management, maintenance, restoration and conservation of water resources. Water rights, water use permits, water storage, and management in drought and flood conditions to achieve unity. shall be as prescribed in the Act, except in the case of any law prescribed in relation to the allocation. The use, development, management, maintenance, restoration and conservation of water resources and water rights in particular shall be carried out in accordance with that specific law, as long as it does not contradict or contradict this Act. (clause 3). (i) Water Resources. The state has the power and duty to manage water resources for the benefit of the public in a balanced and sustainable manner. For the benefit of the management of public water resources other than irrigation and groundwater, The Prime Minister may announce in the Government Gazette that any government agency or local government organization is responsible for supervising and maintaining any public water resource. The government agency or the responsible local government organization has the authority to determine the criteria for access to public water resources according to the framework of guidelines set by the National Water Resources Board. However, it must not be rules on water allocation and water use (Section 6). (ii) Water Right. Individuals have the right to use or store water as necessary for the benefit of their activities or on their land. without causing trouble or damage to other people who may use the water. This is except for this Act or a Ministerial Regulation, a regulation or a notification issued pursuant to this Act, or any other law as otherwise provided. (clause 7). (iii) Water allocation and use. Three types of water use are identified including - use for livelihood, household consumption, agriculture or animal husbandry for subsistence household industry, ecosystem preservation, customs, disaster relief. - Transportation and the use of a small amount of water. the use of public water resources for industry, tourism industry, electricity generation, water supply and other businesses - the use of public water resources for large-scale undertakings that use large amounts of water or may cause impacts across river basins or cover a wide area. Criteria of usage shall be in line with the Ministerial Regulations. (iv) Drought Management. Prime Minister shall have the power to notify in Royal Gazettes the area with severe drought together with necessary requirements or measures to be undertaken to alleviate the situation (clause 58).

Legislations	Description and Relevance to the Project
	(v) Flood Management. The Watershed Committee shall prepare a flood prevention and remediation plan. The plan shall cover normal and emergency conditions and consider the environment, ecosystem and biodiversity in the target area. Applicability to the Project. The project will be able to support the realization of the objectives of this Act. The project is designed to help in the management of drought and flood conditions in the area. This is in line with Part 5 section 2 and 3 of the Act.
Groundwater B.E.2520(1977) Amendments Act and	The Act regulates groundwater zones, groundwater drilling, including groundwater use and groundwater conservation. The act considers the conservation of natural resources. The definition of the term "groundwater" refers to groundwater that occurs in layers of soil, gravel, sand or rocks that are deeper than the depth specified by the Minister, but the depth cannot be less than ten meters. The act also regulates use of groundwater or the discharge of water into groundwater wells (clause 3). The Act does not apply to ministries, departments, departments or organizations of the State responsible for the supply of water for consumption or agriculture in relation to the drilling of groundwater and the use of groundwater, except in the localities which have been declared as groundwater crisis zones (areas where water is pumped up in quantities exceeding the amount of water flowing into the groundwater aquifer which may cause land subsidence or saltwater to spread into the groundwater or a decrease in the water level in the groundwater aquifer) and the Minister of Natural Resources and Environment is designated as the acting minister under this Act (clause 4). It is prohibited to carry out groundwater operation without the permit from Director General or designated person. The procedure to obtain the permit shall be in line with Ministerial regulations (clause 16). Three types of permits include drilling permit, usage permit and discharge into aquifer permit (clause 18). During drilling operation if discovery of antiques, minerals of economic value or any benefit to geological study it is required to report to concerned agencies (clause 23) Applicability to the Project. Project activities especially during construction period will have the potential to generate waste from sources including waste from machine maintenance (oils, lubricants, spent chemicals). These wastes could contaminate groundwater if no proper waste management in place. The project should ensure that it will not impact to groundwater quality as part of protection of ground water resource.
State Irrigation Act B.E. 2485 (1942) and its amendments	The Act has the objective to control and enhance irrigation service to benefit the public. Maintenance of Irrigation System. The Ministry shall have the power to issue Ministerial regulation on fee collection from water users. The fees shall be collected from users in agricultural and

Legislations	Description and Relevance to the Project
	non- agricultural sectors with the rate of 5 Baht/rai/year and 0.50 Baht/m³ respectively(clause 8). It is prohibited to encroach on irrigation waterways, connect or cause leaks in irrigation waterways, dump garbage, sewage, solid waste, or discharge wastewater into irrigation canals(clause 26). The irrigation technician shall be the officer with the authority and duty to control the violation of the said law. If a tree grown on a land of a person encroaches upon the irrigation waterway or cause damage to the irrigation waterway the competent official shall have the power to order the owner of the land to cut down or remove the tree (clause 24). Applicability to the Project. Project activities will be implemented along canals used for flood control and source of irrigation water. The aim of the project on improving these canals has direct beneficial impacts that will help achieve the objectives of the Act.
Biodiversity	
Biodiversity Act B.E. (Draft)	The Act covers the promotion of conservation and sustainable use of biodiversity, strengthening capacity and motivation, as well as supporting the participation of the public and local communities in the conservation and sustainable use of biodiversity. Fair and equitable sharing of benefits. Prevention and reduction of impacts on biodiversity, both from invasive alien species and Living Modified Organisms (LMOs), as well as prevention, remediation, or remediation in the event of impacts on the country's biodiversity Applicability to the Project. Some project sites or alignments are near areas that may have important biodiversity features. Thus, it is important that the project be screened upfront in terms of potential impacts to biodiversity features and include as part of the environmental assessment for the project.
Land Use and Land Laws	
Town Planning Act B.E.2562 (2019)	The National Urban Planning Policy Committee shall have the duty to prepare the Constitution of Town Planning and propose to the Cabinet for approval (Section 75(8)) and shall be binding on government agencies and other relevant agencies to continue to carry out their duties (Section 7). Types of Town Planning: (i) Policy Planning for Area Usage which specifies policy framework and strategy for country development in terms of area usage which includes national policy planning, regional policy planning and provincial policy planning. (ii) Land Use Planning which specifies approach and work plan for land use of specific areas comprising integrated urban planning (Comprehensive Plan) and planning of specific area. Preparation of Policy Planning for Area Usage and Land Use Planning requires public participation and consultation. Applicability to the Project. The development of the project is within the right of way of the canal. The act is not applicable to the project.

Legislations	Description and Relevance to the Project
Land Code B.E.2497(1954) and amendments	Land Code has been enforced to grant Land Deeds and Land Title Deeds. According to Land Code “Land” refers to general land area and includes mountains, creeks, swamps, lakes, islands, and seashores (clause 1). (i) State Land: Land which is not owned by any person shall be state land (clause 2). (ii) Private Land: a. Land with ownership which includes documents such as land deeds, map deeds, deed of reservation and seal that has been enacted as having been used. Land that a person has the right to occupy includes land that has no ownership including vacant land with a certificate of usage, reservation seal, as well as land with proof of notification of land possession. Applicability to the Project. The development of the project is within the right of way of the canal. The act is not applicable to the project.
Agricultural Land Reform Act B.E.2018 (1975) and amendments	The purpose of the Act is to improve land tenure rights, distribution of land rights from both state land and private land to farmers who have inadequate land for farming, infrastructure development, career development, improvement, promotion and support of various necessary inputs of production. Implementation of land reform (i) Land Reform comprising designation of Agricultural Land Reform Zones, procurement or expropriation of private land, procurement of State land by using public interest land, royal parcels, wasteland, vacant land, and degraded national forests in the land reform zone (clause 25, 26 and 29) (ii) Land Arrangement a. Agriculture : Provide landless farmers or those with little land to livelihood, arrange for the Farmer Institute by way of leasing. b. Arrange for the public for other businesses that support or are related to the agricultural land reform. (iii) Control of Land Right : Control before transfer of ownership and control after the transfer of ownership by prohibiting the division and transfer of ownership of land forever, unless it is inherited to the rightful heirs (clause 30 and 39). (iv) Development: Develop infrastructure by coordinating with relevant agencies, develop farmers in terms of occupation and income by coordinating with relevant agencies. Applicability to the Project. The development of the project to enhance the water drainage system will be undertaken within the right of way of the canal. The act is not applicable to the project.
Waste Disposal and Reuse	
Public Health Act B.E. 2535 (1992) and amendment	“Waste” means wastepaper, waste cloth, waste food, waste goods, waste materials, plastic bag, food container, soot, animal dung or carcasses, including any other thing swept away from road, marketplace, animal farm, or other places, including infectious waste, toxic or hazardous waste from community (clause 4).

Legislations	Description and Relevance to the Project
	Waste management under the Act shall not include waste of industrial origin. Sewage and Waste Management. Collecting, hauling or disposing of sewage or waste within the area of any local government shall be the authority of such local government. In carrying out the operations, the local government may do so in conjunction with other government agencies or other local governments under a joint agreement. However, for the benefit of the public, the Minister shall have the authority to issue ministerial regulations, on the advice of the Committee, prescribing criteria, methods, and conditions for the joint operation (clause 18). No person shall engage in the operation of collecting, hauling, or disposing of sewage or waste as a business or for reciprocal benefits, unless a license from the local official is granted (clause 19). The local official shall have authority to prohibit any person from causing a nuisance in a public place or way or private place and to abate nuisances, including watching over, improving, and maintaining roads, land routes, waterways, drainage, trenches, canals, and other places within his/her jurisdiction to be free from nuisances. In this regard, the local official shall have the authority to issue written orders to abate, eliminate, and control nuisances (clause 25,26) Applicability to the Project: During construction, contractors may set up worker camps, which will potentially generate wastes. Contractors are required to comply with this Act and shall contact the local government agency to collect waste for disposal.
Notification of National Environment Board "Soils Quality Standards "January 6,2021 (2564)	The notification prescribes soil standards suitable for residential purpose, to protect health conditions of resident and sensitive groups, and standards suitable for commercial, agricultural purposes and other activities. The notification regulates concentrations of heavy metals, volatile organic compound, pesticides and other toxic materials. Applicability to the Project. Dredging the canal is part of the activity of the project. Dredged or excavated soils from the canals will be disposed following the requirements of the Notification, and will be in compliance with the relevant quality standards set forth for where these will be disposed (i.e. residential, commercial or agricultural, industrial lands).
Forest and Agricultural Land Management	
Forest Act B.E.2484 (1941) and amendments	"Forest" means land that has not been acquired by a person under the Land Law. Land without the right of ownership or possession is considered as a forest and owned by the state. (i) Timber Harvesting and Forest Harvesting: all types of timber on land with ownership or possession rights under the Land Code are not prohibited timber. Logging does not require permission from the authorities. Restricted timber is still strictly controlled, only in "forests"(Forestry Act (No. 8) B.E. 2562 (2019)).

Legislations	Description and Relevance to the Project
	(ii) Forest Clearing: "no person shall build, clear or burn a forest, or do anything that destroys a forest, or occupies or occupies a forest for himself or others, except within an area classified as agricultural and has been announced by the Minister in the Government Gazette or with a permit from an officer (clause 54)." Applicability to the Project. The development of the project is carried out within the right of way of the canal, which is outside the coverage of a forest land. The act is not applicable to the project.
Mangrove Cabinet Resolution December 15, 2530 (1987)	Mangrove forest under jurisdiction of Forestry Act B.E.2484 (1941) and amendments, National Reserved Forest Act B.E.2507 (1964) and amendments, National Park Act B.E. 25/62 (2019) ,Wildlife Conservation and Protection Act B.E.2562(2019) and National Environmental Quality Promotion and Conservation Act B.E.2535 (1992) and its amendments shall be regulated under those acts. The resolution specifies 2 types of land use in mangrove areas of the country including conservation and economic zones. <u>Conservation Zone:</u> Prohibit any change in the area to conserve its environmental conditions and ecosystem. <u>Economic Zone:</u> (i) allowable for forest production such as concessionaires; and (ii) allowable for agriculture, industrial development, community, commercial purpose, pier and others. Agency that requires usage of mangrove area needs to obtain the permit from Department of Marine and Coastal Resources. Applicability to the Project. The development of the project will only involve rehabilitation or improvement of water drainage and conveyance system, which is within the right of way of the canal. These are not within the conservation or economic zones as defined in the resolution. The Resolution is not applicable to the project.
Health and Safety	
Occupational Safety, Health and Environment Act B.E. 2554 (2011)	The Act is under the jurisdiction of the Ministry of Labor. (i) General Provisions: Employer is obligated to provide and keep an establishment and an employee in safe and hygienic working conditions and environment including to support and promote an operation of the employee preventing the employee from any harm on life, physique, mentality and health(clause 6). (ii) Administration, Management and Operation on Occupational Safety, Health and the Environment: a. Employer is required to administer, manage and operate the occupational safety, health and environment in conformity with the standards prescribed in the ministerial regulation (clause 8). b. An Employer shall provide the Safety Officer, personnel, working unit, or group of persons to operate the safety in establishment according to criteria, methods and terms as prescribed in the ministerial regulation(clause 13). Whereas an employer assigns an employee to work in a working condition or environment that may be harmful to life,

Legislations	Description and Relevance to the Project
	physique, mentality and health of such employee, the employer shall inform the employee of danger which may arise out of work, and shall distribute the work manual to every employee before commencing work, changing work or changing workplace (clause 14), an employer shall provide for and control an employee to wear standard personal protective equipment as stipulated by the director-General (section22). (iii) Control, Supervision and administration: An employer shall (1) conduct hazard assessment; (2) conduct study on impacts of working conditions which have an effect on employee; (3) prepare operation plan on occupational safety, health and environment and supervisory plan for employee and the establishment; and (4) submit results on hazard assessment, impact study, operation plan and supervisory plan under (1), (2) and (3) to the Director-General or a person entrusted by the Director General. Applicability to the Project. The project will involve contractors whose workers and employees need to be protected by virtue of this Act. Contractors will need to comply with all provisions of the Act and ensure the health and safety of all workers and employees.
Ministerial Regulation Prescribing the Standards for Administration and Management of Occupational Safety Health Environment for Construction Work B.E. 2564 (2021)	Construction Work: Construction of all kinds of structures such as buildings, airport, railway, road ,tunnel, waterway, drainage including demolition of those structures (clause 2). Employer shall designate safety supervisor to conduct safety inspection before starting work and during working period (clause 5). Keep the construction area always clean, Nonhazardous waste shall be segregated from hazardous waste (clause 6). To transfer the excavated soil from the construction area, employers shall provide stockage area and implement mitigation measures to control hazard and dispersion of dust (clause 7). Provide suitable safety signs including enforce using PPE (clause 13). Specify danger construction zone together with fencing and signs. Only authorized people are allowed to enter the area(clause 16). Piling Works and Diaphragm Wall: Installation ,testing, inspection, operation ,maintenance of crane require compliance with manufacturer's recommendations in operation manual(clause30). After installation of the crane, it requires the engineer to inspect and endorse prior to start operation(clause 32) Prior to starting daily work the construction supervisor shall thoroughly inspect the machine, working area for readiness. Employer shall assign the experienced engineer to supervise the work during construction of diaphragm wall (clause 45)

Legislations	Description and Relevance to the Project
	Construction in Water: Employer requires employees to prepare work plan including safety management program and inform the employees (clause 59(1)). Prepare emergency response plan and provide rescue equipment as well as PPE to employees (clause 59(2,3)). Applicability to the Project: The project will have employees, workers who will be subject to occupation health and safety risks due to activities and construction works. Therefore, the project through the contractors shall comply with this regulation to ensure the health and safety of all employees and workers.
Labor Protection Act B.E. 2541 (1998) and amendments	Prohibition of works to women: Mining, construction work carried out underwater, underground or in tunnel except when the working conditions are safe to the employees, working at heights (more than 10 meters), production or transportation of explosive or flammable materials except the working conditions are safe to the employees (clause 38). Prohibition of works to pregnant women: working with vibrating machine, lifting work more than 15 kg, working in vessel, work related to transportation, and work during 22.00 - 6.00 AM (clause 39). Child Labor: Prohibit child labor under 18 years. In case it is necessary to assign work to children under 18 years, employer requires to comply with the procedures (clause 44,45). Child labor under 18 years shall not work during 22.00- 6.00 AM (clause 47) Prohibit assigning works to child labor under 18 years: melting and stamping works, works related to significant level of heat, light, noise and vibration, hazardous chemicals, toxic microbiological agents, crane controller. Work at height, radioactive work, underwater, underground or in tunnel, cleaning of machine while operating (clause 49) Applicability to the Project: Construction work of the project will require different groups of workers and therefore requires to comply with the Act.
Act on Ancient Monuments	
Antiques, Objects of Art and National Museums B.E. 2504(1961)	"Antique" means an archaic movable property, whether produced by man or by nature, or being any part of ancient monument or of human skeleton or animal carcass which, by its age or characteristics of production or historical evidence, is useful in the field of art, history or archaeology. "Objects of Art" means a thing produced by craftsmanship which is appreciated as being valuable in the field of art. Ancient Monuments: The Director-General shall, for the purpose of keeping, maintaining and controlling ancient monuments under this Act, have the power to cause any ancient monument as he thinks fit to be registered by means of publication in the Government Gazette, and to determine such area of land as he thinks fit to be its compound, which area shall also be considered as ancient

Legislations	Description and Relevance to the Project
	monument. Cancellation and modification of the same may likewise be made in the Government Gazette (clause 7). No person shall repair, modify, alter any ancient monument or excavate for anything within the compound of ancient monument, except by order of the Director-General, or permit has been obtained from the Director-General. If the permit contains any conditions, they have to be complied with (clause 10). The Director-General shall have the power in regard to any registered ancient monument, even owned or lawfully possessed by any individual, to order the competent official or any person to make a repair or to do whatsoever for its restoration or for the preservation of its original condition, provided that its owner or possessor has first to be notified thereof (clause 11). Antiques and Objects of Art. The Director-General is empowered, if he deems that any antique or object of art not being in the possession of the Department of Fine Arts is of special value in the field of art, history or archaeology, to cause such antique or object of art to be registered by means of publication in the Government Gazette (clause 14). No person shall repair, modify or alter any registered antique or object of art, unless permit has been obtained from the Director-General. If the permit contains any conditions, they must be complied with (clause 15). Applicability to the Project. During implementation, antiques and objects of art may be encountered affected by project activities. Therefore, the project will need to comply with the requirements of the Act to ensure these valued articles or objects are not negatively impacted. In cases of chance finds (encounter of underground artifacts or relics), the project will be required to stop construction and inform the Department of Fine Art for the findings and for necessary procedures which is in line with the Act.

D. Applicable Environmental Standards

38. The government provides the environmental standards applicable to the project. Table 2 below provides a list of the various Thailand national standards including international guidelines. Table 3 and

39. Table 4 show the ambient air quality standards and noise level standards to be followed by the project. Following requirements of ADB SPS, the project shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in EHS Guidelines. When the government regulations differ from these levels and measures, the executing agency shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 2: Key National and International Environmental Standards and Guidelines

Environmental Issue	Thai National Standards	International Guidelines
Ambient air quality	- Announcement of National Environment Board No.10 1995 (B.E.2538) "Ambient Air Quality Standards" April 17, 1995 (B.E.2538) - Announcement of National Environment Board No.21 2001(B.E.2544) "Ambient Sulfur Dioxide-1 Hr Standards" April 9, 2001 (B.E.2544) - Announcement of National Environment Board No.24 2004(B.E.2547) "Ambient Air Quality Standards" August 9, 2004 (B.E.2547) - Announcement of National Environment Board No.28 2007(B.E.2550) "Ambient Air Quality Standards" April 10, 2007 (B.E.2550) - Announcement of National Environment Board No.33 2009(B.E.2552) "Ambient Nitrogen Dioxide Standards" June 17, 2009 (B.E.2552) - Announcement of National Environment Board "Particulate Matter with an Aerodynamic Diameter Less Than or Equal to Nominal 2.5 micrometers (PM_{2.5}) Standards" June 23, 2023 (B.E.2565) - Announcement of National Environment Board "Ambient Carbon Disulfide Standards" August 21, 2017 (B.E.2560) -Announcement of National Environment Board No.30 2007(B.E.2550) "Ambient Volatile Organic Compounds; VOCs-1-year Standards" September 14, 2007 (B.E.2550)	WHO Air Quality Guidelines, global update 2005
Noise	- Announcement of National Environment Board No.5 1997 (2540) "Ambient Noise Standards" March 12, 1997 (B.E.2540) - Announcement of National Environment Board No.29 2007 (2550) "Nuisance Noise Level" June 29, 2007 (B.E.2550)	WHO Guidelines for Community Noise, 1999
Groundwater quality	- Announcement of Ministry of Industry No.12 1999(2542) "Groundwater Quality Standards-Drinking" March 10,1999(2542) - Notification of National Environment Board	WHO Guidelines for Drinking-water Quality, Fourth Edition, 2011

Environmental Issue	Thai National Standards	International Guidelines
	No.20 2000 (2543)" Groundwater Quality Standards" August 31, 2000 (2543)	
Surface water quality	- Announcement of National Environment Board No.8 1994 (2537) "Surface Water Quality Standards" January 20, 1994 (B.E.2537) - Announcement of Pollution Control Department "Classification of Water Quality: Bang Pakong River, Nakhon Nayok River and Prachinburi River June 7, 1994 (2537)	- US EPA National Recommended Water Quality Criteria - Mekong River Commission (MRC) Technical Guidelines for the Protection of Aquatic Life
Sea water quality	Notification of National Environment Board "Sea Water Quality Standards" August 13,2021 (2564)	
Effluent quality (including leachate)	- Announcement of Ministry of Natural Resources and Environment" Effluent Standards from Industry, Industrial Estate and Industrial Park March 29, 2016 (2559) - Announcement of Ministry of Natural Resources and Environment" Effluent Standards from Aquaculture Farming in Coastal Area March 19, 2004(2547) - Announcement of Ministry of Natural Resources and Environment" Effluent Standards from Amphidromous fish, shrimp, crab farming May 9, 2007(2550) - Announcement of Ministry of Natural Resources and Environment" Effluent Standards from freshwater fish, shrimp, crab farming November 23, 2007(2550)	33F CEHS General Guidelines, April 2007 33F CEHS Guidelines for Water and Sanitation, December 2007 33F CEHS Guidelines for Waste Management Facilities, December 2007 - USEPA Effluent Limitations
Soil quality standards	Notification of National Environment Board "Soils Quality Standards" January 6,2021 (2564)	
Bottom Sediment Standards Surface Water	Notification of National Environment Board "Bottom Sediment Standards, Surface Water 2022 (2565)" November 30, 2022 (2565)	
Sediment Standards Coastal Area	Notification of Pollution Control Department" Criteria for Sediment Quality in Coastal Area	

40. The government provides the environmental standards applicable to the project. Schedule 2 presents the national standards for ambient air quality and Schedule 4 presents the national standards for ambient noise. Following requirements of ADB SPS, the project shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in EHS Guidelines. When the government regulations differ from these levels and measures, the executing agency shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements

presented in ADB SPS. In view of this, Table 3 and Table 4 show the ambient air quality standards and noise level standards to be followed by the project. Paragraph 41 provides the standards on vibration.

Table 3: Ambient Air Quality Standards

Parameter	Thailand Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$)^a	WHO Air Quality Guidelines 2021^b ($\mu\text{g}/\text{m}^3$)
PM _{2.5}	37.5 (24-hr)	15
PM ₁₀	120 (24-hr)	45 (24-hr)
	50 (1-yr)	15 (1-yr)
SO ₂	780 (1-hr)	
	300 (24-hr)	40 (24-hr)
	100 (1-yr)	
NO ₂	320 (1-hr)	
		25 (24-hr)
	57 (1-yr)	10 (1-yr)
CO	34.2 (1-hr)	
		4 (24-hr)
Ozone	0.14 mg/m ³	100 (8-hr)
		60 (peak season)

^a National Air Quality Assessment and Management Regulation

^b These values are not standards, but are guideline values only. Per WHO, the government may use these guideline values depending on its technical capabilities, economic capacity, air quality management policies and other political and social factors. Although these guidelines are neither standards nor legally binding criteria, they are designed to offer guidance in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence.

Table 4: Ambient Noise Quality Standards

Receptor/ Noise Source	National Noise Standard Guidelines ^a [dB (A)]	WHO Guidelines Value For Noise Levels Measured Out of Doors ^b (One Hour LAeq in dBA)	
		07:00 – 22:00	22:00 – 07:00
Industrial area	70	70	70
Residential; institutional; educational (as receptor)	70	55	45

^a Notification of National Environment Board No.15 1997 " Ambient Noise Standards" March 12, 1997 (General standard is prescribed on the 24-hour average of 70 dB(A), but maximum noise level at 115 dB(A) at any time.

^b WHO. 1999. Guidelines for Community Noise; World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

41. **National standard on Vibration Level to Prevent Impact to Buildings.** The following are the national standards taken from the Notification of the National Environmental Board No. 37, B.E. 2553:

- (i) Building Type 1 (Peak Particle Velocity (PPV) = 10 mm/s): for factories and commercial buildings;
- (ii) Building Type 2 (PPV = 5 mm/s): Residential building, hospital, place of study or religious activity; and
- (iii) Building Type 3 (PPV = 2.5 mm/s): Ancient monuments, antiques, objects of art, national museums, or structures of any other nature that are not stable and strong but have cultural value.

E. International Environmental Agreements

2. Thailand is party to the following international environmental agreements relevant to the project.

Table 5. International Environmental Agreements Relevant to the Project

Convention / Agreement	Key Provisions
Convention on the Protection of the World Cultural and Natural Heritage, 1975 (UNESCO World Heritage Convention)	Ratified in 1987, Thailand protects sites like Ban Chiang and Thungyai-Huai Kha Khaeng, balancing cultural and natural heritage. State Parties shall ensure that Environmental Impact Assessments, Heritage Impact Assessments, and/or Strategic Environmental Assessments be carried out as a pre-requisite for development projects and activities that are planned for implementation within or around a World Heritage property. States Parties have an obligation to notify UNESCO World Heritage Centre in advance before considering any proposed action that may have an impact on a World Heritage property.
United Nations Convention on Biological Diversity (1992)	Adopted in 1992 and entered into force in 1993, Thailand is a party, having signed it in 1992. The CBD aims to conserve biodiversity, promote sustainable use, and ensure fair benefit-sharing. Thailand's participation is evident through initiatives like the Thailand Biodiversity Network Alliance (B-DNA) and the National Biodiversity Action Plan (2023–2027). State parties are required to: • Establish management structures on biodiversity. • Report regularly. • Protect biological diversity from risks of living/genetically modified

Convention / Agreement	Key Provisions
	organisms and biotechnology. • Develop legislation for the protection of threatened species and populations. • Develop a national strategy for the conservation and sustainable use of biodiversity. • Incorporate mitigation of impacts on biodiversity in environmental impact assessment for development projects
United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol	Signed in 1992 as a Non-Annex I party, Thailand ratified it and the Paris Agreement (2016), committing to reduce greenhouse gas emissions by 30–40% by 2030. Recent policy shifts (e.g., 2022 NDC update) show ambition, but vulnerability to climate impacts (e.g., Bangkok's 1.5m elevation) questions adaptation capacity
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	Ratified in 1983 after signing in 1975, CITES regulates trade in endangered species. Thailand's Elephant Ivory Act (2015) demonstrates compliance. State parties are required to: • Set up administrative and scientific bodies to manage the trade of endangered species and ensure, that all relevant authorities in the country, especially the customs, are fully aware of the regulations and the status of endangered species in the country. • Report the number of species imported/exported annually to CITES secretariat.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention 02/02/1971)	Adopted in 1971 and effective from 1975, Thailand joined to protect wetlands of international importance. With 54 designated sites by 2022 progress is notable. The convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. State parties are required to: • Work towards the wise use of all wetlands through national land-use planning, appropriate policies and legislation, management actions, and public education. • Designate suitable wetlands for the List of Wetlands of International Importance and ensure their effective management. • Cooperate internationally concerning trans-boundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands.
United Nations Convention to Combat Desertification (UNCCD)	Established in 1994, Thailand is a party, focusing on land degradation. Its involvement in UNCCD COP15 (2025) indicates active participation, though desertification is less critical than flooding or deforestation in its context
International Labour Organization (ILO) Conventions and protocols	Thailand has ratified several ILO conventions and protocols, including: • Forced Labour Convention, 1930 (No. 29): Ratified in 1969, prohibits forced or compulsory labour, with the 2014 Protocol ratified in 2018 to enhance victim protection. • Abolition of Forced Labour Convention, 1957 (No. 105): Ratified in 1969, targets forced labour for economic or political purposes. • Minimum Age Convention, 1973 (No. 138): Ratified in 2004, sets a minimum age for work (15 years, with 13 for light work), addressing child labour. • Worst Forms of Child Labour Convention, 1999 (No. 182): Ratified

Convention / Agreement	Key Provisions
	in 2001, requires action against hazardous child labour, including trafficking and slavery. • Workmen's Compensation (Occupational Diseases) Convention, 1925 (No. 18): Ratified in 1961, covers compensation for work-related diseases. • Workmen's Compensation (Accidents) Convention, 1925 (No. 17): Ratified in 1961, addresses accident compensation. • Hours of Work (Industry) Convention, 1919 (No. 1): Ratified in 1939, limits work hours (48-hour week). • Right of Association (Agriculture) Convention, 1921 (No. 11): Ratified in 1969, protects agricultural workers' association rights. • Medical Examination of Young Persons (Industry) Convention, 1946 (No. 77): Ratified in 1968, mandates health checks for young workers. • Medical Examination of Young Persons (Non-Industrial Occupations) Convention, 1946 (No. 78): Ratified in 1968, extends health checks to non-industrial youth. • Labour Inspection (Commerce and Offices) Convention, 1947 (No. 86): Ratified in 1969, covers commercial inspections. • Social Security (Minimum Standards) Convention, 1952 (No. 102): Ratified in 1996, sets social security baselines. • Employment Injury Benefits Convention, 1964 (No. 121): Ratified in 1996, enhances injury compensation. • Occupational Safety and Health Convention, 1981 (No. 155): Ratified in 2001, promotes workplace safety. • Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187): Ratified in 2016, strengthens safety frameworks. • Protocol of 2014 to the Forced Labour Convention, 1930: Ratified in 2018, enhances forced labour prevention
The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, 1995	The Mekong Agreement was established in 1995 by Laos, Thailand, Cambodia, and Vietnam to manage and coordinate the use of the Mekong River's resources. It aims to promote sustainable development, ensure equitable water use, and facilitate cooperation among the member countries. Under the Mekong Agreement, the parties have established five procedures including the Procedures for Notification, Prior Consultation and Agreement, or PNPCA. In accordance with the PNPCA, notification to the Mekong River Commission Secretariat is required for: • Intra-basin use and inter-basin diversion on the tributaries, including Tonle Sap (N/A) • Intra-basin use during the wet season on the mainstream Consultation with the Mekong River Commission Secretariat is required for: • Inter-basin diversion from mainstream during wet season • Intra-basin use on the mainstream during the dry season (relevant) • Inter-basin diversion of the surplus quantity of water during the dry season
Montreal Protocol on Substances that Deplete the Ozone Layer	Acceded to in 1989, Thailand meets obligations to phase out ozone-depleting substances, benefiting from Multilateral Fund support

Convention / Agreement	Key Provisions
Stockholm Convention on Persistent Organic Pollutants (POPs) of 17 May 2004	Relevant key provisions of the Convention require each party to: • Prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed annexes to the Convention. • Reduce or eliminate releases from unintentionally produced POPs that are listed in the Convention • Ensure that stockpiles and wastes containing POPs are managed safely.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	To control transboundary movement of hazardous waste before import, export and transshipment to other countries. It is required to provide necessary information in advance. Transshipment cannot be done till having the permit from target government. Key documents that shall be provided include documents relating to Transboundary Movements, Packaging, Labelling, Mode of transport, Financial Guarantee.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	The objective of this Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.
Minamata Convention on Mercury	The primary objective of the Minamata Convention is to protect human health and the environment from mercury pollution. Key provisions of the convention include: • Control and Reduction: The convention requires parties to control and reduce mercury emissions and releases across various sectors, including artisanal and small-scale gold mining, industrial processes, and the use of mercury in products. • Life-Cycle Approach: It takes a comprehensive life-cycle approach to mercury management, addressing its entire life cycle from production to disposal. • Prohibition of Certain Products: The convention prohibits the manufacture, import, and export of specific mercury-containing products, such as certain batteries, thermometers, and dental amalgams, with a phase-out timeline. Health and Safety Measures: It emphasizes the need for improved medical care and training for healthcare professionals to identify and treat mercury-related health effects.
International Covenant on Economic, Social and Cultural Rights (ICESCR)	Ratified in 1999, it includes provisions for safe working conditions • All people have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development. • The States shall recognize the right to work, which includes the right of everyone to the opportunity to gain his living by work which he freely chooses or accepts, and will take appropriate steps to safeguard this right. nomic, social and cultural development. The State shall recognize the right of everyone to the enjoyment of just and favorable conditions of work including fair wages, decent living for themselves and their families, safe and healthy working conditions, equal opportunity for everyone to be promoted in his employment, rest, leisure and reasonable limitation of working hours and periodic holidays with pay,

Convention / Agreement	Key Provisions
	as well as remuneration for public holidays.
ASEAN Agreement on Transboundary Haze Pollution in 2006	Association of Southeast Asian Nations (ASEAN) shall 1) further strengthen international cooperation to develop national policies for preventing and monitoring transboundary haze pollution 2) co-ordinate national action for preventing and monitoring transboundary haze pollution through exchange of information, consultation, research and monitoring 3) undertake individual and joint action to assess the origin, causes, nature and extent of land and/or forest fires and the resulting haze, to prevent and control the sources of such land and/or forest fires and the resulting haze by applying environmentally sound policies, practices and technologies and to strengthen national and regional capabilities and cooperation in assessment, prevention, mitigation and management of land and/or forest fires and the resulting haze.
ASEAN Agreement on Disaster Management and Emergency Response, 2009	The objective of this Agreement is to provide effective mechanisms to achieve substantial reduction of disaster losses in lives and in the social, economic and environmental assets of the Parties, and to jointly respond to disaster emergencies through concerted national efforts and intensified regional and international co-operation. The Parties shall • co-operate in developing and implementing measures to reduce disaster losses including identification of disaster risk, development of monitoring, assessment and early warning systems, standby arrangements for disaster relief and emergency response, exchange of information and technology, and the provision of mutual assistance; • immediately respond to a disaster occurring within their territory. When the said disaster is likely to cause possible impacts on other Member States, respond promptly to a request for relevant information sought by a Member State or States that are or may be affected by such disasters, with a view to minimizing the consequences; • promptly respond to a request for assistance from an affected Party; and d. take legislative, administrative and other measures as necessary to implement their obligations under this Agreement.

Source: TRTA Consultant, July 2025

F. Gaps Analysis between ADB SPS and Government Environmental Requirements

42. The Environmental Impact Assessment or EIA is a statutory and procedural tool to ensure that environmental considerations are integrated into the planning and decision-making for development activities or undertakings. In Thailand, The NEQA, 2018 is the fundamental legislation that stipulates the existing EIA system with provisions on EIA screening, preparation, review process, timing, public consultation, mitigation measures and monitoring. The types and sizes of projects and activities which are required to submit an Environmental Checklist, an Initial Environmental Examination (IEE), EIA and EHIA are stipulated in the Notifications of MONRE issued as an implementing rules of the NEQA. The specific rules, procedures and guidelines for the preparation of an IEE, EIA and EHIA, including the corresponding reports, are specified in the same notification.

43. Based on the gaps assessment, the national regulatory requirements on EIA has similarity with the requirements of ADB SPS. However, the project has obtained an exemption from

conducting an EIA (see attached letter from ONEP). Certain gaps have been identified, and the gap filling measures in order to fully comply with SPS requirements are included in Table 6. These gaps must be filled by requiring the project to follow environmental assessment described in this EARF.

44. Below table summarizes the comparison between SPS principles and national environmental framework, including these key gaps identified and the gap-filling measures that need to be implemented by the project

Table 6: Gaps Analysis Between ADB SPS and National Environmental Framework

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
1	Use of screening process to determine the appropriate environmental assessment	Uses sector-specific rapid environmental assessment checklist for screening and assigns categories based on potential impacts: A- EIA required (irreversible, diverse or unprecedented adverse environmental impacts); B- IEE required; C- No environmental assessment required but a review of environmental implications; FI - ESMS required.	The government regulations set screening criteria to classify industries/projects based on potential environmental impacts. While the project or industry type do not consider the scale and location, the category determines the level of environmental assessment. The EIA law does not have numerical classification system, but environmental assessment is described as either an IEE, EIA or EHIA.	No major gap between ADB and government procedures. However, this project has obtained exemption from conducting EIA for national requirements.	The project will follow ADB SPS requirement by screening the impacts and preparing the required environmental assessment and documentation in the form of IEE and EDDR.
2	Conduct an environmental assessment	EIA and IEE - Identify potential impacts on physical, biological and socioeconomic aspects in the context of project's area of influence (i.e., primary project site and associated facilities) ESMS for FIs	The conduct of environmental assessment is determined by the type and sizes of projects explicitly defined in the NEQA and its amendments. Basically, depending on these size, environmental assessment is required to fulfill the requirement of reports as follows: (i) Environmental checklist; (ii) Initial	No major gap between ADB and government procedures. However, this project has obtained exemption from conducting EIA for national requirements. ADB SPS does not provide exemption, and all	The project will follow ADB SPS requirement by undertaking the required environmental assessment and preparation of IEE and EDDR.

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
			Environmental Examination (IEE) report; (iii) EIA report; and (iv) Environmental and Health Impact Assessment (EHIA) report.	projects with potential environmental impacts are required to undertake appropriate environmental assessment.	
3	Examine alternatives	Analyze alternatives to the project's location, design, and technology Document rationale for selecting the particular project location, design, and technology Consider "no project" alternative	The national EIA process does require an assessment of alternatives as part of the project preparation, which are included in the TOR for the EIA approved by the regulatory agency.	No major gap between ADB and government procedures. However, this project has obtained exemption from conducting EIA for national requirements.	The project will follow ADB SPS requirement by undertaking the IEE and analyzing alternatives and selecting alternative that will result to the least environmental impact.
4	Prepare an environmental management plan (EMP)	EMP to include monitoring, budget and implementation arrangements.	EMP and procedures for monitoring included in the IEE and EIA.	No major gap between ADB and government procedures. However, this project has obtained exemption from conducting EIA for national requirements. This also means that no EMP will be prepared.	The project will follow ADB SPS requirement by undertaking the IEE that includes the EMP.
5	Carry out meaningful consultation	Starts early and continue during implementation; Undertaken in an atmosphere of free intimidation Gender inclusive and responsive tailored to the needs of vulnerable groups Allows for the incorporation of all	Stakeholder consultation and engagement in the EIA process are comprehensive and project proponent is required to consult with stakeholders as early as the project preparation stage such as during	No major gap between ADB policy and government procedures. However, this project has obtained exemption from conducting EIA for	The project will follow ADB SPS requirement by undertaking meaningful consultation as part of the project preparation and be carried out throughout the

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
		relevant views of stakeholders Establish a grievance redress mechanism	selection of alternatives and development of TOR for the EIA study. Project proponent is required to provide relevant materials in a timely manner prior to consultation and in an understandable format and language.	national requirements.	implementation. The preparation and implementation of the stakeholder engagement plan can also help address the gap.
6	Timely disclosure of draft environmental assessment (including the EMP)	Draft EIA report posted on ADB website at least 120 days prior to Board consideration; Draft EA/EARF prior to appraisal Final or updated EIA/IEE upon receipt Environmental monitoring report submitted by borrowers upon receipt.	Disclosure of a full draft EIA is not mandatory. However, the final and approved EIA is required to be disclosed on the website of ONEP.	The gap exists only on the non-mandatory disclosure of draft EIA. However, this project has obtained exemption from conducting EIA for national requirements.	In order to address this gap, it is important for the project to disclose all environmental safeguard documents, including EIA reports, on the implementing agency websites.
7	Implement EMP and monitor effectiveness	Prepare monitoring reports on the progress of EMP Retain qualified and experienced external experts or NGOs to verify monitoring information for Category A projects Prepare and implement corrective action plan if noncompliance is identified Requires submission of quarterly, semi-annual, and annual reports to ADB for review	EIA monitoring report is required to be submitted and disclosed on the website of ONEP.	No major gap between ADB and government procedures. However, this project has obtained exemption from conducting EIA for national requirements.	The project will follow ADB SPS requirement by undertaking the IEE and development of EMP. The implementation of the EMP will be monitored and reports will be submitted to ADB.
8	Avoid areas of critical habitats (use of precautionary approach to the use, development and management	Provides guidance on critical habitats.	Various national environmental laws, rules and regulations have the direct or indirect purpose of protecting biodiversity in the country, including protected areas and national parks.	While related national environmental laws, rules and regulations have the objective of protecting biodiversity in the country,	In case where the project area of influence encompass a critical habitat, a critical habitat assessment needs to be undertaken. If the assessment

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
	of renewable natural resources)			these laws do not have specific requirements for projects or undertakings on the conduct of critical habitat assessment and development of biodiversity management plan or any other plans or programs necessary to protect biodiversity and critical habitats.	reveals potential impact to biodiversity, a biodiversity management plan should be developed and implemented as part of the project implementation.
9	Use pollution prevention and control technologies and practices consistent with international good practices	Refers to World Bank's Environmental Health and Safety (EHS) General Guidelines 2007 (or any update) If national regulations differ, more stringent will be followed. If less stringent levels are appropriate in view of specific project circumstances, provide full and detailed justification	Effluent standards, ambient, emission standards, and noise level standards included in the national regulations.	No major gap between ADB policy and government procedures and requirements. However, this project has obtained exemption from conducting EIA for national requirement. Some parameters of the national ambient air quality standards and noise standards are less strict than the WHO guideline values.	The project will follow ADB SPS requirement by undertaking the IEE, which includes the use of international best practices on pollution prevention and control. For environmental quality standards, the project will follow the more stringent standards. In case this requirement cannot be met due to specific project circumstances, the government, through its

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
					implementing agency, will provide the necessary justification that is acceptable to ADB. The project will consider ADB's Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks. March 2022.¹⁶ xxxxx
10	Provide workers with safe and healthy working conditions	Refers to WB EHS General Guidelines 2007 (or any update).	The national law (Labor Protection Act) and all other occupational health and safety regulations provide the comprehensive safety measures to ensure all workers in the country are protected from accidents and danger. These national regulations are also aimed at ensuring workers have conducive and safe spaces at workplaces.	No major gap between ADB policy and government requirements. However, this project has obtained exemption from conducting EIA for national requirement.	The project will follow ADB SPS requirement by undertaking the IEE, which includes consideration of occupational health and safety in the environmental management planning for the project. The project will need to ensure that the contract documents include all relevant requirements on the

¹⁶ This document can be downloaded from ADB website here: <https://www.adb.org/publications/good-practice-management-control-asbestos>

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
					occupational health and safety.
11	Conserve physical cultural resources (PCR) and avoid destroying or damaging them	Use of field-based surveys and experts in the assessment. Consult affected communities on PCR findings. Use chance find procedures for Guidance.	The Antiques, Objects of Art and National Museums Act provides the protocols and responsible parties on protecting PCRs when implementing projects or undertakings. Current practices of RID when dealing with PCRs in its various project sites include the following: • If the construction area is culturally sensitive or registered with the Fine Arts Department, RID must coordinate with the Fine Arts Department to establish appropriate measures for protection, conservation, or relocation in accordance with legal procedures before construction begins. This is a standard process that RID is already required to follow. • In cases where the area involves historical sites or cultural heritage that are not registered with the Fine Arts Department but is still culturally sensitive—such as	No major gap between ADB policy and government requirements. The definitions of PCRs provided in the ADB SPS and the national law are consistent. However, this project has obtained exemption from conducting EIA for national requirement.	The project will follow ADB SPS requirement by undertaking the IEE, which includes assessment of impacts to PCRs. If needed, permissions from the Fine Arts Department and/or National Office of Buddhism, and relevant authorities shall be obtained by the PMU prior to mobilization of contractors working in the areas where the PCRs are located.

Sl. No.	ADB SPS, 2009		Government of Thailand Requirements	Gaps (if any)	Measures to Address Gap
	Principles	Delivery Process			
			being near temples or religious sites—RID will make every effort to avoid operating in such areas. • RID will coordinate with the National Office of Buddhism, local abbots, and community members to determine suitable measures for protection or impact mitigation.		

G. Specific Requirements for the Project

45. **Bidding and Contract Documents.** The PMU will also ensure that bidding and contract documents include specific provisions requiring contractors to:

- (i) Comply with the measures and requirements relevant to the contractor set forth in the IEE and EMP, and any corrective or preventative actions set out in the environmental monitoring reports;
- (ii) Make available a budget for all such environmental measures;
- (iii) Provide the employer with a written notice of any unanticipated environmental risks or impacts that arise during construction, implementation or operation of the project that were not considered in the IEE or EMP;
- (iv) Adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction;
- (v) Fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction;
- (vi) Comply with all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; (c) allowing freedom of association and effective recognition on the right to collective bargaining; (d) elimination of forced labor; (e) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites, particularly women;
- (vii) Submit to PMU, for review and approval, a site-specific environmental management plan (SSEMP) with Site-Specific Health and Safety Management Plan (SSHSM), including (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, temporary and final disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SSEMP

implementation. Suggested outline and contents of SEMP with SSHSMP is in Appendix 5.

46. No works can commence prior to approval of SEMP by PMU. A copy of the EMP and approved SEMP will be kept on site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the works contracts, EMP and approved SEMP constitutes a failure in compliance and shall require corrective actions.

47. **Conditions for Award of Contract and Commencement of Work.** The PMU will not award any works contract for the project until (i) the IEE and EMP are updated based on the project's tranche-wise information, (ii) PMU has obtained ADB's clearance of such updated IEE and EMP; (iii) relevant provisions from the updated IEE and updated EMP are incorporated into the works contract; and (iv) necessary permits from relevant government agencies have been secured.

III. ENVIRONMENTAL ASSESSMENT FOR MFF TRANCHES

48. The use of the MFF lending modality has been selected because of the large size of the proposed project and implemented over a period of 8 years, excluding the defect liability period. Tentatively, the MFF will comprise three tranches, whereby tranches may be implemented partially overlapping. As part of the project preparation, an initial screening of the MFF was made following ADB SPS categorization criteria.

49. Based on this screening, the MFF was classified as Category B for Environment in view of the assessment that the components and activities planned under the three tranches are unlikely to have any significant adverse environmental impacts that are irreversible, diverse, or unprecedented. All these activities will have the same nature, scale, and setting; and are only separated by their different but contiguous locations in the Lower East Chao Phraya region. Thus, it is expected that the classification of Category B for Environment will remain the same throughout the three tranches of the MFF.

50. The project obtained an exemption to undertake an EIA under the national EIA regulations. Due to this exemption, no environmental assessment following the national EIA requirements will be undertaken. This circumstance resulted to significant gaps in the analysis between ADB SPS requirements and that national environmental requirements. As gap-filling measure, the project will follow ADB SPS procedures and requirements throughout the project implementation. Table 7 provides the key steps, procedures and actions during the different stages of project implementation.

Table 7: Key Steps, Procedures and Actions on Environmental Assessment for the MFF

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
1. Detailed Engineering Design (DED), and updating and approval of the environmental safeguard document	PMU to update the IEE based on the DED for any subsequent tranche by following the detailed updating requirements of the EARF as indicated in Table .8.	In view of the exemption under the national EIA regulation, no environmental assessment will be undertaken. RID, as the executing and implementing	- Updated IEE based on DED - Updated IEE disclosed on ADB and PMU websites - Updated IEE with EMP attached to tender documents or

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
	• PMU to submit the updated IEE to ADB for clearance and disclosure. • ADB provides clearance of the updated IEE to PMU. • ADB and PMU to disclose the updated IEE on ADB and project websites.	agency, will follow ADB SPS requirements. • PMU to attach the updated IEE to all bidding documents for tender. Provide copy of the updated IEE with EMP to contractors of packages already awarded. • PMU to ensure and confirm in writing that any applicable approvals and permits necessary to execute or implement the project have been obtained.	provided to contractors • Relevant permits obtained.
2. Bidding and Contract Award	• PMU to ensure that bidding documents and contracts incorporate the environmental activities and mitigation measures required by the EMP or ECOCP as applicable. • Upon contract award, PMU to submit the signed contract to ADB.	• PMU to ensure bidding activities and contract awarding comply with any relevant government policies, rules and procedures.	• Bidding documents and contracts incorporate the subproject EMP or ECOCP as applicable.
3. Pre-construction phase	• PMU to ensure that the contractor prepares and submits to PMU a SSEMP and SSHSMP, or for Category C components an EHS method statement for review and approval. • PMU with support from PMCSC to review the SSEMP and SSHSMP or EHS method statement for Category C subprojects. PMU to provide approval if the submission is	• PMU to ensure all permits obtained during the DED stage remain valid. Any expired permits should be renewed in time prior to any mobilization or construction works by any contractor.	• SSEMP and SSHSMP prepared and approved by PMU. • GRM established.

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
	satisfactory. If unsatisfactory, PMU will provide its comments and return the submission to the contractor. Contractor will revise the SSEMP and SSHSMP or EHS method statement and resubmit to PMU. The cycle between PMU and contractor will continue until PMU provides the final approval. • PMU to ensure contractors prepare all other relevant sub-plans or work plans based on the requirements in the IEE or updated IEE. • PMU to ensure contractors to undertake environmental baseline monitoring and recording based on the requirements in the IEE or updated IEE. • PMU(s) to ensure that the GRM is established.		
4. Construction Phase - EMP, SSEMP/SSHSMP, and ECOCP Implementation	• PMU to ensure that all EMP requirements are implemented by the contractors	• PMU to ensure the project and the contractors comply with all the conditions set forth in permits and licenses issued by relevant government authorities for the implementation of the project.	• No environmental safeguard issues • No complaints • No breach of permit conditions and requirements.
5. Training, consultations and reporting	• PMU to ensure that PMCSC implements training and capacity building activities according to the EMP. • PMU to ensure implementation of	• Despite the exemption of the project from the national EIA regulation, PMU will ensure that other reporting	• Training reports prepared by PMCSC. • Consultation reports prepared by PMCSC.

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
	consultations according to the EMP. • PMU to ensure that the reporting requirements are implemented.	requirements to relevant government authorities as may be indicated in the IEE (or updated IEE) are complied with at all times.	
6. Monitoring of EMP /ECOCP Implementation	• PMU with support from PMCSC to ensure it carries out on-site inspections to ensure the full and correct implementation of the EMP / ECOCP including environmental quality monitoring. • PMU to ensure that identified non-compliances are reported to ADB, and timely and duly corrected through implementation of corrective action plans.	• Despite the exemption of the project from the national EIA regulation, PMU will ensure that it complies with the ADB SPS requirements on monitoring.	• Environmental monitoring reports submitted to ADB. • Corrective action plans (if any) timely implemented
7. Updating of the EARF or IEE	• PMU to ensure the EARF remains relevant during the entire period of MFF. If necessary, update the EARF to reflect the changes consistent with the requirements of ADB SPS. • In any subsequent tranche, PMU to ensure the IEE is updated based on the guidelines provided in this EARF. See Table 8. • PMU to ensure any updated EARF or IEE is submitted to ADB for review, clearance and disclosure.		• Updated EARF. • Updated IEE and EMP • Disclosed updated EARF or updated IEE.

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
8. Implementation of Grievance Redress Mechanism	• PMU and PIUs to ensure the GRM is implemented and continuously disseminated to stakeholders, especially in new areas or locations of works. • PMU and PIUs to monitor that the GRM is appropriately managed and that grievances are timely resolved.	• Despite the exemption of the project from the national EIA regulation, PMU will ensure that it complies with the ADB SPS requirements on grievance redress mechanism.	• Grievances resolved and reported in environmental monitoring reports to ADB
9. Postconstruction environmental audit	• PMU to ensure that PMCSC conducts post-construction environmental audit and ensure work sites are restored to at least their pre-project conditions or better. If damages occurred, PMU to ensure contractor implements restoration works at the contractor's own costs. • PMU to ensure that no final payment to any contractor is made until and unless it is satisfied with the post construction environmental audit and that all sites are restored to their pre-project conditions or better. • PMU to ensure that each contractor complied with the safeguard requirements and any timebound corrective actions in the defects liability period have been completed, including ensuring	• PMU to ensure the project complies with all conditions and requirements of permits issued by relevant government agencies, including post-construction conditions, if any.	• Post-construction environmental audit report (suggested outline is in Appendix 13) • Validation report on site restoration works

Activity / Step	ADB Procedures	Thailand Procedures	Key Results
	that all complaints have been resolved.		

51. Consistent with the key steps in Table 7, an environmental assessment following the requirements for Category B projects was undertaken for the MFF. An IEE study was conducted and a corresponding draft IEE report was prepared based on the preliminary design and available information as of ADB loan processing. Following the requirements in this EARF, the draft IEE will be updated in subsequent tranches to reflect assessment based on ongoing studies that are not yet completed by the time ADB approves the MFF, including future studies that will be conducted during implementation and/or change in scope, if any.

52. In order to ensure that the project continues to comply with ADB SPS requirements during the MFF implementation, in addition to updating the IEE to include the ongoing and future studies, the IEE needs to be revisited and updated, if needed, as a requirement and condition to the approval of periodic financial request (PFR) of every subsequent tranche.

53. Table 8 provides the key information that will need to be reviewed to determine requirements for updating the IEE.

Table 8: Environmental Guidelines for IEE Updating

Updating Aspects	Criteria and Elements
Project Design, Scope, Location or Alignments	If the project design, scope, location or alignments change significantly that impacts may vary from previous assessments.
	If the project design introduces new components that may have other environmental impacts and require additional mitigation measures.
	Unanticipated impacts
Results of Studies Conducted	Concurrent or after the project processing period, expert view on environmental impacts of project activities to aquaculture and fishery will need to be sought to support the need for any scientific studies that will help the long-term environmental sustainability of the project. Expert opinions will be specifically requested on the following: (i) The relevance of turbidity, suspended solids, and salinity to the aquaculture species in the project area (e.g. mussels aquaculture livelihood activities); and (ii) At what level of turbidity and salinity will impact occurs to the survival or sustainability of aquaculture species. Based on these expert-guided evaluations, and if further assessment is warranted, scientific studies may be fulfilled such as the conduct of salinity dispersion analysis in the brackish environment in the downstream areas. The updating of IEE in subsequent tranches will include the progress of and/or results of these assessments.

Updating Aspects	Criteria and Elements
Regulatory Changes	During the implementation of the MFF, the national regulatory framework may change. In case this happens, the EARF and IEE will need to be updated. For example, new environmental standards, new or updated health and safety regulations, updated water quality criteria, new emission or noise standards, new declaration of protected areas or sensitive areas within or near the project sites, other applicable rule and regulations on environment, health and safety (EHS), etc.
Physical Cultural Resources (PCR)	Reconnaissance of the project sites reveals the potential impacts to PCRs. Initial PCR surveys were conducted and potential impacts assessed in the draft IEE. Continuous survey and site visits will be undertaken during project implementation. Therefore, the IEE will need to be updated if: (i) New PCRs are identified along the alignments that were not accounted during the initial survey; or (ii) New alignments or components are included in subsequent tranches. ADB will be consulted for further guidance on the need for assessment of the PCRs as required by the SPS. The PMCSC will mobilize an expert to support PMU and PIUs in the preparation of the assessment of the PCRs.
Existing Facilities	Conduct environmental audit of any existing facilities¹⁷ as defined in the ADB SPS.
Facilities that will be identified in the implementation and in the subsequent tranches	New project facilities not assessed in the draft IEE. These new facilities could be, but not limited to, the following: (i) Construction camps; (ii) Storage areas; (iii) Laydown areas; (iv) Concrete batching plant; and (v) Existing disposal sites to be used as final disposal site for the project.
Associated Facilities	ADB SPS Appendix 1 para 6 defines associated facilities as “not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project” Analyze environmental impacts and risks of associated facilities not assessed during the project preparation stage. These associated facilities could be, but not limited to, the following: (i) New access roads; (ii) New disposal sites; and (iii) Quarries.

¹⁷ ADB SPS Appendix 4 para 12 on Existing Facilities.

Updating Aspects	Criteria and Elements
Asbestos-containing materials (ACM) including, but not limited to, pipes, roofing, ceilings, insulation materials, etc.	Reconnaissance of the project sites also reveals the existence of asbestos-containing roofings in houses that will likely be demolished. Demolition, handling and final disposal of asbestos cement roofings need to follow procedures consistent with ADB SPS requirements and national regulations on ACMs. The project shall follow international guidelines and national policies that provide framework on the identification, management, handling and disposal of ACMs. These include the following: (i) ADB's Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks. March 2022; (ii) International Finance Corporation's Guidance Notes: Performance Standards on Environmental and Social Sustainability. January 2012; and (iii) World Bank Group's Good Practice Note: Asbestos: Occupational and Community Health Issues. May 2009. In order to do proceed with this compliance, verification by a Waste Management Expert/Asbestos Management Expert (or equivalent) is needed. Include asbestos management plan (AMP) in the SSEMP of contractors. Appendix 8 provides an outline for the AMP.

ADB = Asian Development Bank, EARF = environmental assessment and review framework, IEE = initial environmental examination, SPS = safeguard policy statement

IV. GENERAL ANTICIPATED ENVIRONMENTAL IMPACTS

54. The proposed project locations of all activities covering the three tranches under the MFF are known and have been visited as part of the due diligence during project preparation stage. Site assessment concluded that there are no environmentally sensitive areas per definition of ADB SPS is found in the project area of influence. Project activities are not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential impacts are unlikely to affect areas far beyond the sites or facilities subject to physical works. These impacts are site-specific and local in nature, and few if any of them are irreversible. Planning principles and design considerations will be reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location will not be significant.

55. During construction, potential impacts are expected to be due to civil works. Mitigation measures will be developed to reduce all negative impacts to acceptable levels. In most cases mitigation measures can be patterned after the traditional and internationally accepted approaches that are commonly used at construction sites and known to civil works contractors.

56. During operation, potential impacts are mainly due to operation and maintenance activities of the facilities or infrastructures. In order to avoid or mitigate these impacts, the facilities will operate with routine maintenance, which shall not affect the environment.

57. Subject to procedures in this EARF, anticipated impacts in subsequent tranches are expected to be within the same range of scope, scale and setting as with the potential impacts identified during the project preparation stage, and producing generally the same impacts at same

or lesser magnitude. The draft IEE prepared during the project preparation stage will be updated based on the guidance provided in this EARF (see Table 8).

58. Below are the typical environmental impacts, concerns and issues that can be expected from the project. Some of these may not be applicable to the activities under one of the tranches, but may be applicable to the activities of other tranches. Therefore, this compendium of general impacts, concerns and issues can be used as reference during the updating of IEE in subsequent tranches. More specific impacts and mitigation measures corresponding to these impacts, concerns and issues will be formulated by the assessment team during the IEE study, and these will be highly dependent on the (i) nature, scale, and location of project components, and (ii) potential receptors within the corridor of impacts of project activities.

59. During design/pre-construction phase, anticipated environmental impacts include the following:

- (i) Impact of climate change such as extended heavy precipitation could trigger flooding of roads, drainage and communities rendering them unusable.
- (ii) Loss of vegetation at proposed sites due to surveying activities and site clearance prior to construction activities, including pre-construction investigations (boreholes, soil testing, etc.).
- (iii) Potential loss of trees along project alignments.
- (iv) Loss or damage of environmentally sensitive areas.
- (v) Conflict on land use associated with the development of new access roads and the surrounding lands.
- (vi) Extraction of raw materials needed for construction could impact the environment at the source. For example, sources of gravel and sand sourced from quarrying activities along riverbanks, etc.
- (vii) Damage to existing utility infrastructures such as power lines, telecommunication lines, water supply, drainage, etc.
- (viii) Damage to other public- or private-owned structures and properties due to vibration during contractor mobilization and pre-construction activities.
- (ix) Improper execution of demolition works on structures with asbestos-containing materials (ACMs), including improper transport and disposal of the demolished structural components such as roofings made of ACMs.
- (x) Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups.
- (xi) Environmental pollution due to inadequate or lack of appropriate disposal site for dredged materials and voluminous amount of cleared vegetations.
- (xii) Discharge of hazardous materials into the drains or canals.
- (xiii) Permanent or temporary change in land use or topography including increases in intensity of land use.
- (xiv) Permanent or temporary change in environmental conditions or quality due to due to improper siting and establishment of contractor camps and other project temporary facilities.

60. During construction phase, anticipated environmental impacts include the following:

- (i) Noise and vibration from construction, piling and other civil works activities.
- (ii) Interference with other utilities and blocking of access to residential establishments and/or commercial buildings.
- (iii) Dislocation or involuntary resettlement of people.

- (iv) Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups.
- (v) Dust due to excavation, other civil works, and vehicle mobilization and maneuvering.
- (vi) Air pollution due to emissions from construction vehicles and heavy equipment.
- (vii) Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards. For example, some workers could be exposed to hazardous substances such as asbestos-containing roofings and materials during demolition works.
- (viii) Road blocking and temporary flooding due to land excavation during the rainy season.
- (ix) Temporary silt runoff.
- (x) Traffic disturbances due to transport of construction materials and wastes, including the use of oversized transport vehicles to/from the storage or work sites.
- (xi) Population increase that causes increased burden on social infrastructure (such as sanitation system).
- (xii) Social conflicts between construction workers from other areas and community workers.
- (xiii) Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as fuel and other chemicals, including exposure of community to hazardous materials such as dismantled asbestos-containing roofings and materials.
- (xiv) Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community.
- (xv) Damage to structures, properties, public facilities, and others due to execution of works or other safety risks during construction works.
- (xvi) Other community and occupational health and safety risks during demolition works.
- (xvii) Changes in occurrence of disease or affect disease vectors (e.g. insect or water-borne disease) due to worker's camp.
- (xviii) Improper transport and disposal (temporary and permanent) of wastes such as spoils, overburden, cleared vegetations, dredged canal soil, etc.
- (xix) Solid wastes and effluents from workers' camps and other temporary project facilities.
- (xx) Emission from burning of waste in open air (e.g. worker's camp, slash materials, construction debris).

61. During post-construction and commissioning phase, anticipated environmental impacts include the following:

- (i) The dismantling and abandonment of temporary sites such as construction camps, storage facilities and work areas could lead to deteriorated environmental conditions and nuisance to the people living in nearby communities or villages.
- (ii) The activities of the project will result to sorts of construction and demolition debris after the construction period. These include excess spoils and scrap materials that are generated after all construction activities. This also includes all other wastes such as chemical containers and packaging materials that have accumulated at the sites over the years. Due to the volume and hazardous nature of some of these wastes, indiscriminate disposal or ignoring their proper disposal could be dangerous to the environment and the people in the vicinity of the project sites.

62. During operation phase, anticipated environmental impacts include the following:

- (i) Risks of water overflow from the irrigation canals causing disturbance to agricultural practices.
- (ii) Risks and vulnerabilities related to community and occupational health and safety due to physical, hazards due to the project infrastructures.
- (iii) Discharge of hazardous materials into drains or canals.
- (iv) Positive impacts - employment to local people; improved flooding conditions which will enhance people's well-being and boost economic conditions of communities surrounding the project sites.

63. Following table provides examples of general mitigation measures for selected important impacts at different stages of the project – pre-construction, construction, post-construction/commissioning, and operation. Consistent with the generality of impacts, concerns and issues above, these mitigation measures are likewise generic in nature, and any specific detailed measures will need to be developed during the course of environmental management planning for the IEE study.

Table 9: Anticipated Environmental Impacts and Proposed General Measures to Avoid and/or Mitigate Impacts

Anticipated Impacts	General Mitigation Measures
Design/Pre-construction Period	
Impact of climate change	Integrate climate change considerations in the final detailed engineering designs of project components.
Loss of vegetation or trees	- Avoid removal of vegetations to extent possible. If unavoidable, ensure to conduct pre-works survey to record vegetations that will be removed. Plan translocation of trees or vegetations, if possible. - Develop a tree plantation program.
Loss or damage to environmentally sensitive areas	- Avoid locating components in or near environmentally sensitive areas. - Design the volume and frequency of discharge of irrigation or drainage canal water to minimize impacts on aquatic life in the affected downstream areas, if any.
Conflict on land use associated with the development of new access roads and the surrounding lands.	- Select road alignments that avoid ecologically sensitive areas, densely populated zones, and culturally significant lands. - Coordinate with local authorities to align road development with existing land use plans and avoid overlapping or incompatible uses. - Establish green belts or buffer zones between roads and residential/agricultural areas to reduce noise, pollution, and

Anticipated Impacts	General Mitigation Measures
	encroachment. • Conduct early and continuous engagement with affected communities to understand land use patterns and concerns. • Involve local stakeholders in decisions about land access, compensation, and resettlement.
Environmental damage due to extraction of raw materials for the project	• Avoid quarrying activities. • Procure construction materials such as aggregates, sands, etc. from government-authorized sources.
Disturbance of services due to shifting of utilities (electric poles, wires, water pipes, etc.)	• Ensure all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosures
Impairment or damage to physical cultural resources (PCRs)	• Avoid construction activities in or near PCRs. If cannot be avoided, consult with relevant authorities such as the National Office of Buddhism, the Abbot and local communities surrounding or hosting the PCR. • In unavoidable cases, and in consultation with the relevant authorities, conduct assessment if deemed warranted depending on the scale or scope of project activities and sensitivity of PCRs. Engage the support of PMCSC PCR experts if necessary to execute the assessment. • Develop “chance find” procedures that include a pre-approved management and conservation approach for materials that may be discovered.
Exposure to ACM (e.g., AC pipes or asbestos-containing roofing sheets)	• Close coordination with the project social safeguards team and demolition contractor (or equivalent) to ensure demolished or recovered materials during project implementation period, which contain ACMs such as asbestos cement roofings shall not be included in the salvageable materials by affected households. • Develop and implement an ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear, and disposal methods, among others, for all ACMs recovered during the project implementation period. • Conduct awareness program on safety during the construction work. • Undertake construction work stretch-wise to control the volume of ACMs recovered, handled and disposed at a given time. This will ensure that all precautionary measures on the proper handling, transport and disposal of ACMs as provided in this EARF and in the AMP are complied with. • Appropriate actions as defined in the AMP will have to be adhered to. • Maintain records of ACMs per the AMP. • Refer to the instructions in the AMP, or by the Asbestos Expert.
Social conflicts arising from displacement of communities, including impacts on poor, women and children, Indigenous Peoples or other vulnerable groups	• Avoid land acquisition to maximum extent possible. For potential involuntary resettlement impacts, prepare a Resettlement Plan. • Identify vulnerable groups early and ensure their meaningful participation in consultations and decision-making. • Use local languages, visual aids, and gender-sensitive formats to ensure understanding and inclusion. • Provide income-generating support, skills training, and access to credit for displaced or economically affected groups.
Indiscriminate disposal of dredged soil from irrigation canals and wastes from clearing of vegetations.	• As early as the design stage, identify temporary and final disposal sites for dredged soil and wastes from vegetation clearing. These disposal sites shall be approved by RID and comply with government regulations on the siting of disposal sites, and the sediment management plan that

Anticipated Impacts	General Mitigation Measures
	will be developed as part of the environmental assessment for the project.
Potential damage to structures due to vibration	• Structural survey along the alignments to document that integrity and pre-project conditions of structures that will likely be impacted by the excavation and piling activities.
Environmental damage and community and occupational health and safety issue due to establishment of construction camps and other project temporary facilities	• Follow best practices in internationally recognized standards such as the following: ◦ Workers accommodation pertaining to “Workers’ accommodation: processes and standards. A guidance note by IFC and the EBRD” 2009.¹⁸ ◦ International Labor Organization’s Workers’ Housing Standards,¹⁹ • Ensure sites for temporary facilities are approved by the PIU, in close consultation with local government entities. • Avoid locating in sensitive zones, near water bodies, wetlands, or in areas that disrupt natural drainage. • Ensure sites are clearly marked and confine storage (materials, waste, fuels) to specific, agreed-upon zones, keeping them separate from walkways and emergency routes. • Ensure to minimize footprint. Keep bare soil exposure to a minimum and plan deliveries to reduce on-site clutter. • Ensure site designs and layouts integrate environmental safeguard elements such as, but not limited to, avoidance or prevention of pollution to ambient air quality, noise level, surface water and groundwater quality; and avoidance or minimization of nuisance to communities.
Construction Period	
Noise and vibration from construction activities	• In residential areas and other areas of night time-sensitive institutions such as hospitals, schedule noisy or otherwise invasive activities during periods of the day which will result in least disturbance. • In areas near schools or other areas of daytime-sensitive institutions such as temples and churches, schedule noisy or invasive activities during night time or holidays. • Use of high noise generating equipment shall be stopped during night time. • In unavoidable case of night works (due to local rules) provide prior information to public on work schedule, noisy activities and need to conduct the works at night. Use best construction methods to minimize noise to possible extent. • Vehicle horns should not be used unless necessary to avoid untoward incidents or accidents. • All vehicles and equipment to be used in construction shall be fitted with exhaust silencers. • Use silent-type generators (if required). • If it is not practicable to reduce noise levels to or below noise exposure limits, post warning signs in the noise hazard areas. • Based on the result of the structural survey, use the best construction method of excavation and piling such that structures are not, or least, affected. For example, avoiding use of pneumatic drills or heavy equipment near structures surveyed to be fragile to withstand heavy

¹⁸ https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

¹⁹ <https://www.ilo.org/publications/workers-housing>

Anticipated Impacts	General Mitigation Measures
	vibration. Complete work in these areas quickly.
Interference with other utilities and blocking of access to residential establishments and/or commercial buildings.	• Identify all critical access points to establishments during project planning. • Schedule works in short segments to maintain access to at least one side of the establishment at all times. • Design and communicate temporary detours or bypasses for vehicles and pedestrians.
Dislocation or involuntary resettlement of people.	• Develop and implement a resettlement plan in compliance with ADB SPS requirements.
Increased dust from construction activities	• Use dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles. • Use of water suppression for control of loose materials on paved or unpaved road surfaces. Ensure unpaved surfaces used for haulage of materials within settlements are dust-free
Increase in vehicle-related pollutants	• Use modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions and ensure that these are maintained to manufacturers' specifications at all times. • Use of older vehicles or equipment should ensure that these have valid permits at all times (permits are assumed to ensure the vehicles or machines are in compliance with the relevant vehicle emission standards).
Road blocking and temporary flooding due to excavation during rainy season, resulting to continuing soil erosion/silt runoff in or near construction sites	• As much as possible, conduct of excavation, dredging and piling activities during dry season. • Measures to minimize soil erosion/silt runoff to be incorporated when conducting earthworks during monsoon season
Water and land chemical contamination from fuels and lubricants	• Place storage areas for fuels and lubricants away from any drainage leading to water bodies.
Water and land contamination from solid and liquid wastes	• Prioritize re-use of excess spoils and materials in construction activities, provided that these do not contain hazardous substances beyond the standards. Take all precautions to prevent entering of wastes into streams, watercourses, fisheries ponds or irrigation systems. • Manage solid waste according to the following preferred hierarchy: reuse, recycling and disposal to designated areas.
Increased road traffic and road closures around the project sites due to construction activities	• Prepare traffic management plan. • Communicate the traffic management plan to the public (road users) and communities. • Ensure contractors have the obligation to restore damaged roads. Contracts should have sufficient financial provisions for road restoration
Social conflicts between construction workers from other areas and community workers	• Employ labor force from local communities to maximum extent possible • Restrict activities and movement of staff and workers only within designated construction areas.
Safety risks due to deep excavation (workers and public)	• Prepare community and occupational health and safety plan. • Prepare community awareness plan. Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. • Provide sign boards.
Post-Construction / Commissioning Period	
Deteriorated environmental	• Develop and implement a post-construction rehabilitation and

Anticipated Impacts	General Mitigation Measures
conditions due to dismantling and abandonment of temporary sites, including accumulation of solid wastes and construction debris at these sites.	restoration plan to ensure sites are restored to pre-project conditions or better. • Implement an environmentally suitable waste management and disposal for all wastes and debris left at the sites.
Operation and Maintenance Period	
Health and safety hazards to RID workers and community people	• Implement relevant procedures following schedules and in timely manner. This will ensure all facilities are working properly even during the occurrence of extreme weather events such as heavy rainfall. • Develop and implement an emergency response procedure that need to be followed before, during and after extreme weather events. • Formalize and implement existing practice of informing affected communities prior to release of irrigation water in the downstream areas. • Continue the conduct of meaningful consultations with the affected communities all throughout the O&M period. • Implement the GRM of the project, and ensure that concerns of stakeholders are addressed early and properly taking into account the welfare of these stakeholders. • Ensure that all site personnel have a basic level of health and safety training and protective equipment.

V. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Consultation

64. ADB SPS requires meaningful consultation with affected people that:

- (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;
- (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people;
- (iii) is undertaken in an atmosphere free of intimidation or coercion;
- (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and
- (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

65. A general consultation plan for the MFF is shown in Table 10. This provides a general guidance in undertaking consultation activities for the project at all stages of implementation. This consultation plan is a living document and may be revised from time to time to adjust to any changes of circumstances during the implementation of the project. Each of these activities will be further elaborated in detail in the IEE report, as updated in subsequent tranches.

Table 10: General Consultation Plan

Purpose	Consultees	Timing
- To ensure that all required environment related approvals, permits, certificates, endorsements or no objections are duly and timely prepared, requested and obtained. - To facilitate coordination and collaboration among relevant government departments, offices and administrations.	Relevant government agencies such as the MONRE and departments under it (ONEP, Pollution Control Department, Department of Water Resources, Department of Marine and Coastal Resources, etc.)	During project preparation and ADB loan processing period. Repeatedly during detailed engineering design as necessary.
- To ensure that affected persons and other stakeholders are informed and allowed to participate actively in the development process. - To invite feedback from affected persons, beneficiaries, local governments and other stakeholders to be considered in the project design and implementation. - To ensure affected persons and other stakeholders are aware of the Grievance Redress Mechanism of the project.	Project affected persons and communities, including local authorities and other relevant organizations	During project preparation and ADB loan processing period. Repeatedly during the entire MFF implementation period (all tranches) - Pre-construction phase - Construction phase - Post-construction phase During operation phase (or after the project is completed and the infrastructures are being utilized), PIUs will continue to undertake consultations.

66. During the preparation of this EARF, initial consultation activities were undertaken with RID (personnel at the RID office in Bangkok and RID Regional Office 11). Other consultations were also conducted in the field during site visits. Meaningful consultations with stakeholders will continue throughout project implementation as necessary to address issues related to environmental safeguards. The consultation process will be continued and expanded to ensure stakeholders participate fully in project execution, as well as to implement the stakeholder engagement plan developed for the project.

67. Public consultation and involvement will be given highest priority in the implementation of mitigation measures. Public consultation will take place and on the basis of decision of the consultation meeting, implementation of mitigation measures will be prioritized and will be carried out with the involvement of the local people.

B. Information Disclosure

68. Information will be disclosed through public consultation and more formally by making documents and other materials available in a form and at a location in which stakeholders can easily access. This will involve making reports available at public locations in the project locations and providing a mechanism for the receipt of comments and making documents available more widely by lodging them on the ADB and the executing agencies' websites.

69. The executing agency through the PMU will submit to ADB the following documents for disclosure on ADB's website:

- (i) environmental assessment and review framework;
- (ii) the draft IEE reports;
- (iii) new or updated IEE reports prepared during subsequent tranches; and corrective action plan prepared during project implementation, if any; and
- (iv) semi-annual environmental monitoring reports.

70. PIUs will provide relevant environmental information, after review and receiving approval of the PMU, including information from the relevant documents in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. For the benefit of the community, the summary of the IEE will be translated in the local language and made available at: (i) offices of PMU; and (ii) offices of the PIUs.

71. Electronic version of the IEE will be placed in the official website of RID and PIUs after approval and clearance from ADB. RID will issue notification on the disclosure mechanism in local newspapers, ahead of the initiation of implementation of the project, providing information on the project, as well as the start dates, etc. The notice will be issued by RID through the PMU in local newspapers one month ahead of the implementation works. This will create awareness of the project implementation among the public. PMU and the concerned PIU will consider other additional means of information disclosure depending on practicability, such as the distribution of posters to libraries/headman office within the locality, online group chats, etc. to mass campaign the basic tenets of the IEE.

C. Grievance Redress Mechanism

72. The PMU will be responsible for establishing and coordinating the project specific grievance redress mechanism (GRM). Hotline for LAR issues, as described in the RF and RPs and will be made fully functional prior to start of construction. The GRM Hotline will ensure grievances of affected people are resolved in a timely manner and trigger remedial action. The GRM comprises a set of clear procedures to receive, record, and address concerns of complaints raised about safeguard issues at all levels with the responsible agency.

73. **RID Hotline.** All complaints are encouraged to be submitted and handled through a single system under the existing RID Hotline for complaints, which will coordinate and direct the complaints to the relevant RID offices, including the government line agencies. The complaints for the Hotline can be received from 10 different channels as detailed below:

Table 11: Channels for Submitting Complaints

No.	Channel	Source
1.	Hotline 1460	Receiving complaints from Hotline 1460, RID's public service, and recording details in the complaint management system.
2.	Letter	Received from the Office of the Secretary, with an electronic reference number, CHP number, and date of receipt.
3.	P.O. Box	From P.O. Box 1460 of the RID and P.O. Box 1111 of the Office of the Prime Minister and received from the complaint system (accessible only by authorized personnel with a code).
4.	Voicemail	Received from the voicemail system of Hotline 1460 during non-office hours.
5.	In Person	Complaints written in the complaint form.
6.	Comment Box	Complaints placed in the comment boxes provided by the RID.
7.	News Report	News clippings from the Public Relations and Publication Division, Office of the Secretary.
8.	Public Forum	Public forum reports.
9.	Mobile Agricultural Clinic	Mobile agricultural clinic reports.
10.	Facebook/Email	Complaints via Facebook: 1460 RID Public Service and Email: callcenter1460@gmail.com and 1460@rid.go.th

74. Any complaint filed or raised through the RID Hotline should be immediately addressed as soon as possible; typical matters that can be resolved immediately should be responded to within 7 working days.

75. **The Damrongtham Center.** In parallel to the RID Hotline, If the complaint is not satisfactorily resolved by the project, the affected person can use existing system in place at the Damrongtham Center, under the Department of Local Administration of the Ministry of Interior (MOI), which serves as a key government GRM for the general public. It handles complaints and grievances submitted by citizens seeking assistance, resolution, or factual investigations related to injustices or illegal activities of any Government agency or organization. APs can visit the local Damrongtham Center in-person to register complaint, or can send an email to moi1567@hotmail.com or call 1568 hotline a 24/7 call center, or access an online database system through a website www.1567.moi.go.th or via application Damrongdham App (MOI1567). To ensure timely resolution, the Damrongtham Center monitors progress and issues reminders when deadlines are missed (after 30 days, 15 days later, and again after 7 more days). Upon conclusion of investigations, findings are submitted, reviewed, and analyzed by the Center before being reported to MOI leadership. Final resolutions are shared with both complainants and referring agencies.

76. **ADB's Accountability Mechanism.** In addition to the project GRM, ADB's accountability mechanism (May 2012) also applies to the project. The accountability mechanism provides opportunities for people that are adversely affected by ADB-financed projects to express their grievances, seek solutions, and report alleged violations of ADB's operational policies and procedures, including safeguard policies. ADB's accountability mechanism comprises (i) consultation led by ADB's special project facilitator to assist people adversely affected by ADB-assisted projects in finding solutions to their concerns and (ii) providing a process through which those affected by projects can file requests for compliance review by ADB's Compliance Review Panel.

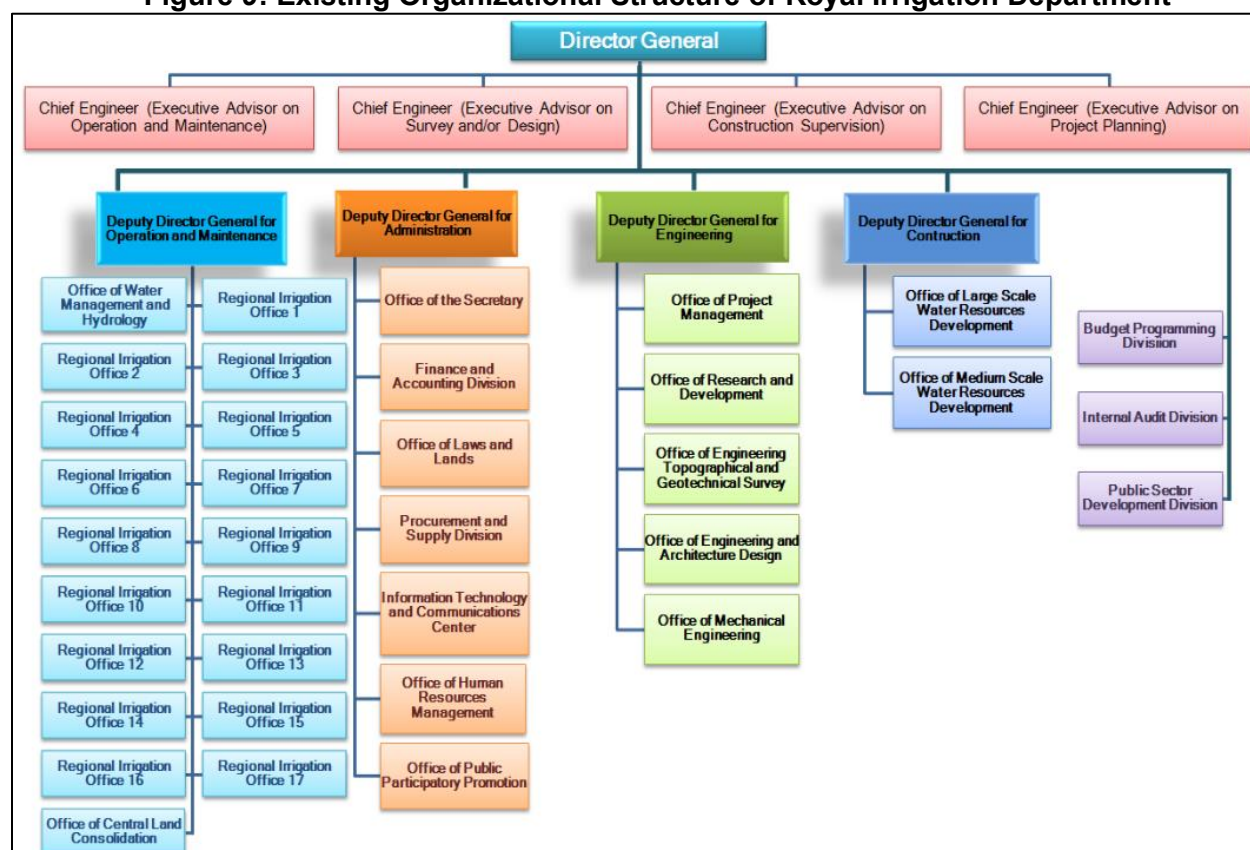
VI. INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES

A. Executing and Implementing Agencies

77. At the executing and implementing agency level, the Royal Irrigation Department is the government agency created under the Ministerial Regulation Organizing the Royal Irrigation Department, Ministry of Agriculture and Cooperatives B.E. 2554 that is mandated to lead the water resources development and management in the country. Duties and responsibilities include implementation of activities aimed at achieving, collecting, storing, controlling, distributing, draining or allocating water for agricultural, energy, household consumption or industrial purposes under irrigation laws, ditch and dike laws and other related laws; and implementation of activities related to prevention of damages from water; safety of dams and appurtenant structures; safety of navigation in commanded areas and other related activities that may not be specified in annual plan; among others.

78. RID has about 36 units and/or offices within the organization and are distributed to deliver different but interrelated functions at various levels. The organization is headed by a Director General who is supported by four Deputy Director Generals and four Chief Engineers. The four Deputy Director Generals head the different units and offices of the department.

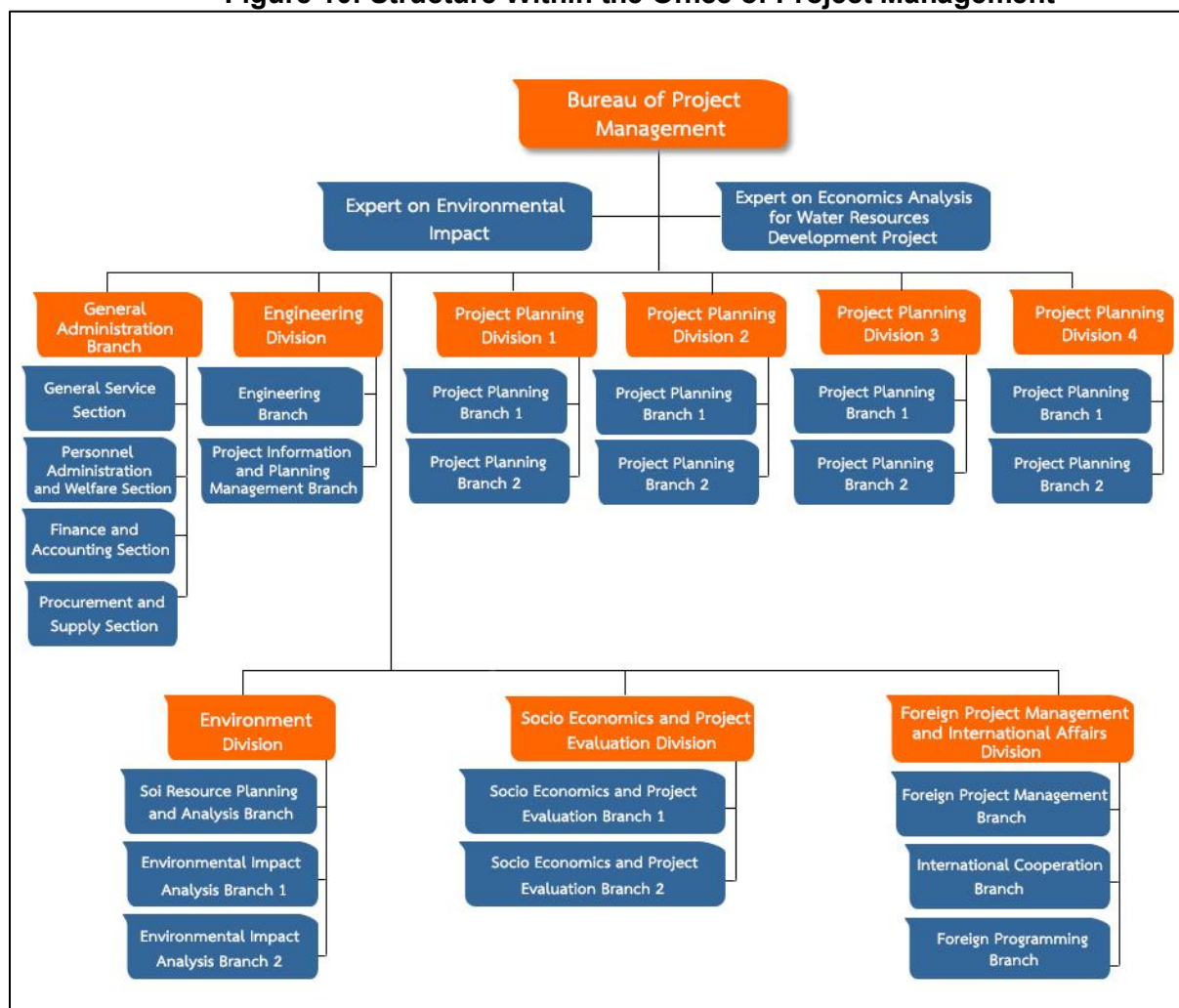
79. This organizational structure is shown in figure below.

Figure 9: Existing Organizational Structure of Royal Irrigation Department

80. Within the Office of Project Management, internal sections are constituted and mandated to fulfill the tasks related to managing different projects of the department that are geared towards achieving the water resource development objectives. The responsibilities of the Office of Project Management are stipulated in the Ministerial Regulations on the Division of the Royal Irrigation Department, Ministry of Agriculture and Cooperatives, B.E. 2557 (2014), as follows:

- (i) Study, analyze and plan the development of water resources and irrigation at the river basin level in accordance with the Department's policies and strategies;
- (ii) Conduct studies to prepare feasibility reports, study environmental impacts, health impacts and other impacts at the watershed level, irrigation projects and other projects of the Department;
- (iii) Analyze, monitor and evaluate environmental, health and other aspects, including the results of irrigation projects;
- (iv) Project management and cooperation in irrigation with foreign countries; and
- (v) Work together with or support the operations of other relevant or assigned agencies.

81. The following diagram shows the arrangement of the Office of Project Management.

Figure 10: Structure Within the Office of Project Management

82. In terms of resources, the Office of Project Management has a total of 131 civil servants, 17 government employees, and 3 permanent staff. In terms of environmental assessment, the Environmental Division has 8 civil servants and 4 government employees, divided as follows:

- (i) Environmental Impact Assessment Unit 1: 5 civil servants, 2 government employees;
- (ii) Environmental Impact Assessment Unit 2: 5 civil servants, 2 government employees; and
- (iii) Soil Resource Planning Unit: 7 civil servants.

83. Staff in EIA Units 1 and 2 are responsible for supervising and managing consultant contracts to prepare environmental reports, including EHIA, EIA, and IEE, as well as Environmental Checklists (EC). Additionally, the Environmental Division is responsible for implementing Environmental Mitigation and Monitoring Plans (EIMP) for projects whose environmental reports have been approved and authorized for construction.

84. There are also 17 temporary staff (as of 2025) who serve as coordination assistants, preparing documents, organizing meetings, and compiling EIMP implementation summary reports for each project.

85. The assessment revealed that RID has the organizational structure and resources in implementing its various projects in the country. In particular to environmental safeguards, appropriate positions are designated in the Bureau of Project Management (or Office of Project Management). Civil servants and government employees are assigned at two levels of the internal structure, which include an expert on environmental impact assessment seated at the bureau or office level, and dedicated staff at the division level (Environment Division). As needed, RID also employs temporary staff to augment the resource gap when multiple projects are implemented all at the same time or when the executions of these projects overlap for a considerable period of time.

86. Currently, the staffing in RID may be considered sufficient given the on-time progress of implementation of its various projects. The additional tasks and responsibilities under the proposed ADB project, notwithstanding other projects that will be implemented alongside, may result to work overload in RID staff. Therefore, during the implementation of the project, RID needs to continuously assess staff workloads to ensure efficient oversight of all projects. In case of need for additional staff support for the ADB project, RID will hire consultants to support through the PMCSC, and ensure effective implementation.

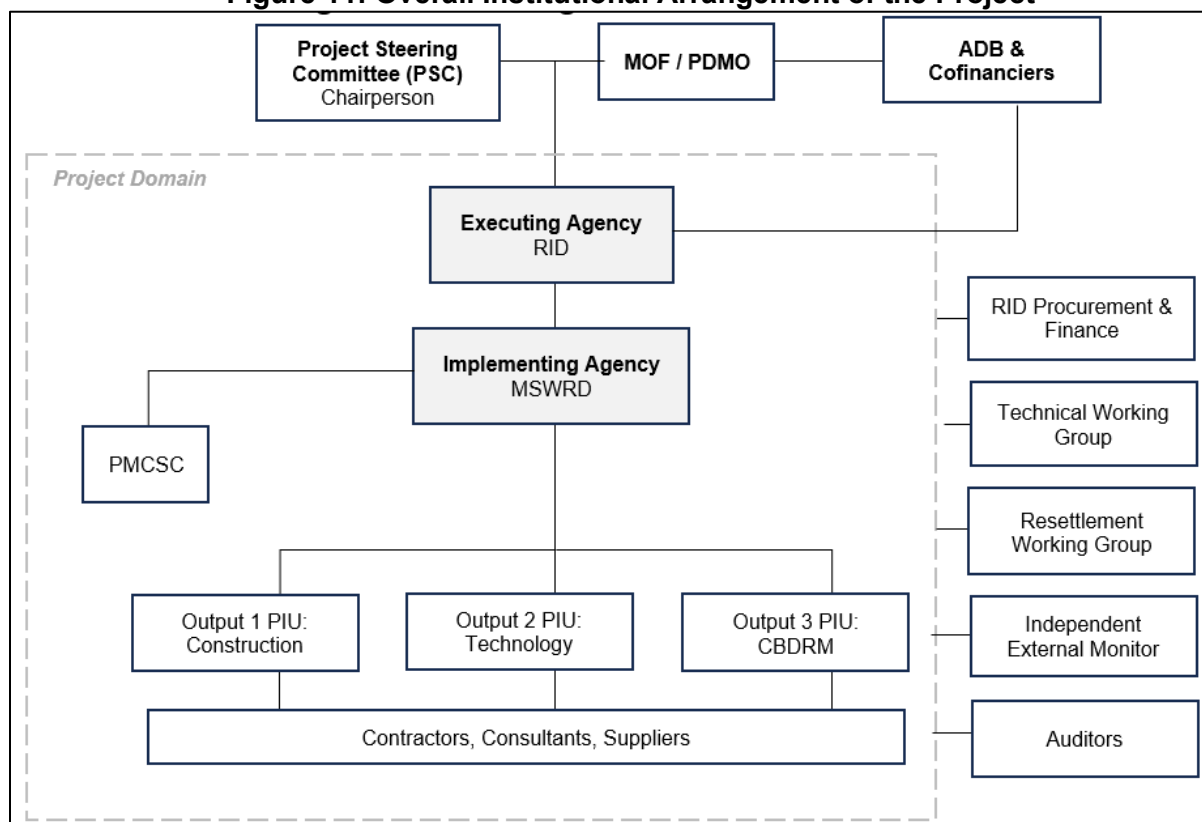
87. Most of the past and ongoing projects of RID are locally or nationally funded, and there is limited experience with projects funded or financed (either wholly or partially) by international lenders or multilateral development banks like ADB. Based on assessment, RID has a limited experience on implementing these types of projects that require compliance with international financiers' respective safeguard requirements. Therefore, the implementation of the proposed project may face some challenges in complying with ADB SPS requirements. This is one major gap that needs to be addressed in the institutional arrangement and capacity development that will be utilized for the project implementation.

88. To effectively bridge the identified gap in institutional capacity, RID must implement a comprehensive program of targeted training and capacity-building initiatives. These activities should be specifically designed to enhance the knowledge, skills, and practical competencies of RID staff in aligning project implementation with the ADB SPS requirements. Such training should encompass not only theoretical understanding but also hands-on application, including workshops, seminars, and on-the-job mentoring, with a focus on environmental safeguards relevant to ADB-funded projects.

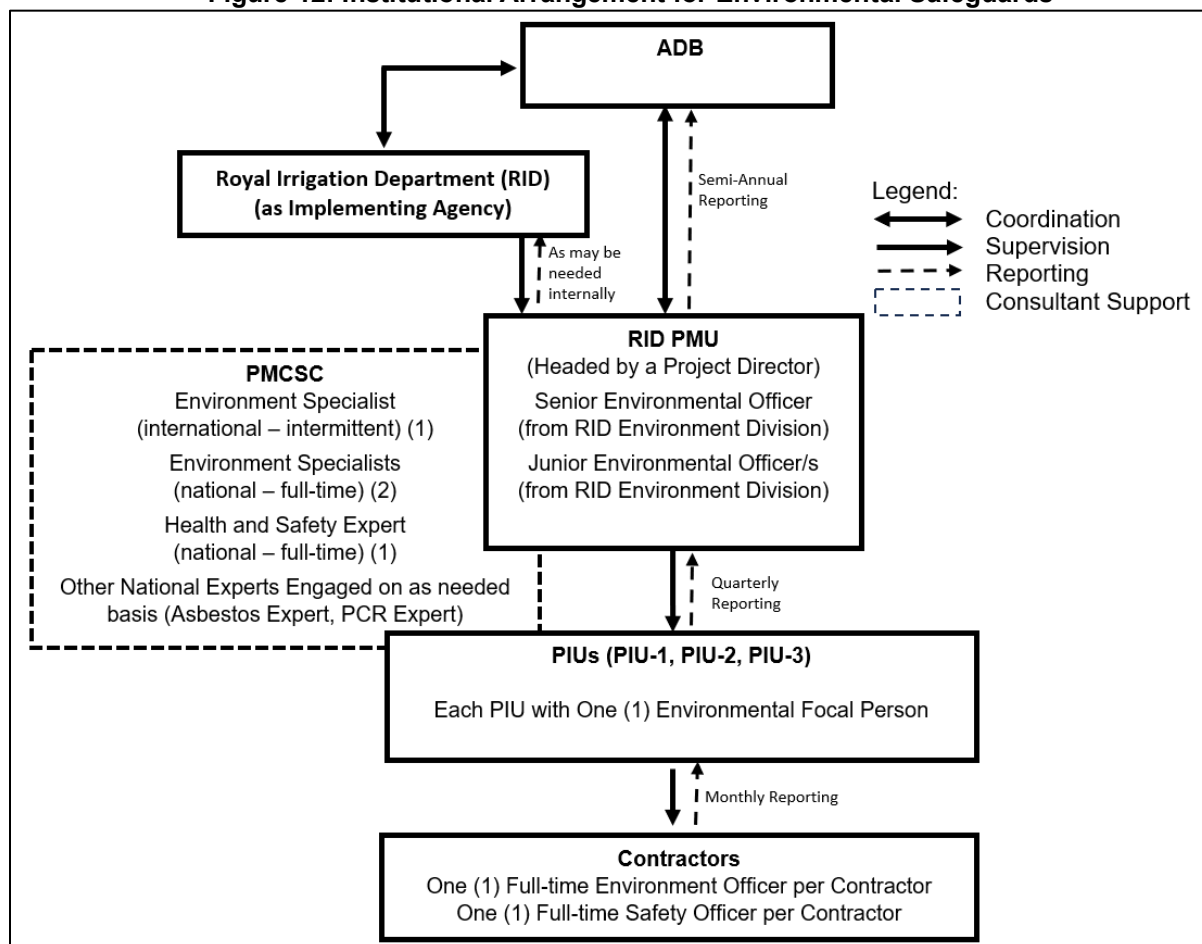
B. Project Management and Implementation Units

89. The institutional arrangement for implementing the project is shown in Figure 11. A Project Steering Committee will be established to provide policy and technical guidance for project implementation. The Project Steering Committee will be chaired by the permanent secretary for the Ministry of Agriculture and Cooperatives and comprises representatives of the leadership of relevant ministries and departments and project community representatives. The Royal Irrigation Department (RID) is the Executing Agency of the LECP. As the Executing Agency, RID has the overall responsibility for ensuring that the project complies with applicable laws, regulations and standards of the Kingdom of Thailand and for compliance with the relevant requirements under the ADB Safeguard Policy Statement and loan covenants.

Figure 11: Overall Institutional Arrangement of the Project



ADB = Asian Development Bank, CBDRM = Community-Based Disaster Risk Management, MOF = Ministry of Finance, MSWRD = Medium Scale Water Resourced Development, PDMO = Public Debt Management Office, PIU = project implementation unit, PMCSC = project management and construction supervision consultant, PMU = project management unit, RID = Royal Irrigation Department

Figure 12: Institutional Arrangement for Environmental Safeguards

ADB = Asian Development Bank, PCR = physical cultural resources, PIU = project implementation unit, PMCSC = project management and construction supervision consultant, PMU = project management unit

90. PMU will be responsible for leading and coordinating environmental safeguards throughout the MFF implementation. This includes conducting environmental assessments, updating the IEE, and ensuring alignment with the EARF, Facility Administration Manual (FAM), and national regulations. The PMU will liaise with government agencies for regulatory compliance, oversee utility shifting and clearance processes during pre-construction, and supervises EMP implementation during construction and operation. The PMU will also monitor environmental performance, support implementation of the GRM, and collaborate with PIUs, PMCSC experts, and social safeguards officers to ensure effective environmental oversight and reporting. Indicative terms of reference (TOR) of the PMU is in Appendix 9.

91. PIUs will be responsible for environmental compliance and effective safeguards implementation at the project level. PIUs will assist PMU in conducting environmental assessments, updating IEEs, and securing necessary regulatory clearances. PIUs will oversee construction activities, engage with affected communities, participate in grievance redressal, and submit regular monitoring reports to the PMU. Additionally, they contribute to documenting good practices and fulfill all responsibilities outlined in the EARF, FAM and IEE. Indicative TOR of the PIUs is in Appendix 9.

92. The composition of the PMU and PIUs will be drawn from a diverse pool of experts representing the various departments and functional units within RID, including personnel from the RID Regional Offices 10 and 11. This multidisciplinary team structure ensures that the PMU and PIUs benefit from a wide range of perspectives, technical knowledge, and operational insights. By integrating professionals from various areas of expertise, the PMU and PIUs will be well-equipped to coordinate complex issues of the project during implementation, align strategic goals across departments, and foster effective collaboration throughout the project lifecycle. This cross-functional approach enhances decision-making, resource allocation, and overall project execution.

C. Project Consultants

93. For the implementation of environmental safeguards, concerned staff from PMU and PIUs will work together with support from PMCSC. The roles and responsibilities of these key players are defined below.

94. The PMCSC will provide assistance in all aspects of project management and implementation, including targeted or more specific support to subprojects or packages. The PMCSC will include the following specialists or experts to effectively support the PMU and PIUs in implementing this EARF and relevant provisions of the IEE report: (i) one international environment specialist on intermitted basis; (ii) two national environment specialist on full-time basis; and (iii) one national health and safety specialist on full-time basis. The indicative TORs of the PMCSC specialists are in Appendix 9.

95. Based on the initial assessment conducted for the overall project, the project may involve ACMs and/or may be located in areas with sensitivity to cultural heritage assets. Therefore, the PMCSC shall have the following experts available whenever needed to implement the relevant requirements of the EMP: (i) asbestos specialist/expert; and (ii) PCR expert. These personnel will provide support to the PMU and PIUs including implementation of the environmental requirements, in accordance with ADB SPS, and assist in monitoring impacts and mitigation measures associated with the project. The PMCSC specialists/experts will support the PMU and PIUs on their environmental management functions, updating IEE with EMP, and monitoring the implementation of EMP. The PMCSC will also provide needed training and capacity building support to the PMU and PIUs.

D. Contractors

96. The contractors of the project will have specific roles in the implementation of the EMP. The contractors shall prepare their respective SSEMPs in compliance with the EARF and IEE prior to commencement of the construction activities. Each contractor shall have at least one full-time dedicated environmental officer (or equivalent) and one full-time dedicated safety officer on site. These officers will be responsible for implementing applicable measures in the EMP. All these specific roles and responsibilities will be defined in the IEE reports, which shall form part of the contract documents. PIUs with support of PMCSC will actively monitor contractors' environmental performance.

E. Roles and Responsibilities

97. Table below summarizes the roles and responsibilities of PMU, PIUs, PMCSC, contractors and ADB. Detailed terms of reference (TORs) are included as Appendix 9 and in the project Facility Administration Manual. The roles and responsibilities will be reviewed and updated as needed during project implementation and loan processing of succeeding tranches.

Table 12: Roles and Responsibilities on Environmental Safeguards

Stakeholder	Roles and Responsibilities
Asian Development Bank (ADB)	• ADB is responsible for screening projects to specify ADB's safeguard requirements; undertaking due diligence; and reviewing the borrower's/client's social and environmental assessments and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1–4; determining the feasibility of ADB financing; helping the borrower/client in building capacity to deliver the safeguards; and monitoring and supervising the borrower's/client's social and environmental performance throughout the project cycle. ADB discloses safeguard plans and frameworks, including social and environmental assessments and monitoring reports, on its website. • If a borrower/client fails to comply with legal agreements on safeguard requirements, including those described in the safeguard plans and frameworks, ADB will seek corrective measures and work with the borrower/client to bring it back into compliance. If the borrower/client fails to reestablish compliance, then ADB may exercise legal remedies, including suspension, cancellation, or acceleration of maturity, that are available under ADB legal agreements. Before resorting to such measures, ADB uses other available means to rectify the situation satisfactory to all parties to the legal agreements, including initiating dialogue with the parties concerned to achieve compliance with legal agreements.
Royal Irrigation Department (RID)	• RID will be responsible for assessing projects and their environmental and social impacts, preparing safeguard plans, and engaging with affected communities through information disclosure, consultation, and informed participation following all policy principles and safeguard requirements. • RID will submit all required information, including assessment reports, safeguard plans/frameworks, and monitoring reports, to ADB for review. • RID will comply with Government of Thailand laws, regulations, and standards, including obligations under international law. • RID will implement safeguard measures agreed with ADB to deliver the policy principles and meet the requirements specified in ADB SPS Safeguard Requirements 1–4. • To ensure that contractors appropriately implement the agreed measures,

Stakeholder	Roles and Responsibilities
	RID will include the safeguard requirements in bidding documents and civil works contracts. Where national safeguard policies and regulations differ from ADB SPS including Safeguard Requirements 1–4, ADB and RID will formulate and agree on specific measures to ensure that ADB's safeguard policy principles and requirements are fully complied with.
PMU	- Responsible for overall project management during implementation. - Review and confirm that the IEE is consistent with the project scope, locations and designs. - Update IEE, if needed, for processing of subsequent tranches following the guidelines in this EARF. - Ensure that EMP is included in bidding documents and contracts of civil works packages. - Ensure that the ECOCP is included in bidding documents and contracts of goods packages that will involve installation or small civil works. - Ensure that the contractor will comply with the measures and requirements relevant to the contractor set forth in the IEE and EMP, and any corrective or preventative actions set out in the environmental monitoring reports; make available a budget for all such environmental measures; provide the employer with a written notice of any unanticipated environmental risks or impacts that arise during construction, implementation or operation of the project that were not considered in the IEE or EMP; adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction; fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction; comply with all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; (c) allowing freedom of association and effective recognition on the right to collective bargaining; (d) elimination of forced labor; (e) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites, particularly women; submit to PMU, for review and approval, a site-specific environmental management plan (SSEMP) with Site-Specific Health and Safety Management Plan (SSHSM), including (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, temporary and final disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SSEMP implementation. - Approve/clear SSEMPs of contractors. Ensure no works will commence prior to approval of SSEMP. - Confirm compliance with applicable government laws, rules and regulations. - Ensure timely disclosure of draft, final, and updated IEE in form and language understandable by affected people and other stakeholders. - Ensure full compliance with safeguard-related provision in loan and financial agreements. - Ensure full capacity of safeguards staff on environment health and safety. - Resolve complaints brought through the Grievance Redress Mechanism (GRM) that have not been resolved at lower level. - Immediately investigate reported serious or fatal incidents that occur on site, and immediately inform ADB of such incident. Information may be relayed initially through call or via email, and followed by a written formal

Stakeholder	Roles and Responsibilities
	report within 48 hours of the incident. The report should contain the result of investigation and actions undertaken by the project. • Submit semi-annual environmental monitoring reports to ADB until the project completion report is issued. • Approve and sign off in the validation of PMCSC's post-construction environmental audit reports (PCEARs). Suggested outline of PCEAR is in Appendix 13.
PIUs	• Supervise the day-to-day implementation of safeguards at project sites. • Supervise environmental management aspects of the construction activities and ensure that SSEMPs are implemented by contractors and aligned with the project EMP. • Ensure PMCSC diligently monitor and supervise contractors on the implementation of the SSEMPs. • Ensure all environmental monitoring, including instrumental measurements, are undertaken. • Confirm locations of disposal sites of cleared vegetations and excavated sediments. Ensure locations of disposal sites for excavated sediments comply with the recommendations of the sediment management plan. • Confirm locations of all temporary facilities that will be utilized by the project. • Disseminate project information through meaningful consultations and by making project documents available at PIU and PMCSC offices or at locations easily accessed by stakeholders. • Ensure feedback and suggestions raised during consultations are considered and incorporated in the project implementation design or execution of works. • Identify necessary corrective actions to address non-compliances. • Address any grievances brought about through the grievance redress mechanism (GRM) in a timely manner. • Ensure that PMCSC consolidate monthly environmental monitoring reports from contractors. • Coordinate with PMU on the conduct of immediate investigation of reported serious or fatal incidents from the contractors. • Ensure that quarterly environmental monitoring reports are prepared and submitted to PMU.
PMCSC	• Assist PMU in: ○ Ensuring EMP requirements are integrated into bidding documents and contracts. ○ Ensuring compliance of the project with all environmental safeguard requirements as defined in loan covenants, FAM, and environmental safeguard documents such as EARF and IEE, including Environmental Due Diligence Report of other project components not covered by the IEE (i.e. Output 2 hydromets). ○ Providing technical support to PIUs when needed to ensure compliance with safeguard requirements at the community or project site level. ○ Overseeing technical studies needed for environmental assessment and update of IEE, including review and approval of results of technical studies. ○ Updating IEE in subsequent tranches. ○ Liaising with ADB and national environmental agencies. ○ Conduct periodic site visits and audits to verify environmental compliance of the project. ○ Conduct of meaningful consultations ○ Preparing environmental assessment or corrective action plan for unanticipated impacts.

Stakeholder	Roles and Responsibilities
	○ Ensuring timely resolution of grievances elevated through the GRM at the project level. ○ Investigating reported serious or fatal incidents at project sites, and preparing investigation reports for PMU's submission to ADB. ○ Review and consolidation of quarterly environmental monitoring reports from PIUs. ○ Preparation and submission of semi-annual environmental monitoring reports to ADB until project completion report is issued. ● Provide guidance or support to PIUs on the shifting of utilities and services, including obtaining necessary clearances from the respective government agencies, prior to award of civil works contracts. ● Organize capacity building activities on environmental safeguards and health and safety through training and seminars for the RID management, PMU and PIU staff, PMCSC, and contractors. ● Develop manuals, checklists, and other technical documents as may be required to help achieve safeguard compliance during project implementation. ● Review and validate post-construction environmental audit reports of PMCSC. ● Support in day-to-day execution of activities at field level and assist the PIUs in: ○ Securing local environment-related permits required of the project, if any. ○ Review and approval of SSEMPs of contractors. ○ Managing the day-to-day field-level implementation of environmental safeguard requirements of the project. ○ Supervising contractors to ensure compliance with mitigation measures in SSEMPs and aligned with the EMP. ○ Conducting meaningful consultations with the local communities and ensure that feedbacks and environmental concerns/ suggestions are incorporated and implemented in the project. ○ Conducting regular monitoring of project sites based on frequency indicated in the monitoring program. ○ Ensuring timely resolution of grievances elevated through the GRM at the field or site level. If not resolved, escalating the issue to the PMU level. ○ Investigating reported serious or fatal incidents at project sites, and providing relevant information for PMU's preparation of incident reports for ADB. ○ Review and approving monthly environmental monitoring reports from contractors. ○ Preparing and submitting quarterly environmental monitoring reports to PMU. ○ Ensuring all temporary facilities are removed by contractors after the construction period, and sites rehabilitated and restored to pre-project conditions or better. ○ Certifying that all environmental obligations of contractors have been fulfilled prior to recommending issuance of final payment to such contractors. ○ Ensure contractors conduct baseline (pre-works) conditions surveys as part of preparation of their SSEMPs (example: photo or video documentation, instrumental monitoring of environmental parameters, habitats of value, valued trees and vegetation, fauna species, structural and technical condition survey of properties that will be potentially affected by vibration and construction works, etc.).

Stakeholder	Roles and Responsibilities
	○ To support the meaningful consultations, establish one-on-one and informal dialogue with the local people to accommodate their openness during discussions. ○ Review of SSEMPs of contractors and provide recommendation of approval or non-approval of such SSEMPs to PIUs. ○ Monitor and record environmental conditions at sites during construction and post-construction, including conduct of instrumental measurements of environmental quality parameters. ○ Maintain records of environmental performance of contractors, including register of incidents at project sites based on reports from contractors. ○ Conduct consultations and disclose environmental safeguard documents such as the EMP, SSEMPs, and other relevant information to local communities. ○ Verify and report occurrence of unanticipated environmental impacts to PIU and PMU, with recommendations of corrective measures for consideration by PIU and PMU. ○ Conduct audit of post-construction rehabilitation and restoration works at the sites by contractors, and prepare post-construction environmental audit report for submission to PIU and PMU.
Contractor	● Ensure that the execution of works will not have impacts to the environment and people that are considered diverse, irreversible or unprecedented. ● Designate full-time environmental officer (or equivalent) and full-time safety officer. ● Adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction. ● Conduct baseline (pre-works) conditions surveys as part of preparation of their SSEMPs (example: photo or video documentation, instrumental monitoring of environmental parameters, habitats of value, valued trees and vegetation, fauna species, structural and technical condition survey of properties that will be potentially affected by vibration and construction works, etc.). ● Prepare SSEMP based on the EMP. The SSEMP shall include (a) proposed sites/locations for construction work camps, storage areas, hauling roads, laydown areas, disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (iv) budget for SSEMP implementation. ● Secure approval of SSEMP from PIU/PMU prior to start of works, including site preparation, vegetation clearing and mobilization. ● Inform the local communities at least seven (7) days prior to the commencement of any construction activities. This notification shall be provided through appropriate means such as public announcements, distribution of notices, or meetings to ensure that affected residents and stakeholders are adequately informed in advance. Furthermore, contractors must install clearly visible informational boards at all active work sites, displaying contact details of relevant contractor representatives. These boards will provide community members with accessible channels to raise concerns or seek information regarding ongoing project activities. ● Ensure that the execution of works consider mitigation measures in the SSEMP. ● Inform affected people and surrounding communities about the works, impacts, duration, mitigation measures, monitoring activities, contact persons and contact details. ● Acquire necessary permits and clearances prior to construction.

Stakeholder	Roles and Responsibilities
	• Ensure all sites, facilities, and lands including temporary and final disposal sites are approved by PMU and PIU. • Understand the EMP requirements and allocate necessary resources for implementation. • Implement all mitigation measures in the SSEMP to avoid or minimize the environmental impacts of construction activities. • Exert all efforts and utilize methodologies that will avoid or minimize impacts of works to both environment and man-made structures. • Hold regular toolbox talks to educate or remind workers with all mitigation measures in the SSEMP, and health and safety procedures to improve safety. • Compensate owners of properties or structures damaged due to execution of works. • Compensate individuals injured due to execution of works. • Implement compensatory or offset measures per EMP for residual impacts that remain significant after implementing mitigation measures. • Ensure compliance with labor laws, rules and regulations. • Ensure that all workers including sub-contractors are fully aware of requirements on environmental, health and safety. • Ensure that all workers (including those of subcontractors', if any) are paid and treated according to the local labor legislations. • Provide worker camps and work sites with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities following international good practices as reflected in internationally recognized standards such as IFC/EBRD Guidance Note on Workers' accommodation: processes and standards". • Conduct environmental monitoring, including vibration monitoring, as required by the EMP. • Act promptly on complaints and grievances concerning the construction activities in accordance with the project's GRM. • Implement corrective actions as required by PMU or PIU or their representatives from PMCSC. • Notify the PMU, PIU or PMCSC immediately if any incident occurs whether on or off the work sites which results in any serious or fatal injury to any person whether directly concerned with the work site or a third party. Such notification may initially be verbal and shall be followed by a written full investigation report within 24 hours of the accident. • Inform PMCSC one month before the target completion of construction, including rehabilitation and restoration of disturbed areas, such that PMCSC can plan for its preparation of the post-construction environmental audit report prior to demobilization. • Implement post-construction rehabilitation and restoration works prior to demobilization. • Submit monthly progress reports on SSEMP implementation to PIU.

ADB = Asian Development Bank, EMP = environmental management plan, IEE = initial environmental examination, PMCSC = project management and construction supervision consultant, NOC = no objection certificate, PIU = project implementation unit, PMU = project management unit, SPS = Safeguards Policy Statement.

F. Capacity Development

98. To ensure full compliance with the ADB SPS, it is essential to build and continuously strengthen the capacity of RID, PMU, PIUs, project consultants, and contractors on environmental safeguards. Capacity building should cover the following key topics, among others:

- (i) understanding ADB SPS principles and requirements;
- (ii) integration of environmental safeguards into project planning and implementation;
- (iii) preparation and updating of IEE and EMP;
- (iv) monitoring and reporting procedures;
- (v) pollution prevention and control technologies;
- (vi) occupational and community health and safety
- (vii) management of physical cultural resources
- (viii) grievance redress mechanisms;
- (ix) meaningful stakeholder consultation and information disclosure; and
- (x) specialized environmental safeguard topics as may be identified during the project implementation

99. As project implementation progresses, capacity building will be treated as a continuous process, adapting to evolving project needs, regulatory changes, and lessons learned from ongoing activities. Regular training, workshops, and on-the-job mentoring will help ensure that all parties remain up to date and capable of meeting both ADB and national environmental safeguard requirements.

100. The PMCSC Environment Specialists (international and national) will be responsible for training the PMU, PIUs and contractors on safeguards. The PMCSC will be required to submit a capacity building action plan to PMU as part of their work program.

G. Indicative Costs

101. Indicative costs and sources of funds required for meeting ADB SPS requirements are in the following table.

Table 13: Indicative Costs of Activities and Sources of Funds

	Item	Source of Funds
1.	Permits and clearances (example: excavation, shifting of utilities, right of way, etc.)	RID
2.	Grievance redressal mechanism	RID
3.	Logistical and administrative support for RID, PMU and PIUs safeguards teams	Government counterpart
4.	Soil and sediment quality study (sampling and analysis) during project implementation	PMCSC (provisional sum as (i) the exact sampling locations, quantities, and parameters to be tested will be determined during project implementation; and (ii) to not affect the bidding price)
5.	Stakeholders engagement and information disclosure	PMCSC (USD10,000/year)
6.	Capacity building on safeguards	PMCSC (USD10,000/year)
7.	Management of asbestos-containing materials including the removal, transport, and disposal (for structures that will be demolished per Resettlement Framework and Resettlement Plan)	Demolition contractor(s)

	Item	Source of Funds
8.	Logistical and administrative support for PMCSC safeguards staff	PMCSC (ensure cost estimates will consider such as but not limited to regular trips to project sites, high volumes of reports, and translation of reports to local language)
9.	All construction-related permits and clearances	Contractor (to be included in the bid document as part of execution of works)
10.	Baseline (pre-works) conditions surveys as part of preparation of the contractor's site-specific environmental management plan (example: photo or video documentation, instrumental monitoring of environmental parameters, habitats of value, valued trees and vegetation, fauna species, structural and technical condition survey of properties that will be potentially affected by vibration and construction works, etc.)	Contractor (to be included in the bid document as part of execution of works)
11.	Tree-plantation as offset measures (EMP recommendation as part of environmental enhancement and biodiversity conservation)	Contractor (to be included in the bid document as provisional sum)
12.	Environment, health, and safety measures during construction per EMP requirements	Contractor (to be included in the bid document as BOQ)
13.	Sediment and dredged materials management, including temporary and permanent disposal sites	Contractor (to be included in the bid document as BOQ)
14.	Vibration monitoring during construction	Contractor (to be included in the bid document as part of execution of works)
15.	Damages to structures, properties, public facilities, and others due to execution of works	Contractor (to be included in the bid document as part of execution of works)
16.	Accidents, injuries, and others to workers and communities related to works	Contractor
17.	Corrective actions due to non-compliances to the EMP and permits/clearances	Contractor
18.	Post-construction clean-up, rehabilitation, and restoration	Contractor (to be included in the bid document as part of execution of works)
19.	Environmental monitoring during construction and post-construction including instrumental measurements of environmental parameters	PMCSC (provisional sum as (i) the exact sampling locations, quantities, and parameters to be tested will be determined during project implementation; and (ii) to not affect the bidding price)
20.	Logistical and administrative support for PMCSC safeguards staff	PMCSC (ensure cost estimates will consider such as but not limited to daily trips to project sites and high volumes of reports. If possible, have one vehicle for use by the environment staff and safety staff)

102. The IEE and EDDR provide the detailed information for consideration of the costs for mitigation measures and monitoring requirements. Any additional costs to meet ADB SPS requirements during project implementation will be reviewed and agreed upon by PMU and ADB.

103. For the updating of IEE for succeeding tranches, the following activities will be conducted: (i) site visit to assess environmental conditions and potential impacts of the project; (ii) liaising with the national or local government agencies to obtain any environmental/social data that might be available readily (e.g. population figures, land use, delineation of sensitive sites, etc.); (iii)

consultation with the local community to inform them about the project and identify their views and concerns; (iv) assessment of impacts and development of mitigation; and (v) desk study and report preparation.

104. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the respective PIUs (i.e. RID Regional Offices). All monitoring during the operation and maintenance phase will be conducted by and costs borne by these PIUs.

VII. MONITORING AND REPORTING

105. PMU, with support from PIUs and PMCSC, will monitor the safeguards compliance and progress of EMP implementation in the different project jurisdictions. The PMU and PIUs will undertake site inspections and document review to verify compliance and progress toward the final outcome of the project. The contractors will conduct day to day implementation of their respective SSEMPs.

106. Each contractor will submit monthly reports to PIU. The monthly reports will include compilation of copies of monitoring sheets accomplished and duly signed by the contractor's EHS supervisor (or equivalent) on a daily basis. A sample daily monitoring sheet which can be used by the contractors is in Appendix 10. This monitoring sheet is indicative which can be further enhanced depending on the actual situations at project construction sites.

107. The PIUs will submit quarterly environmental monitoring reports to PMU, which will include summary of daily monitoring activities of contractor and results of any independent monitoring or inspection activities of the PIU. In the conduct of these independent inspection activities, PIU will be supported by PMCSC in this regard. A sample inspection checklist is in Appendix 11 **Error! Reference source not found.** This checklist is indicative which can be further enhanced depending on the actual situations at project construction sites.

108. PMU shall consolidated quarterly reports from the PIUs and results of its independent monitoring or inspection activities. PMU shall accomplish semi-annual environmental monitoring report (SEMRs), which shall be submitted to ADB for review and disclosure on ADB website. Submission of monitoring report will continue until ADB issues a Project Completion Report. The template for the monitoring report is attached as Appendix 12.

109. ADB will carry out the following monitoring actions to supervise the project implementation:

- (i) On a need basis, conduct site visits to any project component with potential adverse environmental or social impact;
- (ii) Conduct supervision missions with detailed review by ADB's environment and social safeguard specialists and/or officers and/or consultants for project components with adverse environmental and social impacts;
- (iii) Review the monitoring reports submitted by PMU to ensure that adverse impacts and risks are mitigated as planned in the EMPs;
- (i) Work with RID management and its PMU to rectify to the extent possible any failures to comply with its environmental safeguard commitments, as covenanted in the loan agreement and elaborated in all environmental safeguard documents; and formulate and implement a corrective action plan to re-establish compliance as appropriate; and
- (ii) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account

the baseline conditions and the results of monitoring.

110. ADB's monitoring and supervision activities are carried out on an on-going basis until a project completion report is issued. ADB normally issues a project completion report within 1-2 years after the project is physically completed and in operation.

Appendix 1: List of Civil Works, Goods, and Nonconsulting Services Packages in the Procurement Plan

Package Number	General Description
CW01	Precast concrete retaining wall construction and dredging of Khlong Phra-Ong Chaianuchit (850m Pilot section)
CW02	Precast concrete retaining wall construction, and dredging of Khlong 13
	<i>Lot 1 Khlong 13 (Part 1)</i>
	<i>Lot 2 Khlong 13 (Part 2)</i>
CW03	Precast concrete retaining wall, regulator construction, and dredging of Khlong Raphiphat Yaek Tai
	<i>Lot 1 Khlong Raphiphat Yaek Tai [Contract 1]</i>
	<i>Lot 2 Khlong Raphiphat Yaek Tai [Contract 2]</i>
	<i>Lot 3 Khlong Raphiphat Yaek Tai [Contract 3]</i>
	<i>Lot 4 Khlong Raphiphat Yaek Tai [Contract 4]</i>
CW04	Precast concrete retaining wall, regulator construction, and dredging of Khlong 33 and Khlong 14
	<i>Lot 1 Khlong 33 - Khlong Lat Phak Khwang + head pipe + bridge</i>
	<i>Lot 2 Khlong 14 (Part 1) + Beung Pla Ra dn pipe regs + Lat Phak Khwang reg</i>
	<i>Lot 3 Khlong 14 (Part 2) + regulators</i>
	<i>Lot 4 Khlong 14 (Part 3) [Contract 1]</i>
	<i>Lot 4 Khlong 14 (Part 3) [Contract 2]</i>
CW05	Precast concrete retaining wall, regulator construction, and dredging of Khlong Hok Wai Lang and Khlong 15 (Part 1)
	<i>Lot 1 Khlong 15 (Part 1) + check regulator</i>
	<i>Lot 2 Khlong Hok Wa Sai Lang + regulator</i>
CW06	Precast concrete retaining wall construction, and dredging of Khlong Phra-Ong Chaianuchit
	<i>Lot 1 Khlong Phra-Ong Chaianuchit (Part 1)</i>
	<i>Lot 2 Khlong Phra-Ong Chaianuchit (Part 2a)</i>
	<i>Lot 3 Khlong Phra-Ong Chaianuchit (Part 2b)</i>
	<i>Lot 4 Khlong Phra-Ong Chaianuchit (Part 3)</i>
CW07	Precast concrete retaining wall, regulator construction, and dredging of Khlongs Udom Cholaom, Prawet Buri Rom, Chuat Phrao - Lao Moo - Bang Phli Noi, Khlong Samrong + check regulator
	<i>Lot 1 Khlong Udom Cholaom</i>
	<i>Lot 2 Khlong Prawet Buri Rom</i>
	<i>Lot 3 Khlong Chuat Phrao - Lao Moo - Bang Phli Noi (Contract 1)</i>
	<i>Lot 4 Khlong Chuat Phrao - Lao Moo - Bang Phli Noi (Contract 2)</i>
	<i>Lot 5 Khlong Samrong (Part1)</i>
CW08	Precast concrete retaining wall, regulator construction, and dredging of Khlong 15
	<i>Lot 1 Khlong 15 (Part 2) [Contract 1]</i>
	<i>Lot 2 Khlong 15 (Part 2) [Contract 2] and tail regulator</i>
CW09	Precast concrete retaining wall construction, and dredging of Khlongs 16
	<i>Lot 1 Khlong 16 (Part 1)</i>
	<i>Lot 2 Khlong 16 (Part 2) [Contract 1]</i>
	<i>Lot 3 Khlong 16 (Part 2) [Contract 2]</i>
CW10	Precast concrete retaining wall, regulator construction, and dredging of Khlong 17
	<i>Lot 1 Khlong 17 [Contract 1] + Khlong 17 head reg (Lower zone)</i>
	<i>Lot 2 Khlong 17 [Contract 2]</i>
CW11	Precast concrete retaining wall construction, and dredging of Khlong Nakhon

	<i>Neuang Khet</i>
	<i>Lot 1 Khlong Nakhon Neuang Khet (Part 1)</i>
	<i>Lot 2 Khlong Nakhon Neuang Khet Part 2 contract 1a</i>
	<i>Lot 3 Khlong Nakhon Neuang Khet Part 2 contract 1b</i>
	<i>Lot 4 Khlong Nakhon Neuang Khet (Part 2) [Contract 2]</i>
CW12	<i>Precast concrete retaining wall construction, and dredging of Khlong Luang Phaeng</i>
G01	<i>Hydromet network modernisation, 100 stations</i>
NCS01	<i>Surveys of rivers and irrigation canals</i>
	<i>Lot 1 rivers and canal cross sections, 8,000km, and water gate surveys</i>
	<i>Lot 2 Lidar surveys for terrain and cover, 8,000km²</i>
NCS02	<i>Discharge measurements at key stations (updating rating curves) 24 times per year (planned for 2 times)</i>
G02	<i>Acoustic Doppler Current Profilers (ADCP) and boats</i>
	<i>Lot 1 Supply of 4 No. ADCP</i>
	<i>Lot 2 Supply of 4 No. radio controlled boats</i>

[illegible]

No.	Code	Sub-Projects	Canal/Structure	Improvement Detail	Length of Improvement (km)	Existing Flow Capacity (m3/s)	Proposed Flow Capacity (m3/s)	Excavated material (m3)	Compaction soil using excavated material (m3)	Depth (m)	Top width (m)	Bottom width (m)
		Regulator										
13	S2.5	Bueng Pla Ra Pipe Regulator	Structure									
14	S2.6	Canal 14 Check Regulator	Structure					16,112	2,285			
		TRANCHE 2						6,351,710	410,199			
15	C2.6	Phra Ong Chaianuchit Canal (Part1)	Canal	Wall on Both Sides with Dredging	4.547	71	125	3,305,983	58,838	3.9-4.6	50-52	35.5-37
16	C1.5	Phra Ong Chaianuchit Canal (Part 2)	Canal	Wall on Both Sides with Dredging	15.3	30	120			3.9-4.6	50-52	35.5-37
17	C1.6	Phra Ong Chaianuchit Canal (Part 3)	Canal	Wall on Both Sides with Dredging	14.1	28	55			3.9-4.6	50-52	35.5-37
18	C3.1	Canal 15 (Part1)	Canal	Wall on Both Sides with Dredging	14.2	28	55	430,045	61,435	4.5-5	21-23	10-12
19	C2.5	Hok Wa Sai Lang Canal	Canal	Wall on Both Sides with Dredging	9.707	20-28	60-95	234,436	25,267	4-6	29-38	7.5-14
20	C2.8	Chuat Phrao - Lao Moo - Bang Phli Noi Canal	Canal	Wall on Both Sides with Dredging	16.580	6-9	30-36	982,489	79,820	4	25-28	14-17
21	C3.7	Udom Cholaorn Canal	Canal	Wall on Both Sides with Dredging	14.982	13	30	461,385	58,838	4.5-4.8	17-23	5
22	C3.8	Prawet Buri Rom Canal	Canal	Wall on Both Sides with Dredging	23.320	7-27	30-60	899,701	120,707	3.2-5.5	30-40	6-21
23	S3.1	Canal 15	Structure					30,613	4,342			

No.	Code	Sub-Projects	Canal/ Structure	Improvement Detail	Length of Improvement (km)	Existing Flow Capacity (m3/s)	Proposed Flow Capacity (m3/s)	Excavated material (m3)	Compaction soil using excavated material (m3)	Depth (m)	Top width (m)	Bottom width (m)
34	S3.2	Canal 15 Tail Regulator	Structure					29,002	4,114			

Source: TRTA Consultant

Appendix 2: Suggested Outline of Initial Environmental Examination Report

1. An initial environmental examination (IEE) report is required for all environment B projects. Its level of detail and comprehensiveness is commensurate with the significance of potential environmental impacts and risks. An IEE report will follow the outline below. The substantive aspects of this outline will guide the preparation of environmental impact assessment reports, although not necessarily in the order shown. Sample IEEs have been prepared during loan processing, which will serve as actual reference for the preparation of IEE reports of future subprojects.
2. **Executive Summary.** Describe concisely the critical facts, significant findings, and recommended actions.
3. **Policy, Legal, and Administrative Framework.** Discuss the national and local legal and institutional framework within which the environmental assessment is carried out. Identify project-relevant international environmental agreements to which the Government of Republic of Türkiye is a party.
4. **Description of the Project.** Describe the project, its major components, and its geographic, ecological, social, and temporal context, including any associated facility required by and for the subproject/package (for example, access roads, power plants, water supply, quarries and borrow pits, and spoil disposal). Include drawings and maps showing the project's layout and components, the subproject site, and the subproject's area of influence.
5. **Description of the Environment (Baseline Data).** Describe relevant physical, biological, and socioeconomic conditions within the subproject area. Include any known current and proposed development activities within the subproject's area of influence, including those not directly connected to the subproject. Indicate the accuracy, reliability, and sources of the data.
6. **Anticipated Environmental Impacts and Mitigation Measures.** Predict and assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic (including occupational health and safety, community health and safety, vulnerable groups and gender issues, and impacts on livelihoods through environmental media and physical cultural resources in the subproject's area of influence, in quantitative terms to the extent possible; identify mitigation measures and any residual negative impacts that cannot be mitigated; explore opportunities for enhancement; identify and estimate the extent and quality of available data, key data gaps, and uncertainties associated with predictions and specify topics that do not require further attention; and examine global, transboundary, and cumulative impacts as appropriate.
7. **Analysis of Alternatives.** Examine alternatives to subproject or subproject component site, technology, design, and operation—including the no project alternative—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. State the basis for selecting the particular subproject design proposed and, justify recommended emission levels and approaches to pollution prevention and abatement.
8. **Information Disclosure, Consultation, and Participation.** (i) Describe the process undertaken during subproject design and preparation for engaging stakeholders, including

information disclosure and consultation with affected people and other stakeholders; (ii) Summarize comments and concerns received from affected people and other stakeholders and how these comments have been addressed in subproject design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples; and (iii) Describe the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during subproject implementation.

9. **Grievance Redress Mechanism.** Describe the grievance redress framework (both informal and formal channels), setting out the time frame and mechanisms for resolving complaints about environmental performance.

10. **Environmental Management Plan.** Describe and discuss the set of mitigation and management measures to be taken during subproject implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority). Include multiple management plans and actions, if necessary. Include the following key components (with the level of detail commensurate with the subproject's impacts and risks):

(i) **Mitigation.** Identify and summarize anticipated significant adverse environmental impacts and risks; describe each mitigation measure with technical details, including the type of impact to which it relates and the conditions under which it is required (for instance, continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate; and provide links to any other mitigation plans (for example, for involuntary resettlement, Indigenous Peoples, or emergency response) required for the subproject.

(ii) **Monitoring.** Describe the monitoring measures with technical details, including parameters to be measured, methods to be used, sampling locations frequency of measurements, detection limits and definition of thresholds that will signal the need for corrective actions; and describe monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures and document the progress and results of mitigation.

(iii) **Implementation arrangements.** Specify the implementation schedule showing phasing and coordination with overall project implementation; describe institutional or organizational arrangements, namely, who is responsible for carrying out the mitigation and monitoring measures, which may include one or more of the following additional topics to strengthen environmental management capability: technical assistance programs, training programs, procurement of equipment and supplies related to environmental management and monitoring, and organizational changes; and estimate capital and recurrent costs and describe sources of funds for implementing the environmental management plan.

(iv) **Performance indicators.** Describe the desired outcomes as measurable events to the extent possible, such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods.

11. **Conclusion and Recommendation.** Provide the conclusions drawn from the assessment and provide recommendations.

Appendix 3: Basic Outline of an Environmental Due Diligence Report

A. Introduction

This chapter or section provides a brief background of the project for which the environmental due diligence activity is required. This is also the part of the report where the objective and rationale of the due diligence activity is discussed. Other discussions include the project scope, components and locations. Focus on the component subject to due diligence is emphasized.

B. Related Legal Provisions

This chapter or section discusses the relevant national and local legal and institutional framework within which the environmental assessment or due diligence is carried out. If relevant to the project or component being evaluated, this chapter or section also identifies relevant international environmental agreements to which the country is a party.

C. Institutional Arrangement

This chapter or section summarizes the institutional arrangement, and setup and responsibilities of players under the project for which the due diligence is undertaken.

D. Methodology of Due Diligence

This chapter or section discusses the methodology or methodologies used to fulfill the due diligence, including the means of gathering information, validation of information, assessment methods, and bases on arriving at final outcomes or findings.

E. Findings of the Due Diligence

This chapter or section discusses in detail the findings of the due diligence.

F. Stakeholder Consultation

This chapter or section discusses any stakeholder consultations conducted in relation to the due diligence activities undertaken, including summarization of discussions and commitments made during the consultations. Minutes and other supporting documents are attached to the report.

G. Key Impacts Predicted and Mitigation Measures

This chapter or section is linked to the findings of the due diligence, which provides a summary of the potential impacts, if any, of the activities of the project or components, as well as the mitigation measures needed to avoid or mitigate these impacts.

H. Environment Management Cost

This chapter or section provides the costing of any mitigation measures or actions needed to be implemented to address the potential impacts identified, including monitoring the implementation of these mitigation measures based on the institutional arrangements discussed in Chapter C.

I. Conclusion

This chapter or section provides that conclusion of the due diligence, which may include the necessary recommendations to ensure that the implementation of any project component subject to the due diligence complies with both the ADB Safeguard Policy Statement and national environmental requirements.

Appendix 4: Sample Environmental Code of Conduct

Note: These are important components of an Environmental Code of Construction Practice (ECOCP) for small works on water bodies (e.g. Hydromet Modernization Works)

An ECOCP for activities in or on water bodies will aim to mitigate a range of potential impacts. Table below summarizes the aspects and impact areas, and general mitigation measures that need to be observed. Depending on site situation, environmental features and landscape in the area of physical works, these impact areas and mitigation measures may be amended or modified to suit the site-specific needs.

Aspects and Impact Areas	General Mitigation Measures
Water Quality Protection	• Ensure construction materials are handled and treated to prevent leaching of harmful substances. • Dispose of waste materials on land in designated areas, away from the water bodies.
Sediment and Erosion Control	• If heavy scouring is expected, install turbidity curtains (or any practicable or indigenous method) to contain suspended sediment. • Implement and maintain an erosion and sediment control plan. • Regularly inspect and repair sediment controls. • Operate machineries and equipment on stable land areas.
Spill Prevention and Response	• Develop and implement a spill response plan for deleterious substances, such as fuel, oil, grease, including sediments. • Have emergency spill kits available at the work sites at all times.
Habitat and Wildlife Protection	• Protect fish and their habitats from sediments and other disturbances. • Avoid construction activities during restricted periods when sensitive aquatic species are most vulnerable, such as during breeding or spawning season.
Air Pollution	• Cover all materials that are potential source of dust with suitable materials, whether stocked on site or in transit to/from the site. • Require speed limits to all kinds of vehicles (service or construction equipment) to control exhaust and road dust emissions. • Ensure all vehicles (service and construction equipment) are duly registered and comply with the vehicle emission standards.
Noise and Vibration Control	• When using pile driving, prefer vibratory methods or drilling over impact hammers. • Establish exclusion zones and use trained observers to monitor for large marine mammals (e.g. dolphins) during noisy underwater activities especially near the coastal areas.
Occupational Health and Safety	• Require the contractor to implement a construction health and safety plan following the World Bank EHS Guidelines as a minimum standard. • The contractor will appoint an environment, health, and safety officer (or equivalent) to implement the plan. The plan will, at a minimum, include the following:

	▪ Provision of first-aid facilities readily accessible by workers; ▪ Provision of Personal Protective Equipment (PPE) such as hard hats, gloves, rubber boots, etc.; ▪ Wearing PPE while working on-site will be a mandatory requirement for workers; ▪ Posting of safety signs/reminders in strategic areas within the construction area; ▪ Installation of sufficient lighting at night, ensure that vehicle and equipment operators are properly licensed and trained; ▪ Provide staff with infectious disease and HIV-related awareness training. • The contractor will be required to provide priority hiring of qualified construction workers from the villages and to consult with the local authorities to avoid conflict if migrant workers are brought to the site.
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Appendix 5: Suggested Outline of Site-Specific Environmental Management Plans/ Site-Specific Health and Safety Management Plans

Note: This outline has been adopted from other ongoing projects in ADB. This can be modified based on the nature of works, locations, and needs of contractors or of the project to effectively and efficiently implement the EMP at work sites.

Site-Specific Environmental Management Plans (SSEMPs) and Site-Specific Health and Safety Management Plan (SSHSMP) shall be prepared by each contractor and reviewed by and approved by the Project Management Unit (PMU) with the support of the Project Management and Construction Supervision Consultant (PMCSC) before the construction works are allowed to start. This requirement will be included in the construction contracts. The SSEMP/SSHSMP shall be prepared in full alignment with the IEE and EMP, which will be amended from time to time during the MFF implementation. Therefore, the SSEMP/SSHSMP shall also be updated consistent with any updated version of the IEE and EMP.

The SSEMP/SSHSMP details the implementation of measures in accordance with the environmental requirements stipulated in the (i) construction contracts, (ii) ADB SPS through the IEE and EMP, and (iii) applicable national environmental laws, rules, and regulations.

The purposes of the SSEMP/SSHSMP are to:

- (i) Ensure that the Contractor implements appropriate and sufficient site-specific environmental, and health and safety mitigation and monitoring measures as required to adequately protect the environment and human health from risks and impacts associated with the project.
- (ii) Ensure that the Contractor fully complies with all applicable environmental and health and safety requirements of the relevant laws, rules and regulation of Thailand and relevant requirements per ADB SPS.
- (iii) Ensure that the Contractor's management and site organization include personnel with the required competence and authority to effectively implement the SSEMP/SSHSMP.
- (iv) Provide site-specific and practical environmental and health and safety control and mitigation measures, and related construction method statements designed to prevent or minimize environmental and health and safety impacts.

It is recommended that the SSEMP and SSHSMP are combined in one document. This will help to avoid unnecessary repetitions, help to prevent inconsistencies and in general make the document much easier to use.

The recommended structure of the SSEMP/SSHSMP is summarized below:

Part 1: General Matters

- (i) Introduction, presentation of the Contractor, objectives of the SSEMP/SSHSMP.
- (ii) Overview of the construction works, workforce, construction equipment and time schedule with milestones.
- (iii) Applicable environmental legislation and planning conditions.
- (iv) Contractor's organization, roles and responsibilities.
- (v) Consents, commitments, and permissions.

- (vi) Environmental, health and safety compliance assurance procedures and programs (construction supervision, reporting and documentation, corrective actions).
- (vii) Overview of environmental quality monitoring and reporting procedures and programs.
- (viii) Environmental, Social and Health and Safety training and awareness including training plans with topics and training content, trainees, trainers, frequency, duration, and training methods, and emergency drills.

Part 2: EMP Subplans

Subplan 1: Erosion and sediment control measures.

- (i) Description of potential areas prone to erosion, mitigating measures.
- (ii) Site drainage maps (to be updated as the work progresses).
- (iii) Maps and drawings of temporary drainage structures and sediment retention facilities together with engineering calculations of hydraulic and sediment loads.
- (iv) Inspection and maintenance procedures and plans.

Subplan 2: Borrow Pit and Spoil management

- (i) Documentation of approval from the relevant authorities and agreement with landowners for the proposed borrow pits and spoil disposal sites.
- (ii) Maps, layout drawings and cross sections (before and after use) with brief description of the sites and their surroundings.
- (iii) Estimated amounts (to be excavated or disposed) and type of materials.
- (iv) Documentation of testing for contamination before backfilling.
- (v) Documenting application of the borrow pit and spoil disposal site selection criteria listed in tabulation below.
- (vi) Method statement for extraction, transport and backfilling. Description of measures to mitigate associated impacts (noise, dust, loss of habitats, erosion, sedimentation).
- (vii) Inspection, maintenance and rehabilitation plans.

Table 1: Borrow Pit and Spoil Disposal Site Selection Criteria

Site Selection Criteria	Proposed Site Conditions
Preferably on degraded or lower value land such as grasslands, land devoid of forest or with highly degraded forest cover, or land with poor soil quality	
Not in ecological sensitive area (e.g. Protected Area or Key Biodiversity Area or on land that hosts Threatened (IUCN Red List) plant or animal species	
Not in wetlands, waterways or in riparian zones	
To the extent practicable, not in agricultural productive land	
Not in land with spiritual, cultural, historical or archaeological value	

On lower slope land, so that stable landforms can be created. If possible, land with a slope more than 10% shall generally not be used for spoil disposal, where possible	
Not on unstable slopes, where the added weight could trigger mass movement	
Not where groundwater emerges, or a thick organic layer is present	
Where there is existing adequate access for heavy equipment	
Distance from sensitive receptors should comply with any local regulations and such distance should be sufficient to avoid or minimize to acceptable level any impact or nuisance.	
Above the 0.05 (5%) Annual Exceedance Probability flood line	

Subplan 3: Solid and Liquid Waste management

- (i) Description of solid and liquid waste generation, expected amounts, composition and sources.
- (ii) Collection, segregation, temporary storage, treatment and disposal (incl. recipients of effluents) measures and control systems and devices.
- (iii) Maps and drawings of waste and wastewater management facilities.
- (iv) Housekeeping, inspection and maintenance.

Subplan 4: Hazardous materials and hazardous waste management

- (i) Description of solid and liquid hazardous materials and waste use/generation, expected amounts, composition and sources.
- (ii) Description of hazards and risks for each material/waste.
- (iii) Description of collection, segregation, temporary storage and labelling of hazardous waste.
- (iv) Maps and drawings of waste management facilities.
- (v) Documentation of the use of a duly licensed hazardous waste management enterprise for collection, recycling/treatment and/or destruction/disposal of the hazardous waste.
- (vi) Description of hazardous materials, their use, amounts, temporary storage facilities and procedures ensuring adherence to the relevant Material Safety Data Sheets (to be attached in an appendix).
- (vii) Housekeeping, inspection and maintenance.
- (viii) Emergency response and clean-up procedures.

Subplan 5: Air emissions and dust control and monitoring

- (i) Air emissions and dust generation sources, locations and mitigation plans.

- (ii) Ambient air quality monitoring (include sampling point description/ coordinates, maps, parameters to analyze, methods, frequency, standards).

Subplan 6: Noise and Vibration control and monitoring

- (i) Noise and vibration emission sources, locations and mitigation plans.
- (ii) Noise and vibration monitoring (include sampling point description/ coordinates, maps, parameters to analyze, methods, frequency, standards).

Subplan 7: Water quality monitoring program

- (i) Method statement for construction of groundwater monitoring wells.
- (ii) Environmental quality monitoring programs for surface water and groundwater (including sampling point description/ coordinates, maps, parameters to measure/analyze, methods, frequency, standards).
- (iii) Groundwater table measurement program (well location map, method, frequency).

Subplan 8: Chance Find Procedures

- (i) Confirm the chance find procedure to be adopted. The chance find procedure in the EMP can be adopted as it is.

Part 3. Health and Safety Management Subplans:

Subplan 10: Road traffic and access management

- (i) Construction sites access control measures.
- (ii) Description of the road construction plan/ scheme and identify timing and road sections to be partly closed.
- (iii) Community coordination and information measures regarding construction activities.
- (iv) Installation of traffic signs, barriers, posting of traffic (flag) persons, and re-routing plans.

Subplan 11: Occupational health and safety.

- (i) Occupational health and safety hazards and risks assessment.
- (ii) Measures to address the risks which document the proper application of the hierarchy of controls.
- (iii) Plans and procedures for regular follow-up hazard identification and risks assessments including the use of site and work specific check lists.
- (iv) Compliance assurance through inspection, reporting and corrective actions.

Subplan 12: Construction work camp management

- (i) Location map and a site layout drawing.

- (ii) Description and drawings of the labor sanitation and welfare facilities documenting compliance with both the IFC Guidelines on Workers Accommodation and ILO labor housing standards.
- (iii) Expected number of workers to stay at the camp, gender segregated and room allocations.
- (iv) Security, housekeeping, cleaning and maintenance.

Subplan 13: Recruitment and labor management

- (i) Labor data, expected number of workers (male and female) over the course of the construction period, segregated by type of work.
- (ii) Procedures and plans that document implementation of the core labor standards.

Subplan 14. Community health and safety

- (i) Community health and safety concerns (including identification of the directly affected community, community consultations, and mitigation measures that will influence community health and safety) will be identified and incorporated into relevant subplans.

Subplan 15: Emergency Preparedness and Response

- (i) Emergency preparedness and response responsibilities.
- (ii) Identification of hazards that may lead to an emergency situation.
- (iii) Identification of people at risk.
- (iv) Detection, evaluation and emergency level determination.
- (v) Notification and communication.
- (vi) Emergency actions.
- (vii) Termination and follow-up.
- (viii) Prevention and preparedness.
- (ix) Training and exercises.
- (x) Emergency contacts.

Appendix 6: ONEP Letter to RID



ที่ ทส ๑๐๐๗.๒/ ๒ ๐ ๙ ๑ ๑

สำนักงานนโยบายและแผน
ทรัพยากรธรรมชาติและสิ่งแวดล้อม
๑๑๘/๑ อาคารหิปปี้ ๒ ถนนพระรามที่ ๖
แขวงพญาไท เขตพญาไท กรุงเทพฯ ๑๐๔๐๐

๑ ๖ ตุลาคม ๒๕๖๗

เรื่อง ตอบข้อหารือกรณีโครงการปรับปรุงระบบชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง

เรียน อธิบดีกรมชลประทาน

อ้างถึง หนังสือกรมชลประทาน ที่ กษ ๐๓๒๗/๑๑๕๖๒ ลงวันที่ ๓๐ กันยายน ๒๕๖๗

ตามหนังสือที่อ้างถึง กรมชลประทาน แจ้งกรณีการประชุมคณะกรรมการทรัพยากรน้ำแห่งชาติ (กนช.) มีมติเห็นชอบโครงการปรับปรุงระบบชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง ซึ่งเป็นโครงการภายใต้ แผนหลักการบริหารจัดการน้ำในลุ่มน้ำเจ้าพระยาตอนล่าง ๙ แผนงาน ต่อมากรมชลประทานมีแผนการพัฒนา โครงการปรับปรุงชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง เพื่อก่อสร้างได้ทันในปีงบประมาณ พ.ศ. ๒๕๖๙ – ๒๕๗๔ มีวัตถุประสงค์เพื่อเพิ่มประสิทธิภาพการระบายน้ำของระบบส่งน้ำชลประทานเดิมที่มีอยู่ ตั้งแต่ปากคลอง ระพีพัฒน์ จังหวัดพระนครศรีอยุธยา ผ่านระบบโครงข่ายระบบคลองแนวเหนือ - ใต้ จนถึงชายทะเลอ่าวไทย ที่คลองด่าน จังหวัดสมุทรปราการ และระบายน้ำบางส่วนไปยังแม่น้ำเจ้าพระยาและแม่น้ำบางปะกง โดยที่ประชุมคณะอนุกรรมการขับเคลื่อนโครงการพัฒนาทรัพยากรน้ำ ครั้งที่ ๒/๒๕๖๗ มีมติให้กรมชลประทาน หาหรือร่วมกับหน่วยงานที่เกี่ยวข้อง โดยคำนึงถึงระเบียบ หลักเกณฑ์ และกฎหมายอย่างเคร่งครัด รวมทั้งพิจารณา ว่าโครงการนี้ต้องมีการจัดการประเมินผลกระทบสิ่งแวดล้อม (EIA) ด้วยหรือไม่ โดยโครงการปรับปรุงระบบ ชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง มีลักษณะเป็นการปรับปรุงโครงข่ายระบบชลประทานเดิม โดยขุดลอกและ/หรือปรับปรุงทรงคลองเพื่อเพิ่มพื้นที่หน้าตัดการไหล เช่น ปรับรูปทางจากสี่เหลี่ยมคางหมู เป็นรูปตัวยู โดยไม่มีการขยายความกว้างคลองเดิมเพื่อเพิ่มศักยภาพการระบายน้ำลดภัยพิบัติด้านอุทกภัย ที่มีแนวโน้มจะรุนแรงขึ้น ตามหลักด้านวิศวกรรมและสอดคล้องตามสภาพทางธรณีวิทยา ซึ่งพื้นที่ ดำเนินการอยู่ในเขตคลองที่กรมชลประทานได้จัดซื้อไว้แล้ว ครอบคลุมเขตพื้นที่โครงการส่งน้ำและ บำรุงรักษา จำนวน ๘ โครงการ และแบ่งกิจกรรมงานหลักเป็น ๘ กลุ่มงาน กรมชลประทานจึงขอทราบว่ การดำเนินการก่อสร้างโครงการดังกล่าว จะต้องดำเนินการจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม หรือดำเนินการอื่นใดในประเด็นที่เกี่ยวข้องกับกฎหมายหรือระเบียบต่างๆ หรือไม่ ความละเอียดแจ้งแล้ว นั้น

สำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม พิจารณาข้อมูลของ กรมชลประทานที่เสนอมาแล้ว ขอเรียนว่า

๑. ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม เรื่อง กำหนดโครงการ กิจการ หรือ การดำเนินการ ซึ่งต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม และหลักเกณฑ์ วิธีการ และเงื่อนไข ในการจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม พ.ศ. ๒๕๖๖ ลงวันที่ ๒๐ ธันวาคม ๒๕๖๖ เอกสารท้าย

ประกาศ ๔...

- ๒ -

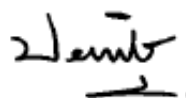
ประกาศ ๔ ลำดับที่ ๓๒ การชลประทาน ที่มีพื้นที่การชลประทานตั้งแต่ ๘๐,๐๐๐ ไร่ขึ้นไป ต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อมเสนอในชั้นขออนุมัติ หรือในชั้นขออนุญาตโครงการ แล้วแต่กรณี และลำดับที่ ๓๕ ประดูระบายน้ำในแม่น้ำสายหลัก ทุกขนาด ต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อมเสนอในชั้นขออนุมัติ หรือในชั้นขออนุญาตโครงการ แล้วแต่กรณี และข้อ ๔ โครงการ กิจการ หรือการดำเนินการใดของรัฐหรือที่รัฐจะอนุญาต แต่มีขนาดไม่ถึงตามที่กำหนดไว้ในข้อ ๓ หากมีการขยายขนาดของโครงการ กิจการ หรือการดำเนินการดังกล่าวในภายหลังจนถึงเกณฑ์ที่กำหนดไว้ หรือกรณีโครงการ กิจการ หรือการดำเนินการใด ที่เป็นการดำเนินการมาก่อนมีการประกาศกำหนดประเภทและขนาดให้ต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม หากมีการขยายขนาดของโครงการ กิจการ หรือการดำเนินการดังกล่าวในภายหลังจากที่ได้รับอนุญาตตามกฎหมาย ผู้ดำเนินการหรือผู้ขออนุญาตจะต้องจัดทำรายงานให้เป็นไปตามที่กำหนดไว้ในประกาศฉบับนี้ด้วย

๒. กรณีการดำเนินโครงการปรับปรุงระบบชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง ครอบคลุมเขตพื้นที่โครงการส่งน้ำและบำรุงรักษา จำนวน ๘ โครงการ ซึ่งประกอบด้วย ๑) โครงการส่งน้ำและบำรุงรักษาป่าสักใต้ ๒) โครงการส่งน้ำและบำรุงรักษานครหลวง ๓) โครงการส่งน้ำและบำรุงรักษาคลองเพรียว - เส้าไห้ ๔) โครงการส่งน้ำและบำรุงรักษานครนายก ๕) โครงการส่งน้ำและบำรุงรักษารังสิตเหนือ ๖) โครงการส่งน้ำและบำรุงรักษารังสิตใต้ ๗) โครงการส่งน้ำและบำรุงรักษาชลหารพิจิตร และ ๘) โครงการส่งน้ำและบำรุงรักษาพระองค์โยยานุชิต หากไม่เป็นการขยายขนาดพื้นที่ชลประทานจากเดิมให้มีขนาดตั้งแต่ ๘๐,๐๐๐ ไร่ขึ้นไป ในแต่ละโครงการ จะไม่เข้าข่ายต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม ตามเอกสารท้ายประกาศ ๔ ลำดับที่ ๓๒ ของประกาศฯ

๓. กรณีการดำเนินโครงการปรับปรุงระบบชลประทานเจ้าพระยาฝั่งตะวันออกตอนล่าง กิจกรรมงานหลักกลุ่มงานที่ ๕ เพิ่มประสิทธิภาพการระบายน้ำช่วงคลองรังสิตประยูรศักดิ์ถึงคลองทวดสายล่าง ซึ่งมีการดำเนินงานก่อสร้างประตูระบายน้ำปากคลอง ๒๒ และคลอง ๒๓ หากไม่เป็นการก่อสร้างประตูระบายน้ำในแม่น้ำสายหลักตามเอกสารท้ายประกาศ ๒ จะไม่เข้าข่ายต้องจัดทำรายงานการประเมินผลกระทบสิ่งแวดล้อม ตามเอกสารท้ายประกาศ ๔ ลำดับที่ ๓๕ ของประกาศฯ

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ



(นายประเสริฐ สิริินภาพร)

เลขาธิการ

สำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม

กองพัฒนาระบบการประเมินผลกระทบสิ่งแวดล้อม

โทรศัพท์ ๐ ๒๒๖๕ ๖๕๐๐ ต่อ ๖๘๓๔ (พิเศษ, เศรษฐวิชัย)

โทรสาร ๐ ๒๒๖๕ ๖๖๒๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@onep.go.th

English Translation

Office of Natural Resources and Environmental Policy and Planning
 118/1 Tipco Tower 2, Rama VI Road,
 Phaya Thai Subdistrict, Phaya Thai District, Bangkok 10400

16 October 2024

Subject: Response to Inquiry Regarding the Lower Eastern Chao Phraya Irrigation System Improvement Project

To: Director-General, Royal Irrigation Department

Reference: Royal Irrigation Department Letter No. KOR 0323/11662, dated 30 September 2024

Reference is made to the letter in which the Royal Irrigation Department (RID) reported that the National Water Resources Committee (NWRC) resolved to approve the project for improving the lower eastern Chao Phraya irrigation system. This project is part of the master plan for flood management in the Lower Chao Phraya River Basin. Subsequently, the RID has planned the development of the Lower Eastern Chao Phraya irrigation improvement project for implementation within the fiscal years 2026–2031. The objective is to enhance the efficiency of water conveyance in the existing irrigation system, starting from the mouth of Khlong Raphiphat in Phra Nakhon Si Ayutthaya Province, passing through the north-south canal network, and reaching the Gulf of Thailand at Khlong Dan in Samut Prakan Province, with some water also being discharged into the Chao Phraya River and Bang Pakong River.

The Subcommittee on Water Resources Development Project Implementation, at its 2nd meeting of 2024, resolved that the RID should consult with relevant agencies, strictly adhering to applicable regulations, criteria, and laws, including consideration of whether the project requires an Environmental Impact Assessment (EIA). The lower eastern Chao Phraya irrigation improvement project involves upgrading the existing irrigation canal network by dredging and/or modifying the canals to increase the flow cross-section, such as changing the canal profile from a trapezoidal to a U-shape. There will be no widening of the existing canal beyond its original width. This aims to improve water conveyance capacity and reduce the risk of increasingly severe flooding, in accordance with engineering standards and geological conditions. The implementation area is within canal zones for which the RID already holds legal rights, covering the command areas of eight Operation and Maintenance Offices, with eight main activity groups. Therefore, the RID requests clarification as to whether implementation of this project requires an Environmental Impact Assessment report or needs to address any other relevant legal or regulatory issues, as detailed above.

The Office of Natural Resources and Environmental Policy and Planning has reviewed the information submitted by the Royal Irrigation Department and would like to inform that:

1. According to the Ministry of Natural Resources and Environment's Notification on "Prescribing Projects, Activities, or Operations Required to Prepare an Environmental Impact Assessment Report, and the Criteria, Methods, and Conditions for the Preparation

of an Environmental Impact Assessment Report, B.E. 2566 (2023)” dated 20 December 2023, as attached.

Notification No. 4, Item 32: Irrigation projects with an irrigated area of 80,000 rai or more must prepare an Environmental Impact Assessment (EIA) report for submission at the project approval or permit application stage, as applicable.

Item 35: All water gates on main rivers, regardless of size, must prepare an EIA report for submission at the project approval or permit application stage, as applicable.

Additionally, Item 4 states that any government project, activity, or operation, or those permitted by the government, that does not meet the specified size criteria in Item 3, but is later expanded beyond the prescribed threshold, or in the case of any project, activity, or operation that was implemented prior to the issuance of the notification specifying types and sizes, must also prepare an EIA report if subsequently expanded. The operator or applicant must ensure compliance with the requirements specified in this notification.

2. In the case of implementing the Lower Eastern Chao Phraya Irrigation System Improvement Project, which covers the command areas of eight Operation and Maintenance Offices, namely:

1. Pasak Tai Operation and Maintenance Office
2. Nakhon Luang Operation and Maintenance Office
3. Khlong Phriw-Sao Hai Operation and Maintenance Office
4. Nakhon Nayok Operation and Maintenance Office
5. Northern Rangsit Operation and Maintenance Office
6. Southern Rangsit Operation and Maintenance Office
7. Chonharapit Operation and Maintenance Office
8. Phra Ong Chaiyanuchit Operation and Maintenance Office

If the project does **not** involve expanding the irrigated area of any individual project to 80,000 rai or more, it does **not** fall under the requirement to prepare an Environmental Impact Assessment (EIA) report, according to the appendix of Notification No. 4, Item 32 of the relevant regulation.

3. In the case of implementing the Lower Eastern Chao Phraya Irrigation System Improvement Project, under Main Activity Group 5: Increasing the efficiency of water drainage from Khlong Rangsit Prayunsak to Khlong Hok Wa Sai Lang, which includes the construction of regulators at the Khlong 22 and Khlong 23, if these are **not** regulators constructed on main rivers as defined in the appendix of Notification No. 2, then they do **not** fall under the requirement to prepare an Environmental Impact Assessment (EIA) report according to the appendix of Notification No. 4, Item 35 of the relevant regulation.

(Mr. Prasert Sirinapaporn)

Secretary General

Office of Natural Resources and Environmental Policy and Planning

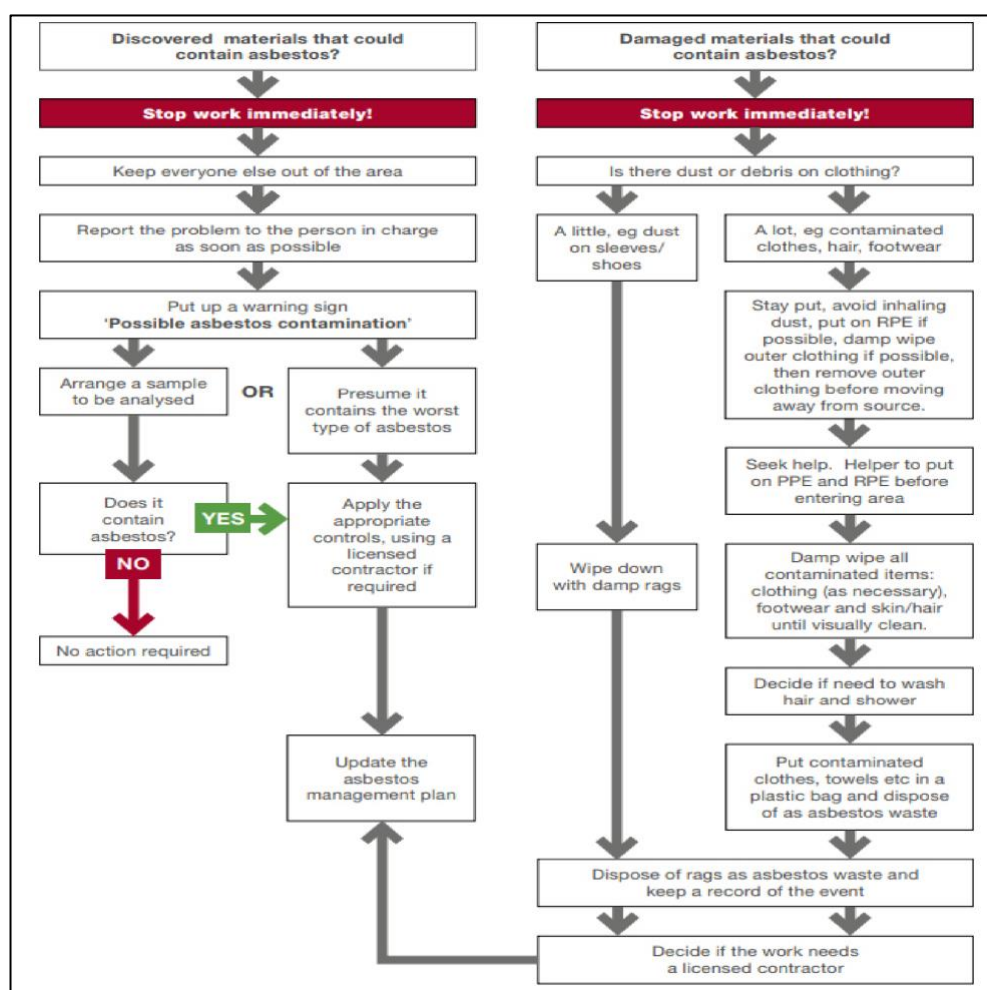
Appendix 7: Sample Construction Site Checklist for EMP Monitoring

Project Name:		
Package No.:		
Contractor:		
EHS Staff:		
Purpose of Inspection:		
Name of Inspector:		
Date:		
Site(s) visited:		
Date of SSEMP approval:		
Questions (to be revised based on approved SSEMP):	Yes	No
EHS supervisor appointed by contractor and available on site		
Construction site management plan (spoils, safety, material, schedule, equipment etc.,) prepared		
Traffic management plan prepared		
Dust is under control		
Excavated soil properly placed within minimum space		
Construction area is confined; no traffic/pedestrian entry observed		
Surplus soil/debris/waste is disposed without delay		
Construction material (sand/gravel/aggregate) brought to site as and when required only		
Tarpaulins used to cover sand and other loose material when transported by vehicles		
After unloading, wheels and undercarriage of vehicles cleaned prior to leaving the site		
No ACMs disturbed/removed during excavation		
No chance finds encountered during excavation		
Work is planned in consultation with traffic police		
Work is not being conducted during heavy traffic		
Work at a stretch is completed within a day (excavation, pipe laying and backfilling)		
Pipe trenches are not kept open unduly		
Road is not completely closed; work is conducted on edge; at least one line is kept open		
Road is closed; alternative route provided and public is informed, information board provided		
Pedestrian access to houses is not blocked due to pipe laying		
Spaces left in between trenches for access		
Wooden planks/metal sheets provided across trench for pedestrian		
No public/unauthorized entry observed in work site		
Children safety measures (barricades, security) in place at work sites in residential areas		
Prior public information provided about the work, schedule and disturbances		
Caution/warning board provided on site		
Guards with red flag provided during work at busy roads		
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc.)		
Workers conducting or near heavy noise work is provided with ear muffs		
Contractor is following standard and safe construction practices		
Deep excavation is conducted with land slip/protection measures		
First aid facilities are available on site and workers informed		

Drinking water provided at the site		
Toilet facility provided at the site		
Separate toilet facility is provided for women workers		
Workers camps are maintained cleanly		
Adequate toilet and bath facilities provided		
Contractor employed local workers as far as possible		
Workers camp set up with the permission of PIU		
Adequate housing provided		
Sufficient water provided for drinking/washing/bath		
No noisy work is conducted in the nights		
Local people informed of noisy work		
No blasting activity conducted		
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings		

Appendix 8: Suggested Outline of Asbestos Management Plan

- A. Background
- B. Project Description
- C. Regulatory Framework, Standards and Protocols
- D. Existing/Baseline Conditions
- E. Risk Assessment:
- F. Roles and Responsibilities
- G. Permissible Levels
- H. ACM Removal Protocol
- I. ACM Handling Protocols
- J. ACM Storage Protocols
- K. ACM Stabilization and Treatment
- L. List of Approved ACM Handlers and Disposal Facilities
- M. Health and Safety Protocols
- N. Trainings
- O. Emergency Response Plan & Chance Find Protocol
- P. Reporting and Monitoring



Appendix 9: Indicative Terms of Reference for Environmental Safeguards Officers/Specialists of the PMU, PIUs, PMCS and Contractor

A. Project Management Unit

1. Environmental Safeguards Officer – PMU

1. Qualifications and Experience. An Environmental Engineer/scientist with experience in management of environmental issues of infrastructure projects and understanding of the regulatory framework for environmental management in Thailand.

2. Detailed Tasks (Indicative):

- (i) Responsible for overall project management during implementation.
- (ii) Review and confirm that the IEE and EDDR are consistent with the project scope, locations and designs.
- (iii) Update IEE and EDDR, if needed, for processing of subsequent tranches following the guidelines in the EARF.
- (iv) Ensure that EMP is included in bidding documents and contracts of civil works packages.
- (v) Ensure that the ECOCP is included in bidding documents and contracts of goods packages that will involve installation or small civil works.
- (vi) Ensure that the contractor will comply with the measures and requirements relevant to the contractor set forth in the IEE and EMP, and any corrective or preventative actions set out in the environmental monitoring reports; make available a budget for all such environmental measures; provide the employer with a written notice of any unanticipated environmental risks or impacts that arise during construction, implementation or operation of the project that were not considered in the IEE or EMP; adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction; fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction; comply with all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; (c) allowing freedom of association and effective recognition on the right to collective bargaining; (d) elimination of forced labor; (e) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites, particularly women; submit to PMU, for review and approval, a site-specific environmental management plan (SSEMP) with Site-Specific Health and Safety Management Plan (SSHSM), including (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, temporary and final disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SSEMP implementation.
- (vii) Approve/clear SSEMPs of contractors. Ensure no works will commence prior to approval of SSEMP.
- (viii) Confirm compliance with applicable government laws, rules and regulations.
- (ix) Ensure timely disclosure of draft, final, updated IEE and EDDR in form and

- language understandable by affected people and other stakeholders.
- (x) Ensure full compliance with safeguard-related provision in loan and financial agreements.
- (xi) Ensure full capacity of safeguards staff on environment health and safety.
- (xii) Resolve complaints brought through the Grievance Redress Mechanism (GRM) that have not been resolved at lower level.
- (xiii) Immediately investigate reported serious or fatal incidents that occur on site, and immediately inform ADB of such incident. Information may be relayed initially through call or via email, and followed by a written formal report within 48 hours of the incident. The report should contain the result of investigation and actions undertaken by the project.
- (xiv) Submit semi-annual environmental monitoring reports to ADB until the project completion report is issued.
- (xv) Approve and sign off in the validation of CSCs' post-construction environmental audit reports.

B. Project Implementation Unit

1. Environmental Safeguards Focal Person – PIU

3. Qualifications and Experience. An Environmental Engineer or civil engineer with specialization in Environment and with working experience related to the integration of environmental issues in design, and construction of infrastructure projects.

4. Detailed Tasks (Indicative):

- (i) Supervise the day to day implementation of safeguards at project sites.
- (ii) Approve/clear SSEMPs of contractors.
- (iii) Supervise environmental management aspects of the construction activities and ensure that SSEMPs are implemented by contractors and aligned with the project EMP.
- (iv) Ensure CSCs diligently monitor and supervise contractors on the implementation of the SSEMPs.
- (v) Ensure all environmental monitoring, including instrumental measurements, are undertaken.
- (vi) Confirm locations of disposal sites of cleared vegetations and excavated sediments. Ensure locations of disposal sites for excavated sediments comply with the recommendations of the sediment management plan.
- (vii) Confirm locations of all temporary facilities that will be utilized by the project.
- (viii) Disseminate project information through meaningful consultations and by making project documents available at PIU and PMCSC offices or at locations easily accessed by stakeholders.
- (ix) Ensure feedback and suggestions raised during consultations are considered and incorporated in the project implementation design or execution of works.
- (x) Identify necessary corrective actions to address non-compliances.
- (xi) Address any grievances brought about through the grievance redress mechanism (GRM) in a timely manner.
- (xii) Ensure that CSCs consolidate monthly environmental monitoring reports from contractors.
- (xiii) Coordinate with PMU on the conduct of immediate investigation of reported serious or fatal incidents from the contractors.

- (xiv) Ensure that quarterly environmental monitoring reports are prepared and submitted to PMU.

C. Project Management and Construction Supervision Consultant

1. Environment Specialist (International)

5. Qualifications and Experience. Engineering background with specialization in environment, having at least 10 years of working experience related to the integration of environmental issues in design, and construction of infrastructure projects. Experience in projects in other regions or countries in major infrastructure development works. Experience in developing safeguard management systems for monitoring and evaluating safeguard performance of contractors. Experience of working for the Asian Development Bank (ADB) or other development organizations' projects is preferred.

6. Detailed Tasks (Indicative):

- (i) Proactively coordinate with other technical experts (e.g., ecotoxicologists, hydromet specialists, biodiversity consultants, etc.) to ensure integrated approaches in all EHS deliverables; organize joint technical meetings; facilitate timely exchange of information; review and integrate technical outputs; document coordination activities; identify gaps/overlaps in expert contributions; and harmonize recommendations in final deliverables, such as the IEE, EDDR, EMP, and corrective action plans.
- (ii) Lead in the preparation and finalization of safeguard documents and ensure that these are consistent with ADB SPS requirements.
- (iii) Facilitate the timely exchange of information and technical inputs between national consultants and other subject matter experts, ensuring that all perspectives are considered in reports, assessments, and management plans.
- (iv) Identify any gaps or overlaps in technical expert contributions and recommend solutions or additional expertise as needed to address complex or emerging project issues.
- (v) Ensure mitigation measures in the EMP are included in bidding and contract documents to ensure environmental safeguard measures are integrated and costed.
- (vi) Provide support to PMU and PIUs on resolving complex environmental issues that may arise during project implementation consistent with ADB SPS requirements.
- (vii) Facilitate knowledge transfer by reviewing national consultants' work, providing constructive feedback, and ensuring alignment with ADB and project standards.
- (viii) Coordinate regular meetings and consultations to address questions, clarify expectations, and resolve any technical or procedural issues faced by national consultants.
- (ix) Monitor progress and performance of national consultants, identifying gaps in skills or understanding, and implementing corrective measures or additional training as needed.
- (x) Provide comprehensive capacity building for PMU, PIUs and national environment specialists from PMCSC, ensuring these specialists are fully knowledgeable of project requirements and safeguard requirements on environment, health, and safety.

- (xi) Deliver targeted training sessions and ongoing mentorship during the initial months, with frequent engagement until national consultants from PMCSC are able to operate independently and efficiently with minimal support.
- (xii) Ensure that national consultants are equipped to handle day-to-day tasks and critical issues independently after the initial capacity-building period.
- (xiii) Document all capacity-building activities and report on the readiness of national consultants to the PMU, recommending further support if required.
- (xiv) Develop and share clear guidance documents, templates, and checklists for all required reports to standardize outputs and processes.
- (xv) Draft all reports, memos, non-compliance reports, and corrective action plans for PMU's final review and sign-off.
- (xvi) Provide guidance to the national environment specialist in the preparation and quality control of semi-annual environmental monitoring reports of the project to ADB.
- (xvii) Document all coordination activities, including meeting minutes, action items, and follow-up communications, and report these to the PMU as part of regular progress updates.
- (xviii) Other tasks as may be required by the PMU.

2. First Environment Specialist (National)

7. Qualifications and Experience. Engineering background with specialization in environment, having at least 5 years of working experience related to the integration of environmental issues in design, and construction of infrastructure projects. Past experience working on donor-funded projects is preferable.

8. Detailed Tasks (Indicative):

- (i) Support the international environment specialist in facilitating coordination with technical experts (such as ecotoxicologists and biodiversity consultants), organizing and documenting joint meetings, managing and sharing technical data, reviewing and integrating expert inputs for key environmental deliverables (IEE, EDDR, EMP, and corrective action plans), identifying and addressing gaps or overlaps in contributions, and ensuring all outputs align with ADB SPS.
- (ii) Provide support to the PMU and the PMCSC International Environment Specialist, particularly in facilitating the integration of EMP requirements into project bidding documents and contracts. This involves working under the guidance of the international environment specialist to ensure all necessary environmental management provisions are clearly incorporated and adhered to, thereby strengthening project compliance from the outset.
- (iii) Provide guidance or support to PIUs on the shifting of utilities and services, including obtaining necessary clearances from the respective government agencies, prior to award of civil works contracts.
- (iv) Work on day-to-day basis, and assist the international environment specialist in monitoring and ensuring project-wide compliance with all environmental safeguard requirements. This includes those outlined in loan covenants, the FAM, EARF, IEE, and EDDR. During the capacity building period, the role is to support the international specialist by providing necessary data, conducting preliminary reviews, and helping to address any compliance gaps. Eventually, lead this task towards the latter part of project implementation.

- (v) Provide relevant technical assistance to PIUs to aid in achieving site-specific compliance with environmental safeguard requirements.
- (vi) Document and report on all capacity-building activities undertaken for PMU, PIUs and national consultants from PMCSC, including conducting readiness assessments. Recommendations for further support are formulated in consultation with the PMCSC international environment specialist.
- (vii) Contribute to the development and dissemination of standardized guidance documents, templates, and checklists for all required environmental reports and project deliverables. This is to be done in support of the PMCSC international environment specialist.
- (viii) Support the PMCSC International Environment Specialist in drafting or preparing environment-related reports, memos, non-compliance reports, and corrective action plans, before obtaining final sign-off from the PMU.
- (ix) Maintain records of coordination activities, including meeting minutes, action items, and follow-up communications. Regular updates are to be provided to both the PMU and PMCSC teams, supporting the international environment specialist.
- (x) Assist in liaising with ADB, national environmental agencies, and other stakeholders as necessary, to facilitate project compliance and secure requisite approvals.
- (xi) Lead or assist in meaningful consultations with stakeholders and communities. Summarize and document feedback from affected people, stakeholders, and experts; integrate new data and field results from engagement; and document all consultations and feedback for inclusion in semi-annual environmental monitoring reports that will be disclosed.
- (xii) Conduct periodic site visits and environmental audits to verify project compliance and identify potential areas for improvement.
- (xiii) Support the PMCSC International Environment Specialist in preparing environmental assessments or corrective action plans to address unanticipated impacts as they arise.
- (xiv) Support PMU in the timely resolution of grievances raised through the GRM at the project level.
- (xv) Under the guidance of the PMCSC international environment specialist, coordinate and work closely with the PMCSC health and safety specialist to investigate any serious or fatal incidents reported at project sites. Ensure that these kinds of incidents are immediately reported, investigated, and resolved in a manner that prioritizes worker safety, legal compliance, and accountability, while preventing recurrence.
- (xvi) Support PMU in timely submission of investigation reports of serious or fatal incidents to ADB.
- (xvii) Review and consolidate quarterly environmental monitoring reports received from PIUs.
- (xviii) Assist in the preparation and quality control of semi-annual environmental monitoring reports for submission to ADB.
- (xix) Under the guidance of the PMCSC international environment specialist, review and validate post-construction environmental audit reports of CSCs, and submit to PMU Environmental Safeguards Officer for approval and sign off.
- (xx) Undertake other related duties as assigned by the PMU or PMCSC International Environment Specialist. The specialist will ensure all activities and deliverables are closely aligned with both PMU and PMCSC requirements, maintaining regular communication and collaboration to support seamless project implementation.

3. Second Environment Specialist (National)

9. Qualifications and Experience. Engineering background with specialization in environment, having at least 5 years of working experience related to the integration of environmental issues in design, and construction of infrastructure projects. Past experience working on donor-funded projects is preferable.

10. Detailed Tasks (Indicative):

- (i) Prior to any mobilization activities by contractors:
 - Ensure that all expert-guided recommendations and activities during pre-construction period (i.e. demolition of structures with asbestos-containing materials, demolition or shifting of PCRs) have been completed following the EMP;
 - In coordination with the social safeguards experts in the PMCSC, confirm that all requirements in the resettlement framework and resettlement plan or social safeguards due diligence report have been complied with.
- (ii) Provide ongoing support to PIUs in securing all necessary local environment-related permits for the project, ensuring compliance at the site level.
- (iii) Support PIUs by verifying that contractors conduct baseline (pre-works) site surveys as part of SSEMP preparation, including documentation of environmental parameters and structures that will be potentially affected due to vibration.
- (iv) Prepare a comprehensive report and register of results of all baseline (pre-works) surveys done by contractors, including all photos and videos taken during the surveys. Ensure that this report and register is provided to PIU and PMU, which will be updated from time to time.
- (v) Assist PIUs by reviewing and recommending approval of contractors' SSEMPs, focusing on site-specific requirements and conditions.
- (vi) Support PIUs in managing and overseeing the day-to-day implementation of environmental safeguard requirements directly at project sites.
- (vii) Work closely with PIUs to supervise contractors on-site, ensuring strict compliance with mitigation measures outlined in SSEMPs and alignment with the project EMP.
- (viii) Facilitate meaningful consultations with local communities on behalf of PIUs, ensuring that site-level feedback and environmental concerns are captured and incorporated into project implementation.
- (ix) Conduct regular on-site monitoring of project activities as specified in the monitoring program in the EMP, and share findings with PIUs for timely action.
- (x) Assist PIUs in ensuring the prompt and effective resolution of grievances raised at the site level through the GRM, escalating unresolved issues to the PMU when necessary.
- (xi) Investigate serious or fatal site incidents reported at project locations, providing PIUs with detailed information needed for PMU incident reporting to the ADB.
- (xii) Review and endorse monthly site-specific environmental monitoring reports from contractors for PIU approval.
- (xiii) Prepare and submit comprehensive quarterly environmental monitoring reports to PIUs for onward submission to the PMU, focusing on site-level activities and compliance.
- (xiv) Monitor and record environmental conditions at project sites during construction, including instrumental measurements, and report findings to PIUs.

- (xv) Maintain comprehensive records for PIUs on contractors' environmental performance at the site level, including incident registers.
- (xvi) Support PIUs in conducting consultations and disclosing environmental safeguard documents (EMP, SSEMPs, etc.) to local communities at the site level. Encourage and facilitate one-on-one and informal dialogue between PIUs and local people to promote openness and trust during site-level consultations.
- (xvii) Work with PIUs to verify and promptly report any unanticipated environmental impacts at project sites, with recommendations for corrective actions.
- (xviii) Ensure, in coordination with PIUs, that all temporary facilities are removed by contractors after construction and that sites are fully rehabilitated and restored to pre-project or better conditions.
- (xix) Conduct final audit of post-construction rehabilitation and restoration works at the sites by contractors, and prepare post-construction environmental audit report for submission to PIU and PMU through the PMCSC.
- (xx) Work with PIUs to certify that all environmental obligations at the site level have been fulfilled by contractors before recommending final payment.

4. Health and Safety Specialist (National)

11. Qualifications and Experience. The Expert shall have at least a master's degree in environmental management, engineering, construction management, public health, health and safety or a related field. The Expert must have an internationally-recognized certificate or diploma in occupational health and safety management. The Expert must have experience designing and implementing H&S systems, particularly for infrastructure projects in Thailand. He/She must have an excellent inter-personal skills to explain health and safety (H&S) concepts and processes to contractors, fellow consultants, government, and other stakeholders of the project.

12. Detailed Tasks (Indicative).

- (i) Conduct a thorough review of the project's EMP, contractors' SSEMPs, technical specifications, bill of quantities (BOQs) within contractor contracts, and contractors' Health and Safety (H&S) plans to ensure that all potential risks are comprehensively identified and that suitable mitigation measures are incorporated. Where deficiencies or omissions are identified, provide support in the enhancement and strengthening of these documents to ensure full alignment with project requirements and best practice standards.
- (ii) As necessary, develop and/or refine straightforward checklists to facilitate effective H&S monitoring, and establish robust systems within RID for the ongoing management of health and safety matters.
- (iii) Formulate a comprehensive incident reporting procedure, ensuring that all contractors and supervision consultants are fully briefed on, and actively implementing, the system. The expert will assist the PMCSC team in the systematic collection, consolidation, and reporting of incidents, with data disaggregated by contract package and presented for both the current reporting period and cumulatively in each quarterly environmental monitoring report.
- (iv) Guarantee that all initial meetings with contractors incorporate a dedicated session on H&S standards, clearly outlining RID's expectations. This should include a formal presentation by contractors of their respective H&S plans, the appointment of qualified focal points, and a detailed explanation of their strategies for achieving and maintaining compliance with all H&S measures.

- (v) Monitor contractors' compliance with stringent occupational and community health and safety protocols, in line with recognized international best practices. Provide timely advice and recommendations to other relevant PMCSC consultants and RID personnel regarding the implementation of corrective actions where non-compliance or deficiencies are observed.
- (vi) Ensure that contractors' designated H&S personnel conduct daily monitoring of their respective sites, verifying ongoing compliance with all agreed-upon standards.
- (vii) Design and implement incentive schemes to promote and reward safe working practices among contractors, thereby fostering a culture of safety throughout the project.
- (viii) Develop and deliver targeted training programs on specific health and safety topics, particularly in areas where capacity gaps are identified, to enhance the competency of all relevant stakeholders.
- (ix) Design and oversee the implementation of comprehensive monitoring and incident reporting systems, ensuring their effective operation across all project components.
- (x) Provide training to RID personnel in health and safety monitoring procedures, and deliver capacity-building sessions to PMU, PIUs, PMCSC consultants, contractors, and other stakeholders as required, to ensure a shared understanding of project H&S expectations and procedures.
- (xi) Develop and implement incentive programs specifically aimed at improving the overall H&S performance of the RID.
- (xii) Undertake additional tasks as may be assigned by the PMU or PIUs, ensuring these are executed in accordance with project objectives and established standards.
- (xiii) On the contractors:
 - a. Monitor and assess contractors' implementation of site-specific safety management systems. As the monitoring agent, ensure that contractors' management systems are regularly updated to reflect the locations and site conditions, and that all potential safety risks within the contractors' scope of work are effectively addressed.
 - b. Maintain ongoing coordination with contractors' site supervisors and workers, overseeing daily safety checks and hazard reporting procedures. Ensure that contractors integrate safety practices into all aspects of on-site operations.
 - c. Conduct scheduled site inspections and safety audits to verify contractors' compliance with safety procedures. Utilize comprehensive checklists to evaluate working practices, equipment conditions, housekeeping standards, and risk control measures implemented by contractors. Document inspection findings, direct contractors to address any deficiencies promptly, and monitor progress to confirm corrective actions have been completed. Maintain detailed inspection records for accountability and future reference.
 - d. Regularly verify contractors' enforcement of proper use and maintenance of PPE and safety equipment. Ensure that all workers, under the contractors' supervision, have access to and consistently use appropriate PPE, such as hard hats, gloves, safety glasses, high-visibility clothing, and respiratory protection. Inspect the quality of PPE provided by contractors and instruct replacements when necessary, as well as advise on correct use and storage. Routinely check the functionality of contractors' site safety

- devices, including temporary perimeter fencing to prevent unauthorized access.
- e. Monitor contractors' organization of site-specific safety training and toolbox talks. Confirm that contractors schedule these sessions regularly and that all workers attend, with training tailored to relevant site risks and tasks. Review topics covered to ensure contractors address hazard recognition, safe lifting, machinery operation, and emergency procedures.
 - f. Oversee contractors' recording and response to incidents and near-miss events. Verify that contractors promptly secure the site, gather witness statements, review documentation, and analyze physical evidence to identify root causes. Monitor contractors' development and implementation of corrective and preventive actions, ensuring these measures are enacted to prevent recurrence.
 - g. Conduct independent investigations of reported incidents, collaborating with contractors' safety officers and site management to prepare detailed reports. Oversee contractors' execution of corrective and preventive actions identified through inspections, audits, and incident reviews, and monitor the effectiveness of these interventions. Recommend adjustments as needed to improve safety outcomes and encourage contractors to seek feedback from workers for continuous improvement.
 - h. Maintain open communication with contractors' safety officers, encouraging the reporting of unsafe conditions or behaviors and supporting a culture of proactive safety. Ensure that contractors promptly address safety concerns and disseminate lessons learned from incidents or inspections to foster ongoing safety enhancements.
 - 1. Supervise contractors' completion of post-construction site safety checks. After project completion, verify that contractors conduct thorough final inspections to identify and rectify remaining hazards, such as debris, exposed utilities, or unstable ground. Confirm that contractors have ensured all areas are safe for handover or further use, and maintain documentation of these checks for project closure records.

5. Physical Cultural Resources (PCR) Expert (National)

13. Qualifications and Experience. The PCR Expert shall have a Bachelor's degree in sociology, anthropology, cultural heritage conservation or any related course. Master's degree will be an advantage. Specific experience in Thailand is required. Past experience in safeguards work with experience on donor-funded or multinational projects with heritage conservation and management component is preferred. Suitability to undertake the detailed tasks and responsibilities mentioned above at the required level. Result oriented and ability to work under limited timeframe and deliver a quality work. The consultant will work closely with the environment and social safeguards specialists of the project, as needed.

14. Detailed Tasks (Indicative). The PCR Specialist will be engaged on as needed basis.

- (i) Undertake a rapid assessment to determine the impacts of project implementation on Physical Cultural Resources (PCRs) located within and surrounding the project sites.
- (ii) Carry out site-specific surveys of PCRs according to project packages with finalized Detailed Engineering Designs (DEDs).

- (iii) Compile a detailed, package-wise register documenting each PCR, including comprehensive descriptions and precise locations supported by GPS coordinates and maps.
- (iv) Prepare a comprehensive report for each package-wise PCR survey. Each report shall, at minimum, include the following sections:
 - a. Introduction: Provide a location map displaying the alignment of project components; offer a general description of properties along the alignment; describe the location and its surroundings, including relevant environmental features and landscape characteristics.
 - b. Description of PCRs: Present a detailed account of the surveyed PCRs, including their nature, significance, specific locations, physical condition, and current photographic documentation.
 - c. Description of Potential Impacts: Outline the project activities that may affect the PCRs and discuss the specific attributes of the PCRs that are likely to be disturbed.
 - d. Mitigation and/or Conservation Strategies: Evaluate alternative approaches, mitigation measures, and conservation methods to avoid or minimize adverse impacts on PCRs. Provide recommendations for additional actions as necessary, such as further written and photographic documentation prior to any demolition, as well as design considerations for rehabilitation or upgrading activities.
- (v) Based on the assessment outcomes, formulate conclusions and recommendations or actions to avoid or minimize the impacts of construction activities on the identified PCRs.
- (vi) In instances where demolition or relocation of PCRs is unavoidable, ensure adherence to local customs and traditions. This shall include the performance of ceremonial rituals to honor, appease, or respectfully disengage the spiritual or cultural significance of the site, carried out to the satisfaction of the owners or local communities prior to the removal or demolition of spirit houses or other PCRs.
- (vii) Provide support for all other activities, follow-up reviews, and clarifications directly related to PCRs, as well as for PCR management and conservation planning during the ADB processing and approval stage of the project.

3. Asbestos Specialist (National)

15. Qualifications and Experience. The Asbestos Specialist shall preferably be a registered asbestos consultant and/or have work experience and familiarity with all aspects of asbestos management and/or have attended a recognized full time training course on all aspects of asbestos management. Candidates with broad experience in the field of asbestos management or hazardous waste management will be preferred. The Asbestos Specialist shall at least be a graduate in environmental science, environmental engineering or a related discipline with significant experience in asbestos management or hazardous waste management and monitoring of projects and implementation of mitigation measures and engineering controls to minimize risks associated with control of asbestos or hazardous wastes in the environment.

16. Detailed Tasks (Indicative). The Asbestos Specialist will be engaged on as needed basis.

- (i) Conduct an inventory of ACMs in structures that will be demolished at all project sites, including all abandoned or unused ACMs found in these sites. The inventory should include estimation of volume and the determination of the kind of asbestos

present in each type of ACM, such as in existing asbestos-containing roofing materials, etc.). If necessary, conduct sampling of these ACMs and submit for laboratory analysis to determine the nature of asbestos materials (e.g. chrysotile, amosite, crocidolite, etc.; friable or non-friable, etc.);

- (ii) Prepare a comprehensive report on the results of conduct of the inventory of ACMs.
- (iii) Prepare an asbestos management plan (AMP) suited for the project and in compliance with national regulations and internationally recognized best practices on the management of ACMs. The AMP should be able to provide step-by-step instructions on the proper demolition, handling, transport and disposal (temporary and permanent) of the demolished components or debris from the project sites;
- (iv) When controlled landfill disposal facilities are available, assist RID to monitor the implementation of necessary controls on asbestos disposal and to monitor the controlled handling, transfer and disposal of the stockpiled ACM following the AMP.
- (v) If no controlled landfill disposal facilities are available, assist RID to identify a suitable buffer storage to stockpile demolished structures with ACMs collected from project sites following the AMP;
- (vi) Train demolition contractors on the proper execution of the AMP.
- (vii) After training the contractors, monitor the demolition, transport, temporary storage and eventual permanent disposal the demolished components or debris. Ensure that demolition contractors strictly follow the AMP at all stages of ACM management;
- (viii) Review and verify the progress of AMP implementation of the project;
- (ix) Assess whether the asbestos management practices per AMP have been achieved by the project; and
- (x) Assess efficiency and effectiveness of asbestos management practices and engineering control measures that have been implemented following the AMP, their impacts (positive as well negative) and sustainability, drawing both on policy and practice and to suggest any corrective measures, if necessary.

D. Contractor

1. Environmental Officer

17. Qualifications and Experience. The Environmental Officer should have a bachelor's degree in engineering, or a related field, and should have sufficient experience on environmental impact assessment. The Officer should have at least 3–5 years of experience in implementing environmental safeguards on infrastructure projects in Thailand, with strong knowledge of pollution control, biodiversity protection, and Thailand national environmental regulations. Familiarity with ADB SPS is essential, as is the ability to conduct site-level monitoring, prepare environmental reports, and coordinate with project stakeholders. Proficiency in both English and the Thai language is also important for effective communication and compliance.

18. Detailed Tasks (Indicative). The Environmental Officer shall ensure that:

- (i) The execution of works will not have impacts to the environment and people that are considered diverse, irreversible or unprecedented.

- (ii) Comprehensive baseline (pre-works) conditions surveys as part of preparation of the SSEMP is conducted (example: photo or video documentation, instrumental monitoring of environmental parameters, habitats of value, valued trees and vegetation, fauna species, structural and technical condition survey of properties that will be potentially affected by vibration and construction works, etc.).
- (iii) Condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction is documented.
- (iv) SSEMP based on the EMP is prepared. The SSEMP shall include (a) proposed sites/locations for construction work camps, storage areas, hauling roads, laydown areas, disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved SSEMP; (c) monitoring program as per EMP; and (d) budget for SSEMP implementation.
- (v) SSEMP is submitted for approval to PIU/PMU prior to start of works, including site preparation, vegetation clearing and mobilization. Ensure that no works happen until the SSEMP is approved.
- (vi) All affected people and surrounding communities are informed about the works, impacts, duration, mitigation measures, monitoring activities, contact persons and contact details.
- (vii) Necessary environmental permits and clearances, if any, prior to construction are obtained.
- (viii) All sites, facilities, and lands including temporary and final disposal sites are approved by PMU and PIU.
- (ix) All mitigation measures in the SSEMP are implemented to avoid or minimize the environmental impacts of construction activities.
- (x) The best construction methodologies are utilized to avoid or minimize impacts of works to both environment and man-made structures.
- (xi) Regular toolbox talks are held to educate or remind workers with all mitigation measures in the SSEMP.
- (xii) Owners of properties or structures damaged due to execution of works are compensated.
- (xiii) Victims of incidents, if any, due to execution of works are compensated.
- (xiv) Compensatory or offset measures per EMP for residual impacts are implemented.
- (xv) Environmental monitoring, including vibration monitoring, as required by the EMP are conducted.
- (xvi) Complaints and grievances concerning the construction activities should be acted upon immediately at the contractor level in accordance with the project's GRM.
- (xvii) Corrective actions as required by PMU or PIU or their representatives from PMCSC are implemented.
- (xviii) PMCSC/PIU and PMU are notified immediately if any incident occurs whether on or off the work sites which results in any serious or fatal injury to any person whether directly concerned with the work site or a third party. Such notification may initially be verbal and shall be followed by a written full investigation report within 24 hours of the accident.
- (xix) PMCSC is informed one month before target completion of construction works including rehabilitation and restoration of disturbed areas. This will provide PMCSC to plan for the preparation of post-construction environmental audit report prior to demobilization.
- (xx) Post-construction rehabilitation and restoration works per EMP is undertaken prior to demobilization.
- (xxi) Monthly progress reports on SSEMP implementation and monitoring activities are prepared and submitted to PIU.

2. Safety Officer

19. Qualifications and Experience. The Safety Officer should have a bachelor's degree in occupational health and safety or engineering, and have acquired recognized certifications such as NEBOSH, IOSH, or OSHA. The Officer should have at least 3–5 years of experience in construction safety management, preferably on donor-funded infrastructure projects in Thailand. Strong knowledge of hazard identification, emergency preparedness, and Thailand national labor laws is essential, as is familiarity with ADB SPS. Effective communication skills, the ability to lead safety training, and proficiency in both Thai language and English are also important for successful coordination and compliance.

20. Detailed Tasks (Indicative).

- (i) Conduct daily site safety inspections to identify hazards and ensure compliance with safety protocols.
- (ii) Ensure that all workers (including those of subcontractors, if any) are paid and treated according to the local labor legislations.
- (iii) Provide worker camps and work sites with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities following international good practices as reflected in internationally recognized standards such as IFC/EBRD Guidance Note on Workers' accommodation: processes and standards".
- (iv) Monitor and mandatorily require use of personal protective equipment (PPE) by all workers and visitors.
- (v) Lead daily toolbox talks on relevant safety topics and site-specific risks.
- (vi) Check safety signage and barricades are in place and clearly visible.
- (vii) Ensure safe storage and handling of hazardous materials and equipment.
- (viii) Develop and update the Health and Safety Plan in line with national OHS standards and labor laws.
- (ix) Prepare Job Hazard Analyses for high-risk activities.
- (x) Maintain safety records, including inspection checklists, incident logs, and training attendance.
- (xi) Ensure safety clauses are included in subcontractor agreements and work permits.
- (xii) Conduct safety induction training for all new workers and subcontractors.
- (xiii) Organize refresher training on emergency response, equipment handling, and hazard awareness.
- (xiv) Promote a safety culture through awareness campaigns and recognition of safe behavior.
- (xv) Respond immediately to accidents or near misses and secure the site.
- (xvi) Notify the PMCSC, PIU, and PMU of serious or fatal incidents within the required timeframe.
- (xvii) Lead or support incident investigations, including root cause analysis.
- (xviii) Develop and implement corrective and preventive actions.
- (xix) Submit incident reports and follow up documents to PMU, PIU and relevant authorities.
- (xx) Conduct regular audits and inspections of work areas, equipment, and procedures.
- (xxi) Monitor compliance with the Health and Safety Plan.

- (xxii) Submit monthly safety reports to the PMCSC and PIU, including statistics, trends, and non-compliance issues.
- (xxiii) Track and report leading and lagging safety indicators (e.g., training hours, incident rates).
- (xxiv) Develop and maintain emergency response plans for fire, chemical spills, medical emergencies, etc.
- (xxv) Conduct regular emergency drills and evaluate response effectiveness.
- (xxvi) Ensure availability of first-aid kits, fire extinguishers, and emergency contacts on site.
- (xxvii) Participate in safety coordination meetings with PMCSC, PIU, and other contractors.
- (xxviii) Support the project GRM by addressing safety-related complaints.
- (xxix) Engage with workers and community members to raise awareness of safety risks and mitigation measures.

Appendix 10: Sample Daily Monitoring Sheet for Contractor

(Note: This checklist is indicative which can be further enhanced depending on the subproject circumstances.)

[NAME OF ADB PROJECT]
Contractor Monitoring Sheet

Name of Subproject: _____
 Location: _____
 Contractor: _____
 Contractor EHS Supervisor (or equivalent): _____
 Date of monitoring: _____

Summary of Findings

Monitoring Item	Status	Remarks
1. Compliance with Local Permit Requirements	(Obtained / Application Submitted / Not Applicable)	
<i>Location/zoning permits</i>		
<i>Permit to construct</i>		
<i>Building permit</i>		
<i>Transport / hauling permits</i>		
2. Compliance with IEE Requirements	(Approved / Under Preparation / Submitted to PMU for Approval / Not Applicable)	
<i>Site-specific EMP (SSEMP)</i>		
<i>Corrective Action Plan, if any</i>		
3. Compliance with SSEMP		
Construction Site	(Satisfactory / Needs Improvement / Not Implemented/Not Applicable)	
- Conduct of toolbox talk		
- Use of PPE		
- Rest areas for male and female workers		
- Toilets for male and female workers		
- Medical kits		
- Drinking water supply		
- Dust control		
- Noise control		
- Solid waste management		
- Wastewater management		
- Chemicals storage (fuel, oil, etc.)		
- Siltation or erosion control		
- Heavy equipment staging / parking area		
- Barricades around excavation sites		
- Access to residential houses/shops/businesses		
- Traffic routing signages		
- Lightings at night		

Monitoring Item	Status	Remarks
- Trench shoring / landslide protection		
Construction Workers' Camp Site	(Available / Needs Improvement / Not Available / Not Applicable)	
- Quarters for male and female workers		
- Sleeping utilities (e.g. beds, pillows, blankets, mosquito nets, etc.)		
- Power/Electricity supply		
- Drinking water supply		
- Toilets for male and female workers		
- General purpose water supply (cooking, washing, bathing)		
- Cooking facilities and areas		
- Solid waste management		
- Wastewater management		
- Pest control		
4. Implementation of GRM	(Yes / No or None / Under Resolution)	
<i>Complaints</i>		
<i>Complaints resolution</i>		
5. Environmental Quality Measurement	(Passed / Failed / Not Applicable)	
<i>Ambient air quality sampling</i>		
<i>Noise level measurement</i>		
<i>Receiving water quality sampling</i>		

Other Issues: _____

Attachments:

1. Copies of new permits obtained, if any.
2. Photos taken at worksites, if any.
(photos attached in previous monitoring sheets should not be used again).
3. Laboratory results of environmental quality measurements, if any.

Prepared by: _____
 Name, Designation and Signature

Appendix 11: Sample Inspection Checklist for Implementing Entities (on behalf of PMU / PIU, PMSCS)

(Note: This checklist is indicative which can be further enhanced depending on the project circumstances.)

[NAME OF ADB PROJECT] SITE INSPECTION CHECKLIST

Subproject / Location: _____

Date: _____

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
1.	Supervision and Management On-Site	Yes	No	NA	
	a. Is an EHS supervisor available?				
	b. Is a copy of the SSEMP available?				
	c. Are daily toolbox talks conducted on site?				
2.	The Facilities	Yes	No	NA	
	a. Are there a medical and first aid kits on site?				
	b. Are emergency contact details available on-site?				
	c. Are there PPEs available? What are they?				
	d. Are the PPEs in good condition?				
	e. Are there firefighting equipment on site?				
	f. Are there separate sanitary facilities for male and female workers?				
	g. Is drinking water supply available for workers?				
	h. Is there a rest area for workers?				
	i. Are storage areas for chemicals available and with protection? in safe locations?				
3.	Occupational Health and Safety	Yes	No	NA	
	a. Are the PPEs being used by workers?				
	b. Are excavation trenches provided with shores or protection from landslide?				
	c. Is breaktime for workers provided?				
	d. How many for each type of collection vehicle is in current use?				
4.	Community Safety	Yes	No	NA	
	a) Are excavation areas provided with barricades around them?				
	b) Are safety signages posted around the sites?				
	c) Are temporary and safe walkways for pedestrians available near work sites?				
	d) Is there a record of treated wastewater quality testing/measurement?				
5.	Solid Waste Management	Yes	No	NA	
	a. Are excavated materials placed sufficiently away from watercourses?				
	b. Is solid waste segregation and				

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
	management in place?				
	c. Is there a regular collection of solid wastes from work sites?				
6.	Wastewater Management	Yes	No	NA	
	a) Are there separate sanitary facilities for various types of use (septic tanks, urination, washing, etc.)?				
	b) Is any wastewater discharged to storm drains?				
	c) Is any wastewater being treated prior to discharge?				
	d) Are measures in place to avoid siltation of nearby drainage or receiving bodies of water?				
	e) Are silt traps or sedimentation ponds installed for surface runoff regularly cleaned and freed of silts or sediments?				
7.	Dust Control	Yes	No	NA	
	a. Is the construction site watered to minimize generation of dust?				
	b. Are roads within and around the construction sites sprayed with water on regular intervals?				
	c. Is there a speed control for vehicles at construction sites?				
	d. Are stockpiles of sand, cement and other construction materials covered to avoid being airborne?				
	e. Are construction vehicles carrying soils and other spoils covered?				
	f. Are generators provided with air pollution control devices?				
	g. Are all vehicles regularly maintained to minimize emission of black smoke? Do they have valid permits?				
8.	Noise Control	Yes	No	NA	
	a) Is the work only taking place between 7 am and 7 pm, week days?				
	b) Do generators operate with doors closed or provided with sound barrier around them?				
	c) Is idle equipment turned off or throttled down?				
	d) Are there noise mitigation measures adopted at construction sites?				
	e) Are neighboring residents notified in advance of any noisy activities expected at construction sites?				
9.	Traffic Management	Yes	No	NA	
	a) Are traffic signages available around the construction sites and nearby roads?				
	b) Are re-routing signages sufficient to guide motorists?				

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
	c) Are the excavation sites along roads provided with barricades with reflectors?				
	d) Are the excavation sites provided with sufficient lighting at night?				
10.	Recording System	Yes	No	NA	
	a) Do the contractors have recording system for SSEMP implementation?				
	b) Are the daily monitoring sheets accomplished by the Contractor EHS supervisor (or equivalent) properly compiled?				
	c) Are laboratory results of environmental sampling conducted since the commencement of construction activities properly compiled?				
	d) Are these records readily available at the site and to the inspection team?				

Other Issues: _____

Prepared by: _____

Name, Designation and Signature

Appendix 12: Suggested Outline of Semi-Annual Environmental Monitoring Report

1 INTRODUCTION

- 1.1 Preamble
- 1.2 Headline Information

2 PROJECT DESCRIPTION AND CURRENT ACTIVITIES

- 2.1 Project Description
- 2.2 Project Contracts and Management
- 2.3 Project Activities During Current Reporting Period
- 2.4 Description of Any Changes to Project Design
- 2.5 Description of Any Changes to Agreed Construction methods

3 ENVIRONMENTAL SAFEGUARD ACTIVITIES

- 3.1 General Description of Environmental Safeguard Activities
- 3.2 Site Audits
- 3.3 Issues Tracking (Based on Non-Conformance Notices)
- 3.4 Trends
- 3.5 Unanticipated Environmental Impacts or Risks

4 RESULTS OF ENVIRONMENTAL MONITORING

- 4.1 Overview of Monitoring Conducted during Current Period
- 4.2 Trends
- 4.3 Summary of Monitoring Outcomes
- 4.4 Material Resources Utilisation
 - 4.4.1 Current Period
 - 4.4.2 Cumulative Resource Utilisation
- 4.5 Waste Management
 - 4.5.1 Current Period
 - 4.5.2 Cumulative Waste Generation
- 4.6 Health and Safety
 - 4.6.1 Community Health and Safety
 - 4.6.2 Worker Safety and Health
- 4.7 Training

5 FUNCTIONING OF THE SSEMP

- 5.1 SSEMP Review

6 GOOD PRACTICE AND OPPORTUNITY FOR IMPROVEMENT

- 6.1 Good Practice
- 6.2 Opportunities for Improvement

7 SUMMARY AND RECOMMENDATIONS

- 7.1 Summary
- 7.2 Recommendations

Appendix 13: Suggested Outline of a Post-Construction Environmental Audit Report (PCEAR)

1. **Introduction**
2. **Project Description**
 - 2.1 Brief Description of the Project
 - 2.2 Agencies Involved in Implementation of the Project
 - 2.3 Description of Any Changes to Project Design
3. **Preparation and Implementation of the Audit Plan**
 - 3.1 Objectives of the Audit
 - 3.2 Methodology
 - 3.3 Study of Available Documentation
4. **Environmental Audit Findings**
 - 4.1 Pre-works conditions
(access roads, work sites and locations of temporary facilities)
 - 4.2 Completed infrastructures
 - 4.3 Post-construction conditions
(access roads, work sites and locations of temporary facilities)
5. **Conclusion and Recommendations**
 - 5.1 Conclusion
 - 5.2 Recommendations
6. **Annexes**
[Include as annexes all necessary reference documents used in the audit. For reference documents that are voluminous, cite in the main report on where or how they can be accessed or obtained.]

See attached checklist for additional guidance on subject matters to look at in the conduct of an effective audit and in the preparation of PCEAR

PCEAR Checklists

Pre-Audit Preparation Checklist:

- ☐ **Document Collection:** Complete IEE/EIA review and environmental commitment matrix preparation
- ☐ **SEMR Analysis:** All semi-annual reports collected, analyzed for trends, gaps, and compliance
- ☐ **Baseline Data:** Pre-construction environmental and dilapidation survey data compiled and organized
- ☐ **Site Access:** Permissions obtained, safety protocols established, local contacts confirmed
- ☐ **Stakeholder Schedule:** Interview appointments confirmed, community consultation meetings arranged
- ☐ **Team Preparation:** Audit team roles defined, responsibilities assigned, communication protocols established

Site Work Quality Assurance Standards

- ☐ **Inspection Protocols:** Standardized checklists used consistently across all inspection sites
- ☐ **Documentation Standards:** GPS coordinates, timestamps, and detailed photographs for all observations
- ☐ **Verification Process:** Multiple team member confirmation of critical findings and assessments
- ☐ **Community Engagement:** Representative consultation conducted at affected locations and communities
- ☐ **Sampling Protocols:** Environmental sampling conducted following approved scientific methods
- ☐ **Daily Reviews:** Team debrief meetings to validate findings, identify gaps, and plan next steps

Report Quality Control Measures

- ☐ **Executive Accessibility:** Summary readable and understandable by non-technical decision makers
- ☐ **Evidence Support:** All findings and conclusions supported by specific references and data
- ☐ **Recommendation Clarity:** Actions prioritized with clear timelines, responsibilities, and resource requirements
- ☐ **ADB Compliance:** Format, content, and reporting requirements fully met and verified
- ☐ **Technical Review:** Internal peer review completed before stakeholder circulation
- ☐ **Stakeholder Input:** Appropriate feedback incorporated and response documented