Environmental Management Plan

March 2014

Kingdom of Cambodia: Greater Mekong Subregion Tourism Infrastructure for Inclusive Growth Project

Kampot Pier Development Subproject

Prepared by the Ministry of Tourism, Cambodia, for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 1 March 2014)

Currency Unit	–	Riel R
R1.00	=	$0.00024
$1.00	=	R4,050

ABBREVIATIONS

ABR	-	Anaerobic Baffle Reactor
ADB	-	Asian Development Bank
CEMP	-	contractor environmental management plan
DAFF	-	Department of Agriculture, Forestry and Fisheries
DDSC	-	detailed design &supervision consultant
DOE	-	Department of Environment
DPWT	-	Department of Public Works and Transport
DOT	-	Department of Tourism
DOWRAM	-	Department of Water Resources and Meteorology
EA	-	executing agency
EIA	-	environmental impact assessment
EMC	-	environmental monitoring consultant
EMP	-	environment management plan
EO	-	environmental officer
ERT	-	emergency response team
EERT	-	external emergency response team
GMS	-	Greater Mekong Subregion
Government	-	Government of Cambodia
IEE	-	initial environment examination
IEIA	-	initial environmental impact assessment
MAFF	-	Ministry of Agriculture, Forestry and Fisheries
MOE	-	Ministry of Environment
MIME	-	Ministry of Industry, Mines and Energy
MPWT	-	Ministry of Public Works and Transport
MOT	-	Ministry of Tourism
MOWRAM	-	Ministry of Water Resources and Meteorology
MRF	-	material recovery facility
PA	-	project administration manual
PCU	-	project coordinating unit
PIU	-	project implementation unit
PPTA	-	project preparatory technical assistance
RP	-	resettlement plan
GRC	-	Royal Government of Cambodia
SPS	-	ADB’s safeguard policy statement (2009)
SS	-	safeguards specialist
WWTP	-	wastewater treatment plant

WEIGHTS AND MEASURES

km	-	kilometer
kg	-	kilogram
ha	-	hectare

In this report, "$" refers to US.

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I. INTRODUCTION

1. The environmental management plan (EMP) for the Kampot Passenger Pier Development in Kampot Town, Kampot Province provided herein is one of two EMPs that have been prepared for the subprojects of the GMS Tourism Infrastructure for Inclusive Growth project (the project) in Cambodia. The other EMP addresses the Crab Market Environmental Improvement subproject in Kep Town neighboring Kep Province. A single Initial Environmental Examination (IEE) of both subprojects was prepared under separate cover. The separate EMPs are comprehensive and are developed as stand-alone management tools that are supported by the parent IEE.

A. Kampot Passenger Pier Development

2. The new passenger pier development consist of a pier, and supporting tourist facilities such as a customs/immigration building, car park, public toilets, and vendor kiosks. The access road to the pier will also be upgraded. Table 1 reproduces the list the subproject activities shown in the IEE.

Table 1: Summary of Components of Passenger Pier Development in Kampot

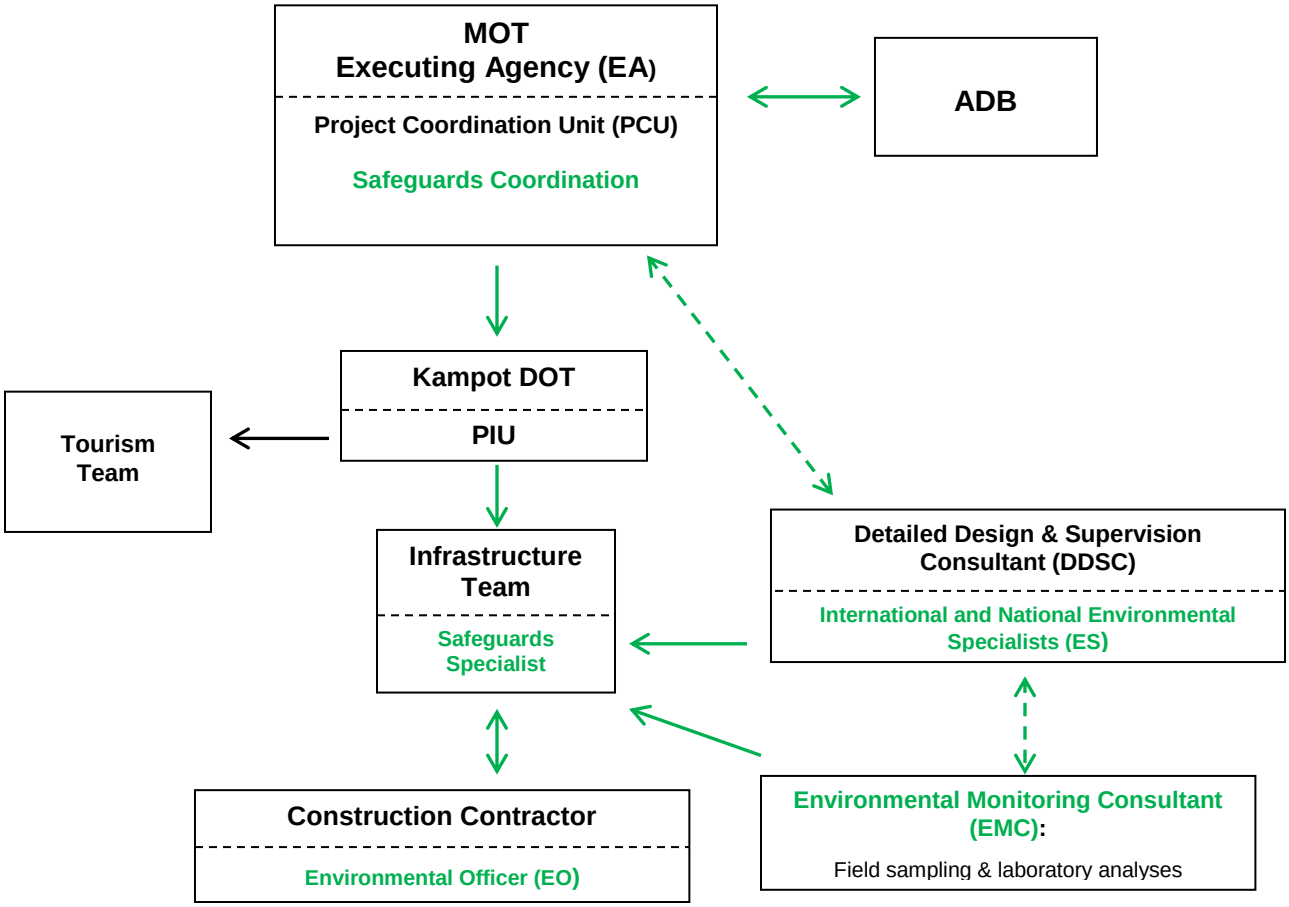
Activity	General Specifications
Upgrade existing 6.5 km access road	• 6.5 km X 6m carriageway • Concrete surface
Install new embankment stabilization structure	
Construct new internal access roads	
Construct new passenger landing area	• 1,500 m^2
Construct new jetty and pier	• suitable for tidal and flood level fluctuation;
Construct new passenger arrival/departure hall with customs/immigration offices, administration and ticket offices, landscaped tourist reception/information center	• total area of 2,500m^2 • equipment to support customs and immigration operations
Install new public toilets	• with ABR septic system
Construct new parking area	• 2,000 m^2
Build new kiosks for food, beverage and souvenir vendors	• 750m^2
Install new power supply and lighting system to all internal and external public areas	
Install new water supply using a borehole	• pumps and tanks with back up rain catch technology
Develop new solid waste management	• garbage bins
Construct new perimeter security fence	
Install directional and information signage	
Provide other supporting infrastructure utilities	

II. INSTITUTIONAL ARRANGEMENTS & RESPONSIBILITIES

3. At the feasibility stage the management framework[1] for the implementation of the environmental management plan for the subproject is summarized in Figure 1. The full project management framework for Cambodia is in Annex 1.

[1] Adapted from the Project Administration Manual.

Figure 1: Management Framework for EMP Implementation



4. The Ministry of Tourism (MOT) which is the executing agency (EA) for the project will take overall responsibility for successful implementation of the EMP. The EA will establish a Phnom Penh-based Project Coordination Unit (PCU) within the Tourism Development Department which, *inter alia*, will provide Safeguards Coordination for the EMP. The provincial Department of Tourism (DOT) in which the project implementation unit (PIU) will be created will implement the EMP with support from the PCU. The PIU will be comprised of technical teams for infrastructure and tourism. The infrastructure team will be cross appointed from the Department of Public Works and Transport (DPWT). The infrastructure team will include a Safeguards Specialist who will lead the implementation of the EMP in conjunction with the Environmental Officer(s) (EO) of the construction contractor(s).

5. The Safeguards Coordination Unit of the PCU will provide operational guidance to the PIU for implementation of the EMP and will liaise with the ADB on safeguard reporting and issues. The Safeguards Specialist of the PIU will oversee the work of the EO of the contractor on the implementation of the CEMP[2] for the particular construction package.

[2] Contractor Environmental Management Plan prepared by contractor as part of bid documents based on updated EMP

6. External support for the implementation of the EMP will be provided by the International and National Environment Specialists (ES) of the Detailed Design and Supervision Consultant (DDSC), and an external Environmental Monitoring Consultant (EMC) which will be required to conduct the field sampling and laboratory analyses of field samples (e.g., water quality, air quality) that cannot be performed by the contractor or PIU.

7. The responsibilities of the different agencies of the management framework in Figure 1 are listed in Annex 2. Provided below is a summary of responsibilities for implementation of the EMP.

8. The responsibilities of the EA as supported by PCU include:

- Provide coordination for environmental and social safeguards and monitoring;
- Liaise with ADB on the implementation of the EMP; and
- Coordinate resolution with PIU, and ADB if necessary with issues arising from the implementation of EMP.

9. The responsibilities of the Safeguards Specialist (SS) of the PIU include:

- Initially assist DDSC with updating the EMP to meet final detailed subproject designs;
- Notify DOT to verify that Government approvals of project are met, and that the EMP is compliant with requirements of Royal Government of Cambodia (RGC)sub-decree on EIA, No 72 ANRK.BK, issued by the Ministry of Environment (MOE, 1999);
- Assist the DDSC with inclusion of CEMP requirements in bidding documents, including bid evaluations, based on the updated EMP;
- Undertake day to day management of EMP implementation activities;
- Work with EMC on implementation of monitoring plan of EMP;
- Ensuring compliance with loan covenants and assurances in respect of all subprojects, including EMPs (as well as the GAP and resettlement plans);
- Lead follow-up meetings with all affected stakeholders;
- Prepare and submit quarterly reports on EMP implementation to the PCU;
- Oversee implementation of the CEMP by contractor;
- Coordinate with ES of DDSC for EMP implementation;
- Undertake regular construction site inspections to ensure contractor implements the CEMP properly; and
- Ensure the contractor's EO submits monthly reports on construction mitigations and monitoring.

10. The responsibilities of the Environmental Specialists of the DDSC are detailed in the Terms of Reference for the two positions in Annex 3. Their key responsibilities for the EMP are listed below:

- Updating the EMP to meet final detailed design requirements of subprojects;
- Provide technical direction and support to PIU for implementation of the EMP;
- Oversee the design and delivery of capacity development and training of PIU staff and the contractor's EO ;
- Provide advice and support to the EMC with their monitoring activities;
- Review all reports prepared by the PIU and EMC for PCU and ADB; and
- Review and inspect the location of any possible contaminated sites near subprojects.

11. The responsibilities of Environmental Officer (EO) of Contractor include:

- Implement the CEMP during the construction phase of subprojects; and
- Prepare and submit monthly reports on mitigation and monitoring activities of CEMP and any environmental issues at construction sites.

12. The responsibilities of Environmental Monitoring Consultant (EMC) include:

- Implement the environmental sampling required for monitoring plan of EMP that cannot be conducted by the contractor and PIU.
- Perform required laboratory analyses for the monitoring program detailed in EMP; and
- Prepare and submit quarterly reports to the PIU on monitoring activities.

13. The Department of Environment (DOE) is the provincial agency which oversees environmental management of Kampot. The DOE with district staff provide direction and support for environmental protection-related matters including application of the Law on Environmental Protection and Natural Resource Management, enacted by National Assembly, 1996, promulgated by Preah Reach Kram/NS/RKM-1296/36; and environmental standards.

14. The ADB provides guidance to EA/PCU with any issues related to EMP and reviews quarterly reports on EMP activities compiled and submitted by the PCU.

A. Worker and Community Health and Safety

15. In 2003 the International Labour Organization (ILO) created the New Global Strategy for Occupational Safety and Health (OSH). Based on the OSH[3], the Ministry of Labour and Vocational Training (MLVT) through the Department of Occupational Safety & Health is developing the Occupational Safety and Health Master Plan (OSHM; 2009-2013) of Cambodia.

16. The emerging OSHM, *inter alia,* addresses worker and public safety in the construction and operation of small-medium enterprises and notably rural roads. The EA/PCU as supported by the PIUs must obtain and implement the directives of the OSH Master Plan. The pertinent associated law and directives is the Labour Law of Cambodia (1997) with specific reference to chapter VIII governing health and welfare of workers and the public.

17. To supplement the OSHM the IFC/World Bank Environment, Health, and Safety Guidelines (2007) should also be consulted the IFC EHS guidelines currently provide the international standard for worker and public safety.

18. ADB assists the PCU with timely guidance at each stage of project implementation following agreed implementation arrangements and reviews all documents that require ADB approval including environmental safeguards.

B. Regulatory Framework and Guidelines for Kep Subproject Components

19. Regulations and guidelines that apply to the construction the new pier facility in Kampot are summarized in Table 2. The current environmental standards for Cambodia are provided in Annex 4. See the IEE for complete the legal and regulatory framework for environmental management in Kampot province.

[3] ILO. 2009. Asean-Oshnet, Occupational Safety and Health Practices.

Table 2: Regulations and Guidelines Applicable to Subproject[4].

Solid Waste Management
• Law on Environmental Protection and Natural Resources Management, enacted by National Assembly, 1996, promulgated by Preah Reach Kram/NS/RKM-1296/36; o Sub-decree on Water Pollution Control (1999): - Annex 2: Industrial effluent standards (including WWTPs); - Annex 4: Water quality standards for public water & biodiversity; and - Annex 5: Water quality standards for public waters and health. • Directive Managing Health Wastes in the Kingdom of Cambodia (MOH, 2008).

III. SUMMARY OF POTENTIAL IMPACTS

20. The potential impacts of the construction and operation of the new passenger pier including upgrading the access road are summarized from the IEE in Table 3. The potential impacts concern the civil works during the construction phase. The short-term disturbances of the construction of the pier facility, and the access road upgrades such as noise, dust, reduced access, increased traffic and risk of traffic accidents, worker and public safety, soil erosion and sedimentation of the Teuk Chuu River and solid and liquid waste can be managed and mitigated.

21. However, the projected initial increase of 10–15 daily ferry departures in/out of Teuk Chuu River as a result of the new passenger pier could negatively affect the sensitive seagrass in the nearshore of Kampot bay, and the mangroves forests along the adjacent shorelines. The increased boat traffic outside dedicated navigation lanes would destroy and damage parts of the extensive (approximately 25,000 ha) seagrass including adjacent seagrass conservation areas.

Table 3: Summary of Potential Environmental Impacts of New Passenger Pier

Pre-construction Phase
• No resettlement is anticipated for new pier, and upgraded access roads upgrades.
Construction Phase
Passenger Pier & Access Road Upgrades • Disturbances from civil works such as dust, noise, reduced public access, disrupted business, air pollution from NOx, SOx, & CO caused by increased truck traffic and heavy equipment use, soil and surface water pollution caused by equipment operation and maintenance, public and worker accidents, disruption of traffic, increased traffic accidents, land erosion and surface water sedimentation of Teuk Chuu river, drainage and flooding problems, solid and domestic waste from worker camps, social issues and community problems caused by migrant workers. • Permanent loss of roadside vegetation and local agriculture for widened carriageway of access roads.
Operation Phase
Passenger Pier • Destruction and damage of seagrass beds and seagrass conservation areas south of the mouth of Teuk Chu River in Kampot bay. • Destruction of mangrove forests along the shoreline of Kampot bay east and west of the Teuk Chuu River.

[4] From CAM IEE

Upgraded Access Road

- Significant increase in traffic (minibus, motorbike, and car) on access road to/from the new passenger pier will increase the risk and frequency of traffic accidents, and will increase noise. The concrete surface should reduce dust from the existing road.

A. Public Consultation

22. The stakeholder consultation strategy that was developed for the IEE will be continued with the start of the pre-construction phase of the subproject. The first step will be the disclosure of the draft IEE to the affected stakeholders that were consulted to obtain their review and comment.

1. Follow-up Consultation

23. As indicated in the IEE, the primary concern of the public and stakeholders of the subproject were disturbances during construction of the upgrades to roads, and the effect of the upgraded road on increased traffic, and traffic accidents. These issues plus any others will be reviewed during follow-up consultations throughout the pre-construction, construction, and operation of the completed subproject components. For example, the consultation with the Children's and Women Development Centre (CWDC) in Kampot and their role with mangrove restoration will be reviewed and asserted during project implementation. Similarly, persons consulted along the access road must be contacted at the beginning of the construction phase.

IV. MITIGATION PLAN

24. The mitigation measures of the EMP are presented in the mitigation plan for the subproject in Table 4.Following the structure of the IEE, the mitigation plan is organized by the three development phases of the subproject defined by the pre-construction; construction; and the post construction operational phase. The mitigation plan addresses the environmental issues and concerns raised at the stakeholder meetings.

25. The mitigation plan combines construction phase impacts common to the access road upgrades and the passenger pier for which single mitigation measures are prescribed. In this way redundant mitigation measures are not re-stated numerous times. However, impacts and required mitigations specific to a subproject component are also identified. Or, common mitigations that are particularly important for a subproject component are underscored.

26. The mitigation plan identifies potential impacts, required mitigations, responsible parties, location, timing, and indicative costs. The mitigation plan is decidedly comprehensive in order for it to be easily updated at the detailed design phase to fully address the potential impacts of the final subproject designs.

Table 4: Environmental Impact Mitigation Plan

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
Pre-Construction, Detailed Design Phase								
Confirmation of no required resettlement, relocations, & compensation	No negative environmental impacts	1. Affected persons well informed well ahead of subproject implementation.	All affected persons in subproject areas	Before project implemented	See resettlement plans	See resettlement plan	PIU/SS	Resettlement committees
Disclosure, & engagement of community	No community impacts	2. Initiate Information Disclosure and Grievance process of IEE	For all construction sites.	Beginning of project	Quarterly	No marginal cost[6]	PIU/SS	PIU
Government approvals	No negative impact	3. Notify DoE of subproject initiation to complete EA requirements, and obtain required project permits and certificates.	Entire subproject	Before construction	As required	No marginal cost	PIU/DoE	DoE
Detailed designs of subproject,	Minimize negative environmental impacts	4. Work with DDSC[7] to complete detailed designs of the upgraded access road, and passenger pier. Ensure the following measures are included: a) identification of spill management prevention plans, and emergency response plans for all construction sites; b) no disturbance or damage to culture property and values; c) no, or minimal acquisition of agriculture or forested lands. d) locate aggregate borrow pits and rock supply areas away from human settlements with fencing and access barriers; e) no, or minimal disruption to village water supplies along access roads, utilities, and electricity with contingency plans for unavoidable disruptions; f) no, or minimal disruption to normal pedestrian and vehicle traffic along all road segments with contingency alternate routes; g) for residential areas include specific plan to notify & provide residents and merchants of construction activities & schedule to minimize disruption to normal commercial and residential activities. h) finalize disposal site for ABR septage with MOE	Final siting	Before construction initiated	Once with detailed designs documents	No, marginal cost	DDSC	EA/PIU

[5] Costs will need to be updated during detailed design phase.
[6] No marginal cost indicates that costs to implement mitigation are to be built into cost estimates of bids of contractors
[7] DDSC is detailed design and supervision consultant.

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
Establish expert committee to develop navigation management plan &and regulations for Teuk Chuu river & Kampot bay	Prevent loss or damage to seagrass and mangroves	5. Committee to be formed comprised of DoT, DAFF, DPWT, DoE, other marine navigation authorities, and Kampot cargo & fishing boat associations to review navigation needs, existing reports, and required studies needed to produce data/information necessary develop navigation management plan and regulations 6. Committee to develop scope of management plan, (e.g. buoyed navigation lanes, seagrass and mangrove zones markers, signage, allowable boat speeds, and boat drafts, seasonal (water depth) specifications)	Teuk Chuu river below passenger pier and nearshore Kampot bay	Before construction	Once	No marginal cost	DDSC / Committee	DDSC/PIU
Develop draft navigation management plan & and regulations	Prevent loss or damage to seagrass and mangroves	7. Review draft plan to ensure it addresses expected increase in boat traffic to/from river	Teuk Chuu river below passenger pier and nearshore Kampot bay	Before construction	Once	tbd	DDSC / M/DoT, M/DAFF, M/DoE,	DDSC/PIU
Update EMP	Positive environmental impacts	8. Confirm siting of passenger pier facilities with DoE/DPWT 9. Review finalized RoW of upgraded access road to confirm absence of valued ecological or cultural resources. 10. Identify any new potential environmental impacts of subproject and include in EMP. 11. Update mitigation measures and monitoring requirements of EMP where necessary to meet detailed designs, and to protect affected environments. 12. Submit updated EMP with new potential impacts to ADB to review. 13. Develop individual management subplans for: a) Construction drainage; b) Erosion; c) Noise and Dust; d) Contaminated Spoil Disposal; e) Solid and Liquid Waste Disposal; f) Construction & Urban Traffic; g) Utility and Power Disruption; h) Worker and Public Safety; i) Tree and Vegetation Removal and Site Restoration; j) Construction Materials Acquisition, Transport, & Storage, and k) Cultural chance finds.	All sites	Before construction initiated	Once with detailed designs documents		DDSC	EA/PIU
Create awareness of physical cultural	No negative environmental impact	14. DoT to review potential locations of physical cultural resources, and explain possible PCR to contractors and DDSC	All subproject areas	Before construction begins	Once	No marginal cost	DoT	DoT/PIU

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
resources in area								
Confirm Government approved construction waste disposal sites	No negative impact	15. Notify DoE, DAFF, and DPWT to confirm locations of sites for borrow pits and disposal areas for construction and hazardous waste for subprojects, and obtain required permits.	Entire subproject	Before construction	As required	No marginal cost	PIU/DoE/ DAFF/DPWT	PIU
UXO survey, & removal	Injured worker or public	16. Ensure Government is consulted for UXO, and clears areas where necessary	All construction sites.	Beginning of subproject	Once	See Monitoring Plan below	EA/PIU	Government
Obtain & activate permits and licenses	Prevent or minimize impacts	17. Contractors to comply with all statutory requirements set out by Government for use of construction equipment, and operation construction plants such as concrete batching.	For all construction sites	Beginning of construction	Once	No marginal cost	DDSC	PIU & contractors
Develop bid documents	No negative environmental impact	18. Ensure updated EMP is included in contractor tender documents, and that tender documents specify requirements of CEMP must be budgeted. 19. Specify in bid documents that contractor must have experience with implementing EMPs, or provide staff with the experience.	All subproject areas	Before construction begins	Once for all tenders	No marginal cost	DDSC	PIU
Capacity development	No negative environmental impact	20. Develop and schedule training plan for (PIU/SS) to be able to fully implement EMP, and to manage implementation of mitigation measures by contractors. 21. Create awareness and training plan for contractors whom will implement mitigation measures.	All subproject areas	Before construction begins	Initially, refresher later if needed	No marginal cost	DDSC	DDSC
Recruitment of workers	Spread of sexually transmitted disease	22. Use local workers as much as possible thereby reducing number of migrant worker	All work forces.	Throughout construction phase	Worker hiring stages	No marginal cost	EA/PIU	Contractor's bid documents
Construction Phase of Passenger Pier, and Upgrades to Access Road								
Initiate EMP & sub-plans,	Prevent or minimize impacts	23. Initiate updated EMP & CEMP including individual management sub-plans for different potential impact areas that are completed in pre-construction phase (see sub-plan guidance below).	For all construction sites	Beginning of construction	Once	No marginal cost	DDSC	PIU & contractors
Worker camps	Pollution and social problems	24. Locate worker camps away from human settlements. 25. Ensure adequate housing and waste disposal facilities including pit latrines and garbage cans. 26. A solid waste collection program must be established and implemented that maintains a clean worker camps 27. Locate separate pit latrines for male and female	All worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC/PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		workers away from worker living and eating areas. 28. A clean-out or infill schedule for pit latrines must be established and implemented to ensure working latrines are available at all times. 29. Worker camps must have adequate drainage. 30. Local food should be provided to worker camps. Guns and weapons not allowed in camps. 31. Transient workers should not be allowed to interact with the local community. HIV/Aids education should be given to workers. 32. Camp areas must be restored to original condition after construction completed.						
Training & capacity	Prevent of impacts through education	33. Implement training and awareness plan for PIU/SS and contractors.	PIU office, construction sites	Beginning of construction	After each event	No marginal cost	DDSC	DDSC/PIU
Implement construction materials acquisition, transport, and storage sub-plan	Pollution, injury, increased traffic, disrupted access	34. All borrow pits and quarries should be approved by DoE. 35. Select pits and quarries in areas with low gradient and as close as possible to construction sites. 36. Required aggregate volumes must be carefully calculated prior to extraction to prevent wastage. 37. Pits and quarries should not be located near surface waters, forested areas, critical habitat for wildlife, or cultural property or values. 38. If aggregate mining from fluvial environments is required small streams and rivers should be used, and dry alluvial plains preferred. 39. All topsoil and overburden removed should be stockpiled for later restoration. 40. All borrow pits and quarries should have a fence perimeter with signage to keep public away. 41. After use pits and quarries should be dewatered and permanent fences installed with signage to keep public out, and restored as much as possible using original overburden and topsoil. 42. Unstable slope conditions in/adjacent to the quarry or pit caused by the extractions should be rectified with tree planting. 43. Define & schedule how materials are extracted from borrow pits and rock quarries, transported, and handled & stored at sites.	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC/PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		44. Define and schedule how fabricated materials such as steel, wood structures, and scaffolding will transported and handled. 45. All aggregate loads on trucks should be covered.						
DBST production, and application (if used)	Air pollution, land and water contamination, and traffic & access problems,	46. Piles of aggregates at sites should be used/or removed promptly, or covered and placed in non traffic areas 47. Stored DBST materials well away from all human activity and settlements, and cultural (e.g., schools, hospitals), and ecological receptors. Bitumen production and handling areas should be isolated. 48. Contractors must be well trained and experienced with the production, handling, and application of bitumen. 49. All spills should be cleaned immediately and handled as per hazardous waste management plan, and according to Government regulations. 50. Bitumen should only be spread on designated road beds, not on other land, near or in any surface waters, or near any human activities. 51. Bitumen should not be used as a fuel.	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Implement spoil management subplan	Contamination of land and surface waters from excavated spoil, and construction waste	52. Uncontaminated spoil to be disposed of in Government -designated sites, which must never be in or adjacent surface waters. Designated sites must be clearly marked and identified. 53. Spoil must not be disposed of on sloped land, near cultural property or values, ecologically important areas, or on/near any other culturally or ecologically sensitive feature. 54. Where possible spoil should be used at other construction sites, or disposed in spent quarries or borrow pits. 55. A record of type, estimated volume, and source of disposed spoil must be recorded. 56. Contaminated spoil disposal must follow Government regulations including handling, transport, treatment (if necessary), and disposal. 57. Suspected contaminated soil must be tested, and disposed of in designated sites identified as per Government regulations. 58. Before treatment or disposal contaminated spoil must be covered with plastic and isolated from all human activity.	All excavation areas	Throughout construction phase	Monthly	See Monitoring Plan for contaminated soil analyses	DDSC & PIU & DoE	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
Implement solid and liquid construction waste sub-plan	Contamination of land and surface waters from construction waste	59. Management of general solid and liquid waste of construction will follow Government regulations, and will cover, collection, handling, transport, recycling, and disposal of waste created from construction activities and worker force. 60. Areas of disposal of solid and liquid waste to be determined by Government. 61. Disposed of waste should be catalogued for type, estimated weigh, and source. 62. Construction sites should have large garbage bins. 63. A schedule of solid and liquid waste pickup and disposal must be established and followed that ensures construction sites are as clean as possible. 64. Solid waste should be separated and recyclables sold to buyers in community. <u>Hazardous Waste</u> 65. Collection, storage, transport, and disposal of hazardous waste such as used oils, gasoline, paint, and other toxics must follow Government regulations. 66. Wastes should be separated (e.g., hydrocarbons, batteries, paints, organic solvents) 67. Wastes must be stored above ground in closed, well labeled, ventilated plastic bins in good condition well away from construction activity areas, all surface water, water supplies, and cultural and ecological sensitive receptors. 68. All spills must be cleaned up completely with all contaminated soil removed and handled with by contaminated spoil sub-plan.	All construction sites and worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU & DoE	contractor
Implement noise and dust sub-plan	Dust Noise	69. Regularly apply wetting agents to exposed soil and construction roads. 70. Cover or keep moist all stockpiles of construction aggregates, and all truck loads of aggregates. 71. Minimize time that excavations and exposed soil are left open/exposed. Backfill immediately after work is completed. 72. As much as possible restrict working time between 07:00 and 17:00. In particular are activities such as pile driving. 73. Maintain equipment in proper working order 74. Replace unnecessarily noisy vehicles and machinery. 75. Vehicles and machinery to be turned off when not in	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		use. 76. Construct temporary noise barriers around excessively noisy activity areas where possible.						
Implement utility and power disruption sub-plan	Loss or disruption of utilities and services such as water supply and electricity	77. Develop carefully a plan of days and locations where outages in utilities and services will occur, or are expected. 78. Contact local utilities and services with schedule, and identify possible contingency back-up plans for outages. 79. Contact affected community to inform them of planned outages. 80. Try to schedule all outages during low use time such between 24:00 and 06:00.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU & Utility company	contractor
Implement tree and vegetation removal, and site restoration sub-plan	Damage or loss of trees, vegetation, and landscape	81. Contact provincial forestry department for advice on how to minimize damage to trees and vegetation 82. Restrict tree and vegetation removal to within RoWs. No tree cutting near Kep national park. 83. Within RoWs minimize removals, and install protective physical barriers around trees that do not need to be removed. 84. All RoWs to be re-vegetated and landscaped after construction completed. Consult provincial forestry department to determine the most successful restoration strategy and techniques. Three trees should be replanted for each tree that has to be removed.	All construction sites.	Beginning and end of subproject	Monthly	No marginal cost	DDSC & PIU	contractor
Implement erosion control sub-plan	Land erosion	85. Berms, and plastic sheet fencing should be placed around all excavations and earthwork areas. 86. Earthworks should be conducted during dry periods. 87. Maintain a stockpile of topsoil for immediate site restoration following backfilling. 88. Protect exposed or cut slopes with planted vegetation, and have a slope stabilization protocol ready. 89. Re-vegetate all soil exposure areas immediately after work is completed.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Implement worker and public safety sub-plan	Public and worker injury, and health	90. Proper fencing, protective barriers, and buffer zones should be provided around all construction sites. 91. Sufficient signage and information disclosure, and site supervisors and night guards should be placed at all sites. 92. Worker and public safety guidelines Government should be followed. See draft Occupational Safety &	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		Health Master Plan of Ministry of Labor & Vocational Training (MLVT)). 93. Population near blast areas should be notified 24 hrs ahead, and evacuated well before operation. Accepted Government blast procedures and safety measures implemented. 94. Speed limits suitable for the size and type of construction vehicles, and current traffic patterns should be developed, posted, and enforced on all roads used by construction vehicles in Kampot. 95. Standing water suitable for disease vector breeding should be filled in. 96. Worker education and awareness seminars for construction hazards should be given at beginning of construction phase, and at ideal frequency of monthly. A construction site safety program should be developed and distributed to workers. 97. Appropriate safety clothing and footwear should be mandatory for all construction workers. 98. Adequate medical services must be on site or nearby all construction sites. 99. Drinking water must be provided at all construction sites. 100. Sufficient lighting be used during necessary night work. 101. All construction sites should be examined daily to ensure unsafe conditions are removed.						
Civil works	Degradation of water quality & aquatic resources	102. Protective coffer dams, berms, plastic sheet fencing, or silt curtains should be placed between all earthworks and nearby surface waters. 103. Erosion channels must be built around aggregate stockpile areas to contain rain-induced erosion. 104. Earthworks should be conducted during dry periods. 105. All construction fluids such as oils, and fuels should be stored and handled well away from surface waters. 106. No waste of any kind is to be thrown in surface waters. 107. No washing or repair of machinery near surface waters. 108. Pit latrines to be located well away from surface waters. 109. No unnecessary earthworks in or adjacent to water courses. 110. No aggregate mining from rivers or lakes. 111. All irrigation canals and channels to be protected the	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		same way as rivers, streams, and lakes						
Civil works	Degradation of terrestrial resources	112. All construction sites should be located away forested or all plantation areas as much as possible. 113. No unnecessary cutting of trees. 114. All construction fluids such as oils, and fuels should be stored and handled well away from forested and plantation areas. 115. No waste of any kind is to be discarded on land or in forests/plantations.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Implement construction and urban traffic sub-plan	Traffic disruption, accidents, public injury	116. Schedule construction vehicle activity during light traffic periods. Create adequate traffic detours, and sufficient signage & warning lights. 117. Post speed limits, and create dedicated construction vehicle roads or lanes. 118. Inform community of location of construction traffic areas, and provide them with directions on how to best co-exist with construction vehicles on their roads. 119. Demarcate additional locations where pedestrians can develop road crossings away from construction areas. 120. Increase road and walkway lighting.	All construction sites	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor
Implement construction drainage sub-plan	Loss of drainage & flood storage	121. Provide adequate short-term drainage away from construction sites to prevent ponding and flooding. 122. Manage to not allow borrow pits and quarries to fill with water. Pump periodically to land infiltration or nearby water courses. 123. Install temporary storm drains or ditches for construction sites 124. Ensure connections among surface waters (ponds, streams) are maintained or enhanced to sustain existing storm water storage capacity. 125. Protect surface waters from silt and eroded soil.	All areas with surface waters	Design & construction phases	Monthly	No marginal cost	DDSC & PIU	contractor
Civil works: cultural chance finds sub-plan	Damage to cultural property or values, and chance finds	126. As per detailed designs all civil works should be located away from all cultural property and values. DoT identified potential sites and types of PCR in pre-con phase. 127. Chance finds of valued relics and cultural values should be anticipated by contractors. Site supervisors should be on the watch for finds. 128. Upon a chance find all work stops immediately, find left untouched, and PIU notified to determine if find is valuable. Culture section of DoT notified by telephone if	All construction sites	At the start , and throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[5] ($)	Responsibility	
							Supervision	Implementation
		valuable. 129. Work at find site will remain stopped until DoT allows work to continue.						
Post-construction Operation of Upgraded Access Road to Passenger Pier								
Operation of upgraded access road	Increased risk of accident or injury.	130. Enforce well marked speed limits, provide guard rails along road where needed, and educate village communities on new road safety.	Upgraded access road	Fulltime	Biannual	O&M	DPWT	
	Increased air pollution & noise	131. Ensure vehicles maintained in proper working condition	Upgraded access road	Periodic checks	Biannual	O&M	DPWT	
Post-construction Operation of New Passenger Pier								
Operation of passenger pier	Boat accidents Damage to seagrass beds and mangrove forests	132. Implement special navigation plan and regulations for boat traffic in river and nearshore Kampot bay (see IEE).	Teuk Chuu river and nearshore Kampot bay	Continuously	Biannual	O&M	DPWT	
Operation of passenger pier	Solid, & domestic, waste at pier facility, and boat pollution	133. Ensure solid and domestic waste management facilities and plans are implemented properly. Ensure all passenger boats are maintained properly, and gas and oils are handled and stored on pier site properly.	Access road, pier facility, Teuk Chuu river	Continuously	Biannual	O&M	DPWT	

V. MONITORING PLAN

27. The environmental monitoring plan for the EMP is provided in Table 5. The monitoring plan focuses on all three phases (pre-construction, construction, post-construction operation) of the access road and passenger pier and consists of environmental indicators, the sampling locations and frequency, method of data collection, responsible parties, and estimated costs. The purpose of the monitoring plan is to determine the effectiveness of the impact mitigations, and to document any unexpected positive or negative environmental impacts of the subproject.

A. Environmental Standards for Subproject Components

28. Environmental standards for ambient water quality for Cambodia are found in Annex 4. The environmental standards provided by the Environmental, Health and Safety Guidelines of the IFC/World Bank (2007) (e.g., ambient air quality and noise) should be followed to supplement standards that are not provided by the Government.

29. An independent environmental monitoring consultant (EMC) will be required to implement the environmental monitoring program. The EMC will be responsible for the sampling of environmental parameters that must be analyzed in a laboratory. The SS and EO will coordinate with the EMC. The DDSC/PIU will provide logistical support to the EMC where necessary for the implementation of environmental monitoring plan.

30. After construction is completed and the pier is in operation the impact on traffic patterns and frequency of accidents should be monitored by the DPWT. The natural environment of the site should be monitored by the DOT with assistance from the DOE.

B. Performance Monitoring

31. Performance monitoring is required to assess the overall performance of the EMP. A project performance monitoring system will be developed by the EA for the entire subproject. Select indicators of major components of the environment that will be affected primarily by the construction phase are drawn from the mitigation and monitoring plans and summarized in Table 6.

VI. REPORTING

32. Regular reporting on the implementation of mitigation measures and on monitoring activities during construction phase of the subproject is required. Reporting is the responsibility of PIU and should be conducted in conjunction with regular meetings with stakeholders as part of the continuation of stakeholder communications. The mitigation and monitoring plans (Table 4 and Table 5) summarize proposed timing of reporting. A report on environmental monitoring and implementation of EMP will be prepared quarterly for the EA/PCU by the PIU. The PIU report will compile monthly reports provided by the EO of contractor, the reports of the EMC on monitoring, and input from the ES of the DDSC. The PIU report will also be sent to the DOE and to the PCU for consolidation and transmission to ADB. The reports will assess all indicators measured with the monitoring plan of EMP including performance monitoring indicators (Table 6), and will include relevant Government environmental quality standards. Templates for the monitoring reports to be prepared by the EO, PIU, and EMC will be developed by the ES of the DDSC at detailed design.

Table 5: Environmental Monitoring Plan

ENVIRONMENTAL EFFECTS MONITORING							
Environmental Indicators	**Location**	**Means of Monitoring**	**Frequency**	**Reporting**	**Responsibility** Supervision / Implementation		**Estimated Cost (USD)**
					Supervision	**Implementation**	
Pre-construction Phase – Update Baseline Conditions							
Update baseline on sensitive receptors (e.g., cultural property & values, schools or hospitals, rare/endangered species, critical habitat), and aquatic resources and human	A) Final ROW for access road upgrades, B) Passenger pier site; and C) Mouth of Teuk Chuu river & nearshore Kampot bay	Original field work, literature survey, community consultations	Once	Once	EA/PIU	Environmental Monitoring Consultant	$3,000.
A) Air quality: dust, CO, NOx, SOx, noise, wind, temperature, and vibration levels B) Affected surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, pH, DO, COD, BOD_5, temperature, TDS, NH_3, NH_4, other nutrient forms of N & P	A): At three sites along access road B): Teuk Chuu river below pier site	Using field and analytical methods approved by DoE.	One day and one night measurement during rainy & dry seasons.	One baseline supplement report before construction phase starts	PIU	Environmental Monitoring Consultant	A) $3,000. B) $4,000
Inventory of present and past land uses that could cause contaminated soil.	Possible contaminated lands at all excavation sites	Using field and analytical methods approved by DoE.	Once	Once	PIU	Environmental Monitoring Consultant	$500.
Construction Phase of Passenger Pier, and Access Road Upgrades							
Analysis of soil quality (heavy metals (As, Cd, Pb, oil & grease, hydrocarbons).	Possible contaminated lands at all excavation sites	Using field and analytical methods approved by DoE.	Once if needed	Once	PIU	Environmental Monitoring Consultant	$2,000.
A) Air quality: dust, CO, NOx, SOx, noise, wind, temperature, and vibration levels B) Affected surface water quality: TSS, heavy metals (As, Cd, Pb) oil and grease, pH, DO, COD, BOD_5, temperature, TDS, NH_3, NH_4, other nutrient forms of N & P C) Analysis of soil quality (heavy metals (As, Cd, Pb, Hg, Mn) and hydrocarbons. D) Domestic (worker) and construction solid waste inside & outside construction sites including worker camps. E) Public comments and	A & B): Baseline sites of pre-construction phase. C) At sites where contaminated soil is suspected. D) All construction sites and worker camps E) Using hotline number	A – C: Using field and analytical methods approved by DoE. Include visual observations of dust and noise from contractor & public reports. D) Visual observation E) Information transferred by	(A – B): Quarterly during construction periods Daily visual records C) Once at start of excavations D) Monthly	Monthly	(A - D):		
					PIU	Monitoring Consultant	A & B: $8,000/yr C: $1,500/yr D: $0.0

ENVIRONMENTAL EFFECTS MONITORING							
Environmental Indicators	**Location**	**Means of Monitoring**	**Frequency**	**Reporting**	**Responsibility** Supervision / Implementation		**Estimated Cost (USD)**
					Supervision	**Implementation**	
complaints	placed at construction areas	telephone hotline number posted at all construction sites.	E) Continuous public input		(E & F) & daily observations:		
F) Incidence of worker or public accident or injury	F) At all construction areas	F) regular reporting by contractors/PIU	F) Continuous		EA/PIU	contractor	E: $1,000./yr F: $0.0
Operation of Upgraded Access Road							
Air quality: dust, CO, NOx, SOx, noise and vibration levels	Baseline sites of pre-construction phase.	Using field and analytical methods approved by DoE.	Quarterly for 5 years	Biannual	DPWT		$3,000/yr
Traffic accidents	Upgraded road.	Regular record keeping.	Continuously	For each event	DPWT		$0.0
Incidence of flooding	Adjacent to upgraded road	Surveys, public complaints	Seasonal for 5 years	Seasonal	DPWT		$500/yr
Operation of Passenger Pier and Facilities							
Incidence of garbage and litter	Along access road and at pier facility	Visual inspection	Weekly	Quarterly	MoT		O&M
Water quality of Teuk Chuu river below pier site: TSS, heavy metals (As, Cd, Pb,) oil and grease, pH, DO, COD, BOD_5, temperature, TDS, NH_3, NH_4, other nutrient forms of N & P	At sampling sites of pre-construction phase	Using field and analytical methods approved by DoE.	Biannually	Biannually	DPWT/DoE		$3000/yr
Incidence of boat accidents	Near and downstream of passenger pier	Visual inspection / reports	Biannually	Biannually	DPWT/DoE		O&M

Table 6. Performance Monitoring Indicators for New Passenger Pier & Access Road

Major Environmental Component	Key Indicator	Performance Objective	Data Source
Pre-construction Phase			
Public Consultation and Disclosure	Affected public and stakeholders	Meetings with stakeholders contacted during IEE & new stakeholders convened for follow-up consultation and to introduce grievance mechanism	Minutes of meeting, and participants list
EMP	Updated EMP	All stakeholders contacted during IEE re-contacted for follow-up consultation	EMP
Bid Documents	Requirements of EMP (CEMP)[8]	EMP appended to bidding documents with clear instructions to bidders for CEMP	Bid documents
Training of PMU/PIU/SS	Training course(s) & schedule	By end of preconstruction phase, required course(s) that will be delivered are designed and scheduled	Course(s) outline, participants, and schedule
Construction Phase			
All subproject areas	Critical habitat, rare or endangered species *if present*	All *present* critical habitat and R & E species if unchanged, and unharmed	Monitoring by EMC[9]
Groundwater quality	Heavy metals, coliform bacteria, TDS, H_2S, BOD_5, TN, NH_3, TP, nutrient forms of N & P[10]	Government environmental standards and criteria met	Monitoring by EMC
Surface water quality	TSS, DO, BOD, COD, pH, oil & grease, nutrient forms of T & N, metals (Pb, Fe, As)[11]	Government environmental standards and criteria met	Monitoring by EMC
Air quality	SOx, NOx, dust, , CO, noise, vibration	Levels never exceed pre-construction baseline levels	EMC & contractor monitoring reports,
Soil quality	Solid and liquid waste	Rigorous program of procedures and rules to collect and store all waste from construction camps and sites practiced.	Contractor and EMC monitoring reports
Hazardous materials and waste	Oil, gasoline, grease, alum, chlorine, soda	Rigorous program of procedures to manage and store all waste from construction camps and sites practiced.	Contractor and EMC monitoring reports
Public and worker safety	Frequency of injuries	Adherence to Government policy and site-specific procedures to prevent accidents[12]	Contractor reports
Cultural property	Incidence of damage or complaints	No valued cultural property, or unearthed valuable relic is harmed in any way	Public input, contractor reports, public input, EMC reports

[8] Contractor Environmental Management Plan developed from EMP in contractor bidding document
[9] Environmental Monitoring Consultant hired to assist implementation of Environmental Monitoring Plan
[10] See Annex 4 for environmental standards, analyzed by laboratory facilities in Phnom Penh.
[11] Footnote 11
[12] MLVT's new Occupational Safety & Health Master Plan needs to be applied , *or*IFC World Bank EHS (2007)

Major Environmental Component	Key Indicator	Performance Objective	Data Source
Traffic	Frequency of disruptions and/or blocked roadways	Disruptions, stoppages, or detours are managed to absolute minimum.	Public input, contractor reports, EMC reports
Operation Phase of Upgraded Road			
Traffic safety	Frequency of accidents	No increase in pre-construction frequency	DPWT
Air quality	SOx, NOx, dust, CO, noise along upgraded road	Levels never exceed pre-construction baseline levels	D/MOE
Operation of Passenger Pier			
Human safety	Incidence of boat accidents/collisions, worker-public injury	Zero incidence	DPWT/marine ports & waterways
Water quality	Oils and grease, nitrogen, solid waste	Compliance with Government standards (Annex 4)	DOE

VII. ESTIMATED COST OF EMP

33. The marginal costs for implementing the EMP are primarily for environmental monitoring because the costs for implementing impact mitigation measures during the construction phase are included with the construction costs in contractor bid documents.

34. From Table 5 the preliminary costs for the implementation of the EMP for the passenger pier development in Kampot are summarized in Table 7. These costs include per diem technician fees. Note that a margin of cost uncertainty/contingency to the total EMP cost has been added. These costs include per diem technician fees.

35. An estimated budget of $15,000 is required for capacity building for environmental management in conjunction with other capacity development activities of the project such as occurring as part of Output 3. The costs will need to be reviewed and updated by the DDSC in conjunction with the PIU during the pre-construction phase.

Table 7: Estimated costs for Environmental Monitoring Plan of EMP

Activity Type	Estimated Cost (USD)
Pre-construction Phase	
Updating Environmental Baseline	
cultural receptors	$3,000
environmental quality	$7,500
Construction Phase	
environmental quality	$21,000
public consultation	$2,000
Post-construction Operation Phase	
environmental quality	$27,000
public input	$2,500
Total	**$63,000**

VIII. EMERGENCY RESPONSE PLAN

36. The Contractor must develop emergency or incident response procedures during construction. In the operational phase the operator/civil authorities will have responsibility for any emergencies or serious incidents. The construction phase should ensure:

i) Emergency Response Team (ERT) of the Contractor as initial responder;
ii) The District fire and police departments, emergency medical service, the Department of Public Health (DPH), collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

37. The Contractor will provide and sustain the required technical, human and financial resources for quick response during construction.

Table 8: Roles and Responsibilities in Emergency Incident Response

Entity	Responsibilities
Contractor Team (ERT)	- Communicates / alerts the EERT. - Prepares the emergency site to facilitate the response action of the EERT, e.g., vacating, clearing, restricting site. - When necessary & requested by the EERT, lends support / provides assistance during EERT's response operations.
External Emergency Response Team (EERT)	- Solves the emergency/incident
Contractor Resources	- Provide and sustain the people, equipment, tools and funds necessary to ensure Subproject's quick response to emergency situations. - Maintain good communication lines with the EERT to ensure prompt help response & adequate protection, by keeping them informed of subproject progress.

38. The ERT will be led by the Contractor's senior engineer (designated ERTL) on site with a suitably trained foreman or junior engineer as deputy. Trained first-aiders and security crew will be the core members of the ERT.

39. The Contractor will ensure that ERT members are physically, technically and psychologically fit for their emergency response roles and responsibilities.

40. Prior to the mobilization of civil works, the Contractor, through its Construction Manager, ERTL, in coordination with the PCU/PIU, will meet with the ultimate response institutions to discuss the overall construction process, including, but not limited to:

i) Subproject sites;
ii) construction time frame and phasing;
iii) any special construction techniques and equipment that will be used; i
iv) any hazardous materials that will be brought to and stored in the construction premise and details on their applications and handling/management system;
v) the Contractor's Emergency Management Plan
vi) names and contact details of the ERT members

41. The objective of this meeting is to provide the ultimate response institutions the context for:

i) their comments on the adequacy of the respective Emergency Management Plans
ii) their own assessment of what types, likely magnitude and likely incidence rate of potential hazards are anticipated
iii) the arrangements for coordination and collaboration.

42. To ensure effective emergency response, prior to mobilization of civil works, the Contractor will:

i) set up the ERT;
ii) set up all support equipment and facilities in working condition
iii) made arrangements with the EERT;
iv) conducted proper training of ERT members, and encouraged and trained volunteers from the work force;
v) conduct orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and
vi) conduct drills for different possible situations.

43. To sustain effective emergency response throughout subproject implementation an adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism, the emergency response equipment, tools, facilities and supplies. Drills and reminders will take place regularly, the former at least every two months and the latter at least every month.

A. Alert Procedures

44. Means of communicating, reporting and alerting an emergency situation may be any combination of the following: (i) audible alarm (siren, bell or gong); (ii) visual alarm (blinking/rotating red light or orange safety flag); (iii) telephone (landline); (iv) mobile phone; (v) two-way radio; and (vi) public address system/loud speakers. Some rules relative to communicating/alerting will be:

(i) Whoever detects an emergency situation first shall immediately :
- call the attention of other people in the emergency site,
- sound the nearest alarm, and/or
- report/communicate the emergency situation to the ERT.

(ii) Only the ERTL and, if ERTL is not available, the Deputy ERTL are authorized to communicate with the EERT. Exceptional cases to this rule may be necessary and should be defined in the Emergency Management Plans.

(iii) When communicating/alerting an emergency to the EERT, it is important to provide them with at least: (i) the type of emergency situation; (ii) correct location of the emergency; (iii) estimated magnitude of the situation; (iv) estimated persons harmed; (v) time it happened; (vi) in case of a spill, which hazardous substance spilled; and (vii) in case of fire and explosion, what caused it. Such details would allow the EERT to prepare for the appropriate response actions.

For an effective reporting/alerting of an emergency situation:

(i) The names and contact details of the relevant persons and institutions should be readily available in, or near to, all forms of communication equipment, and strategically posted (at legible size) in all Subproject sites and vehicles:
   - Most relevant construction/operations staffs namely, the ERTL, Deputy ERTL, first-aiders, supervising engineers, foremen
   - EERT institutions/organizations
   - Concerned village authority/ies
   - PIU Office, SS

(ii) All subproject sites should have good access to any combination of audible and visual alarms, landline phones, mobile phones and two-way radio communication at all times.

(iii) Contractor's construction vehicles should also be equipped with the appropriate communication facilities.

B. Emergency Response Situations

45. The following tables suggest general procedures that will be refined in the final EMP during detailed design, and described in more detail in the Emergency Management Plans of the Contractor.

Table 9: Evacuation Procedure

Procedure	Remarks
• Move out as quickly as possible as a group, but avoid panic.	• All workers/staff, sub-contractors, site visitors to move out, guided by the ERT.
• Evacuate through the directed evacuation route.	• The safe evacuation shall have been determined fast by the ERTL/Deputy ERTL & immediately communicated to ERT members.
• Keep moving until everyone is safely away from the emergency site and its influence area.	• A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
• Once outside, conduct head counts.	• Foremen to do head counts of their subgroups; ERTL/Deputy ERTL of the ERT.
• Report missing persons to EERT immediately.	• ERTL/Deputy ERTL to communicate with the EERT.
• Assist the injured in evacuation & hand them over to the ERT first-aiders or EERT medical group	• ERT to manage injured persons to ensure proper handling.
• If injury warrants special care, DO NOT MOVE them, unless necessary & instructed/directed by the EERT.	• ERTL/Deputy ERTL communicates with EERT to get instructions/directions in handling the injured.

Table 10: Response Procedure during Medical Emergency

Procedure	Remarks
• Administer First Aid regardless of severity immediately.	• Fundamentals when giving First Aid: - Safety first of both the rescuer and the victim. - Do not move an injured person unless: - victim is exposed to more danger when left where they are, e.g., during fire, chemical spill - it would be impossible for EERT to aid victims in their locations, e.g., under a

Procedure	Remarks
	collapsed structure - instructed or directed by the EERT. • First Aid to be conducted only by a person who has been properly trained in giving First Aid.
• Call the EERT emergency medical services &/or nearest hospital.	• ERTL/Deputy ERTL or authorized on-site emergency communicator
• Facilitate leading the EERT to the emergency site.	• ERTL/Deputy ERTL to instruct: - an ERT member on- site to meet EERT in access road/strategic location. He/she shall hold orange safety flag to get their attention & lead them to site. - Other ERT members to clear access road for smooth passage of the EERT.
• If applicable, vacate site & influence area at once, restrict site, suspend work until further notice.	• Follow evacuation procedure.

Table 11: Response Procedure in Case of Fire

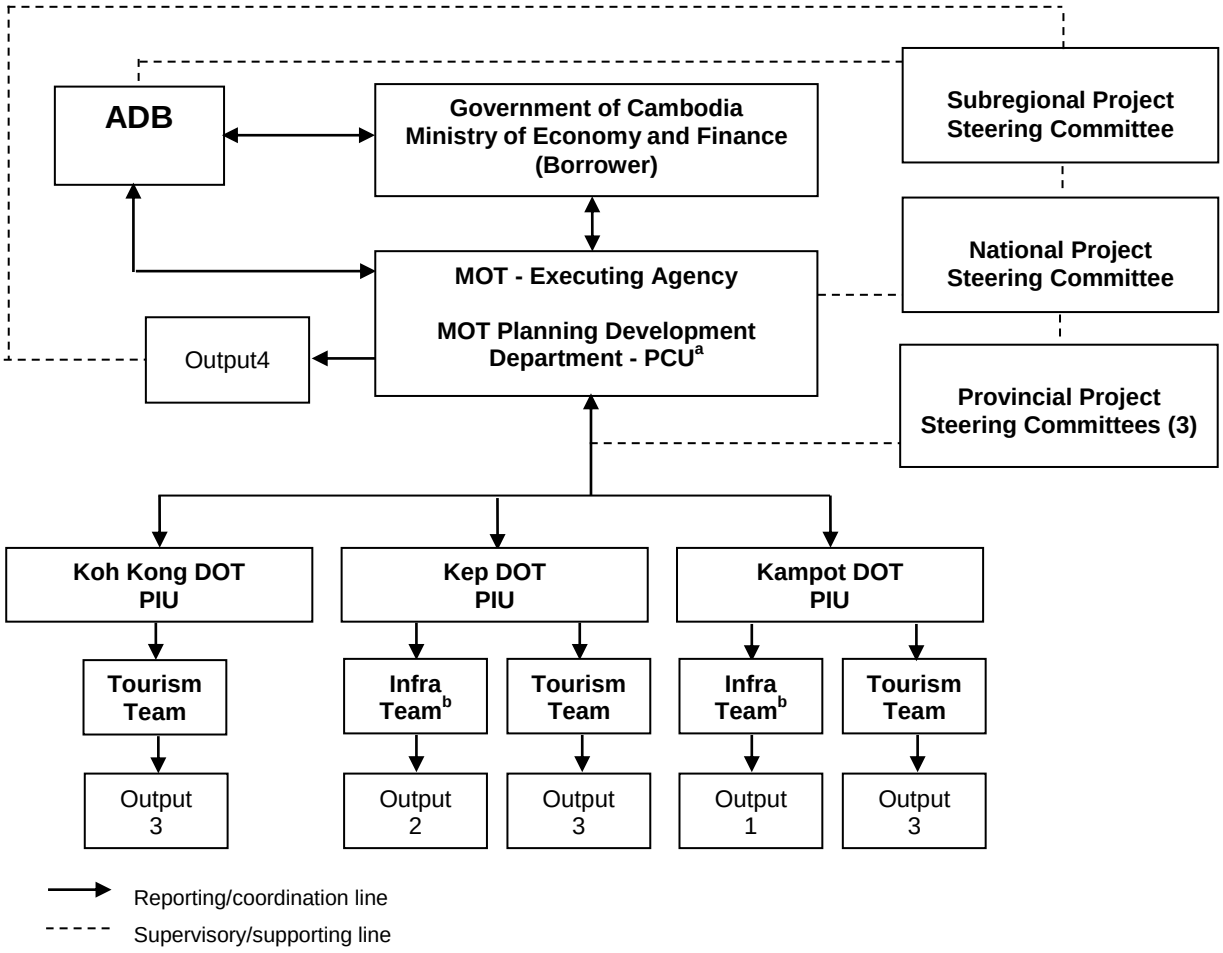
Procedure	Remarks
• Alert a fire situation.	• Whoever detects the fire shall immediately: - call the attention of other people in the site, - sound the nearest alarm, and/or - Foreman or any ERT member among the construction sub-group contacts the fire department (in this case it should be agreed on that it is alright for any ERT member in the sub-group to alert the fire department) - report/communicate the emergency situation to the ERTL/Deputy ERTL.
• Stop all activities/operations and evacuate.	• All (non-ERT) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
• Activate ERT to contain fire/control fire from spreading.	• Guided by the training they undertook, ERT members assigned to mitigate the fire shall assess their own safety situation first before attempting to control fire spread.
• Call the nearest fire & police stations &, if applicable, emergency medical services.	• When alerting the EERT, ERTL will give the location, cause of fire, estimated fire alarm rating, any injuries.
• Facilitate leading the EERT to the emergency site.	• ERTL/Deputy ERTL to instruct: - an ERT member to meet the EERT in the access road or strategic location and lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site. - some ERT members to stop traffic in, & clear, the access road to facilitate passage of the EERT.
• ERT to vacate the site as soon as their safety is assessed as in danger.	• Follow appropriate evacuation procedure.

IX. INSTITUTIONAL CAPACITY REVIEW AND NEEDS

46. Currently there is little experience and capacity for environmental assessment and management amongst national counterparts responsible for the implementation of the EMP, i.e., the DOT/PIU and DPWT in Kampot province. No dedicated environmental staff exist in the DOT and thus the PIU. The DDSC with assistance from the safeguards specialists of the subproject will develop and deliver training courses to the DOT/PIU staff responsible for the implementation of the subproject. The purpose of the course(s) is to strengthen the ability of the PIU/PMU to oversee implementation of the EMP by construction contractors, and the EMC. The safeguards specialists, who will be full-time environmental member of the PIU, as well as the EO of the contractor, should attend training courses as required. Costs for training should be included with costs for implementation of the EMP.

47. Training on the implementation of an EMP should address two thematic areas. The first area should be principles environmental management focused on the potential impacts of subproject activities on the natural and social environment. The second area should be environmental safeguard requirements of the ADB and Government, with specific reference to the EMP.

ANNEX 1: MANAGEMENT ORGANIZATION OF THE PROJECT IN CAMBODIA



The Ministry of Economy and Finance and Ministry of Public Works and Transport will each appoint a coordinator to the PCU.

[b] Infrastructure team members are seconded from the DPWT.

ADB = Asian Development Bank; DOT= Department of Tourism; Infra = infrastructure; MOT = Ministry of Tourism; PCU = project coordination unit; PIU = project implementation unit.

ANNEX 2: INDICATIVE RESPONSIBILITIES OF KEY MANAGEMENT UNITS OF EMP

EMP Implementation organizations	Roles and Responsibilities
Executing agency (EA) (MOT)	➢ Overall responsibility for the execution of the project ➢ Reviews the project implementation progress ➢ Reviews and endorses any proposed change in the project scope or implementation arrangements ➢ Supervises compliance with loan covenants
Project Coordination Unit (PCU), inside MOT	➢ Project preparation, including the setting up of financial and management systems and procedures, and the procuring of PCU office equipment ➢ Consultant recruitment and supervision ➢ Review and approval of goods and civil works contracts, including bid documents ➢ Coordination between the concerned agencies at the national and provincial levels ➢ Coordination of activities of the PIUs and the inputs of concerned stakeholders ➢ Coordination of all reporting aspects of the project ➢ Coordination of institutional strengthening measures ➢ Ensuring compliance with ADB Loan covenants, assurances and safeguard requirements, as well as with national and provincial policies and regulations ➢ Provision of administrative and technical support to the PIUs ➢ Preparation of consolidated project accounts to be forwarded to ADB ➢ Advice to PIUs on revenue-enhancing activities related to the recovery of costs of constructing, operating, and maintaining project facilities and equipment; ➢ Coordination of project audits ➢ All specified monitoring, evaluation and reporting activities ➢ Communication of Project's outcomes, outputs, and activities to all stakeholders ➢ Provide coordination for safeguards and monitoring for PIU
Provincial Project Steering Committee (PPSC)	➢ Ensuring that concerns of all stakeholders are adequately reflected in the project ➢ Coordination of project implementation between the concerned agencies ➢ Confirming compliance with local regulations and provincial policies ➢ Overseeing budgeting and disbursement of counterpart funds ➢ Overseeing implementation of resettlement plans, compensation schemes and all other project safeguard procedures
Project Implementation Units (PIUs) inside DoT	➢ Coordination and supervision of consultants' inputs on the appraisal of feasibility studies, and conceptual and detailed designs construction ➢ Procurement of goods and civil works contracts, including the preparation of bid documents and bid evaluations ➢ Approving payments to contractors and maintaining disbursement records ➢ Ensuring that institutional-strengthening and capacity-building initiatives involving DMOs, private partners, SMEs and CBTOs are implemented in line with agreed project designs, schedules and budgets

EMP Implementation organizations	Roles and Responsibilities
	➢ Ensuring compliance with loan covenants and assurances in respect of all sub projects, including updating of IEEs, EMPs, GAPs, resettlement plans ➢ Oversee implementation of EMP by contractor EO, and EMC ➢ Prepare quarterly reports on EMP implementation for PCU ➢ Coordinate with DDSC to design and deliver capacity development & training. ➢ Coordinating the process of establishing appropriate cost-recovery mechanisms ➢ Coordinating the implementation of identified Public-Private Partnership (PPP) initiatives; ➢ Meetings with all concerned stakeholders ➢ Quarterly progress and monitoring-and-evaluation reporting to the PCU
Detailed Design & Supervision Consultant (DDSC)	➢ Completes detailed designs of subprojects with PIU ➢ Update EMP to meet final detailed designs of subprojects ➢ Supervises and assists PIU with contractor management ➢ Provides technical advice and support when needed to PIU and EMC ➢ Designs and oversees delivery of all training and capacity development of PIU for construction and operation of completed subprojects including EMP. ➢ Provides advisory role for implementation of EMP by PIU and EMC
Environmental Monitoring Consultant (EMC)	➢ Implements environmental sampling for EMP ➢ Conducts laboratory analyses of environmental quality samples from field sampling ➢ Prepares periodic monitoring reports for PIU
Environmental Officer (EO) of Contractor	➢ Implements the CEMP for the construction phase ➢ Maintains a daily log of environmental issues at the construction sites ➢ Prepares brief monthly summaries of mitigation activities and environmental issues at constructions site to PIU.
ADB	➢ Assists PCU through timely guidance at each stage of project implementation following agreed implementation arrangements ➢ Review all documents that require ADB approval ➢ Review of monitoring reports on EMP implementation to ensure EMP meets SPS (2009) ➢ Approval of procurement activities ➢ Periodic project review missions, a mid-term review and a completion mission for the project ➢ Ensuring compliance of all loan covenants ➢ Timely processing of withdrawal applications and release of eligible funds ➢ Ensuring compliance of financial audit recommendations ➢ Regularly updates project information disclosure on the ADB website

ANNEX3: INDICATIVE TORS FOR ENVIRONMENTAL SPECIALISTS OF DDSC

International Environmental Specialist. With assistance from the national environmental specialist the international consultant will be responsible for updating the provincial EMPs at detailed design, and assisting the PIU with overall environmental management of the implementation of the subprojects in Cambodia. The consultant will: (i) update environmental management plans (EMP) for subprojects in Kampot and Kep to ensure that EMPs address the detailed designs and engineering of subprojects. Updates to EMPs include mitiation and monitoring plans, budget, and capacity development needs of executing agency (EA/PCU) and PIUs (DOT / DPWT); (ii) with national consultant design comprehenisve training plan for safeguards specialist/PIU and on principles of EIA, and the purpose, content, and roles and responsibilities for implementation of updated EMPs highlighting environmental issues of subprojects; (iii) ensure that all relevant safeguards of the EMPs are adequately addressed in the bidding documents (instruction to bidders), and in the evaluation criteria for awarding contracts; (iv) Coordinate and work with the PIUs to ensure that contractors finalize their respective site-specific CEMPs based on the updated EMPs and the actual site conditions; (v) oversee the implementation of all safeguards of the three EMPs relating to construction phase activities including handling of construction spoil and waste, water and air quality protection, public nuisance impacts (noise, dust, traffic, blocked access, workers, and camps), and public safety; (vi) Coordinate with the MOT/PCU to develop expert committee of marine resources agencies to design Navigation System and Plan for Teuk Chuu river and nearshore Kampot bay; (vii) coordinate with thetwo provincial Departments of Environment (DOT)on all relevantenvironmental regulatory compliance issues (e.g. noise and dust from construction sites, sanitation in workers campsite etc); (viii) prepare ToR(s) for survey, detection, and removalof unexploded ordnance (UXO) at all civil works sites. Ensure that EA and/or PIUs consult Government authorities to assist with TOR development and implementation; (ix) with PIU/DPWTs, prepare TORs for the follow-up interviews and consultations with the same affected stakeholderand local residents contacted during the PPTA on issues and concerns arising during project construction. Of particular concern is upgrades to access roads; (x) prepare TOR(s) for external national environment monitoring consultant (EMC) for conducting water and air quality sampling, and laboratory analyses for the monitoring plans for the provincial EMPs; (xi) coordinate with PWDTs to address vehicle traffic issues, respectively during road upgrades; (xii) advise PIU/DPWTs on environment-related concerns arising during sub-projects construction, and recommend corrective measures; (xiii) with PIU/DPWTs, ensure dissemination to stakeholders the results of environment quality monitoring and implementation of safeguards, especially among households or small businesses near the civil construction works areas; (xiv) assist EA and PIU/DPWTs prepare a table of contents for regular reports PIU must submit to the EA on implementation of EMPs, environmental, issues, and corrective actions; (xv) assist PIU/DPWTs prepare simple report template for construction contractors to report monthly on mitigation activities, and environmental issues that occur during construction phase; and (xvi) prepare a quarterly status report on implementation of EMPs, environmental issues, and public safety protection to be submitted through the PIU and EA to the provincial DOTs and ADB. The consultant should have an advanced university degree the environmental seiences and at least 7 years experience implementing and managing environmental assessment of infrastructure projects in southeast Asia countries (preferably Cambodia) including: a) understanding of ADB and national environmental safeguard requirements; b) experience working with and supervising the activities of provincial and national environmental management agencies with environmental

safeguards; and c) designing and delivering training and capacity development programs to provincial environment, project implementing units.

National Environmental Specialist. Provide assistance to the international environmental specialist including acquisition of information new information to update the provincial EMPs at detailed design, and work with the PIU with overall environmental management of the implementation of the subprojects in Cambodia. The national consultant will assist with: (i) updating environmental management plans (EMP) for subprojects in Kampot and Kep provinces to ensure that EMPs address the detailed designs and engineering of subprojects.; (ii) deliver initial training to M/DOT and DPWT on the purpose, content, and roles and responsibilities for implementation of updated EMPs; (iii) ensure relevant safeguards of the EMPs are addressed in the bidding documents in paccurate local language and in evaluation criteria for awarding contracts; (iv) help PIUs to ensure that contractors prepare their respective site-specific plans based on the updated EMPs and the actual site conditions; (v) help the international consultant oversee the implementation of all safeguards of the three EMPs relating to construction phase activities including handling of construction spoil and waste, water and air quality protection, public nuisance impacts (noise, dust, traffic, blocked access, workers, and camps), and public safety; (vi) assist coordination with the three provincial DOTs on all relevantenvironmental regulatory compliance issues (e.g. noise and dust from construction sites, sanitation in workers campsite etc); (vii) with PIU/DPWTs, prepare TORs for the follow-up interviews and consultations with the same affected stakeholderand local residents contacted during the PPTA on issues and concerns arising during project construction. Of particar concern is upgrades to access roads; (viii) assist PWDTs to address vehicle traffic issues, respectively during road upgrades; (ix) with the international consultant advise the PIU/DPWTs on environment-related concerns arising during sub-projects construction, and recommend corrective measures; (x) with PIU/DPWTs, ensure dissemination to stakeholders the results of environment quality monitoring and implementation of safeguards, especially among households or small businesses near the civil construction works areas; (xi) assist with all eporting for the EMP. The consultant should have a university degree in the environmental sciences and at least 5 years with environmental assessment of infrastructure projects in Cambodia including: a) understanding of ADB and national environmental safeguard requirements; b) experience working with international consultants; and c) delivering training and capacity development programs to provincial project implementing units.

ANNEX 4: ENVIRONMENTAL STANDARDS FOR CAMBODIA

From Government Sub-decree on Water Pollution Control (1999)
http://www.wepa-db.net/policies/law/cambodia/02.htm

Table 1. Effluent standard for pollution sources discharging wastewater to public water areas or sewer access

No	Parameters	Unit	Allowable limits for pollutant substance discharging to	
			Protected public water area	Public water area and sewer
1	Temperature	^{0}C	< 45	< 45
2	pH		6 – 9	5 - 9
3	BOD5 (5 days at 200 C)	mg/l	< 30	< 80
4	COD	mg/l	< 50	< 100
5	Total Suspended Solids	mg/l	< 50	< 80
6	Total Dissolved Solids	mg/l	< 1000	< 2000
7	Grease and Oil	mg/l	< 5.0	< 15
8	Detergents	mg/l	< 5.0	< 15
9	Phenols	mg/l	< 0.1	< 1.2
10	Nitrate (NO3)	mg/l	< 10	< 20
11	Chlorine (free)	mg/l	< 1.0	< 2.0
12	Chloride (ion)	mg/l	< 500	< 700
13	Sulphate (as SO4)	mg/l	< 300	< 500
14	Sulphide (as Sulphur)	mg/l	< 0.2	< 1.0
15	Phosphate (PO4)	mg/l	< 3.0	< 6.0
16	Cyanide (CN)	mg/l	< 0.2	< 1.5
17	Barium (Ba)	mg/l	< 4.0	< 7.0
18	Arsenic (As)	mg/l	< 0.10	< 1.0
19	Tin (Sn)	mg/l	< 2.0	< 8.0
20	Iron (Fe)	mg/l	< 1.0	< 20
21	Boron (B)	mg/l	< 1.0	< 5.0
22	Manganese (Mn)	mg/l	< 1.0	< 5.0
23	Cadmium (Cd)	mg/l	< 0.1	< 0.5
24	Chromium (Cr)+3	mg/l	< 0.2	< 1.0
25	Chromium (Cr)+6	mg/l	< 0.05	< 0.5
26	Copper (Cu)	mg/l	< 0.2	< 1.0
27	Lead (Pb)	mg/l	< 0.1	< 1.0
28	Mercury (Hg)	mg/l	< 0.002	< 0.05
29	Nickel (Ni)	mg/l	< 0.2	< 1.0
30	Selenium (Se)	mg/l	< 0.05	< 0.5
31	Silver (Ag)	mg/l	< 0.1	< 0.5
32	Zinc (Zn)	mg/l	< 1.0	< 3.0
33	Molybdenum (Mo)	mg/l	< 0.1	< 1.0
34	Ammonia (NH3)	mg/l	< 5.0	< 7.0
35	DO	mg/l	> 2.0	> 1.0

36	Polychlorinated Biphenyl	mg/l	< 0.003	< 0.003
37	Calcium	mg/l	< 150	< 200
38	Magnesium	mg/l	< 150	< 200
39	Carbon tetrachloride	mg/l	< 3	< 3
40	Hexachloro benzene	mg/l	< 2	< 2
41	DTT	mg/l	< 1.3	< 1.3
42	Endrin	mg/l	< 0.01	< 0.01
43	Dieldrin	mg/l	< 0.01	< 0.01
44	Aldrin	mg/l	< 0.01	< 0.01
45	Isodrin	mg/l	< 0.01	< 0.01
46	Perchloro ethylene	mg/l	< 2.5	< 2.5
47	Hexachloro butadiene	mg/l	< 3	< 3
48	Chloroform	mg/l	< 1	< 1
49	1,2 Dichloro ethylene	mg/l	< 2.5	< 2.5
50	Trichloro ethylene	mg/l	< 1	< 1
51	Trichloro benzene	mg/l	< 2	< 2
52	Hexaxhloro cyclohexene	mg/l	< 2	< 2

Remark: The Ministry of Environment and the Ministry of Agriculture, Forestry and Fishery shall collaborate to set up the standard of pesticides which discharged from pollution sources.

Table 2: Water Quality Standard in public water areas for bio-diversity conservation

I. For River

No	Parameter	Unit	Standard Value
1	pH	mg/l	6.5 – 8.5
2	BOD5	mg/l	1 – 10
3	Suspended Solid	mg/l	25 – 100
4	Dissolved Oxygen	mg/l	2.0 - 7.5
5	Coliform	MPN/100ml	< 5000

II. Lakes and Reservoirs

No	Parameter	Unit	Standard Value
1	pH	mg/l	6.5 – 8.5
2	COD	mg/l	1 – 8
3	Suspended Solid	mg/l	1 – 15
4	Dissolved Oxygen	mg/l	2.0 - 7.5
5	Coliform	MPN/100ml	< 1000
6	Total Nitrogen	mg/l	– 0.6
7	Total Phosphorus	mg/l	0.005 – 0.05

III. Coastal Water

No	Parameter	Unit	Standard Value
1	pH	mg/l	7.0 – 8.3
2	COD	mg/l	2 – 8
3	Dissolved Oxygen	mg/l	2 - 7.5

4	Coliform	MPN/100ml	< 1000
5	Oil content	mg/l	0
6	Total Nitrogen	mg/l	– 1.0
7	Total Phosphorus	mg/l	0.02 – 0.09

Table 3. Water Quality Standard in public water areas for public health protection

No	Parameter	Unit	Standard Value
1	Carbon tetrachloride	µg/l	< 12
2	Hexachloro-benzene	µg/l	< 0.03
3	DDT	µg/l	< 10
4	Endrin	µg/l	< 0.01
5	Diedrin	µg/l	< 0.01
6	Aldrin	µg/l	< 0.005
7	Isodrin	µg/l	< 0.005
8	Perchloroethylene	µg/l	< 10
9	Hexachlorobutadiene	µg/l	< 0.1
10	Chloroform	µg/l	< 12
11	1,2 Trichloroethylene	µg/l	< 10
12	Trichloroethylene	µg/l	< 10
13	Trichlorobenzene	µg/l	< 0.4
14	Hexachloroethylene	µg/l	< 0.05
15	Benzene	µg/l	< 10
16	Tetrachloroethylene	µg/l	< 10
17	Cadmium	µg/l	< 1
18	Total mercury	µg/l	< 0.5
19	Organic mercury	µg/l	0
20	Lead	µg/l	< 10
21	Chromium, valent 6	µg/l	< 50
22	Arsenic	µg/l	< 10
23	Selenium	µg/l	< 10
24	Polychlorobiohenyl	µg/l	0
25	Cyanide	µg/l	< 0.005

ANNEX 5: GOVERNMENT COST NORMS FOR LABORATORY ANALYSES

ល.រ	បរិយាយ	តម្លៃសេវា (រៀល)	រយៈពេលផ្តល់សេវា (ថ្ងៃធ្វើការ)	សុពលភាព
24	Chloride(C1-)	28,000	3ថ្ងៃ	
25	Manganese(Mn)	60,000	5ថ្ងៃ	
26	Magnesium(Mg)	60,000	5ថ្ងៃ	
27	Alumium	70,000	5ថ្ងៃ	
28	Iron(Fe)	70,000	5ថ្ងៃ	
29	Copper (Cu)	70,000	5ថ្ងៃ	
30	Zinc(Zn)	70,000	5ថ្ងៃ	
31	Cadmium(Cd)	90,000	5ថ្ងៃ	
32	Selenium(Se)	80,000	5ថ្ងៃ	
33	Mercury(Hg)	90,000	5ថ្ងៃ	
34	Nickel(ni)	80,000	5ថ្ងៃ	
35	Chromium(C)	80,000	5ថ្ងៃ	
36	Lead(Pb)	80,000	5ថ្ងៃ	
37	A·senic(As)	80,000	5ថ្ងៃ	
38	Total Coli form	36,000	7ថ្ងៃ	
39	Feacal Coliform	36,000	7ថ្ងៃ	
40	Total Bacteria	36,000	5ថ្ងៃ	
41	Pathogen Staphylococcus	40,000	7ថ្ងៃ	
42	E-Coli	40,000	7ថ្ងៃ	

ល.រ	បរិយាយ	តម្លៃសេវា (រៀល)	រយៈពេលផ្តល់សេវា (ថ្ងៃធ្វើការ)	សុពលភាព
43	Feacal Streptococcus	40,000	7ថ្ងៃ	
44	Total Nitrogen(TN)	36,000	4ថ្ងៃ	
45	Thermo tolerant Coli form	28,000	7ថ្ងៃ	
46	Barium(Ba)	60,000	5ថ្ងៃ	
47	Beryllium(Be)	60,000	5ថ្ងៃ	
48	Bismuth(Bi)	60,000	5ថ្ងៃ	
49	Boron(B)	60,000	5ថ្ងៃ	
50	Calcium(Ca)	52,000	5ថ្ងៃ	
51	Cobalt(Co)	60,000	5ថ្ងៃ	
52	Cesium(Cs)	72,000	5ថ្ងៃ	
53	Gallium(Ga)	60,000	5ថ្ងៃ	
54	Indium(In)	60,000	5ថ្ងៃ	
55	Potassium(k)	52,000	5ថ្ងៃ	
56	Lithium(Li)	52,000	5ថ្ងៃ	
57	Molybdenum(Mo)	60,000	5ថ្ងៃ	
58	Rubidium(b)	80,000	5ថ្ងៃ	
59	Sodium(Na)	52,000	5ថ្ងៃ	
60	Silver(Ag)	80,000	5ថ្ងៃ	
61	Strontium(S)	80,000	5ថ្ងៃ	

ល.រ	បរិយាយ	តម្លៃសេវា (រៀល)	រយៈពេលផ្តល់សេវា (ថ្ងៃធ្វើការ)	សុពលភាព
62	Titanium(Ti)	80,000	5ថ្ងៃ	
63	Vanadium(V)	80,000	5ថ្ងៃ	
64	Uranium(U)	80,000	5ថ្ងៃ	
65	Ortophosphate(PO4)	24,000	3ថ្ងៃ	
66	Poliphosphate(PO4--)	24,000	4ថ្ងៃ	
67	Carbondioxide(CO2)	24,000	3ថ្ងៃ	
68	Salinity(NaC1)%	24,000	2ថ្ងៃ	
69	Chromium(C 3)	24,000	3ថ្ងៃ	
70	Chromium Exavalend(C 6)	24,000	4ថ្ងៃ	
71	Sulphite(SO2)	28,000	5ថ្ងៃ	
72	Sulfide(S)	28,000	4ថ្ងៃ	
73	Brome(B)	40,000	5ថ្ងៃ	
74	Iron(Fe+3)	40,000	5ថ្ងៃ	
75	Iron(Fe+2)	40,000	5ថ្ងៃ	
76	Color	28,000	3ថ្ងៃ	
77	Chlorohpyll,a	28,000	3ថ្ងៃ	
78	Transparency	20,000	3ថ្ងៃ	
79	Ammonium(NH4)	28,000	3ថ្ងៃ	
80	HydrogenCarbonate(HCO3)	20,000	3ថ្ងៃ	

ល.រ	បរិយាយ	តម្លៃសេវា (រៀល)	រយៈពេលផ្តល់សេវា (ថ្ងៃធ្វើការ)	សុពលភាព
81	Silicon(SiO2)	60,000	5ថ្ងៃ	
82	Chlorine(c1-)	28,000	3ថ្ងៃ	
83	NO_2 (ពិនិត្យក្នុងពេល២៤ម៉ោង)	280,000	7ថ្ងៃ	
84	SO_2 (ពិនិត្យក្នុងពេល២៤ម៉ោង)	280,000	7ថ្ងៃ	
85	TSP			
	ពិនិត្យក្នុងពេល1ម៉ោង	100,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល8ម៉ោង	200,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល២៤ម៉ោង	480,000	5ថ្ងៃ	
86	PM10			
	ពិនិត្យក្នុងពេល1ម៉ោង	100,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល8ម៉ោង	200,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល24ម៉ោង	480,000	5ថ្ងៃ	
87	PM2.5			
	ពិនិត្យក្នុងពេល1ម៉ោង	100,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល8ម៉ោង	200,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល24ម៉ោង	480,000	5ថ្ងៃ	
88	Noise	200,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល8ម៉ោង	60,000	5ថ្ងៃ	
	ពិនិត្យក្នុងពេល24ម៉ោង	120,000	5ថ្ងៃ	