Environmental Management Plan

April 2021

Cambodia: Second Urban Environmental Management in the Tonle Sap Basin Project

Stueng Saen: Solid Waste Management, Kampong Thom Province

Prepared by the Ministry of Public Works and Transport for the Asian Development Bank. This is an updated version of the draft originally posted in May 2018 available on https://www.adb.org/projects/documents/cam-50102-002-emp.

CURRENCY EQUIVALENTS

(as of 2020)

Currency unit	–	riel (KR)
KR 1.00	=	$ 0.000250
$1.00	=	KR 4,000

ABBREVIATIONS

ADB	–	Asian Development Bank
AH	–	Affected Household
BOD	–	Biochemical Oxygen Demand
CDIA	–	Cities Development Initiative for Asia
CEMP	–	Construction Environmental Management Plan
C-EHS	–	Contractor Environmental Health and Safety Officer
CMAC	–	Cambodia Main Action Center
COD	–	Chemical Oxygen Demand
COI	–	Corridor of Imact
CRVA	–	Climate Risk Vulnerability Assessment
DDPP	–	Detailed Design and Project Preparation
DMS	–	Detailed Measurement Survey
EA	–	Executing Agency
EAG	–	Environmental Assessment Guidelines
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
FGD	–	Focus Group Discussion
FS	–	Feasibility Study
GHG	–	Greenhouse Gas
GRM	–	Grievance Redress Mechanism
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination
IESIA	–	Initial Environmental and Social Impact Assessment
IRC	–	Inter- Ministerial Resettlement Committee
IRP	–	Income Restoration Plan
I/NES	–	International and National Environmental Specialists
MAFF	–	Ministry of Agriculture, Forest, and Fishery
MoE	–	Ministry of Environment
MOWRAM	–	Ministry of Water Resources and Meteorology
MPWT	–	Ministry of Public Works and Transport
PDoE	–	Provincial Department of Environment
PDAFF	–	Provincial Department of Agriculture, Forest, and Fishery
PDPWT	–	Provincial Department of Public Works and Transport
PMC	–	Project Management Consultants
PMC-I/NES	–	PMC-International and National Environment Specialists
PIB	–	Public Information Brochure
PIU	–	Project Implementation Unit
PIU-SFP	–	PIU Safeguards Focal Point
PMU	–	Project Management Unit
PMU-ESO	–	PMU Environmental Safeguards Officer

PPE	–	Personal Protective Equipment
PPTA	–	Project Preparation Technical Assistance
PSC	–	Project Steering Committee
RCP	–	Representative Concentration Pathway
RF	–	Resettlement Framework
RGC	–	Royal Government of Cambodia
SEC	–	Social Economic Survey
SHC	–	Sewer Household Connection
SOP	–	Standard Operation Procedures
SPS	–	Safeguards Policy Statement
TS-1	–	Tonle Sap Urban Environmental Improvement Project
TSBR	–	Tonle Sap Biosphere Reserve
TSS	–	Total Suspended Solid
UXO	–	Unexploded Ordnance
WG	–	Working Group
WHO	–	World Health Organization
WSP	–	Waste Stabilization Ponds
WWTP	–	Sewage Treatment Plant

WEIGHTS AND MEASURES

dBA	–	A-weighted Decibel
km	–	Kilometer
km2	–	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
oC	–	Degree Celsius
PM10	–	Particulate Matter 10 micrometers or less
PM2.5	–	Particulate Matter 2.5 micrometers or less
µg/m3	–	Microgram per cubic meter

NOTE

(i) In this report, "$" refers to United States dollars.

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1. INTRODUCTION

1.1. Purpose

1. This document is the environmental management plan (EMP) for the Stueng Saen: Solid waste management subproject in Kampong Thom Province of the Second Integrated Urban Environmental Management in The Tonle Sap Basin Project (TS2 project). The EMP for the Landfill subproject defines mitigation and monitoring measures and describes the institutions, responsibilities and mechanisms to monitor and ensure compliance. Such institutions and mechanisms will seek to ensure continuous improvement of environmental protection activities during pre-construction, construction, and operation of the subproject in order to prevent, reduce, or mitigate adverse environmental-social impacts.

2. The EMP for this subproject outlines the anticipated environmental and social impacts of the project and presents the mitigation and monitoring measures to be undertaken to offset/mitigate the negative impacts at specific locations and the time at which the measures will be implemented.

3. The EMP describes the roles and responsibilities for the implementation of the measures and monitoring, to be shared between Project Owner, the Contractor, and the future Site Operator during pre-construction, construction, and operation of the landfill. Costs are associated with the implementation of the EMP and therefore the project owner or contractor then the operator must plan for capable/experienced staffs and budget to manage and implement the EMP during project activities.

4. The EMP is compliant with ADB Safeguards Policy 2009 and the sub-decree on Environmental Impact Assessment Process, MoE, 1999. The IEE prepared for this subproject is found under separate cover latest updated in March 2021.

5. This EMP was prepared for the construction and operation of a controlled landfill. It is one of several EMPs prepared for the TS2 project. The TS2 Project also includes other infrastructure components in Serei Saophoan city, Banteay Meanchay Province, and Stueng Saen city Kampong Thom province.

1.2. Outline of Subproject

1.2.1. Landfill technology outline

6. After choice of technology and a site selection process conducted during the Project Preparatory Technical Assistance (PPTA), the proposed solid waste management subproject is planned and designed to be a controlled engineered landfill. This is considered to be the appropriate standard of intervention as it provides the best balance between capital cost and operating difficulty compared with environmental controls and sustainability equivalent to those of an engineered landfill.

7. Investment works to be implemented for Stueng Saen under TS2 project comprises the following:

- Upgrading of access road to the landfill site: 2,150 metres of dirt road to be upgraded to a 6 m wide concrete road above flood levels
- Construction of one controlled landfill cells out of a total of four cells.
- Construction of one hazardous waste landfill cell.
- Construction of a non-mechanical type materials recovery facility (MRF).
- Construction of drainage, leachate collection, treatment, and recirculation system.
- Construction of weighbridge and office building; staff dining and rest room; workshop, electrical and mechanical room, and supply building.

- Construction of 1,403 metres of concrete internal roads, bunds, and drainage system.
- Construction of wire mesh fencing, and entrance wall, gate and security guardhouse.
- Construction of car/ vehicle washing facility.
- Construction of a facility for temporary storage of hazardous waste.
- Provision of operations & maintenance (O&M) equipment.

8. Details on design hypotheses, construction principles and operations are provided in the IEE.

9. The wider ADB project "Second Urban Environmental Management in the Tonle Sap Basin Project" involves the closure of the existing dumpsite in Stueng Saen. The closure of the dumpsite is planned to occur immediately following the opening of the new landfill. This dumpsite is an Existing Facility of the wider project which means that an Environmental Compliance Audit (ECA) shall be carried out for that facility pursuant to the ADB Safeguards Policy Statement (SPS) (2009) (ref: section 4.6. Associated & Existing Facilities). The ECA is not part of this subproject but will be prepared separately for the dumpsite closure and remediation under a separate subproject. The current sub-project (construction of new engineered landfill) does not have any existing or associated facilities.

10. The existing dumpsite of Stueng Saen is located south of Sangkat Kampong Roteh, close to the village. The site has an area of 1 ha with a depth of up to 4 m. The site has been in operation for the last 21 years. Crude dumping method is followed for disposal of waste. Currently, informal recyclers are picking recyclable materials. Open burning of waste was observed at the landfill site.

11. The Environmental Compliance Audit (ECA) will be undertaken in accordance with the terms of references attached in Annex 1. The ECA will identify legacy issues and inform the detailed engineering design of the dumpsite closure and remediation.

1.2.2. Project location

12. The project is designed to cover the main urban areas of Stueng Saen. The service area for solid waste collection covers the six sangkats of Prey Ta Hu, Achar Leak, Kampong Roteh, Kampong Kraban, Kampong Thom, and Dameri Chom Khla. The service area is shown in Figure 1.

13. The proposed landfill site is 12 km from the town centre (by road). The landfill has an area of 19.7 ha (Figure 2). The site has a fairly flat topography with elevations generally between 15.5 and 16 m.

14. This landfill site is:

- About 12 km from Stueng Saen town (by road) and about 12 km from Stueng Saen River.
- About 2.5 km from National Road 6 and about 4 km from National Road 62
- About 2-3 km from Trapaeng Russey Village where houses, school, and pagoda are present.

15. The site is located on privately owned land and currently used as plantation. The site has no protected area status, no public natural resources and no communal facilities, and no services are present.

Figure 1: Stueng Saen Service Area

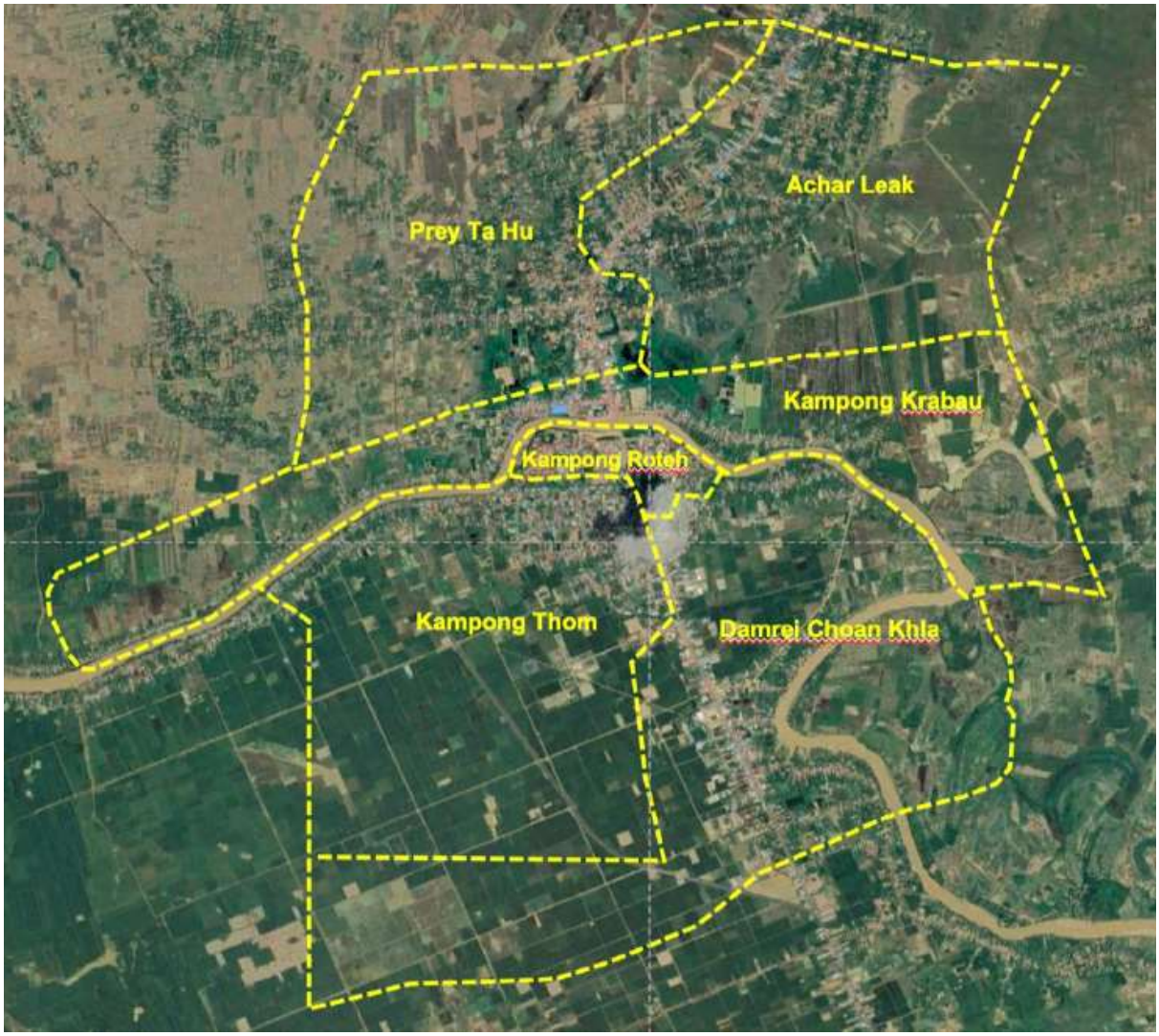
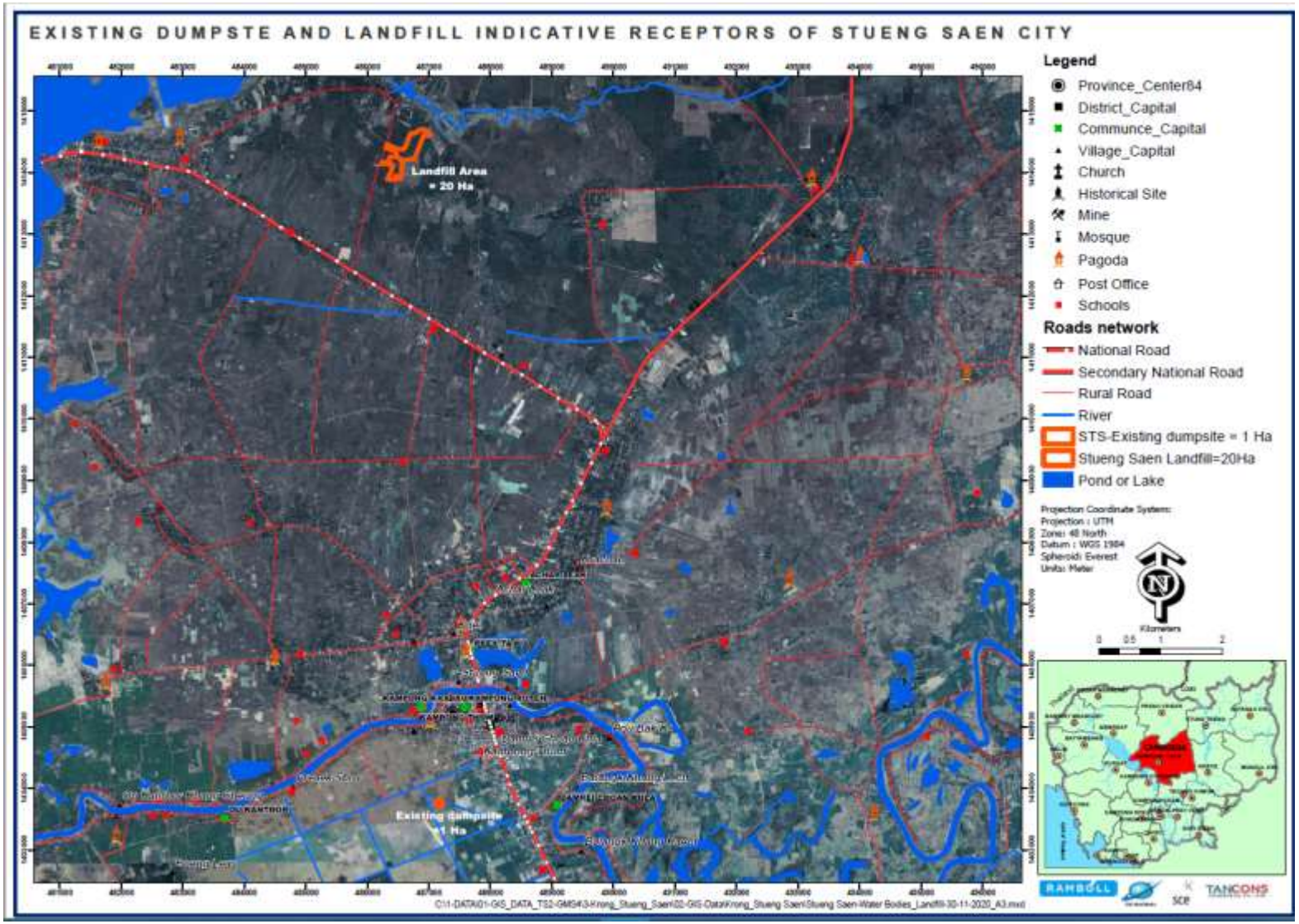


Figure 2: Stueng Saen: Solid Waste Management Subproject



1.3. Objective of EMP

16. The objective of the EMP is to determine and ensure implementation of the appropriate and necessary environmental and social mitigation and monitoring measures that are required to protect the environment and human health and to fully comply with all environmental and social obligations including those required by the Laws of Cambodia and those required by ADB.

17. The EMP describes how the mitigation of adverse environmental and social impacts and measures to enhance the benefits of environmental protection will be implemented. It explains how the measures will be managed, who will implement them, and when and where they will be implemented.

18. The following elements are presented in the EMP:

(i) Implementation of mitigation measures during project preparation (pre-construction phase).

(ii) Implementation of mitigation measures by contractors during the construction phase.

(iii) Implementation of measures during the operation phase.

(iv) Monitoring plan to control efficiency of measures proposed and assess the effective impacts of the project on the natural and human environment.

(v) Contingency response plan for natural or other disasters, and project contingencies;

(vi) Environmental management and monitoring costs including mitigation costs.

2. SUMMARY OF POTENTIAL RECEPTORS AND IMPACTS

19. The significance of project impacts is a combination of impact magnitude and the sensitivity or value of the receiving natural and social environment (the receptors); where magnitude considers the characteristics of the change (intensity, scale, size, spatial extent and timing, duration and reversibility of the impact) on the receptor, and sensitivity/value concerns the resilience of the receptor to change, and/or the value that the receptor represents to individuals, communities or the Nation.

20. The main receptors around the project are summarised in Table 1 and included in Figure 3 and Figure 4.

Table 1: Summary of Receptors in Subproject Area

GPS	Surface Water Receptors	Socio-Economic & Cultural Receptors	Land Cover/ Ecological Receptors	Protected Area Status
12°47'29.82"N, 104°52'34.28"E	- River <500 m north of site leading to Prey Pros lake 5 km west of site Upland site - not flooded, surface run off only. River north dries up during the dry season	- 4 houses < 500 m from the landfill site - Nearest housing area: 1.5 km southwest - NR No 62 about 4 km - NR N.6 about 2.5 km - Distance to City: 8 km - Pagoda: 2.5 km south - Grave: adjacent to the access road	Cashew trees (farmed), plus natural sparse secondary shrub cover including rattan, bamboo, Combretum Quadrangutare, Bauhinia Acuminata (white orchid-tree)	- Nearest UNESCO World Heritage Site: 17 km - Nearest protected area: 30 km - Nearest KBA: 5.2 km

Figure 3: Houses < 500 m from the Landfill site

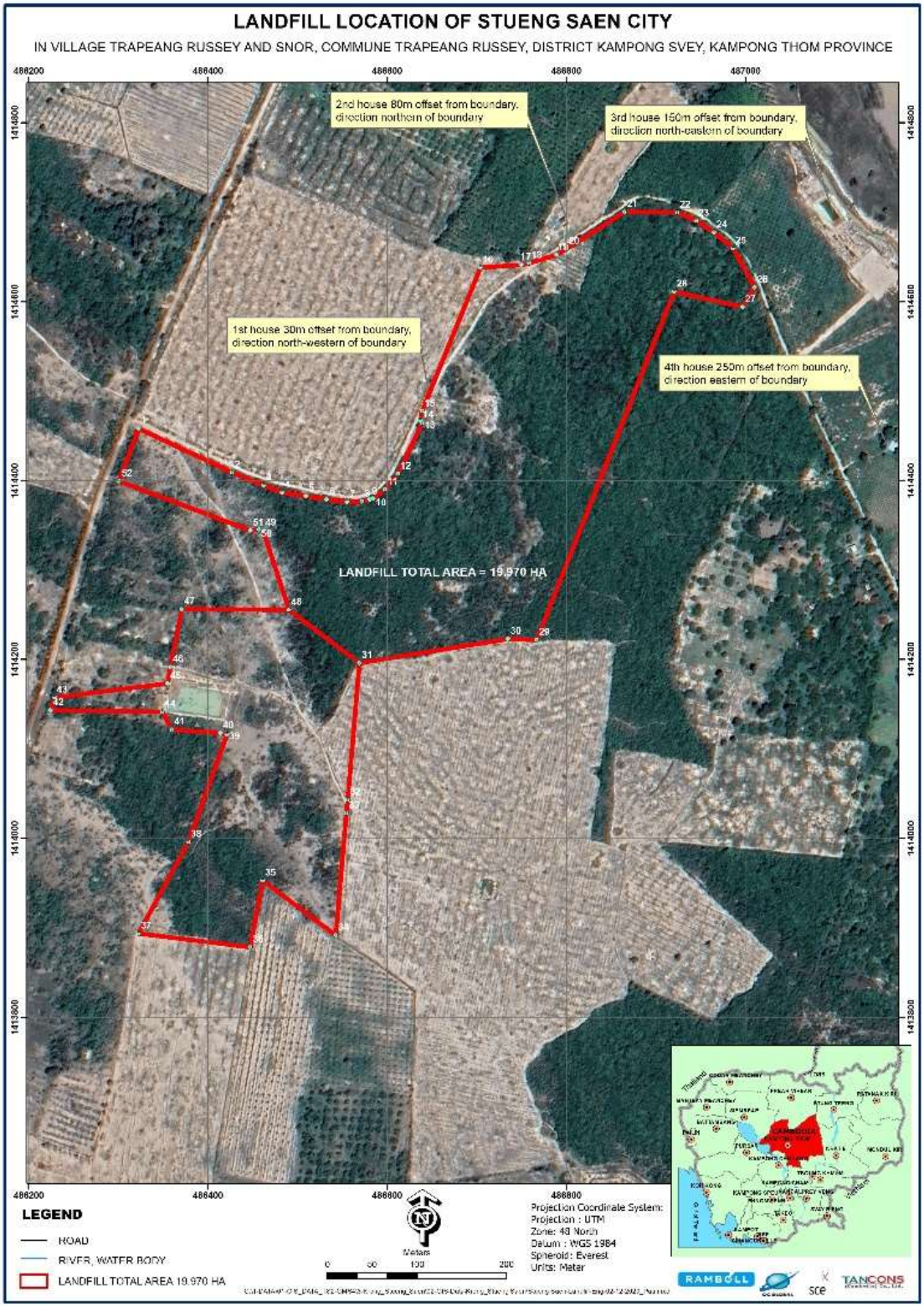
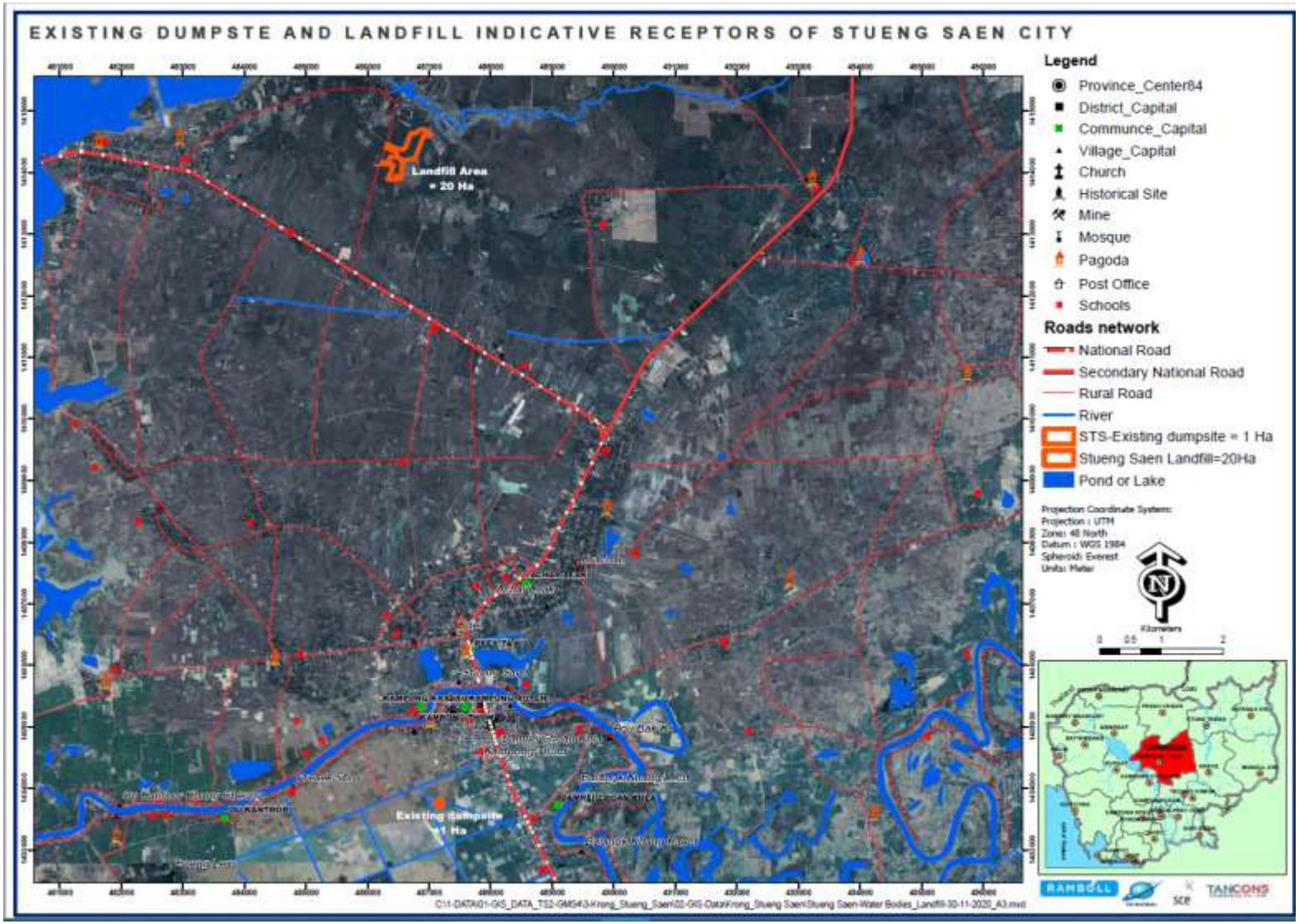


Figure 4: Stueng Saen Landfill Indicative Receptors



21. The EMP sets forth the measures necessary to adequately mitigate the impacts on the receptors and the project site itself in accordance with the assessments in the IEE. A summary of potential adverse impacts on the receptors is presented in Table 2.

Table 2: Summary of impacts for Stueng Saen Solid waste management

Impact	Source	Receptors
Construction		
Degradation of Air Quality	Exhaust fumes from construction machinery and equipment, movement of haulage trucks ■ Asphalt pouring ■ Fugitive dust from borrow pits and all excavation works ■ Fugitive dust from loading, unloading and haulage of construction materials ■ Fugitive dust from concrete batching plants.	■ Ambient Air ■ Populations near project sites ■ Workers
Noise nuisance	■ Noise from construction machinery and haulage trucks ■ Noise from Generators ■ Movement of material / dumping of material (including waste from dumpsite)	■ Populations near project sites ■ Workers ■ Waste pickers at the dumpsite
Impacts on water quality	■ Discharge of contaminated stormwater (suspended material, spills) ■ Accidental Spills ■ Waste / litter ■ Improperly drilled boreholes	■ No surface water body identified nearby ■ Ground water ■ Nearby agricultural fields
Erosion or degradation of soil and land / Flooding	■ Earthworks ■ Accidental spills/ poor management of waste	■ Surface water bodies ■ Communiies
Destruction of fauna and flora	■ Clearing of construction sites (landfill, borrow pit)	■ Trees, bushes and shrubs
Impacts on health and safety	■ Traffic increase in residential areas from trucks movement ■ Air emissions and effluents ■ Co-activity ■ Use of construction equipment/tools ■ COVID-19	■ Communities ■ Workers
Operation		
Degradation of Air quality	■ Biogas Generation ■ Smoke from waste fires ■ Emissions from waste trucks and cover material trucks	■ Ambient air ■ Nearby communities
Impacts on water quality	■ Non-compliant discharged leachates ■ Contaminated stormwater ■ Spills and windblown litter	■ No surface water body identified near the site ■ Groundwater ■ Nearby agricultural fields ■ Fauna and Flora
Odors and Dust	■ Landfill operations / open cells ■ Dust from movement of vehicles	■ Workers ■ Communities
Impacts on Health and Safety	■ Movement of waste trucks and trucks for cover material ■ Accidental events such as fires and explosions ■ Use of equipment/maintenance of landfill	■ Workers ■ Communities

Impact	Source	Receptors
	▪ Presence of litter and pests around landfill ▪ Non-compliant effluents ▪ COVID 19	

3. INSTITUTIONAL ARRANGEMENTS & RESPONSIBILITIES

22. The framework for implementation of the EMP for the project is described here. The key institutions, organizations and stakeholders relevant to environmental safeguards are set out below.

23. The overall responsibility for EMP implementation and compliance with loan assurances lies with the Executing Agency (EA) which is the Ministry of Public Works and Transport (MPWT). The EA has established a Project Management Unit (PMU) based in Phnom Penh, responsible for general project implementation.

24. The Implementing Agency (IA) is the Provincial Department of Public Works and Transport (PDPWT) in each subproject city. The PDPWT will establish a Project Implementation Unit (PIU) in each province, comprising relevant provincial government representatives including the Provincial Department of the Environment.

25. A Project Steering Committee (PSC) will be created to provide policy and technical guidance for subproject implementation. The PSC is chaired by the EA and comprises representatives of relevant provincial departments under their respective ministries including the Ministry of Environment, General Department of Resettlement (GDR) and Ministry of Labour as a minimum.

26. A summary of the key functions for project implementation and environmental safeguards is presented in Table 3 below for ease of reference:

Table 3: Key Roles for Project Implementation

Role	Abbreviation	Location	Summary of Overall Function
Project Steering Committee	PSC	Phnom Penh	Policy and technical guidance for subproject implementation
Project Management Unit	PMU	Phnom Penh MPWT	Responsible for general project implementation and reporting
PMU Environment Safeguards Officer (funded through Loan)	PMU-ESO	Phnom Penh PMU	EMP compliance across the subprojects for environmental safeguards – Full Time
Project Implementation Unit	PIU	Provinces PDPWT	Responsible for subproject implementation
PIU Safeguards Focal Point	PIU-SFP	Province, PIU	Responsible for subproject environmental and social safeguard monitoring – Full Time
Contractor Environmental, Health and Safety Officer	C-EHS	Construction Site	Mitigation measure implementation and reporting
Project Management Consultants	PMC	Phnom Penh	Project final design and implementation, support and capacity development. Engineering supervision for all construction and reporting.
International and National Environment Specialists	PMC-I/NES	Phnom Penh PMC team	Environmental safeguards and reporting support during design and implementation - Intermittent
Asian Development Bank	ADB		Review project progress, compliance with covenants and advise on corrective actions
Ministry of Environment (MOE)/ Provincial Department of Environment (PDoE)	MoE/PDoE	Phnom Penh province	Collaborate with project to provide policies or environmental standards and advise. Observer and conduct environmental monitoring of the project activities based on their mandate during construction and operation.

27. External support to the IA/PIU for EMP implementation during the project detailed engineering design (DED) and project construction phase is provided by the International and National Environment Specialists (I/NES) of the PMC.

28. An external Environmental Monitoring Institute (EMI) will be engaged to conduct the field sampling and laboratory analyses of environmental quality (e.g., water quality, air quality) that cannot be performed by other functions within the project. In Cambodia, this can be performed by qualified staff from the Ministry of Environment (MoE).

29. ADB is responsible for reviewing project progress reports and semi-annual environmental safeguards monitoring reports and undertaking review missions to ensure the project is implemented in line with project environmental safeguard requirements, SPS (2009) and Royal Government of Cambodia (RGC) regulations and guidelines.

30. The EA will be accountable for project implementation and operation on behalf of the RGC. The responsibilities of the EA in relation to environmental safeguards requirements are summarized below:

i. Overall responsibility for subproject implementation and management of the Project Management Unit (PMU).
ii. Recruit and manage qualified ESO for PMU.
iii. Recruit and manage Project Management Consultants.
iv. Ensure compliance with Loan Covenants.
v. Approve procurement plans, bidding documents, bid evaluation and contract awards including EMP.
vi. Approve the Contractor's Construction Environmental Management Plan (CEMP)
vii. Submit regular quarterly and annual subproject reports to ADB including summary on EMP and GRM implementation.
viii. Ensure compliance of subproject/component implementation with ADB and Government social and environmental policies, guidelines and plans.
ix. Approve proposed corrective actions in the event of impacts or non-compliance issues identified in monitoring and evaluation reports.

31. The responsibilities of the IA in relation to environmental safeguards requirements are summarized below:

i. Coordinate and monitor subproject implementation activities including all environmental safeguards activities;
ii. Coordinate capacity development program for PIU;
iii. Obtain necessary approvals from respective departments and other institutions prior to awarding of civil works contracts;
iv. Support PMU-ESO in the implementation of EMP;
v. Coordinate regular reporting of PMU to EA on EMP implementation;
vi. Undertake regular quality control inspection of subproject facilities; and
vii. Manage the handover of subproject facilities to agencies responsible for operation and maintenance.
viii. Ensure PIU engage with and follow the Grievance Redress Mechanism GRM.

32. The environmental safeguard responsibilities are set out for each subproject phase in Table 4.

Table 4: EMP Responsibilities

<table>
<tr><th>Responsible Entity</th><th>Engineering Detailed Design</th><th>Tendering & Pre-construction</th><th>Construction</th><th>Operation</th></tr>
<tr><td>Executing Agency</td><td colspan="4">MPWT and MoE is responsible for ensuring that the mitigation measures in the EMP are implemented and for ensuring compliance with loan covenants</td></tr>
<tr><td rowspan="6">PMU / PMU-ESO</td><td>Update IEE/EMP if needed</td><td>Engage PMC & PMU-ESO</td><td>Ensure EMP is implemented, and that the contractor(s) abide by the EMP</td><td rowspan="6"></td></tr>
<tr><td>Review updated EMP</td><td>Coordinating the tendering process including overseeing incorporation of EMP clauses into the bidding documents</td><td>Supervising project construction (with support of PMC engineers)</td></tr>
<tr><td rowspan="4">Confirm that mitigation measures have been included in engineering detail design</td><td>Ensuring the procurement of environmentally responsible contractors
Review and approve the CEMP</td><td rowspan="2">Prepare and submit quarterly and annual reports including environmental safeguard reporting to ADB</td></tr>
<tr><td>Ensuring that domestic EIA approvals by MoE have been secured prior to the awarding of civil works contracts</td></tr>
<tr><td rowspan="2">Dissemination and coordination of Grievance Redress Mechanism</td><td>Ensure EMP implementation and submit regular monitoring reports to IA and EA</td></tr>
<tr><td>Ensure PIU-SFPs undertake regular site inspections as part of progress reporting</td></tr>
<tr><td rowspan="4">PIU-SFP</td><td rowspan="4"></td><td rowspan="4">Attend all pre-construction training courses regarding EMP implementation</td><td>Working closely with the contractors to ensure EMP implementation</td><td rowspan="4"></td></tr>
<tr><td>Support GRM</td></tr>
<tr><td>Support Progress Monitoring and Reporting requirements working with PMU-ESO</td></tr>
<tr><td>Conduct consultation interviews with affected people</td></tr>
</table>

<table>
<tr><th>Responsible Entity</th><th>Engineering Detailed Design</th><th>Tendering & Pre-construction</th><th>Construction</th><th>Operation</th></tr>
<tr><td rowspan="2">Project Management Consultants PMC</td><td>Engage appropriate engineer and safeguards staff</td><td rowspan="2">See PMC-I/NES</td><td rowspan="2">See PMC-I/NES</td><td rowspan="2">Operator training and support as per ToR in PAM</td></tr>
<tr><td>Finalise Detailed Engineering Design in accordance with Environmental Safeguard principles</td></tr>
<tr><td rowspan="8">Project Management Consultants PMC (PMC-I/NES)]</td><td rowspan="8">Update IEE/EMP if needed</td><td>Providing training on EMP supervision and GRM to PMU, PIU and contractors</td><td>Coordinate public consultation with PMUESO / PIU-SFP</td><td rowspan="5">Organize, prior to project completion report (PCR) mission, a survey to assess community satisfaction with project implementation and EMP implementation performance. Draft environment sections of the PCR.</td></tr>
<tr><td>Setting Up environmental management and internal monitoring systems at PUSO and civil works contracts level</td><td>Preparing annual EMP progress reports</td></tr>
<tr><td>Review tender and contractor documents</td><td>Identifying environment-related implementation issues and necessary corrective actions</td></tr>
<tr><td>Review the CEMP</td><td rowspan="4">Training of PMU, PIU and other stakeholders GRM and EMP implementation</td></tr>
<tr><td>Ensure grievance redress mechanism established</td></tr>
<tr><td>Regular EMP and implementation monitoring</td></tr>
<tr><td rowspan="2">Coordinate public consultation</td></tr>
<tr><td colspan="2">Organize, prior to project completion report (PCR) mission, a survey to assess community satisfaction with project implementation and EMP implementation performance. Draft environment sections of the PCR.</td></tr>
</table>

Responsible Entity	Engineering Detailed Design	Tendering & Pre-construction	Construction	Operation
Contractor		Develop the CEMP	Ensure sufficient funding and human resources for proper and timely implementation of required mitigation and monitoring measures in the EMP throughout the construction phase	Ensure handover of sites is in accordance with EMP and any corrective actions identified in Project Completion Report are completed. Develop an Operation and Maintenance Manual. Conduct testing prior to commissioning. Train the operators in the Operation and Maintenance Manual during a three-months operations and maintenance period.
			Appoint an environment, health and safety (EHS) officer to oversee EMP implementation related to environment, occupational health and safety on construction site	
			Ensure health and safety	
			Implement mitigation measures	
			Act as a local entry point for the project GRM and collaborate with PMU on all GRM issues	
External Monitoring Institute		Undertake specialised environmental monitoring as contracted by PMU	Undertake specialised environmental monitoring as contracted by PMU	Undertake specialised environmental monitoring as contracted by Operator
Operator				Prepare an Operational Environmental Management Plan and associated subplans for the operation
				Allocate staff and budget for implementation of Operational EMP
				Ensure proper operation of project facilities according to design standards & monitoring Allocation of budget for O&M

3.1. Institutional Capacity Review and Needs

33. Currently there is little experience of monitoring and implementing environmental mitigation measures particularly at a provincial level. There is little enforcement of environmental or health and safety legislation and routine environmental monitoring is not undertaken apart from in major urban centres (air quality) or major rivers (water quality).

34. During the preparation of the IEE the team checked the capacity and experience at MPWT and found that there are a number of people who have fulfilled the role of 'focal point' for safeguards on a project-by-project basis, and there is an established Safeguards Team within the ministry of six people. This team have experience of working on highways projects but have not to date been involved with urban development projects and are willing to be involved in any training and site visits required during project implementation and will be issued copies of relevant monitoring reports, EMPs and other relevant safeguards documents.

35. In addition, through understanding existing operations for the landfill in Phnom Penh, provincial disposal sites and existing wastewater treatment operations, it is clear that there is limited ability for operation and maintenance. The limiting factors affecting the operators' ability to maintain adequate standards are likely to be a function of (i) a lack of technical capacity and experience; and (ii) insufficient budget. A training program is set out in Table 5 which addresses the safeguard reporting and implementation requirements during construction, and the environmental and social risks from operations.

36. The engagement of a National Environmental Specialist for a duration of about 10 months spread throughout implementation will be critical to ensure the capacity of the PIU staff and to ensure monitoring and reporting are managed effectively during implementation. This person will also work closely with the PMU Environment Safeguards Officer (PMU-ESO) in order to ensure safeguards are implemented and monitored training for EMP implementation. The proposed training required for project implementation is set out in Table 5[1]. Specifically, the training requirements for the project include to train the PIU, the contractor, municipal officers, and other relevant stakeholders on the implementation of the EMP.

37. As further specified in the Detailed Engineering Design, the Contractor is required to develop an Operation and Maintenance Manual for approval by the PMU. At the end of the construction and commissioning phase, the Contractor shall provide an Operation and Maintenance Manager and relevant staff to operate the landfill facility for a three-months period during which the Contractor shall carry out on-the-job training of the employer's operators in operation and maintenance of the facility. The training shall include implementation of measures and performance monitoring to ensure and document compliance with regulatory requirements and standards.

[1] For budgeting purposes, refer to the Feasibility Report Volume 5, Institutional Strengthening and Capacity Building

Table 5: Capacity Building and Training Requirements

Subject / Content	Participants	Trainer/ Organisation	When/ Frequency	Duration (days / event)	Number of participants
EMP adjustment and implementation - Development and adjustment of the EMP, roles and responsibilities, monitoring, supervision and reporting	PMU, PIU, contractors	I/NES of Project Management Consultants	Twice - Once prior to, and once after 6 months of construction	2	10
Grievance Redress Mechanism (GRM) and roles and responsibilities	PMU, PIU, contractors, Commune Councils	I/NES of Project Mgmt Consultants	Twice - Once prior to, and once after 6 months of construction	1	10
Development of the CEMP (content, function, roles and responsibilities, safeguard standards)	PMU, PIU, contractors	I/NES of PMC	Twice: Upon contract award and after submission of the first draft	1	5
On-the-job training on the implementation of the CEMP including monitoring and reporting requirements	PMU, PIU, contractors	I/NES of PMC	Twice: at the start of construction and 6 months into construction	2	5-10
Environmental protection Pollution control on construction sites (air, noise, wastewater, solid waste)	PMU, PIU, contractors	I/NES of Project Mgmt Consultants	Once (during project implementation)	2	10
Environmental monitoring - Monitoring methods, data collection and processing, reporting systems	PMU, PIU, contractors, Operators of Landfill	I/NES of Project Mgmt Consultants & MoE (environmental analyst)	Once (at beginning of project construction)	2	10
CEMP implementation: Health and safety Pollution control and minimisation of disturbances Monitoring and reporting	Contractor's staff	Contractor's Environment, and Health and Safety Officers	To be specified in the CEMP	To be specified in the CEMP	To be specified in the CEMP
Operation and Maintenance	Operator staff	Contractor	On-the-job training over a three-months period	Daily	To be determined

4. MITIGATION MEASURES PLAN

38. Comprehensive mitigation measures are set out below for the landfill subproject in Stueng Saen Town.

39. **Construction Environmental Management Plans**. The Contractor is required to develop a specific Construction Environmental Management Plan (CEMP) which shall contain detailed plans that set out the contractor's approach to mitigating the highest risks in accordance with this EMP and as identified in the IEE (March 2021). The Contractor is not allowed to start construction works until the CEMP has been approved by MPWT.

40. **Specific Management Subplans**. The following subplans should be included in the CEMP:

- Materials, Spoil and Borrow Site Management Subplan
- Community and Occupational Health and Safety and Emergency Response Sub-Plan
- Traffic Management Sub- Plan (Construction and then for Operation phase)
- Construction Workers Camp Management Sub-Plan
- Waste Management Plan (Construction waste)
- COVID-19 health and safety subplan in accordance with national COVID-19 instructions and regulations.

41. Similarly, the future operator will have to develop an Operations Environmental Management Plan.

4.1. Pre-construction Phase

Table 1: EMP Mitigation Measures for Landfill

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
Pre-Construction Phase					
National IESIA Approval	Landfill construction and Dumpsite Closure	1. Ensure IESIA approvals are in place for the landfill construction and that they include baseline environmental surveys as required by MoE. The PMU should also ensure all other relevant permits are obtained prior to start of any works (including vegetation clearing).	PMU	MoE	Included in project cost
Disclosure and engagement of community through consultation	No community impacts	2. Initiate Information Disclosure and Grievance Redress Mechanism of IEE 3. Include discussion on (including with waste pickers and house close to landfill < 500 m). a. The project implementation schedule, b. Key construction activities (in particular those that result in disturbance or nuisance) c. GRM and status of compensation (if relevant). d. And discussions related to: Impacts/ Nuisance on the Environment and the communities reported by community members. e. Concerns and expectations from the project	PMU-ESO/ PIU-SFP	EA	Included in PMC cost package
Contractor EMP (CEMP)	All impacts	4. The contractor(s) will develop a CEMP for the landfill subproject. 5. The CEMP will include a map of each construction site, showing as a minimum: Access routes, storage areas for waste, storage area for chemicals such as fuels, refuelling locations for vehicles, concrete mixing, stockpile storage areas (on & off site), first aid kit and equipment used in emergency response, location of worker camps (if required) and borrow sites. 6. All related subplans should also be developed by the Contractor (as listed above.) 7. The CEMP should also provide a Method Statement for well drilling (groundwater observation wells, and water supply well for the landfill site). 8. The CEMP is developed by the contactor and submitted to PMC-I/NES Consultant for review and approval.	Contractor (C-EHS)	PMU and DDISC	Included in bid price
Backfill / Extraction of material at Borrow sites	Destruction of Flora Erosion Traffic	9. Where possible, material from existing licensed borrow and quarry sites will be used. If new sites are needed, they will be subject to due diligence and approval by ADB and the relevant PDoE to ensure that sensitive habitats are avoided and that an			

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
	Air Quality impact	appropriate restoration plan using native species is agreed following re-contouring. 10. Select Borrow sites located as close as possible to the proposed landfill site to reduce distances. 11. The Borrow sites to be exploited for the construction activities need to be identified within the CEMP, and site-specific spoil and borrow site management plans need to be prepared for each borrow site identified for construction.			
UXO survey, & removal	Injured worker or public people	12. Ensure national military is consulted to confirm all relevant areas are clear of UXO. This includes: a) All land to which is used for resettlement purposes (for people/businesses/farmland) b) All construction sites including 50 m either side of any access roads c) All associated areas including borrow sites. 13. Cambodian Mine Action Centre (CMAC) to clear areas where necessary and provide evidence of clearance to PMU in advance of construction. 14. As evidence, submit a certificate of UXO clearance and attach it as annex to the subsequent monitoring report to ADB once the certificate of clearance has been awarded. 15. No construction work is allowed to start until the UXO clearance certificate has been issued	Contractor CMAC	PMU, Consultant	Include in the bid price
Preservation of trees and other vegetation	Impacts to trees and other vegetation	16. Existing vegetation shall be preserved where no construction activity is planned 17. All trees over 3 m high will be registered (inventoried) prior to construction works and reported to DWPT for protection or removal. 18. Ensure DWPT and local authority have been informed and obtain the permit for tree cutting. 19. Make provision for plantation of more than 5 new trees for each one removed (agree number with communities in affected area).	Contractor	PMC/PMU	Include in the bid price
GRM	Dissemination	20. Erect sign boards with project details and GRM procedures/contact details at the entrance to each construction site/camp. 21. PMU to provide contractor with GRM contact details which the contractor will use to print 'GRM Contact Cards' for its staff to hand to complainants and will keep cards with all vehicles, machinery and site managers/foremen. 22. Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a	Contractor	PMU and Consultant	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		complaint i.e. direct the person to the most senior site manager present at the time and provide a 'GRM Contact Card'.			
Groundwater and surface water	Groundwater Surface water	23. A site-specific Hydrogeological study is required prior to start of works in order to identify groundwater characteristics (depth, flow direction, productivity, usage, variations), and identify the most appropriate location, and number of monitoring wells. 24. Identification of all groundwater wells and boreholes used by nearby villagers (farmers and industries) within a 3 km radius. 25. Provide Method statement for the construction of groundwater monitoring wells and water supply wells are required during pre-construction period. The statement will be prepared by Contractor and approved by PMC-NES. Monitoring boreholes should also be put in place prior to start of excavation of landfill cells. 26. Monitoring boreholes should also be put in place prior to start of the construction of landfill cells (minimum 1 borehole upstream and 3 boreholes downstream), 27. And a baseline assessment of groundwater quality should be conducted prior to start of work. Samples must be taken from each borehole, and from nearby boreholes at the nearest receptors, to conduct laboratory analyses against drinking water guidelines.	Contractor	PMC-NES	Part of Contract Cost
Construction works and Operations	Nuisance for neighbouring residents	28. Installation of opening glass windows into all windows within the house. 29. Provision of enough viable tree or shrub saplings (native species, to be determined through consultation) to provide a vegetation screen around the front or back, and sides of the property; the resident is responsible for aftercare.	Contractor	PMU/PIU	Included in bid price

4.2. Construction Phase

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
Construction Phase					
Civil works	Air quality	1. Select Borrow sites located as close as possible to the proposed landfill site to reduce distances. 2. Asphalt and concrete batching facilities will be located at least 500 m downwind from the nearest dwellings to reduce the impact of fumes on humans and to be fitted with necessary equipment such as bag house filters to reduce fugitive dust emissions. 3. Water will be regularly sprayed on construction sites, material handling areas, and borrow pits where fugitive dust is generated. 4. Trucks carrying dry construction materials such as earth or waste will be covered with tarpaulins or other suitable cover. 5. Construction vehicles and machinery will be maintained to a high standard to minimize emissions for comply to National emission standards. All mobile equipment should be fitted with catalytic converters. 6. Vehicle speed will be reduced to 30 km/hour in each inhabited area. 7. Waste pickers and all residential areas within 500m of existing dumpsites will be informed in advance of when waste movements will take place. 8. Unauthorized burning of construction and demolition waste material and refuse is prohibited. 9. Air quality will be monitored at landfill site and at receptor level and actions should be taken in case of complaints or non-compliance.	Contractor	PMU, Consultant	Included in bid price
Civil Works	Noise	10. Undertake regular equipment maintenance and maintain all exhaust systems in good working order in accordance with the manufacturers' instructions. ; 11. Restrict construction activities to between 8 am-6 pm; 12. Provide advance warning to the community on timing of noisy activities. Public notification of construction operations will incorporate noise considerations; information procedure of handling complaints through the GRM. 13. Ensure noise monitoring is undertaken near sensitive receptors, particularly at dwellings when construction machinery is operational; and ensure compliance with noise standards of bub-decree N.42 on air pollution control and noise disturbance MoE, 2000.	Contractor	PIU/PMU, Consultant	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		14. All construction workers will use appropriate Personal Protective Equipment (PPE) including ear defenders when operating machinery; 15. As part of the traffic management plan, speed limits will be enforced for trucks and other work machinery when passing through residential areas. Vehicle speed will be reduced to 30 km/hour in each inhabited area. Engines should be turned off when not in use.			
Civil Works	Flora and fauna	16. Existing vegetation shall be preserved where no construction activity is planned 17. An inventory of trees over 3 m high should be conducted prior to construction works. 18. Trees/vegetations over 3m encountered on construction site or access areas shall be protected from construction activities if they are not required to be removed. 19. Cutting of tree over 3 m requires to inform and get permit from DPWT and local authority. In addition, replantation shall be sought upon completion of the work. where a tree must be removed, or an area of grassland disturbed, replant trees and re-vegetate the area after construction. 20. Where possible, material from existing licensed borrow and quarry sites will be used. If new sites are needed, they will be subject to due diligence and approval by ADB and the relevant PDoE to ensure that sensitive habitats are avoided and that an appropriate restoration plan using native species is agreed following re-contouring. 21. Construction workers shall be prohibited from capturing any wildlife in the project areas.	Contractor	PIU/PMU, PD0E Consultant	Included in bid price
Civil Works	Water Quality and Access	22. Portable toilets and small wastewater treatment units will be provided on construction sites and construction camps for the workers and canteens. If there are nearby public sewers, interim storage tanks and pipelines will be installed to convey wastewater to those sewers. All sanitary facilities should be located at least 200 m from surface water bodies. 23. Temporary ditches should be installed around the construction site to manage and control the runoff and prevent direct discharge to surrounding agricultural land or water body. 24. Sedimentation ponds will be installed on construction sites to treat process water (e.g. concrete batching for pier construction) and muddy runoff with high concentrations of suspended solids. If necessary, flocculants such as polyacryl amide will be used to facilitate sedimentation.	Contractor	PIU/PMU	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		25. Runoff accumulating at the bottom of the cells during construction will be pumped out and discharged appropriately 26. The discharge point for stormwater runoff, pumped out water, and other effluents must be identified prior to construction works. Capacity of receiving water body or irrigated land needs to be assessed, as well as risk of contamination from pumped out water or stormwater runoff. 27. Construction machinery will be repaired and washed at dedicated repairing shops. No onsite machine repair and washing shall be allowed. 28. The hazardous waste (oil waste) shall be properly collected and stored in closed container under shelter for reuse or recycle or disposal, to ensure they will not contaminate soil, groundwater and surface water. 29. Material stockpiles will be protected against wind by being covered and runoff waters which might transport them to surface waters. They shall be located further than 50 m from water bodies. 30. Storage of bulk fuel should be on covered concrete pads away from the public and worker camp, and 300 m from surface waters. Fuel storage areas and tanks must be clearly marked, protected, and lighted. Contractors should be required to have an emergency plan to handle fuel and oil spillage. 31. All hazardous fluids such as oil, and fuels shall be stored and handled on a bunded impermeable surface; a bund will be provided around any above ground fuel storage tanks ensuring containment of 110% of the largest single tank volume. 32. No washing or repair of machinery should take place within 50 m of surface water bodies. 33. Implement all soil erosion protection measures needed to prevent erosion. 34. A vegetation buffer shall be maintained between the construction sites and the nearest water bodies. 35. Final design ensures adequate drainage management system like cross drains on all facilities and access roads to ensure project does not cause ponding or further flooding elsewhere. 36. Ensure separation of Hazardous waste to be treated at the Hazardous waste facility. Ensure proper containment of hazardous waste facility. 37. Conduct monitoring of surface water quality around the project site for key parameters including turbidity, Hydrocarbon content and physical parameters.			

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
Protection of Groundwater	Groundwater	38. Landfill design complies with best practices to prevent contamination of groundwater, including: Compacted clay layer at the bottom and on the side of the cells, HDPE liner bottom and side, drainage of leachates and pumping out of the cells, etc. Contractors to make sure they implement the prescription of the DED. 39. Construction vehicles and machinery will be maintained to a high standard to prevent leak of oil, lubricant into the ground. 40. Pits must be backfilled to keep bottom of cells more than 3 m above highest ground water table level 41. Backfilling material must be tested and controlled to ensure it does not impact ground water quality. 42. Implement mitigation measures for waste management as indicated in Solid Waste Management section.	Contractor	PIU/PMU	Included in bid price
Implementation of Materials, Spoil and Borrow Site Management Sub-Plan	Soil and land resources	43. A map of all borrow sites will be developed and maintained with copies held by the Contractor and PIU. 44. Site specific spoil and borrow site management plan will be developed and approved by the relevant Municipal authorities or departments. 45. Safety measures will be implemented including the prevention of access by members of the public and livestock. 46. Measures to rehabilitate the borrow sites shall be implemented including contouring of the slopes within each site and replanting sites with native species; 47. Topsoil present on construction sites will be removed and stockpiled in a labelled area for use on rehabilitation of the site post-construction or rehabilitation of borrow sites; 48. There shall be no disposal of spoil or dredged material on agriculturally productive land or within 50 m of a water course. 49. Construction working areas will be clearly demarcated and encroachment onto adjacent areas prevented.	Contractor	PMU, Consultant	Included in bid price
Implementation of Solid and Liquid Waste Management Sub-Plan	Resource use and natural resource contamination	50. Preparation of a Waste Management Plan before construction which applies the waste hierarchy to ensure efficient use and management of resources with a priority to prevent waste at source as much as possible. 51. Clear arrangements for storage and transportation of all hazardous and non-hazardous waste to an authorised and approved disposal point (approved by PDoE or Local authority). 52. Recyclables to be separated at source and given/sold to recycler (plastic, metal, card, paper as a minimum). 53. No waste will be stored within 20m of a water course and all solid waste to be stored in containers with lids.	Contractor	PIU/PMU	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		54. Prohibit burning of waste at all times. 55. Provide all vehicles/drivers with plastic bags for waste collection and prevent any unauthorized waste disposal with particular attention paid to prevention of waste entering water ways including irrigation canals.			
Implementation of Community and Occupational Health and Safety and Emergency Response Sub-Plan	Human health and safety	56. Community H&S measures to be included in the Community and Occupational Health and Safety and Emergency Response Sub-Plan will include: 57. The contractor shall appoint an Environment, Health and Safety (HSE) Officer who is qualified engineer. 58. Access to construction sites will be prevented through appropriate fencing, protective barriers, and buffer zones. 59. Excavation sites will also be specifically fenced, and no person shall enter an excavation area without supervision/control. 60. Sufficient signage giving health and safety warnings and information will be displayed at all sites. 61. Worker education and awareness seminars for construction hazards will be given on a regular basis. A construction site safety program will be developed and distributed to all workers. 62. The Contractor HSE supervisor shall conduct daily toolbox meetings (safety briefings) 63. An accident record book will be maintained where all major or minor accidents and incidents are recorded with actions taken. 64. The contractor shall ensure that all workers are equipped with and use Personal Protective Equipment. 65. Adequate first aid equipment will be made available on site. 66. Provision will be made for safety precautions when using 220 to 240V Electric Power tools if the workers are likely to be working within wet or flooded environments. 67. Warning signs will be set up if mud is likely on public roads. Mud will be removed at the end of each day. Other spillages on public roads will be removed immediately. 68. Contractor will set out an Emergency Response Plan. 69. The contractor will also develop a traffic management plan covering movement of vehicles within the construction sites, and outside the construction sites. Traffic management must include regular monitoring of traffic safety both within construction site and on public road. Traffic monitoring should entail, description of access roads, speed limits, controls and monitoring on drivers, training of drivers on Health and Safety, emergency numbers for road accidents, grievance mechanism.	Contractor	PIU/PMU, Consultant	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		70. COVID -19 Risk Management[2] measures (see also Annex 6 with detailed measures): - Develop, communicate and execute a work plan on safe working for COVID-19 in compliance with country-specific COVID-19 risk management regulations and directives including directions of the Ministry of Labour, and Vocational Training (MoLVT) - Conduct workplace risk assessment to identify low, medium or high exposure risk to COVID-19. Prepare an action plan for prevention and mitigation of the spreading of COVID-19, and ensure that preventative measures are in place before resuming or beginning construction work. - Conduct Risk communication, training, and education. Training of workers in infection prevention and control practices. - Adopt engineering, organizational and administrative measures, plan work so employees can keep distance from each other and minimise contact. - Provide clear and visible guidelines on how to prevent infection at the construction site and initiatives taken. - Avoid physical interaction and remain socially distant. - Ventilate enclosed workplaces including work camps and communal spaces. - Avoid concentration of workers - limit the capacity of common areas such as work camp dining rooms and changing rooms to allow the minimum separation of 2 meters and organize one-way systems. This includes sleeping areas which must be a minimum of 2 meters between beds. - Regularly clean and disinfect toilet and bathroom - Promote personal hygiene (including hand and respiratory hygiene), make wash basins and sanitizers available - Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need - Provide personal protective equipment (PPE) and inform workers of its correct use.			

[2] For more details, refer to: WHO Guidelines for getting the workplace ready for COVID19: https://www.who.int/docs/default-source/coronaviruse/getting-workplace-ready-for-covid-19.pdf?ua=1
And ILO's Guide: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---act_emp/documents/publication/wcms_740212.pdf

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		- Provide health surveillance and insurance. - Consider other hazards, including psychosocial - Review emergency preparedness plans - Review and update preventive and control measures as the situation evolves. Involve workers/OHS groups in the review - Before entering the site, staff and visitors must confirm that they are not currently exhibiting flu-like symptoms. - Monitor the health status of workers, develop protocols for cases of suspected and confirmed COVID-19. - Workers with symptoms or confirmed cases must be isolated within the construction camp or stay at home for 7 days after symptoms started. - People who have been in close contact with the person with confirmed COVID-19 be quarantined for 14 days. - All workers in quarantine or isolation must be provided with adequate food, water, medical assistance and sanitation. - All workers should be provided with health insurance that includes COVID-19 treatment 71. COVID19 contaminations shall be reported as part of the HSE monitoring report submitted to PMU/ADB.			
Implementation of Construction Workers Camp Management Sub-Plan	Contamination of water, soil, waste production and social issues	72. Construction camp outside the village requires the contractor to develop Campsite Management Plan which includes map showing camp lay out. Provide adequate accommodation and sanitation for male and female workers. Campsite restoration plan after completion of work shall be developed. 73. The construction campsite should be located far from water sources with fencing and safety zone campsite. 74. If a construction camp is not required, the contractor will set out a management plan which includes: Provision of adequate waste disposal facilities, welfare facilities, and sanitation for both male and female workers. 75. Priority given to use of local labour and retain evidence of how local labour recruitment efforts were undertaken.	Contractor	PIU/PMU/ MoE, Consultant	Included in bid price
Protection of workers and Laborers	Socio-Economic Impacts (accessibility)	76. Warning given to residents 4 weeks in advance of any excavations 77. Develop traffic management plan and implement around the construction site. Avoid blockage the road and traffic sign shall be installed to indicate reduced driving speeds, changes to detour or traffic direction. 78. Restoration of any road surface damage.	Contractor	PIU/PMU/ MoE, Consultant	Included in bid price

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		79. Consideration and management of potential localised flood impacts due to construction work. 80. Set up and follow up of grievance mechanism as prepared prior to works.			
Access Road & Site Development	Cultural Impacts	81. The contractor will ensure awareness of all cultural resources in the area including individual family graves along access roads, cemeteries or other relevant sites. 82. The contractor will fence off any such resources to ensure that they are clearly marked and will not be affected by the construction 83. The contractor will take and store a Pre-Condition photograph of any such resources and make this available to MWPT should any dispute occur.	Contractor	PIU/PMU, Consultant	Included in bid price
Dumpsite Closure	Environmental Compliance Audit	84. Undertake Environmental Compliance Audit on dumpsite to be rehabilitated. Incorporate corrective measures in closure plan.	PMC-NIES	PMU, Consultant	Part of Contract Cost
Landfill implementation planning	Occupational health and safety of informal waste pickers	85. Formalise roles of waste pickers and provide safer working environment.	PMC-NIES	PMU, Consultant	Part of Contract Cost
Construction Completion	-	86. Site visit in order to develop Project Completion Report to assess community views on project and EMP implementation overall and state of project at contractor' handover.	PMC-NIES	PIU/PMU	Part of Contract Cost

4.3. Operation Phase

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
Operation Phase					
Waste Management	General	1. Obtain required approvals and permits to operate the site. 2. Agree with MPWT and MOE on the solid waste strategy considering the closure of the existing site.	Operator-PIU	MPWT	Part of ocntract cost
Waste Management	General	3. An operation plan shall be prepared by the operator of the landfill, and the Environmental Management Plan will need to be updated for the operational phase. Minimum measure should include: a. compaction and cover of waste. b. controlling and minimising windblown waste c. clear arrangements for collections, transportation and storage of all hazardous and non-hazardous waste d. controlling and recording waste disposed of at the landfill, including origin, quantity, type of waste, collector. e. Separating and managing hazardous waste according to their type and in line with local regulations and international guidelines. f. Guidelines for leachate management 4. Conduct monitoring of waste disposed of at the landfill, including origin, quantity, type of waste, collector. 5. Hazardous waste shall be separated and managed according to their type and in line with local and international regulations.	Operator-PIU	MPWT	Part of contract cost
Landfill Operation	Nuisance Impacts on nearby populations	6. For all households within 500 m from the landfill site: • Installation of opening glass windows in all windows within the house. • Provision of enough viable tree or shrub saplings (native species, to be determined through consultation) to provide a vegetation screen around the front or back, and sides of the property; the resident is responsible for aftercare. 7. The operator will install a sign board with relevant contact details and operating hours at the entrance to the landfill site. It will state contact details for raising complaints. 8. The contractor will record all public complaints and deal with them within a timeframe agreed with MPWT.	Operator-PIU	PIU/PMU, Consultant	$800/ affected household
Transport and dumping of waste	Air quality	9. Controlled biogas generation through regular cover of waste and injection of leachate into waste heap to stimulate biogas generation. 10. Monitoring of air quality at source and at distant receptors level downwind to ensure the discharged gases do not affect nearby air quality. Ensure the air quality complies with air emission standards of MoE.	Operator-PIU	PIU/PMU, Consultant	Part of contract cost

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		11. Nets to collect windblown litter downwind of operated cells. 12. MRF to be a covered area, with nets/ wire mesh to prevent light material from being carried away by wind. 13. Regular maintenance should be conducted on machinery and vehicles. 14. Monitoring of emissions from trucks to control that they respect Cambodian guidelines for vehicles 15. Waste shall be covered during transport from existing dumpsites to new landfill site. 16. Waste shall be covered during transport from existing dumpsites to new landfill site.			
Leachate and other effluent generation	Surface water protection	17. Ensure proper containment of hazardous waste facility. 18. Drains will be constructed throughout the site in the form of reinforced concrete-lined open ditches and reinforced-concrete covered drains. These drains will divert storm water away from roads, landfill cells, buildings and facilities. The storm water will be discharged into a ditch, which will be constructed as a simple natural channel, which will transport water to the existing pond that is on the site, which will act as a stormwater storage facility. 19. Potentially contaminated water, including leachates, will be treated prior to discharge to the environment. A series of leachate treatment ponds will ensure that in case of a rare release of leachate to the environment, effluent standards are likely to be met and that the absorptive capacity of the receiving waterways is not exceeded and not causing health risks to users of the water. 20. Minimise leachate production by (i) intercepting surface water run-on to the site and internal runoff, (ii) intermediate cover and waste compaction to reduce infiltration into the waste, (iii) building waste in pyramidal phases as opposed to being spread across the whole cell; and (iv) completing the main phases prior to the onset of the wet season. 21. Ensure that only waste leachate is sent to the leachate treatment facility by separating rainwater from the inactive parts of a cell and discharging it as clean stormwater. Each section of a cell will be equipped with an interchangeable pipe system, initially set to stormwater, and subsequently turned via a valve to the leachate transport system when waste is deposited in that particular area. 22. Operation of a low tech, easy to maintain, biological leachate treatment facility. Leachate is moved via gravity through a series of ponds: an anaerobic lagoon, aerobic lagoon, and a maturation lagoon in the form of a constructed wetland. There will also be a	Operator-PIU	MPWT	Included in operational costs – O&M Budget

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		final treated water lagoon, which will provide a storage for the water and connected to a leachate recirculation system returning the liquid to the waste to manage flow rates and accelerate uniform settlement of the waste. 23. Always comply with required operating standards to ensure effective treatment of leachates. 24. Allocate adequate budget for O&M of the landfill and surface water management. 25. Recirculation of leachate to the landfill as necessary and practicable. 26. In case of discharged effluents, monitor and report the quality of receiving water bodies around the landfill site.			
Landfill liner/ Membrane	Groundwater protection	27. Rainwater infiltration will be limited by the construction and use of drainage canals around the operating cells. 28. Ensure separation of hazardous waste to be treated at the Hazardous waste facility. Ensure proper containment of hazardous waste facility. 29. Always comply with required operating standards to limit water infiltration and therefore the generation of leachate including compaction of waste, management of run off and use of (frequent) cover materials; 30. Provision of adequate budget for O&M including monitoring groundwater quality in three (downstream) wells in the nearest village (locations to be confirmed) and addressing liner integrity failure (if identified through groundwater monitoring). 31. Monitoring will be required during operation and after closure of landfill. Monitoring wells will be installed prior to start of construction. One upstream and 3 downstream of landfill cells. Baseline conditions to be determined prior to start of operations. Additional monitoring to be conducted on nearby wells if there are any identified within 3 km radius.	Operator-PIU	MPWT	Included in operational costs – O&M Budget
Landfill Operation	Odour, Dust, Pest (landfill) and Fire Protection	32. Daily compaction of the waste and regularly cover of the waste. 33. Nets downwind of operated cell to capture potential windblown litter. 34. Weekly litter collections and removal of any wastes which are not deposited in cells, including waste at the boundary and access roads to the site. 35. Washing wheels of vehicles before they leave site if they are muddy from accessing the landfill cells to prevent dust increasing on public roads. 36. Quarterly meetings with residents and / or their representatives to identify odour or nuisance issues.	Operator-PIU	MPWT	Included in operational costs-O&M Budget

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		37. Providing and maintenance of a vegetation buffer with tree plantings and green places around and in the landfill site as a screen around the site to reduce noise, dust and odours. 38. All waste loads or transporting to be done with covered trucks. 39. Provision of adequate budget for O&M. 40. There is no plan to flare recovered landfill gas. Gas generated at landfill will be ventilated to atmosphere. The design considers appropriate landfill gas ventilation system. 41. Strict control of fire risk will be implemented at the landfill site including prevention of burning, smoking. 42. A fire response team shall be designated and trained to intervene in case of fire at the landfill. 43. A fire water tank will be available at the dumpsite.			
Landfill operation	Flora and Fauna	44. Prepare a Pest Management Plan complying with ADB Control presence of pest and take measures as necessary 45. Provide worker immunization and health monitoring (e.g. for Hepatitis B and tetanus); 46. Maintain good housekeeping in waste processing and storage areas 47. Promptly compact and cover wastes in operated cells, especially for waste with the potential to attract vermin and flies, such as food wastes 48. Grade the area properly to prevent ponding (to minimize insect breeding areas); 49. Use integrated pest-control approaches to control vermin levels, treating infested areas 50. Fully enclose the waste management site with fencing so that no livestock or wildlife is able to come in contact with the waste and thus prevent spread of livestock and zoonotic disease.			
Landfill Operation	Community Nuisance impact	51. For houses within a 500 m radius of landfill site boundaries: • Installation of opening glass windows into all windows within the house. • Provision of enough viable tree or shrub saplings (native species, to be determined through consultation) to provide a vegetation screen around the front or back, and sides of the property; the resident is responsible for aftercare. 52. The operator will install a sign board with relevant contact details and operating hours at the entrance to the landfill site. It will state contact details for raising complaints. 53. The operator will record all public complaints and deal with them within a timeframe agreed with MPWT.	Operator-PIU	MPWT	Included in operational costs – O&M Budget

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		54. The operator will cover all waste loads and all drivers will follow legal speed limits at all times.			
Landfill Operation	Community and Occupational Health and Safety	55. The Operator shall appoint an Environment, Health and Safety Officer who is a qualified engineer. 56. Access to site will be prevented through appropriate fencing, protective barriers, and buffer zones for all non-authorized personnel. All entrances should be recorded. Video cameras should also be put in place around the perimeter of the site. 57. Sufficient signage giving health and safety warnings and information disclosed at the entrance of all sites. 58. Worker education and awareness seminars for landfill-related hazards will be given. A site safety program will be developed by the operator and workers shall be trained regularly. 59. The site operator HSE supervisor should conduct daily toolbox meetings (safety briefings) 60. An accident record book will be maintained where all major or minor accidents and incidents are recorded with actions taken. 61. Ensure that all workers and waste pickers are equipped with and use Personal Protective Equipment. 62. Adequate first aid equipment will be made available on site for landfill operators and Waste pickers. 63. Firefighting equipment and a trained firefighting team shall be present on site. 64. The operator will prepare an Emergency Response Plan. 65. The operator will develop a Traffic Management Plan for movement of vehicles within the landfill site, and to and from the landfill site. Traffic management must include regular monitoring of traffic safety both within construction site and on public road. Traffic monitoring should entail, description of access roads, speed limits, controls and monitoring on drivers, training of drivers on Health and Safety, emergency numbers for road accidents, grievance mechanism. 66. Monitoring should be conducted on discharged effluents (see surface and groundwater) to control sanitary innocuity. 67. Potential impacts to workers in operation due to COVID-19 will be mitigated through specific measures set out in Appendix 6.	Operator-PIU	MPWT	Included in operational costs – O&M Budget
Overall waste management	Contamination of workers and surrounding environment	68. An operation plan shall be prepared by the operator of the landfill, and the Environmental Management Plan will need to be updated for the operational phase. Minimum measure should include daily compaction and regular covering of waste. 69. Conduct monitoring of waste disposed of at the landfill, including origin, quantity, type of waste, collector.	Operator-PIU	PMU	Included in operation costs

Subproject Activity	Environmental Impact / Issue	Mitigation measures	Implemented by	Supervised by	Cost ($)
		70. Hazardous waste shall be separated and managed according to their type and in line with local and international regulations.			
Landfill closure	Landscape Alteration and erosion	71. Preventing infiltration by adding a cover at the top of the cell, consisting of topsoil (150 mm), Intermediate layer (150-300 mm), barrier layer (600 mm) and a gas collection layer (150 – 300 mm). 72. The elevated design of the landfill and the diversion channels should be maintained. Appropriate ripraps / retaining walls should be established and regularly checked. 73. Re-vegetation of the cover shall be facilitated by a cover of topsoil and seeding with local appropriate species. 74. Monitoring should be conducted even after closure of the cells: - Monitor structural movements and settlement - Groundwater - Landfill gas - Leachate - Revegetation and erosion	Not included in this package. To be implemented in a separate contract.		

5. EXISTING DUMPSITE

42. The wider ADB project "Second Urban Environmental Management in the Tonle Sap Basin Project" involves the closure of the existing dumpsite in Stueng Saen. The closure of the dumpsite is planned to occur immediately following the opening of the new landfill. This dumpsite is an Existing Facility of the wider project which means that an Environmental Compliance Audit (ECA) shall be carried out for that facility pursuant to the ADB Safeguards Policy Statement (SPS) (2009). The ECA is not part of this subproject but will be prepared separately for the dumpsite closure and remediation under a separate subproject. The current sub-project (construction of new engineered landfill) does not have any existing or associated facilities.

43. The Existing Dumpsite (see Figure 5) is located south of Stueng Saen town on a publicly owned land. The dumpsite has an area of 1 ha and waste has been disposed to a depth of up to 4 m. The site has been in operation for 21 years. Waste has been and is currently dumped without any compaction and only occasional sporadic application of cover material. Informal recyclers are collecting recyclable materials and open burning of waste is occurring at the site.

Figure 5: Location of the Existing Dumpsite

44. **Environmental Compliance Audit**. According to the preliminary Terms of Reference for the ECA attached in Annex 1, the ECA will be executed in two phases:

    - **Phase 1**. Preliminary assessment of the risks, possible solutions and the need for immediate mitigation measures at the dumpsite to minimise on-going pollution and risks to human health as much as practical until the long-term solution can be implemented.

- **Phase 2**. Detailed site investigations and analyses as a basis for making a decision on the long-term solution and to provide information for the preparation of the detailed remediation design.
- At the end of each phase, the results will be presented to the Project Steering Committee and ADB for their decision on the next steps.

45. **Temporary Mitigation of Impacts at the Dumpsite**. Phase 1 of the ECA is designed to deliver an action plan and EMP for immediate mitigation measures at the dumpsite. Likely measures include the following:

- Extinguishing fires
- Regular covering of waste
- Extermination of pests (rats)
- Temporary leachate management such as diversion of leachate to a temporary pit
- Training of informal recyclers and providing them with PPEs
- Designation of work areas for waste dumping with minimal risk of polluting waterways.
- Fencing of the dumpsite.

46. The contractor assigned to implement these measures shall develop a CEMP for the activities in alignment with the EMP prepared under Phase 1 of the ECA.

47. **Closure and Remediation of the Dumpsite**. The mitigation and monitoring measures for the closure and remediation of the dumpsite is not included in this EMP as these measures depend on the chosen solution which will be determined in Phase 2 of the ECA. A separate EMP for the closure and remediation of the dumpsite will be prepared based on the ECA in conjunction with the detailed remediation design.

48. The tentative plan is to close and start remediating the dumpsite as soon as the new landfill is ready to receive waste. The key objectives of closing and remediating the existing dumpsite include to:

- minimise the risk that leachate from the waste dump may infiltrate groundwater resources that are or may in the future be used as a source of drinking water;
- minimise the risk of contamination of nearby waterways;
- minimise the risk to public health from spread of infections;
- eliminate the generation of harmful air emissions from open burning of waste;
- control migration of landfill gasses;
- eliminate generation and odour and windblown waste;
- create an area that can be safely used for predetermined purposes;
- improve the livelihoods and living conditions of informal recyclers.

49. The possible long-term solutions to closure and remediation of the dumpsite basically comprise the following three methods:

- **In-place closure by capping the waste**. This method includes a low permeability cap and a topsoil layer (typically comprised of 4 layers: (1) gas drainage, (2) low permeable clay layer, (3) soil drainage layer and (4) a topsoil layer). The final grading of the closed dump should be designed to ensure slope stability and proper drainage that prevents ponding of water and which is not causing erosion. Leachate seepage on side slopes should be collected and then pumped onto a truck for disposal and treatment at the new landfill. Installation of landfill gas vents would also be considered. The site would likely be suitable for sport activities, park or recreation, agriculture (cropland, plantation, grazing land), but not for buildings or installations or infrastructure that require good foundation.

  Long-term aftercare and monitoring would be required, and this would likely include groundwater monitoring (monitoring wells would have to be established), monitoring

of seepage / leachate, and landfill gas monitoring. Aftercare would consist of regular cleaning and repairs to the leachate collection and disposal systems, reinstatement of eroded batters, replacement of soils that are eroded, replanting any vegetation that dies back, filling any depressions that occur on site due to differential settlement, reparation of access roads to allow access at all times, and repairs to the perimeter and internal fences as needed.

- **Closure by upgrading into a controlled engineered landfill**. If there is sufficient available space at the dumpsite, a controlled waste cell could be constructed at the site. The waste would be excavated and disposed in the cell with proper compaction of the waste in thin layers thereby potentially reducing the area or the footprint and thus also the generation of leachate. Ideally, the waste would be encapsulated in a cell with liner, leachate collection system, landfill gas venting and a cap as in the 'in-place closure' alternative, however, the level and scope of mitigation measures would depend on the results of the ECA. Leachate could be treated (possibly also recirculated) onsite or trucked to the new landfill for treatment. Segregating recyclable materials from the excavated waste could be part of the remediation. The future land use would be restricted similar to the 'in-place closure' alternative, but it may be possible to free-up some land that would free of waste and that would not have any land use restrictions. Monitoring and aftercare would likely be similar to the 'in-place closure' alternative.
- **Closure by removing the waste from the dump and disposing it at the new landfill**. This alternative could be combined with sorting the waste for recyclable materials and separation of hazardous waste. In principle, deposition of the waste at the new landfill would inevitably reduce the design-life of the new landfill, however, as explained in the IEE, considering waste settlement, the cells have an extra capacity of some 240,000 m^3. The excavated void should be backfilled with suitable locally available materials. This would in principle ensure that there would not be any land use restrictions and no need for monitoring and aftercare. However, if the groundwater underneath the waste dump has already been contaminated, there may be a need for additional mitigation measure and/or monitoring activities.

50. The contractor assigned to implement the closure and remediation measures shall develop a CEMP for the activities in alignment with the EMP prepared based on Phase 2 of the ECA.

51. **Informal Recyclers.** The social surveys under the Subproject has identified 13 affected households / 56 affected people that derive their livelihoods from collecting and sorting waste at the existing dumpsite and selling it to recycling companies. When the dumpsite closes, these informal recyclers will be affected by economic displacement and they are included under the Detailed Resettlement Plan for the Stueng Saen Wastewater treatment plant subproject. All eligible affected households have chosen cash-only assistance.

6. MONITORING PLAN

52. The project monitoring to be conducted under the EMP is summarized in Table 6.

Table 6: Summary of monitoring under the EMP

Monitoring	Purpose	Estimated costs / source of budget
Project readiness monitoring	Monitoring to check progress on project readiness and close gaps through corrective actions. (Table 7)	No additional cost, part of project implementation activities
Pre-construction and construction phase environmental quality monitoring	To be conducted by a competent authority or person appointed by the Contractor, involving the collection and analyses of air quality, noise and water quality data at designated monitoring locations for assessing compliance with applicable environmental quality and emission standards during construction (Table 8)	Pre-construction: 7,500 USD Construction: 46,100 USD/year
EMP compliance monitoring	To be conducted by the PMC-NES (contracted via the Project Management Consultants) to verify EMP compliance during project implementation (Table 9)	No additional cost, part of project implementation activities
Affected People monitoring (consultation)	This is to be conducted by the PIU-SFP via consulting affected people on the impacts during construction (Table 9)	No additional cost, part of project implementation activities
Operational phase environmental quality monitoring monitoring	This is required as part of the operations of the subproject and will be undertaken by the relevant government department or a nominated private sector operator (Table 8)	To be Included in operation and maintenance budget

53. The Contractors will bear the costs for all mitigation measures during construction, including those specified in the tender and contract documents as well as those to mitigate unforeseen impacts due to their construction activities.

54. The operator will be responsible for operation and shall ensure that the cost is included in annual budget plan.

55. The engagement of a National Environmental Specialist for 10 months will be critical to ensuring capacity-building of the PIU staff and ensuring monitoring is effective and that corrective actions are promptly identified and implemented.

6.1. Project Readiness Monitoring for Subproject

56. Before construction, the PMC will monitor the project's readiness on environmental management based on a set of indicators (Table 7) and report it to ADB and PMU. This assessment will formally demonstrate that environmental commitments are being carried out and environmental management systems are in place before construction starts, or suggest corrective actions to ensure that all requirements are met.

Table 7: Project Readiness Assessment Indicators

Indicator	Criteria	Are the Criteria met? Yes/No	If No, What Corrective action is needed?	Date for Corrective Action Completion
1. EMP update	EMP updated after detailed design & approved by ADB	Y/N		
2. Compliance with loan covenants	The borrower complies with loan covenants related to project design and environmental management	Y/N		
3. Public involvement effectiveness	Meaningful consultation completed	Y/N		
	GRM established with entry points	Y/N		
4. Environmental supervision and monitoring in place	Recruitment of external staff as set out in the Institutional Arrangements for this EMP	Y/N		
	Nomination of government staff for PMU and PIU roles as set out in the Institutional Arrangements for this EMP	Y/N		
5. Bidding documents and contracts with environmental safeguards	Bidding documents and contracts incorporate the environmental activities and mitigation measures required by this EMP	Y/N		
	Bidding documents and contracts incorporate the Particular Conditions for bidding	Y/N		
6. EMP financial support	The required funds have been set aside for EMP implementation including training and capacity building	Y/N		
7. IESIA approved	The national EIEA has been submitted and approved by MoE	Y/N		
8. Permits obtained	All permits required for construction works are obtained	Y/N		
9. CEMP and subplans are provided	Plans have been prepared by Contractor and approved by PMC-NES	Y/N		

6.2. Environmental Policy and Standards

57. The construction and operation phases of the project shall follow relevant environmental quality standards. These are presented in Annex 5 for reference. These quality standards relate to i) air quality, ii) ambient surface water quality, iii) drinking water quality (groundwater), vi) soil quality, v) effluent quality.

6.3. Environmental Quality Monitoring

58. During construction, the impacts on the sensitive environmental receptors will be monitored and compared against the relevant national environmental standards.

59. During operation, the PIU and relevant operators will maintain an adequate budget to ensure environmental monitoring can be undertaken as specified in Table 8.

Table 8: Environmental Quality Monitoring: Landfill subproject

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)	
			Supervision	Implementing	Per Sample	Total per site/yr
Pre-Construction Phase – Landfill, Dump Site and Borrow site						
High trees	Landfill site and access road Borrow sites Contractor's labour camp	Record trees above 3 m to request permit for removal Frequency: Once	CSC/PIU Consultant	Contractor		$5000
Groundwater	Four monitoring wells (one up gradient, three down gradient) + nearby wells (to be agreed with MoE)	Establish baseline – full range parameters as per Cambodian standards: Once	CSC/PIU Consultant	Contractor	$500	$2500
Construction Phase – Landfill, Dump Site and Borrow site						
Air Quality	Nearest residential receptors downwind (2 locations /site)	1 day (24-hr) per 3 months Means in accordance with national standard	CSC/PIU Consultant	Contractor	$1000	$24000
Noise	Nearest residential receptor (2 locations/ site)	1 day (daytime only) per 3 months Means in accordance with national standard	CSC/PIU Consultant	Contractor	$300	$7200
Groundwater	Four monitoring wells (one up gradient, three down gradient) + nearby wells (to be agreed with MoE)	Establish baseline – full range parameters as per Cambodian standards Every 6 months (dry season and rainy season)	CSC/PIU Consultant	Contractor	$500	$2500
Water Quality pH, DO, BOD, COD, TSS, NH4-N, Total Nitrogen, Total Phosphorus, Oil and grease, Coliform	Upstream and downstream at nearest water body (river) to construction sites (landfill), 2 samples/site	Every month during rainy season 3 months otherwise Throughout construction period Means in accordance with national standard (8 sampling/yr)	CSC/PIU Consultant	Contractor	$200	$6400
Operations Phase – Landfill Site						

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)	
			Supervision	Implementing	Per Sample	Total per site/yr
Groundwater pH, COD, Hardness, TDS, NH4-N, Nitrate, Sulfate, Fe, Pb, Cr, Coliform	Four monitoring wells (one up gradient, three down gradient) + nearby wells (to be agreed with MoE)(X: 486805; Y: 1414690)	Conduct monitoring every 6 months (dry season and rainy season) during construction phase – full range parameters as per Cambodian standards	CSC/PIU Consultant	Contractor	$500	$6000
If exceedances are observed in the wells, the wells would be resampled more frequently and for an extended range of parameters as listed below. As above, plus aluminium, PAH, BTEX, cadmium, mercury, selenium, phosphorus scan, chlorinated hydrocarbons, cyanide, phenolic substances.						
Surface Water pH, BOD, COD, TSS, NH4-N, Total Nitrogen, Total Phosphorus, Oil and grease, Coliform	Downstream at nearest water body (one upstream and one downstream of discharge point(s), including X: 487181 and Y: 1414744)	Every month during rainy season 3 months otherwise Means in accordance with national standard	MoE	Operator	To be Included in operational costs – O&M Budget	
Odour	Downwind Boundary	Monthly	MoE	Operator	Included in operational costs – O&M Budget	
Leachate pH, BOD, COD, TSS, NH4-N, Total Nitrogen, Total Phosphorus, Oil and grease, Coliform	Outlet point for leachate treatment	Every month during rainy season Every 3 months otherwise Means in accordance with national standard	MoE	Operator	Included in operational costs – O&M Budget	
Leachate Full range of regulatory parameters	Outlet point for leachate treatment	Once a year Means in accordance with national standard	MoE	Operator	Included in operational costs – O&M Budget	
Occupational Health and Safety	-	Annual Health monitoring all staff (landfill site)	Min. of Labor	Operator & Health Professionals	Included in operational costs – O&M Budget	
Worker & public injury associated with landfill operations	On property landfill	Regular record keeping	Min. of Labor	Operator	Included in operational costs – O&M Budget	

6.4. EMP Compliance Monitoring

60. In order for the EMP to be effective, all its mitigation measures must be monitored to ensure they are implemented. Note this applies to construction only; during operation, it is the responsibility of the appropriate ministry or its line department to ensure monitoring of operational facilities is incorporated in the operations and maintenance manual and carried out routinely (Table 9).

Table 9: EMP Compliance Monitoring

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)
			Verification	Implementation	
Construction Phase – All Subprojects					
Air Quality	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Noise	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Flora	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Water Quality	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Soil and land resources	Quarries, Borrow and Spoil Disposal Sites	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Resource use and natural resource contamination	Implementation site of Solid and Liquid Waste Management	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Human health and safety	Implementation of Community and Occupational Health and Safety and	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC/Contractor H&S engineer	Included in CSC contract

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (USD)
			Verification	Implementation	
	Emergency Response				
Contamination of water, soil, waste production and social issues	Implementation of Construction Workers Management	Monthly checking against mitigation measures specified in this EMP	PMC-NES	CSC	Included in CSC contract
Community Issues • Environmental impacts of civil works (e.g., solid & liquid waste, erosion, local flooding, pollution). • Any unforeseen impacts caused by accidentally e.g. through spillages • Civil nuisance (e.g., noise, disrupted business & farming activity, social issues, community health and safety). • Impaired use of access roads (e.g. traffic issues and access). • GRM and its procedures & key contacts	At all construction locations	Consultation interview with Affected People 4-6 weeks after construction starts Every 2 months until end of construction	PMU-ESO	PIU-SFP	Included in PIU staff/travel budget

7. PUBLIC CONSULTATION

61. The IEE for this subproject contains details of the consultation undertaken during the Project Preparation Technical Assistance (PPTA) and preparation of the DED. In addition, consultation will take place during construction and operation of the landfill site. The PIU Safeguard Focal Point (PIU-SFP) will conduct consultation interviews within 4-6 weeks of construction starting and then again every 3 months until the end of construction. This is set out in the Environmental Monitoring Plan provided in the EMP for the subproject.

62. Informal monitoring interviews with affected people will focus on complaints about community disturbance from construction activities, such as construction noise, dust, solid waste and wastewater, as well as public concerns about ecological protection, soil / land concerns and access issues. A sample Environmental Monitoring Interview Form is given in Annex 2: Affected Person Monitoring Form.

63. The IEE for these subprojects also includes information on consultation undertaken during preparation of this EMP and can be consulted for reference.

8. GRIEVANCE REDRESS MECHANISM

8.1. GRM Objective

64. A grievance redress mechanism (GRM), consistent with the requirements of the ADB Safeguard Policy Statement (2009) will be established to prevent and address community concerns, reduce risks, and assist the project to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM has been designed to help achieve the following objectives:

(i) open channels for effective communication, including the identification of new environmental issues of concern arising from the project;

(ii) demonstrate concerns about community members and their environmental well-being; and

(iii) prevent and mitigate any adverse environmental impacts on communities caused by project implementation and operations. The GRM is accessible to all members of the community.

8.2. Proposed GRM System

65. In Cambodia, there is currently no existing legally established system to resolve environmental concerns and complaints. The MPWT, as the EA of the Tonle Sap II will establish the GRM. The setup shall be made before commencement of site works and have members from the PMU, district authority and commune councils. Grievances can be filed in writing or verbally with any entry point of the GRM. The committee will have 15 days to respond with a resolution. The PMU's Environment Safeguards Officer (PMU-ESO) will oversee the implementation/observance of the mechanism and will be responsible for keeping the PMU informed. The PIU Safeguards Focal Point (PIU-SFP) will be responsible for ensuring GRM implementation at the subproject level.

66. The GRM will accommodate both informally and formally lodged eligible, grievances. Informally lodged grievances are those received by the contractor during construction. Formally lodged grievances are those received at District and Commune Council offices or direct to the PIU. Commune Councils evaluate complaints for eligibility and then report to PDPWT. The PDPWT and PMU maintain a record of all grievances, informally and formally lodged, eligible and ineligible. The PMU will inform the MPWT, as necessary, and report on the observance/implementation of the GRM in the monthly progress reports and in the periodic Environmental Monitoring Report that will be submitted to the MPWT.

8.2.1. Access to the Mechanism

67. Any person who has environmental issues pertaining to the subproject during detailed design, construction and operation phases will have access to the mechanism free of charge. The PMU, through its Environment Safeguards Officer (PMU-ESO) and staff in the MPWT, will ensure that:

(i) The public and all stakeholders are aware of their rights to access, and will have access to, the GRM free of administrative and legal charges; and
(ii) (The GRM is fully disclosed prior to construction: (a) in public consultations, (b) through posters displayed in the commune office (posters to include names and contact details of the PIU-SFP)

68. The Access Points to the GRM are critical for ensuring it is useable for Affected People (APs). The GRM Access points for this project, as set out in this GRM Mechanism will be:

- The Contractors
- District and Commune Councils
- The PIU office

- The Provincial Department of Public Works and Transport (PDWT).

8.2.2. GRM Steps and Timeframe

69. Grievances raised on environmental impacts are critical to the health and safety of APs. Hence, the proposed mechanism intends to be easily accessible and promptly responsive to APs' complaints.

8.2.3. Informal Approach

70. Informally, APs can lodge complaints directly to the contractor during construction. PMU is to provide contractor with GRM contact details which the contractor will use to print 'GRM Contact Cards' for its staff to hand to complainants and will keep cards with all vehicles, machinery and site managers/foremen.

71. The contractor shall document and assess the complaint immediately. If assessment validates the complaint as within the scope of the GRM/eligible, the contractor shall act on the complaint within three days from receipt of complaint. MPWT shall obtain a written confirmation of satisfaction from the AP after 7 days from completion of resolution by the contractor.

72. Contractor to raise awareness of all workers on how to respond when an AP or member of the public has a complaint i.e. direct the person to the most senior site manager present at the time and/or Contractor GRM focal point and prepare a 'GRM Contact Card.'

73. If assessment invalidates the complaint (i.e., reveals the complaint as ineligible or not associated with the project's environmental performance), the contractor shall direct the AP to the Commune Council and shall report the complaint to MPWT within 2 days from receipt of complaint, stating reasons for ineligibility.

8.2.4. Formal Approach

74. If complaint is eligible but is not acted on within three days from receipt of complaint, or if AP is not satisfied with the resolution undertaken by the contractor, he/she can access the formal mechanism, as shown in Table 10.

Table 10: GRM Steps

Step	Action
Step 1: Lodging a Complaint (Day 1)	AP lodges complaint, by him/herself or with assistance from the village chief or district council, at the access point with the Commune Council. The complaint may also be lodged with the PIU or PDPWT,
Step 2: Documentation & Registration of Complaint (Day 1)	Commune Council, PIU/PMU or PDPWT documents/registers lodged complaint, makes sure these are referenced and provides AP with a copy of referenced complaint. The commune forwards complaint document to the MPWT. A copy of the proposed GRM Complaint Form is in **Error! Not a valid result for table.**
Step 3: Assessment and Discussion (Day 1 to 3)	AP shall be informed if the grievance is eligible or ineligible. If it is ineligible, AP shall be directed to the district. If complaint is eligible, AP shall be informed of the expected action timelines as set out in the established mechanism
	If both of the AP and contractor/operator are available, the complaint shall be immediately reviewed, investigated and discussed. If not, both parties should agree to undertake the review, investigation and discussion within 3 days. The

Step	Action
	discussion will centre on the cause and action/measure to implement and will engage the PIU/PMU. After review and investigation, agreement on actions and measures and time involved shall be made with the AP. Agreement shall be properly documented and filed; MPWT, PIU/PMU, Commune Council and AP shall have copies
Step 4: Implementing the Agreed Resolution	(Day 3 to Day 4) If complaint is minor, i.e., not requiring further investigation and would be easy to resolve, the contractor/operator shall immediately implement agreed on action/resolution. (To be implemented by Day 8)
	If further investigation and/or procurement of supplies/parts would be necessary, the contractor/operator shall: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact; and (ii) start work on the final measure within **15 days** from the day the complaint is lodged.
Step 5: **Acceptance of Resolution (1 week after completion of action/measure taken)**	If, according to the AP, the impact has been resolved satisfactorily, MPWT shall obtain a written confirmation of satisfaction from the AP. This confirmation will signify closure of grievance and will form part of the grievance documentation. The PIU, Commune Council and AP shall retain their copies of the confirmation.
Step 6: **Monitoring and Evaluation (for 1 week after closure of grievance)**	The MPWT shall monitor the effectiveness of the resolution for at least a week after closure of grievance (that is, when action implemented has been satisfactorily confirmed in writing by the complainant). Monitoring and evaluation shall be properly documented and included in the Environmental Monitoring Report
Step 7: **Appeal for Dissatisfied AP**	When dissatisfied (or, in the event the issue/impact persists despite actions undertaken), AP can appeal for assistance from the district in the elevation of his/her complaint to the provincial authority. The provincial authority shall call all parties concerned to review the history of the grievance and resolution process taken and assess the validity of the appeal.

75. **Appeals**. If appeal is found not valid, the provincial authority shall write the AP and declare the grievance closed. In the event of an appeal, the MPWT shall immediately report to the PMU. The PMU shall ensure that the ADB is immediately informed.

76. If appeal is assessed to be valid, provincial authority and the parties discuss and agree on the quick resolution of the issue. The PMU requires the contractor and operator to implement the agreed resolution. Should the issue continue to persist despite the second action, or the AP remain dissatisfied, the following steps will be taken.

77. **Special Mission or Judicial System**. If the complainant is still unsatisfied, the PMU/EA will inform ADB to convene a special mission to attempt a resolution prior to use of the Cambodian judicial system.

78. **Accountability Mechanism** of the ADB. In addition, affected people may always contact the Complaints Receiving Officer of the ADB via the following addresses which will be included in the subproject signboard:

Complaints Receiving Officer, Accountability Mechanism

Asian Development Bank

ADB Headquarters, 6 ADB Avenue, Mandaluyong City 1550, Metro Manila, Philippines

(+632) 632-4444 loc. 70309

(+632) 636 2086

amcro@adb.org

79. Instructions available here: http://www.adb.org/site/accountability-mechanism/how-file-complaint

80. Sufficient communication on the GRM including signs containing contact details of the GRM access points will be displayed at strategic locations to sustain the effective implementation of the mechanism.

8.2.5. GRM – Stueng Saen

81. A Provincial Grievance Redress Committees (PGRC) has been established in Stueng Saen (PGRC with reference letter 1051/19 SSR and PRSC with reference letter 070/19 SSR dated on 28 February 2019.).

9. REPORTING

82. Environmental monitoring reports (using ADB's integrated safeguards monitoring report format) will be prepared semi-annually for the EA by the Project Management Consultants in collaboration with PMU-ESO and sent to the MoE and ADB. The reports will table all indicators measured with the monitoring plan of EMP including performance monitoring indicators and will include relevant national environmental quality standards. Table 11 gives reporting requirements.

Table 11: Reporting Requirements

Report	Frequency	Purpose	From	To
Contractors' Progress Report	Monthly	EMP Implementation Progress and Monitoring Results	Contractor	PMU
EMP Progress and Compliance Report	Monthly	Confirm Mitigation Measures	National Env Specialist with PIU-SFP	PMU
Environmental Monitoring	Quarterly	Relevant environmental parameters	PMU-ESO	EA
Environmental Monitoring Report (Integrated safeguards monitoring report format)	Semi-Annual	Full EMP Implementation and Adherence to Environmental Covenants/Conditions	PMU	ADB
Landfill Operations	Quarterly	Tonnages collected, Groundwater-Surface Quality, operator health and safety	Operator	EA

9.1. Mechanisms for Feedback and Adjustment

83. Based on environmental monitoring and reporting systems in place, the PMU shall assess whether further mitigation measures are required as corrective action, or improvement in environmental management practices are required. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. The PMU will play a critical role in the feedback and adjustment mechanism. If the PMU identifies a substantial deviation from the EMP, or if any changes are made to the project scope that may cause significant adverse environmental impacts or increase the number of affected people, then the PMU shall immediately consult MoE, MPWT and ADB to get approval and identify EMP adjustment requirements.

10. ESTIMATED COST OF EMP

84. The total cost for EMP implementation for the landfill comprises the following:

- Consider impacts to nearby houses due to nuisance such as odour and flies in order to mitigate impacts the mitigation measures shown in table 5 are for houses located less than 0.5 km from the landfill site. Project should provide glass widow and tree plantings for affected houses. The estimated cost is $800 per affected house. It is estimated that 4 houses will need these measures and the total costs amount to $3,200 total.
- Environmental quality monitoring during construction $46,100 per year
- EMP Compliance Monitoring (including public consultation). No additional cost.

85. Excluded from the EMP budget as separate items are

- Measures required as part of good construction practice. This includes provision of PPE for workers working at site. Cost estimate for such provision for 100 workers are as follow
    - Hard hat(@ 3 USD) 300 USD
    - Glove(@ 0.25USD) 25USD for 10 units/person/year =250 USD/year
    - Mask (50 pcs) @7 USD for 20 units/person/year=280 USD/year
    - Ear plug @1 USD for 5 units/person/year= 500USD
    - Safety Glass @ 1.5 USD for 5 units/person/year =750 USD/year
    - Boot @ 13 USD for 2 pairs/person/year =2600 USD/year

  Total= 4680 USD/year with 15% contingency then= 5,382 USD/year

86. The annual machinery maintenance cost is, in general, 10 % of machinery cost while mobile noise barriers can be custom designed and built on site for temporary use.

87. Remuneration and associated costs for Project management consultants and staff within PMU and PIU as this is covered elsewhere in the project budget.

- Cost for Project Management Consultant which includes a National and International Environmental Safeguards specialist.
- Training covered elsewhere including landfill operator and management training is included environmental and social safeguards management which is covered under the feasibility study for each specific subproject.

88. Contractors will bear the costs for all mitigation measures during construction, including those specified in the tender and contract documents as well as those to mitigate unforeseen impacts due to their construction activities.

89. The selected operators, private sector or government, will bear all environmental monitoring and reporting costs during the operational stage. EMP operational environmental mitigation and monitoring measures will be incorporated in the operations and maintenance manual.

11. CONCLUSION

90. The EMP, if implemented as directed, will mitigate impacts on the natural environment and affected people to an acceptable level. The key parties responsible for the implementation of the mitigation measures are for the construction contractors for the construction phase, and the landfill operator for the operational phase of the project. The most important impacts are those that may arise during landfill operations including risks to surface water and groundwater, and generation of nuisance odour and pests. The implementation of this EMP will be closely monitored and reported by the contractor and the project consultant team in collaboration with the relevant project stakeholders.

91. A comprehensive training and capacity building component is included in the project. This is essential for ensuring that the investment is both financially and environmentally sustainable and beneficial.

92. A robust Grievance Redress Mechanism will be established as outlined in this EMP. It will ensure that all unplanned impacts which cause grievances for affected people are managed swiftly and a satisfactory outcome brought about.

93. Overall, the project is anticipated to bring environmental benefits to the population in the project cities. It will serve to improve the current waste management situation and will provide long term environmental improvements.

Annex 1: Preliminary Terms of References for the Environmental Compliance Audit of the Stueng Saen Existing Dumpsite

1.0 Background

The Royal Government of Cambodia has obtained a loan and grant from the Asian Development Bank (ADB) towards the cost of the Second Integrated Urban Environmental Management in the Tonle Sap Basin Project (TS2 Project). The TS2 project includes the Stueng Saen Solid Waste Management Subproject in Stueng Saen town, Kampong Thom Province. The Subproject entails the construction of a new controlled engineered landfill.

2.0 Purpose and requirement of Environmental Compliance Audit

The existing dumpsite in Stueng Saen Town is an *Existing Facility*[3] of the wider ADB project "Second Urban Environmental Management in the Tonle Sap Basin Project" and the closure and remediation of the dumpsite require that an Environmental Compliance Audit (ECA) is conducted of that facility pursuant to the SPS (2009), para 10 of Appendix 1 and para 12 of Appendix 4.

The dumpsite closure and remediation will be undertaken as a separate sub-project.

3.0 Scope of the ECA for the dumpsite

The ECA will be carried out in two phases where phase 1 is a preliminary assessment of the risks, possible solutions and the need for immediate mitigation measures at the dump site to minimise on-going pollution and risks to human health as much as practical until the long-term solution can be implemented. Phase 2 of the ECA concerns more detailed site investigations and analyses as a basis for making a decision on the long-term solution and to provide information for the preparation of the detailed remediation design.

Phase 1

Activities

Phase 1 includes the following activities:

1. Site visit(s) to identify existing activities or conditions that may cause or contribute to pollution or spread of infections:
    a. Evidence of open burning
    b. Evidence of vectors (e.g. rats, insects, birds)
    c. Evidence of windblown waste
    d. Direct field assessment of odours
    e. Drainage and waterbodies
    f. Leachate seepage
    g. Mapping of waste piles (active and non-active) and the dumpsite boundary
    h. Inspect incoming waste or recently dumped waste to characterize the waste types
    i. Presence of informal recyclers
    j. Distance to sensitive receptors
    k. Review of any existing permits or authorizations for the dumpsite
    l. Documentation will include drone photos, videos, onsite photos, field observation notes, GPS tracks and waypoints.
2. Interviews with waste management personnel, government officials, informal recyclers, and farmers owning adjacent land:
    a. Date dumpsite was commissioned (became operational);
    b. Current operator and responsible authority of dumpsite
    c. Current disposal practices;
    d. Types of solid waste disposed in dumpsite (e.g. domestic, hospital, construction, industrial);
    e. Rate of solid waste disposal at dumpsite (tonne/day or tonne/month);

[3] *Existing Facilities 12. For projects involving facilities and/or business activities that already exist or are under construction, the borrower/client will undertake an environment and/or social compliance audit, including on-site assessment, to identify past or present concerns related to impacts on the environment, involuntary resettlement, and Indigenous Peoples.*

f. Local water management, water use, flood risk;
g. Existing groundwater wells;
h. Relevant water quality data.

Site visits and interviews may be combined.

Analyses

Phase 1 includes the following analyses:

1. Preparation of georeferenced drone pictures of the dumpsite and its immediate surroundings.
2. Preparation of preliminary drawings and maps with Google Earth backdrop approximately to scale and elevations from onsite GPS data based on the above documentation identifying waste pits or trenches, waterbodies, vegetation, surrounding land use, sensitive receptors, and groundwater wells.
3. Rough estimation of the spatial extent of the waste dump and total volume of waste.
4. Analysis of applicable government laws and regulations (non-exhaustive list below, missing regulations will be identified and included in the analysis) to clarify whether the design and operation of the existing dumpsite is in compliance and to clarify requirements applicable to the closure of the dumpsite.
    a. Sub-decree on Water Pollution Control (Sub-decree No. 27 ANRK/BK) 2009;
    b. Guidance on Selection of Landfill Sites (2016);
    c. Sub-decree on Solid Waste Management (Sub-decree No. 36 ANK/BK) 1999;
    d. Environmental Guidelines on Solid Waste Management in Kingdom of Cambodia, Ministry of Environment, 2006.
5. Preliminary identification and assessment of existing pollution and other health risks and development of practical and affordable immediate actions to eliminate or minimise the risks including cost estimates for such actions.
6. Preparation of a simple Environmental Management Plan covering the immediate mitigation measures at the dumpsite.
7. Preliminary analysis of alternative long-term solutions aiming at a preliminary ranking and identification of important information gaps to be filled in Phase 2. Key considerations include future land use, risks to human health and the environment, remediation costs, spatial development plans, and real estate prices.

Expected Results

Phase 1 is designed to provide the following results:

1. Legal requirements to dumpsite closure
2. Preliminary analysis of alternative long-term solutions
3. Final Phase 2 investigation programme
4. Action plan, Environmental Management Plan and cost estimates for immediate mitigation measures at the dumpsite.

The results will be documented in a concise report and presented to the Project Steering Committee and ADB for their decisions on the next steps.

Phase 2

The objectives of the Phase 2 investigations are to determine the long-term solution to the remediation of the dumpsite and to provide information for the preparation of the detailed remediation design.

The scope of the Phase 2 investigations consists of the activities listed below and possibly additional activities which will be determined in Phase 1.

Activities

1. Interviews (continued from Phase 1) with waste management personnel and government officials with knowledge about the dumpsite:
    a. the number and depth of waste cells;
    b. underlying waste cell lining material if any;
    c. extent of active surface runoff collection and drainage;

   d. extent of leachate and gas collection and treatment;
   e. extent of septage disposal and management;
   f. waste recycling process used by local waste pickers; and
   g. scheduling of transport of solid waste to dumpsite.
2. Obtain documentation for land ownership of the dumpsite.
3. Obtain existing data on groundwater quality near the dumpsites from PDoE (if available).
4. Determine distance of nearest surface waters (stream, lake) that could be affected by the dumpsite, and obtain existing surface water quality data.
5. Determine distance of nearest residences or businesses from the dumpsite.
6. Determine number of full-time and part-time informal recyclers that work (and live) at the dumpsite
7. Identify any other use of the dumpsite area.
8. Consult with the surrounding community and the informal recyclers to determine if there are past or present environmental, social, or human health issues associated with the operation of the existing dumpsite.

Additional Optional Activities

Phase 1 will result in a preliminary ranking of long-term solutions and to enable a final decision, it is likely that Phase 2 will have to include certain physical site investigations. These investigations will be designed to support reliable risk assessments and to determine a reasonably accurate spatial extent of the waste deposits.

The optional investigation programme may include one or more of the activities listed below. Other activities may also be considered.

1. Drilling programme. Short drillings in selected waste cells to determine the depth and composition of the waste and to collect samples of leachate or groundwater and landfill gas for chemical analyses.
2. Groundwater monitoring wells. Establishment of monitoring wells upstream and downstream the dumpsite to determine the local hydrogeological conditions, groundwater flow direction, groundwater table elevation and seasonal fluctuations, and groundwater quality.
3. Sampling and chemical analyses of leachate seepage.
4. Sampling and analysis of surface water quality in nearby waterbodies.
5. Detailed topographic survey of the dumpsite and its immediate surroundings.

Expected Results

Phase 2 is designed to provide the following results:

1. Recommendations on the future land use of the remediated dumpsite
2. Analysis and ranking of alternative long-term solutions
3. Description of the preferred long-term solution including monitoring and aftercare.
4. Cost estimate

The results will be documented in a concise report and presented to the Project Steering Committee and ADB for their decisions on the next steps.

Annex 2: Affected Person Monitoring Form

Consultation / Interview Form

Date of Interview		**Interviewer Name**	
Interview Site: Where is the interview held? In school, on the road, in shop		**Stakeholder Name & Status:** Full name, status is business owner, school teacher, religious leader, resident	
Construction Site & Date Construction Started Which road, GPS location if available		**Has this stakeholder been interviewed before?** Yes (when were they interviewed) No	

Interview Discussion Points:

1. NOISE	**Record of Discussion**
Before the project started, was the person disturbed by noise? If yes, explain how and when. Where did the noise come from? E.g. traffic, machinery, people, music When did it disturb the person? E.g. all day, at night, intermittently.	
During the construction, is the person disturbed by noise from the project? If yes, explain how and when. What type of noise and where did the noise come from? All day, at night, intermittently?	
If noise from construction is a problem, what changes does the person suggest are made?	
2. AIR QUALITY	**Record of Discussion**
Before the project started, was the person affected by air pollution or dust? If yes, explain how and when. Where did the pollution or dust come from? E.g. traffic, machinery, construction, burning garbage, cooking stoves When was the dust or pollution a problem? E.g. all day, at night, intermittently	
During the project, is the person disturbed by dust or pollution? If yes, explain how and when. What type of noise and where did the noise come from? E.g. increased traffic congestion, construction machinery, construction workers, burning construction garbage etc When did it disturb the person? E.g. all day, at night, intermittently	

If dust or air pollution from the construction is a problem, what changes does the person suggest are made?	
3. VEGETATION AND LAND USE	**Record of Discussion**
Before the project started, what was the vegetation like in the project area? E.g. pasture land, trees, shrubs, rice fields.	
During the project, has the person found the vegetation situation has changed? If yes, explain how and when.	
If impact on vegetation is unacceptable, what changes does the person suggest are made?	
4 COMMUNITY SAFETY	**Record of Discussion**
Before the project started, can you describe the community safety situation in the project area? E.g. no problems, some accidents, difficulty crossing the roads	
During the project, has the person found the community safety situation has changed? If yes, explain how and when. Slower traffic so easier to cross the roads, construction vehicles are making a crossing harder / easier, more accidents / less accidents, construction site dangers	
If change in road safety is unacceptable, what changes does the person suggest are made?	
5. WATER QUALITY	**Record of Discussion**
Before the project started, was the person affected by poor water quality? If yes, explain how and when. Ground water ? Surface Water ? which Water source ? How was it polluted ?	
During the project, is the person affected by water pollution? If yes, explain how and when. Ground water ? Surface Water ? which Water source ? How is quality being affected ?	
If water quality from the construction is a problem, what changes does the person suggest are made?	
6. ACCESS	**Record of Discussion**
During the project, is the person affected by reduced access to their business, home or land ? Access to what is limted, and how ?	
If access limitations are not acceptable, please suggest changes which can be made ?	
7. OTHER ISSUES	**Record of Discussion**
Any other issues about the construction sites that the person wants to discuss? E.g. wastewater concerns, waste disposal, Other concerns, labour force,	

Annex 3: GRM- Complaint Recording Form

PIU Staff Responsible: **(name and role)**	
Date: **(of this record)**	

Date of Complaint:	
Date Resolution Required by (15 days from initial complaint):	
Complaint Made by: (Name & Contact Details)	
Method of Complaint: (direct to PMU, via Contractor, Via Commune People's Council)	
Details of Complaint: (issues, actions taken so far, when did it start – all details needed)	
PMU Actions: (Next steps for PMU to resolve the issue or to move complaint to next level)	
Follow Up Actions Needed and Date: (PMU to follow up on resolution if needed, e.g. check contractor actions)	

Annex 4: Particular Conditions (For Bidding Documents)

94. The following clauses shall be added to the Bidding Document, Section 8 Particular Conditions in relation to the Environmental Safeguards for the Project:

95. The contractor will undertake to develop and submit to the PMU/CSC for approval, **a site specific Construction Environmental Management** Plan with the following management sub-plans:

    A. Spoil and Borrow Site Management;
    B. Waste Management Plan
    C. Community and Occupational Health and Safety and Emergency Response;
    D. Construction Workers' Camp Management (if required).

96. The management sub-plans will be sufficiently detailed as to allow a clear understanding of the approach the contractor will take to mitigate environmental impacts during construction. The contractor will adhere to the management sub-plans at all times unless prior agreement has been given by the PMU under extenuating circumstances.

97. The Contractor will commit to ensuring a full time environmental health and safety officer on site who is competent, nominated to manage health and safety risks, and who can implement the EMP requirements for occupational health and safety and ensure relevant health and safety legislation is followed.

98. The Contractor will commit to enabling the project staff or consultants tasked with monitoring, full access to all information and data required in order that the Environmental Management Plan can be fully monitored.

99. The Contractor will hire a qualified Environment Health and Safety (EHS) Officer

Annex 5: Environmental Quality Standards

(1) Ambient Air Quality Standards

Source: Sub-decree **No. 42 ANRK.BK** on Air Pollution Control and Noise Disturbance, MoE 2000 and WHO Ambient Air Quality Guidelines (2005)

Parameter	Averaging Period	No. 42 ANRK.BK		WHO Ambient Air Quality Guidelines (2005)	
		Unit	Value	Averaging Period	Value / Unit
Nitrogen Dioxide (NO2)	24 hours	mg /m^3	0.1	1 hour	200 µg/m^3
Sulfur Dioxide (SO2)	24 hours	mg /m^3	0.3	1 hour	20 µg/m^3
Carbon Monoxide (CO)	24 hours	mg /m^3	20		
PM 2.5	24 hours	-	-	24 h	25 µg/m^3
PM 10	24 hours	-	-	24 h	50 µg/m^3

(2) Ambient Noise Standards

Source: Sub-decree **No. 42 ANRK.BK** on Air Pollution Control and Noise Disturbance, MoE , 2000 and WHO Community Noise Guidelines (1999)

Time Period (24 hours)	No. 42 ANRK.BK	Areas Specified for WHO Guidance	WHO Community Noise Guidelines (1999)
	Value / Unit		Value / Unit
Daytime (from 6:00am to 6:00pm)	70.0 dB(A)	Outdoor Living Area - serious annoyance - moderate annoyance	 55 dB(A) 50 dB(A)
Evening Time (from 6:00pm to 11:00pm)	65.0 dB(A)	Inside dwellings - moderate annoyance	35 dB(A)
Night-time (from 11:00pm to 6:00am)	50.0 dB(A)	Inside dwellings - sleep disturbance	30 dB(A)

(3) Surface Water Quality Standard

Referring to Sub-decree **No. 27 ANRK.BK** on Water Pollution Control, MoE, 1999, the standards of water quality are divided as follows:

Annex 2 of Sub-decree on Water Pollution Control

Effluent standard for pollution sources discharging wastewater to public water areas or sewer

Note: The effluent standards applicable to the Subproject are those for discharge to "Public water area and sewer"

No	Parameters	Unit	Allowable limits for pollutant substance discharging to	
			Protected public water area	Public water area and sewer
1	Temperature	0C	< 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	< 60	< 120
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

No	Parameters	Unit	Allowable limits for pollutant substance discharging to	
			Protected public water area	Public water area and sewer
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 Byphemyl	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.

Annex 4 of Sub-decree on Water Pollution Control

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

Source: Sub-decree **No. 42 ANRK.BK** on Water Pollution Control, MOE, 1999.

a) River

Parameter	Standard	
	Unit	Value
pH	mg/l	6.5 – 8.5

BOD5	mg/l	1 – 10
Suspended Solid	mg/l	25 – 100
Dissolved Oxygen	mg/l	2.0 - 7.5
Coliform	MPN/100ml	< 5000

b) Lakes and Reservoirs

Parameter	**Standard**	
	Unit	**Value**
pH	mg/l	6.5 – 8.5
COD	mg/l	1 – 8
Suspended Solid	mg/l	1 – 15
Dissolved Oxygen	mg/l	2.0 - 7.5
Coliform	MPN/100ml	< 1000
Total Nitrogen	mg/l	1.0 – 0.6
Total Phosphorus	mg/l	0.005 – 0.05

Annex 5 of Sub-decree on Water Pollution Control:

Water Quality Standard in public water areas for public health protection

Source: - Ground water quality monitoring MoE, 2016.

- The CNDWQS Standard is National Standard of the Ministry Industry and Handicraft.

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

No	Parameter	Unit	Standard Value
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

(4) (4) Drinking Water Quality Standards (DWQS), Ministry of Energy, Mines and Industry, January 2004

The standards are applicable as the minimum requirement to all sources of drinking water in both urban and rural areas, public or private water supply regardless of its source including groundwater, surface water, rainwater, intended for human consumption.

Drinking Water Quality Standards

No	Parameter	Standard	
		Unit	Value
1	pH	-	6.5-8.5
2	Turbidity	NTU	5.0
3	Dissolved Oxygen (DO)	mg/l	NV
4	Total Suspended Solid (TSS)	mg/l	NV
5	Chloride (Cl-)	mg/l	250
6	Nitrate (NO3)	mg/l	50
7	Phosphate (PO4)	mg/l	NV
8	Sulphate (SO4)	mg/l	250
9	(BOD)5	mg/l	NV
10	(COD) Mn	mg/l	NV
11	Aluminium (Al)	mg/l	0.2
12	Arsenic (As)	mg/l	0.05
13	Copper (Cu)	mg/l	1.0
14	Iron (Fe)	mg/l	0.3
15	Lead (Pb)	mg/l	0.01
16	Manganese (Mn)	mg/l	0.1
17	Mercury (Hg)	mg/l	0.001
18	Zinc (Zn)	mg/l	3.0
19	Total Coli form	MPN/100ml	0
20	*Escherichia coli (E. coli)*	MPN/100ml	0

(6) Soil Quality Standard

Source: Cambodia National Quality Standards for agriculture, Ministry of Agriculture, Forest, and Fishery (MAFF).

Parameter	Standard	
	Unit	Value
pH		
Salinity	ppt	6-8
Oil & Grease	mg/kg	-
Chloride	mg/kg	-
Petroleum Hydrocarbons		
Kerosene hydrocarbons (c10-c14)	mg/kg	-
Diesel hydrocarbons (c15-c28) (mg/L)	mg/kg	-
Heavy oil hydrocarbons (c29-c36) (mg/L)	mg/kg	-
BTEX		
Ethylbenzene	mg/kg	0.018
Benzene	mg/kg	0.0068
Toluene	mg/kg	0.08
Xylene	mg/kg	2.4
Metals		
Nickel	mg/kg	50
Copper	mg/kg	63
Zinc	mg/kg	200
Arsenic	mg/kg	12
Cadmium	mg/kg	1.4
Lead	mg/kg	70
Iron	mg/kg	-
Chromium	mg/kg	64
Mercury	mg/kg	6.6

Annex 6: The COVID-19 Protection and Mitigation Measures

1. Prevention Measures

Below is a checklist for prevention measures.

N.o	Preventing measures to COVID-19, some measures are needed to be implemented as below:	Yes	No
1	Dissemination about COVID-19 prevention and mitigation measures to staff and workers through orientation or distributing leaflet/poster at information/safety board at each construction and camp site;		
2	Daily checking temperature of staff and workers prior starting the works;		
3	Staff and workers have to wear masks all the time and properly;		
4	Do not share personal items or supplies such as phones, pens, notebooks, tools, etc.;		
5	Avoid common physical greetings, such as handshakes;		
6	Maintain a minimum physical distance of one metre from others if possible;		
7	Wash hands often with soap and water for at least 20 seconds after using the washroom, before handling food, after blowing nose, coughing, or sneezing, and before smoking. If hands are not visibly soiled, and soap and water are unavailable, alcohol-based hand sanitizer can be used;		
8	All offices and jobsites implement additional cleaning measures of common areas. All door handles, railings, ladders, switches, controls, eating surfaces, shared tools and equipment, taps, toilets, and personal workstation areas are wiped down at least twice a day with a disinfectant, such as disinfectant wipes. Individuals are responsible for cleaning and disinfecting their workstations;		
9	Commonly touched surfaces on vehicles and equipment are thoroughly cleaned and disinfected at the end of shifts and between users;		
10	Coughing or sneezing into a tissue or the bend of your arm, not your hand; And dispose of any tissues you have used as soon as possible in a lined waste basket and wash your hands afterwards;		
11	Complying with any instructions announced by Ministry of Health accordingly		

Response measures: Possible cases of COVID-19

Below is a checklist for prevention measures:

N.o	Responding measures if there is a COVID-19 case, some measures are needed to be implemented as below:	Yes	No
1	Individuals who have been potentially exposed to the virus, or who are exhibiting flu-like symptoms such as fever, tiredness, coughing, or congestion are instructed to: ▪ Not come to work; ▪ Contact their supervisor and/or human resources department; ▪ Stay at home and self-isolate; and ▪ Contact local health authorities for further direction.		
2	Such individuals are required to follow the directions of the local health authority and may not return to work until given approval by the proper health authorities;		
3	Individual who begin to display flu-like symptoms on site are instructed to avoid touching anything, take extra care to contain coughs and sneezes, and return home immediately to undergo self-isolation as directed by the local health authority;		
4	All areas on site potentially infected by a confirmed or probable case are barricaded to keep individuals two meters away until the area is properly cleaned and disinfectted.		

Note: Additional COVID-19-related checklist/form, please go to this link:

http://www.cdcmoh.gov.kh/resource-documents/covid-19-documents/494-2019-ncov-documents-management