Environmental Due Diligence Report

September 2014

CAM: Urban Water Supply Project – Stoung Subproject

Prepared by Ministry of Industry and Handicraft for the Asian Development Bank.

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ABBREVIATIONS

ADB	Asian Development Bank
CAP	Corrective Action Plan
CC	Construction Contractor
CEMO	Contractor Environmental Management Officer
DDR	Due Diligence Report
DE	Design Engineer
DPWS	Department of Potable Water Supply
DSC	Design and Supervision Consultant
ES	Environmental Specialist
GMS	Greater Mekong Subregion
IEE	Initial Environmental Examination
MIH	Ministry of Industry and Handicraft
MOE	Ministry of Environment
MOH	Ministry of Health
MPWT	Ministry of Public Works and Transport
PEMO	PMU Environmental Management Officer
PIU	Project Implementation Unit
PMU	Project Management Unit
PPTA	Project Preparation Technical Assistance
PWW	Provincial Water Works
REA	Rapid Environmental Assessment (Checklist)
SPS	Safeguard Policy Statement (2009)
UWSP	Urban Water Supply Project
WTP	Water Treatment Plant

Units

cm	centimeter
km	kilometer
L	liter
m	meter
m^3/day	cubic meters per day
masl	meters above seal level
MCM	million cubic meters
mg/L	milligrams per liter
ROW	right of way
Φ	diameter

I. INTRODUCTION

1. The Urban Water Supply Project (the Project)[1] financed by the Asian Development Bank (ADB) provides for rebuilding, retrofit and extension of water supply systems at nine towns in Cambodia. Proposed improvements in four towns are of sufficient magnitude to merit full feasibility study reports, whereas the feasibility studies for the remaining five towns (Kampong Thom, Kampot, Pursat, Sihanoukville and Stoung) are prepared according to an abbreviated format.

2. The Project is classified as a Category B Project according to the ADB Safeguard Policy Statement (2009). Environmental impacts are generally minor for the Stoung subproject. Improvements are confined to the area within the boundary of the water treatment plant property, and involve only retrofit of equipment. Accordingly, a due diligence review has been prepared for the subproject.

II. SUBPROJECT DESCRIPTION

3. Stoung is located along National Road (NR) 6 in Kampong Thom Province some 56 km from the provincial center. The Stoung water supply system draws water from the Stoung River followed by treatment in a conventional water treatment plant with capacity of 1,300 m^3/day. The plant is old and poorly designed, and is located on a small piece of land without much room for expansion. Further, the plant is undersized for the existing demand. Current and future demand based on the existing population of the service area and growth of 0.15% p.a. are 8,820 and 10,050 m^3/day respectively. The proposal provides for installing a single treatment unit in the available space, then removing the old treatment plant equipment to provide room to install a second parallel treatment unit. Removal of other old and outdated equipment is necessary to provided room for the upgrade. Figure 1 shows the general layout of the existing plant and notes the required demolition and replacement of the plant with new equipment. The step-by-step inventory of improvements is as follows:

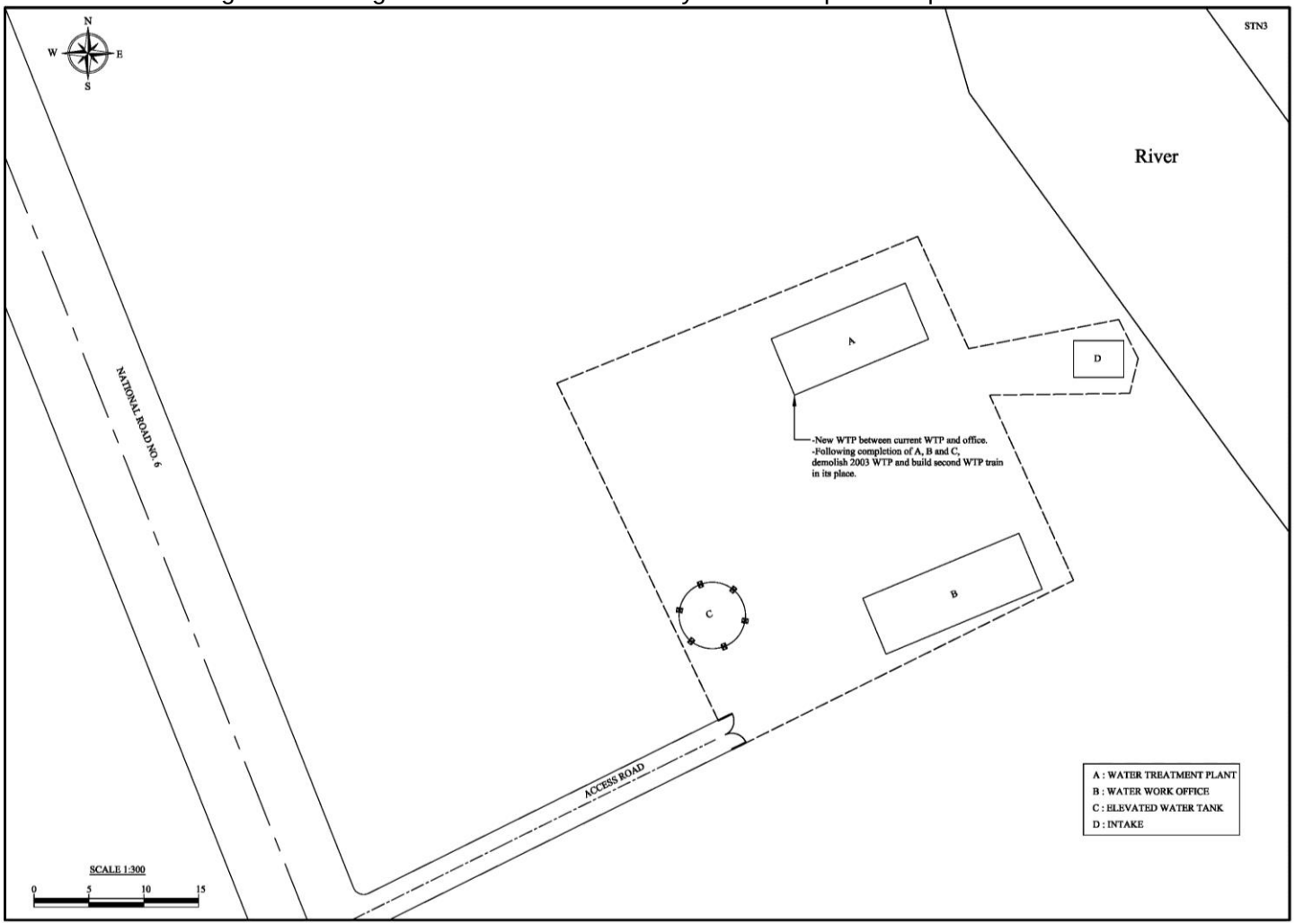
1. Remove 2008 sedimentation basin extension
2. Remove generator building and construct new one near car park
3. Construct new WTP between current WTP and office
4. Install gate valve for backwash line
5. Following completion of the above, demolish 2003 WTP and build second WTP train in its place
6. Laboratory equipment

Sanitation

4. The sanitation component aims to provide a basis for defining needs and response within the subproject area regarding sanitation and drainage as a basis for a future sector loan. Various ministries have overlapping responsibilities related to sewerage and sewage/wastewater treatment in urban sanitation, and the sector loan will attempt to define responsibilities for implementing sanitation improvements in any future loan project. The outcome will be a set of interventions to improve sanitation and drainage that will be linked to expansion of water supply coverage. No actual sanitation works are provided under the present Scope for the Project and the Stoung Water Supply Subproject.

[1] ADB, 2013; "Project Data Sheet"; Project Number 41403-013; Urban Water Supply and Sanitation Project; at . http://www.adb.org/projects/41403-013/main.

Figure 1: Stoung Water Treatment Plant Layout and Proposed Improvements



III. BRIEF DESCRIPTION OF THE ENVIRONMENT

A. Site Visit

5. The environmental and social teams of the PPTA conducted a site visit of the Stoung Water Treatment Plant facilities on 6 June and interviewed the director of the water supply agency. Problems and constraints faced by the director were noted: shortage of adequate raw water supply in the river during the dry season, an ageing and poorly designed plant and a constrained site of inadequate size; as noted in the feasibility study report, the agency is receiving support from various sources to rectify the problems. The team conducted a site inspection, visited the various locations within the plant boundary, both inside and outside of buildings, and viewed from a distance the adjacent property that is being considered for purchase.

B. Rapid Environmental Assessment Checklist and Categorization

6. Based on discussions with the director, onsite inspection and prior knowledge of the surrounding area, the rapid environmental assessment checklist (REA Checklist) was completed and is found in Appendix 1. In addition, an audit was conducted of the existing facilities to determine the presence of discarded and unused chemicals, waste oil and other materials that pose a hazard to human health and environment to determine if a Corrective Action Plan (CAP) is needed (SPS Appendix 1, Para 10).

C. Description of Surrounding Environment

7. The site is situated between NR 6 and the Stoung River in the midst of open lots, buildings and homes, generally separated from the site by distances of 2-20 m. Two and three storey buildings are located along the main road frontage (NR 6) near the entrance to the plant including, from S-E to N-W along NR 6, a privately owned building used for residential space, and three public buildings housing the local Dept of Education, the Dept. of Social Affairs and the Dept. of Taxation, successively. Away from the road, the plot of land on the southeast side is vacant with the exception of a traditional wooden home. On the northwest side is a sparsely used vacant plot of land. The Stoung River bounds the plant on the back (northeast) side. No data are available concerning raw water quality at the intake to the Stoung Treatment Plant.

IV. GENERAL ISSUES RELATED TO THE ENVIRONMENT

8. The improvements under the subproject take place within the confines of the plant property. The property will be reconfigured to accommodate the improvements, and there are no environmental resources currently on the plant property to be adversely affected by the proposed building program. Still, the affected area extends beyond the plant confines in various ways, which pose the potential for environmental impact (public health, safety and convenience). In addition, inadequate worker provisions can affect the safety and health of workers. The means by which project execution extends beyond the plant boundary are as follows:

- Movement of construction materials and demolition debris to and from the site will occur along NR 6 and through the narrow access road of the plant.
- Disposal of demolition debris will be done at offsite locations, and could affect environmental values at or in transit to the disposal location.
- Noise and dust generated during construction activity reaches beyond the plant boundary and causes inconvenience to surrounding property.
- Runoff from rainfall incident on the plant site can transport sediment down-slope to the river.
- Construction workers will need to be housed offsite at an as-yet unidentified location, which can affect surrounding land uses and local resources.

9. The means by which safety and health risks may arise onsite are as follows:

- Direct injury of workers in the course of demolition of existing structures and the construction of new structures and installation of equipment.
- Chronic injury from prolonged exposure to persistent noise, fumes, dust and heat.
- Dehydration and fatigue from lack of sufficient drinking water and food.
- Lack of sufficient onsite sanitation facilities for workers.

10. Provisions are set out in the following paragraphs for mitigating these potential impacts.

11. Movement of construction materials and demolition debris to and from the site should be restricted to daylight hours, and trucks should be equipped with fully functioning exhaust mufflers. Trucks hauling sand, gravel, dirt and demolition debris should be covered, or the surface of the materials wetted prior to dispatch, to prevent loss of materials along the roadway. Trucks should observe traffic rules and travel at safe speeds, especially in congested areas. A flagman should be posted at the intersection of the site access road at NR 6 to facilitate entry and exit of vehicles and assist to prevent accidents.

12. According to the director of the water supply agency, there are willing takers of the construction demolition debris for use as fill material. The total volume of materials is not great, approximately 300 m3. Disposal of demolition debris will be done only at offsite locations where there are signed consent statements from the owners of the land. Materials will be disposed of at those locations in a consolidated fashion, preferably with equipment present for shaping and spreading the material. The route to the disposal location will be determined beforehand and approved by the PMU. The choice of disposal location will be determined in part by ease of access and convenience to the public. Demolition materials will be either covered or wetted prior to movement on public roads, in order to prevent the escape of dust along the roadway.

13. Noise and dust generated during construction activity is to a great extent unavoidable; however minimizing discomfort and inconvenience to surrounding property users should be a priority of the contractor. Work should be limited to daylight hours, or should conform to the preference of surrounding users (which may be nighttime, since three of the four adjacent buildings are government offices). Dust generated during demolition should be suppressed with water. Use of jack hammers should be confined to short time periods; use of explosives is prohibited. The loss of sediment due to runoff from rainfall incident on the plant site should be controlled with silt fences formed from woven polyethylene fabric or from bunched hay.

14. Construction workers will be housed offsite at a location approved by the PMU. A signed consent from the owner of the property is necessary, which will set out terms of payment, if any, for use of the site. Suitable temporary housing, bathing and sanitation facilities, and a canteen for preparation of food should be in place before occupancy. Rudimentary site drainage and access should be prepared for the site. The site should be sufficient distance from markets, schools, temples, and neighborhoods to avoid any adverse impact thereto. Housing of workers at commercially available guest houses is a suitable option.

15. The building contractor's safety and health program should be sufficient to prevent accident, injury and ill-health among workers. Suitable and effective personal protective equipment (PPE) should be provided for workers, including protective footwear, hearing protection, eye protection and dust masks. The use of any protective device depends on the work being performed; regardless of PPE, workers should not be required to perform hazardous tasks which could result in injury and exposure. External means of

preventing exposure should be pursued wherever possible, including alternative means of performing similar work.

16. Workers-at-height should be equipped with and required to wear safety harnesses. The entry of workers into enclosed spaces such as vacated tanks or sumps should be preceded with and accompanied by forced air ventilation. Tasks requiring use of high decibel equipment should be performed over short stretches by alternating workers. Workers should be provided with easy access to clean drinking water and modern sanitation facilities at the construction site, given suitable work breaks, and time for midday meals. The contractor should conform to the laws of Cambodia governing hiring, payment and treatment of labor.

V. EXISTING FACILITIES AUDIT

17. Appendix I of the ADB SPS (2009) requires that, "when the project involves existing activities or facilities, relevant external experts will perform environmental audits to determine the existence of any areas where the project may cause or is causing environmental risks or impacts." The rapid environmental assessment checklist (Appendix 1) includes a section in which the existing facilities have been audited to identify the presence of waste, spent, out-of-spec and discarded water treatment chemicals, oils, cleaning fluids and solvents, as well as contaminated soils that have or have the potential for causing environmental impacts or risks. Waste materials that pose a hazard to human health or the environment have not been identified at the facility. The director of the water supply agency confirms the absence of any such materials within the water supply system buildings or on property under the control of the water supply agency. There is no need to prepare a corrective action plan to dispose of materials of this nature or remediate soils or structures for purposes of reducing environmental impact and risk.

18. In addition, the potential presence of unexploded ordinance (UXO) and mines has been evaluated within the subproject area based on survey maps, discussion with provincial authorities and inspection of the premises where the work is to take place. The site has been occupied for many years. It has been determined that there is no basis for suspecting that UXO or mines are present.

VI. ENVIRONMENTAL MANAGEMENT PLAN

A. Review of Impacts

19. Table 1 summarizes the impacts in the approximate order that they have been discussed in the previous section. The table also summarizes the required mitigation measures, institutional responsibilities for assuring the mitigation action is carried out and costs, which are in all cases included in previously identified budgets for design, construction and operation of the systems.

Table 1: Potential Environmental Impacts and Mitigation Measures

Project Activity	Potential Negative Impact	Proposed Mitigation Measure	Institutional Responsibility	Cost Estimates
Construction				
Movement of construction materials and demolition debris to and from the site	Dust and roadside grit hazardous to pedestrians and motorcyclists	- Movement of construction materials and demolition debris restricted to daylight hours - Trucks to be equipped with fully functioning exhaust mufflers - Trucks hauling aggregate and demolition debris to be covered, or surface of materials wetted - Trucks to observe traffic rules and travel at safe speeds, especially in congested areas - Flagman posted at site access road to facilitate vehicle movements and prevent accidents.	Construction Contractor (CEMO)	Included in bid price for work
Disposal of demolition debris	Degraded land uses and precedent for disposal of other forms of solid waste	- Disposal only at locations with signed consent statements from owners of land - Materials to be disposed of in a consolidated fashion, with shaping and spreading - Route to location determined beforehand and approved by the PMU. - Choice of location determined in part by ease of access and convenience to public. - Materials either covered or wetted prior to movement on public roads	Construction Contractor (CEMO)	Included in bid price for work
Onsite demolition and construction works	Noise and dust generated during construction activity	- Work limited to daylight hours, or to conform to the preference of surrounding users - Dust generated during demolition to be suppressed with water - Use of jack hammers confined to short time periods - Use of explosives is prohibited.	Construction Contractor (CEMO)	Included in bid price for work
Onsite demolition and construction works	Runoff from rainfall incident on the plant site can transport sediment	- Sediment loss controlled with silt fences formed from woven polyethylene fabric or from bunched hay	Construction Contractor (CEMO)	Included in bid price for work
Construction worker offsite housing	Community social and sanitation impacts	- Location for offsite housing approved by the PMU - Signed consent from the owner of the property, to set out terms of payment, if any, for use. - Suitable temporary housing, bathing and sanitation facilities, and canteen for preparation of food erected at site and rudimentary site drainage and access in place before occupancy	Construction Contractor (CEMO)	Included in bid price for work

Project Activity	Potential Negative Impact	Proposed Mitigation Measure	Institutional Responsibility	Cost Estimates
		- Sufficient distance from markets, schools, temples, and neighborhoods to avoid impact - Housing of workers at commercially available guest houses is a suitable option.		
Onsite demolition and construction works	Direct injury of workers in the course of demolition of existing structures	- Personal protective equipment (PPE) provided for workers - Workers not required to perform hazardous tasks which could result in injury and exposure - External means of preventing exposure to be pursued wherever possible, including alternative means of performing similar work. - Workers-at-height equipped with and required to wear safety harnesses. - Entry of workers into enclosed spaces such as vacated tanks or sumps to be preceded with and accompanied by forced air ventilation.	Construction Contractor (CEMO)	Included in bid price for work
Onsite demolition and construction works	Chronic injury from prolonged exposure to persistent noise, fumes, dust and heat	- Tasks requiring use of high decibel equipment to be performed over short stretches by alternating workers.	Construction Contractor (CEMO)	Included in bid price for work
Onsite demolition and construction works	Dehydration and fatigue and lack of sufficient onsite sanitation facilities	- Workers to be provided with easy access to clean drinking water and modern sanitation facilities at the construction site, given suitable work breaks, and time for midday meals.	Construction Contractor (CEMO)	Included in bid price for work

B. Institutional Arrangements

20. The Department of Potable Water Supply at central level under Ministry of Industry and Handicraft (MIH) is the executing agency, and will establish the Project Management Unit (PMU) to execute the Project. The PMU will assign responsibility for environmental aspects to a particular individual as staff PMU safeguard management officer (PSMO) who is engaged full time with implementation of the project to monitor implementation of mitigation measures.[2] The Stoung Water Works (PWW) will the implementation agency for the subproject Stoung WW will establish a Project Implementation Unit (PIU) to manage the implementation of the Subproject at Stoung in Kampong Thom Province.

21. The PMU will engage Contractors for specific works, based on the subcontract packages considered most suitable for execution. Legal clauses regarding mitigation measures are required to be included in construction contract bidding documents and become part of contract agreements; a set of specifications are provided in Appendix 2 that reflects the mitigation measures foreseen for the current subproject. For the main construction contracts, the Contractor will be required to appoint a staff Construction Environmental Management Officer (CEMO) responsible for supervising implementation of mitigation measures during the execution of the contract. The contractor will be required to prepare a Construction Management Plan (CMP) to ensure construction, demolition and excavation that take place at building sites do not adversely affect health, safety, amenity, traffic or the environment in the surrounding area. The CEMO working with the Contractor's Site Manager is responsible for preparing this plan prior to the start of construction and receiving approval for the plan from the PMU before the start of construction. The CEMO will serve as a point of contact that is accountable for environmental aspects of the construction work. For smaller construction contracts or subcontracts, the (sub-)contractor will still be held accountable for implementation of mitigation measures through a system of quality assurance supervised by the PMU[3].

22. The PMU has direct responsibility for monitoring the implementation of the mitigation measures. The PSMO will be assisted in tasks by the Environmental Specialists (ES), consultants[4] who are part of the Design and Supervision Consultant (DSC) and support all the subprojects undertaken through the loan. Work will commence with updating and finalizing IEEs and DDRs and their respective environmental mitigation measures and monitoring plans, submitting the environmental reviews on behalf of MIH to the Ministry of Environment, incorporating legal clauses regarding mitigation measures into construction contract bidding documents, assisting the PSMO in monitoring the implementation of those measures during the progress of construction, and preparing the environmental sections of semi-annual reports to be provided to ADB. The ES also will provide training to PMU and PIU staff. Table 2 describes the functions of various agencies engaged in the project, and a diagram illustrating the institutional arrangement is provided in Figure 2.

23. For the present project, RGC/Client approval for Environment Clearance from the Ministry of Environment involves revision of the DDR during the design phase, coincident with detailed design preparation, and translation of the DDR into Khmer. The DDR is submitted to the Department of EIA within MOE, which has a period of 30 days to review and respond with comments, or approve, the DDR. A timeline for updating the DDR as well as for inclusion of the EMP and special conditions in contract and/or bidding documents is as follows:

- Project design proceeds over a period of 5 mo (anticipated)

[2] While the PEMO is engaged fulltime with subproject execution, duties related to environmental management may constitute only a portion of his/her responsibilities.

[3] Subcontractors hired by the general contractor, or minor contracts undertaken at the site are required to be managed under the provisions of the main contract and in conformance with the CMP.

[4] Both international and national ES will be engaged. It is recommended that the international ES be engaged for two months over the project duration, and the national ES be engaged fulltime, to provide support to the PEMOs for this and other subprojects.

- Monitoring of water quality over first two months
- Concurrently, DDE is updated with new design data
- By end of month 2, expected that issues related to design are resolved
- DDR undergoes translation (2 weeks)
- DDR submitted to DOE by mid-month 3 of design period
- DOE has 30 days to review/approve DDR
- DDR approved by mid-month 4 of design period
- ADB review runs concurrently with DOE review
- Final approval from ADB and the Government obtained before detailed design finalized in time for inclusion in procurement package

24. The Ministry of Environment (MOE) and the provincial Departments of Environment (PDOEs) play a role in submittal, review, and approval of DDRs, and monitoring and reporting. This work takes place during the implementation phase. The ES will revise and update the DDR based on final designs, and the document should be translated into Khmer prior to submittal to MOE DEIA, which will engage in the review process the provincial PDOE where the subproject takes place. Once DEIA approves the subproject, implementation can proceed with construction mitigation measures mostly in the hands of the contractor, and the ES, PDOE, PIU and PSMO working together to perform monitoring and reporting. It will be the job of the PIUs supported by the ES to compile quarterly reports, which then are compiled into semi-annual safeguard monitoring reports by the PMU and DSC, supported by the ES. A sample environmental monitoring reporting form is shown in Appendix 3. The PSMO and PMU Project Director will be responsible for submittal of reporting to ADB.

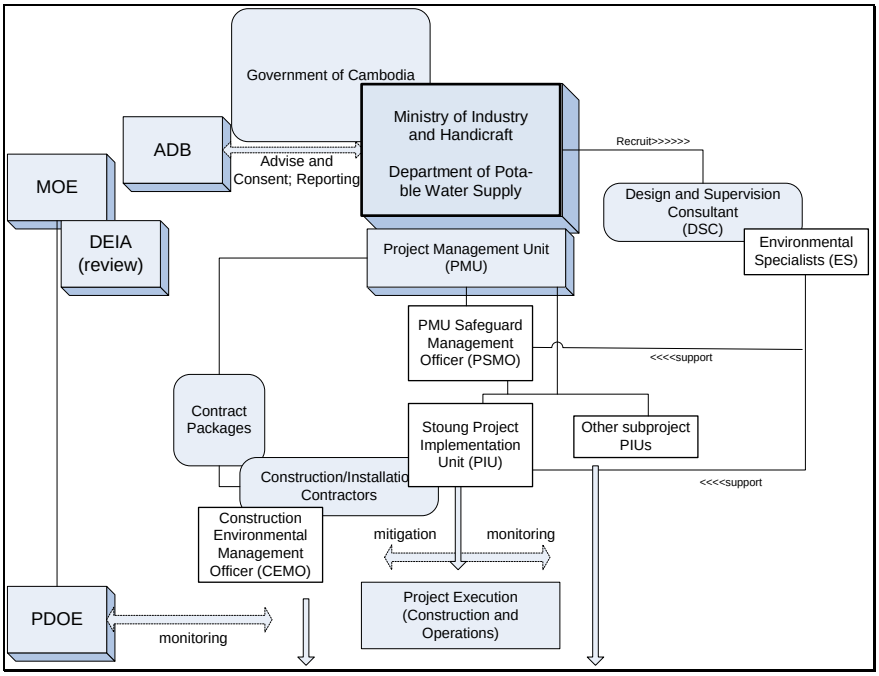
Table 2: Roles and Responsibilities

Agency	Role
MIH—DPWS Project Management Unit (PMU)	Supervision and guidance; assist to appoint staff of PMU; recruit competent national environmental specialist (NES) as part of the DSC to assist design team and PMU; submit DDR to Ministry of Environment (MOE) for approval; consolidate and submit semi-annual reports to ADB.
Stoung Water Works PIU	Appoint Project Environmental Management Officer (PEMO) to PMU, who will work with the ES to ensure EMPs are satisfied in the design and construction of the subproject; review and approve CMP; supervise and monitor DDR/CMP implementation; prepare and conduct public consultations, administer the grievance redress mechanism, monitor subproject activities and prepare quarterly environmental reporting at the subproject level.
Design and Supervision Consultant (DSC) National Environmental Specialist (ES)	Assist the PEMOs and the PMO to review, update and submit DDR for approval by MOE; incorporate EMP requirements into design, specifications and construction contract; coordinate with other government agencies regarding environmental issues; organize and implement public consultation and grievance redress mechanism; monitor activities of design engineer and construction contractors to assure mitigation measures are implemented; incorporate environmental reporting into semi-annual progress reports.
MOE DEIA and PDOE	Review of DDR; PDOE to support monitoring of mitigation measures during construction
Construction contractors	Implement environmental requirements related to construction; incorporate environmental costs into bid estimate; prepare a Construction Management Plan (CMP); appoint the Construction Environmental Management Officer (CEMO); assure all environmental requirements are followed.
DPWS/MIH Lab	Implement water quality monitoring of raw and treated water supplies during operations

C. Environmental Monitoring Plan

25. Environmental monitoring extends during the implementation of the loan and engages the previously identified groups. Table 3 identifies the monitoring to be undertaken in respect to the mitigation measures previously identified. The PEMO is responsible for the bulk of the monitoring being undertaken during the design and construction periods. During operations, the Stoung Water Works is responsible.

Figure 2: Organization for Environmental Management on Stoung Subproject



D. Water Quality Monitoring

1. Types, Frequency and Timing

26. Concerns about surface water quality impacts during construction will be met by observing site conditions and no direct water quality monitoring of surface water is needed. No data are needed regarding the source of supply for the subproject, since the subproject does not address augmented supplies or treatment. Hence there is no water quality monitoring necessary on the project preliminary to construction.

27. Recommended protocols for monitoring raw water quality used in production operations (the raw water source) and finished water quality are already in place by DPWS in which a number of parameters are monitored (Table 4). Treated water quality should be within the limits set by the DPWS/MIH. It is important to consistently monitor raw and finished water quality, produce consistent data outputs, and analyze data for the purpose of maintaining and improving operations.

28. Other operations monitoring may be required. For instance, some operators measure select parameters downstream of the sedimentation tank in order to track performance of flocculation and settling in response to adjustments in chemical addition rate. Sampling and analysis may be performed at greater or lesser frequencies than specified herein to adjust performance. Actual parameters may differ depending on the source of supply (ground or surface water). The monitoring proposed herein is part of the operating unit's protocols, and is supported by MIH's Water Quality Lab, hence there is no additional cost associated with the proposal.

1. Sampling Locations

29. The location of raw water quality sampling is at the raw water intake. Treated water quality monitoring takes place at the end of the treatment plant. Monitoring chlorine residual is done at various locations in the distribution system.

Table 3: Environmental Monitoring Plan

Mitigation Measure	Parameters to be Monitored	Location	Measurements	Monitoring Frequency	Responsibility for Monitoring	Cost to Monitor
Construction						
- Movement of construction materials and demolition debris restricted to daylight hours - Trucks to be equipped with fully functioning exhaust mufflers - Trucks hauling aggregate and demolition debris to be covered, or surface of materials wetted - Trucks to observe traffic rules and travel at safe speeds, especially in congested areas - Flagman posted at site access road to facilitate vehicle movements and prevent accidents.	Field Conditions	Stoung roadside environment	Visual inspection	Over duration of work	PEMO, ES, PDOE	No extra cost.
- Disposal only at locations with signed consent statements from owners of land - Materials to be disposed of in a consolidated fashion, with shaping and spreading - Route to location determined beforehand and approved by the PMU. - Choice of location determined in part by ease of access and convenience to public. - Materials either covered or wetted prior to movement on public roads	Field Conditions	Disposal sites, haul routes	Visual inspection	During disposal of demolition waste	PEMO, ES, PDOE	No extra cost.
- Work limited to daylight hours, or to conform to the preference of surrounding users - Dust generated during demolition to be suppressed with water - Use of jack hammers confined to short time periods - Use of explosives is prohibited.	Field Conditions	Construction site and environs	Visual inspection	Over duration of work	PEMO, ES, PDOE	No extra cost.
- Sediment loss controlled with silt fences formed from woven polyethylene fabric or from bunched hay	Field Conditions	Construction site and environs	Visual inspection	Over duration of work	PEMO, ES, PDOE	No extra cost.
- Location for offsite housing approved by the PMU - Signed consent from the owner of the property, to set out terms of payment, if any, for use. - Suitable temporary housing, bathing and sanitation facilities, and canteen for preparation of food erected at site and rudimentary site drainage and access in place before	Field Conditions	Labor Camps	Visual inspection	At start of contract; quarterly	PEMO, ES, PDOE	No extra cost.

Mitigation Measure	Parameters to be Monitored	Location	Measurements	Monitoring Frequency	Responsibility for Monitoring	Cost to Monitor
occupancy - Sufficient distance from markets, schools, temples, and neighborhoods to avoid impact - Housing of workers at commercially available guest houses is a suitable option.						
- Personal protective equipment (PPE) provided for workers - Workers not required to perform hazardous tasks which could result in injury and exposure - External means of preventing exposure to be pursued wherever possible, including alternative means of performing similar work. - Workers-at-height equipped with and required to wear safety harnesses. - Entry of workers into enclosed spaces such as vacated tanks or sumps to be preceded with and accompanied by forced air ventilation.	Field conditions	Construction site	Visual inspection	Weekly	PEMO, ES, PDOE	No extra cost.
- Tasks requiring use of high decibel equipment to be performed over short stretches by alternating workers.	Field conditions	Construction site	Visual inspection	Weekly	PEMO, ES, PDOE	No extra cost.
- Workers to be provided with easy access to clean drinking water and modern sanitation facilities at the construction site, given suitable work breaks, and time for midday meals.	Field conditions	Construction site	Visual inspection	Weekly	PEMO, ES, PDOE	No extra cost.

Table 4: Drinking Water Quality Parameters and Frequency

Parameter	*Raw Water*	*Treated*	*Notes*
Essential Items (Analyze Daily)	✓		
-Color	✓	✓	
-Turbidity	✓	✓	
-pH	✓	✓	
-TDS	✓	✓	Or conductivity
-Residual Chlorine		✓	Multiple locations in pipeline
Important Items (Analyze every 3 months)			
-Taste		✓	
-Odor		✓	
-Mn	✓	✓	
-Zn	✓	✓	
-SO_4	✓	✓	
-Cu	✓	✓	
-H_2S	✓	✓	
-Hardness	✓	✓	
-Al	✓	✓	
-Cl^-	✓	✓	
-Fe	✓	✓	
-NH_3-N	✓	✓	
-E. Coli	✓	✓	
-Total Coliform	✓	✓	
Other possible analyses			
-Alkalinity	✓	✓	Some ops measure daily
-Organic carbon content	✓	✓	Permanganate test (COD)
-arsenic	✓	✓	Until satisfied none is present exceeding 50 µg/L

VII. PUBLIC CONSULTATION AND DISCLOSURE

A. Public Consultation

30. Public consultation should be held at the outset of procurement for the construction of civil works under the project. This is in order to notify the homes and businesses in the immediate vicinity of the site that work will commence on the project, to review environmental issues of concern, and to inform the public of the grievance redress mechanism established under the project.

B. Disclosure

31. Details of the subproject will be disclosed through a process of public consultation described above. Further to that, MIH will provide the relevant environmental information for this subproject, including information from the DDR to affected people in a timely manner, in an accessible place, and in a form and language(s) understandable to them by providing a copy of the DDR in Khmer language at the PWW office for review by interested parties. In addition, ADB will post on its website the subproject DDR, updates prepared during the project implementation period, and environmental monitoring reports prepared during the implementation period.

VIII. GRIEVANCE REDRESS MECHANISM

32. Grievances related to both environmental and resettlement issues are addressed through the Grievance Redress Mechanism (GRM). In order to ensure that complaints from all affected persons (APs) on any aspect of environment, land acquisition, compensation and resettlement are addressed in a timely and satisfactory manner, and that all possible avenues are available to APs to air their grievances, a well defined grievance redress mechanism will be established. All APs can send any questions to the implementing agency about their rights in relation with redress of environmental problems and entitlements. APs are not required to pay any fee in order to file a complaint at any level.

The GRM has been explained in the public information booklet distributed to all APs, and is explained here in relation to complaints related to environmental impacts.

33. Stage 1 - Complaints from APs on any aspect of environmental impacts or the resettlement program shall first be lodged verbally or in written form to the commune leader. The commune leader along with the members of the provincial resettlement subcommittee working group (PRSC-WG) will meet to decide on a course of action within 15 days from the day it is lodged.

34. Stage 2 - If no understanding or amicable solution can be reached, or if no response from the commune chief is received by the AP within 15 days of registering the complaint, he/she can appeal directly to the PRSG-WG. APs will be heard in person by the vice chairman of the PRSC-WG and APs will be invited to produce documents which support his/her claim. The complaint must be settled within 60 days of registering the original complaint. The PRSC-WG will provide a decision within 30 days of the registering of the appeal.

35. Stage 3 - If the AP is not satisfied with the decision of the PRSC-WG, or in the absence of any response, the AP can appeal to the Interministerial Resettlement Committee-Resettlement Department (IRC-RD). The IRC-RD has 30 days to provide a resolution of the problem from the day it is lodged.

36. Stage 4 - If the AP is still not satisfied with the decision of the IRC-RD on appeal, or in absence of any response from the IRC-RD within the stipulated time, the AP, as a last resort, may submit his/her case to court of law, whose judgment is final. APs may also ask for resolution from ADB's responsible project officer consistent with the provision of the ADB's accountability mechanism. They can file their complaint through the ADB resident mission in Phnom Penh for transmittal to the ADB headquarters in Manila.

37. At each stage the governing official is responsible for recording the minutes of meetings, maintaining files on all complaints, and for distributing copies of all decisions to the PMU and lower level bodies, including commune/village officials and affected parties and households.

IX. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

38. The Stoung Water Supply and Sanitation Subproject is a small-scale remediation of an existing facility that with some exceptions takes place wholly at the location of the existing water treatment plant on property owned by the water supply agency. The scale of work, including demolition and new construction, is similar to that of a moderately sized building, and as such presents little or no potential for significant environmental impact. A due diligence review was conducted and is reported on in this document.

39. No residual chemicals, waste oil or contaminated earth has been identified at the site, so there is no need to prepare a corrective action plan (CAP) for the facility.

40. The Stoung Water Supply and Sanitation Subproject is an important intervention to assure the supply of potable water in the Stoung service area over the near term. No environmental constraints exist for implementing the project.

B. Recommendations

41. Potential environmental impacts stem from the transport of construction materials and demolition debris, from site construction and demolition with the potential to generate noise and dust, and from inadequate worker provisions, health and safety protections. Measures have been set out to mitigate these potential impacts, reinforced by a set of

environmental specifications for the construction contractor. These measures should be implemented in order to minimize any adverse effects.

42. Institutional measures are also in place to obtain compliance from the construction contractor, to monitor the implementation of mitigation measures and to fulfill reporting functions related to loan implementation. These institutional measures that constitute the environmental management framework should also be implemented. Costs related to mitigation and monitoring were considered, and no special costs have been identified.

Appendix 1: Rapid Environmental Assessment (REA) Checklist

Country/Project Title:	Cambodia Urban Water Supply and Sanitation (Stoung)
Sector Division:	Water Supply

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area…			
▪ Densely populated?		✓	
▪ Heavy with development activities?		✓	
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		✓	
• Protected Area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
B. Potential Environmental Impacts Will the Project cause…			
▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		✓	
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	
▪ hazard of land subsidence caused by excessive ground water pumping?		✓	
▪ social conflicts arising from displacement of communities ?		✓	
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		✓	
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	✓		**Water is treated using conventional treatment approach.**
▪ delivery of unsafe water to distribution system?		✓	
▪ inadequate protection of intake works or wells, leading to pollution of water supply?		✓	

Screening Questions	Yes	No	Remarks
▪ over pumping of ground water, leading to salinization and ground subsidence?		✓	
▪ excessive algal growth in storage reservoir?		✓	
▪ increase in production of sewage beyond capabilities of community facilities?		✓	
▪ inadequate disposal of sludge from water treatment plants?		✓	
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		✓	
▪ impairments associated with transmission lines and access roads?		✓	
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		✓	
▪ health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		✓	
▪ dislocation or involuntary resettlement of people?		✓	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
▪ noise and dust from construction activities?	✓		**Moderate effects; mitigated through standard means**
▪ increased road traffic due to interference of construction activities?		✓	
▪ continuing soil erosion/silt runoff from construction operations?	✓		**Moderate effects; mitigated through standard means**
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		✓	
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		✓	
▪ accidental leakage of chlorine gas?	✓		**Capacity building in safe handling of chlorine gas provided under the project**
▪ excessive abstraction of water affecting downstream water users?		✓	
▪ competing uses of water?		✓	
▪ increased sewage flow due to increased water supply		✓	
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		✓	

Screening Questions	Yes	No	Remarks
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	
▪ social conflicts if workers from other regions or countries are hired?		✓	
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?		✓	
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	

Preliminary Climate Risk Screening Screening Questions		Score	Remarks[5]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	1	Design to consider sustainable river & groundwater levels
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium

[5] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Appendix 2: Environmental Specifications for Contract Tender Documents

General

1. The contractor will post a public notice regarding the nature, extent and cost of the project at the start of the construction zone; and post notices announcing the grievance redress mechanism in local government offices and in strategic places of the subproject's area of influence.

Worker Provisions

2. GOC criteria for minimum age, wage and living provisions, benefits, hours of work, overtime arrangements and overtime compensation, and leave for illness, maternity, vacation or holiday should be met for all workers. The Contractor will conform to national law in relation to hiring and employment; and will comply with the principle of equal opportunity, fair treatment, and nondiscrimination with respect to the employment relationship; except that hiring of project-affected persons, residents of project-affected administrative units and disadvantaged groups is encouraged.

3. The contractor shall implement a safety and accident prevention program involving provision, training and use of safety equipment; minimum skills qualifications for operators and drivers; and record keeping related to accidents.

4. The Contractor will provide Personal Protective Equipment (PPE) to workers that offer adequate protection to the worker without incurring unnecessary inconvenience in its use[6]. Proper maintenance of PPE, including cleaning when dirty and replacement when damaged or worn out; and proper use of PPE should be part of training programs, as appropriate.

5. The contractor will maintain first aid kits onsite along with instructions for use, and personnel trained in basic first aid emergency response measures; and emergency care should be available on call.
6. Laborers and others resident at the site will be provided with lodging in a camp setting, potable water supply, food service facilities, adequate means for maintaining personal hygiene and solid/liquid waste disposal, and onsite facilities for preparing food, or food service contracted.
7. The contractor will provide means for disposing of wastewater from toilets, baths and food preparation areas either through a septic tank and soakaway, or holding tank with removal by vacuum truck. Solid waste should be collected at waste bins and disposed of properly offsite.
8. The public should be barred from the site as well as from worker housing areas.

9. HIV/AIDS awareness should be incorporated into the contractor's policy and outreach toward workers.

Use of Land for Construction Purposes

[6] Depending on the application PPE may include safety glasses with or without side-shields, and protective shades; plastic helmets with top and side impact protection; hearing protectors (ear plugs or ear muffs); safety shoes and boots for protection against moving & falling objects, liquids and chemicals; gloves made of rubber or synthetic materials; facemasks with appropriate filters for dust removal and air purification; single or multi-gas personal monitors; portable or supplied air; on-site rescue equipment, and insulating clothing, body suits and aprons of appropriate materials.

10. The contractor will obtain approval from landowners for temporary use of land for labor camps and construction yards. Local authorities will be consulted on locations, which will in no case be close to sensitive receptors such as hospitals, schools and residential communities.

11. The contractor will not encroach upon vacant land or cause damage to adjacent properties. The Contractor will execute a plan for preventing firewood gathering in the project area and prohibit among workers possession of instruments or poisonous substances for killing or capturing fish or wildlife.

12. Cutting trees is prohibited except inside the construction zone. Trees to be removed must be specified in the Project plans and specifications.

13. No fuel, oil, or parts cleaning fluids shall be spilled, wasted or disposed of at the project site. Secondary containment (earth or concrete berm) at least equal to the capacity of the fuel storage tank shall be provided at fueling stations.

14. After completion of occupancy, all affected areas within the general project boundary shall be graded to the original or specified elevation that allows positive drainage. Machinery, equipment, structures, contaminated earth, plant matter and waste or unused materials shall be removed and disposed of properly.

Conduct of Work

15. The workplace should be kept orderly to reduce accidents. Deep excavations in unstable soils need to be shored, and below grade construction brought to grade quickly, then excavations closed. The contractor will:

    a. Restrict use of heavy equipment and material receipts to daylight hours. Apply water to suppress dust where needed.

    b. Exercise caution to prevent erosion losses, close excavations rapidly and stabilize soils once the pipeline is in place.

    c. Return land to the original condition on completion.

    d. Complete work on a segment according to a progressive sequence of activity. Provide access by bridging trenches.

    e. Store bedding materials outside trafficked areas. Cover materials and/or suppress dust with water. Remove excess.

    f. Avoid stockpiling materials, equipment and supplies at the site.

    g. Avoid trenching in locations where damage might occur. If needed, provide shoring to assure no subsidence occurs.

    h. Excavations should be barricaded and marked. Workers should not be allowed to enter trenches greater than waste deep unless they are properly shored.

    i. Use tarpaulins to cover truck beds or avoid overfilling and spillage along roadways, plan routes to avoid congested areas and narrow roads, and schedule transportation to avoid peak traffic periods.

    j. Plan construction to avoid repeated excavation in roads and easements.

k. Provide movable sanitary facilities at the work site and maintain the site clean, free of odors and usable.

l. Plan work to minimize duration of shutdown. Limit shutdown to less than four hours. Notify public in advance and advise to store water as necessary.

m. Increase work force to complete construction quickly in affected areas. Minimize dust / avoid obstruction of pedestrians and vehicles

Sediment Controls

16. Areas to be cleared and excavated are limited to areas where construction will take place. Areas will be protected from flowing water including sheet runoff. The contractor will limit sediment loss from exposed surfaces. Existing drainage patterns should be maintained during construction.

17. Discharge of wastewater into water bodies is prohibited as is the discharge of wash water from concrete trucks to waterways. . Land clearing activity will be suspended during rains to limit sediment loss.

Community Values

18. Vehicles will operate within the legal speed limits in populated areas. The operation of moving equipment in locations accessible to the public will be done in a manner so as to prevent the occurrence of incidents and accidents.

19. The contractor is responsible for regular spraying of roadway surfaces in use as haul routes and of sites under construction where these locations are accessed by the public. The contractor will remove excess debris during construction and after completion of the item of work.

20. The Contractor will post flagmen at intersections of transit paths for construction vehicles and local traffic, and along traffic lanes where work is in progress. Traffic detours will be clearly marked.

21. For work in public right-of-way, the contractor will provide a path for transit of pedestrians and vehicular traffic through the construction area; and barricade open excavations to prevent injury to the public.

22. The contractor will provide temporary access to affected properties and reinstate permanent access on completion of work; minimize the area under construction at any one time and the duration of works at any one location; and minimize impacts on infrastructure, access and services.

23. The contractor will install signs and lighting, where there is nighttime traffic, in the vicinity of works on public roads, and restrict access to the construction site to the public.

Site Conditions and Haul Routes

24. At the start of construction, the contractor will provide a Construction Management Plan for development of the construction zone, worker camps, equipment yards, and haul roads.

25. Haul routes will minimize interference with ongoing activity in the area. Routes shall be approved by the PMU. Haul roads and transport/equipment routes shall be kept within the construction zone, unless authorized by the PMU.

Disinfection of Pipes, Tanks and Equipment

26. The Contractor will disinfect water mains, tanks and reservoirs by chlorination and include a bid item for disinfection in piping installation contracts.

Appendix 3: Sample Environmental Monitoring Reporting Form

TEMPLATE/FORMAT

Safeguard Monitoring Report

Summary:
(to be included as part of the *main* Report)

- **Summary of EMP/RP Implementation**
- **Description of monitoring activities** carried out (e.g. field visits, survey questionnaire, public consultation meetings, focus group discussions, etc)
- **Key issues**, any **corrective actions** already taken, and any **grievances**
- Recommendations

Safeguards Monitoring Report
(to be included in the annex/appendix of the *main* Report)

1. Introduction and Project Overview

Project Number and Title:		
Safeguards Category	Environment	
	Indigenous Peoples	
	Involuntary Resettlement	
Reporting period:		
Last report date:		
Key sub-project activities since last report:	This section can include, among others, the following: • Activities of Proponent • Progress of Work (% physical completion) • Changes of Surrounding Environment • Status of Permits / Consents	
Report prepared by:		

2. Environmental Performance Monitoring

a. Summary of Compliance with EMAP Requirements (Environmental Performance)

EMAP Requirements	Compliance Status (Yes, No, Partial)	Comment or Reasons for Non-Compliance	Issues for Further Action
Use environmental impact as main heading and EMAP as listing (see example below)	Use EMoP list as basis for rating/evaluating compliance (see example below)		
Rise of employment opportunities: • Job openings of the project should give priority to local communities. • Recruitment of local laborers should be stipulated in the	• Field inspections and interviews with communities - DONE • Note each complaint case in the field – 3 COMPLAINTS RECEIVED		

contract for construction	• Set up grievance centre and report as part of monitoring action plan – NOT DONE		

b. Issues for Further Action

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
List of EMoP measures or activities not completed (last column of previous table)			
New Issues from This Report			

c. Other activities

- Other issues not covered by EMAP/EMoP
- Environmental monitoring as required by GOI (e.g., air quality, water sampling)

3. Involuntary Resettlement Performance Monitoring

a. Summary of Compliance with RP Requirements

RP Requirements	Compliance status Yes/No/Partial	Comment or Reasons for Compliance, Partial Compliance/Non-Compliance	Issues for Further Action[7]
Establishment of personnel in PMU/PIU			
Public consultation and socialization process		Provide information on: • Public consultation, participation activities carried out • Inclusive dates of these activities To be elaborated on in Item 5	

[7] To be elaborated further in table 3.b (Issues for Further Action)

Land area to be acquired is identified and finalised			
Land acquisition completed			
Establishment of Resettlement Site(s)		Please state: • Number of AHs to be relocated as per agreed RP • Number of AHs already relocated • Number of houses built • Status of installation of community facilities to be provided as per agreed RP	
Compensation payments for affected assets is completed		Please state: • Total Number of Eligible AHs and APs (as per agreed RP) • Number of AHs and APs compensated as of this monitoring period • Total Budget allocation as per agreed RP • Total budget disbursed to AHs as of this monitoring period	
Transport assistance for relocating affected households		As above	
Additional assistance to vulnerable affected household		Please state: • Total Number of vulnerable AHs and APs (as per agreed RP) • Agreed forms of assistance as per RP • Number of AHs and APs assisted as of this monitoring period	
Income Restoration Program		Please state progress per income restoration feature/activity and actual period of implementation	
Temporary impacts have been addressed (affected properties restored to at least pre-project conditions)		Please state: • Total Number of AHs affected by temporary impacts as per agreed RP • Actual Number of AHs and total area affected by temporary impacts (if this differs from the projected number, such as in cases of unforeseen project impacts) • Status of restoring affected property	
Capacity building activities			

b. Issues for Further Action

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
List of RP activities not completed (last column of previous table)			
New Issues from This Report			

4. Occupational, Health and Safety (OHS) Performance Monitoring

a. OHS for worker

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
New Issues from This Report			

b. Public Safety

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
New Issues from This Report			

5. Information Disclosure and Socialization including Capability Building

- Field Visits (sites visited, dates, persons met)
- Public Consultations and meetings (Date; time; location; agenda; number of participants disaggregated by sex and ethnic group, not including project staff; Issues raised by participants and how these were addressed by the project team)
- Training (Nature of training, number of participants disaggregated by gender and ethnicity, date, location, etc.)
- Press/Media Releases
- Material development/production (e.g., brochure, leaflet, posters)

6. Grievance Redress Mechanism

Summary:

- Number of new grievances, if any, since last monitoring period: ____
- Number of grievances resolved: _____
- Number of outstanding grievances: _____

Type of Grievance	Details (Date, person, address, contact details, etc.)	Required Action, Responsibility and Timing	Resolution
Old Issues from Previous Reports			
New Issues from This Report			

7. Conclusion

- Important results from the implementation of EMAP/EMoP and RP monitoring
- Recommendations to improve EMAP/EMoP and RP management, implementation, and monitoring

8. Attachments

- Consents / permits

- Monitoring data (water quality, air quality, etc.)
- Photographs
- Maps