

Environmental Assessment and Review Framework

Draft

July 2015

Cambodia: Uplands Irrigation and Water Resources Management Sector Project

Prepared by the Ministry of Water Resources and Meteorology for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 1 July 2015)

Currency unit	–	riel (KR)
KR1.00	=	\$0.00024
\$1.00	=	KR4,099.95

ABBREVIATIONS

ADB	–	Asian Development Bank
EARF	–	environment assessment and resettlement framework
EIA	–	environmental impact assessment
FWUC	–	farmers water user commune
IEE	–	initial environmental examination
MOE	–	Ministry of Environment
MOWRAM	–	Ministry of Water Resources and Meteorology
PDWRAM	–	Provincial Department of Water Resources and Meteorology
PMIC	–	project management and implementation consultant
PMU	–	project management unit

NOTE

In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. This outline environment assessment and resettlement framework (EARF) is prepared as part of the Asian Development Bank (ADB) project preparatory technical assistance (PPTA) (TA 8702-CAM) to prepare the Uplands Irrigation and Water Resources Management Sector Project. This PPTA is based on agreement between ADB and the Government of Cambodia (Government) and funding of the PPTA is under a grant from the ADB.

2. The overall goal of the project is to enhance agricultural and rural economic productivity through increased efficiency of irrigation systems and improved management of water resources in the uplands areas away from the Tonle Sap.

A. Project Description

3. The project will be implemented in Kampong Thom and Battambang provinces. The uplands of these provinces have potential for improved land and water productivity through improved irrigation systems and water resource management. The project area will comprise selected irrigation systems in these provinces, which have potential for growing vegetables and fruits with paddy being the main crop. It will complement the impact and outcome of the Climate Resilient Rice Commercialization Development Program (Rice-SDP) approved on 27 June 2013.

4. The project will (i) rehabilitate, modernize and climate proof existing irrigation systems and improve their performance and management, (ii) enhance land and water productivity through watershed management and land improvement, and (iii) improve management of water resources through participatory irrigation and water resource management.

5. This will comprise capital works to the main canals and side canals including embankments and headworks as well as refurbishment or replacement of cross regulators, offtakes, sluices and bridges. Works will also encompass the construction of new secondary and tertiary canals and drains with regulators, offtake structures and culverts.

6. The institutional strengthening component of the project will target those departments with direct responsibility for initiating and supporting Farmer Water Users Communes (FWUCs) i.e. Ministry of Water Resources and Metrology (MOWRAM) Technical Affairs Directorate, the Department of Irrigation and Agriculture, Provincial Departments of Water Resources and Meteorology (PDWRAMs), and the Ministry of Agriculture, Forest and Fisheries (MAFF). Strengthening activities will make full use of the work that has been undertaken under the North West Irrigation Sector Project (NWISP) and the ADB Water Resources Management Sector Development Program (WRMSDP).

7. A long list of candidate subprojects was developed during the course of the PPTA, along with selection criteria for finalizing the preferred ones. The selection criteria are as follows:

- (i) Category B or less in terms of environmental impact as defined in the SPS [do not have any significant environmental impact];
- (ii) Category B or less in terms of involuntary resettlement impact as defined in the SPS [do not cause involuntary resettlement and land, if required, will be within the permissible limits for Category B];
- (iii) Category C in terms of indigenous peoples impact as defined in the SPS [do not have any impact on indigenous peoples];

- (iv) Irrigation system has low irrigation efficiency and water productivity, and would have scope for substantial enhancement of both irrigation efficiency and water productivity;
- (v) Subproject should involve only rehabilitation of existing systems or related schemes and should not involve construction of new systems;
- (vi) Subproject should be located outside the Tonle Sap basin;
- (vii) Subproject should involve rehabilitation of both primary and secondary canals to ensure that water reached the farm;
- (viii) Subproject should not be covered by other ongoing or proposed projects financed by ADB or any other Development Partner;
- (ix) Beneficiaries should include sharecroppers, poor farmers, and women farmers; and
- (x) Subproject should be economically viable; and technically, socially and environmentally feasible. The EIRR of each subproject should be greater than 12%.

8. For the final criterion, environmental feasibility will be determined by the environmental impact assessment undertaken in compliance with ADB SPS. The first step in this process is subproject screening for environmental sustainability. This commenced with the Rapid Environmental Assessment (REA) checklist which was undertaken during project development by the ADB (Annex A) and is continued according to the steps in Section IV.A. below.

9. These criteria identified the first two subprojects to be funded (called “core” subprojects). These are the Taing Krasaing scheme in Kampong Thom Province and the Prek Chik Scheme in Battambang Province. An initial environmental examination (IEE) conforming to the ADB’s Safeguard Policy Statement 2009 (SPS) has been completed for these two core subprojects.

10. Future subprojects, drawn from the long list will also conform to the selection criteria.

B. Purpose of the EARF

11. For sector investments with potential environmental impacts, the borrower/client will agree with ADB on an EARF.¹ The future sector investments for the Uplands Irrigation and Water Resources Management Sector Project fall within this requirement.

12. The framework will guide subproject selection, screening and categorization, environmental assessment, and preparation and implementation of safeguard plans of subprojects and to facilitate compliance with the requirements specified in Safeguard Requirements 1–3.²

13. This EARF identifies the broad scope of the project and outlines the policy, procedures and institutional requirements for preparing subsequent subprojects under the loan. The Implementing Agency for the future subprojects will be responsible for preparing environmental assessments and implementing environmental management plans (EMPs) for subprojects as outlined in this framework and submitting them to ADB for review and approval prior to

¹ As part of the same process, where involuntary resettlement impacts or impacts on Indigenous Peoples are involved, a resettlement framework, or an Indigenous Peoples planning framework (IPPF) will also be required.

² Safeguard Requirements cited in the ADB SPS (2009) for (1) Environment (2) Involuntary Resettlement and (3) Indigenous Peoples

commencement of work/finalization of contracts. This EARF shall apply to all subprojects under the loan so as to ensure that the environmental issues are appropriately addressed and mitigated to acceptable levels.

II. LEGAL AND POLICY FRAMEWORK

A. Legal Framework

14. The Government law covering environmental impact assessment is Sub-decree No. 72 ANRK.BK in the Law on Environmental Impact Assessment Process dated 11 August 1999. The main objectives of this sub-decree are to:

- (i) determine an environmental impact assessment (EIA) upon every private and public project or activity; it must be reviewed by the Ministry of Environment (MOE), prior to the submission for a decision from the government.
- (ii) determine the type and size of the proposed project(s) and activities, including existing and ongoing activities in both private and public sector prior to undertaking the process of EIA.
- (iii) encourage public participation in the implementation of the EIA process and take into account their conceptual input and suggestions for re-consideration prior to the implementation of any project.

15. An Annex of the sub-decree lists the activities and the scale of activity which require an environmental assessment. An excerpt from this Annex, covering agricultural activities is included below.

No.	Type and activities of the projects	Size/Capacity (hectares)
	AGRICULTURE	
1.	Concession forest	≥ 10,000
2.	Logging	≥ 500
3.	Land covered by forest	≥ 500
4.	Agriculture and agro-industrial land	≥ 10,000
5.	Flooded and coastal forests	All sizes
6.	Irrigation systems	≥ 5,000
7.	Drainage systems	≥ 5,000

Source: Sub-decree No. 72 ANRK.BK in the Law on Environmental Impact Assessment Process. 1999.

16. Since all subprojects which comply with the selection criteria will involve the refurbishment of existing irrigation schemes, most will not require environmental impact assessment under sub-decree No 72 ANRK.BK. However, where the command area is substantially expanded by the refurbishment of a scheme to provide more than 5,000 ha of newly irrigated land or land previously without reliable irrigation, the provisions of the sub-decree will apply.

B. ADB Environmental Classification

17. Under ADB procedures, there are a number of categories of project depending on the significance of environmental impacts and risks. The main ones are:

- (i) **Category A:** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works.

- (ii) **Category B:** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects.
- (iii) **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

18. It is expected that most subprojects implemented under the loan will be classified under ADB guidelines/rules as Category B. Such subprojects are judged to have some adverse environmental impacts with most occurring during construction phase, but of lesser degree and/or significance than those for category A projects. For these subprojects an IEE is required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

C. Complying with Government and ADB Requirements

19. The IEE (for Category B subprojects) or review of environmental effects (for Category C subprojects) will be prepared according to ADB SPS requirements. On a case-by-case basis, MOE will determine whether the ADB assessment document will also satisfy Sub-decree No. 72 ANRK.BK. In most cases, the ADB IEE will satisfy MOE requirements but this will need to be checked for each subproject via submission to the MOE setting out the project description and the level of ADB assessment that will be prepared.

20. To support the executing agency and implementing agency to prepare environmental safeguards documents, and implement the environmental management and monitoring plans of subprojects, an environmental management officer will be assigned to the project management unit (PMU). The environmental management officer will be assisted and trained by an environment specialist (consultant) on environmental management and monitoring. With these staff and consultant, the capacity of the executing and implementing agencies is considered adequate to implementing Government legislation and ADB safeguard requirements.

III. ANTICIPATED ENVIRONMENTAL IMPACTS

A. Potential Impacts

21. The core subproject IEEs prepared in April/May 2015 for schemes in Kampong Thom and Battambang have provided guidance on the common types of impacts to be expected for both the construction and operation phases and have also flagged some significant issues for special attention.

B. Pre-construction

22. Following selection criteria described in paras. 7 and 8, subprojects will follow screening procedures and all category A subprojects will be excluded from the investment.

C. Construction Impacts

23. During construction activities at sluices, canals and local regulators (including access roads and bridges), the main issues will be air and water pollution and soil erosion, all of which

must be managed by strict control of construction contractors. Additional localized traffic congestion should also be anticipated and this must be minimized by responsible transport planning. Health and safety of the community and construction workers is also, as always, a primary concern.

24. Mitigation of construction-phase impacts relies heavily on the responsibility of works contractors to follow specification clauses in contracts designed to minimize pollution of air and water and soil erosion. This mitigation will in turn rely on oversight by an Environmental Management Officer (EMO) in the PMU and also by the project management and implementation consultant (PMIC).

D. Operation Phase Impacts

25. A fundamental concern will be that the irrigation schemes must be sustainable and responsibly managed, to ensure that agreed irrigation and base flows are maintained and water users downstream are not disadvantaged. The subproject EMP should set, as a prerequisite for project commencement, a clear and detailed extraction plan for the growing seasons to be prepared and submitted before construction. The extraction plan will be part of the Joint Reservoir Operations Plan (JOROP), which will be developed by the PMIC and adopted by MOWRAM and PDWRAMS for Stung Chinit and Taing Krasaing reservoirs in Kampong Thom province, and Bassac and Dauntri reservoirs in Battambang. Irrigation scheduling will be done to assess the volume of water to be released from headworks to the main canals and from main canals to the distribution canals during cropping. The canals flow data will be recorded by installing gauges at all inlets and outlets and record will be maintained by PDWRAMS and FWUCs.

26. Operation and protection of water source. Water sources for long-list subprojects are from existing upland reservoirs. The management of these sources should be included as part of the operational environmental protection measures. This will include: watershed protection; pollution control; protection of local fisheries; and maintenance of local beneficial users (direct irrigators, subsistence gardens etc.).

27. Loss of terrestrial vegetation and habitat. New areas not previously farmed or long abandoned, which come into the command area with the renovated irrigation scheme may have regrowth shrub land or forest and provide habitat for local wildlife populations. Subproject selection criteria have ensured that no critical or important natural habitats will be involved, however local biodiversity may need to be considered and the retention of linked refuge vegetation and corridors should be included where local biodiversity is recorded.

28. Attention should also focus on any increases in the level of un-recycled agricultural waste, and fertilizer and pesticide residues. Mitigation of these impacts will involve the establishment of linkages to the national integrated pest management program and training/agricultural extension services for FWUCs and individual farmer groups.

E. Special and Cross Cutting Environmental Considerations

29. Water balances are an integral part of water and agricultural planning within irrigation command areas. They should be prepared using local data for inflow, infiltration, runoff coefficients, crop water demands and agricultural calendars.

30. Increases in greenhouse gas emissions through increases in inundation or rice paddy areas should be calculated and assessed for significance. Climate change scenarios for the provinces should be used to apply sensitivity analyses to the water balances.

31. Fishing and economic displacement. The canals provide limited fisheries resource for farmer families, especially in the dry season when water levels are too low for irrigation. Mitigation measures include the provision for fish passage through the watergates and retention of fish habitats in the main canals. In canal sections where the canals are to be lined, FWUCs need to allow affected families to fish elsewhere in the canals.

32. Post-construction mitigation will benefit from capacity building and training to use fertilizers and pesticides efficiently and responsibly. The training program should also promote commune based disaster risk management.

IV. ENVIRONMENTAL ASSESSMENT FOR SUBPROJECTS AND/OR COMPONENTS

A. Summary of Assessment Steps

33. First, the proposed subproject should be screened for environmental issues which would be critical to the success and environmental performance of the subproject. These are listed in (B) below. The screening will be undertaken by the subproject PMU during the stages of subproject selection and initial design using the REA checklist (see Annex A for template).

34. Next, an environmental impact assessment, which complies with ADB requirements and Government regulations, will be prepared by the PMU as part of the feasibility and design phase of the subproject. This is described in (C) below. The appropriate level of impact assessment for ADB requirements will be an IEE.

35. The first IEE (including EMP) prepared under this EARF will be submitted to ADB, via the PMU, for prior review before contracts are awarded for construction. Upon confirmation that it meets SPS 2009 requirements, subsequent IEEs including EMPs can be approved by the PMU Director. The approval is subject to post review by the ADB upon request. If the MOE's approval of the IEE is required, this approval must be obtained before submission of the IEE to ADB (in case of prior review) and before contracts are awarded for construction (in case of post review).

36. Finally, completed and approved IEEs including EMPs must be submitted to ADB for public disclosure on the ADB's website.

37. The PPTA has prepared a Climate Risk and Vulnerability Assessment (CRVA) for the project and the impact assessment of all subprojects will need to take account of its findings.

B. Environmental Screening of Subprojects

38. Potential adverse environmental impacts associated with potential subprojects can be avoided or minimized through careful screening. Specific environmental criteria for subproject selection are that the proposed subprojects will:

- (i) have sustainable water supply;
- (ii) not be subject to water use conflict or other water security issues;
- (iii) not encroach on or impact nature reserves or wildlife sanctuaries;
- (iv) not be undertaken where soil contamination requiring remediation occurs; and

- (v) avoid monuments of cultural or historical importance.

C. Procedures for Environmental Assessment of Subprojects

39. Any subproject not meeting the criteria listed above will be rejected. The environmental assessment of the subprojects will be conducted according to the ADB's Safeguards Policy Statement 2009, the Government's environmental assessment sub-decree, and this EARF. An EMP with adequate budget will be developed for each subproject.

D. Process to Prepare Initial Environmental Examination

40. The IEE process shall initially involve the scoping and preparation of a TOR for the IEE Study. Scoping is a planning exercise to determine the content and emphasis (level of detail) for different parts of the IEE study. Scoping quickly assesses the existing environmental status of the project area, lists the likely environmental impacts, and determines the methodology of assessment. The TOR also reveals the team of experts required for the assessment and refines the study schedule.

41. **Assessment Methods.** An outline of the activities for conducting the IEE study has the following steps:

- (i) Desk Study: Review of information such as maps, reports, and EARF for the project. Checklist for collecting site information is also finalized.
- (ii) Consultations: communities and local stakeholders shall be consulted by means of Focus Group Discussions (FGD). Discussions with concerned Government agencies will also be undertaken.
- (iii) Field Assessment: Assessment of the potential and significant environmental concerns shall be done to collect data and analyze any potential impacts.
- (iv) Sampling and analysis of data: Special sampling will be necessary to establish baseline water quality for surface water in the irrigation system and groundwater accessed through domestic wells and to monitor impacts during project implementation. The quality of silt dredged from the main canal will need testing to ensure safe reuse in new earthworks.
- (v) Identification of Environmental Impacts and Mitigation Measures: The impacts will be identified in terms of their significance, extent, reversibility, and duration.
- (vi) Design of Environmental Management Plan: The IEE shall include an EMP where potential environmental impacts are identified, mitigation measures prepared, method of mitigation measure developed, indicators suggested, frequency and nature of monitoring activities set out with, cost estimated, and responsible agency for undertaking the monitoring identified. A model EMP matrix is presented in Annex B.

42. The EMP is a critical document for each subproject. The provisions of the EMP will be incorporated into tender documents and construction contracts.

V. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Public Consultation

43. The public consultation and participation process during the project preparation stage should involve: (i) reconnaissance surveys of the subproject sites, and (ii) participatory meetings with local stakeholders.

44. Reconnaissance surveys of the subproject sites will comprise on-site discussions with water use commune officials to provide information on the physical and biological resources, social-economic environment, opportunities and constraints relevant to the proposed subproject.

45. Participatory meetings with government stakeholders and representatives from water user groups and farmers should be undertaken to collect data and to present the project (designs and locations), and to ascertain social and environmental issues and concerns.

46. Feedback from the participants on subproject implementation and consensus on how to deal with environmental issues in the area will be important goals of the consultation process.

B. Public Disclosure

47. All IEEs, EMPs and environmental monitoring reports must be submitted and disclosed on ADB website. IEEs will also be disclosed on the PMU's website too.

C. Grievance Redress Mechanism

48. A grievance redress mechanism (GRM) will be established for the project in compliance with ADB's SPS (2009) requirement to prevent and address community concerns and assist the project to maximize environmental and social benefits. The setting up of the GRM through the PMU will be supported by the environmental consultant of the loan implementation consultancy services.

49. The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Multiple points of entry, including face-to-face meetings, written complaints, telephone conversations, or e-mail, will be available. Opportunities for confidentiality and privacy for complainants will be honored where this is seen as important.

50. The PMU will establish a Project Public Complaint Unit (PPCU), which will act as a central recording and coordinating unit for all subprojects under the project. The PMU will ensure that the GRM is publicized locally so that the community is fully aware of the mechanism and the local points of entry to it. In most cases these will be complaints directed to contractors or grievances communicated to the FWUC leadership or provincial representatives of the PMU. The preferred action sequence for complaints handling is that the complaint should be investigated and resolved by the unit receiving the complaint. If this is not possible, the complaint should be referred to the PMU (whose wider membership will enable coordinated action in response).

51. During construction, the PMU will be informed by contractors and construction supervisors, and FWUC staff, if people complain about the project.

52. To ensure that complaints are dealt with in a timely fashion, time limits should be set for referral of complaints and resolution.

53. The PMU will maintain records of complaints and actions taken to correct them. This data will be included in the PMU's reports to the ADB.

VI. INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES

54. The Ministry of Water Resources and Meteorology (MOWRAM) is the executing agency (the EA) and Department of Farmer Water User Communes (DFWUC) is the implementing agency (the IA). A Project Steering Committee, headed by Minister MOWRAM, will oversee the project implementation and management. A PMU was established before start of the PPTA and the PMU was fully involved in the project preparation.

55. The supervision and monitoring of environmental activities during the pre-construction, construction and operation phases are the functions of the PMU. In line with this, it is appropriate that the position of an Environmental Management Officer (EMO) be established in the PMU, responsible for supervision of environmental management and for environmental monitoring. Terms of reference for the EMO positions are at Annex C.

56. The major responsibilities of the environmental officer would be to ensure that:

- (i) mitigation measures and monitoring of these activities are carried out in accordance with the EMP;
- (ii) environmental monitoring program, comprising the taking of samples and analysis are being carried out; and
- (iii) reporting is performed in compliance with ADB and Government requirements.

57. The PMU will submit semi-annual project progress reports to the ADB on project implementation and these will include environmental performance based on the monitoring and inspections data provided by the Provinces. The PMU monitoring reports should also be made available to MOE as required.

58. PMICs will be employed during implementation, and the environment specialist will pass on expert advice and guidance and conduct capacity building on environmental management and monitoring. Terms of reference for the environment specialist position are at Annex D.

ANNEX A: Rapid Environmental Assessment Checklist

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: CAM (44328): Uplands Irrigation and Water Resources Management Sector Project

Sector Division: SEER

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			
▪ PROTECTED AREA		<input checked="" type="checkbox"/>	
▪ WETLAND		<input checked="" type="checkbox"/>	
▪ MANGROVE		<input checked="" type="checkbox"/>	
▪ ESTUARINE		<input checked="" type="checkbox"/>	
▪ BUFFER ZONE OF PROTECTED AREA		<input checked="" type="checkbox"/>	
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY		<input checked="" type="checkbox"/>	

Screening Questions	Yes	No	Remarks
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE...			
▪ loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		<input checked="" type="checkbox"/>	Works are confined to rehabilitation/modernization within existing sites for irrigation infrastructure and will not encroach on new sites.
▪ conflicts in water supply rights and related social conflicts?		<input checked="" type="checkbox"/>	Farmers water user communes will be organized and trained.
▪ impediments to movements of people and animals?	<input checked="" type="checkbox"/>		Some disruption of movement of people and animals is expected during construction phase. Appropriate works scheduling and temporary access arrangements will be discussed and agreed with the communities during construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		<input checked="" type="checkbox"/>	Not anticipated
▪ Insufficient drainage leading to salinity intrusion?		<input checked="" type="checkbox"/>	Not anticipated
▪ over pumping of groundwater, leading to salinization and ground subsidence?		<input checked="" type="checkbox"/>	No groundwater pumping, it's a surface irrigation project
▪ impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		<input checked="" type="checkbox"/>	No new construction is envisaged in the rivers, therefore downstream water quality is not going to be affected
▪ dislocation or involuntary resettlement of people?		<input checked="" type="checkbox"/>	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		<input checked="" type="checkbox"/>	
▪ potential social conflicts arising from land tenure and land use issues?		<input checked="" type="checkbox"/>	
▪ soil erosion before compaction and lining of canals?	<input checked="" type="checkbox"/>		No major impact expected. Mitigation measures include: (i) diversion drains and bunds, and temporary silt traps/ponds; and (ii) stockpiling of soil in flat areas and far from drainage routes

Screening Questions	Yes	No	Remarks
▪ noise from construction equipment?	<input checked="" type="checkbox"/>		Noise may be increased during construction phase. Discussions will be held with communities to agree on schedules and duration of noisy construction activities. All construction vehicles and equipment must be well maintained. Contractors must be licensed to carry out their work.
▪ dust during construction?	<input checked="" type="checkbox"/>		Dust may be increased during construction phase but will be mitigated by appropriate management measures, such as (i) regular watering of exposed areas; (ii) covering all trucks carrying dispersible materials to and from the site; (iii) and agreement with the local community on the schedule and duration of construction works.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		<input checked="" type="checkbox"/>	Not anticipated
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		<input checked="" type="checkbox"/>	Not anticipated
▪ reduction of downstream water supply during peak seasons?		<input checked="" type="checkbox"/>	Irrigation efficiency will be increased so water flow regimes will not be affected.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?		<input checked="" type="checkbox"/>	
▪ soil erosion (furrow, surface)?		<input checked="" type="checkbox"/>	
▪ scouring of canals?		<input checked="" type="checkbox"/>	
▪ clogging of canals by sediments?			One of the activities in rehabilitation will be removal of sediment and clogging of canals. System design will be in place to avoid clogging by sediments. Where unavoidable, adequate operation and maintenance will be designed.
▪ clogging of canals by weeds?		<input checked="" type="checkbox"/>	Not anticipated
▪ seawater intrusion into downstream freshwater systems?		<input checked="" type="checkbox"/>	
▪ introduction of increase in incidence of waterborne or water related diseases?		<input checked="" type="checkbox"/>	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> ▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation? 		<input checked="" type="checkbox"/>	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
<ul style="list-style-type: none"> ▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		<input checked="" type="checkbox"/>	Local labor is to be recruited as much as possible.
<ul style="list-style-type: none"> ▪ social conflicts if workers from other regions or countries are hired? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> ▪ 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 construction and operation? 		<input checked="" type="checkbox"/>	Rehabilitation work is unlikely to result in significant risks. Specific provision in the bidding documents and contracts together with monitoring of EMP implementation will be ensure minimizing such risks.
<ul style="list-style-type: none"> ▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) 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? 		<input checked="" type="checkbox"/>	Rehabilitation work is unlikely to result in significant risks. Specific provision in the bidding documents and contracts together with monitoring of EMP implementation will be ensure minimizing such risks.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: CAM (44328): Uplands Irrigation and Water Resources Management Sector Project

Sector : Agriculture, natural resources and rural development

Subsector: Irrigation, Water-based natural resources management

Division/Department: SEER/SERD

Screening Questions		Score	Remarks ¹
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?	1	Affected sections of the canals will be strengthened to withstand anticipated floods and landslides. For droughts irrigation scheduling will be done based crop water requirements
	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.)?	0	Hydrological analysis will be done to forecast the river flows, water availability and extreme floods/droughts
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	1	Floods may affect the infrastructure if

¹ 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.

Screening Questions		Score	Remarks ¹
	project output(s)?		not designed to withstand those.
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?	1	Droughts may affect irrigation supplies.

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_____

Other Comments: _____

Prepared by: _____

ANNEX B: Model Environmental Management Plan

1. The matrix below summarizes the typical potential impacts of subprojects developed as part of the Uplands Irrigation and Water Resources Management Sector Project. It also outlines corresponding mitigation measures designated to minimize those impacts.

2. The mitigation measures, suitably adapted to particular subprojects and locations, will be incorporated into tender documents, construction contracts, and operational management procedures. Contractors, PMIC, PMUs and PDWRAMs will implement these measures, depending upon subproject phases. The effectiveness of these measures will be carefully watched via environmental monitoring to determine whether to continue them or to make improvements.

Typical Potential Impacts and Mitigation Measures

Item	Environment al Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)
Pre-construction					
1.1 Design stage	Final site designs	Final designs of canals, siting of control structures and canal alignments will be completed after taking into account the provisions of the EMP.	PMIC	PMU	Design costs
	Irrigation extraction planning	Operational plans and operating practices for water allocations and drainage will be documented and approved by the PMU and ADB before completion of construction works and handing over of canals to FWUCs. This will be part of the Joint Reservoir Operations Plans (JROP).	PMU, FWUCs and PMIC	PMU, ADB	Design costs
	Baseline water quality	Establish baseline water quality for surface water (see monitoring plan)	PMIC	PMU	Included in monitoring costs
1.2 Construction Preparation Stage	Environmental management budget	Confirm budgets for the implementation of environmental management measures and environmental supervisory responsibilities. Assign final budget allocations against each of the items in the EMP	PMU	PSC	Design costs
	Update EMP	Updating EMP: Mitigation measures defined in this EMP will be updated and incorporated into the detailed design to minimize adverse environmental impacts.	PMIC	PMU	Design costs

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
	Incorporate environmental management into contract documents	Contract documents: Preparation of the environment section in the Terms of Reference for bidders for construction contracts, and environmental contract clauses for contractors, namely the special conditions for the protection of the water, soil and air environments (referencing the EMP and monitoring plan).	PMIC	PMU	Design costs	
1.3 Construction support preparation	Environmental education and awareness	Environmental Protection Training: Environmental specialists (including PMIC) and/or officials from local MOE offices will be invited to provide training on implementation and supervision of environmental mitigation measures to PMU and PDWRAMs.	PMIC and MOE officers as required	PMU	Included in project training budget	
		Environmental Protection Training: EMO, PMIC and/or officials from local MOE offices will be invited to provide training on implementation and supervision of environmental mitigation measures to contractors.	PMU and PMIC	PMU	Part of EMP training costs	
	Complaints procedures established	The project Grievance Redress Mechanism will be established and local contact points for the subprojects publicized	PMU and PMIC	PSC	Part of Design costs	
	Site planning	Prepare a Site Environmental Management and Supervision Manual, including an emergency preparedness and response plan for construction emergencies and site environmental health and safety plan.	Contractors	PMU and PMIC	Part of construction costs	
Construction						
2.1 Water	Pollution from construction wastewater	Construction wastewater from the main construction	Contractors	PMU and PMIC		

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
		sites will not be discharged onto the surrounding soil or into surface water systems (canals). Sedimentation tanks will be provided, and after settling out of solids the upper clear liquid will be recycled for spraying the construction site (dust control), and the waste residue will be transported to disposal sites where they will not contaminate agricultural soils or waterways. Oil-containing wastewater will require the installation of oil-water separators before the sedimentation tank.				
	Hazardous materials	To prevent pollution of soil and surface water/groundwater: (i) storage facilities for fuels, oil, cement, and chemicals will be within secured areas on impermeable surfaces, provided with bunds and cleanup installations; (ii) vehicle, machinery, and equipment maintenance and re-fueling will be carried out in such a way that spilled materials do not seep into the soil; (iii) oil traps will be provided for service areas and parking areas; (iv) fuel storage and refilling areas will be located at least 50 m from canals and channels and will be protected by temporary drainage bunds to contain spills.	Contractors	PMU and PMIC		
2.2 Air	Air quality	Equipment will be maintained to a high standard to ensure efficient running and fuel-burning. High-horsepower equipment will be provided with tail gas purifiers. All vehicle emissions will be in compliance with relevant Cambodian emission standards.	Contractors	PMU and PMIC		
	Dust	Material stockpiles and concrete mixing equipment will be equipped with dust shrouds. For both	Contractors	PMU and PMIC		

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
		construction sites and construction roads, water spraying for the suppression of dust and maintenance of driving surfaces will be standard site management practice. Vehicles carrying soil, sand, or other fine materials to and from the construction sites will be covered.				
2.3 Noise and Vibration	Noise impacts on sensitive receivers	Construction at night within 280m of residences shall be strictly prohibited. During daytime construction, the contractor will ensure that: (i) sites for concrete-mixing plants and similar activities will be located at least 1 km away from residences and schools; and (ii) temporary anti-noise barriers will be installed to shield any schools or residences within 100m of the construction site.	Contractors	PMU and PMIC		
2.4 Solid wastes	Demolition waste	Any waste from the demolition of unrepairable sluice and gate structures will be either sold to building material recyclers or collected and transported to official landfill sites. Metal parts, including pumps and pipes will be broken up and sold to scrap metal merchants. Any excess spoil will be made available to nearby communities for use as building pads and bunds.	Contractors	PMU and PMIC		
	Dredge spoil	The sediment quality of spoil from channel clearing or dredging will need to be tested and assessed for contamination before reuse. The sediment testing results will determine the requirements to ensure safe disposal or reuse.	PMIC	PMU		
	Waste from worker camps	Contractors will provide toilets with pump-out and disposal facilities and sufficient garbage bins at strategic locations and	Contractors	PMU and PMIC		

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
		ensure that they are (i) protected from birds and vermin, (ii) emptied regularly (using the nearest township solid waste system and landfill), and (iii) do not overflow				
2.5 Soil erosion and ecology		Erosion control will include: (i) limiting construction and material handling during periods of rains and high winds; and (ii) stabilizing all cut slopes, embankments, and other erosion-prone working areas while works are going on. All earthwork disturbance areas shall be stabilized within 30 days after earthworks have ceased at the sites.	Contractors	PMU and PMIC		
2.6 Social and Cultural	Impacts to local cultural sites	Contractors will ensure that all local cultural sites (including shrines and graves) will be kept clear of construction material and protected from dust and other disturbance. Access to these sites will not be impeded. After construction is finished any disturbed surroundings will be restored to pre-construction standards.	Contractors	PMU and PMIC		
2.7 EHS	Community health and safety	Community health and safety will be safeguarded by: 1) Planning construction activities so as to minimize disturbances to residents, utilities and services. Temporary land occupation will be planned well ahead of construction to minimize its impact. Land will be reinstated to its original condition after construction. 2) Implementing safety measures around the construction sites to protect the public, including warning signs to alert the public to potential safety	Contractors	PMU and PMIC		

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
		hazards, and barriers to prevent public access to construction sites.				
	Occupational health and safety	<p>Measures to ensure occupational health and safety will include:</p> <p>Contractors shall be required by the PMU to ensure that their workers and other staff engaged in the proposed constructions are in a safe environment;</p> <p>Following the award of construction contracts, the successful contractors will prepare site environmental health and safety plan, for approval by the PMU;</p> <p>Contractors shall ensure that: (a) all reasonable steps are taken to protect any person on the site from health and safety risks; (b) the construction site is a safe and healthy workplace; (c) machineries and equipment are safe; (d) adequate training or instruction for occupational health and safety is provided; (e) adequate supervision of safe work systems is implemented; and (f) means of access to and egress from the site are without risk to health and safety.</p>	Contractors	PMU and PMIC		
2.8 Unexpected environmental impacts		If unexpected environmental impacts occur during project construction phase, the PMU will update the EMP, and environmental protection measures will be designed and resources will be utilized to cope with these impacts	PMU and PMIC	PSC		
Operation						
3.1 Management of Irrigation	Implementation of extraction and drainage plans	Irrigation schemes to be operated strictly in concurrence with extraction and irrigation plans which ensure sustainability of supply.	PDWRAM and FWUCs	PMU		

Item	Environmental Impacts and issues	Mitigation Measures and/or Safeguards	Who Implements	Who Supervises	Costs (\$)	
	Canal fisheries	Informal canal fisheries rights safeguarded for local farmers	FWUCs	PMU	-	
3.2 Training in IPM and sustainable farming		The project will support the national Integrated Pest Management program and deliver IPM training modules and low chemical cultivation training modules applicable to cropping conditions and capacities in the project sites.	PMIC	PMU	Part of EMP training costs	
3.3 Emergency response Planning	Floods and extreme weather events	The project will promote the development of community based disaster readiness programs at the irrigation and drainage communes with particular reference to flooding and other natural disasters.	Project output	ADB		

PMU = project management unit; EMO = Environmental Management Officer (of PMU); PDWRAM = Provincial Department of Water Resources and meteorology; ADB = Asian Development Bank; MOE = Ministry of Environment; PMIC = project management and implementation consultant; FWUC = farmers water user commune; PSC = project steering committee.

Source: PPTA Team.

A. Monitoring Program

3. The project monitoring program will focus on the environment within the project's area of influence. An environmental monitoring program is summarized in the table below. The program considers the scope of monitoring and frequency. The monitoring results will be assessed against the following standards and corrective management implemented in cases of non-compliance.

- (i) The Sub-decree No. 27 ANRK.BK on Water Pollution Control is dated on April 6th, 1999. (Table for Lake and Reservoir)
- (ii) The Sub-decree No. 36 ANRK.BK on Solid Waste Management is dated on April 27th, 1999.
- (iii) Ministry of Industry Mines and Energy Drinking Water Quality Standards, January, 2004

4. For the re-use and disposal of silt from canal cleaning or dredging, there is no Government of Cambodia standard, and standards applying to paddy field environments from China and Japan will be referenced.¹

¹ PRC: GB4284-84 Control standards for pollutants in sludge for agricultural use. PRC: GB/T23486-2009 Sludge quality for afforestation in gardens or forests. Japan: Environmental Quality Standards (EQS) for soil pollution, August 1991.

Typical Environmental Monitoring Plan

Parameters	Location	Frequency	Responsibility
Pre-Construction			
Surface water quality: pH, SS, EC, NH ₄ ⁺ , NO ₃ ⁻ , PO ₄ ³⁻ , DO, BOD ₅ , COD, Oil& Grease, Coliform	At main canal headworks to establish baseline water quality for surface water entering main canal	Two times: once at beginning of construction period, and once at beginning of wet season irrigation period	PMIC and PMU
During Construction			
Dust and noise	Site inspection of all subproject sites	Quarterly	PMIC to supervise and PMU to inspect
Surface water quality: pH, SS, EC, NH ₄ ⁺ , NO ₃ ⁻ , PO ₄ ³⁻ , DO, BOD ₅ , COD, Oil& Grease, Coliform	Canal waters 100m downstream of major construction sites.	Quarterly	PMIC and PMU
Silt and dredge spoil: Organic matter, Zn, Cu, Pb, Hg, As, Cd moisture content, phenols, mineral oil,	Canal silt cleared from waterway. Three sampling locations - at start, midpoint and end of main canal (Taing Krasaing).	Once at each location to check disposal/reuse safety.	PMIC and PMU
Operation Phase			
Surface water quality: pH, SS, EC, NH ₄ ⁺ , NO ₃ ⁻ , PO ₄ ³⁻ , DO, BOD ₅ , COD, Oil& Grease, Coliform	Canal waters at start, midpoint and end of main canal.	Semi-annual	PDWRAM to contract an organization to do sampling and testing
Groundwater quality: "Priority Parameters": pH, Turbidity, Arsenic, Iron, TDS, Pesticides, coliforms.	<ul style="list-style-type: none"> • Five household wells located within each of the water user commune areas of the Taing Krasaing scheme • Five household wells located within each of the water user commune areas of the Prek Chik scheme 	Semi-annual	PDWRAM to contract an organization to do sampling and testing

5. During construction, the PMU will make appropriate arrangements for monitoring according to the progress of implementation. Monitoring reports will be made available to MOE as required, on a quarterly basis during construction. When complaints are received from the

public (either directly or via the formal grievance redress mechanism), monitoring staff will conduct additional inspections immediately.

B. Management and Monitoring Costs

6. The costs of implementing the environmental management and impact mitigation measures listed in the EMP matrix are included in the design costs, construction contracts and operational budgets. Detailed budget allocations against each of the items in the EMP will be developed by the PMU with the assistance of the Environment Specialist.

7. The continuing activities of the PMU's monitoring during construction and the initial operational period will be funded from the construction budget. The PDWRAMs' ongoing monitoring costs will be covered by their operational budget.

ANNEX C: Terms of Reference for PMU Environmental Management Officer

A. Qualifications

1. The officer will have: (i) an undergraduate degree or higher in environmental management or related field; (ii) at least five years of experience in environmental management, monitoring, and/or impact assessment; (iii) ability to communicate and work effectively with local communities, contractors, and government agencies; (iv) ability to analyze data and prepare technical reports; (v) willingness and health to regularly visit the sub-project sites; and (vi) ideally, proficiency in spoken and written English.

B. Detailed tasks

2. The officer will have a detailed understanding of the environmental assessment and resettlement framework (EARF) and relevant laws and regulations and ADB requirements for initial environment examinations (IEEs) and reporting. Working closely with the Environment Specialist, the officer will:

- (i) assist the project management unit (PMU) to implement the environmental screening and assessment provisions of the EARF for each subproject;
- (ii) provide training to PMUs and farmer water users communes as necessary to facilitate implementation of the EARF;
- (iii) assist PMUs to ensure that candidate Subprojects are correctly screened and comply with the selection criteria for environment;
- (iv) working with the PMU implement the project grievance redress mechanism (GRM), including: (i) instruct the PMU and other project agencies on their responsibilities in the GRM; (ii) establish a simple registry system, to document and track grievances received (including forms to record complaints and how they have been resolved); and (iii) prepare reports on progress of the GRM for inclusion in the semi-annual environmental monitoring and progress reports to ADB; and
- (v) prepare quarterly environmental reports during subproject construction and semi-annual environmental progress reports otherwise for the PMU to submit to ADB.

ANNEX D: Terms of Reference for Environment Specialist

A. QUALIFICATIONS

1. The specialist should have: (i) an undergraduate degree or higher in environmental management or related field; (ii) at least 10 years of experience in environmental management, monitoring, and/or impact assessment; (iii) familiarity with ADB project management requirements and national environmental management procedures; (iv) ability to communicate and work effectively with local communities, contractors, and government agencies; (v) ability to analyze data and prepare technical reports; (vi) willingness and health to regularly visit the sub-project sites; and (vii) proficiency in spoken and written English.

B. TASKS

2. Working closely with the project management unit (PMU) and the PMU environmental management officer, and other relevant personnel and agencies, the consultant will assist in all aspects of the implementation of the project environmental assessment and resettlement framework (EARF) and subproject initial environment examinations (IEEs). The consultant will:

- (i) ensure that the steps of the EARF covering environmental screening and impact assessment are followed by PMUs;
- (ii) deliver training in (i) EARF procedures for screening, and assessing environmental impact (IEEs); and (ii) record-keeping and reporting;
- (iii) assist the PMU to establish and publicize the grievance redress mechanism (GRM) for sub-projects, ensuring that the GRM publicity is appropriate to the scale and complexity of the sub-project and includes, as a minimum, the disclosure of all contact persons for lodging complaints; and
- (iv) assist the PMU to prepare quarterly (during construction) and semi-annual project monitoring progress reports (otherwise) for submission to ADB within 2 months after each reporting period.