Environmental Management Plan

Project Number: 50236-002
Sept 2021

Lao PDR: Sustainable Rural Infrastructure and Watershed Management Sector Project

Nam Poua Catchment
Xamneua and Viengxay Districts
Houaphan Province

Prepared by the Ministry of Agriculture and Forestry for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 5 April 2019)

Currency Unit	–	Lao Kip (LAK)
KN1.00	=	$ 0.000116
$1.00	=	LAK 8,600

ABBREVIATIONS

ACIAR	:	Australian Center for International Agricultural Research
ADB	:	Asian Development Bank
AF	:	Additional Financing
CCA	:	climate change adaptation
CIFOR	:	Center for International Forestry Research
COL	:	Concessional OCR lending
DAFO	:	District Agriculture and Forestry Office
DALAM	:	Department of Agricultural Land Management
DDMCC	:	Department of Disaster Management and Climate Change
DMF	:	Design and Monitoring Framework
DOI	:	Department of Irrigation
DRR	:	disaster risk reduction
EIA	:	Environment Impact Assessment
EMP	:	Environmental Management Plan
ERP	:	Emissions Reduction Program
FAO	:	Food and Agriculture Organization (of the United Nations)
GCF	:	Green Climate Fund
GDP	-	Gross Domestic Product
GIZ	:	Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation Agency)
GMS	:	Greater Mekong Subregion
IEE	:	Initial Environment Examination
IMT	:	irrigation management transfer
ISF	:	irrigation service fee
IUCN	:	International Union for the Conservation of Nature
IWMI	:	International Water Management Institute
LDC	:	least developed country
LIC	:	Loan Implementation Consultant
MAF	:	Ministry of Agriculture and Forestry
MAF	:	Ministry of Agriculture and Forestry
NGO	:	Non-Governmental Organizations
NRI	:	Northern Rural Infrastructure Development Project
NSEDP	:	National Socio-Economic Development Plan
NTFP	:	non timber forest product
O&M	:	Operations & Maintenance
OCR	:	Ordinary Capital Resources
ODA	:	Overseas Development Assistance
PAFO	:	Provincial Agriculture and Forestry Office
PAM	:	Project Administration Manual
PDR	:	People’s Democratic Republic (of Laos)
PGT	:	Program Governance Team
PLUP	:	participatory land use planning
PONRE	:	Provincial Office of Natural Resources and Environment
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PRAP		Provincial REDD+ Action Plans
PPIT	:	Provincial Project Implementation Team
PRC	:	People's Republic of China
PRI	:	productive rural infrastructure
PRT	:	pesticide reduction training
RRP	:	Report & Recommendations to the President
RSP	:	representative subproject
SME	:	Small-Medium Enterprises
SRIWSM	:	Sustainable Rural Infrastructure and Watershed Management
TRTA	:	Transaction Technical Assistance
VDF	:	village development fund
WUA	:	water users association
WUG	:	water user group

GLOSSARY

Catchment	In its totality a catchment is equivalent to a watershed, however a watershed may comprise of micro-catchments and sub-catchments. In this document a catchment refers to a subset of the larger watershed.
Watershed	A topographically delineated area from which rainwater drains as surface run-off via a river or stream to a common outlet point (e.g. a large river, lake or the sea).
Watershed management	Securing watershed functions in a sustainable manner. Broadly these functions include: ➢ Ecological function: availability of sufficient good quality water over time, space; erosion control, soil fertility, biodiversity, clean air, carbon sequestration; ➢ Economic function: sufficient natural resource products like food, fuel wood, timber, water, fish, energy required for basic needs of the local population; income generating opportunities; ➢ Social function: maintenance of social structures; protection and development of knowledge and lifestyle arrangements; maintenance and revitalisation of cultural identity and values, recreational facilities.

NOTE(S)

(i) In this report, "$" refers to US dollars unless otherwise stated.

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Reference Documents

List of Appendixes

I. INTRODUCTION

A. Nam Poua Subproject

1. The Nam Poua Subproject is to support the upgrading of an irrigation distribution system constructed during 2004. The scheme is designed to support an irrigated area of 70 hectares during the wet season and currently supports 55 hectares during the dry season, allocated to households in six villages. The productive rural infrastructure (PRI) will support the existing intake headworks, the distribution canal and the overall command area. The scheme has a high-level canal running mostly along the toe of a slope that then irrigates down to a valley floor stream.

B. Purpose of the Environmental Management and Monitoring Plan

2. This Environmental Management Plan (EMP) has been prepared in compliance with the specified safeguard requirements of the borrower, the Government of Lao PDR (the government), and the Asian Development Bank (ADB). It accompanies an Initial Environmental Examination (IEE) that: (i) provided an overview of the proposed subproject and its purposes; (ii) provided a description of existing environmental conditions; (iii) made an evaluation of the likely impacts that will occur to the environment as a result of the proposed subproject activities; and (iv) outlined the mitigation measures that will be required to ensure that no part of the project causes significant damage to the environment.

3. The EMP has been prepared on the basis of the design for the subproject, and its likely effects on the environment, as evaluated in the IEE. It defines the anticipated environmental impacts, the measures required to mitigate them, the responsibilities for doing so and the responsibility for monitoring that they have been undertaken effectively at the right time. Following the approval of the IEE, this EMP forms the guiding document to ensure that all necessary environmental safeguards are put in place.

4. Adherence to this EMP is a condition of the use of ADB financing for the Nam Poua Subproject. Acceptance of and a commitment to implement the EMP must also form part of the contractual conditions for any physical engineering works under the subproject.

C. Use and Review of the EMP

5. Compliance with this EMP is an ADB loan covenant. The subproject works will construct infrastructure that will give rise to changes to the environment. Consequently, the management and monitoring of the resulting environmental impacts should be continued for the lifetime of the infrastructure, not just the construction period of the project. The EMP covers the design, construction and operation periods of the subproject as well as associated facilities provided under the cofinancing of IFAD[1]. Each stakeholder requires to use different parts of the document at different times. It is recommended that the tables of responsibilities given in the appendices are extracted and used by the appropriate entities as the basis of their working practices on the project. The environmental monitoring team will need to use the monitoring table relevant to each phase. Once construction has been completed, it is recommended that the EMP be updated to form a simplified document for the operational period following handover of the infrastructure to

[1] Should IFAD financing be delayed ADB will finance these activities until IFAD financing becomes effective.

its users. This should be done by the PAFO, supported by the Loan Implementation Consultant and in consultation with the PONRE.

II. RESPONSIBILITIES AND CAPACITY FOR ENVIRONMENTAL MANAGEMENT AND MONITORING

A. Summary of Institutional Arrangements

6. The executing agency of the SRIWSM is MAF, with support from the IA - Department of Irrigation (DOI). Implementation is decentralised to the Provincial Agriculture and Forestry Offices (PAFO) where implementation activities will be assigned to the respective sections of PAFO, co-ordinated by a Provincial Project Implementation Team (PPIT) for the management of the SRIWSM Project.

7. The executing agency (i.e. MAF) and IA (i.e. DOI) will establish a Program Governance Team (PGT) that would be responsible for: (i) establishing the operational procedures to be used by the PPIT, including planning, budgeting, financial management, procurement, disbursement, contract management, safeguard monitoring and compliance monitoring; (ii) ensuring both government and donor audit requirements are met; (iii) providing capacity building at the provincial level for both PPIT staff and potential contractors; and (iv) providing technical support for advanced engineering designs and project management teams, including the provision of skill mentoring and technical assistance input to procurement and contract management.

8. Government staff are involved in environmental management and monitoring at a number of levels and in two main ministries: MAF for both management and monitoring; and MONRE as delegated to PONRE for monitoring. Reforms of government to separate the environmental portfolio from agriculture and forestry started in 2017 and is not yet complete. Capacity in this respect is therefore still being developed, particularly at the provincial and district levels.

9. The capabilities required of staff varies depends on the phase of the subproject, and their level and remit, a sound understanding of the environment and society in the rural hill catchments of the northern provinces, and a particular understanding of current issues in both upland and irrigated agriculture is needed. PONRE staff have the underlying environmental knowledge but often lack the technical expertise to address specific issues. DONRE staff are far less experienced and qualified. The Loan Implementation Consultant will be expected to help improve capacity and assist the government to improve its staff skills and knowledge in this respect. This should include support to PONRE and DONRE staff in their capabilities for environmental monitoring. The Loan Implementation Consultant (LIC) – both international and National will provide (i) Project awareness training, (ii) technical training with respect to environmental monitoring systems and techniques that will apply to their specific subproject, (iii) PONRE staff receive budgetary support for their additional costs on an output basis ie PAFO will pay for monitoring reports received. In addition, PONRE and DONRE monitoring staff will be supported for regular site visits by the construction supervision staff of PAFO.

10. During the project implementation period, which effectively involves subproject design and construction phases, safeguards are the responsibility of the Vice Governor Office represented by PAFO with support from the PGT within the Department of Irrigation. Environmental safeguard monitoring responsibility will be assigned to PONRE through a Memorandum of Understanding (MoU) between the Vice Governor Office, Director of PAFO and Director of PONRE.

11. At the provincial level, PAFO will assign overall project management to an existing PAFO Deputy Director General to implement subprojects. Within each PAFO, the technical staff will be assigned to the PPIT must be able to monitor the implementation of works programs.

12. Following construction and commissioning, the subproject infrastructure will be handed over to and operated by the Water User Groups. The relevant PONRE will be responsible for environmental monitoring during operation.

13. The project implementation responsibilities as set out in the PAM are provided in Table 1.

Table 1: Project Implementation Responsibilities

Project organisation	Management Roles and Responsibilities
Ministry of Finance (MOF)	• Establish the Project's Advance Account, • Manage direct payments to contractors, • Provide replenishment reports to ADB, • Provide advances to Implementing Agencies Subaccounts, • Overarching financial control.
Ministry of Agriculture and Forestry (MAF) - Executing Agency (EA)	• The EA will constitute a national steering committee with representatives of MAF, Office of Governor (Implementing Agency – IA) of four northern provinces (FNP), MOF, Ministry of Planning and Investment (MPI) and Ministry of Natural Resources and Environment (MONRE). • Responsible for ensuring loan agreements and covenants and assurances are achieved. • Responsible for internal monitoring of the States' interests.
National Steering Committee (NSC)	• Provide guidance to the IAs and EAs in terms of project scope of work, expected performance standards, remedial action. • Ensure cross sector coordination and integration of work plans • Confirm annual performance. • Membership will include MAF – Minister, Governors of the FNP, Provincial Agriculture and Forestry Offices (PAFO) Director Generals (DG) from each province, and Deputy Director Generals (DDG) of Department of Irrigation (DOI).
DOI - IA	• Support and operate the Program Governance Team and represent the EA in the day to day implementation of the project. • Provide technical support on irrigation and institutional issues. • Consolidate financial and progress reports for the MAF ADB. • Consolidate and quality check all withdrawal applications and replenishment requests to be forwarded to MAF's Department of Planning and Finance (DOPF) for clearance and onward forwarding to MoF.
MAF's DOPF	• Define and validate the project management systems to be applied across the programme to ensure that government and ADB requirements are met. • Verify all subproject draft procurement (including safeguards) documentation prior to be submitted to ADB or publicly advertised. • Undertake a quality control and verification of the quarterly and annual reports that will have document quality control procedures and an endorsement page. • Ensure financial management systems (FMS) are consistent with MAF's requirements.

Project organisation	Management Roles and Responsibilities
	• Ensure that project reporting systems support both Government and ADB requirements. • Provide quality assurance for the replenishment and disbursement documentation to be provided to ADB and MOF.
Program Governance Team (PGT) within the DOI	• Overall program management and coordination of the project • Prepare a code of conduct including accountability of individuals, authority and levels of delegated authority, jurisdiction and mandate limits. • Produce a project management manual, and the supporting templates, guidelines for planning, budgeting, financial accounts, disbursement, procurement, contract management, reporting, safeguards and audit. • Provide the consolidation and quality assurance function with the project for all work planning, budgeting and financial management records, replenishment requests, withdrawal applications that are then forwarded to DOPF. • Conduct assigned procurement of (i) vehicles, (ii) equipment, (iii) LIC, and (iv) other consultants and service providers. • Facilitate the development of provincial contractor awareness and capability. • Provide technical support for setting up project management systems and templates in the Provincial project implementation team (PPIT) and the required capability to operate these systems • Appoint a Gender focal point from MAF' Women Advancement Unit (WAU) to oversee and support the implementation of the gender action plan (GAP). • Undertake safeguard screening of additional subprojects in line with Resettlement and Ethnic Group Development Framework (REGDF) and Environmental Assessment and Review Framework (EARF) to confirm classifications, and that subprojects that would be classified as Category A to be excluded. • Ensure safeguard frameworks (REGDF and EARF) are applied in the screening, selection and assessment of subprojects and preparation of safeguard plans, Resettlement and Ethnic Group Development Plans (REGDPs) and Initial Environmental Examination / Environment Management Plans (IEEs / EMP) at the subproject level, to be reviewed and commented on within 30 working days by ADB. • Monitor implementation of safeguard requirements as set out in the REGDF/REGDPs and IEEs / EMPs/Environmental Code of Conduct (ECC) during subproject implementation. • Ensure that all subproject design reports (SDR) clearly demonstrate dry season water availability for the reliable irrigation whilst ensuring environmental minimum flow is sustained. • Assign two staff to act as safeguards focal points – one for resettlement and social safeguards and one for environmental safeguards, to provide safeguard oversight and input to semi-annual safeguards reports for submission to ADB.
Provincial Steering Committee (PSC)	• Each of the FNPs will establish a PSC chaired by the Governor, participating District Governors, Directors General of PAFO, Finance, Planning and Investment, Public Works and Transport Office (PWTO), Plant Protection Center, and Provincial office of Natural Resources and Environment (PONRE).

Project organisation	Management Roles and Responsibilities
	• Review annual work plans and provide guidance on project scope and performance standards. • Approve annual work plans and receive regular progress reports • Establish operational memorandums of understanding (MOUs) between PAFO, PONRE, and PWTO.
Provincial Procurement Committee (PPC)	• Each of the FNPs will establish a PSC chaired by the Governor and including Provincial representatives. • Manage evaluation bidding documents, conduct scoring and ranking of bids. • Provide recommended procurement actions to PSC and PAFO.
Provincial Project Implementation Team (within the PAFO)	• Each provincial government will form within PAFO a Project Implementation Team (PPIT), aligned to the Provincial Irrigation Section (PIS). The PAFOs will identify implementation focal points in Department of Agriculture and Land Management (DALAM) and DOF to be seconded into the project management structure of the PPIT to support activities relating to land use planning, catchment management and land registration administration. • PAFO will establish a gender focal point from the WAU that will be responsible for ensuring the GAP is implemented and that all stakeholders are fully aware of the GAP and the associated responsibilities • Each PAFO will appoint a safeguards focal point to supervise implementation of safeguard requirements and to co-ordinate project specific grievance redress mechanism and support provincial program safeguards focal point on periodic safeguards monitoring and reporting. • Establish operational systems with staff assigned who have the capacity to maintain the project administration and management systems. • Establish and maintain subproject monitoring and impact assessment using the productive rural infrastructure (PRI) representative subprojects (RSP) as learning sites. • Coordinate the ADB-financed activities and integrate these with the activities of other donor-financed programmes working on watershed management. • Provide quarterly and annual reports and semi-annual safeguards reports according to the templates specified by the PGT. • Ensure subproject REGDPs if any and IEE/EMPs are updated based on detailed engineering design, approved by ADB and disclosed on ADB website prior to contract awards. • Obtain final approval from the PAFO DG in accordance with the Irrigation Law 2014 - (Article 38). • Obtain environmental compliance certificates from the relevant PONREs prior to award of civil works contracts. • With support from the PGT, identify local contractors and conduct awareness and capacity building programmes to increase the inclusiveness of local contracting companies. • Complete land acquisition and compensation as per the REGDF prior to award of civil works contracts. • Contract management during implementation.

Project organisation	Management Roles and Responsibilities
	• Ensure implementation of the mitigation and monitoring measures as set out in the EMPs and any required safeguards corrective actions. • Ensure implementation of the REGDF action plan. • Safeguards monitoring as per the land acquisition and resettlement plans (LARP) and REGDF subproject documents. • On project completion as confirmed by the construction supervision consultant (PG the Project Director (PAFO) conduct a site inspection in accordance with the Public Work and Irrigation Law. On confirmation of contract completion, PAFO will transfer the operation and maintenance (O&M) of the asset to the water user group (WUG). **For WUGs** • Provide awareness and capacity building on project activities, WUG implementation roles and procurement modalities. • Monitor and mentor water WUG contracting of in-command area works.
PONRE Land Registration Department	• Conduct land registration. • Issue land title and demarcation.
PONRE Environmental Management Department	• Conduct regular environmental monitoring of subprojects. • Undertake a general programme of monitoring environmental parameters (e.g. water quality) at strategic sample locations throughout the province. • A budget provision has been made for (i) training, (ii) travel and (iii) field allowances. Training is in the terms of reference (ToR) for the LIC consultants.
MAF _ Plant Protection Centers	• Identify the need for Pesticide Reduction Training (PRT), Crop Surveillance and integrated pest management as part of the Lao GAP quality assurance support
MAF – DALAM	• Agricultural land use planning guidelines and verification.
PAFO – DALAM	• Agricultural land registration survey. • Consultation of land users in command areas. • Land registration proposal for agricultural land. • Participatory land use planning (PLUP) responsibilities
MAF - Department of Forestry	• Provide training and leadership in the issues surrounding ecological service protection for the land use change programs • Forest Land Use Guidelines and quality verification
PAFO - Department of Forestry	• Forest Land use zonation and survey demarcation. • Participate in PLUP when requested. • Supervision of forestry activities funded by ADB.
Provincial Nutrition Committees	• Facilitate multi-sectoral coordination for nutrition, including coordinating joint baseline and end line surveys to be developed by the National Nutrition Committee (NNC) Secretariat; ensuring alignment with any National Nutrition Advocacy and Communication Strategy and Plan of Action, or similar; supporting Joint Government of Lao PDR – Development Partners Monitoring Missions, etc. • Coordinate implementation and monitoring. • Undertake field monitoring activities. • Receive monitoring reports from districts and projects and provide annual and biannual reports to the NNC.

Project organisation	Management Roles and Responsibilities
	• Provide leadership and support for District Nutrition Committees (DNC)
DNC	• Facilitate multi-sectoral coordination for nutrition, including identifying priority villages • Coordinate implementation and monitoring • Undertake field monitoring activities and provides annual and bi-annual reports to Provincial Nutrition Committee (PNC).
District Agriculture and Forestry Office (DAFO)	• Assign a focal point who should be at least a Deputy Head of the DAFO and should be the representative on the DNC. This officer will be responsible for planning and oversight of project Nutrition Support Advisor (NSA) activities in the district, including agreeing monthly and weekly workplans with the assigned technical staff • Assign one staff member to be responsible for the financial management related to project NSA activities • Assign up to 3 full-time equivalent technical staff as members of District Nutrition Teams, with preference for female staff and staff belonging to local ethnic groups • Permit these assigned staff to participate in basic nutrition training and ensure that trained staff remain assigned for the duration of the project • Select priority villages in coordination with the DNC. The primary criterion will be nutrition needs as identified by the DNC, taking account of any other completed, ongoing or anticipated NSA interventions. The secondary criterion will be to give preference to nutrition priority villages in the watersheds and command areas of the PRI subprojects. • Collaborate with the Lao Womens Union (LWU) to form nutrition clubs in the selected villages, and provide them with NSA activities using a farmers' nutrition school approach, resulting in group and / or individual NSA development plans • Provide technical support to facilitate implementation of the development plans

B. Institutional arrangements for implementation of environmental safeguards

14. **PGT.** The PGT will appoint a qualified environmental safeguards officer to supervise and co-ordinate implementation of environmental safeguard requirements with support of the LIC International and National Environment Specialists. The PGT Project Director will be responsible for submitting semi-annual environmental safeguard reports to ADB for clearance and disclosure. They will also carry out regular monitoring during implementation and prepare a summary of progress of EMP and GRM implementation for the quarterly project progress reports. They will participate in ADB loan review missions, ensure that semi-annual environmental safeguards monitoring reports are submitted to ADB on time and follow-up on agreed actions.

15. **PPIT.** Each PPIT will nominate an environmental safeguards focal point to support LIC Environment Specialists and PGT with coordination at the province level. The environmental safeguard focal point shall have a background in environmental and social safeguards and will receive training in project environment and social safeguards requirements by the LIC. The PPIT environmental safeguards focal point will undertake joint site visits with subproject Supervision Staff and Contractors to review implementation of EMP and GRM and report issues to PGT and LIC. PPIT will co-ordinate environmental quality monitoring with PONRE and invite PONRE to

join site visits and ADB loan review missions. The environmental safeguard focal point shall have a background in environmental and social safeguards and will receive training in project environment and social safeguards requirements by the LIC. The PPIT environmental safeguards focal point will undertake joint site visits with subproject Supervision Staff and Contractors to review implementation of EMP and GRM and report issues to PGT and LIC. The environmental safeguard provisions of all contracts will be monitored and supervised by PPIT construction supervision staff and PoNRE.

16. **Loan Implementation Consultants.** The LIC will assist the executing agency (i.e. the PGT within DOI), the implementing agency (i.e. PAFO) and the other project stakeholders in the design and construction of the subproject. For this reason, the Program Governance Team will contract a LIC with two environmental specialists (9 months International Environment Specialist and 17 months National Environmental Specialist)- See PAM for detailed ToRs for LIC Environmental Specialists (LIC-ES) to support subproject designs and the preparation of IEE and for the supporting and monitoring of the EMP during subproject implementation.

17. The environmental safeguard consultants in the LIC will undertake screening, classification and assessment of future subprojects and will train and support PONRE and DONRE staff with monitoring visits and preparation of monthly and quarterly safeguard reports that will be submitted to the Vice Governor, and the EA via the PGT in DOI. The LIC will support the PGT to prepare a summary of safeguards and GRM implementation to be included in the quarterly project progress reports to be submitted to ADB. The LIC will support PGT to prepare semi-annual integrated safeguard reports to be submitted to ADB. These reports will include details of issues raised and resolved through the GRM during the reporting period. The semi- annual integrated safeguards monitoring report will be disclosed on ADB website once approved.

18. During the design and preparation phase the LIC environmental specialists work with the WUG, PAFO and DAFO and the contractors for the subproject, to ensure the required environmental mitigation measures are incorporated into the final engineering designs and bid documents. During the construction period, they must work with the subproject implementation partners to ensure that all of the environmental management and mitigation measures are fully complied with, as agreed in each IEE and as outlined in every EMP. The LIC Environment Specialists will provide safeguards and GRM capacity development training for PGT, PPIT, LIC, Contractors and GRM focal points on EMP mitigation and monitoring measures, Contractor EMP preparation, templates for environmental monitoring and report.

19. **Contractors and Subcontractors.** All contract documents must include the EMP (category B) or Environmental Code of Conduct (category C) and an environment section in the terms of reference for bidders, and environmental contract clauses for contractors that include special conditions for the protection of the physical, biological and socio-economic environments. These will underpin the obligations towards the environment that must be upheld by all contractors. There is a need to ensure that contractors, as the stakeholders with the shortest-term involvement in the subproject, do not give rise to long term liabilities for the subproject owners and other stakeholders through reckless practices.

20. While the contractors themselves must fulfil their environmental responsibilities, in most cases success in this respect requires strict management and supervision of the contractor during site works: this is the responsibility of PAFO. Because of the competitive bidding process and the emphasis on engineering works, there is often a tendency for environmental safeguards to be delayed by contractors in the hope that costs can be saved and overlooked by management staff as being of lower importance than the primary functional infrastructure.

21. Additional attention must be paid to subcontractors. It must be made clear to the main contractor at all times that they are fully responsible for the actions of subcontractors, and that retention money is at risk if there is not full compliance with this plan. The contractor should be encouraged to start this process with an orientation for each subcontractor before they start work, and sub-contractual conditions to ensure that the subcontractor complies. The project implementation consultant should be able to assist the contractor in this process.

22. The Contractor will be required to develop a site-specific Construction Environmental Management Plan (CEMP) in accordance with the IEE/EMP and designate an environmental health and safety (EHS) Officer to supervise and train workers on occupational and community health and safety practices and to monitor and report on implementation of EMP/CEMP and corrective actions. A GRM focal point/community liaison officer should also be designated to ensure public disclosure of planned construction to affected persons and monitoring and reporting on GRM. Each works Contractor EHS Officer will prepare a monthly report on EMP/CEMP and GRM implementation for submission to PPIT, PGT and LIC.

23. The construction supervision consultants (CSC) will review and approve the CEMP and ensure it covers all the required provisions of the subproject IEE and EMP. The CSC will be responsible for day to day monitoring of implementation of health and safety and EMP requirements and issuing instructions for corrective actions, as needed.

24. ADB will visit project sites and review project performance against the EMPs and legal agreements and as documented in periodic environment monitoring reports submitted by the PGT. If any of the safeguard requirements that are covenanted in the legal agreements are found not to be satisfactorily met, ADB will require the PGT to develop and implement an appropriate corrective action plan (CAP) agreed upon with ADB. If unanticipated environmental impacts become apparent during project implementation, ADB will require the PGT with support of LIC ES to (i) assess the significance of such unanticipated impacts; (ii) evaluate the options available to address them; and (iii) prepare or update the IEE and EMPs.

III. SUMMARY OF THE POTENTIAL ENVIRONMENTAL IMPACTS

A. Potential Impacts on the Environment

25. The IEE identified a number of potential environmental impacts. Some of these are beneficial, mainly directly to the socio-economic environment but also indirectly to the bio-physical environment. Although on balance these are judged to outweigh the negative impacts, as with most projects there are long lists of potential adverse impacts. As described below, and given in tables in this plan, there are means of mitigating these impacts so that the effects do not cause significant damage.

B. Enhancement Measures

26. Community organisation and development is the basis of the subproject. This will be enabled through assistance to the WUG to establish improved capacity and management systems, so that their members can best gain from the rehabilitated and enhanced infrastructure that the subproject will fund. Improved livelihoods are the intended outcomes for the beneficiaries, giving households dependent on agriculture a wider range of choices and access to more productive farming systems.

27. The infrastructure rehabilitated and upgraded by the subproject is designed to be resilient. This means that it should withstand both current and likely future extreme climatic effects while remaining functional. This is achieved by careful design on the basis of analysis of climate variables and change possibilities, to ensure that the structures are robust but not over-engineered at too high a cost.

C. Mitigation Measures for Adverse Environmental Impacts

28. Under the classification of subprojects into MONRE category 1 and ADB category B, all adverse environmental impacts must be mitigated; if they cannot be mitigated, then the category of the subproject would need to be changed and a full EIA undertaken; this would make it ineligible for SRIWSM funding. Hence ways must be found to avoid, minimise or restore all potential impacts found in the course of designing and implementing an SRIWSM subproject. The detailed mitigation measures depend on individual site conditions. However, in most cases there are only a limited number of options for the mitigation of certain issues.

29. The mitigation measures are listed in the Environmental Management and Monitoring Matrix forms the operational core of this EMP. They cover all of the main impacts that are likely to occur. Most of them represent simple, practical, common sense measures to ensure that disturbance to the environment is limited to the minimum as a result of all subproject activities.

D. Specific Key Priority Concerns

30. The quality of water used in irrigation is defined by the government in the National Environmental Standards (2017), where it should meet class 3 quality criteria (see Appendix 5). The reason for this is to ensure that soil, plants and aquatic organisms are not poisoned by a build-up of toxic chemicals brought in by river water from polluting activities carried on in the upper catchment. In the Nam Poua, the irrigation scheme has operated for more than one decade and the proposed SRIWSM support simply modifies the manner in which water is managed within the existing irrigation command area. As considered in detail in the project's Environmental Assessment and Review Framework (EARF), the responsibilities of an entity using polluted water are not as clear as those causing the pollution in the first place. As also discussed in the EARF, the process of undertaking a reliable and definitive water testing programme is also problematic for a number of technical reasons. The mitigation measures recommended in this EMP address this issue in a pragmatic way.

31. In some cases, mitigation measures cannot be defined precisely because there is inadequate information on which to base precise actions. Water flows are little understood because to date there have been very few gauging stations maintained in smaller catchments. Defining compensatory flows throughout the year is therefore difficult, and initially must be based on estimates, however the SRIWSM will not increase the water take that has been the usual scenario for the last decade. The mitigation strategy in this case is to use as much information as possible to ensure that the initial estimates are as accurate as they can be, while starting to collect continuous series monitoring data. Because of natural variations from year to year, this process needs to be continued every year for at least ten years, and ideally throughout the life of the infrastructure, so that the compensatory flows can be updated as the running averages, minima and maxima for flow in each month become more statistically robust. The implementation of water quality testing that is robust in both sampling and testing protocols is proposed if a significant risk to water quality is determined during the catchment planning project to be financed by GIZ.

32. Both to realise the environmental benefits of the project and to safeguard the infrastructure investments, catchment land use needs to be improved in the water supply catchment of the subproject. Part of the rationale for the SRIWSM is to assist the rural population to reduce its dependence on upland agriculture, since other land pressures mean that shifting cultivation is no longer just used by a limited population for subsistence, but is being used to produce cash crops for export and as a result is giving rise to an unsustainable rate of forest conversion. Loss and fragmentation of the forests has had a major impact on biodiversity. It has almost certainly also affected the hydrology of the steep hilly watershed of the Nam Poua. Periodic disturbances to vegetation cover have also increased sediment fluxes in the river. In the long term, the effectiveness of the subproject irrigation facilities depends on the stabilisation of vegetative cover in the catchment. This in turn is dependent on the communities within the catchment adopting improved land use planning, which would focus on intensified agriculture in the irrigated lowland and leave more of the upper catchment under a longer-term cycle of forest use. Better land use management is beneficial for the subproject in achieving its purpose and is to be implemented by GIZ as part of the WB Emissions Reduction Program and applying the Agreed WB safeguard frameworks.

33. In a steep hilly catchment like that of the Nam Poua, and with the intense rainfall that occurs throughout northern Laos, the protection of soil surfaces is essential around all of the infrastructure that will be installed through the subproject. This includes irrigation headworks, canals and access roads. There are two main purposes for this. The first is to avoid erosion from rainfall, with bare surfaces highly prone to the entrainment of soil particles as a result of raindrop impact and runoff, leading to the loss of topsoil and increased amounts of sediment in water courses. The second is to protect earthworks from flood scour, when river or canal flows overtop the structures during high floods. Simple bio-engineering measures are the only effective way of protecting large surface areas from rainfall-induced erosion, and so this is a straightforward but critical mitigation measure in targeted key locations.

IV. ENVIRONMENTAL MONITORING

A. Environmental Management Plan

34. The EMP is the key document underpinning each IEE and ensuring that the required environmental safeguards are adequately implemented. This EMP follows the format provided in the EARF for the SRIWSM.

35. Although environmental management and environmental monitoring plans are often issued as separate documents, for SRIWSM they are combined. The purpose of the monitoring plan is to ensure that the management plan is being implemented. Combining the two helps to ensure that this happens, and also clarifies the institutional responsibilities.

B. Institutional Responsibilities for Environmental Monitoring

36. The institutional responsibilities for both the implementation and monitoring of environmental management measures is provided in detail above. Implementation of environmental management actions follows the same responsibilities as the overall construction and implementation of the subproject itself. The PAFO PPIT is responsible for subproject implementation and the participation of the WUG. During the project construction period, the PPIT and PONRE will be supported by LIC for monitoring.

37. The operational responsibilities for the subproject infrastructure will lie with the Water User Groups who will continue to be assisted by IFAD under the PICSA project. The combination of ADB and IFAD support seeks to institutionalize the operational management of irrigation infrastructure based on the increased incentives from dry season irrigated cropping. The application of irrigation service fees are sufficient to finance the operation and maintenance of infrastructure.

V. ENVIRONMENTAL MANAGEMENT AND MONITORING MATRIX

A. Introduction

38. The matrix below forms the practical management tool of the EMP. It lists the environmental impacts expected to be experienced on the Nam Poua Subproject, and the typical mitigation measures that can be used to avoid, minimise or restore the effects of these impacts.

39. The division of responsibilities between different agencies during the planning, construction and subsequent operation phases are given in simplified tables for the various sections of the PAFO (Appendix 2), the contractor (Appendix 3) and the Water User Group (Appendix 4).

40. Additional environmental monitoring by appropriate units of both the Ministry of Agriculture and Forests and the Ministry of Natural Resources and Environment is not always referred to in the matrix, but represent further safeguards on the project's activities.

41. The standards against which compliance is to be monitored are: (i) the Lao PDR National Environmental Standards (2017), including the surface water quality standards given in Appendix 5 of this EMP[2]; (ii) the World Bank's Environment, Health and Safety General Guidelines (2007); and (iii) the SRIWSM environmental guidelines given in Appendix 6.

B. Subproject Planning Phase during Project Implementation

42. Environmental mitigation in the design phase is principally the responsibility of the provincial representative of the project implementing agency (i.e. the Programme Governance Team in the Department of Irrigation), supported by the Provincial Project Implementation Team in the PAFO and the Loan Implementation Consultant company.

[2] Under Government of Lao, Environmental Assessments and Environmental Management and Monitoring Plan (EMMP) is required, ADB requires a broader assessment within an Environmental Management Plan (EMP). EMP is used to cover both of these documents.

Table 2: Planning Phase Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.01	Loss of land or other property to infrastructure.	1. Full consent to the subproject must be sought through standard consultative processes. 2. Full and fair compensation is to be paid for loss of land, crops or other assets before the subproject commences. 3. Land Acquisition and Resettlement Framework to be followed diligently.	PIS - PAFO, supported by PAFO representative and project preparation consultant. 1. Before application to the project implementing agency for subproject funding. 2. Before signing a contract for the commencement of physical works.	DALAM - PAFO. 1. Before approval of project funding for the subproject. 2. Before approving any contract for physical works.
1.02	Loss of land of importance for biodiversity.	1. Subproject landtake is to be minimised. 2. Landtake is to use land that is already degraded, to the greatest extent possible.No projects to go ahead in forest or protected areas.	PIS - PAFO and engineering team of the project preparation consultant, supported by environment team of preparation consultant. 1. At the start of subproject design. 2. At each design review.	PONRE. Before approval of project funding for the subproject.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.03	(a) Incomplete hydrological data and as yet poorly developed climate change models lead to inaccurate designs for infrastructure. (b) Infrastructure is damaged by high flood levels, reducing the scheme's lifespan or effectiveness and causing damage to the nearby environment. (c) Downstream riverine quality is affected in very dry years due to abstraction of water for irrigation.	1. Care is to be used to interpret as well as possible the best available data for the subproject catchment. 2. A significant margin is to be allowed to ensure that infrastructure is likely to be resilient under current climatic conditions. 3. An additional margin is to be allowed to ensure that infrastructure remains resilient under possible future more intense or prolonged rainfall events. 4. Specially designed protection measures such as bio-engineering must be incorporated into designs as a matter of course. 5. Engineering designs must not be approved without adequate provision of protection against high flood conditions. 6. In very dry periods, released flows from the intake must be monitored to ensure that the minimum agreed environmental base flow is always provided downstream of the intake.	PIS - PAFO and engineering team of the project preparation consultant, supported by environment team of preparation consultant. 1. At the start of subproject design.	DG PAFO, DG PONRE. During subproject design.

1.04	Disruption of hydrological flows by offtake from rivers.	1. All available rainfall and flow data for the river catchment must be collected and assessed to provide a working model of average monthly flows throughout the year. 2. A Staff gauging plate will be established upstream of the headworks, to help define acceptable dry season minimum flows. The proximity and flows of tributary streams close downstream from the proposed headworks must also be assessed. 3. If necessary a survey will be undertaken which establishes the cumulative minimum water needs of other existing users, plus ecological requirements. 4. A calculation must then be made as to the offtake that can be allowed. 5. Where no flow data exist, initial minimum flows of at least 30 percent of the estimated monthly average flow are planned however if levels fall between 10 and 30% PONRE will provide PAFO guidance to the Provincial Steering Committee through PAFO. Flows falling under 10% are not permitted. 6. Offtake regimes must	PIS - PAFO and engineering team of the project preparation consultant, supported by environment team of Loan Implementation Consultant. 1. Gauging station to be installed at the start of subproject design. 2. Data to be re-assessed at each design review. 3. Data and offtake regime to be reviewed annually from the date of starting subproject implementation.	PONRE. Review the emerging data in the light of observations and comments from water users, and discuss with the PIS whether adjustments to water flows are desirable.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		be refined as more data become available.		
1.05	Water supplies polluted by upstream land management practices do not comply with national standards for surface water.	1. An assessment must be made of the quality of water at the headworks and its likely suitability for use in irrigation. 2. Under the PICSA IPM and Pesticide management programs a water quality risk assessment will be undertaken to, if required, customize a water quality testing program of surface water discharged from the command area	LIC. During subproject design. PAFO, supported by Loan Implementation Consultant. IFAD PICSA Implementation Team	PONRE. During subproject design. Cropping planning and monitoring for each season
1.06	Upstream land uses cause a decline in the quality and quantity of water available for the irrigation scheme.	GIZ will prepare and implement a catchment land use plan should be initiated before construction starts on physical works. The plan should be both socio-economically beneficial and environmentally sound, in that its primary objective would be upstream catchment protection to ensure that the subproject irrigation scheme is safeguarded in terms of water supply and limited sediment supply.	Watershed management, agriculture and forestry teams in DALAM AND DOF, PAFO. .	DALAM Before approval of project funding for the subproject.

C. Subproject Construction Phase during Project implementation

43. Environmental mitigation in the construction phase is principally the responsibility of the contractor, managed by the Provincial Project Implementation Team as the provincial project implementing agency, supported by the DAFO and the Loan Implementation Consultant.

Table 3: Construction Phase Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.01	(a) Release of silt into water courses from excavations and earthworks during construction. (b) Release of silt into water courses from poorly finished earthworks following construction.	1. The removal of vegetation and creation of bare surfaces must be minimised to essential areas only. 2. Vegetation clearance and earthworks may only be undertaken during the months of October to April. 3. Temporary sediment settling ponds built using strong stone or timber check dams (not bamboo or fabric silt fences) must be constructed to trap sediment from all earthworks that have unprotected surfaces at any time during the months of April to October inclusive. 4. Borrow areas, camp sites, temporary access tracks etc. must be fully rehabilitated back to a condition that is fully protected against soil erosion. 5. Bio-engineering surface protection must be planted on all bare earthworks during the months of May to July.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period. 2. Before issuing the contractor's certificate of substantial completion. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.02	Environmental damage of any form results from the poor understanding of subproject requirements by the contractor and subcontractors.	1. The Contractor EHS officer will prepare a CEMP to be approved by supervision consultant prior to starting works. 2. EHS Officer/GRM focal point to ensure details of subproject GRM entry point contacts are disclosed at camp, sites and affected villages. 3. EHS Officer to induct/ train workers on occupational and community health and safety practices 4. GRM focal points/community liaison officers to carry out regular consultation with affected persons.	Contractor, PPIT Before mobilisation and as required eg. whenever the contractor mobilises a new subcontractor.	Programme Governance Unit in DOI. As per the timings given for implementation.
2.03	Clearance of vegetation leads to the unnecessary removal of trees and other plants.	1. No tree over 200 mm diameter at breast height (1.5 metres above the ground) may be cleared unless the design drawings specifically require it. 2. The contractor's site clearance plan must be limited to the agreed work site boundaries and must be approved by the PPIT 's environmental representative before any clearance may be commenced.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period. 2. Before issuing the contractor's certificate of substantial completion. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.04	Temporary closure of irrigation systems during construction.	1. Contractors must provide a plan in advance to provide irrigation water into existing supply channels, which must be approved by the project implementing agency and the Water User Group. 2. If it is not possible to avoid temporary closure, then full and fair compensation is to be paid for loss of crops as a consequence.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before allowing the contractor to commence work. 2. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.05	Disposal of soil from excavations such as irrigation canals.	1. Soil from excavations should be re-used in designs wherever possible. 2. Where soil is excess to engineering requirements and is treated as spoil, it must be disposed of in the nearest available approved location, and stabilised and protected from rainfall using bio-engineering measures.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period. 2. Before issuing the contractor's certificate of substantial completion. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.06	Release of dust into the atmosphere from excavations and other construction activities.	1. Earthworks must be halted during periods of strong winds. 2. Heavily used access tracks must be sprayed with water during dry periods. 3. On all unmetalled surfaces, construction traffic must be limited to 30 kmh within 250 metres of habitation and 80 kmh elsewhere. 4. Loads of dust-making materials must be covered. 5. Crushers must be fitted with water sprays to prevent dust emissions.	Contractor, managed by the PPIT and Loan Implementation Consultant. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.07	Release of noxious gases into the atmosphere.	1. Vehicles and machines must be in a good condition and serviced regularly, to ensure minimal emissions. 2. All vehicles and machines must comply with the Lao PDR emissions standards.	Contractor, managed by the PPIT and Loan Implementation Consultant. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.08	Noise nuisance from construction activities.	1. Contractors must not exceed statutory noise levels at any time. 2. Work sites within 500 metres of habitation: (a) must not operate during the hours of darkness or on holidays; and (b) must have noise-abatement measures installed for other periods.	Contractor, managed by the PPIT and Loan Implementation Consultant. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.09	Temporary use of land for construction affects livelihoods or leaves it damaged.	1. Land for use by any contractor or subcontractor must be agreed by both the PPIT and the local community authority before the contractor may have access. 2. Full and fair compensation is to be paid for loss of crops or other assets before the contractor may have access to the land. 3. The contractor must have a land restoration plan, which must have been implemented to the satisfaction of both the PPIT and the landowner before the contractor's final bill may be paid.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before work is permitted to start. 2. Throughout the subproject construction period. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.10	Influx of temporary labour disrupts local communities.	1. Contractors and subcontractors are required to use the maximum local labour possible. 2. If a significant number of staff and workers (i.e. more than 20) are to be brought into the subproject site, then the contractor must provide a management plan and code of conduct for the staff and workers, that is approved by the local community authority.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before work is permitted to start. 2. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.11	Operation of construction machines affects both workers and local society.	1. The noise and dust reduction measures listed above must be adhered to. 2. Safety measures for machine operation must be defined and approved by the project implementing agency. 3. Machine operators and workers must be trained and certificated in the safe use of machines.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before work is permitted to start. 2. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.12	Pollution by hydrocarbons from construction plant.	1. The contractor must prepare a plan for the management of hydrocarbons, which must be approved by the PPIT before the contractor is permitted to mobilise to site. 2. Fuel and oil must be transported in properly designed vehicles meeting national standards. 3. Fuel and oil must be stored at least 50 metres from a water body, in covered and bunded locations, and dispensed under strict controls		
2.12	Pollution by hydrocarbons from construction plant.	4. The contractor must prepare a plan for the management of hydrocarbons, which must be approved by the PPIT before the contractor is permitted to mobilise to site.		

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		5. Fuel and oil must be transported in properly designed vehicles meeting national standards. 6. Fuel and oil must be stored at least 50 metres from a water body, in covered and bunded locations, and dispensed under strict controls. 7. Vehicle and machine parking and service areas must have impermeable surfaces and the outlet drains must be fitted with oil traps. 8. Contractors must have spill clean-up equipment on site, and persons always present who know when and how to use it. 9. The contractor must have a land restoration plan that includes hydrocarbon facilities, which must have been implemented to the satisfaction of both the project implementing agency and the landowner before the contractor's final bill may be paid. 10. Any subcontractor must comply with the same rules, at the contractor's liability.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before the contractor is permitted to mobilise to site. 2. Throughout the subproject construction period. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.13	Pollution from construction site wastewater, from camps and other work sites.	1. The contractor must prepare a plan for the management of wastewater, which must be approved by the PPIT before the contractor is permitted to mobilise to site. 2. “Black” wastewater from sanitation facilities must be led to a properly constructed septic tank and soakaway. 3. “Grey” wastewater from washing and cooking facilities must be led to a septic tank or to a specially built reed bed filtration system. 4. Oil-contaminated water from workshops and fuel stores must be collected and taken to an approved municipal waste management facility. 5. The contractor must have a land restoration plan that includes wastewater facilities, which must have been implemented to the satisfaction of both the PPIT and the landowner before the contractor’s final bill may be paid. 6. Any subcontractor must comply with the same rules, at the contractor’s liability.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before the contractor is permitted to mobilise to site. 2. Throughout the subproject construction period. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.14	Pollution from solid waste materials.	1. Solid waste must be recycled wherever possible. 2. Non-recyclable solid waste must be sent to an official landfill site. 3. Open burning of solid waste is prohibited 4. The contractor must have a land restoration plan that includes solid waste, which must have been completed to the satisfaction of both the PPIT and the landowner before the contractor's final bill may be paid.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period. 2. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.15	Injuries to workers and others.	1. Work sites must be clearly demarcated using barrier tape and all non-project personnel excluded. 2. All staff, workers and visitors to construction sites must be issued with appropriate personal protective equipment. 3. All staff, workers and visitors to construction sites must be briefed on safe working procedures for that site. 4. Every construction site must have a first aid kit and at least two persons always present who are trained and competent to use it.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before the contractor is permitted to commence work. 2. Throughout the subproject construction period.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.16	Disruption of cultural sites.	1. All small cultural sites (such as small shrines and graves) must be protected by the contractor during works periods. 2. A plan for the protection of cultural sites must be approved by the PPIT . 3. Once construction is complete the surrounding of such sites must be restored to their pre-construction condition.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Before the contractor is permitted to commence work. 2. Throughout the subproject construction period. 3. Before returning retention monies.	PPIT environmental section. Quarterly or as required. PONRE. At quarterly inspections throughout subproject construction period.
2.17	Subsequent users may not fully understand how to manage the subproject works.	1. Instructions on managing the infrastructure must be provided to the end users before handover. 2. The operating instructions must be explained to the Water User Group. 3. Before handover, the operating instructions must be finalised and the EMP requirements included.	Contractor, supported by the PPIT and Loan Implementation Consultant. 1. By 6 months before scheduled handover of infrastructure. PPIT and Loan Implementation Consultant. 2. 6 months and 3 months before handover, and at handover. 3. At infrastructure handover.	Director of PAFO and PONRE. 1. 3 months before handover. 2. At infrastructure handover.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.18	Covid-19 prevention for joining team	1. All site engineers / labours must have enough vaccinated as recommended by the nation 2. Self-quarantine / isolation for at least 14 days before working 3. Take covid-19 at least 2 times (the person come from risky areas) in prior to start working and staying at the site/camp 4. Develop or convene a joint occupational safety and health committee with members representing the employer and workers. 5. Train team members on the basic principles for the formulation and implementation of occupational safety and health preventive and control measures 6. Develop and communicate a work plan on safe working for COVID-19. Such plan should be fully aligned with any government regulations and guidelines on COVID-19 prevention and control, or in the absence thereof, with international good practice guidelines as may be updated from time to time.	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.19	Risk assessment during the Covid-19 pandemic to decide when to	1. Undertake a risk assessment to determine the	Contractor, managed by the PPIT and Loan	PPIT environmental section.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
	work, who works and how	preventive and control measures 2. Ensure preventative measures are in place before resuming or beginning construction work	Implementation Consultant	Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.20	Covid-19 prevention (Regularly clean and disinfect)	1. Increase the frequency of cleaning and disinfection, in particular heavily trafficked areas and common areas, including work camps. 2. All door handles, railings, ladders, switches, controls, eating surfaces, shared tools and equipment, taps, toilets, and personal areas are wiped down at least twice a day with a disinfectant. 3. Discourage the sharing of items such as cups, glasses, plates, tools	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.21	Promote personal Hygiene- Covid-19 prevention	1. Provide workers with the conditions and means necessary for frequent 2. hand washing (soap, water or alcohol gel) with a posted hand washing protocol at site entries, exits, bathrooms, communal areas, offices, and any other areas with commonly touched surfaces.	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		3. Inform workers of the need to avoid physical contact when greeting, and avoid touching eyes, nose and mouth 4. Inform workers of the need to cover the mouth and nose with a disposable handkerchief when coughing or sneezing or the crook of their arm. 5. Dispose of tissues in a lined and covered waste bin and wash hands afterwards		period till the end of Covid-19 pandemic.
2.22	Health surveillance and insurance-Covid-19 prevention	1. Before entering the site, staff and visitors must confirm that they are not currently exhibiting flu-like symptoms. 2. Monitor the health status of workers, develop protocols for cases of suspected and confirmed COVID-19. The protocol will state that: • workers with symptoms or confirmed cases must be isolated within the construction camp or stay at home for 7 days after symptoms started. • If symptoms persist after 7 days the person must isolate until the symptoms stop • People who have been in close contact with the person with confirmed COVID-	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		19 be quarantined for 14 days 3. All workers in quarantine or isolation must be provided with adequate food, water, medical assistance and sanitation. 4. Identify workers who have had close contact with people infected with COVID-19 and follow national medical guidance. 5. Communicate confirmed cases of COVID-19 infection to the appropriate authorities. 6. All workers should be provided with health insurance that includes COVID-19 treatment		
2.23	Review emergency preparedness plans- Covid-19 prevention	1. Develop an emergency plan adapted to COVID-19 and regularly review it.	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.24	Camp location-Covid-19 prevention	1. Not in area liable to flooding, landslide or other natural disaster 2. Not in area affected by construction dust, noise, sewage or other pollution 3. Not in a residential area	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
				end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.25	Minimum housing standards-Covid-19 prevention	1. a separate bed for each worker 2. beds should not be arranged in tiers of more than two; 3. separate accommodation of the sexes or to accommodate couples 4. adequate natural light during the daytime and adequate artificial light 5. adequate ventilation to ensure sufficient movement of air 6. adequate supply of safe potable water 7. adequate sanitary facilities (see below); 8. adequate drainage 9. adequate furniture for each worker to secure his or her belongings, such as a locker. 10. common dining rooms, canteens or mess rooms, located away from the sleeping areas 11. appropriately situated and furnished laundry facilities 12. reasonable access to plug sockets for charging telephones and other devices 13. rest and recreation rooms and health facilities, where not	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		available in the community		
2.26	Minimum accommodation sizes - Covid-19 prevention	Sleeping space 1. inside dimensions over 198 centimeters by 80 centimeters; Sleeping room: 2. headroom of over 203 centimeters allowing full free movement 3. Beds minimum 2m apart for COVID-19 risk management	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.27	Sanitation facilities - Covid-19 prevention	1. One toilet, one tap / basin, one toilet for every 6 people 2. Convenient location to accommodation 3. Provision of soap 4. Separate facilities for men and women 5. Ventilation to open air 6. Fresh cold running water 7. Clean and hygienic 8. Septic tank / sewage treatment facility, or pit latrines located at least 200m from surface waters, and in areas of suitable soil profiles and above the groundwater levels	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.28	Health and Safety within worker accommodation - Covid-19 prevention	1. Separate area for sick workers to prevent transmission of disease 2. Smoke detector in sleeping area 3. Fire safety throughout accommodation such as fire extinguishers, fire alarms, fire blankets	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
		4. Worker training in fire prevention and procedures 5. Fire exit sign, adequate means of escape and clearly maintained exit 6. Security lighting within camp and for sanitation block and lighting for route from sleeping area to sanitation block. 7. Electrical cables to be in safe condition, elevated and not in areas liable to flood		PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.
2.29	Inspection - Covid-19 prevention	1. 2 weekly inspection to inspect for cleanliness, state of repair of building, accommodation and fire equipment. 2. Record inspection results and retain for review	Contractor, managed by the PPIT and Loan Implementation Consultant	PPIT environmental section. Regularly throughout subproject construction period till the end of Covid-19 pandemic PONRE. At all inspections throughout subproject construction period till the end of Covid-19 pandemic.

D. Subproject Operation Period following Project implementation

44. Environmental mitigation in the operation period is principally the responsibility of the Water User Group and the Provincial Irrigation Section in the PAFO, supported by other sections of the PAFO and the DAFO.

Table 4: Operation Period Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
3.01	Disruption of downstream hydrological flows due to offtake from river.	1. Once scheme operation commences, the gauged low rates and water offtake volumes must be reassessed. These, plus any complaints from downstream users, must be used to recalculate the allowable offtake. 2. The scheme must then be revised accordingly.	PIS - PAFO. Annually.	PONRE. Annually.
3.02	(a) Extraction of water from a river causes a decline or loss of aquatic biodiversity. (b) Extraction of water from a river leaves downstream users short. (c) Subproject irrigation scheme requires more water than is available.	1. If these impacts occur, then it shows that the assumptions of water flow made during subproject design were wrong. This is likely to be due to a lack of flow data at design stage. 2. The minimum flow release must be recalculated, based on user needs and the latest data on river flow. 3. Water use by the subproject scheme must be reviewed against what is actually available. 4. A revised scheme management plan must be introduced, implemented, monitored and adjusted until it resolves the problem.	PIS - PAFO. If necessary, specialist expertise should be requested from the central Department of Water Resources and the central Department of Irrigation. Annually.	PONRE. Annually.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
3.04	(a) Flood damage to headworks. (b) Erosion of canal banks, either from flood surges or normal flows.	1. All flood protection works must be maintained as per the design of the subproject, or any subsequent engineering works. 2. Any flood damage must be reviewed and appropriate measures designed for resolution. 3. Occasional minor flood damage should normally be resolved by using appropriate measures. 4. The use of civil engineering structures (i.e. concrete or gabion works) may be required in the event of serious damage from exceptional floods.	Water User Group, calling on the PIS – PAFO for advice if damage is severe. Annually.	PAFO and PONRE. Annually.
3.05	Increased use of agrichemicals and nutrient	1. Identification of crops, cropping and farming systems 2. Support for Lao Gap training and awareness 3. Where warranted PRT 4.Where required IPM training for specific crops that require pesticide use 5. Nutrient management regimes built into farm technology demonstrations	1. PAFO with Input from IFAD financed support services 2. PAFO Plant Protection Centre staff	1. Cropping season monitoring to capture detail of agrichemical use – PPIT, PAFO monitoring program implemented by WUG through mobile phone systems at sowing and harvest of each cropping season

VI. ENVIRONMENTAL MONITORING FORMAT

A. Recommended Format

45. Environmental monitoring in both the subproject construction phase and the subsequent operation period is principally the responsibility of the Environmental Section of the PONRE. During the construction phase, monitoring must be undertaken quarterly, or more frequently if deviations are observed or complaints received. During the subsequent and indefinite operation period, monitoring must be undertaken annually, or more frequently if deviations are observed or complaints received.

46. It is recommended that a simple table and traffic light system is used to indicate the level of seriousness of any lapses. A key and format for this is given below. The intention is to give a quick and clear indication of anything that is going wrong, who needs to take action to resolve it, and what they must do.

Category 3	Serious issue causing widespread pollution or other environmental damage.
Category 2	Significant issue causing localised pollution or other environmental damage.
Category 1	Minor lapses causing short term environmental damage that can be easily rectified.
Category 0	No environmental problems or previous problem resolved.
Category D	Issues requiring action but deferred due to plans for future activities that will affect them, or for other reasons.

Table 5: Monitoring Action Report

No.	Mitigation	Assessment of Condition	Corrective Actions Required	Timing	Cat.

B. Example of the Monitoring Format Used

47. The version of the monitoring table below shows a hypothetical worked example for some of the mitigation measures during the construction phase of the subproject.

Table 6: Monitoring Action Report – Nam Poua Subproject
[*Hypothetical Example, 1 September 2020*]

No.	Mitigation	Assessment of Condition	Corrective Actions Required	Timing	Cat.
2.01(1)	The removal of vegetation and creation of bare surfaces must be minimised to essential areas only.	Contractor is complying well and there are no areas cleared unnecessarily.	DAFO to continue encouraging contractor to go on complying.		0
2.01(2)	Vegetation clearance and earthworks may only be undertaken during the months of October to April.	Contractor commenced vegetation clearance on feeder canal in August to try to improve his schedule. Erosion has started and some neighbouring land has been inundated with sediment.	DAFO engineer must hold a site meeting with the contractor. The contractor must install emergency erosion control measures within one week. The contractor must also rehabilitate the damaged land in consultation with the engineer and the landowner, within one month.		2
2.01(3)	Temporary sediment settling ponds built using strong stone or timber check dams must be constructed to trap sediment from all earthworks that have unprotected surfaces at any time during the months of April to October inclusive.	These were installed successfully in March. However, the heavy rains in early August caused some damage near the headworks construction site, leading to some erosion and soil washing into the irrigation canal.	The contractor must repair the damaged sediment traps within two weeks. The DAFO engineer is to ensure this is done.		1
2.01(4)	Bio-engineering surface protection must be planted on all bare earthworks during the months of May to July.	Bio-engineering works were implemented on schedule in June. The grass has established well and is already providing a good protection from erosion on the main canal embankment.	The contractor is to continue to protect the site and ensure that livestock do not graze it during the forthcoming dry season. The DAFO engineer is to monitor.		0

No.	Mitigation	Assessment of Condition	Corrective Actions Required	Timing	Cat.
2.03(1)	No tree over 200 mm diameter at breast height (1.5 metres above the ground) may be cleared unless the design drawings specifically require it.	No trees had to be cut in the process of these works.	Not applicable.		0
2.03(2)	The contractor's site clearance plan must be limited to the agreed work site boundaries and must be approved by the PPIT 's environmental representative.	The contractor is keeping to the agreed site boundaries in most cases. However, there are lapses in that the contractor's trucks are frequently parked overnight on the river bank and not taken back to the camp. Engine oil is dripping on to the soil surface and could be leached into the river.	The contractor must ensure that the trucks are parked in the correct location overnight, with immediate effect. The contractor must clean up the oil contamination within two days. The DAFO engineer is to ensure this is done.		1

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Appendix 1. Subproject Terms of Reference for Technical PONRE Staff

Category	Description
A: Position /Title	**Provincial Environmental Officer**
B: Position / Type	Staff member of the PONRE
C: Source	National
D: Qualifications	Degree in an environmental subject (e.g. soil science, botany, zoology, physical geography, ecology, forestry, agronomy or environmental science).
E: Experience	At least five years of field experience in the operation of rural infrastructure development projects (i.e. in project implementation).
F: Posting	Provincial Centre
G: Reporting To	DG-PONRE and National Environmental Safeguards Consultant
H: Role duration	21 person months over project years 2 to 6 inclusive.
I: Starting Date	Q2 of project year 2.
J: Deliverables	1. Successful implementation of the Environmental Management and Monitoring Plan (EMP) for every GOL Category 1 subproject, or Environmental Codes of Conduct for non-qualifying subprojects, in the officer's province. 2. Provincial Quarterly Environmental Monitoring Reports.
K: Outputs	The officer will contribute as follows to the Project outputs in their province: 1. Environmental safeguarding of all subprojects are implemented and monitored as per the requirements of the Subproject EMP and as per the provisions of the Project Administration Manual (PAM).
L: Tasks	SRIWSM Outputs 1 and 3: As directed by the National Environmental Safeguards Consultant, to undertake the following tasks. 1. Participate in training seminars provided by the Loan Implementation Consultant's team. 2. Support the Loan Implementation Consultant's team in undertaking the field studies and consultations necessary for future subprojects. 3. Co-ordinate the implementation of the EMP or Code of Conduct for every subproject in the province. Work with the relevant subproject stakeholders to support them in fulfilling their obligations under the plans and codes. 4. Undertake active on-site monitoring throughout the construction period of the subproject infrastructure. This should involve at least two site visits per week while the contractor is mobilised to ensure that it is fully compliant with the requirements of this EMP . 5. Undertake regular on-site monitoring during the infrastructure operation period until the termination of the project in the province. This should involve one site visit per month to ensure that the WUG's management of the new infrastructure is fully compliant with the requirements of this EMP . 6. Monitor the subproject areas that are the target of activities under these outputs, to determine whether there are any unexpected negative environmental impacts caused by the upgraded rural infrastructure. 7. Report findings to the Provincial Steering Committee and DG-PAFO. 8. Implement practical demonstrations of environmental mitigation actions as necessary to assist the subproject stakeholders in fulfilling the environmental safeguards as needed. 9. Assist project stakeholders in the collection of additional environmental data, particularly relating to meteorology and hydrology. 10. Undertake environmental sampling as necessary to ensure that safeguards are in place or to quantify lapses affecting air, water or soil.

	11. ~~Complete the quarterly monitoring of the subprojects using the formats in~~ the EMP to compile Provincial Quarterly Environmental Monitoring Reports from Q2 of year 2 onwards.

Appendix 2. Responsibilities of the Provincial Agriculture and Forest Office

Provincial Irrigation Section of the PAFO – Planning Phase		
No.	**What you Must Do**	**Why You Must Do It**
1.01	1. Full consent to the subproject must be sought through standard consultative processes. 2. Full and fair compensation according to the provisions in the Land Acquisition and Resettlement Framework to be applied .	To compensate people for losses of land or other property to infrastructure.
1.02	1. Subproject landtake is to be minimised. 2. Landtake is to use land that is already degraded, to the greatest extent possible. 3. If previously undisturbed forest must be used (not planned as part of the design), the subproject would be changed to a different environmental category and would no longer be eligible for SRIWSM financing.	To compensate for the loss of land of importance for biodiversity.
1.03	1. Care is to be used to interpret as well as possible the best available data for the subproject catchment. 2. A significant margin is to be allowed to ensure that infrastructure is likely to be resilient under current climatic conditions. 3. An additional margin is to be allowed to ensure that infrastructure remains resilient under possible future more intense or prolonged rainfall events. 4. Specially designed protection measures such as bio-engineering must be incorporated into designs as a matter of course. 5. Engineering designs must not be approved without adequate provision of protection against high flood conditions. 6. In very dry periods, released flows from the intake must be monitored to ensure that the minimum agreed environmental base flow is always provided downstream of the intake.	To protect infrastructure from high flood levels in an uncertain climate setting.

Provincial Irrigation Section of the PAFO – Planning Phase		
No.	**What you Must Do**	**Why You Must Do It**
1.04	1. All available rainfall and flow data for the river catchment must be collected and assessed to provide a working model of average monthly flows throughout the year. 2. A hydrological gauging station must be established on the subproject catchment, upstream of the headworks, to help define acceptable dry season minimum flows. The proximity and flows of tributary streams close downstream from the proposed headworks must also be assessed. 3. A survey must be undertaken which establishes the cumulative minimum water needs of other existing users, plus ecological requirements. 4. A calculation must then be made as to the offtake that can be allowed. 5. Where no flow data exist, initial minimum flows of at least 30 percent of the estimated monthly average flow must be used as the abstraction criterion. 6. Offtake regimes must be refined as more data become available.	To minimise the disruption of hydrological flows by offtake from rivers.

PAFO and DAFO Watershed Management, Agriculture and Forestry Teams – Planning Phase		
No.	**What you Must Do**	**Why You Must Do It**
1.05	1. An assessment must be made of the quality of water at the headworks and if there is doubt about water quality, then the subproject should be abandoned as a candidate for SRIWSM funding.	In case water supplies polluted by upstream land management practices do not comply with national standards for surface water.
1.06	Discussions on creating a catchment land use plan should be initiated prior to construction. The plan should be both socio-economically beneficial and environmentally sound, in that its primary objective would be upstream catchment protection to ensure that the subproject irrigation scheme is safeguarded in terms of water supply and limited sediment supply.	So that upstream land uses do not cause a decline in the quality and quantity of water available for the irrigation scheme.

Provincial Project Implementation Team of the PAFO – Construction Period		
No.	**What you Must Do**	**Why You Must Do It**
2.02	1. At a pre-mobilisation site meeting, the contractor must demonstrate a full understanding of the requirements of the EMP. 2. All of the sub-plans listed below must be created, reviewed, improved if necessary and accepted for approval. 3. The contractor must demonstrate that he is fully responsible for all subcontractors' adherence to the provisions of the EMP, and that he has formally ensured this.	To ensure that environmental damage of any form does not result from the poor understanding of subproject requirements by the contractor and subcontractors.
2.17	1. Instructions on managing the infrastructure must be provided to the end users before handover. 2. The operating instructions must be explained to the Water User Group. 3. Before handover, the operating instructions must be finalised and the EMP requirements included.	To ensure that subsequent users fully understand how to manage the subproject works.

Provincial Irrigation Section of the PAFO – Operation Period		
No.	**What you Must Do**	**Why You Must Do It**
3.01	1. Once scheme operation commences, the gauged river flows and water offtake volumes must be reassessed. These, plus any complaints from downstream users, must be used to recalculate the allowable offtake. 2. The scheme must then be revised accordingly.	To ensure that there is no disruption of downstream hydrological flows due to offtake from river.
3.03	1. See if water shortages occur, which would show that the assumptions of water flow made during subproject design were wrong. This is likely to be due to a lack of flow data at design stage. 2. The minimum flow release must be recalculated, based on User needs and the latest data on river flow. 3. Water use by the subproject scheme must be reviewed against what is actually available. 4. A revised scheme management plan must be introduced, implemented, monitored and adjusted until it resolves the problem.	So that the extraction of water from a river does not cause a decline or loss of aquatic biodiversity, or leave downstream users short, if the subproject irrigation scheme requires more water than is available.

PAFO and DAFO Watershed Management, Agriculture and Forestry Teams – Operation Period		
No.	**What you Must Do**	**Why You Must Do It**
3.02	1. The catchment land use plan initiated before project implementation (see 1.06) should be continued indefinitely to ensure that the scheme is safeguarded throughout its operational life. The plan's primary objective is upstream catchment protection to ensure that the subproject irrigation scheme is safeguarded in terms of water supply and limited sediment supply. 2. Arrangements for implementation of the plan must be maintained.	So that upstream land uses do not cause a decline in the quality and quantity of water available for the irrigation scheme.

Appendix 3. Responsibilities of the Contractor

The subproject civil works contractor is responsible for the following actions during the construction phase.

Contractor – Construction Phase		
No.	**What you Must Do**	**Why You Must Do It**
2.00	1. Appoint qualified Environmental, Health and Safety Officer to manage site safety and implementation of EMP and GRM requirements. 2. Prepare subproject specific Construction EMP (CEMP) confirming how EMP requirements will be implemented. 3. EHS Officer to provide induction, training and toolbox talks for all Contractor staff and other site visitors. 4. EHS Officer to liaise with affected persons and local community 5. EHS Officer to implement and monitor any required corrective actions and resolution of issues raised through the GRM. EHS Officer to report monthly to PPIT on implementation of EMP and GRM.	To ensure Contractor fulfils their contractual requirements to: provide and maintain a safe and hygienic working environment; implement, monitor and report on subproject EMP and GRM requirements effectively.
2.01	6. The removal of vegetation and creation of bare surfaces must be minimised to essential areas only. 7. Vegetation clearance and earthworks may only be undertaken during the months of October to April. 8. Temporary sediment settling ponds built using strong stone or timber check dams (not bamboo or fabric silt fences) must be constructed to trap sediment from all earthworks that have unprotected surfaces at any time during the months of April to October inclusive. 9. Borrow areas, camp sites, temporary access tracks etc. must be fully rehabilitated back to a condition that is fully protected against soil erosion. 10. Bio-engineering surface protection must be planted on all bare earthworks during the months of May to July.	To avoid water course pollution from releases of silt from excavations and earthworks during construction, and from poorly finished earthworks following construction.
2.03	1. No tree over 200 mm diameter at breast height (1.5 metres above the ground) may be cleared unless the design drawings specifically require it. 2. The contractor's site clearance plan must be limited to the agreed work site boundaries and must be approved by the PPIT 's environmental representative before any clearance may be commenced.	So that the clearance of vegetation does not lead to the unnecessary removal of trees and other plants.

Contractor – Construction Phase		
No.	**What you Must Do**	**Why You Must Do It**
2.04	1. Contractors must provide a plan in advance to provide irrigation water into existing supply channels, which must be approved by the project implementing agency and the Water User Group. 2. If it is not possible to avoid temporary closure, then full and fair compensation is to be paid for loss of crops as a consequence.	To avoid temporary closures of irrigation systems during construction.
2.05	1. Soil from excavations should be re-used in designs wherever possible. 2. Where soil is excess to engineering requirements and is treated as spoil, it must be disposed of in the nearest available approved location, and stabilised and protected from rainfall using bio-engineering measures.	To ensure the safe disposal of soil from excavations such as irrigation canals.
2.06	1. Earthworks must be halted during periods of strong winds. 2. Heavily used access tracks must be sprayed with water during dry periods. 3. On all unmetalled surfaces, construction traffic must be limited to 30 kmh within 250 metres of habitation and 80 kmh elsewhere. 4. Loads of dust-making materials must be covered. 5. Crushers must be fitted with water sprays to prevent dust emissions.	To minimise the release of dust into the atmosphere from excavations and other construction activities.
2.07	1. Vehicles and machines must be in a good condition and serviced regularly, to ensure minimal emissions. 2. All vehicles and machines must comply with the Lao PDR emissions standards.	To minimise the release of noxious gases into the atmosphere.
2.08	1. Contractors must not exceed statutory noise levels at any time. 2. Work sites within 500 metres of habitation: (a) must not operate during the hours of darkness or on holidays; and (b) must have noise-abatement measures installed for other periods.	To minimise noise nuisance from construction activities.
2.09	1. Land for use by any contractor or subcontractor must be agreed by both the PPIT and the local community authority before the contractor may have access. 2. Full and fair compensation is to be paid for loss of crops or other assets before the contractor may have access to the land. 3. The contractor must have a land restoration plan, which must have been implemented to the satisfaction of both the PPIT and the landowner before the contractor's final bill may be paid.	To ensure that the temporary use of land for construction does not affect livelihoods or leave it damaged.

Contractor – Construction Phase		
No.	**What you Must Do**	**Why You Must Do It**
2.10	1. Contractors and subcontractors are required to use the maximum local labour possible. 2. If a significant number of staff and workers (i.e. more than 20) are to be brought into the subproject site, then the contractor must provide a management plan and code of conduct for the staff and workers, that is approved by the local community authority.	To minimise the disruption to local communities due to an influx of temporary labour.
2.11	1. The noise and dust reduction measures listed above must be adhered to. 2. Safety measures for machine operation must be defined and approved by the project implementing agency. 3. Machine operators and workers must be trained and certificated in the safe use of machines.	To minimise the effects on both workers and local society from the operation of construction machines.
2.12	1. The contractor must prepare a plan for the management of hydrocarbons, which must be approved by the PPIT before the contractor is permitted to mobilise to site. 2. Fuel and oil must be transported in properly designed vehicles meeting national standards. 3. Fuel and oil must be stored at least 50 metres from a water body, in covered and bunded locations, and dispensed under strict controls. 4. Vehicle and machine parking and service areas must have impermeable surfaces and the outlet drains must be fitted with oil traps. 5. Contractors must have spill clean-up equipment on site, and persons always present who know when and how to use it. 6. The contractor must have a land restoration plan that includes hydrocarbon facilities, which must have been implemented to the satisfaction of both the project implementing agency and the landowner before the contractor's final bill may be paid. 7. Any subcontractor must comply with the same rules, at the contractor's liability.	To avoid the pollution by hydrocarbons from construction plant.

Contractor – Construction Phase		
No.	**What you Must Do**	**Why You Must Do It**
2.13	1. The contractor must prepare a plan for the management of wastewater, which must be approved by the PPIT before the contractor is permitted to mobilise to site. 2. "Black" wastewater from sanitation facilities must be led to a properly constructed septic tank and soakaway. 3. "Grey" wastewater from washing and cooking facilities must be led to a septic tank or to a specially built reed bed filtration system. 4. Oil-contaminated water from workshops and fuel stores must be collected and taken to an approved municipal waste management facility. 5. The contractor must have a land restoration plan that includes wastewater facilities, which must have been implemented to the satisfaction of both the PPIT and the landowner before the contractor's final bill may be paid. 6. Any subcontractor must comply with the same rules, at the contractor's liability.	To avoid the pollution from construction site wastewater, from camps and other work sites.
2.14	1. Solid waste must be recycled wherever possible. 2. Non-recyclable solid waste must be sent to an official landfill site. 3. The contractor must have a land restoration plan that includes solid waste, which must have been completed to the satisfaction of both the PPIT and the landowner before the contractor's final bill may be paid.	To avoid pollution from solid waste materials.
2.15	1. Work sites must be clearly demarcated using barrier tape and all non-project personnel excluded. 2. All staff, workers and visitors to construction sites must be issued with appropriate personal protective equipment. 3. All staff, workers and visitors to construction sites must be briefed on safe working procedures for that site. 4. Every construction site must have a first aid kit and at least two persons always present who are trained and competent to use it.	To avoid injuries to workers and others.
2.16	1. All small cultural sites (such as small shrines and graves) must be protected by the contractor during works periods. 2. A plan for the protection of cultural sites must be approved by the PPIT . 3. Once construction is complete the surrounding of such sites must be restored to their pre-construction condition.	To minimise the disruption of cultural sites.

Contractor – Construction Phase		
No.	**What you Must Do**	**Why You Must Do It**
2.17	1. Instructions on managing the infrastructure must be provided to the end users before handover. 2. The operating instructions must be explained to the Water User Group. 3. Before handover, the operating instructions must be finalised and the EMP requirements included.	So that subsequent users fully understand how to manage the subproject infrastructure.

Appendix 4. Responsibilities of the Water User Group – Operation Period

Water User Group – Operation Period		
No.	**What you Must Do**	**Why You Must Do It**
3.04	1. All flood protection works must be maintained as per the design of the subproject, or any subsequent engineering works. 2. Any flood damage must be reviewed and appropriate measures designed for resolution. 3. Occasional minor flood damage should normally be resolved by using appropriate measures. 4. The use of civil engineering structures (i.e. concrete or gabion works) may be required in the event of serious damage from exceptional floods.	To prevent flood damage to headworks and the erosion of canal banks, either from flood surges or normal flows.

Appendix 5. Surface Water Quality Standards

Government of Lao PDR National Environmental Standards (2017)
10. Surface Water Quality Standards

Class 2: Water quality for aquatic animal conservation, fisheries and water sports.
Class 3: Water quality for agriculture, livestock and other uses.

No.	Substances	Symbol	Unit	Standard Value		Method of Measurement
				Class 2	Class 3	
1	Colour, Odour and Taste	-	-	n'	n'	Description
2	Temperature	t	°C	n'	n'	Thermometer
3	Potential of Hydrogen	pH	-	6-8	5-9	Electronic pH meter
4	Dissolved Oxygen	DO	mg/l	6.0	5.0	Azide Modification
5	Electro-conductivity	EC	µS/cm	≤ 1000	≤ 2000	EC meter
6	COD	COD	ml/l	5-7	7-10	Potassium Dichromate Digestion; Open Reflux or Closed Reflux
7	Total Coliform Bacteria	Coliform Bacteria	MPN/100 ml	5000	20000	Multiple Tube Fermentation
8	Faecal Coliform Bacteria	Faecal Bacteria	MPN/100 ml	1000	4000	
9	Total Suspended Solids	TSS	mg/l	≤ 25	≤ 40	Glass Fibre Filter Disk
10	Phosphate	PO_4	mg/l	0.5	1.0	Ascorbic Acid
11	Ammonium Ion	$^{+}$	mg/l	≤ 1.5	≤ 3.0	Kjeldahl
12	Nitrate-nitrogen	NO_3-N	mg/l	5.0	5.0	Cadmium Reduction
13	Ammonia-nitrogen	NH_4 NH_3-N	mg/l	0.5	0.5	Distillation Nezzlerization
14	Phenols	C_6H_5OH	mg/l	0.005	0.005	Distillation, 4-Amino antipyrene
15	Copper	Cu	mg/l	1.5	1.5	Atomic Absorption Direct Aspiration
16	Nickel	Ni	mg/l	0.1	0.1	
17	Manganese	Mn	mg/l	1.0	1.0	
18	Zinc	Zn	mg/l	1.0	1.0	
19	Cadmium	Cd	mg/l	0.003	0.003	
20	Chromium, Hexavalent	Cr^{6+}	mg/l	0.05	0.05	
21	Lead	Pb	mg/l	0.01	0.01	
22	Mercury	Hg	mg/l	0.001	0.001	Atomic Absorption Cold Vapour
23	Arsenic	As	mg/l	0.01	0.01	Atomic Absorption Direct Aspiration, ICP
24	Cyanide	CN^-	mg/l	0.07	0.07	Pyridine-Barbituric Acid
25	Alpha Radioactivity	α	Becquerel/l	0.1	0.1	Geiger Counter
26	Beta Radioactivity	β	Becquerel/l	1.0	1.0	
27	Organochlorine Pesticide	-	mg/l	0.05	0.05	Gas Chromatography
28	Dichlorodiphenyl-trichloroethane (DDT)	$C_{14}H_9Cl_5$	µg/l	1.0	1.0	
29	Alpha-Benzene Hexachloride (BHC)	αBHC ($C_6H_6Cl_6$)	µg/l	0.02	0.02	
30	Dieldrin	$C_{12}H_8Cl_6O$	µg/l	0.1	0.1	

31	Aldrin	$C_{12}H_8Cl_6$	µg/l	0.1	0.1	
29	Heptachlor and Heptachlor Epoxide	$C_{10}H_5Cl_7$, $C_{10}H_5Cl_7O$	µg/l	0.2	0.2	
30	Endrin	$C_{12}H_8Cl_6O$	µg/l	None	None	

Appendix 6. Project Environmental Guidelines

The Government of Lao PDR National Environmental Standards (2017) will be used as the reference points for the areas that they cover. The list below gives the additional guideline standards that must be followed on all SRIWSM subprojects. If new standards are gazetted by the government during the project implementation period, then they shall take precedence if they are stricter.

Soil

- All bare surfaces (including roadsides and drains but excluding road running surfaces) shall be protected using bio-engineering measures that shall be implemented during the months of May to July each year. The SRIWSM bio-engineering guidelines will be followed.
- Agrichemicals shall only be used that are not on the Government of Lao PDR lists of prohibited substances under the Regulation on the Control of Pesticides in Lao PDR (Regulation No 2860/MAF, 11 June 2010) and the Decree on Pesticide Management: (Decree No. 258/GOV, 24 August 2017).

Vegetation

- No tree of more than 200 mm diameter at breast height (1.5 metres above the ground) shall be cleared unless the design drawings specifically require it.
- Other vegetation shall be cleared only within agreed site boundaries or in connection with agreed subproject activities.
- Fire shall not be used as a means of clearing vegetation or for the disposal of cleared vegetation.

Agrichemical Use

- Each cropping system shall be integrated within Lao Gap certification Systems
- Where required PRT provided by the crop protection centre staff of PAFO
- Where warranted IPM training programs provided by PAFO

Water

- The National Environmental Standard (2017) for water quality shall apply in every case.
- A vegetated band of at least 50 metres should be maintained between any areas of disturbance and any water course. Exceptions are made only where irrigation headworks and road crossings must necessarily be closer.
- Irrigation headworks shall utilise the minimum amount of cleared land. During and after construction, the surface drainage from all earthworks shall be directed via sediment traps to ensure that runoff water is clear at the point of discharge into a flowing watercourse.
- Road crossings shall be at 90 degrees to a water course. Properly designed and constructed culverts and bridges shall be used. Road drainage shall be provided and sediment traps shall be installed to ensure that road runoff water is clear at the point of discharge into a flowing water course. Alignments should be at 90 degrees to the water course within a band of 50 metres on each side unless the terrain or an obstruction prevents this.
- All weirs and other obstructions in rivers, streams and canal channels must have provision for native migratory fish to pass.

Animals

- All subproject staff, workers and beneficiaries shall be issued with a list of rare, threatened and endangered species in the area around the subproject, which shall not be hunted, traded or eaten. Such a list shall be included in each subproject IEE and shall be based on the regional data held by the International Union for the Conservation of Nature (IUCN) Red List.

Air

- The National Environmental Standard (2017) for air quality shall apply in every case.
- On all unmetalled surfaces, construction traffic shall be limited to 30 kmh within 250 metres of habitation and 80 kmh elsewhere.
- Dust emissions shall be minimised by spraying water during dry weather and using other site-specific measures.
- Vehicle and machine engines shall be stopped when stationery.

Storage

- No storage of oil, fuel or chemicals is permitted within 50 metres of a water body.
- All stores shall be covered with full rain protection.
- Oil and fuel stores shall have impermeable bunds capable of retaining 150 percent of the stored volume indefinitely.

Hazardous Materials

- Fuels, oils, cement, fertilisers and pesticides shall be included in the category of hazardous materials.
- All hazardous materials shall be stored in secure compounds, with rain protection and bunding in case of spills and leakages.
- Every site where hazardous materials are stored or used shall have spill clean-up equipment and staff trained in its use.
- Fuel handling areas shall be bunded and all drainage water directed through oil traps. Sediment from oil traps shall be sent for disposal at a waste disposal facility authorised for the handling of hydrocarbon waste.

Solid Waste Management

- All work sites shall be provided with sanitary facilities. These may be pit latrines or water-based toilets with septic tanks and subsurface soakaways.
- Solid waste shall be recycled where facilities exist.
- Where solid waste cannot be recycled, it shall be sent to an approved landfill site.
- Fire shall not be used as a means of disposing of waste.

Society

- The National Environmental Standard (2017) for noise and vibrations shall apply in every case.
- There shall be no night-time working (i.e. between sunset and sunrise) within 500 metres of habitation.

Construction Site Safety

- All construction sites shall be delineated with barrier tape and non-project personnel excluded at all times.
- All staff and workers shall wear appropriate personal protective equipment (PPE) at all times that they are on a work site.

- The minimum for all personnel is: reflective vest; safety helmet; and safety boots.
- Other PPE such as gloves, eye protection, ear protection, etc. shall be used according to the work performed or underway nearby in the site.