

Initial Environmental Examination for Nam Phieng 1 and 2 Representative Subprojects

Project Number: 50236-002
April 2019

Lao PDR: Sustainable Rural Infrastructure and
Watershed Management Sector Project

CURRENCY EQUIVALENTS

(as of 5 April 2019)

Currency Unit	–	Kip (KN)
KN1.00	=	\$ 0.000116
\$1.00	=	KN8,600

ABBREVIATIONS

ADB	:	Asian Development Bank
AF	:	Additional Financing
COL	:	Concessional OCR lending
DAFO	:	District Agriculture and Forestry Office
DALAM	:	Department of Agricultural Land Management
DDMCC	:	Department of Disaster Management and Climate Change
ECC	:	Environmental Code of Conduct
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
GIZ	:	Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation Agency)
IEE	:	Initial Environment Examination
IUCN	:	International Union for the Conservation of Nature
IWMI	:	International Water Management Institute
MAF	:	Ministry of Agriculture and Forestry
MONRE	:	Ministry of Natural Resources and Environment
NGO	:	Non-governmental Organisation
NRI	:	Northern Rural Infrastructure Development Project
NSEDP	:	National Socio-Economic Development Plan
NTFP	:	non-timber forest product
PAFO	:	Provincial Agriculture and Forestry Office
PDR	:	People's Democratic Republic (of Laos)
PGT	:	Program Governance Team
PLUP	:	participatory land use planning
PPIT	:	Provincial Project Implementation Team
PONRE	:	Provincial Office of Natural Resources and Environment
PRI	:	productive rural infrastructure
RSP	:	representative subproject
SRIWSM	:	Sustainable Rural Infrastructure and Watershed Management
TRTA	:	Transaction Technical Assistance
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	<p>Securing watershed functions in a sustainable manner. Broadly these functions include:</p> <ul style="list-style-type: none">➤ 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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CONTENTS

	Page
I. INTRODUCTION	1
A. Purpose of the Environmental Review	1
B. Subproject Rationale	1
C. Subproject Design	4
D. Implementation Arrangements	5
II. SUBPROJECT ENVIRONMENTAL SCREENING	11
A. Government of Lao PDR Environmental Policy	11
B. Asian Development Bank Environmental Policy	11
III. CATEGORIZATION OF THE NAM PHIENG SUBPROJECT	12
IV. OUTLINE DESCRIPTION OF THE SUBPROJECT ENVIRONMENT	17
A. Physical Geography	17
B. Water Resources for Agriculture	19
C. Climatic Conditions	21
D. Habitat, Ecology and Wildlife	22
E. Air Quality	22
F. Ambient Noise	22
G. Infrastructure	23
H. Pollutants	23
I. Unexploded Ordnance	24
J. Population and Ethnicity	24
K. Livelihoods, Agriculture, Development and Economic Conditions	25
L. Household survey	27
M. Cultural and Scenic Matters	31
N. Climate Change Considerations	31
V. ENVIRONMENTAL IMPACT MITIGATION	31
A. Environmental Justification	31
B. Potential Environmental Impacts	31
C. Environmental Management and Monitoring	32
D. Consultation	32
E. Information Disseminated	32
F. Results from Consultation	33

Reference Documents

Annex A. Environmental Code of Conduct

I. INTRODUCTION

A. Purpose of the Environmental Review

1. This Environmental Review (ER) has been prepared for one subproject, Nam Phieng irrigation subproject, in Xayaboury Province which is proposed for financing through the Sustainable Rural Infrastructure and Watershed Management - Sector Project (SRIWSM).
2. This subproject has been classified as Category C, this ER comprises a review of environmental implications and is accompanied by Annex A - Environmental Code of Conduct (ECC), which is a simplified Environmental Management and Monitoring Plan (EMP).

B. Subproject Rationale

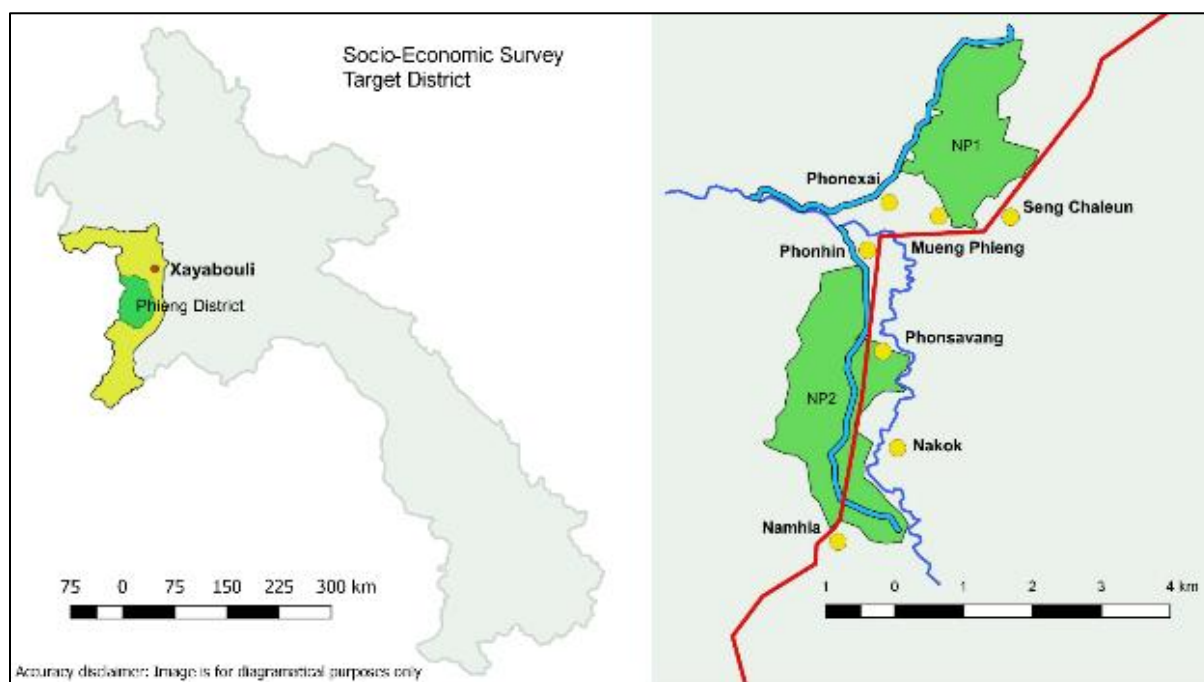
3. The Nam Phieng Irrigation Subproject will support upgrade of the existing irrigation distribution infrastructure. A series of four weirs diverts water for irrigation from the Nam Phieng. The Phieng 1 weir was built in the 1950s and upgraded in 2003-2004. Phieng 2 was built in the late 1960s and also upgraded in the early 2000s. Both headworks are in operational condition but in need of maintenance. Figure 1 shows the layout of the two command areas relative to the upland river catchment.
4. The upgrading works proposed for the Phieng 1 and Phieng 2 irrigation schemes will enable improved water management that enables the expansion of high value crop dry season cropping¹. Currently this opportunity links closely to the contract growing of green soybean production by ensuring water can be scheduled and rotated around the command areas to avoid overwatering and root disease issues. Lower lying areas (see Figure 2) will continue to grow dry season paddy rice due to the impeded drainage in these areas. Overall water demand will reduce as the area of paddy rice is reduced and soybean or other high value crops increases.
5. The flows in the Nam Phieng are considered sufficiently reliable to provide for the proposed dry season irrigated crop area demands, other water users plus environmental flows, as per current practice. The irrigation systems have been operating for over 50 years and the farmers understand the flow characteristics of their systems very well. However, the topography and design water levels along the main canals should be confirmed and operational hydraulic design re-assessed (i.e. some spot levels² are required along the secondary canals to the furthest fields) given that all the main distribution structures are to be upgraded. There is no necessity for a full topographic survey of the schemes, but a canal network base map can be prepared from aerial photographs. However, all canals and structures should be GPS referenced and an inventory of assets prepared that describes their dimensions, design function and condition. All field and land title boundaries should be checked and overlaid on the base map with the land ownership records updated. All permanent activities associated with the proposed upgrading of the schemes are within the existing canal rights of way.

¹ Prescriptive cropping systems are not promoted as the water users will make market based decisions. Currently the preferred option is green soyabean production under contract of r supply to the Chinese market. The 2017-2018 dry season represented the first growing season where such production was undertaken and demonstrated. The results of these demonstrations have resulted in the majority of WUG members seeking these contracts. As market change or are developed alternative crops will emerge and may be grown. Crops such as red bean and lentil crops for the Thailand market are increasingly competitive but currently are considered more risky than the soybean option.

² Spot levels are elevations measurement at a specific spot.

6. In Phieng 1, the 1,680 metres of main canal (MC) is concrete-lined in parts, mainly in-fill sections³. Some erosion is occurring but otherwise embankments are quite sound. Farmers reported some weak sections and the need for cleaning along sections totalling about 500 metres. In total there are 16 canals amounting to a combined length of 19,800 metres, of which 8,000 metres is considered in need of upgrading. The Phieng 1 irrigation scheme was designed to serve 477 ha but currently serves 394 ha in the wet season and 122 ha in the dry season, down from 156 ha in 2004. There are 504 beneficiary households. Since construction, land has been lost to urbanisation and there is an inability to deliver water due to failing canal distribution.

Figure 1. Nam Phieng Subproject. Top, overall area with the water supply catchment outlined in pink. Bottom, distribution canals and command areas.



³ In fill sections are where the canal elevation requires the canal foundation to be raised above the natural ground level through depressions etc.

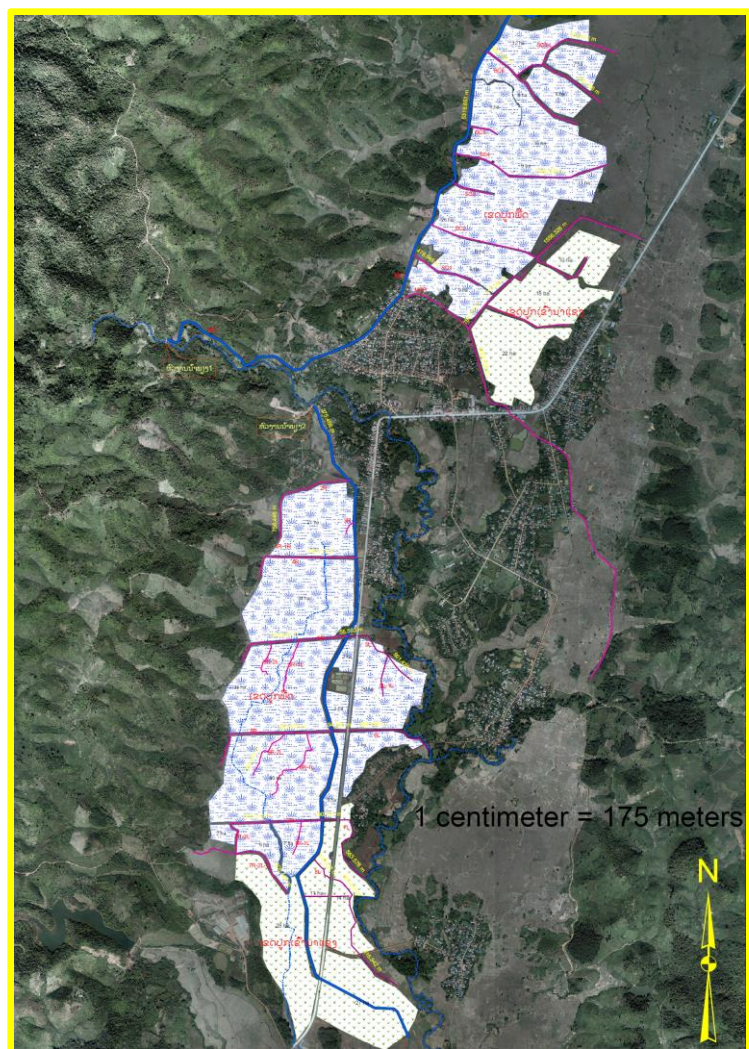


Figure 2: Command Area to be served by subproject (Blue Hatching)

8. In Phieng 1 the irrigated area in the 2018 dry season was only 85 ha of rice, as canal Main Canal number 1 (MC1) was under maintenance. The only main canal – right (MCR) canal was operating. The rice crop was planted from the end of November to mid-December. Phieng 1 farmers would like to switch to dry season soybean production on the higher areas (irrigated from MC1), with rice continuing to be grown on the lower areas due to water tabling impact on soybean productivity.

9. In Phieng 2, the 4,750-metre main canal is lined for the first 600 metres, and then is an earth channel for the remainder. The concrete-lined section is showing signs of damage, with concrete broken longitudinally and the development of holes. The biggest problem is with canal bank collapse in the earth sections: the critical section reported by the farmers in need of repair is between chainages 2,000 and 3,000 metres. There are seven secondary canals of about 4,900 metres in total length, of which some are lined with brick masonry. The Phieng 2 irrigation scheme was designed to serve 320 ha in the wet season but currently serves 295 ha. In the dry season, the design is for 100 ha of rice. It serves 365 households.

10. In 2018, the dry season irrigated area was 86 ha of soybean under a contract farming arrangement. This was also planted from the end of November to mid-December, with no water issues experienced throughout the season. The DAFO and the enterprise had considered planting 100ha however the late rice harvest delayed the sowing of Soyabean. As the market for fresh green soya is only available to mid March late sowing results in the crop being harvested for seed. Soybean yields of 9.2 tonne/ha of green pods, equivalent to 3.5 to 4.0 tonne/ha of seed. Farmers received close to LAK 3 million per hectare for land rent, plus daily labour at LAK 50,000 per day. At harvest, the farmers are paid LAK 25,000 per 50 kg bag, which can reach up to LAK 200,000 a day.

C. Subproject Design

11. Following meetings between the Provincial Irrigation Section (PIS), Water User Association (WUA) reached agreement on the works to be included in the schemes to maximise the immediate benefits from irrigation. Water users seek to grow soybean during the dry season in all areas of both Phieng 1 and Phieng 2 that are not low lying. The soybean will be irrigated in the day time, with drainage or return water being diverted to the rice along with the unregulated flows at night. The planned dry season irrigated cropped areas are 130 ha of soybean and 50 ha of rice in Phieng 1, and 180 ha of soybean and 80 ha of rice in Phieng 2.

12. The infrastructure improvement proposal for Phieng 1 is as follows.

- (i) Canal MC1. (a) Desilting and reshaping along a length of 3,000 metres of earth canal using an excavator. The road embankment along the canal was re-reconstructed in 2018 using Water User Association (WUA) funds and is in good condition overall but needs an upgraded pavement and reshaping, current pavement is laterite. (b) Concrete lining in MC1 in a 20-metre long elevated section between secondary canal (SC) SC3 and SC4, where seepage leaks are occurring. (c) Replacement reinforced cast concrete (RCC) division boxes at all seven secondary canal branches in MC1, plus a concrete-lined section over a culvert located between SC5 and SC6.
- (ii) Canal SC2. Brick lining in some sections, estimated to total 200 metres.
- (iii) Canal MCR-2. The existing concrete channel section through Ban Phonesay needs its capacity increasing along 300 metres, of which 100 metres needs to be covered.

- (iv) Canal SC4. Brick lining over the full length of 1,068 metres.
- (v) Canal SC6. Brick lining over the full length of 780 metres.
- (vi) Canal SC6-L. Brick lining over the full length of 785 metres.

13. The proposed engineering works for Phieng 2 will consist of the following elements.

- (i) Main Canal. Repair of eight division structures at secondary canal offtakes (2R, 3R, 4R, 5R, 6R, 7R, 8L and 9L). In addition, there may be a need for desilting the canal.
- (ii) Canal 2R. Masonry brick lining along 750 metres.
- (iii) Canal 4R. Masonry brick lining along 750 metres.
- (iv) Canal 5R. Masonry brick lining along 750 metres.
- (v) Canal 6R. Masonry brick lining along 100 metres of this 900-metre canal.
- (vi) Canal 7R. Masonry brick lining along 50 metres of this 614-metre canal.
- (vii) Canal 5L. Masonry brick lining along 500 metres of this 556-metre canal.
- (viii) Canal 6L. Masonry brick lining along 50 metres of this 686-metre canal.
- (ix) Canal 7L. Masonry brick lining along 30 metres.

D. Implementation Arrangements

14. 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 into a Provincial Project Implementation Team (PPIT) for the management of the SRIWSM Project.

15. The executing agency (i.e. MAF) and IA (i.e. DOI) will establish a Program Governance mentoring and technical assistance input to procurement and 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 contract management.

16. Government staff are therefore 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. The capabilities required of staff varies depending on the phase of the subproject, and their level and remit, but the common thread required by all is 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. 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 Consultants – 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 (most PONRE have only 3 subprojects to monitor), (iii) PONRE staff receive budgetary support for their additional costs on an output basis ie PAFO will at the instruction of the Provincial Steering Committee 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.

17. 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 safeguards will be assigned through a Memorandum of Understanding (MoU) between the Vice Governor Office, Director of PAFO and Director of PONRE. Additional support is provided by the environmental safeguard consultants in the LIC. PAFO Project management staff, will work with the construction supervision staff, PONRE and DONRE staff to provide the monthly, quarterly safeguard reports that will be submitted to the Vice Governor, and the EA via the PGT in DOI.

18. At the provincial level, a PAFO will assign overall project management to an existing PAFO Deputy Director General and will implement subprojects. Within each PAFO, the technical staff will be assigned to the PPIT must be able to monitor the implementation of works programs with the supervision role also maintaining both social and environmental checklists for site visits. The submission of safeguard reports to the Vice Governor and to the PGT will trigger a consolidation report from the PGT that will be submitted to ADB twice yearly for review and approval.

19. The division of the responsibilities for environmental safeguards is listed in Table 1.

Table 1: Responsibilities Regarding the Environment and Related Safeguards

Project organisation	Management Roles and Responsibilities
Ministry of Agriculture and Forestry (Executing Agency)	<ul style="list-style-type: none"> • The EA will constitute a national steering committee with representatives of MAF, Vice-governors of Participating Provinces (4), MOF, MPI and MONRE.
National Steering Committee	<ul style="list-style-type: none"> • Provide guidance to the IAs and EAs in terms of project scope of work, expected performance standards, remedial action. • Confirm annual performance.
Department of Irrigation (Implementing Agency)	<ul style="list-style-type: none"> • Support and operate the Program Governance Team. • Provide technical support on irrigation technical and institutional issues. • Consolidation of reports
Department of Planning and Finance (within the MAF)	<ul style="list-style-type: none"> • 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 safeguard) 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 a sign-off page
Program Governance Team (within the DOI)	<ul style="list-style-type: none"> • Overall programme management and coordination of separate project investment within the programme. • Define the programme code of conduct including accountability of individuals, authority and levels of delegated authority, jurisdiction and mandate limits. • Produce a project management procedure manual, and the supporting templates, guidelines for planning, budgeting, financial accounts, disbursement, procurement, contract management, reporting, safeguards and audit.

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Technical support for setting up project management systems and templates in the Provincial project management units and the required capability to operate these systems • Ensure safeguard frameworks are being applied in the design of subprojects with each safeguard plan (i.e. the Resettlement and Ethnic Minority Development Plan or REMDP and IEE / EMMP) at the subproject level, to be reviewed and commented on within 30 working days. • Monitor the safeguard implementation of the REMDP and IEE / EMMP during subproject implementation. • Facilitate the development of provincial contractor awareness and capability. • Will ensure that all subproject detailed engineering designs include a first step that confirms dry season water availability for a minimum of 50 percent of the wet season command area and that the social and environmental safeguard screening is confirmed as category B or C under ADB safeguard provisions.
Provincial Steering Committee	<ul style="list-style-type: none"> • Each Participating Province will establish a Provincial Steering Committee chaired by the Vice-governor, Participating District Governors, Directors General of PAFO, Finance, Planning and Investment, and PONRE. • Review annual work plans and provide guidance on project scope and performance standards.
Provincial Project Implementation Team (within the PAFO / PIS)	<ul style="list-style-type: none"> • Each provincial government will form a Project Implementation Team under the Provincial Agriculture and Forestry Office (PAFO), aligned to the Provincial Irrigation Section (PIS) within the PAFO. The PAFO will identify implementation focal points in DALAM and DOF to be seconded into the project management structure of the PIT to support activities relating to land use planning, catchment management and land registration administration. • Establish operational systems with staff assigned and with the capacity to maintain the project administration and management systems • Establish and maintain subproject monitoring and impact assessment using the RSP irrigation modernization as a wider learning site • 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 according to the templates specified by the Program Governance Team • For the Representative Subproject • Obtain final approval from the Director General of the PAFO in accordance with the Irrigation Law 2014 - (Article 38).

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • With support of the Program Governance Team identify local contractors and conduct awareness and capacity building programmes to increase the inclusiveness of local contracting companies. • Complete land acquisition and compensation programme as per the REGDP. • Contract management during implementation • Ensure implementation of the Environmental Management and Monitoring Plan. • Ensure implementation of the REGDP action plan. • Safeguard monitoring as per the LARP and REGDP subproject documents. • On project completion as confirmed by the construction supervision consultant (Program Governance Team) the Project Director (PAFO) shall conduct a site inspection in accordance with the Public Work and Irrigation Law. On confirmation of contract completion the PAFO will transfer the operation and maintenance of the asset to the water user group. • For Water User Groups: • Provide awareness and capacity building on project activities, water user group implementation roles and procurement modalities. • Monitor and mentor water user group contracting of in-command area works.
PONRE Land Registration Department	<ul style="list-style-type: none"> • Conduct land registration. • Issue land title and demarcation.
PONRE Environmental Management Department	<ul style="list-style-type: none"> • 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. • Provide Quarterly monitoring reports to PAFO
MAF – DALAM	<ul style="list-style-type: none"> • Agricultural land use planning guidelines and verification.
PAFO – DALAM	<ul style="list-style-type: none"> • Agricultural land registration survey. • Consultation of land users in command areas • Land registration proposal for agricultural land
MAF - Department of Forestry	<ul style="list-style-type: none"> • Forest Land Use Guidelines and quality verification.
PAFO - Department of Forestry	<ul style="list-style-type: none"> • Forest Land use zonation and survey demarcation. • Supervision of forestry activities funded by ADB.

20. During the infrastructure operation period, following construction and commissioning, the subproject infrastructure is operated by the WUA. The subproject infrastructure will be handed over to the WUA at the time of commissioning with government agency only responsible for supporting a general overview role.

21. The environmental monitoring portfolio of the PONRE means that its staff are responsible for ensuring compliance with environmental safeguards under all activities of the subprojects supported by the SRIWSM, and during the subsequent infrastructure operational period, which is indefinite. This role includes review of submitted reports, analysis of the information provided and occasional field visits to verify findings. These staff are responsible for ensuring that the project's environmental impacts really are effectively mitigated, and for flagging up shortcomings in its strategy if this does not appear to be the case. This takes place both through the PONRE, and at national level, through the ministry itself.

22. Reforms of government to separate the environmental portfolio from agriculture and forestry started in 2017 and are not yet complete. Capacity in this respect is therefore still being developed, particularly at the provincial and district levels. Early in the subproject, the loan implementation consultants will therefore 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.

1. Water User Association

23. The subproject WUA becomes the owner of the infrastructure at the time it is commissioned. It then has the responsibility for managing and maintaining it, and ensuring environmental mitigation during the operational period of the infrastructure – which in effect means throughout the lifetime of the engineering works created under the subproject. During the design period, the members of the WUA being the respective Water User Groups (WUG) from each site will be given the support required by its members to understand and commit to implementing operational mitigation measures during their use of the subproject facilities.⁴ Further support is required during the later construction period, in the run-up to the handover of the infrastructure. It is likely that the WUG members' capacity will need to be enhanced in order to be able to undertake some aspects of these obligations.

2. Loan Implementation Consultant

24. The project implementation consultant 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 Loan Implementation Consultant with two environmental specialists- See PAM for detailed ToRs to support environmental monitoring during implementation.

25. The LIC environmental specialists work with the WUG, PAFO and DAFO and the contractors for the subproject, to ensure the ECC is effectively implemented. 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.

3. Contractors and Subcontractors

26. All contract documents must include 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

⁴ The proposed IFAD project will support WUG capacity strengthening

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.

27. 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. This must not be allowed to happen, or it will mean that the subproject and therefore the overall SRIWSM is non-compliant with respect to both government and ADB safeguards.

28. 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 his 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.

4. Summary of Institutional Arrangements

29. 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 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 ECC 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.

30. Each PPIT will nominate an environmental safeguards focal point to support LIC Environment Specialists and PGT with co-ordination at the province level. The PPIT environmental safeguards focal point will undertake joint site visits with subproject Supervision Staff and Contractors to review implementation of ECC 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.

31. The LIC Environmental Specialists (LIC ES) will provide safeguards capacity development training for PGT, PPIT, LIC, Contractors and GRM focal points on ECC mitigation and monitoring measures, templates for environmental monitoring and reporting.

32. The Contractor will be required to 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 ECC 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 ECC and GRM implementation for submission to PPIT, PGT and LIC.

33. The construction supervision staff (CSC) will be responsible for day to day monitoring of implementation of health and safety and ECC requirements and issuing instructions for corrective actions, as needed.

34. ADB will visit project sites and review project performance against the ECC 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) update the ECC.

II. SUBPROJECT ENVIRONMENTAL SCREENING

A. Government of Lao PDR Environmental Policy

35. The Decree on Environmental Impact Assessment (EIA Decree), dated April 2010 sets out the principal institutional arrangements, assigning primary responsibility for undertaking environmental assessment of projects to the project developer, which may be an individual or private sector entity as well as a Government Department. In the case of development projects, the relevant line Ministry is responsible to review and assess draft environmental assessments and issue its own approval before submission to the Ministry of Natural Resources and Environment (MONRE) – formerly the Water Resource and Environment Administration – and local administrations, as appropriate. The MONRE is responsible for the review and approval of environmental assessment reports, co-ordination of monitoring and evaluation, and issuance of compliance certificates, acting through the head office in Vientiane or through its provincial departments. Public participation and discussion with local administrations is required throughout the environmental assessment process.

36. Investment projects are categorised according to a schedule to the EIA Decree into:

- (i) Category 1: small scale investment projects with minor environmental and social impacts, for which initial environmental examination is required;
- (ii) Category 2: Large scale investment projects which are complicated or create significant environmental and social impacts, for which environmental impact assessment is required.

37. For irrigation projects, those with a command area of between 100 and 2,000 hectares are in category 1, and those with a command area greater than 2,000 hectares are in category 2. The implication is that an irrigation project with a command area less than 100 hectares and with negligible environmental impacts would not qualify as either. In the EIA Decree, where a project is of a type that is not in either category, an investment application is submitted to the MONRE for screening.

B. Asian Development Bank Environmental Policy

38. ADB's environmental policy is described in its Environment Safeguards: a Good Practice Sourcebook – Draft Working Document, dated December 2012. This provides guidance for implementation of the Environmental Assessment Guidelines (2003). In turn, these go into considerable detail on a number of issues which must be incorporated into the EARF and IEE

documents. Key among them is the initial screening of projects, which leads to the following three categories.

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

Category B: A proposed project is classified as Category B if its potential adverse environmental impacts are less adverse than those of Category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects.

Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

III. CATEGORIZATION OF THE NAM PHIENG SUBPROJECT

39. The Nam Phieng Subproject was screened using the criteria summarised in Table 4a, which forms part of the review process described in the EARF. This is designed in accordance with both government and ADB criteria. The screening resulted in it not being allocated to either of the MONRE categories, and being classified as ADB category C. The subproject does not require the use of any new land or any increased water offtake for irrigation. It only involves improvements to existing irrigation canals and water management systems. There will be very localised environmental impacts of a number of types as a result of small scale construction activities, but the likely impacts are expected to be temporary and effectively controlled with simple mitigation measures and good construction site management practices. An ECC has been prepared that sets out these measures. These documents can be shared with the Provincial Office of Natural Resources and Environment (PONRE) for issue of environmental compliance certificate, as required.

Table 2a: Environmental appraisal categorisation checklist

Screening issue	Outcome
<ol style="list-style-type: none"> 1. Will the subproject involve an irrigation command area of more than 2000 hectares? 2. Will the subproject involve an irrigation command area of more than 100 hectares? 3. Might the siting of the subproject cause the removal of native trees and shrubs? 4. Might the site of the subproject be affected by climate conditions including extreme weather-related events such as floods, droughts, storms or landslides? 5. Will the subproject cause alteration of surface water hydrology that might result in increased sediment in streams? 6. Will there be bare surface at the construction site that might give rise to soil erosion? 7. Might silt and waste runoff from construction lead to a deterioration of surface water quality? 8. Might there be increased air pollution due to subproject construction and operation? 9. Might there be increased noise and vibration due to subproject construction and operation? 10. Might the subproject or its construction generate solid waste or hazardous waste? 11. Might chemicals or fuels be stored and used for the subproject or its construction? 12. Might wastewater be produced during subproject construction or operation? 13. Might there be construction dust and erosion from earthworks? 14. Might there be any loss of habitat or micro-habitat for local biodiversity? 15. Might there be changes to local drainage? 16. Might the subproject involve an excessive use of local water resources? 17. Might the subproject lead to water use conflicts? 18. Might the subproject cause cumulative impacts on limited water resources? 19. Might the construction and use of access roads be close to and affect residences, waterways or other facilities due to dust, noise or runoff? 20. For agricultural components, might there be transport, storage, handling and use of materials, and inputs of seeds, seedlings, fertilisers and pesticides? 21. Might there be increased residues of plastics, including mulch materials, in soil and water? 	<ul style="list-style-type: none"> • If “yes”, then it qualifies as MONRE category 2 (ADB category A) and cannot be supported. • If no, then address all of the questions below. • If the answer to any one of these questions is “yes” and the potential adverse impacts are likely to be significant, irreversible, diverse or unprecedented, then it qualifies as MONRE category 2 (ADB category A) and cannot be supported. • If the answer to any one of these questions is “yes”, but the likely impacts are reversible and can be mitigated, then it qualifies as MONRE category 1 (ADB category B) and requires an IEE (see Environmental Assessment and Review Framework). • If the answer to all of these questions is “no”, then it does not fall into a MONRE category (but fits ADB category C), it requires an investment application that must be covered by an Environmental Code of Conduct

22. Will soil conservation and management risks be increased or important for the sustainability of the infrastructure
23. Will the subproject increase the use of pesticides?
24. Will fertiliser use increase with the diversification and intensification of irrigated cropping?
25. Will there be a change greenhouse gas emissions?
26. Will there be increased risks to occupational safety and health from physical, chemical hazards including UXO?
27. Will there be changes to the Community Safety and Health risk arising from traffic and vehicle movement, in-migration of labor, and chemical use?

**Table 2b. Environmental appraisal categorisation checklist
completed for Nam Phieng**

Screening issue	Finding
1. Will the subproject involve an irrigation command area of more than 2000 hectares?	• No.
2. Will the subproject involve an irrigation command area of more than 100 hectares?	• No.
3. Might the siting of the subproject cause the removal of native trees and shrubs?	• No.
4. Might the site of the subproject be affected by climate conditions including extreme weather-related events such as floods, droughts, storms or landslides?	• Not beyond what can be mitigated by appropriate climate resilience measures, to be put in place in line with the project's CRVA.
5. Will the subproject cause alteration of surface water hydrology that might result in increased sediment in streams?	• No.
6. Will there be bare surfaces at the construction site that might give rise to soil erosion?	• Not beyond what can be fully controlled through the COC.
7. Might silt and waste runoff from construction lead to a deterioration of surface water quality?	• Not beyond what can be fully controlled through the COC.
8. Might there be increased air pollution due to subproject construction and operation?	• Not beyond what can be fully controlled through the COC.
9. Might there be increased noise and vibration due to subproject construction and operation?	• Not beyond what can be fully controlled through the COC.
10. Might the subproject or its construction generate solid waste or hazardous waste?	• Not beyond what can be fully controlled through the COC.
11. Might chemicals or fuels be stored and used for the subproject or its construction?	• Not beyond what can be fully controlled through the COC.
12. Might wastewater be produced during subproject construction or operation?	• Not beyond what can be fully controlled through the COC.
13. Might there be construction dust and erosion from earthworks?	• Not beyond what can be fully controlled through the COC.
14. Might there be any loss of habitat or micro-habitat for local biodiversity?	• No.
15. Might there be changes to local drainage?	• No.
16. Might the subproject involve an excessive use of local water resources?	• No.
17. Might the subproject lead to water use conflicts?	• No.
18. Might the subproject cause cumulative impacts on limited water resources?	• No.
19. Might the construction and use of access roads be close to and affect residences, waterways or other facilities due to dust, noise or runoff?	• No.
20. For agricultural components, might there be transport, storage, handling and use of materials, and inputs of seeds, seedlings, fertilisers and pesticides?	• Not beyond what can be controlled through planned capacity building of PAFO staff.
21. Might there be increased residues of plastics, including mulch materials, in soil and water?	• Not expected.
22. Will Soil Conservation and Management risks be increased	• No – to the contrary substantial gains are likely from non paddy crop

23. Will the subproject increase the use of pesticides
24. Will fertiliser use increase
25. Will there be a change in greenhouse gases
26. Will there be increased risk to occupational safety and health from physical and chemical hazards including UXO
27. Will there be changes to the Community Safety and Health Risks from Traffic and vehicle movement, in-migration and chemical use
- rotations
- Command area pesticide use is unlikely to increase although the crop type and chemical used may change
 - Based on expected soya bean cropping the fertiliser use will change from nitrogenous fertiliser to phosphate and Potash, With multiple cropping in the dry season fertiliser use may increase
 - Yes but minimal declines, from the reduction in dry season paddy production and the movement away from nitrogenous fertilisers
 - Occupation risks will increase for areas not previously dry season cropped with additional canal structures, UXO exposure is however possible and will Provincial certification of UXO clearance
 - Construction vehicle risks will increase however post construction community access will not require the use of the main road reducing risks from traffic, local construction is expected and the labor risks to community will be low but need to be managed, the number of people handling chemicals may increase as cropping during the dry season is diversified in the short term as the agrichemical use is under the contract farming arrangement most is applied by the contract holders staff.

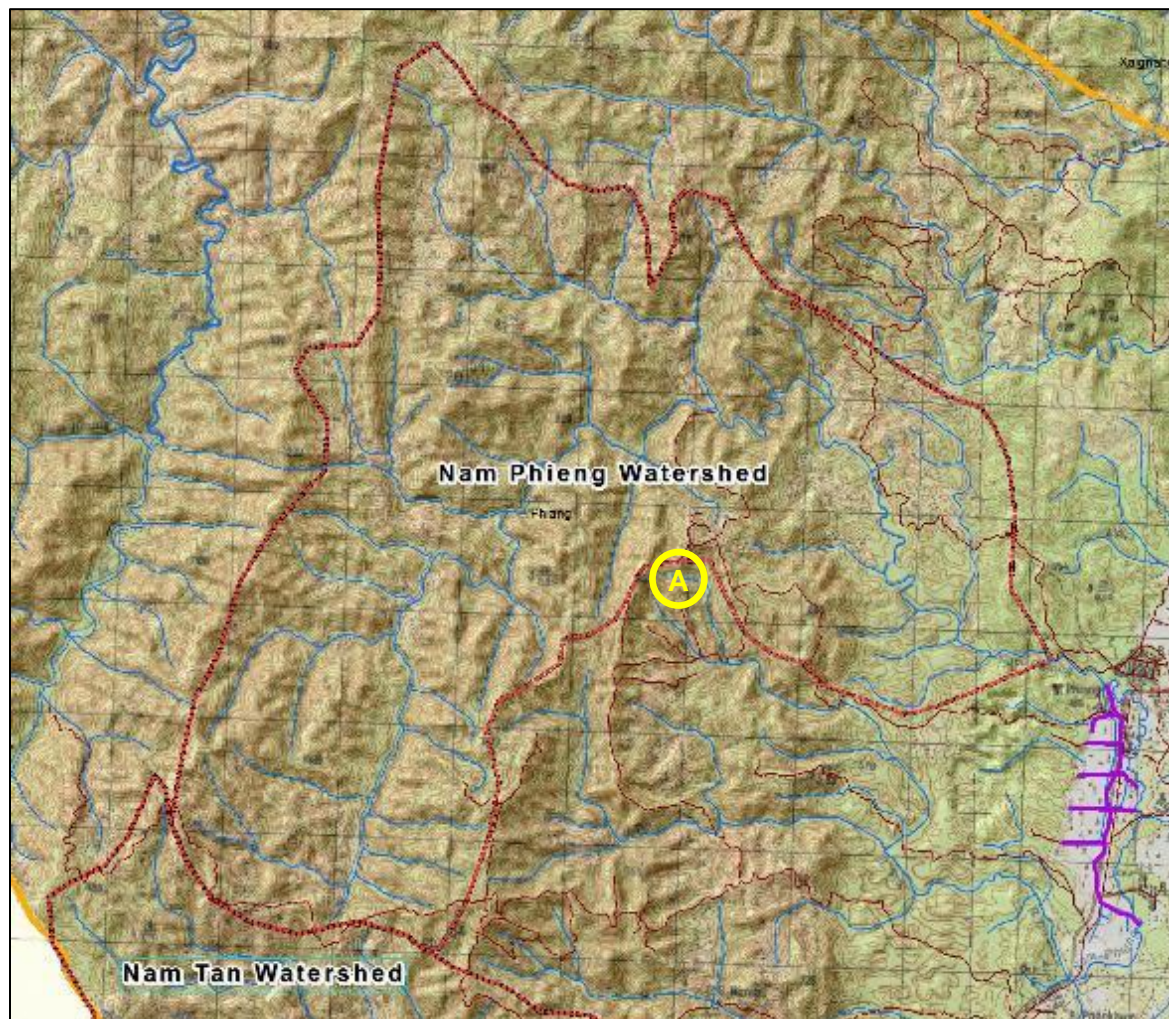
IV. OUTLINE DESCRIPTION OF THE SUBPROJECT ENVIRONMENT

40. The paragraphs below provide a summary description of the subproject environment.

A. Physical Geography

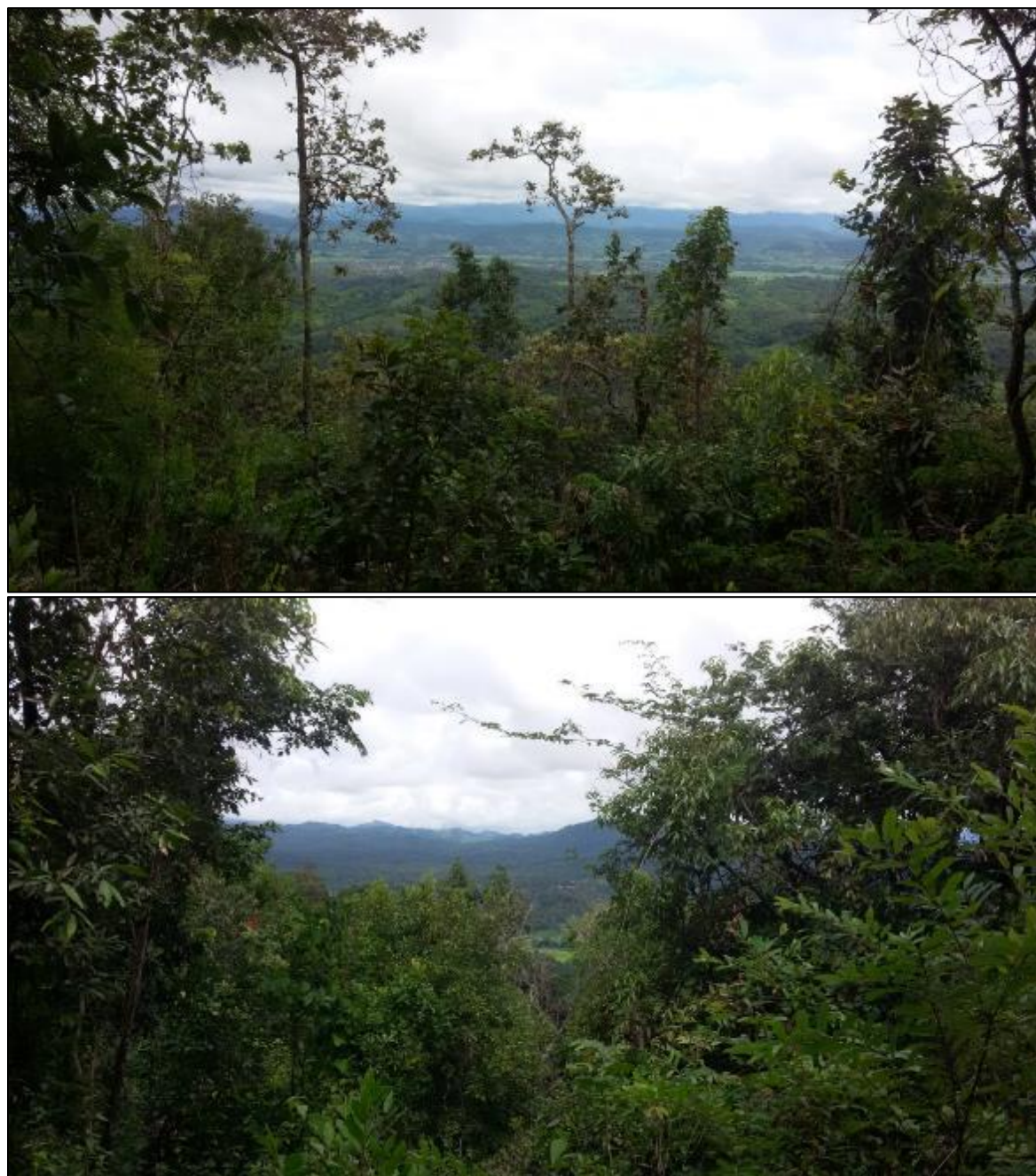
41. The Nam Phieng catchment is in a hilly area of Lao PDR on the western side of the Mekong. A map shows the layout in Figure 2. The broad lowland valleys that have been developed into the Phieng 1 and Phieng 2 command areas are between 350 and 400 metres above sea level. The hills in the south-western part of the upper catchment rise to between 900 and 1200 metres along the boundary of the watershed. The dendritic drainage network appears to be controlled to some extent by the underlying geological structure, since the river and its tributaries tend to have dominant flow lines that trend either east-south-east or north-north-east. However, the geology is mixed locally, leading to a range of soil types. Some of these include heavy lateritic clays, which indicate ancient landforms that have been subject to prolonged and intense weathering. As a result, slopes tend to be rounded rather than rugged, and wet season runoff contains a significant level of very fine suspended sediment from natural erosion.

Figure 2. Topographic map of the Nam Phieng watershed. The purple lines in the bottom right hand corner are the distribution canals in the Phieng 2 command area. Point A is the viewpoint used for the image in Figure 3.



42. In the lowland command areas, the land cover is almost exclusively of agricultural crops. Pockets of lowland rice paddy are also found along the river sides in the lower, eastern part of the upstream catchment. Above these are some tree plantations (mainly rubber and teak), but forest trees predominate on the slopes of the upper catchment (see Figure 3). Most of these are relatively young, as the area was categorised as protection forest in 2012 and much of the upland is returning from fallowed shifting cultivation back into semi-natural forest. The protected forest is generally healthy, with the trees showing good growth rates and a variety of native species. There are still a few small pockets of shifting cultivation; some felling and pit sawing were also observed, remaining large trees are under threat; and some cattle were being grazed high in the forest.

Figure 3. Views of the Nam Phieng water supply catchment from Point A in Figure 2. Top: eastwards over the lower part of the catchment; the low-lying Phieng 2 command area is visible in the middle distance. Bottom: westwards across the upper catchment.



B. Water Resources for Agriculture

43. There is no flow recording station on the river and apart from one gauging record made at Phieng 2 weir in 2016 (see below), no other records could be provided by the PIS or Water Resources Department at provincial and district levels. The estimates of available water are therefore based mainly on the experience of the farmers, who have used the existing irrigation systems for more than 50 years.



Figure 4: Above the headworks

44. There is an agreement between Phieng 1 and Phieng 2 (made by the PAFO) to share water for dry season rice irrigation, which is for 150 ha at Phieng 1 and 100 ha at Phieng 2. In the recent past, 2013 was a particularly dry year and rationing was required, but normally there is sufficient water for this arrangement. In 2016, Phieng 2 successfully grew 126 ha of dry season rice. There is no agreement to pass water on to the weirs downstream of Phieng 2, although some water is allowed to pass, there is leakage through the weir and some irrigation return water finds its way back into the river for use downstream.

45. The water supply for Ban Phonxsay and Ban Muang Phieng comes from soakage galleries adjacent to the river downstream of the Phieng 1 weir. The water is pumped into a tank and reticulated through the villages. Connections are metered with a tariff of LAK 2,700 per cubic metre. The farmers could not recall there ever being an issue with the water supply source.

46. Flows in the Nam Phieng are always good in November and December, and similar every year. There have been no noticeable changes over the years. Flows are said to be lower now in March than they used to be, but irrigation is usually over at this stage and for the soyabean cropping the last irrigation is at the end of February. The reasons for this are not known: farmers suggested climate change or additional upland cropping. Both the PIS and the farmers reported that there are no further weirs or other developments affecting flows that are planned upstream of Phieng 1.

47. The flow immediately above the Phieng 2 weir was measured in February 2016 at 0.37 m³/s, according to a Master's paper by a Mr. Thongsavanh. At this time Phieng 1 was irrigating 143 ha of rice (confirmed from WUA records), and the estimated flow to this provided by PIS was that about 0.8 m³/s was flowing above Phieng 1. Based on this, the PIS estimates for average dry season water flows are as follows.

- Natural flow above the Phieng 1 weir: 808 l/s.
- Flow diverted to Phieng 1 irrigation scheme: 195 l/s.

- Remaining natural flow above the Phieng 2 weir: 613 l/s.
- Flow diverted to Phieng 2 irrigation scheme: 270 l/s.
- Remaining natural flow below the Phieng 2 weir: 343 l/s.

48. These figures suggest that approximately 42 percent of the total natural flow appears to remain in the Nam Phieng below the two scheme offtakes, for ecological purposes and other downstream uses.

49. Based on the discussions with the farmers, historically there appears to be sufficient water for full irrigation in the dry season, as the systems were designed for 150 and 100 ha of dry season rice in Phieng 1 and 2 respectively. Since Phieng 2 successfully grew 126 ha of dry season rice in 2016, both the farmers and the staff of the PIS believe that with an improved distribution system they could grow 150 ha in the same scheme. However, the proposal is to switch to growing a combination of soybean with daytime irrigation and rice with night time irrigation. Given these crops' water demands, sufficient water will be available for the proposed cropping areas of 130 ha of soybean and 50 to 60 ha of rice in Phieng 1, and 170 ha of soybean and 80 ha of rice in Phieng 2. Overall water use will reduce during the day time and be unchanged at night maintaining or improving current environmental flows since ADB CMI project.



C. Climatic Conditions

50. There are no weather data specifically for the Nam Phieng catchment, so climate must be considered at the provincial scale. Xayaboury as a whole has a humid tropical climate, being situated between 19.5 and 21.0 degrees north of the equator. Average temperatures are generally in the range of 15 to 30 degrees centigrade throughout the year in the valleys. Temperature declines with elevation, to the extent that the high land at the head of the catchment has a temperature regime about five degrees cooler than the valley bottoms. To this extent the

higher areas might be considered to have subtropical climates, while the valley bottoms are tropical.

51. Moisture is dominated by seasonal air movements, with most rainfall coming with the south-west monsoon during the northern hemisphere summer. Simply put, the northward migration of the sun draws warm, moist maritime air from the Indian Ocean across the land masses of south and south-east Asia. Rainfall varies across Laos, but Xayaboury is in a moderate rainfall belt. The one weather station in the Province, at Xayaboury City, has an average annual rainfall of 2,340 mm over a data period of 47 years. The range of annual totals recorded over the same period shows variations between 2,900 and 3,800 mm. This is a reasonable variation – 19 percent either side of the mean – but not as variable as found in some provinces in northern Lao PDR.

D. Habitat, Ecology and Wildlife

52. While they are not close to the Nam Phieng catchment, a number of protected areas exist in the region that contain a wide range of animal and plant species, including a number that are classified as Critically Endangered, Endangered or Vulnerable on the IUCN Red List. The Nam Pouy National Biodiversity Conservation Area lies in the north-western part of the province and covers 1,780 square kilometres. It was designated largely for the conservation of elephants. This is effectively the same area as the internationally recognised Nam Phoun Key Biodiversity Area, which is both designated separately and named differently. The nearest point is around 15 km from the subproject area. Close across the border in Thailand, lie the Dai Phukha and Mae Charim National Parks (also internationally designated as Key Biodiversity Areas). The subproject site is also about 15 km from the defined Key Biodiversity Area along the Mekong River from Louang Prabang to Vientiane. Despite being largely an altered environment, this riverine ecosystem contains a number of Critically Endangered, Endangered or Vulnerable species, significant migratory bird habitat and species congregations, and other important biodiversity features. The subproject area is all existing agricultural land and has no commercial or conservation trees within the command area.

53. Consultation with water users and officials confirmed that conservation species were not present in the command area below the headworks and that few remain in the upper catchment due to habitat fragmentation. For example, in Phonesay village over the last 5 years, no wildlife has been observed in the village forest. In the wider Nam Phieng watershed wildlife as wild boar, wild chicken, palm civet, moles, muntiacus, Sciuridae, Tupaiidae, Cervus unicolor are still present but increasingly rare. Small fish are found along the irrigation canals and villagers catch them on occasions in both dry and wet season.

E. Air Quality

54. There are no records of air quality measurements in the Nam Phieng catchment, and being a rural area with no significant industries other than agriculture, the air quality is generally good. There are the usual short-duration impacts from road traffic in the vicinity of the few existing unsurfaced roads, in the form of vehicle emissions, and dust during the dry season, but traffic levels are usually very low.

F. Ambient Noise

55. As with air quality, there are no records of ambient noise measurements in the Nam Phieng catchment, and being a rural area with no industries other than agriculture, ambient noise

levels are generally quite low. Agricultural activities can themselves generate localised noise, particularly from tractors and brush cutters, but these are usually tolerated in rural communities. There is also the usual short-duration impact from vehicle noise in the vicinity of the few existing roads, but traffic levels are low.

G. Infrastructure

56. The lower part of the Nam Phieng catchment, where the two command areas are located, is well served by roads, with a national highway running across both areas. This makes access to Ban Muang Phieng very easy, and also means that the residents have good access to the full range of socio-economic services elsewhere in the district and province. From the highway, small access roads run into the hills around the upper part of the watershed. These are accessible either on foot or by tractor. However, as the upper catchment itself is designated as protection forest, it does not have any roads running into it.

57. Residential areas are located mostly along the main highway which is also on one of the higher elevations in Phieng 1. For Phieng 1 houses are aligned along the main highway and at locations within the wider command areas. No residential area is aligned with drainage zones however canal leakage can affect local access points.

H. Pollutants

58. There are no known pollutants in the upper Nam Phieng catchment. Since it is mostly forested and the forest is recovering under its state protection, pollution is unlikely. The water quality at the upper irrigation headworks appears to be good. During the wet season, however, it does contain a certain level of fine suspended sediment that raises the turbidity. This appears to be the result of a low level of semi-natural erosion of the soils under the re-growing forest, added to by man-induced erosion from the pockets of lowland rice paddies close to the river. It is possible that pollution of the soil and water may occur in the command areas due to over-use of agri-chemicals current use rates are very low by international standards and the proposed soya diversification reduces some of the risk. It will be important for the PAFO staff to monitor this, as it is elsewhere throughout northern Lao PDR.

Table 3: Agrichemical Use

Crop	Urea	NPK (15-15-15)	
Fertiliser Use (kg.ha)			
WS Rice	50	50	
DS Rice	100	50-100	
Soya	-	150	
Agrichemical Use	Herbicide 24d	Glyphosate	Pesticide
DS Rice	30kg/ha	Nil	Depends on crop season
Soyabean	Nil to 15kg/ha	12kg/ha	1.5 l/ha
Herbicide use for Soyabean is a function of the wet season rice harvest date - rice early harvest requires less or no herbicide use			



Figure 5: Command Area landscape

I. Unexploded Ordnance

59. Xayaboury Province as a whole has very limited amounts of unexploded ordnance, being on the opposite side of the country from the bombing zones of the 1960s and 1970s. None is known of in the Nam Phieng catchment. . The Government will be required to certify to ADB that all Project areas are clear of UXO, with any UXO clearance activities being the responsibility of the Government of Laos. No Contract may be awarded without this certification.

J. Population and Ethnicity

60. In the seven villages that use the Phieng 1 and Phieng 2 command areas, there is a total of 1,873 households comprising almost 10,000 people (Table 4). All are predominantly ethnic Lao, apart from the village of Namhair, which is mainly Hmong.

**Table 4: Summary of the household characteristics
in the villages affected by the subproject**

Village name	Ethnicity	Population	HH	Male	Female	HH headed by women	Command area (ha)	Irrigated area (ha)
Phieng 1								
Phonexay	Lao	1,934	357	966	968	12	141	141
Muang Phieng	Lao	1,852	332	940	912	15	123	123
Sengchaleun	Lao	1,464	329	747	717	12	55	55
		5,250	1,018	2,653	2,597	39	319	319
Phieng 2								
Phonhin	Lao	1,411	282	725	868	14	108	108
Phonsavang	Lao	448	91	225	223	8	43	43
Namhair	Hmong	1,619	258	807	812	4	51	51
Nakok	Lao	1,171	224	599	572	6	2	2
		4,649	855	2,356	2,475	32	204	204
Total		9,899	1,873	5,009	5,072	71	523	523

K. Livelihoods, Agriculture, Development and Economic Conditions

61. There are 4 villages accessing land irrigated by NP1, with Phonxai, Meuang Phieng and Seng Chaleun being the 3 dominant user villages. All seven villages identified in the project access NP2, with four villages being the dominant user villages - Phonhin, Phonsavang, Namhia and Seng Chaleun. Of note, Seng Chaleun has fairly even user access of NP1 and NP2. Meanwhile, Nakok village only accesses 2ha of irrigated land in NP2 (compared with an average in NP2 of 83ha access/village). Basic information of the communities is shown in Table 5 whereas Table 6 summarizes the basic household demographics of the surveyed villages.

Table 5: Village Data – NP1 and NP2

Sub Project	Sub project Villages	Ethnicity by %	Popn	# HHs	# M	# F	Single F HHs	Poor / vulnerable HHs	Current Irrigated areas (2017 WS)
NP1	Phonhin	Lao 98%	1,411	275	725	686	7	0	10
NP1	Phonxai	Lao 97%	1,934	355	966	968	30	4	141
<i>NP1</i>	<i>Meuang phieng</i>	<i>Lao</i>	<i>1,852</i>	<i>332</i>	<i>940</i>	<i>912</i>	<i>15</i>		<i>123</i>
<i>NP1</i>	<i>Seng chaleun</i>	<i>Lao</i>	<i>1,464</i>	<i>329</i>	<i>747</i>	<i>717</i>	<i>12</i>		<i>55</i>
NP1	Phonhin	Lao 98%	1,411	282	725	686	7	0	104
NP1	Phonxai	Lao 97%	1,934	355	966	968	30	4	2
NP2	Namhia	Hmong	1,619	258	807	812	15	0	45
<i>NP2</i>	<i>Phon-savang</i>	<i>Lao</i>	<i>448</i>	<i>91</i>	<i>225</i>	<i>223</i>	<i>8</i>		<i>43</i>
<i>NP2</i>	<i>Nakok</i>	<i>Lao</i>	<i>1,171</i>	<i>224</i>	<i>599</i>	<i>572</i>	<i>6</i>		<i>2</i>
<i>NP2</i>	<i>Meuang phieng</i>	<i>Lao</i>	<i>1,852</i>	<i>332</i>	<i>940</i>	<i>912</i>	<i>15</i>		<i>9</i>
NP2	Seng chaleun	Lao	1,464	329	747	717	12		40

Source: Phonhin; Phonxai; Namhia: Village Authority interview; Source: Phonsavang; Nakok; Meuang phieng; Seng chaleun: Project Data

Table 6: Ethnic Group Demographics

Village	No HHs	EG HHs (show by %)	Total M	Total F	Single FHH	Poor / Vulnerable HHs	Land-less HHs	Ave HH popn
Phonhin	275	2% ⁵	725	686	7	0	0	5.1
Phonxai	355	3%	968	966	30	4	0	5.4
Namhia	258	62%	807	812	15	0	0	6.2

Source: Village Authority interview

62. Notably, Namhia is the only ethnic (Hmong) majority community accessing the irrigation system (Table 7). Discussions suggest that there is a degree of cultural integration between Namhia and surrounding Lao Loum communities (for example, a Hmong woman explained how since the last 10 years Hmong and Lao Loum people have started to contribute to and attend each-others ethnic ceremonies), while other ethnic distinctions remain.

⁵ 33% if include Lue (Lue considered similar to Lao Loum)

Table 7: Distribution of ethnicity of users (3 surveyed villages)

Sys tem	Village	Total irrigation users	Wet Season 2017							Dry season 2018							
			Lao		Hmong		Total	Rice		irrigation users	Lao		Hmong		DS area	Soya bean	Rice
			H	HH	%	HH	%	ha	HH	%	HH	HH	%	HH	%	Area	HH
NP1	Phonhin	12	12	100	0	0	10	10	100	3	3	100	0	0	3	0	3
NP1	Phonxai	191	190	99	1	1	141	141	100	40	40	100	0	0	21	0	40
NP2	Phonhin	127	127	100	0	0	104	104	100	65	65	100	0	0	53	65	0
NP2	Phonxai	5	5	100	0	0	2	2	100	0	0	0	0	0	0	0	0
NP2	Namhia	59	12	20	47	80	45	45	100	15	10	67	5	33	14	15	0

Source: WUG –Committee Interview

63. At commune level and in WUGs the survey identified two main groups of priorities, firstly, the technical issues of the irrigation systems and secondly, market stability for commercial (non-rice) crops. Technical issues of the irrigation systems included water leakage from canals impacting on quantity and timing of water provision to farmers and lack of women participation in WUGs (target is at least 20% of positions in WUG committees would be filled by women). Market stability for commercial (non-rice) crops is unreliable with companies encouraging growing of various cash crops but purchasing the produce due to market price fluctuations. Renting land/labor to the company was a method considered to manage this risk. Issues related to ethnicity, labor migration, all-year access, or natural disaster (flooding/landslides) were not listed to be significant issues in Phieng District. The table 8 provides a summary of the concerns raised.

Table 8: Core Development Priorities in Phieng

Development issues	Priorities	Agri Production Issues	Priority Needs
Irrigation infrastructure	Rehabilitation of systems	Water losses from canal systems; Users at the end of the systems not accessing water Sedimentation in front of the weir of NP1	Canal rehabilitation. Reverse trend of reduced irrigation due to water loss
Market stability for commercial crops	Stable markets	Reliance on a few companies for inputs; purchase; market access	Improved / reliable market access
Irrigation management		Respect for WUG regulations; Women participation in WUGs	Addition WUG support Promote rice cultivation.
Labor migration		Labor leaving for work in other provinces/ Thailand	
Land constraints		Limited land for cash crops (Phonxai) as upland of	

Namphieng river catchment is a
protected forest area.

Livestock

livestock rearing promotion
(Namhia)

64. All communities and villages were enthusiastic for the rehabilitation of the Nam Phieng 1 and 2 systems, due to leakage, broken structures and insufficient water at the end of the systems. The other key issue raised in discussions was the lack of stable markets, particularly for cash crops, and that companies come to support cash crop cultivation (verbal and letter contract farming), but the agreements are not strictly enforced (re. price; returning fields to original condition). Other issues raised in village level discussions was on the need to connect a village road to the canal road (70m of access road needed) so that villagers can access the fields in that area directly. For village development priorities see Table 9.

Table 9: Village Development Priorities

Village	Dev Priority 1	Dev Priority 2	Dev Priority 3	Dev Priority 4
Phonhin	Namphieng 2 irrigation rehabilitation	Rice cultivation promotion	Rubber planting	Job's Tears cultivation promotion
Phonxai	Namphieng 1 irrigation rehabilitation	Rice and cash crops cultivation	Livestock rearing	Weaving
Namhia	Namhia irrigation rehabilitation	Rice cultivation promotion	Rubber planting	Job's Tears

L. Household survey

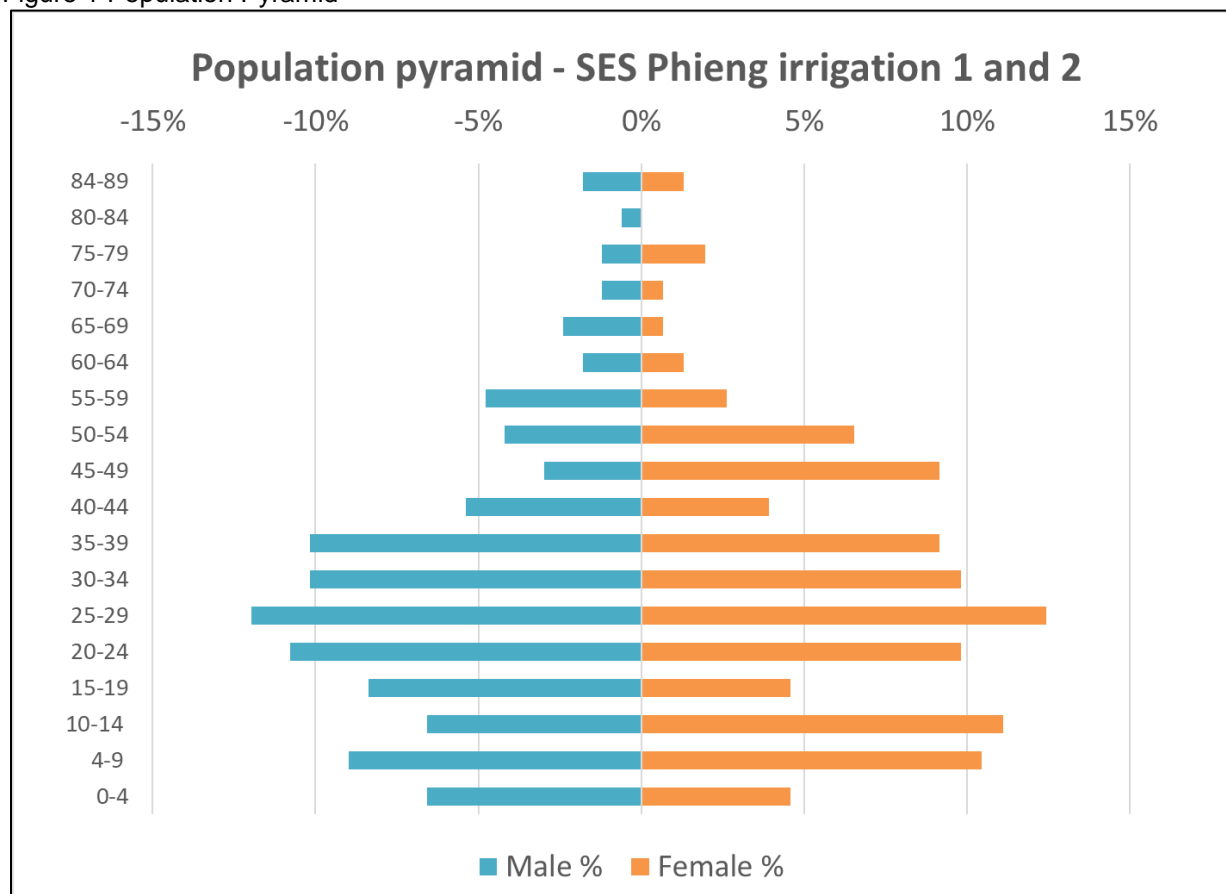
65. All surveyed villages (Table 10) have Thai-dam ethnic groups which are considered in this context to be grouped within the Lao Loum ethnicity. It can be seen from the SES that 53% of the population are male, 47% female. 85% of the sampled households were Lao Loum. The 12% Hmong are largely from Namhia village. All sampled villages have a small minority of Khmu ethnicity.

Table 10: Household Composition

Popn	Head of HH	Spouse	Father/ Mother	Fatherinlaw/ Motherinlaw	Brother sister	Children step- children	Grand child	Niece/ nephew	Other	Total	%
Female	6	49	2	4	2	66	21	1	2	153	47.8
Male	48	1	2	4	6	67	13	4	24	169	52.8
Total	54	50	4	8	8	133	34	5	24	320	
Lao	46	42	4	8	8	106	30	5	23	272	85.0
Hmong	6	7	0	0	0	22	4		1	40	12.5
Khmu	2	1	0	0	0	5	0		0	8	2.5
Total	54	50	4	8	8	133	34	5	24	320	

66. The population pyramid below shows the age distribution of the members of the 54 surveyed household. The pyramid shape suggests the population is moving from 'expansive' toward 'stable' with the majority age group being young adults.

Figure 1 Population Pyramid



67. Table 11 shows the primary and secondary occupations by household member category. Farming is the most prevalent primary occupation, followed by a government position, and then small businesses, labor, and livestock raising. The majority of those with a primary job do not have a second occupation. Those that do have a second occupation are mainly involved in livestock raising, farming and selling labor.

Table 11: Household Member Category and Primary Source of Income

Category	Head of HH	Spouse	Father/Mother	Parents In-law	Brother sister	Child & step child	Other	Total
Primary Occupation								
Farming	17	13				7	2	39
Government	8	3				8	7	26
Business	5	4				9	2	20
Labourer full-time	6					6	3	15
Livestock	5	7		1		1		14
NTPF	2	8			1		1	12

Shop	1	7		1		2		11
Seasonal labour	2					4	2	8
Odd jobs	3	2				2		7
Retired No pension	1		3					4
Weaving		2				2		4
Aquaculture	1					1		2
No job		1				1		2
PWD		1	1					2
Rental	1						1	2
Remittances	1							1
Retired with pension	1							1
Studying						25		
Total	54	48	4	2	1	68	18	170
% of person	100	96	100	25	12.5%	51%	75.0%	53.10%
Secondary Occupation								
No job	7	13				26	9	55
Livestock	15	13				5	3	36
Farming	17	7				6	4	34
Seasonal labour	3	4			1	5	1	14
NTPP	6	6						12
Weaving	1	3				1		5
Rental	1	1					1	3
Aquaculture	1							1
Business		1						1
Remittances	1							1
Sales	1							1

68. With regard to livestock, within the 54 surveyed sample HHs, 96% kept poultry and 41% of HHs kept cattle (average of 10 cattle per HH amongst those raising them). See Table 12.

Table 12: Livestock

Livestock	HH with livestock	% of HH with Livestock	Total in 54 HHs
Buffalo	1	1.9%	3
Cows	22	40.7%	220
Pigs	4	7.4%	33
Poultry	52	96.3%	2,175
Other (Fish)	3	5.6%	10,500

69. The estimated annual incomes from primary and secondary income sources of the 54 household interviewees as shown in Table 13. The indicative values in the table below are based on these figures, with net income calculated in relation to estimates of direct expenditure for those income sources.

Table 13: Average Incomes

Village		Total Ave HH income p.a.			% of Total Ave income from			
Gross	Av LAK	Hi (top 20%)	Med (60%)	Low (bottom 20%)	Farming (crop not distinguished)	NTPP	Livestock	Off farm (all other income)
Phonhin	60,547,535	117,166,667	54,291,636	26,866,699	13,493,340	3,000,000	8,425,000	45,175,500

Net Income	48,751,653	92,333,333	45,639,818	16,580,033	11,300,007	3,000,000	7,101,667	34,804,875
	(17HH)	(3HH)	(11HH)	(3HH)	15HH (Pri and sec occ)	1 HH (sec)	12 HH	16HH
Phonxai	47,332,773	126,270,000	30,462,500	27,441,500	6,003,294	4,775,833	5,812,500	44,476,667
Net Income	38,298,455	119,445,000	24,717,500	4,685,250	5,265,059	4,775,833	4,233,929	34,829,444
	(22HH)	(4HH)	(14HH)	(4HH)	17HH (Pri and sec occ)	12HH	14HH	18HH
Namhia	63,233,353	111,500,000	60,166,688	24,166,699	7,208,358	9,375,000	6,100,000	58,730,769
Net Income	45,593,353	82,233,333	42,155,577	19,266,699	6,433,358	9,375,000	5,310,000	39,546,154
	(15HH)	(3HH)	(9HH)	(3HH)	12HH (Pri and sec occ)	4HH	10HH	13HH

Notes: the net average income is calculated by adding the totals of the primary and secondary incomes, and subtracting 'Agriculture; Business; Equipment; Fisheries; Forestry; Livestock; Repair; Transport; Truck' expenses for all incomes. For the farming sub category, only 'farming' expenses are subtracted, etc. All household expenses (e.g. family celebrations, village costs are not included as expenses). Farming and livestock will appear low as it does not account for subsistence use (it is income from surplus after 12months of household consumption; Livestock is also kept as an asset, and so its value is not registered here as income (as it would be if sold and the asset value kept in savings)).

70. The 54 people interviewed identified that they had 158 plots of land that would be impacted by the irrigation rehabilitation (Table 14). All interviewees supported the project. Notably 91% anticipated in improved access to water and 78% expected the project would increase crop yield. 48% anticipated that new dry season cropping areas would result. 89% did not anticipate any loss to their livelihood due to the project.

Table 14: Support for the project

Project expected impact	Yes	%	No	%	Don't know	%
New Dry Season Cropping	26	48.1%	27	50.0%	1	1.9%
Increased Dry Season Cropping	31	57.4%	21	38.9%	2	3.7%
Direct water supply	35	64.8%	17	31.5%	2	3.7%
Improved distribution	35	64.8%	7	13.0%	12	22.2%
Improved access	49	90.7%	5	9.3%	0	0.0%
Increased land value	34	63.0%	14	25.9%	6	11.1%
Increased rental value	25	46.3%	24	44.4%	5	9.3%
Expected increased yields	42	77.8%	8	14.8%	4	7.4%
Expected decreased maintenance	35	64.8%	3	5.6%	16	29.6%
Do you think the benefits are significantly greater than the value of the land and or assets you will lose?	33	61.1%	13	24.1%	8	14.8%
Will the loss of assets negatively impact your livelihood significantly?	6	11.1%	48	88.9%	0	0.0%
Do you support the project as planned?	54	100%	0	0.0%		0.0%
Do you think ethnic group HHs have special needs in order to participate equally as others?			2	3.7%	3	5.6%

M. Cultural and Scenic Matters

71. There are no cultural or scenic issues in the Nam Phieng area. The command areas are valley bottoms dominated by irrigated fields. The upper catchment provides pleasant scenery, but it is not a tourist area. There are no temples or archaeological sites in the area. Local grave sites are located within the command area however these will not be impacted by the subproject.

N. Climate Change Considerations

72. The project's Climate and Disaster Risk and Vulnerability Assessment provides a detailed analysis of the climate change setting in the northern Lao provinces. Modelling of the potential changes is far from conclusive, but it is possible that there could be an increase in the frequency of extreme rainfall events, and therefore floods; and also in the length of dry seasons, and therefore water scarcity. The subproject's proposed engineering actions would contribute to resilience against both of these possibilities. The strengthened irrigation canals will resist damage during high flows, and will also improve the delivery of water during very dry periods.

V. ENVIRONMENTAL IMPACT MITIGATION

A. Environmental Justification

73. The main justification for the Nam Phieng Subproject is that it will provide improved irrigation facilities for up to 1,873 households in seven villages. The upgraded irrigation systems will allow for better dry season cropping options through more reliable water supplies outside the rainy season. Intensification and diversification in the dry season provides substantial livelihood benefits and as such the subproject will continue to build the socio-economic environmental conditions from the past ADB investments in community based irrigation.

74. Improved lowland irrigation generally also results in reduced pressures on the less productive uplands. This in turn helps to move the farming system away from its dependence on the remaining upland forests, because rural households are no longer reliant on the traditional systems of shifting cultivation and the growing of the less productive dryland rice and other crops. Forests will still retain a place in the livelihoods system, but more for the collection of non-timber forest products than for cropping. This is far less damaging than the wholesale slash and burn clearance that is part of shifting cultivation. Hence with improved lowland agriculture, there is expected to be a trend towards better conservation of upland forests, with better soil protection and safeguarding of biodiversity. The subproject is also expected to generate benefits for upland habitats and catchment management.

B. Potential Environmental Impacts

75. Environmental impacts are very limited with all works occurring within the existing canal cross sections and along the canal access roads. As such most a temporary construction impacts that are highly localised. The most likely impacts will relate to increased machinery on access roads however given the scale of ongoing operational and maintenance programs financed by the Water Users the change is expected to be small and within the management capability of the WUG and their contractors.

76. Intensification of agriculture will be enabled by the ADB investment and IFAD and PAFO are encouraged to continue to build best practice models linked to Lao GAP which will both

diversify market opportunities and provide knowledge and alternatives for safe handling and use of agrichemicals.

C. Environmental Management and Monitoring

77. This ER of implications of the subproject identifies that minor impacts may result during construction. An ECC, which is a simplified EMP sets out good construction practices to be implemented by the Contractor to address identified minor impacts (see Annex A).

D. Consultation

78. The process for public consultation and information disclosure is described in the EIA Decree. The project developer is required to make people in the affected area aware of the project and what it will involve, and to collect their views, early in the environmental appraisal process. These initial disclosure and consultation meetings must then be followed up later on, to release a draft of the ER for comment over a period of at least 30 days. Potentially damaging impacts must be made clear to all stakeholders. Associated with this consultation process is a grievance redress mechanism that allows complaints to be heard by the authorities responsible for the project, and recorded at the district administration. The mechanism must allow concerns to be raised from village to district level and if still not resolved, to national level.

79. During ER preparation, a series of meetings was held in the province, district and village centres, at which the following activities were undertaken: (i) a summary of the works proposed under the subproject was presented; (ii) discussion was held on the subproject objectives, and likely positive and negative environmental impacts, covering the construction phase and longer term operational period; and feedback was gathered in the form of any comments that the various stakeholders made, along with their suggestions on mitigation. The dates, attendees, topics covered and conclusions of consultations are recorded and included in Appendix 1. In some cases, comments, corrections or further information have been provided alongside the records.

80. Following completion of a draft environmental appraisal document, the EIA Decree requires consultation meetings at provincial, district and again at village level. For this purpose, the ER must be prepared in both English and Lao, and distributed to district administrations, where they will be made available for public review.

E. Information Disseminated

81. The preliminary engineering designs, along with estimates of potential impacts on land, the acquisition needed and compensation and resettlement for the subproject implementation, were used as the basis for discussions in meetings with the community. Additional specific meetings were then conducted with households whose land would be affected by the proposed rehabilitation or construction. Safeguard specialists assisted project engineers to disseminate and discuss the preliminary engineering designs with the community, and particularly with the affected households.

82. The meetings provided the information required to clarify: (i) the justification of the proposed subproject rehabilitation or construction works considering the anticipated resettlement impacts; (ii) mitigation measures to restore the affected households' livelihoods and standard of living; and (iii) assistance from the community or the district administration to plan, agree and implement the mitigation and support measures for the affected households. The consultations

also covered the villagers' views on measures to mitigate the anticipated impacts including compensation and design alternatives to reduce impacts.

83. More details on information dissemination and consultation are provided in the Nam Phieng Subproject Due Diligence Report on social impacts, which forms a parallel safeguard document to this ER.

F. Results from Consultation

84. The results of all the consultations regarding environmental issues are given in Appendix 1. In general the stakeholders were all in favour of the subproject, since it involves improving an existing irrigation scheme, and it will lead to better cropping options and improved incomes. At both district and provincial levels it is supported as a positive intervention that fits with their strategies for environmentally sound agricultural development.

VI. CONCLUSIONS

85. This ER provides an overview of the proposed subproject, baseline and identifies potential environmental implications of the proposed subproject activities. The subproject environmental classification is confirmed as Category C. An ECC defines good practice measures for the Contractor to minimise impacts.

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Appendix 1. Records of Consultations, September 2018

Provincial Agriculture and Forest Office

The Nam Phieng 1 project area is about 35 km from the provincial town, located in Ban Phonxay, Phieng district. The east part is a community area and the west is the rice field and plantation area. Until 2004 it had the DIDM project to improve the irrigation system and from 2004 until the present has been operated and managed by the local authorities.

The Nam Phieng 2 project area is about 32 km from the provincial town, located in Ban Phohin, Phieng district. The east part is community area and the west is the rice field and plantation area and the northern part close to Ban Phonxay. Until 2002 it had the DIDM project to improve the irrigation system, but from 2002 until now has been operated and managed by the local authorities.

The current situation of forest management and providing the mitigation measure are insufficient and could not cover all the forest area. This is because of the lack of budget and proper planning, and no skilled officers to support it with detailed technical advice.

District Agriculture and Forest Office

The SUFORD project had provided funds for land use management, agriculture, reforestation and community based programs, and the awareness programs since 2012.

The private sector has conducted the economic plantation of teak, rubber and eaglewood.

The land use planning for the household extension is also one of the programs for district residence development, to prevent forest encroachment and illegal logging, shifting cultivation and forest burning.

The proposed development plan has included reforestation in the catchment area.

Corn, job's tear, sugar palm fruit and cassava are the main income source crops for villagers. The Suford program supports the community in providing the technical supervision, funds and trading of products. Rice and livestock are only for household consumption and exchange among the community members.

Currently there is no investment program on agricultural and forest products in Phieng district.

The village authority could be supported for a forest management program by providing the villagers as volunteers, observers, inspectors and others.

The local people request to have the public market at the villages, particularly at Ban Phonhin and Ban Phonxay, in order to allow local product to contribute to family incomes.

Land and Productive Forest Management Plan at Kang Jok-Nam Ngim since 2012

Productive forest management plan in Phieng district covers six sub-management programs including Paksong town and Na Xing, Phieng 1, 2, 3, 4, 5 ; which it was planned in the land management plan and supported by Forest Resources Development Fund.

The main objectives are:

- To support the forest sector, productive forest management unit and district forest unit achieve target of the forest management plan and supply the sustainable forest product.
- To support the district forest unit to summary the activities and programs, and able to complete the yearly plan and practicable in actual implementation.
- To allow the district and village unit to implement the programs such as survey before exploration, survey the cut trees and mark, patrolling for preventing the wildfire and wildlife hunting, observe and record illegal logging, NTFP collection, and the preventing of forest damage.

The specific forest and land management plan are included in the programs of (1) to increase the productive timbers, (2) to protect and conserved forest (3) to provide the suitable agriculture land

The budget and fund sources had been provided based on the type of the programs as such (1) timber exploration programs, to use the budget from the cost of export the timber and forest development funds (2) forest rehabilitation, to use the forest development fund and SUFORD budget, (3) protect and management forest, to use the volunteer and villager group.

For monitoring the land and forest management are: (1) to monitor the progress of the approved plan and activities (2) to monitor the village group activities for forest protection and management including the timbers cutting, NTFP collection, wildfire controlling, changing the land use type for better use; (3) Forest Inspection by Inspect Unit of MAF and/or MONRE.

Land and Productive Forest Management Plan at Phouphadam since 2012

The land management of Phieng district was included in the Phouphadam productive forest management plan, there covered 12 villages of Phieng district which included all villages of the Nam Phieng 1 and 2 subproject area.

The main purposes of this plan are:

- To support the forest productions in long term and sustainable
- Planning the forest rehabilitation, replanting and conserved forest degraded forest
- Planning for conserving and management the NTFP collection to ensure the sustainable and long term consumption
- Conserve and protect the land and river along the sensitive area and/or in the conserved forest for protecting the watershed/water source along the steep hill.
- Support to use the land for suitable programs such as tree planting, agroforestry planting with different tree species, and long term agriculture program.

Current land and forest use (ha) in the Muang Phieng land management program covered about 9,197.8 ha:

- Mixed forest is 93.5 ha
- Dry forest is 168.7 ha
- Fellow forest is 8,845.9 ha
- Community land is 21.5ha

- Cemetery area is 3.4 ha
- Rice field area is 62.1 ha
- Upland field is 2.7 ha

Forest type	Area (ha)	Diameter(cm)										Total	
		20<30		30<40		40<50		50<60		>= 50			
		tree/ha	m3/ha	tree/ha	m3/ha	tree/ha	m3/ha	tree/ha	m3/ha	tree/ha	m3/ha	Tree/ha	m3/ha
Mixed forest	93.5	10.36	2.96	9.24	0.87	10.35	9.18	8.88	11.43	3.19	5.78	42.02	34.2
Dry forest	168.7	0	0	0	0	0	0	0	0	0	0	0	0
Fellow forest	8845.9	1.29	0.33	0.6	0.26	0.19	0.18	0.25	0.35	0.03	0.05	2.36	1.17

Current Potential Development, Opportunity and Limitation:

Potential development and Opportunity:

- The villages had closed to the forest management which it could be provided the fund or budget for forest management and rehabilitation
- The economic status may be increased by supporting the planting of volume trees
- Local worker could support on the forest rehabilitation program and productive forest management
- The watershed area has water sources available for development program
- Local people could be made aware to participate on the sustainable natural resources management
- Each village has village forest committee for forest protection and observation

Limitations:

- There are different cultures and traditions of different tribes in Muang Phieng which reduces joint participation for any activities.
- Villagers' livelihood activities are reliant on natural conditions which it could not be as the permanent income source, and local people has insufficient consumption.
- Lack of fund for forest management and for support the agriculture program,
- The villagers are still low skill on the land development and management.
- The most land type is the flat and dry forest area where it is simple access to the forest for other purpose such as shifting cultivation.

Potential land management from now to the next year period includes:

- Preparing the land management plan with all related authorities and villagers
- Well arrange for use of land use and forest, which it would cover for (1) Timber production area (2) Conserved area for volume trees (3) Providing the agriculture and tree planting area.
- To have a yearly action plan and timeframe for implementation

Provincial Office of Natural Resources and Environment

River branches in Phieng district

The Phieng watershed has several streams and Nam Phieng has branches such as Nam Yam, Nam Moun, Nam Lak, Nam Pou, Nam Ngiew, which there are the main streams supplying the Nam Phieng canals.

Nam Phieng stream has flow whole year, though decreasing during the dry season. The river water quality looks good for agricultural activities and outdoor uses.

The width of the Nam Phieng stream is about 8 to 15 metres, and depth is 1 to 5 metres.

The stream branches have a small flow during the rainy season, such as Houy Tham, Houy KaLoung , Houy Xiengvang, Nam Phieng, Nam Song, Houy Kem, Houy Nam Kham, Houy Ngiew and others. All those river streams are used by villagers fishing for family consumption.

Soils

At the Phouphadam productive forest, soils are mostly Lfs, SL, SiL, Si which there are the 6 classes of land such as ACdyh, ACha, Acsk, Acvt.

Potential environmental concerns

- Chemical and pollutant emissions from largescale agriculture without proper management measures, ignoring pollution control and discharging chemicals into the natural environment.
- Local people lack skills to use of chemicals and choose the specific fertilizers for the different types of trees and other plants.
- Lack of safety in ignoring personal protection during planting.

Nam Phieng accessibility

There is one dirt road through the Nam Phieng watershed area. Another option is a village access road which is passable by motorbike and tractor.

Villages conditions

- Due to the villages located along the main road and based on the low land rice field rather than upland field, so the villagers could not found the wildlife down to the village's area, and no hunting in the village boundary, but some occasion see the wildlife in the watershed area,
- Overall environmental condition of Nam Phieng watershed is still good for sustainable providing the water source through the irrigation system.
- The more household extension the more use of low land may occurs, which of this would reflect to improve and increase more irrigation system for sufficient providing the water.

Nam Phieng watershed condition

- In general, there is forest cover but some of the productive forest still allows the planting of economic trees, which would be re-arranged by the district and provincial authorities.
- The potential increasing of household numbers would lead to a decrease in the forest area and increase the use of land and that may require to change the land use type in the future.

Provincial Public Works and Transportation Office (PWTO) and District Public Works and Transportation Office (DPWTO)

The provincial development plan has no proposed infrastructure development. The water user villages are located along the main road where there is more developed infrastructure.

The provincial and district data had been referred to the Nam Phieng district survey during the previous data collection in April 2018.

Provincial Energy and Mine Office and District Energy and Mine Office

During the data collection on September 2018, we had a meeting with the PEMO to clarify the existing and proposed projects in the Nam Phieng watershed area.

There are no existing mine programs. But there is a proposed plan from the Mine State Enterprise Company to the Provincial office via the Ministry of Energy and Mines, submitted in September 2018. That proposal is still under consideration (Feasibility Study) among the related sectors of the Provincial office, and will take some time to consider.

Village Consultations

General

Historically, bad flooding occurred in 1973 and 1964 and 2018, which it was the fast flooding cause of the high water flow from the heavy rainfall and natural disaster.

Since 20 years ago, villages were not large size and there were fully sufficient natural resources and villagers could simple reach of the agricultural product, But presently the villages are larger and increasing of the villager number which it reflects to the use of land and forest management, the more people the more developed and more request and those have decreased the natural resources and land also.

Overall status of the forest, the average forest component are included the fellow forest (5-10%), mixed forest (63-70%), bamboo forest (20-30%) and degraded forest (2%). Since 10 years ago, there is not economic tree and no many value trees available in the forest and presently appear the value trees in some portions of the forest in the watershed area.

The villagers proposed to have:

- this project for improving their rice and plantation during the dry season,
- the agriculture program rather than the tree cutting proposal
- public consultation and sharing information from time to time of the project,
- the proper land and forest mapping and division, and provision of awareness programs for knowing the prevention of adverse impact to forest and environment.

Phonhin

Some wildlife comes down to the village forest for passing and finding food, and only small wildlife is caught for family and sale. Presently, there is no wildlife head down to the downstream and village area, only some occasion which have seen some type of wildlife. The wildlife hunting would happen on occasions when the villagers had been to the rice field along the village boundary to the watershed area, and to collect some of the NTFP, which are low value and only for household use.

Due to the river is the small stream along the village boundary to the watershed area, which villagers could find only the small amount and small size of fish along the Nam Phieng river and its branches (called Houy), so villagers did not rely on fishing for their income but only for occasional household consumption. The common fish species found and caught by the villagers are recorded in the below table, which was recorded by interviewing the villagers and through market observations.

Phonxay

Since 5 years ago, no wildlife has come down to the village forest and community area, but inside the Nam Phieng watershed is still appear of the wildlife as wild boar, wild chicken, palm civet, moles, muntiacus, Sciuridae, Tupaiidae, Cervus unicolor. The villagers would catch a small wildlife for occasion due to the prohibit hunting the wildlife in the watershed area. And catching for family consumption but not for sale, and the most seen the wildlife is along the river line only where they come down for water in sometime at the watershed area.

Small fish are found along the irrigation canals and villagers catch them on occasions in both dry and wet season.

Forest Trees

No	Timber type	Last seen	Use or not	Use for what	Still have in the project area (many, not so many)
1	Bamboo tubes, Mai Pong	current	use	Community purpose, regular used for household activity and some of the agriculture work such as being the fence, chacol, build the small hut, shall house, rice storage, field hut, and other temporary structure in the village.	These type of trees has found inside the watershed area which there are only the small size and some section of the watershed has appeared the large size with a few numbers.
2	Bark, Mai Bong	current	use		
3	Peltophorum dasyrachis, Mai Safang	current	use		
4	Lagerstroemia, Mai Peuy	current	use		
5	Meliaceae tree, Mai Yom	current	use		
6	Papilionoideae, Mai Dou	current	No	No	
7	Afzelia xylocarpa, Leguminosae, Mai Tea	current			
8	Darma resin,Dipterocarp resin, Mai Xee	current			
9	Damar oil, Dipterocarp oil, Mai Yang	current			
10	Hopea pierrel, Mai Kean	current			
11	Vaticacinerea, Mai xee	current			
12	Plam tree	current	No	Under planting and no plan for sale or use for	These type of trees has found along the village's productive forest where is the boardary line to watershed area. These is the planting tree by villagers and private owner.
13	Shoreaobtusa, Mai Jik	current	No		
14	Teak, Mai suk	current	No		
15	Sterculiaceae, Mai Por		No	No	There appear in watershed area
16	Hypericaceae, Mai Tiew		No	No	

Non-timber Forest Products

No	NTFP type	Collect month	Whom collect (male or female)	Domestic consumption (Eat or sale)	How many Kg per year	Price per kg (kip)	Where to sale	Remark
					Kg		(village or market)	
1	Mushroom	Dry season(Nov-April)	Female	Eat	No	No	No	There is a few type of vegetable which could find all year in different type of vegetable.
	Bamboo shoot	All year	Female	Eat	No	No	No	
2	Wild Vegetable	All year	Female	Eat	No	No	No	
3	Wild Fruit	Dry season(Nov-April)	Female	Eat	No	No	No	
4	Red muchroom	June - October	Female/Male	Sale	Depend on each year	15000kip/ kg	Chinese traders come to buy at village	Since 10 year ago had rarely appear this much room and hardly find presently.
5	Calamus acanthophyllus Beccari, Kheua Wai	All year	Female	Use	Occasion found	No	No	
6	Arenga westerhoutii, MakTao	Dry season(Nov-April)	Female/Male	Eat/ Sale	2 T/ yr	6000kip/kg	Trader collects at the village	
7	Caesalpinaceae, Sa kha	Dry season(Nov-March)	Female	Eat	NA	No	No	
8	Rattan, Wai	Dry season(Nov-March)	Female/Male	Eat /sale	500 kg/year	8500 kip/kg	Trader collects at the village	
9	Sapindaceses, Mak Khorh	October - April	Female/Male	Eat /sale	2 T/ yr	5000kip/kg	Sale at the village's market	To collect one time per 3 years
10	Honey	May-July	Female/Male	Eat	No	No	No	
11	Dark bee	May-July	Female/Male	Eat /sale	average 200 kg/year	160000kip/kg	Sale at the village's market	
12	Oak, Castanea mollissima Blume, Mak Kor	October - December	Female/Male	Eat /sale	average 200 kg/ 2 years	4000 kip/ kg		

Wildlife

No	Name	Always see	Rarely seen	Hunting number	Hunting time	Remark
				(-Unit)	(-Time/Month)	
1	Wild boar, Mupa	√		3 /year	Occasion	It has seen in the watershed area in whole year
2	Common palm civet, Ngen		√	No	No	
3	Wild chicken, kaipa	√		No	No	
4	Mole, Toun	√		No	No	
5	Muntiacus feai, Fan		√	No	No	
6	Porcupine, Men		√	No	No	
7	Bear		√	No	No	
8	Monkey	√		No	No	
9	Sciuridae, Kahok	√		30/year	during the dry season only	To hunt during the dry season, it appears in whole year in the watershed area and sometime appear at the village boarder
10	Tupaiaidae, Katea	√		20/year	during the dry season only	
11	Euroscaptor klossi, On	√		12/year	during the dry season only	
12	Red-necked keelback, Ngoou Danghea	√		No	No	It has seen in the watershed area
13	Green snake spices, Ngooukhiew	√		No	No	
14	Cervus unicolor, Rusa unicolor Kouang		√	No	No	
15	Tragulus javanicus, Kaih		√	No	No	
16	Varanus bengalensis		√	No	No	

Birds

No.	Bird name	Always see	Rarely see	Hunted bird per time	Hunting frequency(time per season)	Remark
				(bird number)		
1	Riparia paludicola, Nok Aen	√		10/c/year	6 time per dry season	
2	Cisticola exilis, Nokkajip	√		30/c/year	6 time per dry season	
3	Flycatcher, Nok Chik	√		10/c/year	6 time per dry season	
4		√		No hunt	No	
5	Grey Peacock Pheasant, Nok Kangkh	√		10/c/year	6 time per dry season	
6	Cuckoo drove, Nok Khao		√	No hunt	No	Only appear at the Nam Phiang watershed area where it is along the river bank, and they appear during the dry season only.
7	Changeable Hawk Engle, Leow		√	No hunt	No	
8	Asian Fairy Bluebird, Nok Sew		√	No hunt	No	
9	Greater coucal, Nok Kot		√	No hunt	No	
10	Crested Finchbill, Nok Khoak		√	No hunt	No	
11	Parrot, Nok Keo	√		10/c/year	8 time per dry season	
12	Mountain Imperial Pogeon, Nok moum		√	No hunt	No	
13	Gracula religiosa, salika	√		No hunt	No	
14	Orange-Breasted Green, Pokpao		√	No hunt	No	

Fish

No	Fish name	which stream had seen (name of stream)	distance from village (km)	How many kg per time fishing(average per week)	Domestic Consumption	Sale, how many kg	Where to sale (village or market)
1	Poropuntius laocnsis, Pa Jad	Houy Boun, Nam Phiang	4-10km	0.2	Yes	No	Only for domestic use
2	Puntiusaurotaeniatus, PaKhao		4-10km	0.2	Yes	No	
3	Osphronemus goramy, PaMen		4-10km	0.2	Yes	No	
4	Nemacheilidae, Pa Phanh		4-10km	0.2	Yes	No	
6	Channa striata, Pa Khor	Houy San, Houy Kayoung	10-16 km	0.2	Yes	No	
7	Orphoides, Pa Pok	Houy San, Houy Kayoung	10-16 km	0.2	Yes	No	
8	Oreochromis niloticus, PaNin	Hououy Kayoung, Nam Phiang, NamYam, along the irrigation canal	4-10km	0.2	Yes	No	
9	Devario salmonatus, Pa Siew		4-10km	0.2	Yes	No	
10	Claias batrachus, PaDouk		4-10km	0.2	Yes	No	
11	Anabas testudineus, Pa Kheng		4-10km	0.2	Yes	No	
12	Macrobrachium sp. shrimp, Kouing		4-10km	0.2	Yes	No	
13	Frog, Kob		4-10km	0.2	Yes	No	

Appendix 2. Attendance Sheets from Consultation Meetings

បញ្ជីចំណុច / Register

Meeting Location: ភ្នំពេញ ខណ្ឌ ដូនពេញ
 Date: 20/09/2018

ល.រ (No.)	ឈ្មោះ (Name and surname)	តំណែង (Position)	ស្ថាប័ន (Organizational)	ទូរសព្ទ (Phone No.)	អាសយដ្ឋាន (Email address)	ហត្ថលេខា (Signature)
1	ក. វណ្ណៈ	ប្រធាន	គណៈកម្មាធិការ	020 2241223	keovanh.1787@gmail.com	
2	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	22363005	bonlaykphong@gmail.com	
3	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	5549453		
4	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	58584324	bhsoukthay@gmail.com	
5	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	55778859	pe.silk@gmail.com	
6	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	55194015		
7	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	22435770	staphon1974@gmail.com	
8	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	99944177	Boutthanhk@gmail.com	
9	ក. ឃុន ឈីន	អនុប្រធាន	គណៈកម្មាធិការ	22484555	phong keo 69@gmail.com	
10						
11						
12						

ប្រតិបត្តិការ / Register

Meeting: គណៈកម្មាធិការ
 Location: ភ្នំពេញ
 Date: 20-09-2018

ល.រ (No.)	ឈ្មោះ (Name and surname)	តំណែង (Position)	ស្ថាប័ន (Organizational)	លេខទូរសព្ទ (Phone No.)	អាសយដ្ឋាន (Email address)	ហត្ថលេខា (Signature)
1	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	55978677	sihounhvang.m@gmail.com	
2	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	55477894		
3	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	54811773	Thongsa vanh se@hotmail.com	
4	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	5953061		
5	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	82412323	khomnemy78@hotmail.com	
6	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	82439779	mayetv14@gmail.com	
7	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	55549353		
8	ល. វណ្ណៈ វណ្ណៈ	អគ្គនាយក	រាជរដ្ឋាភិបាល	8863070		
9						
10						
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12						

ប្រតិបត្តិការ / Register

កាលបរិច្ឆេទ Meeting: ០៩/០៩/២០១៨
 ទីតាំង Location: បន្ទីរពេទ្យស្រីព្រះស្រី
 ថ្ងៃទី Date: ០៩/០៩/២០១៨

ល.រ No.	ឈ្មោះ (Name and surname)	តំណែង (Position)	ស្ថាប័ន (Organizational)	ទូរស័ព្ទ (Phone No.)	អាសយដ្ឋាន (Email address)	ហត្ថលេខា (Signature)
1	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ១	៥១១៦៨៥០		
2	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ២	៥៥១១៥៤៥		
3	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៣	៥៤៨១១៣៣		
4	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៤	៥៥១៥៤៥៧		
5	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៥	៥៥១៥៤៥៧		
6	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៦	៥៥១៥៤៥៧		
7	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៧	៥៥១៥៤៥៧		
8	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៨	៥៥១៥៤៥៧		
9	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ៩	៥៥១៥៤៥៧		
10	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ១០	៥៥១៥៤៥៧		
11	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ១១	៥៥១៥៤៥៧		
12	ឈ. ហង់ ធីតា	ប្រធាន	ស្ថាប័ន ១២	៥៥១៥៤៥៧		

ប័ណ្ណចុះឈ្មោះ / Register

ទីកន្លែងប្រជុំ: រោងចក្រស្រូវ... ភូមិ... សង្កាត់...
 ទីតាំង: ភូមិ... សង្កាត់...
 ថ្ងៃខែឆ្នាំ: ១១/០១/២០១៨

ល.រ	ឈ្មោះ (Name and surname)	តំណែង (Position)	ស្ថាប័ន (Organizational)	លេខទូរស័ព្ទ (Phone No.)	អាសយដ្ឋាន (Email address)	ហត្ថលេខា (Signature)
1	ព. ហង់ ហង់	ប្រធាន	សង្កាត់	៩៨៥៦៨០១		
2	ព. ហង់ ហង់	—	សង្កាត់	០៩០១២៣៤៥៦		
3	ព. ហង់ ហង់	ប្រធាន	សង្កាត់	៩៨៤១០២៦៥		
4	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
5	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
6	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
7	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
8	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
9	ព. ហង់ ហង់	ប្រធាន	សង្កាត់	៩៨៥៦៨០១		
10	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
11	ព. ហង់ ហង់	ប្រធាន	សង្កាត់			
12	ព. ហង់ ហង់	ប្រធាន	សង្កាត់	៩៨៥៦៨០១		

ល.រ (No.)	ឈ្មោះ (Name and surname)	តំណែង (Position)	ស្ថាប័ន (Organizational)	ទូរសព្ទ (Phone No.)	អ៊ីម៉ែល (Email address)	ហត្ថលេខា (Signature)
13	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
14	ឈ. វណ្ណៈ ឈ. វណ្ណៈ		ឈ. វណ្ណៈ			ឈ. វណ្ណៈ
15	ឈ. វណ្ណៈ	អគ្គនាយក				ឈ. វណ្ណៈ
16	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
17	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
18	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
19	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
20	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
21	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
22	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
23	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
24	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
25	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ
26	ឈ. វណ្ណៈ	អគ្គនាយក	ក្រសួងសេដ្ឋកិច្ច			ឈ. វណ្ណៈ

సభ్యుల జాబితా / Register

Meeting: సామాజిక సేవల కమిటీ
 Location: సామాజిక సేవల కమిటీ
 Date: 21/09/2018

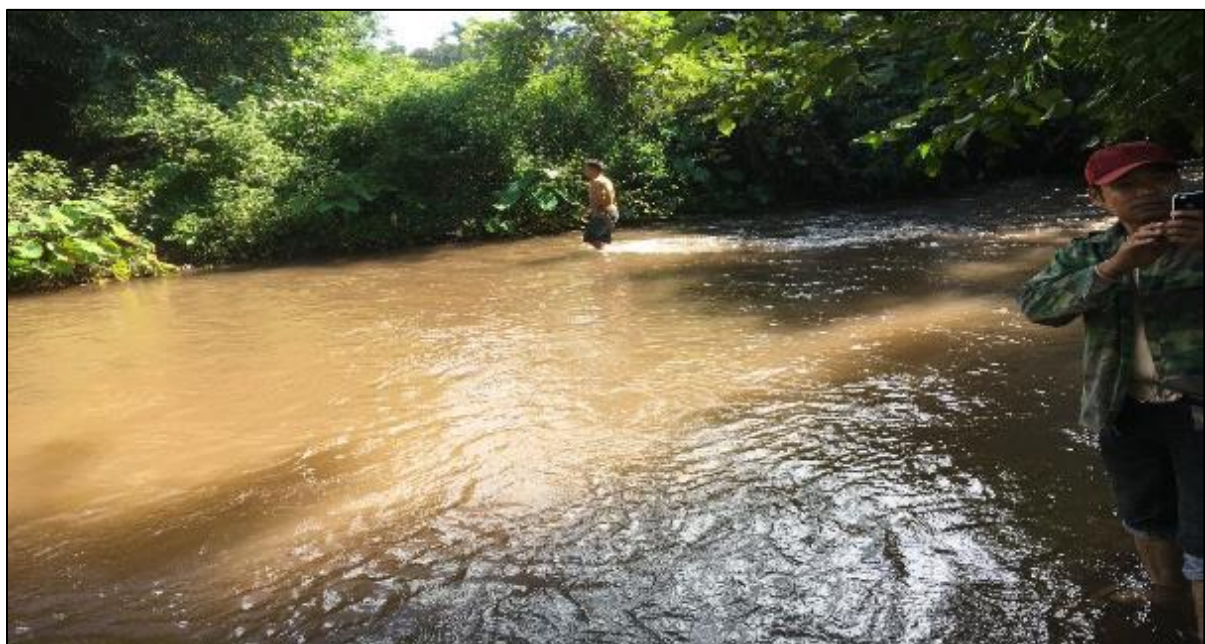
సం. No.	సభ్యుని పేరు (Name and surname)	దానిని (Position)	సంస్థ (Organizational)	ఫోన్ (Phone No.)	ఈమెయిల్ (Email address)	చిహ్నం (Signature)
1	ఎ. సత్యం	స/క	స. సత్యం			ఎ. సత్యం
2	బి. సత్యం	స/క	—			బి. సత్యం
3	సి. సత్యం	స/క	—			సి. సత్యం
4	డి. సత్యం	స/క	—			డి. సత్యం
5	ఇ. సత్యం	స/క	—			ఇ. సత్యం
6	ఎ. సత్యం	స/క	—			ఎ. సత్యం
7	బి. సత్యం	స/క	—			బి. సత్యం
8	సి. సత్యం	స/క	—			సి. సత్యం
9	డి. సత్యం	స/క	—			డి. సత్యం
10	ఇ. సత్యం	స/క	—			ఇ. సత్యం
11	ఎ. సత్యం	స/క	—			ఎ. సత్యం
12	బి. సత్యం	స/క	—			బి. సత్యం

အမှတ် No.	အမည် (Name and surname)	တာဝန် (Position)	အဖွဲ့အစည်း (Organizational)	ဖုန်း (Phone No.)	အီးမေးလ် (Email address)	လက်မှတ် (Signature)
13	ဒေါ် ဦး	1/3	အထွေထွေ			ဒေါ် ဦး
14	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
15	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
16	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
17	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
18	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
19	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
20	မယ်လွှဲ	1/3	မယ်လွှဲ			မယ်လွှဲ
21	မယ်လွှဲ	1/3	မယ်လွှဲ	90594165		မယ်လွှဲ
22	မယ်လွှဲ	1/3	မယ်လွှဲ	65644852		မယ်လွှဲ
23						
24						
25						
26						

Appendix 3. Photographs of Field Visits



Nam Phieng watershed area



Nam Phieng, above Phieng 1 headworks



Phieng 1 headworks



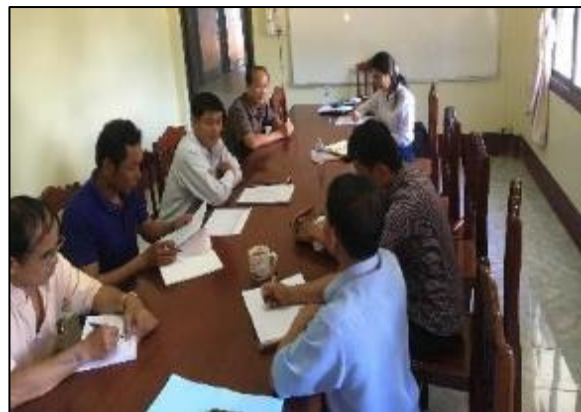
Phieng 1 channel



Phieng 2 headworks



Meeting at PAFO



Meeting at Phieng District offices



Consultation with village and district authorities and water users, Ban Phonhin



Consultation with village and district authorities and water users, Ban Phonxay

Environmental Review

Project Number: 50236-002
April 2019

Lao PDR: Sustainable Rural Infrastructure and Watershed Management Sector Project

Annex A: Environmental Code of Conduct

Nam Phieng Irrigation Subproject Phieng District Xayaboury Province

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

CURRENCY EQUIVALENTS

(as of 5 April 2019)

Currency Unit	–	Kip (KN)
KN1.00	=	\$0.000116
\$1.00	=	KN8,600

ABBREVIATIONS

ADB	: Asian Development Bank
COL	: Concessional OCR lending
DAFO	: District Agriculture and Forestry Office
DALAM	: Department of Agricultural Land Management
DDMCC	: Department of Disaster Management and Climate Change
EIA	: Environment Impact Assessment
ERP	: Emissions Reduction Program
FAO	: Food and Agriculture Organization (of the United Nations)
GCF	: Green Climate Fund
GIZ	: Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation Agency)
IEE	: Initial Environment Examination
IUCN	: International Union for the Conservation of Nature
IWMI	: International Water Management Institute
LIC	: Loan Implementation Consultant
MAF	: Ministry of Agriculture and Forestry
MONRE	: Ministry of Natural Resources and Environment
NGO	: Non-governmental Organisation
NRI	: Northern Rural Infrastructure Development Project
NSEDP	: National Socio-Economic Development Plan
NTFP	: non-timber forest product
PAFO	: Provincial Agriculture and Forestry Office
PDR	: People's Democratic Republic (of Laos)
PGT	: Program Governance Team
PLUP	: participatory land use planning
PPIT	: Provincial Project Implementation Team
PONRE	: Provincial Office of Natural Resources and Environment
PRI	: productive rural infrastructure
RSP	: representative subproject
SRIWSM	: Sustainable Rural Infrastructure and Watershed Management
TRTA	: Transaction Technical Assistance
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	<p>Securing watershed functions in a sustainable manner. Broadly these functions include:</p> <ul style="list-style-type: none"> ➤ 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

- (i) In this report, “\$” refers to US dollars unless otherwise stated.

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CONTENTS		Page
<u>I.</u>	<u>INTRODUCTION</u>	1
	<u>A. Nam Phieng Subproject</u>	1
	<u>B. Purpose of the Environmental Code of Conduct</u>	1
<u>II.</u>	<u>SUBPROJECT IMPLEMENTATION RESPONSIBILITIES</u>	1
	<u>A. Provincial Project Implementation Team</u>	1
	<u>B. Institutional arrangements for implementation of environmental safeguards</u>	7
<u>III.</u>	<u>ENVIRONMENTAL MANAGEMENT AND MONITORING MATRIX</u>	9
	<u>A. Introduction</u>	9
	<u>B. Subproject Construction Phase during Project implementation</u>	9
	<u>C. Subproject Operation Period following Project implementation</u>	16

List of Appendixes

Reference Documents

Appendix 1. Responsibilities of the Provincial Agriculture and Forest Office

Appendix 2. Responsibilities of the Contractor

Appendix 3. Responsibilities of the Water User Group – Operation Period

Appendix 4. Project Environmental Guidelines

VII. INTRODUCTION

A. Nam Phieng Subproject

86. The Nam Phieng Subproject is to support the upgrading of an existing irrigation distribution system serving households in a number of villages. The subproject covers two distinct areas. The productive rural infrastructure (PRI) element will cover the existing Nam Phieng 1 and Nam Phieng 2 command areas, specifically improving various distribution canals leading into and around the command areas. The other part of the subproject is the Nam Phieng catchment above the headworks, where watershed management improvements are being implemented by the Provincial Agriculture and Forestry Office (PAFO) to help safeguard the quality and quantity of the irrigation water supply.

87. The subproject is to be implemented as one of the interventions financed in Xayaboury Province by the Sustainable Rural Infrastructure and Watershed Management - Sector Project (SRIWSM). This project is a joint undertaking of the Government of Lao PDR (the government or GOL) and the Asian Development Bank (ADB).

B. Purpose of the Environmental Code of Conduct

88. This Environmental Code of Conduct has been prepared in compliance with the specified safeguard requirements of the borrower, the Government of Lao PDR (the government), and the main financing organisation, the Asian Development Bank (ADB). It accompanies an Environmental Review (ER) that: (i) provides an overview of the proposed subproject and its purposes; and (ii) makes an evaluation of the likely impacts that will occur to the environment as a result of the proposed subproject activities.

89. This Environmental Code of Conduct outlines the mitigation measures that will be required to ensure that no part of the project causes significant damage to the environment.

90. The Environmental Code of Conduct has been prepared on the basis of the design for the subproject, and its likely effects on the environment, as evaluated in the ER. 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 ER, this Code of Conduct forms the guiding document to ensure that all necessary environmental safeguards are put in place.

91. Adherence to this Code of Conduct is a condition of the use of ADB financing for the Nam Phieng Subproject. Acceptance of and a commitment to implement the Code of Conduct must form part of the contractual conditions for any physical engineering works under the subproject.

VIII. SUBPROJECT IMPLEMENTATION RESPONSIBILITIES

A. Provincial Project Implementation Team

92. 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 into a Provincial Project Implementation Team (PPIT) for the management of the SRIWSM Project.

93. 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.

94. Government staff are therefore 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. The capabilities required of staff varies depending on the phase of the subproject, and their level and remit, but the common thread required by all is 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. 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 Consultants – 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 (most PONRE have only 3 subprojects to monitor), (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.

95. 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 safeguards will be assigned through a Memorandum of Understanding (MoU) between the Vice Governor Office, Director of PAFO and Director of PONRE. The Loan Implementation Consultant (LIC) team will include international and national environmental safeguard consultants who will provide additional support. PAFO Project management staff, will work with the construction supervision staff, PONRE and DONRE staff to provide the monthly, quarterly safeguard reports that will be submitted to the Vice Governor, and the EA via the PGT in DOI.

96. At the provincial level, a PAFO will assign overall project management to an existing PAFO Deputy Director General and will implement subprojects. Within each PAFO, the technical staff will be assigned to the PPIT must be able to monitor the implementation of works programs with the supervision role also maintaining both social and environmental checklists for site visits. The submission of safeguard reports to the Vice Governor and to the PGT will trigger a consolidation report from the PGT that will be submitted to ADB twice yearly for review and approval.

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

Table 1: Responsibilities Regarding the Environment and Related Safeguards.

Project organisation	Management Roles and Responsibilities
Ministry of Finance (MOF)	<ul style="list-style-type: none"> • Establish the Project's Advance Account, • Manage direct payments to contractors, • Provide replenishment reports to ADB, • Provide advances to Implementing Agencies Subaccounts,

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Overarching financial control.
Ministry of Agriculture and Forestry (MAF) - Executing Agency (EA)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. • 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	<ul style="list-style-type: none"> • 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.

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Conduct assigned procurement of (i) vehicles, (ii) equipment, (iii) loan implementation consultants (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)	<ul style="list-style-type: none"> • 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). • 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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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

Project organisation	Management Roles and Responsibilities
	<p>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.</p> <ul style="list-style-type: none"> • 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. • 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). <p><u>For WUGs</u></p> <ul style="list-style-type: none"> • Provide awareness and capacity building on project activities, WUG implementation roles and procurement modalities.

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Monitor and mentor water WUG contracting of in-command area works.
PONRE Land Registration Department	<ul style="list-style-type: none"> • Conduct land registration. • Issue land title and demarcation.
PONRE Environmental Management Department	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Identify the need for Pesticide Reduction Training, Crop Surveillance and integrated pest management as part of the LAOGAP quality assurance support
MAF – Dept Agriculture and Land Management (DALAM)	<ul style="list-style-type: none"> • Agricultural land use planning guidelines and verification.
PAFO – DALAM	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Forest Land use zonation and survey demarcation. • Participate in PLUP when requested. • Supervision of forestry activities funded by ADB.
Provincial Nutrition Committees	<ul style="list-style-type: none"> • 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. • Provide leadership and support for District Nutrition Committees (DNC)
DNC	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • 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

98. **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 Environmental code of conduct and grievance redress mechanism (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.

99. **PPIT.** Each PPIT will nominate an environmental safeguards focal point to support LIC Environment Specialists and PGT with co-ordination at the province level. The PPIT environmental safeguards focal point will undertake joint site visits with subproject Supervision Staff and Contractors to review implementation of ECC 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.

100. **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 ECC during subproject implementation.

101. The environmental safeguard consultants in the LIC 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.

102. During the design and preparation phase, the LIC environmental specialists will 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 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. The LIC Environment Specialists will provide safeguards and GRM capacity development training for PGT, PPIT, LIC, Contractors and GRM focal points on ECC mitigation and monitoring measures, templates for environmental monitoring and report.

103. **Contractors and Subcontractors.** All contract documents must include the ECC 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.

104. 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. This must not be allowed to happen, or it will mean that the subproject and therefore the overall SRIWSM is non-compliant with respect to both government and ADB safeguards.

105. The Contractor will be required to 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 ECC 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 ECC and GRM implementation for submission to PPIT, PGT and LIC.

106. The construction supervision consultants (CSC) will be responsible for day to day monitoring of implementation of health and safety and ECC requirements and issuing instructions for corrective actions, as needed.

107. ADB will visit project sites and review project performance against the ECC 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) update the ECC.

IX. ENVIRONMENTAL MANAGEMENT AND MONITORING MATRIX

A. Introduction

108. The matrix on the following pages forms the practical management tool of the Code of Conduct. It lists the environmental impacts expected to be experienced on the Nam Phieng Subproject, and the typical mitigation measures that can be used to avoid, minimise or restore the effects of these impacts. 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 1), the contractor (Appendix 2) and the Water User Group (Appendix 3).

109. The standards against which compliance is to be monitored are given in Appendix 4. These are based on the Lao PDR National Environmental Standards (2017), as well as on project-specific guidelines.

B. Subproject Construction Phase during Project implementation

110. 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. The Contractor EHS Officer will monitor implementation of ECC and will submit monthly reports on implementation and any required corrective actions throughout construction to PPIT/PGT and LIC. The EHS officer will co-ordinate with the community regularly to ensure that any issues/grievances are resolved and reported in the monthly reports.

Table 2: Construction Phase Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.00	Environmental damage of any form results from the poor understanding of subproject requirements by the contractor and subcontractors.	<ol style="list-style-type: none"> 1. EHS Officer/GRM focal point to ensure details of subproject GRM entry point contacts are disclosed at camp, sites and affected villages. 2. EHS Officer to induct/train workers on occupational and community health and safety practices 3. 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.
		1.		

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.01	(a) Release of silt from excavations and earthworks during construction.	<ol style="list-style-type: none"> <li data-bbox="532 296 862 491">2. The removal of vegetation and creation of bare surfaces must be minimised to essential areas only. <li data-bbox="532 499 862 695">3. Bio-engineering surface protection must be planted on all bare earthworks during the months of May to July. 	Contractor during the subproject construction period.	<p data-bbox="1198 296 1354 388">PPIT construction supervision.</p> <p data-bbox="1198 428 1354 659">PONRE. At all inspections throughout subproject construction period.</p>
1.02	Temporary closure of irrigation systems during construction.	<ol style="list-style-type: none"> <li data-bbox="532 701 862 1031">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. <li data-bbox="532 1039 862 1262">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. 	<p data-bbox="899 701 1154 856">Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> <li data-bbox="899 865 1154 957">1. Before allowing the contractor to commence work. <li data-bbox="899 966 1154 1094">2. Throughout the subproject construction period. 	<p data-bbox="1198 701 1416 827">PPIT throughout subproject construction period.</p> <p data-bbox="1198 835 1354 1058">PONRE. At all inspections throughout subproject construction period.</p>
1.03	Disposal of soil from excavations and cleaning irrigation canals.	<ol style="list-style-type: none"> <li data-bbox="532 1268 862 1394">1. Soil from excavations should be re-used in designs wherever possible. <li data-bbox="532 1402 862 1766">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. 	<p data-bbox="899 1268 1154 1423">Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> <li data-bbox="899 1432 1154 1558">1. Throughout the subproject construction period. <li data-bbox="899 1566 1154 1734">2. Before issuing the contractor's certificate of substantial completion. <li data-bbox="899 1743 1154 1795">3. Before returning retention monies. 	<p data-bbox="1198 1268 1416 1394">PPIT throughout subproject construction period.</p> <p data-bbox="1198 1432 1354 1667">PONRE. At all inspections throughout subproject construction period.</p>

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.04	Release of noxious gases into the atmosphere.	<ol style="list-style-type: none"> 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.	<p>PPIT throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>
1.05	Noise nuisance from construction activities.	<ol style="list-style-type: none"> 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.	<p>PPIT throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>
1.06	Temporary use of land for construction affects livelihoods or leaves it damaged.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before work is permitted to start. 2. Throughout the subproject construction period. 3. Before returning retention monies. 	<p>PPIT throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.07	Influx of temporary labour disrupts local communities.	1. Contractors and subcontractors are required to use the maximum local labour possible.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period.	PPIT throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.
1.08	Operation of construction machines affects both workers and local society.	1. The noise and dust reduction measures 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 throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.

1.09 Pollution by hydrocarbons from construction plant.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before the contractor is permitted to mobilise to site. 2. Throughout the subproject construction period. 3. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>
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No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.10	Pollution by wastewater from camps and other work sites.	<ol style="list-style-type: none"> <li data-bbox="532 296 867 558">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. <li data-bbox="532 562 867 758">2. "Black" wastewater from sanitation facilities must be led to a properly constructed septic tank and soakaway. <li data-bbox="532 762 867 989">3. "Grey" wastewater from washing and cooking facilities must be led to a septic tank or to a specially built reed bed filtration system. <li data-bbox="532 993 867 1220">4. Oil-contaminated water from workshops and fuel stores must be collected and taken to an approved municipal waste management facility. <li data-bbox="532 1224 867 1587">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. <li data-bbox="532 1591 867 1732">6. Any subcontractor must comply with the same rules, at the contractor's liability. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> <li data-bbox="899 464 1159 590">1. Before the contractor is permitted to mobilise to site. <li data-bbox="899 594 1159 720">2. Throughout the subproject construction period. <li data-bbox="899 724 1159 789">3. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.11	Pollution from solid waste materials.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Throughout the subproject construction period. 2. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.</p>
1.12	Injuries to workers and others.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before the contractor is permitted to commence work. 2. Throughout the subproject construction period. 	<p>PPIT environmental section. Regularly throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.</p>

C. Subproject Operation Period following Project implementation

111. 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 3: Operation Period Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.01	Erosion of canal banks, either from flood surges or normal flows.	<ol style="list-style-type: none"> 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. If necessary, specialist expertise should be requested from the central Department of Irrigation. Annually.	PAFO and PONRE. Annually.

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Appendix 1. Responsibilities of the Provincial Agriculture and Forest Office

Provincial Project Implementation Team of the PAFO – Construction Period

No.	What you Must Do	Why You Must Do It
1.02	<ol style="list-style-type: none"> 1. At a pre-mobilisation site meeting, the contractor must demonstrate a full understanding of the requirements of the Code of Conduct. 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 Code of Conduct, 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.
1.17	<ol style="list-style-type: none"> 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 Code of Conduct 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
2.01	<ol style="list-style-type: none"> 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.
2.03	<ol style="list-style-type: none"> 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. 	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
2.02	<ol style="list-style-type: none"> 1. The catchment land use plan, preparations for which should have been initiated before project implementation 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. 	<p>So that upstream land uses do not cause a decline in the quality and quantity of water available for the irrigation scheme.</p>

Appendix 2. 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
1.00	<ol style="list-style-type: none"> 1. Appoint qualified Environmental, Health and Safety Officer to manage site safety and implementation of ECC and GRM requirements. 2. EHS Officer to provide induction, training and toolbox talks for all Contractor staff and other site visitors. 3. EHS Officer to liaise with affected persons and local community 4. EHS Officer to implement and monitor any required corrective actions and resolution of issues raised through the GRM. 5. EHS Officer to report monthly to PPIT on implementation of ECC 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 ECC and GRM requirements effectively.
1.01	<ol style="list-style-type: none"> 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.
1.03	<ol style="list-style-type: none"> 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.
1.04	<ol style="list-style-type: none"> 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.

Contractor – Construction Phase

No.	What you Must Do	Why You Must Do It
1.05	<ol style="list-style-type: none"> 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.
1.06	<ol style="list-style-type: none"> 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.
1.07	<ol style="list-style-type: none"> 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.
1.08	<ol style="list-style-type: none"> 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.
1.09	<ol style="list-style-type: none"> 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.
1.10	<ol style="list-style-type: none"> 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.

Contractor – Construction Phase

No.	What you Must Do	Why You Must Do It
1.11	<ol style="list-style-type: none"> 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.
1.12	<ol style="list-style-type: none"> 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
1.13	<ol style="list-style-type: none"> 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. 	<p>To avoid the pollution from construction site wastewater, from camps and other work sites.</p>
1.14	<ol style="list-style-type: none"> 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. 	<p>To avoid pollution from solid waste materials.</p>
1.15	<ol style="list-style-type: none"> 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. 	<p>To avoid injuries to workers and others.</p>
1.16	<ol style="list-style-type: none"> 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. 	<p>To minimise the disruption of cultural sites.</p>

Contractor – Construction Phase

No.	What you Must Do	Why You Must Do It
1.17	<ol style="list-style-type: none">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 Code of Conduct requirements included.	So that subsequent users fully understand how to manage the subproject infrastructure.

Appendix 3. Responsibilities of the Water User Group – Operation Period

Water User Group – Operation Period		
No.	What you Must Do	Why You Must Do It
2.04	<ol style="list-style-type: none"> 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 bio-engineering 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 and the erosion of canal banks, either from flood surges or normal flows.

Appendix 4. SRIWSM 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.

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.

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 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 ambient 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 stationary.

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.

Initial Environmental Examination

Project Number: 50236-002
April 2019

Lao PDR: Sustainable Rural Infrastructure and
Watershed Management Sector Project

Annex A: Environmental Code of
Conduct

Nam Phieng Irrigation Subproject
Phieng District
Xayaboury Province

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

CURRENCY EQUIVALENTS

(as of 5 April 2019)

Currency Unit	–	Kip (KN)
KN1.00	=	\$0.000116
\$1.00	=	KN8,600

ABBREVIATIONS

ADB	: Asian Development Bank
COL	: Concessional OCR lending
DAFO	: District Agriculture and Forestry Office
DALAM	: Department of Agricultural Land Management
DDMCC	: Department of Disaster Management and Climate Change
EIA	: Environment Impact Assessment
ERP	: Emissions Reduction Program
FAO	: Food and Agriculture Organization (of the United Nations)
GCF	: Green Climate Fund
GIZ	: Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation Agency)
IEE	: Initial Environment Examination
IUCN	: International Union for the Conservation of Nature
IWMI	: International Water Management Institute
LIC	: Loan Implementation Consultant
MAF	: Ministry of Agriculture and Forestry
MONRE	: Ministry of Natural Resources and Environment
NGO	: Non-governmental Organisation
NRI	: Northern Rural Infrastructure Development Project
NSEDP	: National Socio-Economic Development Plan
NTFP	: non-timber forest product
PAFO	: Provincial Agriculture and Forestry Office
PDR	: People's Democratic Republic (of Laos)
PGT	: Program Governance Team
PLUP	: participatory land use planning
PPIT	: Provincial Project Implementation Team
PONRE	: Provincial Office of Natural Resources and Environment
PRI	: productive rural infrastructure
RSP	: representative subproject
SRIWSM	: Sustainable Rural Infrastructure and Watershed Management
TRTA	: Transaction Technical Assistance
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	<p>Securing watershed functions in a sustainable manner. Broadly these functions include:</p> <ul style="list-style-type: none">➤ 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

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

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CONTENTS		Page
I.	INTRODUCTION	1
	A. Nam Phieng Subproject	1
	B. Purpose of the Environmental Code of Conduct	1
II.	SUBPROJECT IMPLEMENTATION RESPONSIBILITIES	1
	A. Provincial Project Implementation Team	1
	B. Institutional arrangements for implementation of environmental safeguards	7
III.	ENVIRONMENTAL MANAGEMENT AND MONITORING MATRIX	9
	A. Introduction	9
	B. Subproject Construction Phase during Project implementation	9
	C. Subproject Operation Period following Project implementation	16

List of Appendixes

Reference Documents

Appendix 1. Responsibilities of the Provincial Agriculture and Forest Office

Appendix 2. Responsibilities of the Contractor

Appendix 3. Responsibilities of the Water User Group – Operation Period

Appendix 4. Project Environmental Guidelines

I. INTRODUCTION

A. Nam Phieng Subproject

1. The Nam Phieng Subproject is to support the upgrading of an existing irrigation distribution system serving households in a number of villages. The subproject covers two distinct areas. The productive rural infrastructure (PRI) element will cover the existing Nam Phieng 1 and Nam Phieng 2 command areas, specifically improving various distribution canals leading into and around the command areas. The other part of the subproject is the Nam Phieng catchment above the headworks, where watershed management improvements are being implemented by the Provincial Agriculture and Forestry Office (PAFO) to help safeguard the quality and quantity of the irrigation water supply.

2. The subproject is to be implemented as one of the interventions financed in Xayaboury Province by the Sustainable Rural Infrastructure and Watershed Management - Sector Project (SRIWSM). This project is a joint undertaking of the Government of Lao PDR (the government or GOL) and the Asian Development Bank (ADB).

B. Purpose of the Environmental Code of Conduct

3. This Environmental Code of Conduct has been prepared in compliance with the specified safeguard requirements of the borrower, the Government of Lao PDR (the government), and the main financing organisation, the Asian Development Bank (ADB). It accompanies an Environmental Review (ER) that: (i) provides an overview of the proposed subproject and its purposes; and (ii) makes an evaluation of the likely impacts that will occur to the environment as a result of the proposed subproject activities.

4. This Environmental Code of Conduct outlines the mitigation measures that will be required to ensure that no part of the project causes significant damage to the environment.

5. The Environmental Code of Conduct has been prepared on the basis of the design for the subproject, and its likely effects on the environment, as evaluated in the ER. 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 ER, this Code of Conduct forms the guiding document to ensure that all necessary environmental safeguards are put in place.

6. Adherence to this Code of Conduct is a condition of the use of ADB financing for the Nam Phieng Subproject. Acceptance of and a commitment to implement the Code of Conduct must form part of the contractual conditions for any physical engineering works under the subproject.

II. SUBPROJECT IMPLEMENTATION RESPONSIBILITIES

A. Provincial Project Implementation Team

7. 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 into a Provincial Project Implementation Team (PPIT) for the management of the SRIWSM Project.

8. 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.

9. Government staff are therefore 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. The capabilities required of staff varies depending on the phase of the subproject, and their level and remit, but the common thread required by all is 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. 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 Consultants – 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 (most PONRE have only 3 subprojects to monitor), (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 safeguards will be assigned through a Memorandum of Understanding (MoU) between the Vice Governor Office, Director of PAFO and Director of PONRE. The Loan Implementation Consultant (LIC) team will include international and national environmental safeguard consultants who will provide additional support. PAFO Project management staff, will work with the construction supervision staff, PONRE and DONRE staff to provide the monthly, quarterly safeguard reports that will be submitted to the Vice Governor, and the EA via the PGT in DOI.

11. At the provincial level, a PAFO will assign overall project management to an existing PAFO Deputy Director General and will implement subprojects. Within each PAFO, the technical staff will be assigned to the PPIT must be able to monitor the implementation of works programs with the supervision role also maintaining both social and environmental checklists for site visits. The submission of safeguard reports to the Vice Governor and to the PGT will trigger a consolidation report from the PGT that will be submitted to ADB twice yearly for review and approval.

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

Table 1: Responsibilities Regarding the Environment and Related Safeguards.

Project organisation	Management Roles and Responsibilities
Ministry of Finance (MOF)	<ul style="list-style-type: none"> • Establish the Project's Advance Account, • Manage direct payments to contractors, • Provide replenishment reports to ADB, • Provide advances to Implementing Agencies Subaccounts,

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Overarching financial control.
Ministry of Agriculture and Forestry (MAF) - Executing Agency (EA)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. • 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	<ul style="list-style-type: none"> • 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.

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Conduct assigned procurement of (i) vehicles, (ii) equipment, (iii) loan implementation consultants (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)	<ul style="list-style-type: none"> • 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). • 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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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

Project organisation	Management Roles and Responsibilities
	<p>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.</p> <ul style="list-style-type: none"> • 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. • 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). <p><u>For WUGs</u></p> <ul style="list-style-type: none"> • Provide awareness and capacity building on project activities, WUG implementation roles and procurement modalities.

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Monitor and mentor water WUG contracting of in-command area works.
PONRE Land Registration Department	<ul style="list-style-type: none"> • Conduct land registration. • Issue land title and demarcation.
PONRE Environmental Management Department	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Identify the need for Pesticide Reduction Training, Crop Surveillance and integrated pest management as part of the LAOGAP quality assurance support
MAF – Dept Agriculture and Land Management (DALAM)	<ul style="list-style-type: none"> • Agricultural land use planning guidelines and verification.
PAFO – DALAM	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Forest Land use zonation and survey demarcation. • Participate in PLUP when requested. • Supervision of forestry activities funded by ADB.
Provincial Nutrition Committees	<ul style="list-style-type: none"> • 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. • Provide leadership and support for District Nutrition Committees (DNC)
DNC	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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

Project organisation	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • 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

13. **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 Environmental code of conduct and grievance redress mechanism (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.

14. **PPIT.** Each PPIT will nominate an environmental safeguards focal point to support LIC Environment Specialists and PGT with co-ordination at the province level. The PPIT environmental safeguards focal point will undertake joint site visits with subproject Supervision Staff and Contractors to review implementation of ECC 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.

15. **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 ECC during subproject implementation.

16. The environmental safeguard consultants in the LIC 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.

17. During the design and preparation phase, the LIC environmental specialists will 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 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. The LIC Environment Specialists will provide safeguards and GRM capacity development training for PGT, PPIT, LIC, Contractors and GRM focal points on ECC mitigation and monitoring measures, templates for environmental monitoring and report.

18. **Contractors and Subcontractors.** All contract documents must include the ECC 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.

19. 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. This must not be allowed to happen, or it will mean that the subproject and therefore the overall SRIWSM is non-compliant with respect to both government and ADB safeguards.

20. The Contractor will be required to 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 ECC 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 ECC and GRM implementation for submission to PPIT, PGT and LIC.

21. The construction supervision consultants (CSC) will be responsible for day to day monitoring of implementation of health and safety and ECC requirements and issuing instructions for corrective actions, as needed.

22. ADB will visit project sites and review project performance against the ECC 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) update the ECC.

III. ENVIRONMENTAL MANAGEMENT AND MONITORING MATRIX

A. Introduction

23. The matrix on the following pages forms the practical management tool of the Code of Conduct. It lists the environmental impacts expected to be experienced on the Nam Phieng Subproject, and the typical mitigation measures that can be used to avoid, minimise or restore the effects of these impacts. 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 1), the contractor (Appendix 2) and the Water User Group (Appendix 3).

24. The standards against which compliance is to be monitored are given in Appendix 4. These are based on the Lao PDR National Environmental Standards (2017), as well as on project-specific guidelines.

B. Subproject Construction Phase during Project implementation

25. 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. The Contractor EHS Officer will monitor implementation of ECC and will submit monthly reports on implementation and any required corrective actions throughout construction to PPIT/PGT and LIC. The EHS officer will co-ordinate with the community regularly to ensure that any issues/grievances are resolved and reported in the monthly reports.

Table 2: Construction Phase Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.00	Environmental damage of any form results from the poor understanding of subproject requirements by the contractor and subcontractors.	<ol style="list-style-type: none"> 1. EHS Officer/GRM focal point to ensure details of subproject GRM entry point contacts are disclosed at camp, sites and affected villages. 2. EHS Officer to induct/train workers on occupational and community health and safety practices 3. 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.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.01	(a) Release of silt from excavations and earthworks during construction.	<ol style="list-style-type: none"> <li data-bbox="534 300 876 499">2. The removal of vegetation and creation of bare surfaces must be minimised to essential areas only. <li data-bbox="534 499 876 695">3. Bio-engineering surface protection must be planted on all bare earthworks during the months of May to July. 	Contractor during the subproject construction period.	<p data-bbox="1190 300 1422 401">PPIT construction supervision.</p> <p data-bbox="1190 432 1422 667">PONRE. At all inspections throughout subproject construction period.</p>
1.02	Temporary closure of irrigation systems during construction.	<ol style="list-style-type: none"> <li data-bbox="534 705 876 1035">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. <li data-bbox="534 1035 876 1266">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. 	<p data-bbox="893 705 1174 867">Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> <li data-bbox="893 867 1174 968">1. Before allowing the contractor to commence work. <li data-bbox="893 968 1174 1108">2. Throughout the subproject construction period. 	<p data-bbox="1190 705 1422 835">PPIT throughout subproject construction period.</p> <p data-bbox="1190 835 1422 1066">PONRE. At all inspections throughout subproject construction period.</p>
1.03	Disposal of soil from excavations and cleaning irrigation canals.	<ol style="list-style-type: none"> <li data-bbox="534 1276 876 1407">1. Soil from excavations should be re-used in designs wherever possible. <li data-bbox="534 1407 876 1789">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. 	<p data-bbox="893 1276 1174 1438">Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> <li data-bbox="893 1438 1174 1579">1. Throughout the subproject construction period. <li data-bbox="893 1579 1174 1740">2. Before issuing the contractor's certificate of substantial completion. <li data-bbox="893 1740 1174 1799">3. Before returning retention monies. 	<p data-bbox="1190 1276 1422 1407">PPIT throughout subproject construction period.</p> <p data-bbox="1190 1438 1422 1669">PONRE. At all inspections throughout subproject construction period.</p>

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.04	Release of noxious gases into the atmosphere.	<ol style="list-style-type: none"> 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 throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.
1.05	Noise nuisance from construction activities.	<ol style="list-style-type: none"> 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 throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.
1.06	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.	Contractor, managed by the PPIT and Loan Implementation Consultant. <ol style="list-style-type: none"> 1. Before work is permitted to start. 2. Throughout the subproject construction period. 3. Before returning retention monies. 	PPIT throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.07	Influx of temporary labour disrupts local communities.	1. Contractors and subcontractors are required to use the maximum local labour possible.	Contractor, managed by the PPIT and Loan Implementation Consultant. 1. Throughout the subproject construction period.	PPIT throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.
1.08	Operation of construction machines affects both workers and local society.	1. The noise and dust reduction measures 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 throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.

1.09	Pollution by hydrocarbons from construction plant.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before the contractor is permitted to mobilise to site. 2. Throughout the subproject construction period. 3. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>
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No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.10	Pollution by wastewater from camps and other work sites.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before the contractor is permitted to mobilise to site. 2. Throughout the subproject construction period. 3. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period.</p> <p>PONRE. At all inspections throughout subproject construction period.</p>

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
1.11	Pollution from solid waste materials.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Throughout the subproject construction period. 2. Before returning retention monies. 	<p>PPIT environmental section. Regularly throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.</p>
1.12	Injuries to workers and others.	<ol style="list-style-type: none"> 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. 	<p>Contractor, managed by the PPIT and Loan Implementation Consultant.</p> <ol style="list-style-type: none"> 1. Before the contractor is permitted to commence work. 2. Throughout the subproject construction period. 	<p>PPIT environmental section. Regularly throughout subproject construction period. PONRE. At all inspections throughout subproject construction period.</p>

C. Subproject Operation Period following Project implementation

26. 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 3: Operation Period Environmental Management and Monitoring

No.	Potential Impact	Safeguards or Mitigation	Responsibility to Implement and Timing	Monitoring, Checking and Timing
2.01	Erosion of canal banks, either from flood surges or normal flows.	<ol style="list-style-type: none"> 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. If necessary, specialist expertise should be requested from the central Department of Irrigation. Annually.	PAFO and PONRE. Annually.

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Appendix 1. Responsibilities of the Provincial Agriculture and Forest Office

Provincial Project Implementation Team of the PAFO – Construction Period		
No.	What you Must Do	Why You Must Do It
1.02	<ol style="list-style-type: none"> 1. At a pre-mobilisation site meeting, the contractor must demonstrate a full understanding of the requirements of the Code of Conduct. 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 Code of Conduct, 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.
1.17	<ol style="list-style-type: none"> 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 Code of Conduct 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
2.01	<ol style="list-style-type: none"> 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.
2.03	<ol style="list-style-type: none"> 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. 	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
2.02	<p>1. The catchment land use plan, preparations for which should have been initiated before project implementation 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.</p> <p>2. Arrangements for implementation of the plan must be maintained.</p>	So that upstream land uses do not cause a decline in the quality and quantity of water available for the irrigation scheme.

Appendix 2. 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
1.00	<ol style="list-style-type: none"> 1. Appoint qualified Environmental, Health and Safety Officer to manage site safety and implementation of ECC and GRM requirements. 2. EHS Officer to provide induction, training and toolbox talks for all Contractor staff and other site visitors. 3. EHS Officer to liaise with affected persons and local community 4. EHS Officer to implement and monitor any required corrective actions and resolution of issues raised through the GRM. 5. EHS Officer to report monthly to PPIT on implementation of ECC 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 ECC and GRM requirements effectively.
1.01	<ol style="list-style-type: none"> 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.
1.03	<ol style="list-style-type: none"> 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.
1.04	<ol style="list-style-type: none"> 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.

Contractor – Construction Phase		
No.	What you Must Do	Why You Must Do It
1.05	<ol style="list-style-type: none"> 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.
1.06	<ol style="list-style-type: none"> 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.
1.07	<ol style="list-style-type: none"> 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.
1.08	<ol style="list-style-type: none"> 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.
1.09	<ol style="list-style-type: none"> 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.
1.10	<ol style="list-style-type: none"> 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.

Contractor – Construction Phase		
No.	What you Must Do	Why You Must Do It
1.11	<ol style="list-style-type: none"> 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.
1.12	<ol style="list-style-type: none"> 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
1.13	<ol style="list-style-type: none"> 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.
1.14	<ol style="list-style-type: none"> 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. 	To avoid pollution from solid waste materials.
1.15	<ol style="list-style-type: none"> 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.
1.16	<ol style="list-style-type: none"> 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
1.17	<ol style="list-style-type: none"> 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 Code of Conduct requirements included. 	So that subsequent users fully understand how to manage the subproject infrastructure.

Appendix 3. Responsibilities of the Water User Group – Operation Period

Water User Group – Operation Period		
No.	What you Must Do	Why You Must Do It
2.04	<ol style="list-style-type: none"> 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 bio-engineering 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 and the erosion of canal banks, either from flood surges or normal flows.

Appendix 4. SRIWSM 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.

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.

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 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 ambient 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 stationary.

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.