Environmental Assessment and Review Framework

April 2016

LAO: Northern Rural Infrastructure Development Sector Project

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

CURRENCY EQUIVALENTS

as of March 2016)

Currency unit	–	kip (KN)
KN1.00	=	$0.00012
$1.00	=	KN 8300

ABBREVIATIONS

ADB	–	Asian Development Bank
EIA	–	Environmental Impact Assessment
EIRR	–	economic internal rate of return
EMP	–	Environmental Management Plans
EPL	–	Environmental Protection Law
GEF	–	Global Environment Facility
GRM	–	grievance redress mechanism
IEE	–	Initial Environmental Examination
km	–	kilometer
m	–	meter
MAF	–	Ministry of Agriculture and Forestry
MONRE	–	Ministry of Natural Resources and Environment
NRIDSP	–	Northern Rural Infrastructure Development Sector Project
PAFO	–	Provincial Agriculture and Forestry Office
PMO	–	project management office
PPMO	–	provincial project management office
PPO	–	provincial project office
PPTA	–	project preparation technical assistance
UNDP	–	United Nations Development Programme

WEIGHTS AND MEASURES

C	–	Celsius (centigrade)
°	–	degree
km	–	kilometer
m	–	meter
ml	–	milliliter
mg/l	–	milligrams per liter
pH	–	

NOTE

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

CONTENTS

I. INTRODUCTION

1. The Northern Rural Infrastructure Development Sector Project (NRIDSP) will address key constraints to rural economic growth and the commercialization of agriculture in the provinces of Bokeo, Luang Namtha, Oudomxay, Phongsaly, the country's four most northern provinces. This document sets out the responsibilities and procedures for the environmental assessment of NRIDSP based on the relevant laws of Lao PDR (Decree on Environmental Impact Assessment - 2010) and ADB requirements (Safeguards Policy Statement, 2009 and Environmental Assessment Guidelines, 2003). They are intended to provide for effective integration of environmental assessment and environmental management planning into the preparation and implementation of subprojects.

II. OVERVIEW OF TYPE OF PROJECTS TO BE ASSESSED

A. Subproject Scope

2. In accordance with the project objectives and according to the Government's strategy of strengthening market linkages in rural areas, subprojects will be identified and selected at locations where there is opportunity enhance agricultural productivity through irrigation development and rehabilitation. Subprojects must meet eligibility criteria which ensure avoidance of potentially negative impacts that cannot be mitigated. Candidate subprojects include the rehabilitation of rural access roads and the establishment and/or rehabilitation of small to medium scaled irrigation schemes. In order to maximize the impact from infrastructure investments, associated initiatives will include: (i) strengthening of technical extension services available to direct subproject beneficiaries; (ii) support for producer and marketing groups to coordinate supplies of agricultural produce to markets and/or processors; (iii) support for contracted agricultural production with price incentives based on quality standards; (iv) initiatives to secure tenure and access to land for sedentary agricultural production and land re-zoning to protect the integrity of watersheds (and thus reservoirs) above rehabilitated irrigation systems; and (v) initiatives to strengthen public private partnerships to improve smallholder access to markets, amongst others. These will be closely linked to infrastructure investments and will be included in investment costs for each subproject.

3. The scope of irrigation subprojects will include the rehabilitation of small to medium scaled gravity-fed irrigation schemes and may involve the rehabilitation of head-works (including the replacement of makeshift weirs with permanent structures), lining of primary and secondary irrigation canals, construction of minor water management structures, and rehabilitation of reservoir walls.

4. Given the pre-screening of candidate subprojects by project preparation technical assistance (PPTA) consultants during preparation and the criteria used in the identification of subprojects, eligible subprojects are considered as Category B of ADB's environmental classification as they may result in some adverse environmental impacts which can be largely mitigated. For projects in this category an Initial Environmental Examination (IEE) is required for assessing environmental impacts.

5. Incremental investments to enhance the impact from infrastructure investments are likely to include the formation of water user groups and public private partnerships. These will involve facilitation and training work aimed at enhancing the ability of smallholders to pool marketing and logistical resources.

6. Private processors who wish to engage in supply contracts with smallholders may include rice millers, manufacturers of food products such as oils, sauces and tea, and operators of drying facilities. Participating processors must be able to provide appropriate licenses for their operation issued by the Ministry of Natural Resources and Environment (MONRE) and in addition, be able to substantiate that the processes engaged do not involve environmentally damaging activities such as discharge of pollutants into waterways or the air, or the use of fuel wood from natural forests. In order to ensure that the processes used do not cause environmental damage and/or to institute appropriate mitigation, participating processors will be subject to environmental audit prior to the completion of supply contracts and annually thereafter, to be carried out by Provincial Offices of Natural Resources and Environment, with support from the safeguards officer in the appropriate provincial project management office (PPMO) and the Loan Implementation Consultant as necessary. The audit report is to be submitted to the PPMO.

7. Pilot marketing and processing infrastructure are intended to reduce transport and handling costs and to employ environmentally friendly technologies. Items may include the rehabilitation of commodity handling infrastructure such as transfer stations at rural road / major road junctions for transfer to large vehicles for transportation, small markets in district centers, and small scale drying facilities. Environmentally friendly technologies may include low cost measures for handling and reusing crop residues such as corn stalks and cobs, and small scale drying facilities that are not dependent on fuel or power sources.

8. Watershed degradation due to land use changes and in particular due to deforestation leads to reduced base flows in the dry season and thus potentially aggravates drought conditions. Reduced flows are however not only due to watershed degradation, but also due to upstream water uses. Deforestation potentially also leads to increasing risk of flash floods. Those risks are aggravated by climate variability and climate change. The introduction of land zoning in catchment areas of reservoirs will minimize inappropriate land-use activities within the catchment and reduce the risk of siltation of reservoirs while assuring dry season flows. The preparation of catchment management plans and associated land rezoning is intended to bring the benefit of informed participatory land-use planning to groups that undertake cultivation activities in upper catchment areas of watersheds. The zoning process will help ensure the adoption of land-uses that support income generation and avoid risks of soil erosion that can jeopardize the effectiveness of the canals and reservoirs and the long term viability of irrigated agriculture in the lower catchment areas. Such uses may include encouragement of natural forest regeneration, enrichment planting, or planting of multipurpose trees.

B. Anticipated Environmental Impacts and Mitigation for the Subprojects

1. Environmental Impacts Related to Location

9. Some property will be affected by the schemes, both permanently through land required for structures and temporarily during construction, for the storage of materials and equipment. The Land Acquisition and Resettlement Plan for the subproject will ensure that any loss of land or property will be subject to compensation in accordance with the Resettlement Framework for the Project. In general subprojects will not involve substantial widening of the canal network and limitations of the movement of people and animals are unlikely, though the input of user communities in detailed design will identify where additional canal crossings need to be provided to maintain or improve access. Most schemes will include canal lining, which will significantly reduce seepage losses, a positive impact. Potential schemes located within or adjacent to areas of special ecological or biodiversity significance are excluded in subproject

screening and therefore there is no impact on these. Where existing structures are makeshift and constructed largely from branches, which is common, the replacement will be a permanent concrete structure which will reduce pressure on trees and forest resources, as well as reduce the labor requirement for maintenance.

2. Environmental Impacts Related to Construction

10. Impacts related to construction will be temporary in nature, and can in most cases be mitigated. Mitigation measures are listed in the EMP for each subproject which is to be included in the bidding documents for contractors, so that the cost of compliance with the mitigation can be included in the bid price.

11. Excavation work, to prepare canals for the installation of lining and of borrow areas will release silt, except when works take place during dry conditions. This calls for careful control of the works. Mitigation may include (i) the placement, by the Contractor, of a site supervisor for all excavation work; (ii) confining excavation operations to the dry season; (iii) use of silt traps where warranted, according to instructions from the construction supervisors; and (iv) disposal of spoil from excavation works at sites approved by the construction supervision agency. To the extent possible, spoil should be used as fill, for example backfilling of culvert walls.

12. Construction operations may also involve the temporary closure of irrigation systems. Because construction will take place mainly during the dry season, this may have significant impacts on crops and livestock and on local livelihoods. In some situations this can be mitigated by the use of temporary diversions, either in channels or by the use of flexible pipes and pumps where necessary, however it is unlikely to be feasible to maintain full irrigation flows while the works are taking place. User communities need to be involved in scheme planning and construction, ensuring that local farmers are aware of the construction schedule will further mitigate the effects of temporary closure.

13. Excavation works will also release dust, which will be a potentially significant nuisance where it takes place close to peoples' homes. Where excavation operations carried out during dry and windy weather are within 50 meter (m) of an occupied dwelling, excavated sites should be sprayed with water to control dust release. The operation of plant is not expected to cause a significant increase in air pollution, as most construction tasks are likely to involve hand labor. Only light plant such as cement mixers and water pumps are likely to be used.

14. Similarly, as most construction will involve hand labor or small plant, noise nuisance is not expected to be significant. The location of the new weir is about 2 kilometer (km) away from the nearest village.

15. Temporary use of land, including the construction of any temporary track for vehicular access to the weir site, will receive compensation in the form of rents payable during scheme construction period and land will be re-instated in accordance with the resettlement framework.

16. While the Contractor will be encouraged to engage local people for the works, some skilled workers and possibly supplementary labor will need to be brought to the site from elsewhere in Lao PDR. These workers are likely to be accommodated in buildings rented by the Contractor, though temporary accommodation may also be built. Interactions with local residents can potentially lead to the spread of communicable diseases, or incidences of disharmony, and temporary toilet facilities can release raw sewage. These potential effects can be avoided or mitigated by (i) consultation with local people on acceptable areas for siting of

facilities; (ii) installation of suitable toilets such as pit latrines and grey water drainage facilities such as soakage pits; (iii) arrangements for collection of solid waste; (iv) briefing of workers and awareness raising of the local population on dangers of communicable diseases; and (v) assignment of responsibility for worker and local peoples' welfare to a senior member of the Contractor's staff.

17. Some construction operations, including excavations and use of plant and the use and handling of fuels or other hazardous materials will pose a small safety risk to workers and to local people. These will be mitigated by the allocation of responsibility for site safety to the Contractor's site supervisory staff will ensure that all reasonable safety measures, such as use of safety clothing and equipment and placing of hazard warnings, are taken.

18. Fuels and hazardous materials may also cause soil contamination or pollution of waterways. These and safety hazards will be prevented either by exclusive use of commercial fuel providers operating nearby, or by the storage of fuel in designated, supervised areas that are clearly marked and have restricted access. These areas should be at least 20 m from the nearest watercourse. All machine waste will be deposited in sealed containers and removed from the site for recycling or safe disposal as appropriate.

3. Environmental Impacts Related to Operation

19. Agriculture practiced by beneficiary farmers will intensify in areas beyond the current effective command area. This will bring significant long term benefit to users. Users who are not currently using water pumps to obtain irrigation water will begin to practice irrigated agriculture, or to resume irrigated agriculture if they were in areas where irrigation water was formerly available. Any increase in the use of agro-chemicals, particularly pesticides, can affect plant, animal and insect populations and lead to loss of biodiversity. Adverse effects may occur as a result over-application of agro-chemicals, poor or unsafe storage, and improper handling including washing of equipment used to dispense chemicals in rivers or irrigation channels. Since groundwater is not used for drinking water in the visited sub-projects, potential groundwater contamination is not a priority issue and will be also reduced through the proposed mitigation measures. A tendency to apply excessive agro-chemicals and risks associated with poor storage and handling (sometimes based on misconceptions, such as the belief that chemicals in powder form do not leave lasting residues on utensils) can be mitigated by the promotion of sustainable land use practices such as (i) the use of organic based pest control methods, informed use of mineral fertilizers; (ii) promotion of the concept of integrated pest management, focusing on cost effective and environmentally friendly or benign pest management techniques; and (iii) emphatic discouragement of the use of persistent pesticides through awareness raising.

20. A related issue in the project area is rapid expansion of plantations, particularly banana and rubber, has taken place in the project area over recent years. There is an extensive existing banana plantation adjoining the command area. Management of the banana plantation is chemical intensive, and follows banana culture methods now used extensively in Oudomxay and other northern provinces. Invariably, industrial banana plantations involve foreign investment and management, and a temporary lease covering one rotation of banana plants for a limited number of years. Agreements with landowners typically do not include removal of plastic pipes and rubbish left on site following banana cultivation. A recent study has reviewed the negative impacts of banana plantation cultivation has highlighted potential issues related to soil damage, effects of abandoned plastic piping and other materials, and of intense agro-chemical use.

21. Long term effects on the aquatic ecosystem and result from the expansion of the command area, the greater obstruction of fish movements from construction of permanent weirs, and effects of any increased use and improper handling of agro-chemicals. While the increase the extent of paddy fields which are seasonally inhabited by fish, mollusks, crustaceans and aquatic insects and improved water storage where weir structures are improved. Yet, head works and other irrigation infrastructure impacts the aquatic ecology and in particular fish migration and thus also impacting sustainable livelihoods through reduced fish stocks. This will be mitigated by a standard design of weirs, which integrates a fish ramp as a passage for aquatic species, since carefully planned fish passages restore the ecological connectivity. Experimental fish passage between wetlands and the mainstream of the Mekong in central Lao PDR resulted in an increase in the number of species captured in the wetlands, as recorded from interviews of local villagers (Baumgartner et al. 2012[1]). In complex, multi-species ecosystems, it is difficult to design passages that are effective for all species. Elements such as the type of fish passage, the target species, the slope, the flow, and the entrance and exit locations have an effect on which species will be able to navigate the passage. For the weirs that are rehabilitated or constructed within the proposed sub-projects, fish ramps will be the type of fish passage used. Fish ramps use natural, locally available substrate to slow down water and create pools and small rapids that mimic natural stream conditions. The bottom substrate needs to have a very gentle slope and therefore these types of passages work best for relatively short barriers as most weirs of the small scale irrigation systems of the project. The appropriate design of fish passages is essential for successful upstream and downstream migration. Therefore, the construction of the fish passage is done in collaboration between the irrigation engineer and the bio-engineer. After completion of the fish passage, it has to be assured by management measures that fishing is prohibited on and near the fish ramp.

22. The intensification of agriculture will also lead to greater use of fertilizers. Surplus fertilizer, such as nitrogen compounds that are not taken up by plants or bound in the soil will raise the nutrient status of the water released at the outflow of the system, increasing the chemical oxygen demand of the water. If allowed to accumulate, or if insufficiently diluted when released into the receiving waters, the increased nutrient status may affect the aquatic ecosystem and lead to eutrophication and algal blooms. This risk can be reduced by information and training of farmers in informed use of mineral fertilizers, so that they are applied at optimal levels. This should be provided in the context of good agricultural practices, so that farmers can gain a basic understanding of nutrient needs in relation to soil type and site characteristics, leading to sound decisions about fertilizer type and dosage rate prior to planting and also in response to signs of growth deficiencies. Besides reducing environmental risks, this has the added advantage of reducing farmers' input costs.

23. The incidence of waterborne diseases in local communes is significant. Irrigation water is used as a supplementary source for domestic purposes, and this practice will increase after construction when the more water may be flowing through the system. Risks will come both from waterborne pathogens, and from any increase in ponding that may result from wastages, as ponds provide a habitat for insect vectors of disease. These risks can be mitigated by (i) promoting improved operation and maintenance of the schemes as part of training and support to water user groups so that blockages and ruptures causing water logging are rapidly

[1] L. J. Baumgartner, T. Marsden, D. Singhanouvong, O. Phonekhampheng, I. G. Stuart and G. Thorncraft (2012) Using an Experimental in Situ Fishway to Provide Key Design Criteria for Lateral Fish Passage in Tropical Rivers: A Case Study from the Mekong River, Central Lao PDR. River Res. Applic. 28: 1217–1229 (2012).

repaired, and (ii) raising awareness, during training and support to water user groups, on the hazards posed by poor sanitation, water logging and use of untreated irrigation water for drinking.

24. Competition with other water uses. Population growth and increasing incomes will place increasing demands for domestic water supply, as well as for irrigation. This becomes critical during the dry season, and in particular when dry years occur. It is important to allow a minimum stream flow to maintain the aquatic ecosystem as well as meet the demands of users. Hydropower is a further potential use of water, although this use does not compete as such (because water is returned to the stream course) but can modify flows, particularly for systems which use dams, to reduce the variability of flows over the annual cycle. At present, the water for domestic use is obtained from a variety of sources including open wells and gravity fed supplies from streams. Water from the irrigation canals is used for washing and in some cases, drinking and cooking. For the purposes of design, a minimum flow needs to be estimated although there is an absence of data on dry season flows and their variability from year to year. However, should plans be made to develop intakes for rural water supplies on the streams that feed the irrigation systems, improved data is important as well as formal communication and cooperation to resolve potential conflicts. Improved data could be obtained by systematic recording of water levels in the reservoir. Should a rural water supply scheme be proposed in the area, it will be subject to environmental assessment under the Environmental Protection Law (1999) and Environmental Impact Assessment (EIA) Decree (2010) and also the Water and Water Resources Law (1996). The latter is under revision to reflect recent institutional changes and growing use of water for hydropower and irrigation. Article 11 of the draft revised version of the Water and Water Resources Law states that "the allocation of water sources and catchments shall be based on surveys and on data collected, in order that water and water resources are distributed, managed and used effectively and in accordance with their purposes". However, as yet the draft does not provide detail on water resource allocation, or means of arriving at allocation decisions. Future users such as water supply schemes will be obliged under law to assess the resource and the issue of allocation of water to different uses. This will of necessity involve greater data on stream flows, gathering of further data such as downstream uses and discussion on options such as limits on use during the dry season.

25. Also with increasing population and use of irrigated agriculture, the demand for irrigation water will grow and potentially lead to conflict among users. This can be substantially reduced by collaborative action among users to optimize the use of irrigation water and to ensure that allocations to all users, including those situated at the periphery of the network, are fair.

26. Soil salinization may occur as a result of the accumulation of salts that are dissolved in the irrigation water, and upward transport of salt deposits in lower soil horizons in the case of over-irrigation. These risks are low for the scheme, as any salt not taken up by growing plants will be subject to natural flushing by rainwater in the wet season, and users consulted during the field visits confirmed that over-irrigation rarely takes place. Over-irrigation is prevented both by the relative shortage of irrigation water towards the edges of the command area, by water regulation for areas closer to the primary canal. While salt build-up may occur in these areas, risks of widespread build-up over irrigated fields are low.

27. Risks of increasing erosion and scour may arise where land either side of the canal alignment is steep, calling for regular maintenance of slope vegetation, and possibly slope protection work in scheme design. Bio-engineering concepts are used to design measures to stabilize environments near the infrastructure.

III. ENVIRONMENTAL ASSESSMENT AND REVIEW PROCEDURES

28. The law governing the protection of the environment, including the assessment and management of projects, is the Environmental Protection Law (EPL), 1999 and its associated Decree on the Implementation of the EPL (2002). Responsibilities and procedures for conducting environmental assessments, together with the requirements for environmental monitoring of projects, have been further revised in the EIA Decree (16 February 2010), for which an unofficial English translation is available.

29. The recent EIA Decree assigns primary responsibility for undertaking environmental assessment of projects to the project developer. MONRE (acting through its central office or provincial departments) is responsible for review and approval of environmental assessment reports, co-ordination of monitoring and evaluation, and issuance of compliance certificates. Public participation and discussion with local administrations is required throughout the environmental assessment process.

30. Investment projects are categorized according to a schedule in the EIA Decree as Category 1- small scale investments that require an IEE, or Category 2- large scale investments that require an EIA. Where a project is of a type that is not listed, an investment application should be submitted to MONRE for screening. The Decree sets out procedures, rights and responsibilities for the preparation and approval of IEEs and the preparation, approval, implementation and verification of environmental management and monitoring plans.

31. The EIA Decree stipulates responsibilities for the key stakeholders involved in the process. These are listed as MONRE, local administrations, development project responsible agencies (taken to mean, essentially, the line agency either at ministerial or provincial level), concerned sector bodies and project developers. The responsibilities relate to the process of IEE preparation and approval. The roles include investigations, field inspections, information dissemination, public consultation, review of draft IEEs, updating IEEs in response to comments and the issuance of certificates of compliance. The roles and responsibilities of the key stakeholder groups for the process, as described in Article 9 of the EIA Decree, are summarized in Table A11.1.

Table A11.1: Roles of Stakeholders in Environmental Assessment

Stakeholders	**Roles**									**Notes**
	Investigations	Dissemination meetings	Field inspections	Consultation Meetings	IEE preparation	Review and comment on IEE	Incorporation of comment in IEE	Approval	Issuance of certification	
MONRE			✓	✓				✓	✓	MONRE may nominate provincial offices of natural resources and environment to act on its behalf
Local Administrations	✓	✓		✓					✓	Certification based on verification by MONRE
Sectoral bodies in charge	✓	✓		✓		✓				

Stakeholders	Roles									Notes
	Investigations	Dissemination meetings	Field inspections	Consultation Meetings	IEE preparation	Review and comment on IEE	Incorporation of comment in IEE	Approval	Issuance of certification	
of investments										
Line Ministries						✓				
Project Developers	✓	✓	✓	✓	✓		✓			

32. Project developers are defined in Article 3 of the EIA Decree as any person, legal entity or organization, from the public or private sector, who/which is licensed to undertake study, survey, design, construction and operation of an investment project.

33. Procedures for IEE preparation and approval are described in Article 10 of the EIA Decree and are summarized as follows:

(i) The project developer prepares the IEE report, in cooperation with other stakeholder agencies and including consultation at village, district and provincial levels;
(ii) On completion of consultations at district level and subsequent updating of the IEE report based on comments received, the project developer should send the IEE report to the relevant line ministry;
(iii) The line ministry should review the IEE report within 10 days and either accept or instruct the project developer to provide further information or make revisions;
(iv) Once accepted by the line ministry, the project developer should submit 15 hard copies and a soft copy of the IEE to the line ministry;
(v) The line ministry should send the IEE report to the local administration and concerned agencies within five days of receipt;
(vi) Recipients of the IEE report must send any comments on the IEE reports within 20 working days of receipt;
(vii) The line ministry should convene a technical workshop to review the IEE and, if necessary, undertake a field visit, following which comments are sent to MONRE with a recommendation as to the acceptability of the IEE; and
(viii) MONRE decides whether to issue a certificate of compliance, instruct the project developer to amend the IEE report, instruct the project developer to undertake further investigations, or to reject the IEE report.

IV. SPECIFIC PROCEDURES TO BE USED FOR SUBPROJECTS

34. The following procedures provide for assessment of environmental impacts, reporting and environmental management planning and have been designed to meet both Lao PDR requirements (as specified in the EIA Decree, 2010) and ADB requirements (as specified in the Safeguards Policy Statement, 2009).

A. Responsibilities and Authorities

35. The responsible agency will be the Ministry of Agriculture and Forestry (MAF) which is also the Executing Agency for the proposed Project to be financed by ADB. MAF will act primarily through its provincial offices, the Provincial Agriculture and Forestry Office (PAFO).

36. A Provincial Project Office (PPO) will be established under PAFO in participating provinces with responsibility for day-to-day coordination and supervision of subproject implementation. The PPO will respond to guidance from a provincial steering committee with multi-agency representation under the chairmanship of the provincial vice governor and composed of members from PAFO, the Department of Planning and Investment, DPWT, provincial office of natural resources and environment, provincial Land Management Authority, Lao Women's Union, National Front and governors from the participating districts.

37. PAFOs will be primarily responsible for preparing each subproject IEE, acting essentially as the "project developer" with technical support coordinated through the PPO. PAFO will be responsible for: (i) carrying out investigations and preparing the IEE report; (ii) holding consultations at village, district and provincial level as required under the EIA Decree; and (iii) responding to comments by participating communities, local administrations, and provincial office of natural resources and environment.

B. Criteria for Subproject Eligibility

38. Eligibility criteria for candidate subprojects are as follows:

(i) Subprojects must be shown to contribute to strategic objectives of provincial and, where appropriate, district socio-economic development plans;
(ii) Subprojects must have limited potential environmental impacts and conform with Category B subprojects of ADB's environmental classification system and also with Category 1 as outlined in Lao PDR's Decree on Environmental Impact Assessment of April 2010;
(iii) Subprojects must have no significant resettlement (no more than 200 severely affected persons) or land compensation implications as defined by Lao PDR Government and ADB definitions of what constitutes 'significant' resettlement;
(iv) Subprojects must be located only in rural areas where the majority of beneficiaries are likely to be dependent upon agriculture for their livelihoods;
(v) Subprojects must be able to demonstrate either increased agricultural productivity or improved access to facilitate the development of stronger market linkages;
(vi) There must be demonstrated local commitment to the subproject with confirmation by beneficiaries (inclusive of women and ethnic groups), participating kumbans, and district authorities to that effect;
(vii) Subprojects must be within the cost range of $300,000 to $800,000;
(viii) Subprojects likely to have recurrent expenditure requirements for their continued operations and maintenance will need to confirm financing arrangements for routine and periodic maintenance;
(ix) In view of environmental issues and the potential impact rural infrastructure development can have on protected areas, an additional criteria is proposed that will specifically exclude subprojects that adjoin or pass through an existing or proposed protected area;

(x) The benefits from each subproject must be independent and achieved directly from the investment under consideration, i.e. not dependent on subsequent adjoining subproject;
(xi) The subproject must not be located in any area where a major development, such as a new hydropower scheme, a mine, or a Special Economic Zone, is planned; and
(xii) The subproject must satisfy the threshold economic internal rate of return (EIRR) of 12%. In cases where the estimated EIRRs are below the 12% threshold, EIRRs of 10% are acceptable in the presence of substantial level of benefits that cannot be readily quantified. Such unquantified benefits must be documented to justify the eligibility of the subproject for financing.

39. Candidate subprojects will have been screened by PPTA consultants to ensure conformity with these criteria and specifically to observe environmental criteria presented in the list above. In that way, all eligible subprojects can be considered as having only minor environmental impact and that negative impacts can be readily mitigated through the implementation of subproject Environmental Management Plans, which are included in each IEE.

40. Infrastructure improvements will mainly comprise the rehabilitation of existing irrigation schemes. While the criteria do not exclude new infrastructure, these are unlikely to be eligible on the grounds of cost (criterion vii).

41. For irrigation subprojects, the issue of dry season water availability, particularly in the dry season flows in dry years, is especially significant due to the risk to riparian ecosystems if a stream bed is allowed to run dry. However, data on stream water flows, which help to determine the maximum water off-take, is not routinely collected. It is necessary to confirm that water sources are sufficient to meet the demands of the scheme during the dry season, while allowing a minimum stream flow for the maintenance of the riparian ecosystem in source streams. In addition, data on the variation of stream water flows is valuable to detect longer term changes that may result from climate change, and can inform initiatives that assist water users to adapt to phenomena such as longer dry seasons. A condition of implementation therefore will be regular measurements of water flows in source streams for each scheme by district office of natural resources and environment officers, commencing from the date of subproject identification.

42. With regard to criterion (ix), which excludes subprojects that are situated in adjoin or pass through protected areas, it is important to note that no activity associated with the project, such as quarrying or soil borrowing, may take place within the protected area. Subprojects must have viable materials sources from outside protected areas in order to be eligible.

C. Procedures for Environmental Assessment of Subprojects

1. Environmental Classification

43. The environmental categorization for each subproject will be determined by the project management office (PMO) with assistance from the grant implementation consultants. Categorization will be based on: (i) the schedule contained in the EIA Decree of April 2010, which allocates projects into Category 1 (requiring an IEE) and Category 2 (requiring an EIA), based on parameters identified therein, and (ii) checklists provided in the ADB's Environmental

Assessment Guidelines, 2003[2]. It is expected that all subprojects will fall into Category B in the ADB system whereby some adverse environmental impacts are anticipated, but of a lesser extent and/or significance than those for Category A. Similarly, all subprojects are likely to fall into Category 1 according to schedule attached to the EIA Decree. Within this schedule, Category 1 projects include irrigation projects with a command area of between 100-2,000 ha, all road upgrading and rehabilitation projects, and water supply projects that produce less than 500 m^3 per day. All subprojects eligible under subproject selection criteria, are therefore likely to be of Category 1 status for the purpose of environmental assessment, and thus will require IEEs.

2. IEE Preparation

44. The preparation of an IEE for each subproject will be carried out by the PPO within PAFO, under the guidance of the PMO and technical support by the grant implementation consultants.

3. Environmental Management Plan Preparation

45. Environmental Management Plans (EMPs) are to be included in the IEEs, providing for appropriate avoidance and mitigation of potential negative impacts identified in the IEE process and showing responsibilities for implementation. The EMP should cover management of impacts associated with subproject preparation and design, with construction and with operation. IEEs, incorporating EMPs, have been prepared for sample subprojects during project preparation, these provide worked examples to guide EMP (and IEE preparation).

4. Review of IEEs

46. The PMO will be responsible for the review of IEEs and will therefore undertake internal review, with the assistance of the consultants as required. In accordance with the article 10 of the EIA decree, the IEEs will also be reviewed by provincial office of natural resources and environment and local administrations and presented to stakeholders at provincial, district and village level for public review (see section below). The PMO will be responsible for updating the IEE in response to comments received. In some cases, the IEEs will be referred to the ADB Lao PDR Resident Mission for review, for example where confirmation and/or guidance is required on particular issues. This shall be at the discretion of the PMO Director.

5. Environmental Monitoring

47. Three types of monitoring are envisaged, (i) compliance monitoring, to ensure that mitigation specified in the EMP is carried out to an adequate standard; (ii) community feedback to obtain views and information on relevant environmental parameters; and (iii) testing of water samples for contaminants.

48. Contaminants of potential concern are mainly microbial pathogens and traces of agro-chemicals, particularly chemical pesticides and herbicides. While knowledge of long term effects of chemical agents is necessary to gauge the effectiveness of capacity development in integrated pest management techniques and/or the effects of chemical use on large industrial plantations, laboratory test methods for the presence and concentration of these chemicals are

[2] The environmental categorization checklists provided in the Environmental Assessment Guidelines (2003) have not been superseded by the Safeguards Policy Statement (2009).

complex and exacting, and due to the decay in chemical pesticides and herbicides on contact with air and water, need to be very regular and frequent as the concentrations detected reflect both the time that has elapsed since application of the chemicals, as well as the levels that have been applied. It is therefore proposed that a recently developed proprietary method based on populations of macro invertebrates in the streams, known as Macro Invertebrate (MI) testing, is used for water quality monitoring. It is a proven method in Europe and other countries as part of water quality monitoring and the method is currently in use in Lao PDR, at least at pilot level. Its application involves participation from community members, who make the field observations and measurements. Its introduction involves (i) training of PAFO/PONRE officials who will then be in a position to provide further training as well as support to communities that use the techniques; (ii) training communities and District Agriculture and Forestry Office officials from village clusters; and (iii) ongoing support. A budget for the cost of introducing MI testing is therefore included. This method will be used for the water quality baseline assessment upstream and downstream of the planned irrigation systems before the construction, as well as annually during the operation phase.

49. During construction, the key tasks are monitoring the compliance with environmental mitigation measures stipulated in the environmental management plan for each subproject, which shall be done by the construction supervision team, and also testing of water samples, before, during and after construction, as specified in the EMP for each subproject.

50. During operation, the principal source of environmental monitoring will be feedback from the user communities (which will also be sought during the construction phase).

51. Water quality is intended to detect any changes in water quality resulting from the irrigation system improvements. Parameters, schedules, methods and costs of monitoring will be specified in the IEE report for each subproject. Water quality parameter values have been selected to reflect the quality appropriate for water in irrigation schemes. Provision is given for awareness raising for the subprojects, to make scheme users aware of the hazards associated with drinking water from the irrigation canal systems. The following parameters and standards are suggested:

Parameters	**Maximum Value**
Ph	5.5 - 9
Faecal Coliforms	<1,000 per 100 ml
Biological Oxygen Demand ($20^{o}C$)	<25 mg/l
Chemical Oxygen Demand	<35 mg/l

52. There is limited capacity for testing in the provinces themselves. The water supply authorities in each province (Provincial Nam Papa) undertake regular testing of water from their treatment plant, but usually limited to pH, turbidity and residual chlorine. Testing for fecal coliforms and biological and chemical oxygen demand can be done at laboratory facilities in Vientiane.

53. The findings from the monitoring will be summarized and included in quarterly project progress reports prepared by the PPOs. These will be submitted to the PMO for consolidation and reporting to the ADB and MAF. Any issues that arise that call for further monitoring activities or other investigation will be raised by the PMO in the quarterly progress reports and discussed at review missions.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE PLAN

54. Public consultation is carried out for IEE preparation, and again once the IEEs are prepared, to invite comment from the public in accordance with the EIA Decree.

55. During IEE preparation, the EIA decree requires village dissemination meetings to inform the villagers, in various forms, the proposed project and the possible environmental and social impacts as well as to collect opinions from people who may be affected by the project. Assistance is to be provided by the local administrations. At this stage, the following agenda should be used to ensure that there is adequate exchange of information and opinion:

(i) A summary of the proposed works under the subproject;
(ii) A summary of subproject objectives and likely positive and negative environmental impacts, covering the construction phase and operational impacts;
(iii) Invitation for feedback in respect of any areas of concern that the public may have, and suggested means of implementation;
(iv) Acceptability of the proposed works to the public; and
(v) Request for information on the known occurrence of unexploded ordinance in the area where the scheme components will be built.

56. For consultations, the dates, attendees, topics covered and conclusions should be recorded and included with the IEE report. These are to take the form of meetings at which the findings of the IEE will be presented in addition to key background information. Comments are recorded and the IEE updated accordingly.

57. Following completion of the draft IEE, the EIA Decree requires consultation meetings at provincial, district and again at village level. Once the IEE is completed, it should be summarized and made available to the public for a period of at least 30 days. For this purpose, the IEEs should be prepared in English and Lao language and distributed to district administrations, where they will be made available for public review.

58. During construction and operation, the project developer is obliged under the EIA Decree to inform project affected people and other stakeholders of project activities which are likely to create environmental and social impacts, and to allow them to access general information about the subproject.

59. In addition, should people affected by the proposed Project have any grievances, they have the right to lodge complaints through a grievance redress mechanism (GRM) established for the subproject. The GRM provides a process for affected persons or concerned members of the community (referred to as affected persons, or APs) to lodge complaints regarding any aspect of the subproject (including implementation of environmental, social and resettlement safeguards) without prejudice to their right to file complaints with the court of law at any point in the process. Costs are borne by the implementing agencies. Where complainants do not have sufficient literacy skills to express themselves in writing, they are encouraged to seek assistance from the subproject and/or nominated local non-governmental organizations and/or other family members, village heads to have their grievances recorded in writing. All complaints and resolutions will be properly documented by the PPO/ District Coordination Office and be available for (a) the public and (b) review for monitoring purposes. The GRM applies to all aspects of the project. The GRM involves a series of procedural steps, providing recourse to district, provincial and central level authorities as may become necessary. These are described in the table below.

Serial No.	Procedural Steps
1	In each village existing mediation committees would be the first contact for APs to address their concerns. It is recommended that in agreement with villages either this committee would be responsible for LARC issues or the village would establish a project related LARC committee. The village shall decide about its community internal approach.
▼	
2	APs would address their complaints to committee/s that would have to react within a defined time (5 days to be defined by village) after submission of the complaint.
▼	
3	In case provided responses are not satisfying to affected people the grievance applications would be forwarded to the district council for resolution within a defined time (5 days) from the date of filing the complaint with this court.
▼	
4	In case APs are still not satisfied next steps could involve provincial authorities that would have to issue a final decision within a defined time (10 days).
▼	
5	If subproject APs are still not satisfied with the response given or decisions made, the complaint can be elevated at national level either to the national court, if legal decision at provincial level will require this, or to the National Project Management Office which is to be established by the DOP through which the MAF will be responsible for the overall project management for final clarification in this matter within 15 days.

VI. STAFFING REQUIREMENTS AND BUDGET

60. An international environment specialist will be required to provide initial training in IEE preparation and intermittent support for the first two years of the Project, supported by a domestic environment specialist who will provide direct support to PPOs in IEE preparation. These specialists will be required for 3 months and 18 months respectively.

Table 1: Budget Requirements for Environmental Inputs

Budget Item	Unit Cost	Units	Total
International Environmental Specialist	$20,000	3	$60,000
Domestic Environmental Specialist	$3,000	18	$54,000
Travel and Per Diems			
International Air Travel	$2,500	2	$5,000
Domestic Air Travel	$135	9	$1,215
Per Diem: International Specialist	$110	120	$13,200
Per Diem: Domestic Specialist	$35	60	$2,100
TOTAL			**$135,515**

Table 2: Budget Requirements for establishing and supporting MI testing

Budget Item	Unit Cost	Units	Total
Training Specialists	$5,500	4	$22,000
Training Assistants	$2,700	4	10,800
Per Diem	900	8	7,200
Domestic Air Travel	$135	6	$810
Land transport	$4,500	4	$18,000
Training Materials	$12,000	1	$12,000
Venue and Catering costs	$4000	1	$4,000
TOTAL			**$74,810**

Note: This assumes one training session for PAFO staff in Oudomxay and five training sessions for clusters of villages.

VII. TERMS OF REFERENCE FOR THE ENVIRONMENT SPECIALISTS

1. Environment Specialists (3 person-months international and 18 person-months national)

61. The specialists will have appropriate tertiary qualifications in environmental science or natural resource management from a recognized institution and will have more than 10 years experience working in the field of environmental management for internationally funded development projects, some of which will have been undertaken in Lao PDR or elsewhere in the Mekong Subregion. The national specialist will also have considerable experience in environmental monitoring and will be familiar with the laws of Lao PDR associated with the environment as well as having had experience in internationally funded development projects, preferably related to infrastructure development, as an environmentalist. Training skills would also be an advantage to the international and national specialists.

62. Duties of the specialists will include the following:

(i) Review the environmental recommendations of the PPTA Final Report and the formats for environmental examinations contained therein;

(ii) Brief the staff of the PPOs and participating district staff in participating provinces on environmental procedures and requirements for subproject preparation;

(iii) Visit each subproject during the subproject preparation to ensure environmental safeguards are being properly conducted;

(iv) Assist the PMO with the internal review of the initial environmental examinations and associated environmental management plan prepared for each subproject and assist with updating the draft IEEs in response to comments received; and

(v) Assist in the preparation and implementation of training activities with regard to the environmental aspects of the proposed Project.

VIII. CLIMATE CHANGE CONSIDERATIONS

63. In Lao PDR, the most significant phenomena associated with predicted climate change are increasing frequency and severity of heavy rainfall events, and longer, more severe, drought periods. These will result in greater maximum and minimum river levels and therefore greater risks of floods, as well as increased soil erosion and droughts, which threaten food security and rural livelihoods. A gradual increase in annual mean temperature, of between 0.1 to 0.3°C per decade is predicted, which may affect the health and yields of crops in the long term. The need for adaptation to climate change and mitigation of it is recognized in MAF's vision for agricultural development to 2020.

A. Project Adaptation and Mitigation Actions

64. The design of new and rehabilitated infrastructure under Output 1 of the Project will take into account primarily the key climate change phenomena identified during the NAPA process, namely more intense and frequent extreme rainfall events, and more severe droughts. The infrastructure will be designed for resistance to damage, particularly from more severe water runoff during extreme events. This will be reflected in the hydraulic design of road drainage structures and of irrigation headworks, canals and control structures, and of slope protection measures, including retention and revetment structures and low cost, plant based measures. The need for expertise to apply these principles to an appropriate and cost effective level, using experience developed in similar environments, is reflected in the level of technical assistance that is to be provided for the project. These design tasks are included in the Terms of Reference for the irrigation and rural road engineers on the consulting team.

65. Output 2 of the Project provides for strengthening of technical extension services to support subproject beneficiaries. Later in the life of the project, this will include the application of community based adaptation measures, as they are developed and piloted by MAF in accordance with its long term vision and with support from UNDP and GEF. Responsibility for monitoring the development of these measures and assisting with their application are included in the Terms of Reference for the Agronomist.

66. Output 2 also provides for land re-zoning to protect the integrity of watersheds. This will be achieved by participatory land use and its application, which will develop protective vegetation cover in watershed areas. This carries important climate change mitigation effects both in preventing soil erosion (and thereby lost opportunity for carbon sequestration) and by encouraging increased forest cover, increasing carbon sequestration and thereby contributing to climate change mitigation in accordance with the NAPA.