

# Cumulative Impact Assessment Guidelines for Hydropower Projects in the Lao People's Democratic Republic



**IFC**

**International  
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## Executive Summary

The Lao People's Democratic Republic (Lao PDR) is a resource rich nation with world-renowned biodiversity and abundant natural resources. In recent years, Lao PDR has increased its development in hydropower projects to provide power for not only its own people, but for other countries in South East Asia. Lao PDR has a theoretical hydropower potential of about 26,500MW excluding the mainstream of the Mekong. Around 15% of the country's hydropower potential has been developed over the past 30 years, and by 2020, Lao PDR is committed to supplying up to 10,000MW to Thailand, 5,000MW to Vietnam and 1,500MW to Cambodia.

The rapid expansion of hydropower projects can be exemplified by the following. As of December 2015, there were 36 hydropower projects in Lao PDR with an operational capacity of >1MW (5,806MW in total). At the same time, there were 35 hydropower projects under construction with a total capacity of 4,471MW, thus a total of 71 currently operational or under construction. In addition to that 71, as many as 55 hydropower projects with a capacity of 4,130 MW will either be operational or under construction by 2010. As such, there is the potential for the construction and operation of 126 hydropower projects in Lao by 2020. Lao PDR has signed Project Development Agreements for 22 other hydropower projects and a further 27 projects were/are undertaking feasibility studies. Overall, as many as 234 hydropower projects have signed Memorandums of Understanding with Lao PDR. The numbers are very significant.

Lao PDR also has seen growth in other sectors that rely on water resources e.g. mining, agribusiness, etc and these will continue to develop in the short to medium terms.

All these projects have the potential to have environmental and social impacts; however, in the past, little consideration has been given to the cumulative impacts of multiple projects in a certain area, and the multiple impacts of a number of projects on the environment and social fabric of Lao PDR.

Cumulative impacts are impacts that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities. These impacts are incremental effects of past, present, or future activities combined with the proposed project. Cumulative impacts can cause significant environmental and social impacts when added together; whereas they may often considered negligible at the individual project level. As such, it is critical to have an appropriate mechanism that is specific to Lao PDR to assess and manage cumulative impacts.

Lao PDR has developed a legal framework for considering not only, the environmental and social impacts of projects, but moreover, for the assessment of cumulative impacts. This document, the Cumulative Impact Assessment Guidelines for Hydropower Projects in the Lao PDR (CIAG), have been developed based on the need to assess the cumulative impacts of hydropower projects in Lao PDR for the Department of Environment and Social Impact Assessment within the Ministry of Natural Resources and Environment. The CIAG has been developed under the International Finance Corporation's (IFC) Hydro Advisory Program which receives support from the Australian Department of Foreign Affairs and Trade (DFAT) and Japan Government. The CIAG have been developed consistent with the IFC's *Good Practice Handbook on CIAM: Guidance for the Private Sector in Emerging Markets* (IFC Handbook).

The general objectives of the CIAG are to improve and strengthen the cumulative impact assessment (CIA) process and implementation, to provide support for studies related to the Ministerial Directives and promote the sustainable development of natural resources while enhancing basin management planning. The CIAG are intended to define the scope of the studies required for the preparation of a CIA to allow for consideration and subsequent decision-making on the appropriateness of the construction, operation and decommissioning/rehabilitation of hydropower projects under the *Law on Environmental Protection 2012* and other relevant legislation.

These CIAG are being developed in consultation with the Government of Lao PDR including significant consultation and workshopping with Ministry of Natural Resources and Environment (MONRE), businesses, development partners, hydropower project proponents and relevant stakeholders including regional and non-government organisations.

The format of the CIAG is as follows:

**Chapter 1:** Provides decision-makers with an overview of the expansion of hydropower project and the cumulative impact assessment requirements contained within the *Law on Environmental Protection 2012* and *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013*;

**Chapter 2:** Provides decision-makers and proponents with an overview of the fundamental of undertaking a cumulative impact assessment, the VECs that are usually impacted by the construction and operation of hydropower project and how the cumulative impact assessment requirements contained within the CIAG are linked with the undertaking of an ESIA as required by the *Law on Environmental Protection 2012* and *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013*;

**Chapter 3:** Provides proponents with the criteria and methodologies require to undertake a CIA for a hydropower project in Lao PDR. This process requires identification and management of impacts from the project on affected communities and stakeholders. This section includes a discussion on the various aspects/studies etc that the proponent and MONRE will undertake individually and jointly; and

**Chapter 4:** An assessment checklist for decision-makers to ensure that the cumulative impact assessment is compliant with the requirements of the *Law on Environmental Protection 2012*, *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013* and the CIAGs contained in Chapter 3 of this document.

For the purposes of understanding and consistency, an Environmental and Social Impact Assessment (ESIA) is the international definition for a joint environmental impact assessment and social impact assessment. An ESIA is a project specific assessment required by law. A CIA is the process of analysing the potential impacts and risks of multiple existing, current and proposed projects in the context of the potential effect of other human activities and natural environmental and social external drivers on specific Value Ecosystem Components over time. A CIA also includes the proposed mitigation measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible for not only the specific project but for existing and proposed projects.

## Acronyms

ADB	Asian Development Bank
CIA	Cumulative Impact Assessment
CIAG	Cumulative Impact Assessment Guidelines
DESIA	Department of Environmental and Social Impact Assessment
DFAT	Australian Department of Foreign Affairs and Trade
ESIA	Environmental and Social Impact Assessment
GIS	Geographic Information Systems
IFC	International Finance Corporation
LAC	Limits of Acceptable Change
Lao PDR	Lao People's Democratic Republic
LOR	Level of Reporting
MONRE	Ministry of Natural Resources and Environment
VEC	Valued Ecosystem Components
WB	World Bank

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## 1. Introduction

### 1.1. Objectives of the Cumulative Impact Assessment Guideline

The Cumulative Impact Assessment Guidelines for Hydropower Projects in the Lao PDR (CIAG) have been developed based on the need to assess the cumulative impacts of hydropower projects in Lao PDR for the Department of Environment and Social Impact Assessment (DESIA) within the Ministry of Natural Resources and Environment (MONRE). The CIAG has been developed under the International Finance Corporation's (IFC) Hydro Advisory Program which receives support from the Australian Department of Foreign Affairs and Trade (DFAT) and Japan Government.

The CIAG were developed based on the need to properly assess the cumulative impacts of the rapidly expanding hydropower sector in Lao PDR and to consider other projects within the area of the proposed hydropower project including but not limited to road, mining operations, agriculture, forestry and other plantations and any other project that will or is likely to be relevant to the consideration of cumulative environmental and social impacts. The CIAG have been developed consistent with the IFC's *Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets* (IFC Handbook).

The general objective for the development of the CIAG is to provide guidance and direction for both MONRE and proponents on the undertaking and assessment of cumulative impact assessments (CIA) in the hydropower sector. The specific objectives of the CIAG are the following:

- (a) provide an overview of the current understanding of the practice of CIA;
- (b) establish the foundation for CIA studies to be conducted in Lao PDR for hydropower projects (and potentially other sector projects using this document as a template and/or guide);
- (c) enhance the quality and content of project-level Environmental and Social Impact Assessment (ESIAs) by incorporating CIA considerations;
- (d) provide guidance on the scope of a CIA, the area of influence, and the relevant Valued Ecosystem Components (VECs) that may be impacted;
- (e) provide guidance on the appropriate methodology to be used to prepare a CIA including the collection of baseline and undertake an effective cumulative impact assessment;
- (f) provide a framework for the monitoring of cumulative impacts within an area of influence; and
- (g) provide MONRE with a checklist to assess the quality of a submitted CIA prior to approval.

There are significant benefits of undertaking comprehensive CIAs for hydropower projects in Lao PDR as will be highlighted below. The information that can be provided by a CIA can allow decision makers and the community to be properly informed as to the potential impacts on VECs and their interactions with their livelihoods as well as the social fabric of a region. It will also allow MONRE to determine the level of development that potentially could occur within a specific area of Lao PDR based on ecosystem resilience to withstand the multiple impacts. It can also be high strategic to determine what other projects apart of that proposed in this case e.g. hydropower project that may be either compatible or incompatible with other projects particularly in relation to the coordination of projects within the area of influence. This could include significant resettlement or substantial changes in livelihood that people have traditionally undertaken.

These CIAG are being developed in consultation with Government including significant consultation and workshopping with MONRE, hydropower project proponents and relevant stakeholders including Lao PDR Government businesses, regional organisations, and non-government organisations. The CIAG is seen as a paradigm shift in the way previous CIAs have been conducted in Lao PDR which was more an ad hoc approach that was not easily replicated across different areas. As such, the CIAG set the benchmark that proponents should see as the minimum they should do when undertaking a CIA for a proposed hydropower project in Lao PDR.

## 1.2. Expansion of Hydropower in Lao PDR and the Need for a Cumulative Impact Assessment

Lao PDR is a resource rich nation with world-renowned biodiversity and abundant natural resources. In recent years, Lao PDR has increased its development in hydropower projects. Lao PDR has a theoretical hydropower potential of about 26,500MW excluding the mainstream of the Mekong. Around 15% of the country's hydropower potential has been developed over the past 30 years, and by 2020, Lao PDR is committed to supplying up to 10,000MW to Thailand, 5,000MW to Vietnam and 1,500MW to Cambodia.

The rapid expansion of hydropower projects can be exemplified by the following. As of December 2015, there were 36 hydropower projects in Lao PDR with an operational capacity of >1MW (5,806MW in total). At the same time, there were 35 hydropower projects under construction with a total capacity of 4,471MW, thus a total of 71 currently operational or under construction. In addition to that 71, as many as 55 hydropower projects with a capacity of 4,130 MW will either be operational or under construction by 2010. As such, there is the potential for the construction and operation of 126 hydropower projects in Lao by 2020. Lao PDR has signed Project Development Agreements for 22 other hydropower projects and a further 27 projects were/are undertaking feasibility studies. Overall, as many as 234 hydropower projects have signed Memorandums of Understanding with Lao PDR. The numbers are very significant. This data does not include other projects that may be being considered and have not reached full agreement with Government. It also does not consider projects that may be investigated in the future that are not currently foreseeable but may potentially occur. The location of some of the existing and proposed hydropower projects within Lao PDR and more generally, and the location of existing and proposed hydropower projects on the Mekong is shown in Figure 1 as at 2016.

Figure 1: Existing and Proposed Dams on the Mekong and Tributaries (as at 2016)<sup>1</sup>

Lao PDR also has seen growth in other sectors that rely on water resources e.g. mining, agribusiness, forestry, etc and these will continue to develop in the short to medium terms.

All these existing and planned projects have the potential to have significant environmental and social impacts; however, until recently, little consideration has been given to the cumulative impacts of multiple projects in a certain spatial area, and the multiple impacts of a number of projects, whether within the same sector or multiple sectors on the environment and social fabric of Lao PDR.

Figure 1 shows that there are significant clusters where hydropower projects are both existing and planned and as such, in combination with other projects such as mining, agribusiness, forestry, etc and hydropower projects outside Lao PDR, there is an urgent need to properly understand and where possible mitigate the potential environmental, social and more so, cumulative impacts and how those impacts might affect the environment and the people using and living in the area on both resettlement and livelihood changes. Without this information, Lao PDR would see very significant environmental and social impacts in the future.

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<sup>1</sup> CGIAR Research Program on Water, Land and Ecosystems (WLE) (2016)

### 1.3. Scope and Relation to Lao PDR Environmental Impact Assessment Legislation, Ministerial Instruments and Process

Lao PDR has established a legal framework for considering not only, the environmental and social impacts of projects, but moreover, for the assessment of cumulative impacts. The relevant legislation related to hydropower projects in Lao PDR includes but is not limited to the:

- (a) *Law on Environmental Protection 2012;*
- (b) *Environmental Impact Assessment Guidelines 2012;*
- (c) *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013;*
- (d) *Ministerial Instruction on Initial Environmental Examination of the Investment Projects and Activities 2013;*
- (e) *Ministerial Agreement on the Endorsement and Promulgation of List of Investment Projects and Activities Requiring for Conducting the Initial Environmental Examination or Environmental and Social Impact Assessment 2013;*
- (f) *Prime Minister's Decree on Compensation and Resettlement of People Affected by Development Projects no. 84/Government of Lao PDR 2016;*
- (g) *Public Involvement Guidelines in the EIA Process 2013;*
- (h) *Law on Electricity 2012;*
- (i) *Law of Water and Water Resources 1996;*
- (j) *Regulation on Small Hydropower Project Development 1180/Ministry of Energy and Mines 2016;*
- (k) *Policy for Sustainable Hydropower Development in Lao PDR 2015:* the objective of the Policy builds on environmental and social sustainability while also including technical, economic and financial aspects. It repealed the *National Policy – Environmental and Social Sustainability of the Hydropower Sector in Lao PDR 2005;* and
- (l) *Technical, Economical and Financial Feasibility Study Guidelines as required under Article 30 of the Law on Electricity 2012.*

With respect to the requirement to undertake and prepare a CIA, the *Ministerial Instruction on Environmental and Social Impact Assessments of Investment Projects and Activities 2013* provides MONRE with a power to require a CIA to be completed for all projects, although more likely those that are considered as Group Two (2) under the *Ministerial Agreement on the Endorsement and Promulgation of List of Investment Projects and Activities Requiring for Conducting the Initial Environmental Examination or Environmental and Social Impact Assessment 2013*. Clause 1.2 of the *Ministerial Instruction on Environmental and Social Impact Assessments of Investment Projects and Activities 2013* relates to the *Principles of Environmental and Social Impact Assessment Process* and states:

*The Project Owner shall conduct the **cumulative impact assessment** in addition to the normal Environmental and Social Impact Assessment in case any Investment Projects and Activities are predicted to cause social and environmental impact cumulatively with other Investment Projects and Activities located in the adjacent areas; provided that such cumulative impact assessment shall be conducted pursuant to the relevant technical guidelines (**emphasis added**).*

MONRE is the relevant entity that has the power of decision making for the approval of a project's Environmental and Social Impact Assessment (ESIA) and a CIA. For the purposes of understanding and consistency, an ESIA is the international definition for a joint environmental impact assessment and social impact assessment. An ESIA is a project specific assessment required by law. A CIA is the process of analysing the potential impacts and risks of multiple existing, current and proposed projects in the context of the potential effect of other human activities and natural environmental and social external drivers on specific Value Ecosystem Components (VECs) over time, and includes the proposed mitigation measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

Internationally, there are numerous important Performance Standards and Safeguard Policies that are relevant to the undertaking of a CIA for a hydropower project. These include but are not limited to the World Bank's Safeguard Policies, the IFC's Performance Standards, and the Equator Principles. These should be considered along with the CIAGs when undertaking CIAs in Lao PDR.

#### **1.4. Format of the Cumulative Impact Assessment Guideline**

The format of the CIAG is as follows:

**Chapter 1:** Provides decision-makers with an overview of the expansion of hydropower project and the cumulative impact assessment requirements contained within the *Law on Environmental Protection 2012* and *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013*;

**Chapter 2:** Provides decision-makers and proponents with an overview of the fundamental of undertaking a cumulative impact assessment, the VECs that are usually impacted by the construction and operation of hydropower project and how the cumulative impact assessment requirements contained within the CIAG are linked with the undertaking of an ESIA as required by the *Law on Environmental Protection 2012* and *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013*;

**Chapter 3:** Provides proponents with the criteria and methodologies require to undertake a CIA for a hydropower project in Lao PDR. This process requires identification and management of impacts from the project on affected communities and stakeholders. This section includes a discussion on the various aspects/studies etc that the proponent and MONRE will undertake individually and jointly; and

**Chapter 4:** An assessment checklist for decision-makers to ensure that the cumulative impact assessment is compliant with the requirements of the *Law on Environmental Protection 2012*, *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013* and the CIAGs contained in Chapter 3 of this document.

## **2. Fundamentals of a Cumulative Impact Assessment and Valued Ecosystem Components**

### **2.1. Definitions and Concepts of Cumulative Impacts and Cumulative Impact Assessment**

#### **2.1.1. What is a Cumulative Impact**

Cumulative impacts are impacts that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities. These impacts are incremental effects of past, present, or future activities combined with the proposed project. Cumulative impacts can cause significant environmental and social impacts when added together; whereas they may often be considered negligible at the individual project level. As such, and with multiple hydropower projects operating and under development, it is critical to have an appropriate mechanism that is specific to Lao PDR to assess and manage cumulative impacts, particularly given the proposed rapid expansion of existing and planned hydropower projects in the country.

Multiple and successive environmental and social impacts from existing projects, combined with the potential incremental impacts resulting from proposed and/or anticipated future projects, can result in significant cumulative impacts that would not be expected in the case of a stand-alone project. Examples of cumulative impacts that could be attributed to a hydropower project in Lao PDR include:

- (a) Effects on ambient conditions such as the incremental contribution of pollutant air and noise emissions in the airshed given that much of Lao PDR is either vegetated or rural communities where air quality is likely to be high and the level of noise will be relatively benign;
- (b) Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation through both the construction and operation of hydropower projects;
- (c) Reduction of water flow in a watershed due to multiple reservoirs that can have multiple impacts on both upstream and downstream users;
- (d) Increases in sediment loads on a watershed or increased erosion which can result in the loss for example, of important sediment for subsistent agriculture that could change livelihood activities for people in Lao PDR;
- (e) Interference with migratory routes or wildlife movement;
- (f) Increased pressure on the carrying capacity or the survival of indicator species in an ecosystem through pushing species into smaller habitats. Internationally, the impacts of this have been that animals for example change their behaviours which can increase potential interactions with people;
- (g) Reductions in fauna caused by the loss of habitat;
- (h) Depletion of a forest resources that may have been important livelihood sources through flooding from multiple reservoirs; and
- (i) Secondary, consequential or induced social impacts, such as in-migration, from construction workers into a project's area of influence.

As an example for Lao PDR, where a number of hydropower projects are to be constructed within the same river/watershed, the cumulative impacts that are commonly observed included those to flora and fauna, on downstream water availability or quality, on watershed sediment dynamics, on navigation for both small and potentially larger vessels, on local communities' livelihoods through the loss of land and changes in the way they undertake their livelihoods, or on adjacent land uses because of increased access from associated roads.

With the rapid expansion of hydropower in Lao PDR to up to 62 hydropower projects based on signed agreements, the multiple projects are likely to incrementally cause significant impacts, and thus it is necessary to properly assess these to reduce their short to long term impacts on the environment and the people lives using these areas for their homes and livelihoods.

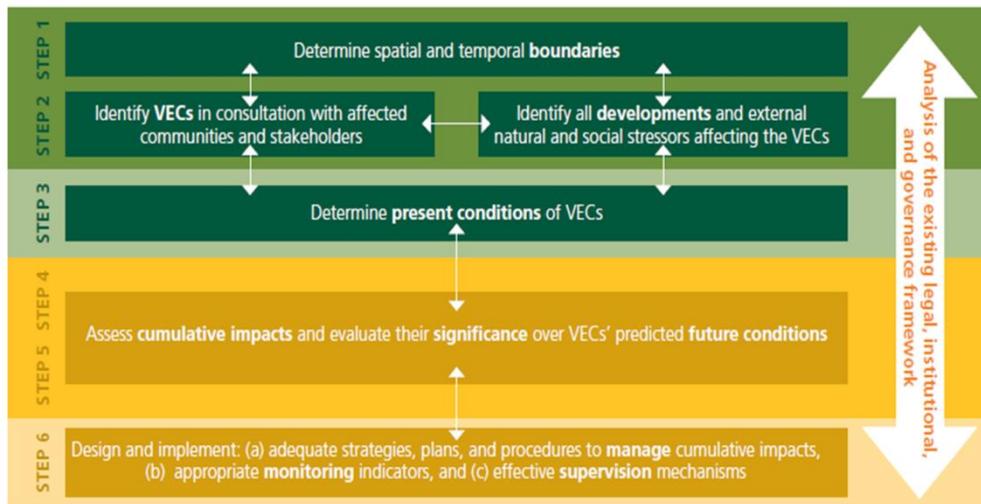
## 2.1.2. What is a Cumulative Impact Assessment

A CIA is the process of analysing the potential impacts and risks of existing and proposed projects in the context of the potential impacts of other human activities and natural environmental and social external drivers on the chosen VECs over time. A further critical component of a CIA is proposing practically and more importantly, implementable measures to avoid, reduce, or mitigate the cumulative impacts and risk to the extent possible and then importantly, to set a platform for the monitoring of the predictions made of the impacts. A CIA is not greatly different from assessing impacts when undertaking the preparation of an ESIA. While ESIA usually focus on a small area in immediate proximity to a project, a CIA, will examine a larger area at for example, a catchment, regional, and/or provincial level.

The IFC Handbook established six key objectives of a project-initiated CIA, these being:

1. Assess the potential impacts and risks of existing and proposed projects over time, in the context of potential effects from other projects and natural environmental and social external drivers on a chosen VECs;
2. Verify that the proposed project's cumulative social and environmental impacts and risks will not exceed a threshold that could compromise the sustainability or viability of selected VECs;
3. Confirm that the proposed project's value and feasibility are not limited by cumulative social and environmental effects;
4. Support the development of governance structures for making decisions and managing cumulative impacts at the appropriate geographic scale (e.g., airshed, river catchment, town, regional landscape);
5. Ensure that the concerns of affected communities about the cumulative impacts of existing and proposed project are identified, documented, and addressed; and
6. Manage potential reputation risks.

The IFC Handbook also establishes a logical six step framework for undertaking a CIA. The framework is shown below in Figure 2. Steps 1 and 2 relates to the scoping phase where a proponent in consultation with MONRE sets the spatial and temporal boundaries of the CIA, establishes the VECs the proponent is required to assess and importantly, identifies all existing and proposed projects that should be included in the CIA. Once the scoping exercise is undertaken, the proponent with the assistance of MONRE; will undertake a baseline assessment of the environment and establish the present condition of VECs (Step 3). The assessment of cumulative impacts should utilise information from a variety of instruments including, regional and local environmental, social and resource studies including previous ESIA, programs and/or planning documents; strategic, sectoral, and regional assessments; project impact assessments, CIAs, and targeted studies on specific issues. This is essentially the same as would be undertaken for an ESIA but is undertaken on a larger spatial scale. Steps 4 and 5 involved the evaluation of the significance of predicted cumulative impacts to the viability or sustainability of the affected VECs. Once the impacts are assessed, Step 6 involves the designing and implementation of mitigation measures to manage the project's contribution to the cumulative impacts and risks. It is critical that this be a flexible process which allows for the re-evaluation and the inclusion of new data and information as it becomes available.



**Figure 2: IFC Handbook's Six Step Process for undertaking CIA**

An additional important task when preparing a CIA is to assess how the potential impacts of existing and proposed project might combine, cumulatively, with the potential impacts of the other human activities and other natural stressors such as droughts or extreme climatic events. With climate change resulting in large intensity rainfall events that have caused flooding in Lao PDR in recent years, the proper assessment of this impact is vitally important to the outcomes of a CIA.

In some cases, CIA may be needed to assess and manage the impacts of several new projects, activities, or actions that are being developed or planned. In these cases, proponents should proactively work together to undertake the CIA to both save time and money, but to produce a more comprehensive document. In cases where there is only one proponent undertaking multiple projects within a specific spatial scale which has previously occurred in Lao PDR; that is relatively easy. By comparison, where there are multiple proponents within a specific spatial scale as is also common in Lao PDR, commercial and confidentiality issues may need to be resolved to allow for proponents to work proactively together.

Alternatively, the CIA of a single new project may be appropriate when it occurs in an area where concerns exist about cumulative impacts, for example, where issues are well documented or identified through consultation that with affected communities and other stakeholders. More importantly, many ESIA's are undertaken in a piecemeal approach, this being that different components of the same project are assessed individually. In this case, undertaking a CIA should properly assess all impacts of the single whole project although it will be necessary for proponents and MONRE to work proactively together to ensure all the available information is used when preparing the CIA.

The expected outcomes of a good quality CIA should be:

- (a) in consultation with MONRE and other stakeholders, an agreement on the VECs that should be assessed as part of the CIA;
- (b) identification of all existing and proposed projects that are within the area of influence;
- (c) identification of all VECs that may be impacted by all the projects;
- (d) a prediction of the likely condition of VECs as a result of the cumulative impacts of the existing and proposed projects prior to mitigation and the thresholds of the VECs for further projects;
- (e) the development of avoidance mechanisms, in accordance with the mitigation hierarchy, of the projects' impacts on the VECs for the life of the projects;
- (f) mechanisms for the monitoring and management of risks to VECs over the life of the projects;
- (g) provision of project-related monitoring data to MONRE; and
- (h) continuous engagement and participation of the affected communities in the decision-making process, and monitoring and supervision.

## 2.2. Previous CIAs in Lao PDR

There have been a number of CIAs previously undertaken in Lao PDR. However, the CIAs have not used a consistent approach and moreover, in a number of cases, they were not effective in providing accurate information in relation to the actual cumulative impacts due to their scope and spatial area. Examples of the CIAs undertaken for hydropower projects in Lao PDR are discussed below.

Nam Ou	Nam Theun 1
<p>The CIA assessed the cumulative impacts of seven hydropower projects within a single catchment all operated by a single proponent.</p>	<p>The CIA assessed the cumulative impacts of three hydropower projects in upper reaches of the Nam Theun (Khading) River in Lao PDR. The three projects will be operated by different proponents.</p>
<p>The aim of the CIA was to assess the impacts of the entire cascades together in a wider, basin context; the impacts upon the Mekong; and identify the key issues for the watershed management strategy.</p> <p>The CIA used a Rapid Sustainability Assessment Tool to scope the CIA and relied predominantly on the findings of the ESIA although there was some very limited field survey of the river and collection of data and interviews with provincial / district officials. No formal consultations with community occurred as part of the CIA.</p>	<p>Nam Theun 1 is in the middle of the Nam Kading National Protected Area, one of the most remote and biodiversity- rich protected areas in the specific are of Lao PDR.</p> <p>The aim of the CIA was to assess the impacts of Nam Theun 1, Theun Hinboun (and expansion) and Nam Theun 2 which were both already operational.</p> <p>The spatial scale of the CIA was relatively small when compared internationally with other CIAs.</p>
<p>The CIA used the environmental and social baseline of the catchment, including:</p> <ul style="list-style-type: none"> <li>• Terrestrial Biodiversity (flora and fauna) and Resource Use;</li> <li>• Land Use;</li> <li>• Aquatic Resource Use;</li> <li>• Hydrology;</li> <li>• Water quality;</li> <li>• Water Resource Use;</li> <li>• Population and demographics;</li> <li>• Regional economy and livelihoods;</li> <li>• Ethnicity and cultural heritage;</li> </ul> <p>The CIA attempted to identify potential cumulative environmental and social impacts of the cascade development on (but not limited to) the environmental and social aspects listed above.</p> <p>An outcome of the CIA was the development of a catchment-scale and cascade-scale management and mitigation measures that could be implemented by the single proponent. Thereafter, the proponent decided to develop the cascade in phases. Phase 1 included three hydropower projects (2-5-6) and Phase 2 included four hydropower projects (1-3-4-7).</p> <p>The CIA was conducted in less than 50 days by a single person.</p>	<p>The CIA discussion included:</p> <ul style="list-style-type: none"> <li>• River continuum;</li> <li>• Discharge Patterns downstream;</li> <li>• River to lake conditions;</li> <li>• Terrestrial habitats;</li> <li>• Impacts to access roads;</li> <li>• Social impacts;</li> <li>• Sediment reduction;</li> <li>• Hydrology;</li> <li>• Water Quality;</li> <li>• Groundwater impacts;</li> <li>• Noise, Vibration and Air Quality; and</li> <li>• Impacts to fish populations.</li> </ul> <p>The results demonstrated that there would be significant impacts on downstream users through major decreases in water flow and water quality.</p> <p>There was very limited information relied upon to make the assessment and as such, the CIA produced “vague” conclusions to be reached. Generally, the CIA was inadequate for assessing impacts and identifying future management strategies.</p>

As can be noted above, the spatial scale, methodologies used and the issues assessed for the two CIAs were very different and in the case of the Nam Theun 1, was not adequate to properly assess the cumulative impacts

While the above only highlights two past examples (additional examples include the Nam Theun 2 and Nam Ngum 3), there has been a lack of information either available and/or obtained during the CIA process to provide a generally accepted level of baseline data. Further, there have been variations of methodologies used for the different CIAs. The CIAG therefore establishes a standard methodology for future CIA for hydropower projects in Lao PDR.

### **2.3. Government and Proponent Roles and Responsibilities**

When undertaking a CIA in Lao PDR, there are a number of potential issues that proponents need to resolve early so as they can undertake an effective CIA. As such, it is necessary to establish the roles of various entities including proponents, MONRE, etc and how they engage with relevant stakeholders.

It is anticipated that MONRE would be responsible for the following activities for a CIA:

- (a) establish of the CIA boundaries;
- (b) provide advice on the scope and VECs that should be assessed as part of the CIA;
- (c) provide direction on any uncertainties about other developments, in that a CIA needs to consider all projects, not just the same type of projects – eg mining, hydropower projects, agriculture, forestry etc;
- (d) provide adequate baseline data where available; where data is not available, MONRE should use all its endeavours to both provide proponents with information from previous ESAs and also seek data that may not be commercially sensitive from existing and future proponents that would be important to the CIA; and
- (e) conduct CIAs of geographic area which includes baseline conditions and predict future baselines where there are multiple proponents, although it would be expected that proponents would provide funding for this work.

It is anticipated that proponents would be responsible for the following activities for a CIA:

- (a) prepare CIA with the support of existing and proposed proponents and MONRE;
- (b) collect additional baseline data where data is not available;
- (c) undertake desk top or full assessment eg hydrological modelling with all hydropower projects within the scope area, with the support of MONRE;
- (d) monitor and manage cumulative impacts and risks related to the development for the life of the project; and
- (e) provide project-level cumulative impact monitoring data to regional cumulative impact monitoring program.

It is acknowledged that other stakeholders may also provide valuable input into the CIA including but not limited to the Mekong River Commission, NGOs and other government and non-government entities.

Where there is more than one project proponent proposing a hydropower project within the CIA spatial footprint within the foreseeable future, it is anticipated that the project proponents would work together to provide a more inclusive CIA for the additional projects.

### **2.4. Valued Ecosystem Components**

VECs are the main assessable matters of the CIA process. VECs are defined as any part of the environment and social fabric of Lao PDR that is considered important by the proponent, stakeholders, community, environmental and social scientists, anthropologists and MONRE involved in the assessment process. Importance can be determined on the basis of cultural values or social and/or scientific concern.

The attributes related to a VEC can include but are not limited to biological, cultural, ecological, environmental, physical and social issues including but not limited to changes in the livelihoods of affected peoples,

resettlement and any other relevant issue that may be considered during the scoping and development of the CIA. When considering any VEC, there is a need to consider all these elements rather than just for example, environmental or social issues.

The following provides a brief summary of the VECs that are likely to be relevant to hydropower projects in Lao PDR.

#### **2.4.1. Air and Noise**

The quality of air within the environment is recognised as being a very important aspect for the health and safety of people working and living in any location. The quality of air is also important to local flora and fauna. People living in communities close to projects that use an area for fishing, hunting and other traditional uses, need to know that the integrity of the air will be maintained and that noise related effects will be minimised, particularly with respect to their possible effects on wildlife. In addition, changes in air quality can effect from climate change which can increase cumulative impacts. Hydropower projects will produce air emissions from engine and ventilation exhaust, dust from blasting, crushing, excavations, milling and road use during construction, all of which will have very localised impacts. Air is also a pathway for air contaminants that may arise as a result of projects, which can result in changes to trophic cycles. Noise will occur from a variety of sources and will be attenuated through the atmosphere, particularly in environments where the ambient noise level is low. Air quality and local climate conditions are important to ecosystem health.

The areas where hydropower projects are likely to be located in Lao PDR are expected to have good air quality and relatively little anthropogenic noise.

#### **2.4.2. Affected Peoples, Resettlement and Livelihoods**

Hydropower projects can result in people living in a particularly area of influence to be affected. Impacts can include but are not limited to involuntary resettlement to an alternate location as a result of for example, the location of a reservoir, which could have customary implications and conflict issues. Other significant impacts can include changes in and the loss of livelihood, loss of income and assets including non-tangible assets, the influx of construction workers who can bring with them violence, disease and other issues. This can result in health and social issues within a society. All these impacts are dependent on the type of hydropower project being proposed, as for example, small scale projects may be constructed in areas with extremely limited populations or do not require the development of a reservoir.

When considering affected peoples, resettlement and changes in livelihoods, it is very important to link these with the other VECs and assess the impacts on the multiple impacts on all VECs at once. There is the potential of the cumulative impacts of hydropower projects to change for example, water use which can therefore result in changes in agricultural activities downstream that can in turn result in significant impacts on people's livelihoods.

#### **2.4.3. Cultural and Ethnic Archaeology and Heritage**

Cultural and Ethnic Archaeology and Heritage resources are important because of the information they reveal about past and present land use, cultural identity, and relationships with other cultures and the social and biophysical environments. Historic resources represent archival information from the past and existing and proposed project may result in the alteration or loss of such archival information. Both hunting and fishing can be considered important cultural activities that continue today and have been passed on from generation to generation. Children are often taken out on the land itself to learn the traditional ways and witness the remains left by generations before them. Often more critical Even more important, is the need to continue to pass on the information, even if a more modern way of life is practiced today. Without the opportunity to continue to practice a hunting, fishing and subsistence way of life, the cultural identity of a particular group of people could be greatly altered.

#### **2.4.4. Erosion and Sedimentation Processes**

Hydropower projects can result in both increased erosion and sedimentation, and then reduced sedimentation. The majority of erosion and downstream sedimentation from hydropower projects occurs during the construction phase when ground cover and vegetation is cleared. As a result, until the ground is stabilised through natural or artificial means, hydropower projects increase sediment yields through greater erosion and subsequent sediment discharge. This has frequently been observed on many projects, whereby after the vegetation has been removed and catchment areas have been converted to other land uses, increased sediment discharges and associated adverse effects result and can persist for some time. This has significant flow on effects to water quality, and the modification of bed composition which can result in the disappearance of habitats for fish and other freshwater fauna. The development of an armour layer may temporarily arrest the degradation.

By contrast, the development of a dam wall can significantly increase the sediment load retained within the reservoir and result in the change in downstream water quality caused by altered flow patterns. The sedimentation would also cause reduced levels of dissolved phosphorus, total phosphorus, nitrate and ammonium downstream during normal operation. Further, during the early stage of inundation, the nutrients trapped in the reservoir could be a source for algal bloom, which would lead to oxygen depletion at night. High phytoplankton productivity was predicted to occur frequently during the initial several years. Further, the loss of sediment movement can change agricultural activities for example, that have relied for many years on sediment top up during flood events.

The importance of sediment in Lao PDR cannot be underestimated. Changes in sediment movement for example, can change the amount of material and the nutrients attached to the sediment that are available for agricultural activities downstream that can in turn result in significant impacts on people's livelihoods due to the loss. This could potentially result in lands become unusable over time.

#### **2.4.5. Fish and Aquatic Habitats**

Fisheries and use of rivers and tributaries by important native fish is well known to be an important part of South East Asian Rivers. Rivers often provide extremely important fish habitats that are both critical to the survival of a species, while at the same time, being critical to local subsistence, culture and identity as well as provides a key food source for wildlife. Hydropower projects have the potential to significantly alter aquatic habitat, including changes in water quality, restrict movement or access and potentially remove important spawning grounds. Further, exotic species are known to be extremely good at pioneering modified habitats and this can result in pressure being placed on native species that are ultimately impacted.

Recent studies in Lao PDR have demonstrated that the development of multiple hydropower projects can result in significant reductions in fish biodiversity, with exotic species being those that usually thrive in the modified habitats. Fish and their habitats can also be adversely affected by changes in water quality as a result of hydropower projects.

#### **2.4.6. Natural Resources eg Agriculture, Forestry, etc**

The construction and operation of multiple hydropower projects in a specific area will result in the loss of important agricultural and forest areas that may have been utilised by local people for many years. Areas or at least proportion of land can be lost, damaged or inaccessible due to multiple hydropower projects. This can result in an incremental change in benefits of affected land users (e.g. lost agricultural production, subsistence use, etc.). This then has flow on effects to the total land area available and as a result, the diminishment of the value of land use benefits that may have been previously available, and further lower the potential for sustainable livelihood and increase poverty. As such, it is critical to ensure that the loss of the use of land does not cumulative result in significant detrimental impacts to communities and the natural environment.

### **2.4.7. Terrestrial Habitats eg protected areas, critical habitats**

Lao PDR is renowned for its high biodiversity. Much of that biodiversity is located in pristine or less impacted forests and associated with rivers and tributaries.

The construction and operation of multiple hydropower projects in a specific area will result in the loss or at best, fracturing of habitat and this will have an incremental change in population carrying capacity of a habitat, merely as a result of a loss of habitat. In the first instance, animals and their habitats will be killed through initial flooding as well as clearing. This can then result in population size being forced into small areas which can have significant changes on predator prey relations and domination between different predators. Overtime, over population can also result in disease which will incrementally increase the mortality rate of fauna. It is critical to understand and to be able to measure what these changes mean.

### **2.4.8. Water Quality and Quantity**

A range of impacts on water quality may occur at different stages during construction and operation phases of a hydropower project. During construction, the activities that are likely to cause changes in the water body and its characteristics are dredging, excavating, filling, canalising and camp settling. The placement of the dam wall will result in impoundment of the water body, which is significantly different from that of a natural stream. This consequently affects the aquatic environment downstream, where the river receives water released from the impoundment. The direct and cumulative physical impacts on the water include increased water depth, increased water retention time, and potential thermal stratification. The changes caused by the hydropower projects have the potential to affect a broad spectrum of water quality parameters for both the impounded water and the water released downstream. Suspended solids will also have a cumulative impact on water quality downstream during construction activities, such as cutting into the hillsides to build the new access road, which could lead to more sediment and landslides. The bare topsoil and excavated debris and rocks caused by the construction activities at the construction site could also contribute to high sediment levels downstream. Uncovered soil will be a major source of sediment, which would be carried by runoff.

After reservoir impoundment, the main water pollutants will be from degradation of organic material under anaerobic conditions and sedimentation, and with multiple hydropower projects, this can be significant. The reservoirs may also become stratified into thermocline and hypolimnion zones. During the early phase of water impoundment, organic matter in the soil and remaining plants will degrade anaerobically, while some chemical components can be expected to leach. The rate of leaching and degradation would like become less, depending on the amount of organic matter remaining in the reservoir, the depth of the impounded water and the effect of the thermocline.

## **2.5. Preparing a separate Cumulative Impact Assessment**

It is highly recommended that a standalone CIA be prepared with its own technical chapters and submitted at the same time as the ESIA. The CIA report should include the following:

- (a) establishing and documenting the content of the CIA together with MONRE and the study team, ensuring that the terms of reference and format for the study meet the concerns of the regulatory authorities and key stakeholders (scoping);
- (b) preparing a complete description of the existing and proposed projects;
- (c) focus the assessment of the most important issues, eg these being the VECs (identified through consultation with stakeholders);
- (d) reviewing all ESIA's prepared for other projects and include this information in the CIA;
- (e) include a discussion on the cumulative impacts, and where possibly identify whether they are direct or indirect impacts from a particular project or all projects more broadly;
- (f) provide results and conclusions obtained in each step of assessment; and
- (g) ensuring that conclusions are defensible and that the presentation of results can be readily interpreted and is usable by decision makers.

The CIA should be published as a standalone report with technical chapters on the proponent's website, MONRE's website and made available for viewing in locations that are prominent for people of the spatial area.

Further, the CIA's executive summary should be prepared in English, Lao and any other languages relevant to the project's location. MONRE should provide proponents assistance in making the document available at provincial offices for public viewing.

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### **3. Terms of Reference for Cumulative Impact Assessment of HPP in Lao PDR**

#### **3.1. Cumulative Impact Assessment Framework**

The CIAG set out the matters a proponent must address (with the assistance of MONRE) when preparing a CIA. The CIAG is approved by the Director General of the MONRE under the *Law on Environmental Protection 2012* and *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013*.

The CIAG is intended to provide proponents and their consultants with background information on CIAs and suggestions for possible approaches. It is expected that investigations will be required to provide sufficient information for the CIA. The nature and level of investigations must be related to the likely extent and gravity of the potential impacts (likelihood, consequence, magnitude, extent and scale of impacts, including worst case scenarios) on VECs. All relevant impacts of the project are to be investigated and analysed with commitments to avoid, mitigate and offset / compensate for any adverse impacts to be detailed in the CIA. This CIAG will also require consultation with all relevant Government and Provincial Ministries and Departments, developers of existing and planned hydropower projects, proponents of other projects in the specific area that might result in cumulative impacts and relevant stakeholders.

In preparing the CIA, the proponent must consider the following aims of the CIA and public review process:

- (a) to provide a source of information from which interested individuals and groups may gain an understanding of the project;
- (b) the need for the project;
- (c) the alternatives of the project;
- (d) the baseline environment which it could potentially affect;
- (e) the VECs that occur within the region that will be affected cumulatively;
- (f) the impacts that may occur in combination with other existing, proposed and planned projects and the measures proposed to be taken to avoid or minimise these impacts;
- (g) to provide a forum for stakeholder engagement, public consultation and informed comment on the project; and
- (h) to provide a framework in which decision-makers can consider the cumulative aspects of the project including biophysical, cultural, social, heritage, gender, economic, technical and other factors.

The proponent must ensure that the CIA discusses compliance with the objectives of and the principles of sustainable development and use, as set out in the *Law on Environmental Protection 2012*, the *Policy on Sustainable Hydropower Development 2015* and other relevant Lao PDR law.

It is the responsibility of the proponent preparing the CIA and MONRE to work proactively together to identify and address, as fully as possible, all matters relevant to existing and proposed projects and its potential impacts. Proponents will need to engage with existing project proponents to gain an understanding of their projects and the potential cumulative impact issues and it is fully expected that MONRE will be fully engaged in this process. It may be necessary for proponents and MONRE to collaborate in the acquisition of data that can be used for the proposed CIA along with future CIAs in a basin wide planning mechanism.

The CIA would provide a description of the existing environment and social fabric in the area affected by the project and any decommissioning / rehabilitation of existing infrastructure, construction, operations and future decommissioning proposed. All potential cumulative impacts on environmental and social values are to be investigated and analysed. The CIA would present an evaluation of the potential cumulative environmental and social impacts using an accepted risk-based methodology and their impacts on VECs and describe proposed measures to avoid, minimise or offset / compensate the expected, likely, or potential impacts. All prudent and feasible alternatives must be discussed in detail and the reasons for selection of the preferred option must be clearly given.

## 3.2. Scoping

Scoping is the most critical component when undertaking a CIA. During scoping, the identification of key issues, VECs, the area of influence and other critical aspects of the CIA are determined that will lead into the assessment process. If VECs, other projects etc are missing during this stage, it can result in significant delays in the completion of the CIA.

To ensure that the assessment remains focused and the analysis remains manageable and practical, scoping should include inputs from key subject matter specialists, MONRE and stakeholders. By scoping correctly, it is easier for the proponent to address VECs within the area of influence and to plan the relevant baseline studies and methodology to be used for assessing cumulative impacts. Professional judgment is required to achieve an optimum balance between the minimum required by legislation and ideal goals of producing a CIA that provides the information all parties require to ensure VECs are not significantly impacted.

The following section highlights the critical elements of the scoping phase to ensure the delivery of a successful CIA.

### 3.2.1. Identification and Details of All Existing, Proposed and Future Hydropower Projects and Other Projects Likely to Affect Valued Ecosystem Components

When addressing project activities, the proponent should describe all projects within the area of influence in sufficient detail including the stage of each project to allow for the consideration of what VECs might be impacted. All pre-construction, construction, operational and decommissioning / rehabilitation components of the listed projects (short, medium and long term) must be described in detail. This includes, but is not limited to, the time period over which construction will take place, details of the locations of each component of the project (eg. preferably the precise location (including coordinates) of all works to be undertaken and/or the footprint area(s)), dimensions of infrastructure where relevant to be built and the materials used, equipment to be used as well as construction access requirements, lay down areas and elements of the project. The description of all existing and proposed project should include as best as possible:

- (a) all the components associated infrastructure; existing infrastructure and easements on the potentially affected land, all pre-construction activities (e.g. vegetation clearing, site access, interference with watercourses and floodplain areas, including wetlands), construction; commissioning; operation; related maintenance activities, both long and short term; and decommissioning / rehabilitation along with explanation of the anticipated timetable;
- (b) the proposed construction methods and details of construction and operational equipment to be used for all projects;
- (c) the precise location of any works to be undertaken for each project including structures to be built or elements of the project that may have relevant impacts. Aerial photographs, maps, figures and diagrams should be incorporated where appropriate;
- (d) include assessment of any directly linked projects that would be required to be delivered by other entities that are necessary to support the project proceeding (for example, power, water, roads);
- (e) how all the projects are to be undertaken and conceptual design parameters for those aspects of the structures or elements of the project that may have environmental and social impacts;
- (f) the process for the decommissioning/rehabilitation of the projects;
- (g) a description of the local and regional economic, social and built context, including historical and future trends and the likely nature and timing of projects including gender and other affected peoples;
- (h) a detailed description of social and economic impacts and drivers for the project (including positive and negative impacts);
- (i) details of the environmental parameters (incorporating predictions of the impacts to and from climate change and 'worst case scenarios') the structures are designed to withstand, based on the expected life of project;
- (j) details of the sustainability measures that will be employed to minimise the project's carbon footprint;
- (k) proposed safeguards and mitigation measures to deal with relevant impacts of the project;

- (l) any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to all the projects;
- (m) to the extent reasonably practicable, any feasible alternatives to the project/s, including if relevant, the alternative of taking no project and with sufficient detail to make clear why any alternative is preferred to another;
- (n) any consultation about the project/s including all relevant Government and Provincial Ministries and Departments and any future proposed consultation about relevant impacts of the project/s; and
- (o) identification of affected parties, including all communities that may be affected and a description of their concerns.

There is the potential for some of these issues to not be readily available to a proponent. In this case, assistance should be sought from MONRE to provide this information to the proponent.

### **3.2.2. Identification of Area of Influence – eg whole of catchment, Greater Mekong**

As is the case with an ESIA, a critical element is the spatial area for which the CIA should be conducted. This area forms one of the important boundaries for the study (eg. spatial scale) and is a critical component of the scoping phase. The minimum study area for conducting CIA for a project is known as the area of influence of the project. International financial institutions (IFIs) pay special attention to impact area determination, as do many authorities, since this is explicitly specified in many standards and guidelines. It is a concept that should be covered during the scoping phase with ever-increasing refinement as the precise locations are identified. Area of influence is defined in the International Finance Corporation's (IFC's) Performance Standard 1 (IFC, 2012) as follows:

*“Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence.”*

When considering the area of influence in relation to the preparation of a CIA, the proponent should consider the following matters:

- (a) all parts of the proposed project that are directly owned, operated, or managed (including by contractors) by the proponent;
- (b) areas potentially impacted by existing and proposed project and the project owner's activities and facilities;
- (c) areas potentially impacted by unplanned but predictable activities caused by the project/s that may occur later or at a different location;
- (d) affected communities whose livelihoods are affected by indirect project impacts on biodiversity or the ecosystem;
- (e) areas potentially impacted by cumulative impacts from existing and additional proposed or other sources of similar impacts in the geographical area, any existing project or condition, and other project-related activities that can realistically be expected at the time that due diligence is undertaken; and
- (f) areas and communities potentially affected by impacts from unplanned but predictable projects caused by the project/s that may occur later or at a different location.

The area of influence for a project might be different for various types of potential impacts and different environmental components (physical, biological, social). For example, the impact area of a hydropower project for water quality would differ from that for air quality. For water quality, this area would cover upstream and downstream of the dam and hydropower sites and how far downstream would have to be decided on a case-by-case basis. For air quality, the impact would be mainly dust generation during construction and the area of influence would cover the vicinity of the construction sites, material borrow areas, and access roads.

It is essentially that the area of influence be properly considered before baseline and impact assessment commence, as areas that may be critical that are not considered initially, could significant delay the finalisation of the CIA.

### **3.2.3. Selection of Valued Ecosystem Components**

VECs are the main assessable matters of the CIA process. VECs are defined as any part of the environment that is considered important by the proponent, public, scientists, and government involved in the assessment process. Importance can be determined on the basis of cultural values or scientific concern. The attributes related to a VEC can include biological, cultural, ecological, environmental, physical and social issues. VECs for hydropower projects within Lao PDR are more than likely to include the following (in alphabetical order only):

- (a) Air and Noise;
- (b) Affected Peoples and Resettlement;
- (c) Cultural and Ethnic Archaeology and Heritage;
- (d) Erosion and Sedimentation Processes;
- (e) Fish and Aquatic Habitats;
- (f) Natural Resources eg Agriculture, Forestry, etc;
- (g) Terrestrial Habitats eg protected areas, critical habitats; and
- (h) Water Quality and Quantity.

This above list may not be exhaustive depending on the location of the specific area of influence but is used as a guide only. During scoping, the proponent should consider the relevant VECs and discuss and agree these with MONRE as they provide the basis for the resulting baseline collect and impact assessment.

### **3.2.4. Determination of Project-Specific Standards and Thresholds**

Thresholds are an essential consideration for any CIA as they play a key role in determining the significance of impacts. Thresholds are limits beyond which cumulative change becomes a concern and can be expressed in terms of goals or targets, standards and guidelines, carrying capacity, or limits of acceptable change (LAC). Scientific data and societal values are reflected, to various degrees, in each description.

A threshold can be the maximum concentration of a certain pollutant beyond which the health of the environment or an organism is adversely affected, or a maximum amount of land cleared from its existing natural state before visual impacts become unacceptable. Drawing conclusions about cumulative impacts, such as the significance of effects and or the actual risk of a change requires some LAC to which incremental effects can be compared. If the cumulative impacts of all combined projects in the area of influence do not exceed a LAC or threshold, the projects would normally be considered acceptable. The concept of determined LAC shifts the focus from identifying appropriate levels of use to describing environmental conditions that are deemed acceptable. The advantage of this approach is that once acceptable conditions have been described, the appropriate combination of levels of use and maintenance interventions required to sustain those conditions can be determined.

In real terms, however, the assessment of cumulative impacts cannot be fully complete as there is often a degree of uncertainty in the data and moreover, there is nothing to establish acceptable LAC or thresholds. Contaminants affecting human health and constituents in air and water are usually regulated; therefore, thresholds useful for assessment purposes are defined by regulation or available in guidelines; however it is often very difficult to establish thresholds for terrestrial and aquatic environments where flora and fauna have been observed to have been susceptible to changes in limits not normally quantifiable by biological, chemical or physical analysis.

When considering these situations, it is critical that the scientific literature, the use of experts and professional judgment must usually be relied upon. When an actual LAC cannot be determined, analysis of trends can assist in determining whether goals are likely to be achieved or patterns of degradation are likely to persist. In the absence of defined thresholds, the proponent should propose an appropriate threshold.

## **3.3. Methodology for undertaking a Cumulative Impact Assessment**

The methods and tools for undertaking a CIA rely upon the basics used when undertaking an ESIA and a number of addition methods. Several approaches/methods are available for assessing cumulative impacts; however, there is no one single method that should always be used; nor necessarily, one type of method for specific impacts or types of actions. The appropriate method is the one that best provides an assessment of the effects on the VECs being examined. The following methods in combination will normally be used when assessing cumulative impacts:

- (a) specialist opinion: past experience and obtaining the opinion from scientific and technical specialist can be extremely beneficial in VEC determination, CIA and management and the development of mitigation strategies. Specialists should be asked to consider multiple scenarios based on past experience and provide their expert opinion for evaluation of the impacts of existing and proposed projects. Their mandate should be broad in nature and they should be used continually throughout the CIA process including during the scoping of the project, development of necessary baseline studies, impact evaluation and mitigation development;
- (b) the undertaking of specific consultation and questionnaires with relevant stakeholders can be a means of gathering information about a wide range of actions, including those in the past, present, and future which may influence the impacts of project/s. Anecdotal accounts of changes in environmental conditions is a very underutilised source of information;
- (c) using checklists as a systematic way for ensuring that all relevant issues are considered;
- (d) the utilisation of risk matrices as commonly used to assess the consequence and likelihood of impacts. The use of three dimensional matrices are highly recommended when considering vertical cumulative impacts (multiple impacts at one time rather than multiple projects at one time (vertical));
- (e) undertaking computational and numerical modelling (conceptual, habitat suitability, quantitative) to provide predictive results. The use of analytical tools can allow for the quantification of cause-effect relationships by simulating environmental conditions, although it is imperative that any models used are calibrated to the specific conditions of the area of influence;
- (f) the use of Spatial Analysis/Geographic Information Systems (GIS), visual analysis and simulation is an excellent method to assess the scale of impacts, particularly when linked to modelling outputs. Spatial analysis tool can be used for identifying where the cumulative impacts of a number of different actions may occur and impact interactions. By using GIS, proponents can superimpose the impacts of multiple projects and the impacts on selected VECs to establish areas where impacts would be most significant to envision the impact sources;
- (g) undertake a review of available planning documents, investment programs, public permits and previously prepared ESIA to identify reasonably foreseeable future actions. When considering previously prepared ESIA, it is critical to analyse whether the predicted impacts were those actually observed. This is a common failing of many ESIA monitoring programs;
- (h) develop indicators of VECs and their functions representing the importance of the VECs and possible changes in their condition, and what the risk is of that change; and
- (i) undertaking an assessment of mitigation for incremental impacts using past experience, best available techniques, good/best practices, and expert opinion.

Coordination between the project proponents and MONRE to manage local and regional cumulative impacts is critical to the overall success of the reporting as a whole. This may include the necessity to undertake additional technical and baseline studies that needed to be funded by MONRE and the proponents, whether jointly or individually. Further, MONRE will act as a repository for any available data that can be shared with existing and proposed proponents to assist in the preparation of CIA.

### **3.4. Baseline Studies and Impact Assessment**

#### **3.4.1. Baseline Studies**

A common concern among proponents is the level of effort and resources required to collect adequate data to assess cumulative impacts. While early scoping is required to ensure that the assessment is focused on the most important VECs and the appropriate area of influence, it is acknowledged that the availability of data and the costs associated with data collection is limited to only that which is required to address these issues.

When assessing baseline data, the first option should be to utilise data collected from previous ESIA as it would be anticipated, depending on the quality of that data, that it would provide a snap shot in time of the environmental and social conditions specific to each project. Data from the project actually being proposed should also be included.

When considering actual data collect for environmental parameters such as water quality, air quality, and noise levels, it is critical that proponents discuss the collection of this data with experts to ensure the data being collected is both usable and appropriate, and is collected within the area of influence, particularly given the cost of data collection. This data will normally provide a baseline that includes the impacts of existing projects. When collecting data for other aspects such as vegetation surveys, consideration should be given to using satellite imagery, LiDAR etc to provide a better understanding of local conditions, particularly where the area of influence might be thousands of hectares. It is also likely to be necessary to collect hydrological data on a larger scale to provide inputs into modelling that will be used to assess impacts.

Generally, it is recommended that proponents seek advice on necessary specific baseline studies from MONRE and subject matter experts to ensure the appropriate data is collected that will provide the best benefit to the impact and risk assessment process. This should be considered during the scoping phase.

#### **3.4.2. Impact and Risk Based Assessment**

When undertaking the impact and risk assessment, it is critical that the CIA include a description and analysis (including relevant risk matrices used) of *all* the relevant cumulative impacts of existing and proposed project. Relevant cumulative impacts are impacts that the project will have or is likely to have on VECs and more generally, the environmental and social matters of area of influence. For the construction and operation phases, cumulative impacts should be considered separately for physical, biological, and socioeconomic environments. In each case the projects can be categorised into three groups, existing, proposed and planned and can assess the impacts on VECs, based on this scenario.

Impact and risk models have been used extensively in CIA as they provide a linkage between the cause and impact. The advantage of using impact models is that they provide a simplified perspective of complex systems, allowing for step-by-step analysis of each interaction in a cause-effect relationship. They also facilitate the description of cause-effect relationships over large areas. Numerical models are algorithms that are used to simulate environmental conditions. Model allow proponents to predict the state of a physical or chemical constituent by using a computer-based application to assess air and water quality, hydrology, loss of vegetation etc. As highlighted above, the use of models and establishing LACs for terrestrial and aquatic ecosystems is more difficult as there are considerable uncertainties in predicting their behaviour and physiological responses of organisms. Air and water modelling have been used extensively in CIAs and allow for the prediction of the distances in which airborne or waterborne impacts occur over an area of influence. As such, it is highly recommended the proponents prepare and run models for air, noise, hydrology and water issues to allow for the adequate assessment of the cumulative impacts both in quality and quantity.

The analysis of cumulative effects should focus on assessing effects on selected VECs. Several approaches are available as were identified in the methodology section above. The appropriate method is the one that best provides an assessment of the effects on the VECs being examined.

Impacts during the construction, operational and the decommissioning / rehabilitation phases of the projects should be addressed. With respect to reporting, the CIA should include:

- (a) a description of the framework used to assess impacts, including risk assessment processes, based on best available practice and any technical data and other information used or needed to make a detailed assessment of the relevant impacts;

- (b) a statement as to whether any relevant impacts are likely to be unknown, unpredictable, irreversible or sub-lethal (reversible over time) and what confidence level is placed on the predictions of relevant impacts;
- (c) a full description of the potential risks to people and property that may be associated with the projects in the form of a preliminary risk assessment for all components of the projects and in accordance with relevant standards. The assessment should include potential hazards, accidents, spillages, fire and abnormal events that may occur during all stages of the project, including estimated probabilities of occurrence; identifying all hazardous substances to be used, stored, processed or produced and the rate of usage; potential wildlife hazards, natural events (e.g. cyclone, flooding, bushfire, landslide, riverine erosion) and implications related to climate change; how the projects may potentially affect hazards away from the project sites (e.g. changing flooding characteristics) and how the projects may potentially affect the area's natural disaster management and recovery.

### **3.5. Impacts to and from Climate Change**

Climate change can have impact on hydropower projects and conversely, while hydropower projects are considered to be renewable energy, the construction of a hydropower project can have some impact on climate change.

Climate information should be presented in a statistical form including long-term averages and extreme values, as necessary, including consideration of rainfall patterns and storm events that could have the potential for example, to result in an accident or an engineering failure which would have cumulative downstream impacts. The CIA should provide a description of the historic weather observations and trends, details of the accepted future projections under projected climate change as determined by the Intergovernmental Panel on Climate Change, regional and national agencies and organisations, whether the area is considered to be in a high risk area or areas and, if so, briefly identify potential hazards in the area of influence. The cumulative impacts of climate change impacts on the environment and community must also be considered in the assessment of ecosystem resilience and the availability of resources to the local population.

### **3.6. Mitigation Measures**

Mitigating cumulative impacts can often be difficult, particularly when older projects that are operating under existing approvals may be the main contributor to the resultant impact. Notwithstanding, the development of mitigations measures starts with those developed as part of the ESIA process. Mitigating a project specific impact as far as practicable is likely to be the best way to reduce cumulative impacts; however, to be most effective, mitigation and monitoring must be long term and regionally based.

Mitigation measures can be applied to projects other than the proposed project. Several alternate projects, administrative jurisdictions and stakeholders will usually fall within an assessment's area of influence. In many cases, the cooperation of these other interests may be required to ensure that recommended mitigation is successfully implemented.

The CIA should provide information on proposed avoidance, safeguards and mitigation measures to deal with the impacts of the project and how these link in with all projects. By preference, the mitigation measures should be adaptive and MONRE will seek to have other project proponents to also undertake adaptive mitigation strategies that will allow for changes in operation where deleterious impacts are observed above a LAC on a VEC. The CIA's mitigation section should have specific and detailed descriptions of proposed measures and these should be provided and substantiated, based on good practices and how they link with actions being undertaken

The section on cumulative mitigations should include the following elements:

- (a) identify the level of risk associated with potential impacts already identified related to VECs and those that require mitigation, monitoring or management to avoid or reduce impacts both from the specific project and other projects;
- (b) a consolidated list of measures proposed to be undertaken to avoid, prevent, minimise or compensate for the impacts of the project, including a description of proposed avoidance, safeguards and mitigation measures to deal with impacts of the project; an assessment of the expected or predicted effectiveness of the measures and the cost of the mitigation measures and how these link cumulatively with other projects within the area of influence;

- (c) particular focus must be given to determining factors in the planning of the project so as to avoid damage to the environment and social issues;
- (d) outline how any avoidance, safeguards, management and mitigation measures will increase resilience of the environment, VECS and social amenity within the area of influence;
- (e) characterise, quantify and address uncertainties that may affect the effectiveness of management measures and therefore on the confidence that VECS would be maintained (or improved) during and after the project and what additional information might be required during monitoring;
- (f) staff training, including training in relation to environmental and social issues;
- (g) an outline of an environmental and social management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the project, including any provisions for independent environmental and social auditing; and
- (h) a discussion on consultation with other project proponents and linkages that can be made and statements of intent on how other project proponents may alter their current activities to mitigate the actual cumulative impacts on VECs in the areas of influence.

It may be necessary, depending on the level of cumulative impact for environmental offsets to be considered either individually or jointly with other project proponent. Environmental offsets broadly mean measures to compensate for the adverse residual impacts of a project and in this case, multiple projects on the environment that compensate for cumulative environmental impacts that cannot be adequately reduced through avoidance or mitigation. Offsets do not reduce the impacts of projects. Instead they provide an environmental counterbalance to manage the impacts that remain after avoidance and mitigation measures. These remaining impacts are termed residual impacts.

Offsets are not intended to make projects with unacceptable impacts acceptable; they simply provide an additional tool that can be used during project design and the ESIA/CIA process. This section of the CIA should outline plans to offset the residual potential impacts of the specific project and how other proponents may also offset their impacts given the cumulative nature of the impacts. Environmental offsets may be appropriate when they:

- (a) are necessary to protect or repair impacts to important aspects of the environment, or the environment more broadly;
- (b) relate specifically to an important species being impacted; and
- (c) seek to ensure that the health, diversity and productivity of the environment are maintained or enhanced.

Proponents are encouraged to work with MONRE and other project proponents to find suitable offsets that can be held for the life of the projects.

### **3.7. Evaluation of Significance**

Determining the significance of impacts, this being the short to long term impact after mitigation is critically important for the purposes of the CIA. A cumulative impact approach requires the determination of the extent of further impacts as well as the LAC that can be sustained by a VEC before it suffers irreversible and permanent changes to its condition or state.

In answering these questions, a proponent should consider the following. For a biological and/or ecological VEC:

- (a) how much of the original and current population may have its reproductive capacity and/or the survival of individuals affected? Or, for a habitat, how much of the productive capacity of the habitat may be affected (e.g., <1%, 1-10%, >10%);
- (b) what degree of recovery of the population or habitat is possible, even with mitigation (e.g., complete, partial, none); and
- (c) how soon could restoration to acceptable conditions occur (e.g., <1 year or 1 generation, 1-10 years or 1 generation etc).

With respect to a physical-chemical VEC:

- (a) how much could changes in the VEC exceed those associated with natural variability in the region? What degree of recovery of the VEC is possible, even with mitigation; and
- (b) how soon could restoration to social VEC:
- (a) how much could changes in the VEC exceed those associated with ordinary in the region eg people migrating, changes in agricultural practices etc? What level of change is acceptable before compensation and/or some form of offset and resettlement is required, even with mitigation; and
- (b) how soon could restoration to acceptable conditions occur?

The cumulative impact on a VEC may be significant even though each individual project - specific assessment of that same VEC concludes that the impacts are insignificant. When considering the significance of any change, a proponent should consider the following

- (a) what is the level of existing disturbance to the VEC;
- (b) what is the level of exceedance of a threshold;
- (c) what is the relative conservation status and endemism of species, eg is it only found within the area of influence, or does it have a distribution across Lao PDR / South East Asia more broadly;
- (d) what is the actual contribution of the actual project by contrast to other projects and their activities; and
- (e) how effectiveness will the cumulative mitigation strategies be and what are their chances of actual success;

If the answer to the above questions is in the negative, a proponent should firstly consider the viability of the project based on the potentially significant impacts on VECs. Further, the proponent should seek subject matter expert advice and provide this to MONRE for discussion of the potential options to reduce the level of significance.

### **3.8. Monitoring**

Appropriate baseline data requirements are to be included to form the basis for baseline measurement and ongoing monitoring of environmental and social parameters for the CIA. It must be demonstrated that the proposed methods for baseline measurements and subsequent monitoring are based on current good practice and are environmentally and socially scientifically robust and statistically sound to enable diligent and systematic data collection that will deliver unbiased and sound responses. This section must identify parameters to be monitored, the performance indicators to be used to evaluate accuracy of predicted impacts and effectiveness of mitigation measures and offsets / compensation, and management response trigger values and response activities. This section must also identify and describe monitoring programs, procedural and compliance audit programs and reporting requirements and arrangements which will demonstrate the effectiveness of proposed management measures and monitoring.

The proponent must, in addition to outlining proposed programs, clearly identify what is to be monitored and why. Monitoring programs must be designed to provide objective evidence regarding activities associated with the project and if these activities are adversely impacting on the environment in the short, medium and long term. Monitoring programs must demonstrate an understanding and consideration of the following:

- (a) VECs including important species / ecological communities and migratory species, noise issues, light and light horizon impacts and water quality issues as a result of the project;
- (b) social factors include gender, vulnerable and indigenous peoples and cultural heritage issues as a result of all existing and proposed project;
- (c) measuring the effectiveness of mitigation and / or rehabilitation and offset /compensation measures of all existing and proposed project;
- (d) documenting the difference between predicted and actual impacts cumulatively and individually of all existing and proposed project;
- (e) methods for identification of non-predicted impacts and appropriate reporting and remedial measures;
- (f) application and effectiveness of emergency and contingency plans;

- (g) review of consultation and management arrangements including with all relevant Government and Provincial Ministries and Departments / Agencies and the community. A diagram showing monitoring and reporting arrangements must be included in the CIA;
- (h) trigger values should be outlined for use in management project and response to adverse project impacts particularly on VECs;
- (i) outline measures required to ensure that the existing and proposed projects avoid the release of hazardous materials as a result of a natural hazard event. This should include details on the safeguards that would reduce the likelihood and severity of hazards, consequences and risks to persons, within and adjacent to the project area(s). Identify the residual risk following application of mitigation measures. The proponent should present an assessment of the overall acceptability of the impacts of the project in light of the residual uncertainties and risk profile;
- (j) provide an outline of the proposed integrated emergency management planning procedures (including evacuation plans, if required) for the range of situations; and
- (k) the need for monitoring at a fine enough scale to be useful (for example, measurement of particulates with regards to air quality) and for continuous monitoring sufficient to identify any spikes in air, noise, odour, water or other forms of pollution that will provide accurate data to assess the cumulative impacts.

In this section, the proponent is required to provide a list of all commitments to implement management measures (including any monitoring programs) relevant to the project and its potential impacts and how these interact with existing and proposed projects. Management practices proposed should be commensurate with the risk and severity of predicted impacts. Proposed management practices may be collated to produce a consolidated management plan.

### **3.9. Levels of Uncertainty**

MONRE recognise that there are challenges associated with preparing the CIA including the lack of basic baseline data, uncertainty associated with other proposed projects, and absence of strategic regional, sectoral, or integrated resource planning schemes. The CIA must define the level of uncertainty and what measures have been adopted to address that uncertainty. As such, the CIA should take a precautionary approach that explicitly considers uncertainty in what thresholds of acceptable VECs have been established and why. From this, the CIA should present an assessment of the overall acceptability of the impacts of the project in light of the residual uncertainties and risk profile.

### **3.10. Stakeholder Engagement and Consultation**

The CIA should include sections on consultation undertaken about the project and its interaction with existing and proposed projects, including:

- (a) what consultation has been undertaken about the proposed projects, details of the issues discussed, including the views of the affected parties;
- (b) all consultation that has taken place during the preparation of the CIA including details of frequency, forum and timeframes provided for consultation including with all relevant Government and Provincial Ministries and Departments / Agencies;
- (c) proposed consultation about relevant impacts of the projects with the community and relevant stakeholders;
- (d) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views on the projects as a whole;
- (e) how the consultation has specifically targeted vulnerable groups such as women, people with disabilities, elderly and squatter settlements and what impact the projects as a whole will have on them in the short, medium and long term with details how they were included in the decision making process;
- (f) details on how affected parties comments received during consultations have been addressed in the CIA; and
- (g) any further proposed consultation including with all relevant Government and Provincial Ministries and Departments / Agencies about potential impacts of the project.

The CIA must demonstrate how stakeholder engagement has been an inclusive and continuous process throughout the life of a project and interrelated to other existing and proposed projects. The CIA must outline how it will encourage local stakeholders including women to participate in the project and to empower them to do something practical to address any issues that affect their lives.

### 3.11. Alternatives to Project

This section of the CIA must describe, to the extent reasonably practicable, any prudent and feasible alternatives to the project when considering existing and other proposed/planned projects within the spatial area of the CIA. For each alternative listed, the proponent should provide the project details, impacts (positive and negative), location, scale, configuration and staging options and how these issues interaction with other projects. Sufficient detail must be provided to make clear why any alternative is preferred to another. This section must describe, but not be limited to the following:

- a) the alternative of taking no project or not proceeding with components of the project;
- (a) potential alternative locations for all components of the project as well as different components of the project and how this might interact with existing and other proposed/planned projects;
- (b) short, medium and long-term environmental, social and economic advantages and disadvantages of the options (including the no project option) and their relationship to VECs;
- (c) potential alternative configuration or scale options for key components of the project and how this might interact with existing and other proposed/planned projects;
- (d) a description of options for integrating operations with existing infrastructure where they exist to mitigate impacts on the general environment, VECs etc;
- (e) a description of options or possible innovations for reducing the total amount of infrastructure involved in the project, such that net impacts on, or risks relating to VECs and ensure they are reduced;
- (f) a comparative description of adverse and beneficial impacts of the project as a whole and how this might interact with existing and other proposed/planned projects, each component of the project, and location of certain activities associated with the project;
- (g) a description of how each stage would be affected if one or more of the stages does not occur or is significantly modified and how this might interact with existing and other proposed/planned projects;
- (h) the reasons for choosing the preferred location and option for the project as a whole, and each key component of the project, must be explained. The explanation must include a comparison of the adverse and beneficial effects used for selecting the preferred location and option, and compliance with the objectives of legislation;
- (i) the advantages and disadvantages of alternatives must be specifically addressed; and
- (j) short, medium and long-term environmental, social and economic advantages and disadvantages of each option must be considered in relation to VECs.

### 3.12. Reporting

Reporting of the findings is often the final stage in an ESIA process; however, in the case of a CIA, reporting should be an integral part of the studies being conducted and should continue to be updated post the submission of the studies through condition based reporting. There are two types of reporting, both consultative and written to submit a report. Preparation of the written CIA should include the following:

- (a) establishing and documenting the content of the CIA together with MONRE and the study team, ensuring that the terms of reference and format for the study meet the concerns of the regulatory authorities and key stakeholders (scoping);
- (b) preparing a complete description of the existing and proposed projects;
- (c) focus the assessment of the most important issues, eg these being the VECs (identified through consultation with stakeholders);
- (d) reviewing all ESIA's prepared for other projects and include this information in the CIA;

- (e) include a discussion on the cumulative impacts, and where possibly identify whether they are direct or indirect impacts from a particular project or all projects more broadly;
- (f) provide results and conclusions obtained in each step of assessment; and
- (g) ensuring that conclusions are defensible and that the presentation of results can be readily interpreted and is usable by decision makers.

The CIA should be published as a standalone report with technical chapters on the proponent's website, MONRE's website and made available for viewing in locations that are prominent for people of the spatial area. Further, the CIA's executive summary should be prepared in English, Lao and any other language relevant to the project's location. MONRE should provide proponents assistance in making the document available at provincial offices for public viewing.

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## 4. Review of Cumulative Impact Assessment

### 4.1. Key Criteria for Good International Industry Practice

This checklist is designed for decision-makers to review the quality and adequacy of the CIA consistent with the *Law on Environmental Protection 2012*, *Ministerial Instruction on Environmental and Social Impact Assessment Process of the Investment Projects and Activities 2013* and the CIAGs.

In considering whether the information is sufficient for a decision maker, the reviewer should consider whether there are any omissions in the information and if there are, whether these omissions are vital to the decision-making process and require additional work to be undertaken in the form of a Supplementary CIA. Further, it is critical to ensure that the information that is contained within the CIA is consistent with that contained within any relevant technical chapters. When making a determination on the adequacy of an CIA and for example, there is an unacceptable impact on a specific VEC, MONRE should consider international good practice including but not limited to World Bank, International Finance Corporation and other policy / standards when making an assessment and whether to approve a project.

When undertaking a review, the CIA should be assessed with respect to its adequacy against the criteria established in the table below.

Rating	Explanation
A	Generally well performed, no important tasks left incomplete (covering 80-100% of the requirement)
B	Generally satisfactory and complete, only minor omissions and inadequacies (covering 60-80% of the requirement)
C	Just satisfactory despite omissions and / or inadequacies (covering 40-60% of the requirement)
D	Unsatisfactory, significant omissions or inadequacies (covering 20-40% of the requirement)
E	Very unsatisfactory, important tasks poorly done or not attempted (covering 0-20% of the requirement)
N/A	Not applicable, the review topic is not applicable in the context of the project

Where the CIA is not considered satisfactory, MONRE may seek the proponent to undertake additional work etc. The basis for the additional work should be shown through the assessment undertaken consistent with the checklist.

Prior to approving the project, it is recommended that MONRE seek advice from the external reviewer and Technical Working Group on conditions the Director may wish to apply to the project, if it is to be approved. Further, MONRE may wish to consider options with respect to performance of the project including how MONRE can be assured that the proponent/s has/have the financial capacity in relation to the cumulative impacts of the project and to undertake the relevant monitoring. Only after giving full consideration to these matters, should MONRE approve the CIA.

## 4.2. Cumulative Impact Assessment Checklist

	Review Question	Relevant	Adequate	What further information is required?
	<b>Description Of The Project</b>			
1.	Is the program for implementation of all Projects described, detailing the estimated length of time and start and finish dates for construction, operation and decommissioning / rehabilitation?			
2.	Are all the main components of the projects described?			
3.	Are the location of all the projects' component identified, using maps, plans and diagrams as necessary?			
4.	Are the activities involved in construction of all the projects described?			
5.	Are the activities involved in operation of all the projects described?			
6.	Are the activities involved in decommissioning of all the projects described?			
7.	Are any additional services required for all the projects described? (e.g. transport access, water, sewerage, waste disposal, electricity, telecoms, roads, power, pipelines etc)			
8.	Are all projects likely to occur as a consequence of the project identified? (e.g. new housing, roads, water or sewerage infrastructure).			
9.	Are all existing activities which will alter / cease as a consequence of the Project identified?			
	<b>The Size and Scope of the Existing and Proposed Projects</b>			
10.	Is the area of land occupied by all the permanent projects' components quantified and shown on a scaled map including any associated access arrangements and ancillary facilities?			
11.	Is the area of land required temporarily for construction of all the projects quantified and mapped?			
12.	Are details of the owners of all the land detailed along with the land acquisition process?			

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	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
13.	Is the reinstatement and after use of land occupied temporarily for operation of the Projects described?			
14.	Are the size of any structures or other works developed as part of the projects identified including the size of excavations, the area or height of planting, the height of structures such as embankments, bridges, the flow or depth of water etc)			
15.	Is the form and appearance of all structures or other works developed as part of the projects described? (e.g. type, finish and colour of materials, design of buildings and structures, plant species, ground surfaces, etc)			
16.	If the projects involve the displacement of people or businesses; are the numbers and other characteristics of those displaced described?			
17.	For projects generating substantial traffic flows, is the type, volume, temporal pattern and geographical distribution of new traffic generated or diverted as a consequence of the projects described?			
	<b>Construction and Resources Used</b>			
18.	Are all the processes involved in operating all the projects described (e.g. manufacturing or engineering, processes)?			
19.	Are the types and quantities of raw materials and energy needed for construction and operation discussed?			
20.	Are the environmental implications of the sourcing of raw materials discussed?			
21.	Is efficiency in use of energy and raw materials discussed?			
22.	Is the transport of raw materials to the projects and the number of traffic movements involved (including road and river) for all phases discussed?			
23.	Are details of the employment that will be created during each phase of the projects discussed?			
24.	Does the CIA provide information on staff amenities particularly for any vulnerable people?			

	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
25.	Are the access arrangements and the number of traffic movements involved in bringing workers to the projects estimated?			
26.	Is the housing and provision of services for any temporary or permanent employees for the projects including a migration of workers between areas discussed?			
	<b>Residues and Emissions</b>			
27.	Are the types and quantities of solid waste generated by the projects identified including construction or demolition wastes, surplus spoil, process wastes, by-products, surplus or reject products, hazardous wastes, site clean-up wastes, decommissioning / rehabilitation wastes			
28.	Is the composition and toxicity or other hazards of all solid wastes produced by the projects discussed?			
29.	Are the methods for collecting, storing, treating, transporting and finally disposing of these solid wastes described?			
30.	Are the locations for final disposal of all solid wastes discussed?			
31.	Are the types and quantities of liquid effluents generated by the projects (including site drainage and run-off, process wastes, cooling water, treated effluents, sewage) identified for all phases?			
32.	Are the methods for collecting, storing, treating, transporting and finally disposing of these liquid effluents described?			
33.	Are the types and quantities of gaseous and particulate emissions generated by the projects including process emissions, fugitive emissions, emissions from combustion of fossil fuels in stationary and mobile plant, emissions from traffic, dust from materials handling, odours identified?			
34.	Are the locations for final disposal of all liquid effluents discussed?			
35.	Is the composition and toxicity or other hazards of all emissions to air produce by the projects discussed?			
36.	Are the methods for collecting, treating and finally discharging air emissions described?			

	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
37.	Are the locations for discharge of all emissions to air identified and the characteristics of the discharges identified? (e.g. height of any stack, velocity and temperature of release)			
38.	Is the potential for resource recovery from wastes and residues (including re-use, recycling or energy recovery from solid waste and liquid effluents) discussed?			
39.	Are any sources of noise, heat, light or electromagnetic radiation from the projects (including equipment, processes, construction works, traffic, lighting, etc) identified and quantified?			
40.	Are the methods for estimating the quantities and composition of all residues and emissions identified and any difficulties discussed?			
41.	Is the uncertainty attached to estimates of residues and emissions discussed?			
	<b>Risks of Accidents and Hazards</b>			
42.	Are measures to prevent and respond to accidents and abnormal events including preventive measures, training, contingency plans, emergency plans, etc) described?			
43.	Are all and any risks associated with the projects discussed including the handling of hazardous materials; from spills fire, explosion; traffic accidents; from the breakdown or failure of processes or facilities, impacts to and from climate change and exposure from and to the projects by natural disasters (earthquake, cyclones, floods, etc)			
	<b>Consideration of Alternatives</b>			
44.	Is the process by which the projects are/were developed described and are alternatives considered during this process described?			
45.	Is the baseline situation of the No Projects situation described?			
46.	Are the alternatives realistic and genuine alternatives to the projects?			
47.	Are the main reasons for the choice of the projects explained, including any environmental reasons for the choice?			
48.	Are the main environmental impacts of the alternatives compared with those of the existing and proposed project?			

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	Review Question	Relevant	Adequate	What further information is required?
	<b>Description of the Existing Environment</b>			
49.	Are the current land uses of the land existing and proposed to be occupied by and surrounding the projects described? Are any people living on or using the lands for residential, agricultural, recreational and amenity land uses and are there any buildings, structures or other property?			
50.	Does the existing environment contain any unexploded ordinances and have these been mapped?			
51.	Is the topography, geology and soils of the land existing and proposed to be occupied by the projects and the surrounding area described?			
52.	Are any significant features of the topography or geology of the area existing and proposed to be used described and are the conditions and use of soils described including soil quality stability and erosion, agricultural use and agricultural land quality?			
53.	Are local climatic / meteorological conditions in the area described?			
54.	Are any relevant climate change and disaster risk identified?			
55.	Is the existing air quality described? Does the CIA provide validated data that has been collected with appropriate equipment?			
56.	Is the existing situation regarding light, heat and electromagnetic radiation described?			
57.	Is the existing noise climate described?			
58.	Is the water environment of the area described including surface waters, ground waters, estuaries, including run off and drainage?			
59.	Are the hydrology, water quality and use of any water resources that may be affected by the projects described including use for water supply, fisheries, amenity, navigation and effluent disposal?			
60.	Are the fauna and flora and habitats of the terrestrial and aquatic areas existing and proposed to be occupied by the projects and the surrounding area described and illustrated on appropriate maps?			

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	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
61.	Are species populations and characteristics of habitats that may be affected by the existing and proposed projects described and are any designated or protected species or areas defined?			
62.	Are any material assets in the area that may be affected by the existing and proposed projects described, including buildings, other structures and water resources?			
63.	Does the CIA provide adequate details on the existing land ownership with respect to both customary and proprietary rights?			
64.	Are demographic, social and socio-economic conditions in the area described including the use of relevant current data?			
65.	Does the CIA contain up to date information on existing employment in the project areas and the conditions under which employees are currently and proposed to be working?			
66.	Are any vulnerable groups or indigenous peoples identified as currently living with the project areas?			
67.	Are any locations or features of archaeological, historic, architectural or other community or cultural importance in the area that may be bisected the projects described, including any designated or protected sites?			
68.	Is the landscape of the area that may be affected by the existing and proposed projects described, including any designated or protected landscapes and any important views or viewpoints?			
69.	Are any future changes in any of the above aspects of the environment that may or may not occur in the absence of the existing and proposed projects?			
	<b>Data Collection and Survey Methods</b>			
70.	Has the study area been defined widely enough to include all the area likely to be significantly affected by the existing and proposed projects?			
71.	Have all relevant national and local agencies been contacted to collect information on the baseline environment?			

	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
72.	Have sources of data and information on the existing environment been adequately referenced?			
73.	Where surveys have been undertaken as part of the CIA to characterise the baseline environment, are the methods used good practice and where there any difficulties encountered and any uncertainties in the data described?			
74.	Were the methods used appropriate for the purpose?			
75.	Are there any important gaps in the data on the existing environment identified and what are the means used to deal with these gaps during the assessment explained?			
76.	If surveys were required to adequately characterise the baseline environment but they have not been practicable for any reason, are the reasons explained and proposals set out for the surveys to be undertaken at a later stage?			
	<b>Impact Assessment</b>			
77.	Is the process by which the scope of the CIA was defined described as per the Guidelines?			
	<b>Prediction of Direct Impacts</b>			
78.	Are direct impacts on material assets and depletion of non-renewable natural resources described?			
79.	Does the CIA provide information on the relevant potential contaminants that might be released by the projects?			
80.	Are direct impacts on geological features and characteristics of soils described and where appropriate quantified?			
81.	Are direct impacts on climatic conditions described and quantified with computer modelling?			
82.	Are impacts on climate change described with computer modelling?			
83.	Does the CIA include details on the potential impacts of the projects on climate change?			

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	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
84.	Does the CIA include details on the potential impacts of climate change on the projects?			
85.	Does the CIA include details on the potential impacts of the projects on disaster risk?			
86.	Are direct impacts on heat, light or electromagnetic radiation described and quantified with computer modelling?			
87.	Are direct impacts on air quality described and quantified with computer modelling?			
88.	Are direct impacts from lighting described and quantified with computer modelling?			
89.	Are direct impacts on the acoustic environment (noise or vibration) described and quantified with computer modelling?			
90.	Are direct impacts on the quality of the landscape and on views and viewpoints described and where appropriate illustrated?			
91.	Are direct impacts on the hydrology and water quality of water features described and quantified with computer modelling?			
92.	Are direct impacts on all fauna and flora and habitats described and where appropriate quantified?			
93.	Are direct impacts on uses of the aquatic environment described and quantified with computer modelling?			
94.	Are direct impacts on land uses described and where appropriate quantified?			
95.	Are direct impacts on transport including airports, highways etc described and where appropriate quantified?			
96.	Are the proposed working conditions adequately addressed to ensure that staff and in particular women will not be disadvantaged?			
97.	Are direct impacts on demography, social and socio-economic condition in the area described and where appropriate quantified?			
98.	Are details of the potential impacts on increased population been considered and how it will change the local setting?			

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	<b>Review Question</b>	<b>Relevant</b>	<b>Adequate</b>	<b>What further information is required?</b>
99.	Does the CIA carefully analyse the potential issues on community health and safety by the existing and proposed projects? Does the CIA specifically state how the projects will deal with alcohol related issues?			
100.	Are details of the potential impacts on increased women's participation been considered and how it will change the local setting?			
101.	Are there specific plans to deal with the potential increase of sexually transmitted diseases and does the CIA establish how will they be implemented and managed?			
102.	Does the CIA state how the issue of unplanned and unwanted pregnancies will be effectively managed?			
103.	Are direct impacts on any vulnerable groups and indigenous peoples in the area described and where appropriate quantified?			
104.	Are direct impacts on locations or features of cultural importance described?			
105.	Have issues related to land acquisition been adequately addressed?			

	<b>Prediction of Temporary, Short Term, Permanent, Long Term, Accidental Cumulative Impacts</b>			
106.	Are induced and secondary impacts on any of the above aspects of the environment caused by primary impacts on other aspects described and where appropriate quantified including for example, impacts on fauna, flora or habitats caused by soil, air or water pollution or noise; impacts on uses of water caused by changes in hydrology, sediment mobilisation or water quality and other relevant impacts?			
107.	Are temporary, short term impacts caused during construction or during time limited phases of project operation or decommissioning / rehabilitation described for all projects?			
108.	Are permanent impacts on the environment caused by construction, operation or decommissioning / rehabilitation of the existing and proposed projects described?			
109.	Are long term impacts on the environment caused over the lifetime of the existing and proposed projects' operations or caused by the build-up of pollutants in the environment described?			
110.	Are impacts which could result from accidents, abnormal events or exposure of the existing and proposed projects to natural or anthropogenic disasters described and quantified with computer modelling?			
111.	Are impacts on the environment caused by activities ancillary to the existing and proposed projects described, including but not limited to the construction of access routes and infrastructure, traffic movements, sourcing of aggregates or other raw materials, generation and supply of power, disposal of effluents or wastes etc?			
112.	Are indirect impacts on the environment and social aspects caused by consequential development of the existing and proposed projects described?			
113.	Are the geographic extent, duration, frequency, reversibility and probability of occurrence of each effect identified as appropriate?			
114.	Is the significance or importance of each predicted effect discussed in terms of its compliance with legal requirement, Valued Ecosystem Component and the number, importance and sensitivity of people, resources or other receptors affected?			

115.	Are positive as well as the negative impacts on the cumulative environment and social aspects described?			
116.	Is the significance of each effect clearly explained?			
	<b>Impact Assessment Methods</b>			
117.	Are the methods used to predict cumulative impacts described and are the reasons for their choice, any difficulties encountered and uncertainties in the results discussed?			
118.	Where there is uncertainty about the specific details of the existing and proposed projects and their impact on VECs; and are worst case predictions described?			
119.	Where there have been difficulties in compiling the data needed to predict or evaluate impacts on VECs; were these difficulties acknowledged and their implications for the results discussed?			
120.	Are impacts described on the basis that all proposed mitigation has been implemented eg area all the residual impacts described?			
121.	Is appropriate emphasis given to the most severe, adverse impacts of the existing and proposed projects with lesser emphasis given to less significant impacts			
122.	Is the basis for evaluating the significance or importance of impacts clearly described?			
	<b>Community and Stakeholder Consultation</b>			
123.	Does the CIA provide details on all consultation that has been undertaken and who attended the meetings?			
124.	Does the CIA identify all affected peoples, including a statement mentioning any communities that may be affected and describing their views on the project			
125.	Has the consultation ensured that targeted vulnerable groups have been adequately involved in the process.			
126.	Have comments and suggestions gained from consultation been adequately addressed in the CIA?			
127.	Are there details about on-going consultation during the construction and operational phases of the existing and proposed projects?			

	<b>Description Of Mitigation</b>			
128.	Where there are significant adverse impacts on any aspect of a Valued Ecosystem Component, are the proposed mitigation methods discussed?			
129.	Are any measures proposed to mitigate impacts clearly described and their effect on the magnitude and significance of impacts clearly explained?			
130.	If the effect of mitigation measures on the magnitude and significance of impacts is uncertain, is this explained and quantified with appropriate reasoning?			
131.	Is it clear whether the proponents of the existing and proposed projects have made a binding commitment to implement the proposed mitigation or are the mitigation measures merely suggestions or recommendations that could / should be followed?			
132.	Are the proponent's reasons for choosing the proposed mitigation clearly explained?			
133.	Are responsibilities for implementation of mitigation including funding clearly defined?			
134.	Where mitigation of significant adverse impacts is not practicable, or the proponents have chosen not to propose any mitigation, are the reasons for this clearly explained?			
135.	Are arrangements proposed to monitor and manage residual impacts within the Environmental and Social Management Plans related to cumulative impacts?			
136.	Are any negative impacts of the proposed mitigation described?			
	<b>Non-Technical Summary</b>			
137.	Does the environmental and social information include a non-technical Executive Summary sound feasible?			
138.	Does the Executive Summary provide a concise but comprehensive description of the existing and proposed projects, the Valued Ecosystem Component, the impacts of the existing and proposed projects on VECs and the proposed mitigation?			

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139.	Does the Executive Summary highlight any significant uncertainties about the existing and proposed projects and their impacts on VECs?			
140.	Does the Executive Summary provide an overview of the approach to the assessment?			
141.	Is the Executive Summary written in non-technical language, avoiding technical terms, detailed data and scientific discussion?			
142.	Would it be comprehensible to a lay member of the public?			

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