Initial Environmental Examination

Project Number: 46293-003
Loan Number: 3156-LAO
May 2017

Lao People's Democratic Republic: Greater Mekong Subregion Tourism Infrastructure for Inclusive Growth Project

Prepared by the Ministry of Information, Culture and Tourism for the Asian Development Bank.

CURRENCY EQUIVALENTS
(January2017)

Currency Unit	–	kip K
K.00	=	$0.00012
$1.00	=	K8,000

ABBREVIATIONS

CEMP	-	Construction Environmental Management Plan
DOH	-	Department of Heritage
DAF	-	Department of Agriculture, Forestry, and Fisheries
EA	-	Environmental Assessment
DONRE	-	Department of Natural Resources and Environment
DDSC	-	Detailed Design and Supervising Consultant
DICT	-	Department Information and Culture and Tourism
EIA	-	Environmental Impact Assessment
ECC	-	Environmental Compliance Certificate
ECO	-	Environmental control officer
EMP	-	Environment Management Plan
ESIA	-	Environment and Social Impact Assessment
EA	-	Executing Agency
GMS	-	Greater Mekong Subregion
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IUCN	-	International Union for Conservation of Nature
Lao PDR	-	Lao People's Democratic Republic
LWU	-	Lao Women's Union
MAF	-	Ministry of Agriculture, Forestry and Fisheries
MICT	-	Ministry of Information, Culture and Tourism
MOF	-	Ministry of Finance
MONRE	-	Ministry of Natural Resources and Environment
MPWT	-	Ministry of Public Works and Transport
MRC	-	Mekong River Commission
NBSAP	-	National Biodiversity Strategy and Action Plan
NPA	-	National Protected Area
O&M	-	Operation and Maintenance
PIU	-	Project Implementation Unit
PCU	-	Project Coordination Unit
PPP	-	Public-Private Partnership
REA	-	Rapid Environment Assessment
TSS	-	Total Suspended Solids
UXO	-	unexploded ordnance
WREA	-	Water Resources and Environment Agency

WEIGHTS AND MEASURES

km: kilometer kg: kilogram ha: hectare mm: millimeter

NOTE in this report, "$" refers to US dollars unless otherwise stated.

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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I.EXECUTIVE SUMMARY

A. The Project

1. The Greater Mekong Subregion (GMS) Tourism Infrastructure for Inclusive Growth Project (the project) includes subprojects in three countries, Cambodia, Lao PDR and Viet Nam. The subprojects include infrastructure and environmental improvement investments that have the inclusive goal of increasing and improving tourism and associated socioeconomic development at selected locations. The development of tourism to enhance pro-poor employment is an objective of the GMS Strategic Framework 2012–2022, GMS Tourism Sector Strategy 2005–2015, and the current poverty reduction strategies of the participating countries.

B. Updated IEE

2. An initial environmental examination (IEE) was prepared for the subproject in January 2014. This document is the updated IEE which takes account of the detailed engineering design for the subprojects in Khammouane province, in Lao PDR which are classified as ADB environment category B.

C. Project Summary

3. The subprojects contain two outputs. Output 1includes an array of small infrastructure and environmental improvements at established tourist sites that will improve the environmental conditions and the overall quality of the tourism experience. The goal is to increase the number of tourists that visit each site. Output 2 includes larger scale improvements to sanitation and solid waste management systems which are classed as environmental services. This IEE covers outputs 1 and 2 of the project.

Table I-1 Subprojects leading to Outputs 1 and 2

Subproject	Province
Output 1: Last Mile Tourism Access Infrastructure Improved	
Xang Cave Access Improvements	Khammouane
Output 2: Environmental Services in Cross Border Tourism Centers Improved	
That Sikhottabong Environmental Improvement	Khammouane

4. There have been no major changes to the design since 2014.

D. Potential Impacts

5. Khammouane province includes the National Biodiversity Conservation Areas (NBCA) of Nakai-Nam Theun and Phou Hin Poun. However, sub-project activities will not impact on them as they are over 10kms away.

6. There are no known rare or endangered wildlife species or critical habitats in the subproject areas.

7. Potential environmental impacts are largely restricted to the construction phase of the subproject components. Common construction-related disturbances include noise, dust, erosion, sedimentation, solid and liquid waste pollution, workers camp issues, reduced access, increased vehicle and boat traffic and road traffic disruptions.

8. There will be no actual works in the cave itself nor in the Stupa. Previous plans to install lighting and stairs in the cave have been dropped. There are no planned works inside the Stupa.

9. An Environmental Management Plan (EMP)has been prepared. This identifies potential impacts, gives the mitigation required, stipulates environmental monitoring plans, gives indicative costs for EMP implementation, and specifies the institutional responsibilities for the environmental management of the subproject.

10. All activities within the stupa enclosure must be conducted with the deepest respect for the cultural values of the site. Contractors should be fully briefed on appropriate behaviour within the enclosure and made aware of restrictions. The contractors are required to check if there are any prayer times or similar sensitive activities during which potentially disruptive works may need to be temporarily suspended.

11. Potential long-term environmental impacts of the subprojects relate to operation and maintenance (O&M) of the improved sanitation and solid waste systems that will be established at the sites. The new public toilet blocks have Anaerobic Baffled Reactor (ABR) septic tanks which are a simple yet effective technology for sewage treatment. They are particularly suited for use as sanitation systems in remote, high density tourist areas.

12. Like all such systems the toilets and the ABR tanks must be regularly maintained with digested septate sludge routinely removed and disposed of in government approved disposal areas. Due to their high efficiency in biodegradation this is an infrequent operation and is only required when the tanks are full, which can be at several years intervals.

13. Improved solid waste management is provided by provision of garbage bins, a solid waste transfer station and recycling facilities. Garbage bins should be emptied daily and not left until full or overflowing.

14. There will be an increase in tourism but this is a planned outcome of the project. The provision of better traffic management due to improved roads, car parking, additional toilet

facilities, litter collection, more waste bins and a small solid waste transfer station will minimise the impacts of extra tourists. The management of the solid waste and sanitary facilities for the Stupa will be undertaken by the Sikhottabong Village Association (SVA) who are currently charged with all maintenance of public utilities in the Stupa area. They will continue in this role post construction. The SVA receives funds from the ticket sales for the Stupa compound. A portion of this gate revenue is given to the SVA for operation and maintenance of the site.

15. Although the aim of the project is to increase tourism and bring benefits to the area there can be negative impacts due to this increase. Extra infrastructure and facilities are to be provided but these may be inadequate in the long term. Degradation of these facilities can lead to discouragement of more tourists and an actual drop in the number of visitors who find the location less attractive. DICT should initiate a monitoring program to ensure that the attractiveness of the site is not lost through degradation from overuse. If such degradation is detected, possibly through a drop in visitor numbers, then improved site management or increase in tourist facilities should be considered.

16. The stakeholder consultations and household and village level interviews underscored the need for effective management of construction-phase impacts such as noise, dust, traffic disruptions, and worker and public safety. However, the local residents were in favor of the planned improvements and supported the project. Follow-up meetings with the consulted stakeholders in October 2016 confirmed this opinion.

E. Conclusions

17. The IEE confirms that the sub-projects are Category B and that there are no overriding reasons why the project should not proceed.

II.Introduction

A. Project Background

18. The Greater Mekong Sub Region (GMS) Tourism Infrastructure for Inclusive Growth Project (the project) is a multisector tourism development project situated in Lao PDR, Cambodia, and Viet Nam. The project is comprised of transport-related and environmental infrastructure investment subprojects in twelve provinces of the three participating countries. The subprojects in the province of Khammouane of Lao PDR are presented in this IEE.

19. The objective of the project is to accelerate inclusive tourism growth in the targeted areas of the GMS. Inclusive growth is defined by local social and economic growth from tourism development that is environmentally sustainable. The development of tourism to enhance pro-poor employment serves the GMS Strategic Framework 2012–2022, GMS Tourism Sector Strategy 2005–2015, and the current poverty reduction strategies of the participating countries. The GMS Tourism Sector Assessment, Strategy, and Roadmap indicate that ADB's assistance to the tourism sector will focus on:

1) Improving last-mile tourism access infrastructure and sanitation in secondary destinations;

2) Capacity building for public officials and local communities; and

3) Promoting multi-country tour circuits.

20. The project is included in the targeted countries of ADB's Country Partnership Strategies which emphasize the need to improve rural transport infrastructure, expand municipal infrastructure and services, and promote small and medium-sized enterprises to boost the poor's access to economic opportunities. The four outputs are:

Output 1: Last Mile Tourism Access Infrastructure Improved which include new and upgraded roads, piers, and associated tourism support facilities;

Output 2: Environmental Services in Cross Border Tourism Centers Improved which includes wastewater treatment facilities and landfills;

Output 3: Institutional Capacity to Promote Inclusive Tourism Growth Strengthened

Output 4: Effective Project Implementation and Knowledge Management.

21. Output 1 and Output 2 involve small infrastructure investments, whereas Outputs 3 & 4 involve "softer" development initiatives such as tourism planning and management, development of public-private partnerships, and counterpart capacity development and training in tourism. The focus of this IEE is the infrastructure investments in Outputs 1 and 2.

22. Figure II-1 shows the provinces in Lao PDR where subprojects are proposed. This IEE refers only to the two subprojects in Khammouane Province, as described in Table II-1.

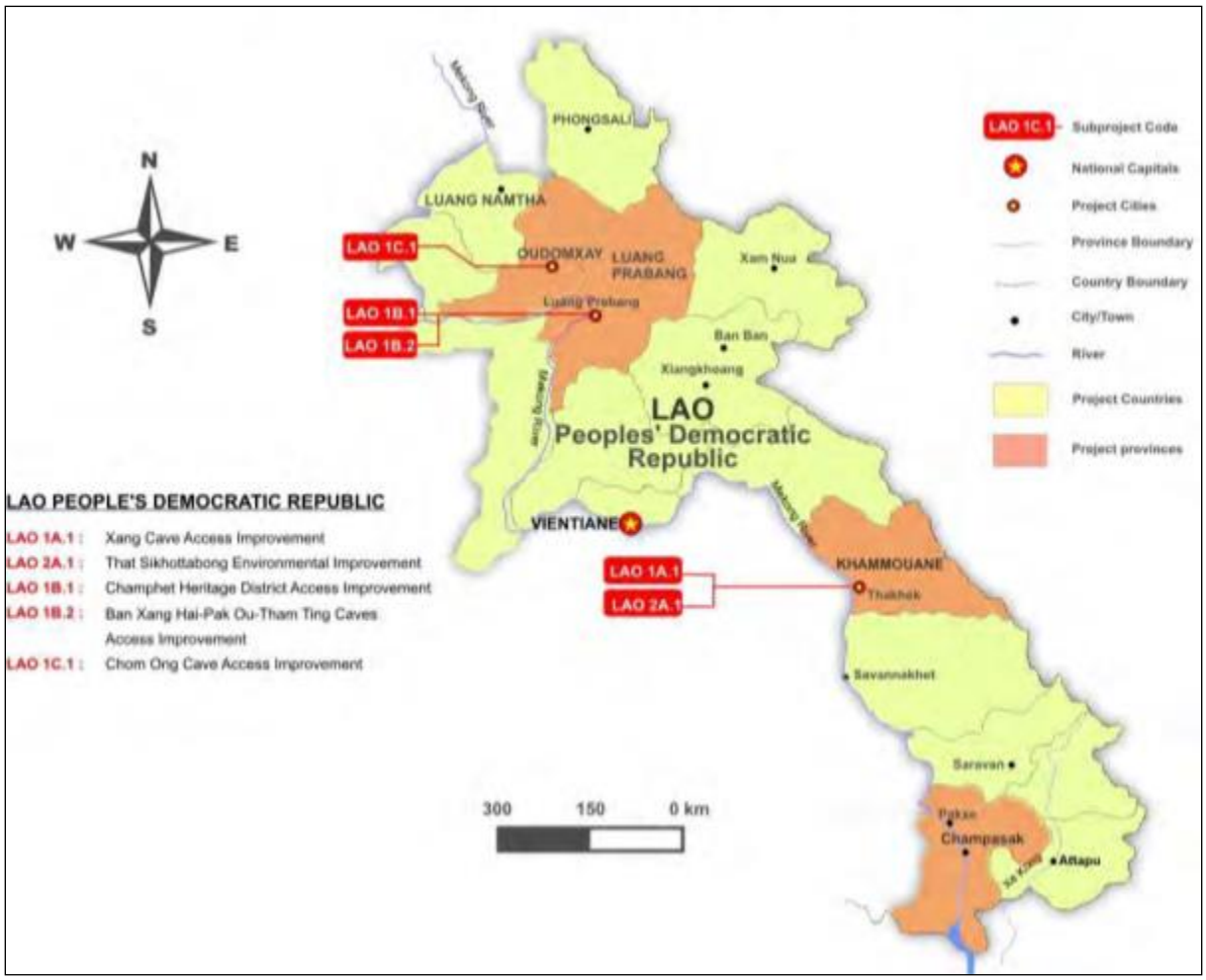

Figure II-1 Project Provinces in Lao PDR

Table II-1 Subprojects leading to Outputs 1 and 2

Subproject	Province
Output1: Last Mile Tourism Access Infrastructure Improved	
Xang Cave Access Improvements	Khammouane
Output2: Environmental Services in Cross Border Tourism Centers Improved	
That Sikhottabong Environmental Improvement	Khammouane

B. Environmental Category

23. The ADB Safeguard Policy Statement and Sourcebook (ADB 2009, 2012) clarifies the rationale, scope and content of an EA. Projects are initially screened to determine the level of assessment that is required according to the following three environmental categories: Category A for projects that normally cause significant or major environmental impacts that are irreversible, diverse or unprecedented such as hydroelectric dams (an Environmental Impact Assessment is

required); Category B projects which have potential adverse impacts that are less adverse than those of category A, which are site-specific, largely reversible, and for which mitigation measures can be designed more readily than for category A projects (an Initial Environmental Examination is required); and Category C projects that are likely to have minimal or no negative environmental impacts. An environmental assessment for Category C projects is not required but environmental implications need to be reviewed.

24. 24. The project is classified as an Environmental Category B pursuant to requirements of the ADB safeguard policy[1] and good practice sourcebook guidance.[2] The subprojects in Lao PDR were screened ensure that environmental impacts and risks can be classified as environment Category B.

25. The Government of Lao PDR requires that an Environmental Assessment (EA) be conducted for the subprojects in accordance with the national EIA regulatory framework and guidelines. The detailed design engineering Team applied for the approval in 2016 during the design stage. Their application was approved and the Environment Certificate issued on 24 February 2017. (See Annex A for certificate and translation).

C. Feasibility Study and Detailed Design

26. The initial IEE was prepared in 2013 for the Lao PDR subprojects at the feasibility study stage using available data and information on sensitive ecological and cultural receptors that exist at the different subproject sites. The detailed designs for the subprojects are now under preparation and so the IEE is being updated. This IEE also includes the environmental management plan (EMP).

D. Existing Impact Footprints

27. The subprojects by intention are located in existing tourist destinations with the goal of increasing tourist visitation at the sites. The subproject activities will upgrade existing tourist facilities such as access roads, small tourist reception buildings, and solid and wastewater management. Thus, the environmental impact footprint due to tourism development already exists at the subproject areas. The subprojects will not be creating new impact footprints from new tourist sites. The challenge is to improve the tourist facilities through small infrastructure and environmental developments without significantly enlarging the tourist impact footprints.

[1]ADB. 2009.Safeguard Policy Statement, ADB Policy Paper.

[2]ADB,2012,Environmental Safeguards, A Good Practice Sourcebook, Draft.

III. Policy, Legal, And Regulatory Framework

A. National Environmental Laws, Strategies, and Policies

1 Framework

28. Lao PDR's national framework for the governance of environmental matters includes a comprehensive set of environmental and natural resources related laws and regulations. Several government agencies are involved in environmental management.

29. In 2011 the Ministry for Natural Resources and the Environment (MONRE) was created by merging the Water Resource and Environment Administration (WREA) with departments of the National Land Management Authority (NLMA) and portfolios of other ministries including the Geology Department, and the Forest Conservation and Divisions within the Ministry of Agriculture and Forestry (MAF). The policies, laws relevant to environmental protection are listed below.

2 Laws

30. The following laws are relevant to environmental assessments:

- Law on Environmental Protection No. 02/99/NA (1999)
- Law on Industry No.01/99/NA (1999)
- Law on Hygiene, Prevention and Health Promotion No.01/NA (2001)
- Law on Water and Water Resources (1996)
- Law on Land (2003)
- Law on Roads (1999)
- Law on Forestry (2007)
- Law on Cultural, Historical and Natural Heritage (2005)
- Law on Fisheries (2010)

3 Strategies, Plans, Policy

31. The following publications are relevant to environmental assessments:

- The7th National Social and Economic Development Plan(NSEDP) (2011-2015)
- National Forestry Strategy to 2020(FS2020)
- National Biodiversity Strategy to 2020&ActionPlan to 2010(NBSAP)
- Urban Master Plan (2001) No. 58/PM
- National Water Resources Strategy and Action Plan [draft]
- Strategy on Climate Change (2010)
- National Adaptation Programme of Action to Climate Change(NAPA) (2009)
- Strategic plan on disaster risk management in Lao PDR (2020, 2010) and Action Plan (2003-2005)

4 International Agreements

32. The Lao Government is party to international multilateral environmental agreements.

Agreements pertaining to the project are listed below.

- World Heritage Convention(WHC), March 20, 1987
- Framework Convention on Climate Change (FCCC), 4 January,1995
- Agreement on The Cooperation for The Sustainable Development of The Mekong River Convention on Biological Diversity (CBD), September 20, 1996
- Montreal Protocol on Substances that Deplete the Ozone Layer, August 21,1998
- Persistent Organic Pollutants(POPs), March5, 2002
- ASEAN Agreement on Transboundary Haze Pollution, June10,2002
- Plant Protection Agreement for the Asian and Pacific Region, March 17,1960

5 Environmental Standards &Criteria

33. National standards and criteria exist for drinking water quality, surface and groundwater quality, soil quality for agriculture, air quality and noise level standards, and wastewater discharge standards for BOD, NH3-N, TSS, and pH. Specific standards are also available for certain chemical use by factories. The existing standards are found in the National Environmental Standard Order No. 2734/PMU-WREA (2009)

B. Forest Types

1 Categories of Forests

34. Some components of the subprojects are located inside or adjacent to forested areas. The three primary forest types or categories with respect to forest preservation and development are:

- Protection forests
- Conservation (or reserved) forests
- Production Forests

35. Two other managed forest categories which reflect the overall goal of the Government of forest restoration through community based forest management are Regeneration Forests and Degraded Forests.

These are defined below.

2 Protection Forests

a) Classification

36. Protection forests are forests classified for the function of environmental protection defined by water resources, river banks, road sides, preventing soil erosion, protecting soil quality, strategic areas for national defence, and protection from natural disasters.

b) Activity Restrictions

37. Protected forests are further stratified into total protected zones and controlled use zones. The total protected zone is usually steep sloped, contains water resources including forests along

rivers, roads and other areas with high risk of environmental degradation. These areas must be protected from activities such as crop rotation, cutting or burning, tree removal, housing construction, extraction of soil, stones, or mining.

38. The controlled use zone is the forest area without a perceived high risk of environment impacts. These areas must be protected similar to the total protection zone, but people are allowed to use wood and forest products according to the management plan. For example, Article 5 of the Forestry Law would apply which indirectly encourages the utilization of forests for research, tourism and recreational purposes.

3 Conservation or Reserved Forests

a) Classification

39. Conservation forests are forests classified for the purposes of conserving nature, preserving plant and animal's species, forest ecosystems and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific research experiments. Conservation forests exist at the national, provincial, district and village levels.

b) Activity Restrictions

40. Similar to protected forests, conservation forests are divided into zones defined by *total protection zones, controlled use zones, corridor zones and buffer zones.* The *total protection zone* is the forest area that is main habitat, feeding and breeding place for various wild animals and it is the place of diverse and dense vegetation. In this zone, it is strictly prohibited to conduct any forestry activity, to harvest any forest products, including unauthorized entry in this zone. Examples are core zones of national parks or nature reserves.

41. The controlled use zone is the forest area adjacent or close to the total protection zone. These areas must be protected similar to the total protection zone, but people are allowed to use wood and forest products according to local management plan.

42. The corridor zones are managed areas for preserving tracts of forest to provide passage for animals between two conservation forests or between a conservation forest and another category of forest to preserve existing biodiversity and to increase the general wildlife population. In this zone, it is prohibited to cut trees, conduct forestry activities or any other activity that may obstruct or destroy the passage for the animals. The buffer zones are managed areas for preventing any encroachment and destruction in the conservation forest.

4 Production Forests

43. Production forests are natural forests and planted forests that are actively utilized for wood production, and for wood and forestry product-related livelihoods to satisfy the requirements of national socio-economic development and people's living.

5 Regeneration Forest

44. Regeneration forest is young fallow forest classified for the purpose of regeneration and maintenance so that it increases in maturity toward a stage of natural equilibrium.

6 Degraded Forests

45. Degraded forest has been heavily damaged to the extent that land is barren without trees. The forest is classified for tree planting and/or allocation to individuals and organizations for tree planting, permanent agriculture and livestock production, or for other purposes.

C. Lao National Environmental Procedures

46. Pursuant to the Environmental Protection Law (1999), development projects and operations that have or will have the potential to affect the environment shall require environmental assessment in accordance with the regulations of MONRE (previously WREA). MONRE is responsible for environmental management and monitoring and the issuance of an Environmental Compliance Certificate (ECC) as per the Regulation on Environment Assessment No:1770/WREA (3/10/2000).

47. A Development Project Responsible Agency (DPRA) carries out the initial environmental assessment in accordance with the Regulation. The DPRA screens the project to determine whether the initial environmental assessment must be expanded into an IEE as specified in Article 9 of the Regulation. A more in depth Environmental Impact Assessment (EIA) maybe required if this is shown to be needed following a review of the IEE, as specified in Articles11,12,13, and 14 of this Regulation.

48. Key directives and regulations for environmental assessment in Lao PDR are as follows:

- Decree of Environmental Impact Assessment (no. 112/PM, February 2010)
- Regulation on Environment Assessment No: 1770/WREA (3/10/2000)
- Manual of Environmental Impact Assessment Procedures Road Projects in Lao PDR (1997).
- Regulation and Guidelines for Environmental Assessment of Road Projects (1999).
- Environmental Impact Assessment for Industry and Processing Handicraft Order No.1222/MIH (2005)

49. The technical and procedural aspects of above regulations and directives were combined into the UNDP-UNEP supported and MONRE-sponsored Environmental Impact Assessment Guidelines for Lao PDR (2012), which has been followed by the draft IEE guidelines (2013). The 2012 EIA and 2013 draft IE guidelines support the Decree of Environmental Impact Assessment (2010).

50. The IEE requirements of the ADB SPS (2009) more than satisfy the current draft IEE guidelines for Lao PDR. A project is assigned the requirement for either an IEE or EIA depending on project size or complexity. The Lao PDR EIA and IEE processes are essentially the same but differ by the required level of investigation, and that an EIA requires a formal Scoping and TOR for the EIA to be prepared. The Lao and ADB IEE follow the same major steps and consist of the same major components. However, the scope of the follow-up environmental and social management plan differs. The EMP of the ADB IEE equals the scope of the ESMMP required of

the Lao PDR EIA. While similar in process, the ADB IEE provides more comprehensive assessment and follow-up management.

IV. Description Of Subprojects

A. Subprojects in Khammouane Province

51. There are 5 subprojects in Lao PDR of which two are in Khammouane province. This IEE relates only to those subprojects in Khammouane Province. One is a subproject of Output 1 and the other is a subproject of Output 2 (Table IV-1). The locations are given in Figure IV-1. The descriptions of the subprojects provided below reflect the Detailed Design as of March 2017.

Table IV-1 Overview of Sub-Projects by Output and Province

Subproject Number	Province	Output1: Last Mile Tourism-Related Access Improvements	Output 2: Environmental Services in Cross Border Tourism Centers Improved
4	Khammouane Province	Xang Cave Access Improvements	
5			That sikhottabong Environmental Improvement

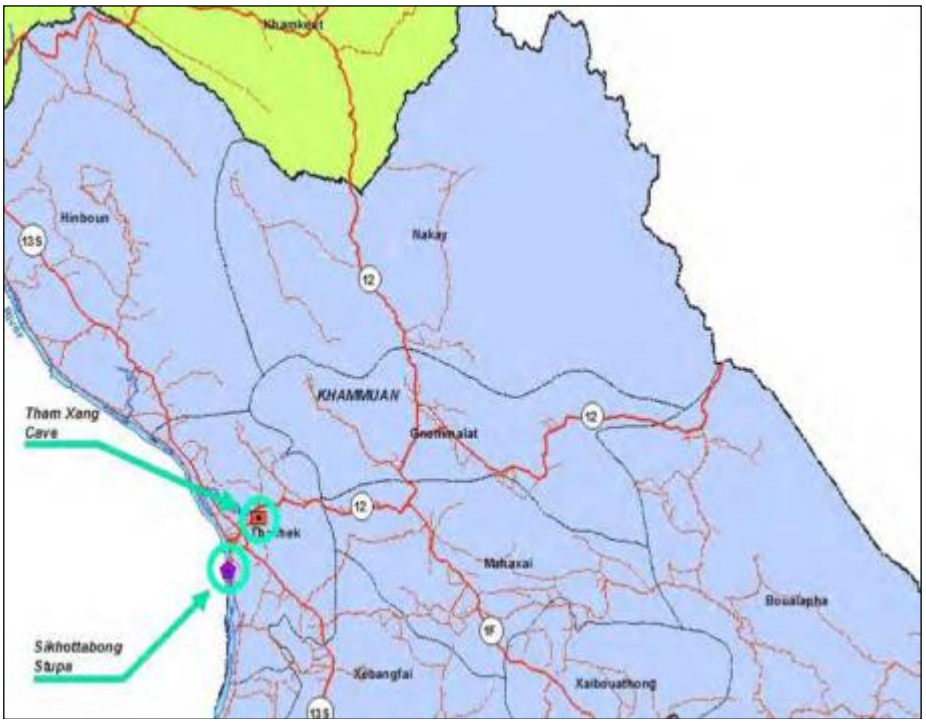

Figure IV-1 Location of subprojects in Khammouane province

B. Sub-Project 4Xang Cave Access Improvements

1 Location Xang Cave

52. The Xang cave is located just south of National Highway 12 about 6km northeast of Thakhek town in Thakhek District. The main access to the site is via National Highway 12 then by following a secondary unpaved road (1.7 km) to Ban Tham village (Figure IV-2). The initial 1.3 km of the unpaved road runs along a raised embankment through farmland crossing one small bridge. The flat access road to the Ban Tham village and Xang Cave crosses agricultural lands and a stream before entering the village, and then a second stream just before the cave.

53. The final approach to the cave is from Ban Tham along a 400m motorable track which crosses the small stream by a ford. According to the village head the track and adjacent parts of the village are flooded during the rainy season. (Figure IV-3)

54. From Ban Tham village the access road continues on for 2.0 km to Ban Xang Vaen. This section will also be upgraded. (Figure IV-4)

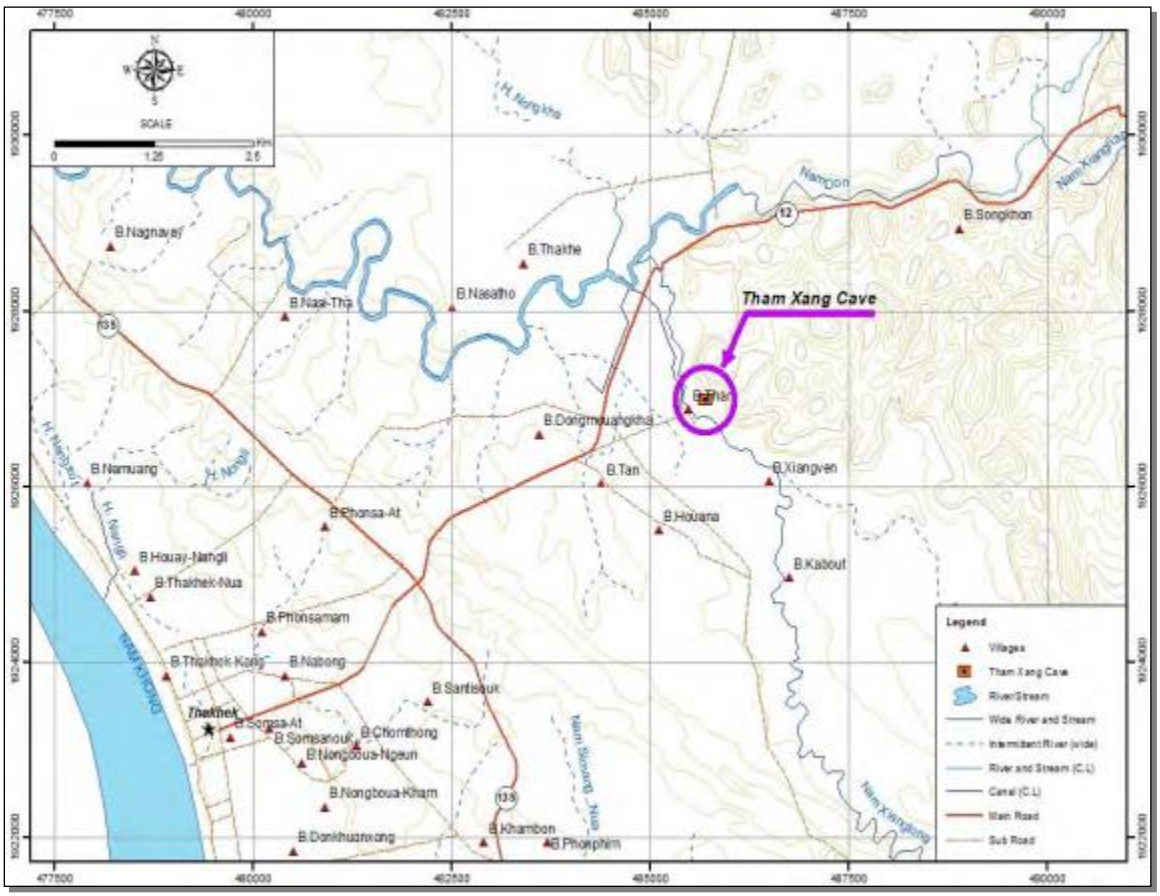

Figure IV-2 Location of Xang Cave Access Improvements

55. The access road from Thakhek runs through agriculture land. Figure IV-5 shows a section of access road to Ban Tham village that will be upgraded, and the second stream in front of the cave that will be forded with the access road upgrades.

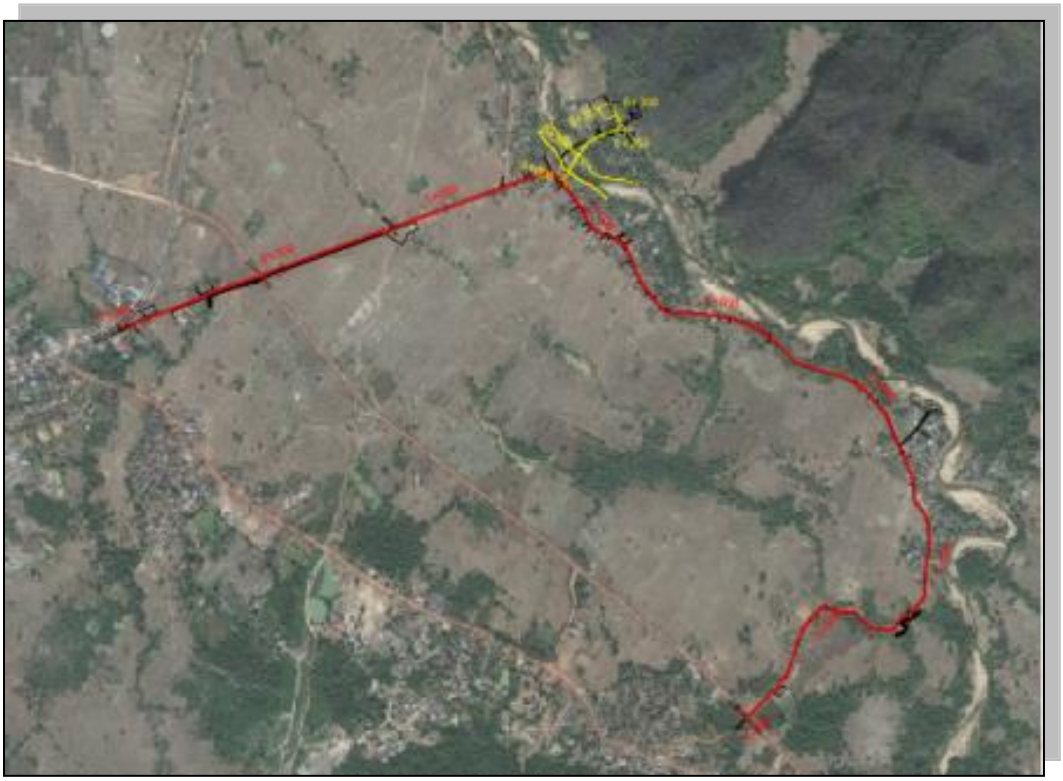

Figure IV-3 Xang Cave Road Access Improvements

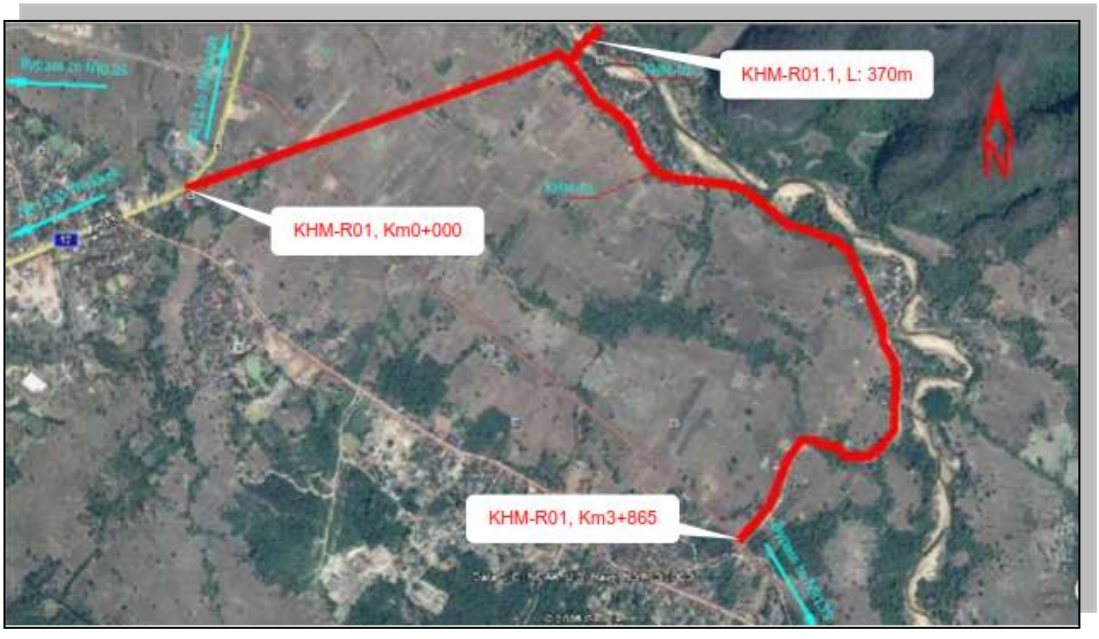

Figure IV-4 Xang Cave Road Connections

Figure IV-5 Access road &forded stream crossing.

2 Xang Cave Reception

56. The tourist reception area at the front of the cave is located on agricultural land and village property. Figure IV-6 shows the face of the cave and the tourist reception area.

Figure IV-6 Cave frontage & existing tourist structure.

3 Other Development in Area

57. The Xang Cave including the access road are located in agricultural lands with scattered homesteads surrounding the site. There is no other major development in the area.

4 Works

58. The subproject activities will occur along the access road to Xang cave, in the two villages beside the cave, and at the cave itself. Subproject activities are given in Table IV-2.

Table IV-2 Xang Cave Access Improvements

Activity	General Specifications
Upgrade existing access road to Xang Cave and Nearby Xiang Vaen village	• 4.0kmX 6.0m • DBST surface • existing bridge only concrete decking required
Construct new secondary access road	• 500m • 100mfootbridge • ford crossing with box culverts
Construct2newvehicleparksatXangcave Entrance Xiang Vaen village	• 4,000m^2,1,000m^2 • gravel surface
Construct new multi-purpose tourist information Reception center near cave entrance	• utilize existing structure
Construction of new public toilet blocks	• Septic tanks with ABR system (Anaerobic Baffled Reactors) which are simple yet give high efficiency.
Construction of new vendor kiosks with landscaping	
Upgrade existing steps and footpaths to cave	• with handrails
Install rubbish bins at key locations	
Placement of signage and information boards	

59. It should be noted that the previous requirement for an improved cave lighting system inside the cave has been removed.

5 Sites of Special Ecological Interest

60. The cave is located on the northern boundary of Ban Tham village just inside a protected forest (Figure IV-6. It is 10 km southwest of the nearest sensitive location which is Phou Hin Poun NBCA (Figure V-1).

61. Although Xang cave is located in protected forest the tourist gathering area is located in the village. The access road traverses mostly farmland with intermittent scrub forest clumps. According to the village head the small river near the cave entrance does not support fish populations. However, according to DONRE, as the river is a tributary of the Mekong River it is a passageway for the flood plain migration of fish during the rainy season.

62. The Xang Cave has both archaeological and religious significance due to interesting rock formations, one in the form of an elephant, and the Buddhist shrines and other ancient artefacts. A high percentage of visitors are Lao and Thai who visit to pray.

63. The village and surrounding area is located on the Mekong River flood plain. No rare or endangered wildlife are known to inhabit the area including the cave.

C. Sub-Project 5That Sikhottabong Environmental Improvement

1 Location Sikhotabong

64. The Sikhotabong Stupa cultural site is located on the east bank of the Mekong river 5 km south of the town of Thakhek. The Stupa lies inside a walled 5 ha compound with other religious and cultural buildings. The enclosure is bordered by the Mekong river to the west and National Highway 11 to the east. (Figure IV-7). The topography and land use around the Stupa compound is flat agricultural lands with mixed scattered homesteads beside the site on three sides (Figure IV-8) and has an extensive internal road network (Figure IV-9)

Figure IV-7 Location of Sikhottabong Stupa Environmental Improvements

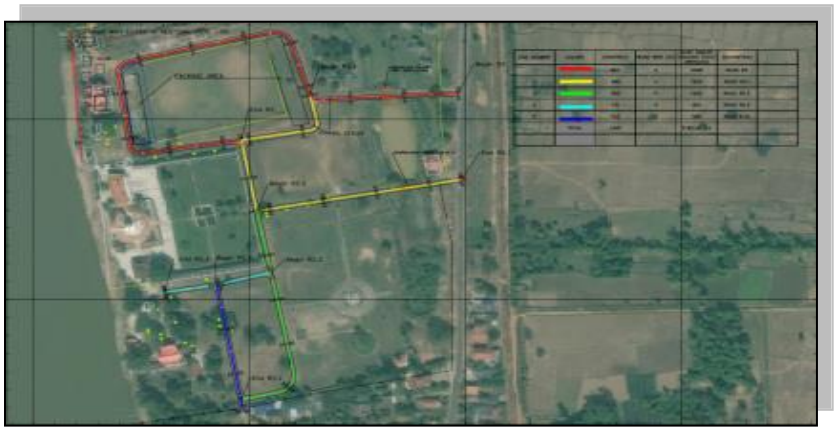

Figure IV-8 Location of Sikhottabong Stupa Internal Roads

Figure IV-9 Location of Sikhottabong Stupa Internal Roads

65. The 29-meter-high stupa lies within a walled compound of 5 ha surrounded by other

religious and cultural buildings. (Figure IV-10 and Figure IV-11)

Figure IV-10 Main Stupa building

Figure IV-11 Aerial view of Stupa compound with main building (mid left of photo)

2 Other Developments in the Area

66. The peri-urban and rural areas of Thakhek are located outside of the walls of the Stupa compound. The solid waste transfer station will be located outside the north gate of the complex, not inside the compound. Only cultural activities and tourism occur inside the compound.

3 Works

67. The subproject activities that will occur inside the compound are given in Table IV-3.

Table IV-3 Sikhottabong Stupa Environmental Improvements

Activity	General Specifications
Upgrade existing internal road network in compound	• 2km • sealed gravel
Rehabilitate existing internal road bridges	
Upgrade existing vehicle park	• 4,000m^2 • sealed gravel surface
Construction of 20 new public toilets	•with ABR septic system
Rehabilitate existing 2 storey structure to a tourist reception and information center	• exhibition area and interpretation facilities
Construct new food and beverage kiosks	
Installation of new souvenir, food and beverage stalls	
Develop hard and soft land scape features	• to create public green space for residents and tourists
Construct a new solid waste transfer station	
Install rubbish bins	
Placement of new signage and information boards	• Lao, English

4 Sites of Special Ecological Interest

68. The Stupa compound is not located in protected forest, conservation forest, or a protected area. No rare or endangered wildlife are known to inhabit the Stupa area.

5 Importance of That Sikhottabong

69. The That Sikhottabong Stupa is one of Lao PDR's most sacred religious sites. It was originally built around the 6th century by the Sikhottabong Empire to house relics of Lord Buddha.

V. Description of Environment

A. Lao PDR

1 Physical Geography

70. Lao PDR is situated in the centre of the South East Asian peninsula between 13°54' and22°30'N and between 100°05' and 106°38'E. It is surrounded by Cambodia, Peoples Republic of China (PRC), Myanmar, Thailand and Vietnam, and covers an area of 236,800 km^2. The country extends approximately 1,000 km at its longest length in a northwest to southeast direction.

59. There are three types of physical terrain in Lao PDR[3] which are:

- **Northern Highlands.** Consists of severe mountainous terrain between 500-2000maslwith only6%ofthe areawitha slope of under20%and with half of the terrain exceeding 50% slope. Soils are characterized with low pH with low water retention, and low fertility.
- **Annamite Range.** The Annamite range is mountainous topography between 500-2,000 masl. The soil type is similar to the Northern Highlands.
- **Mekong Plain.** The Mekong Plain is characterized by the alluvial plain of Mekong river and the major tributaries. The area is flat with some alluvial deposits being acidic and shallow. The newer alluvial soil soft the floodplain is more fertile.

71. The upper half of the country is broader than the south with a maximum width of about 470 km. Topography is predominantly mountainous with cultivated floodplains along some reaches of the Mekong River and its larger tributaries. Almost 80% of the land surface is hilly and mountainous. Lao PDR is landlocked with more than 40% of it consisting of stocked forests.[4]

2 Lao Climate

72. The climate of Lao PDR is strongly influenced by the annual monsoon cycle, with the wet SW monsoon from April to October bringing around 90% of annual rainfall. During the dry season from November to March, some months may be completely devoid of rainfall over much of the country. Annual rainfall is about 1,900–2,600mm. Average temperature in February and March is around 19°C. From April to May average temperatures exceed 30°C.

3 Protected Areas

73. The protected areas in Lao are shown in Figure V-1 below with the Project Sites marked. There are three protected areas in Khammouane province

[3]Modified from ICEM, 2003

[4]LaoPDR MONRE, 2012.

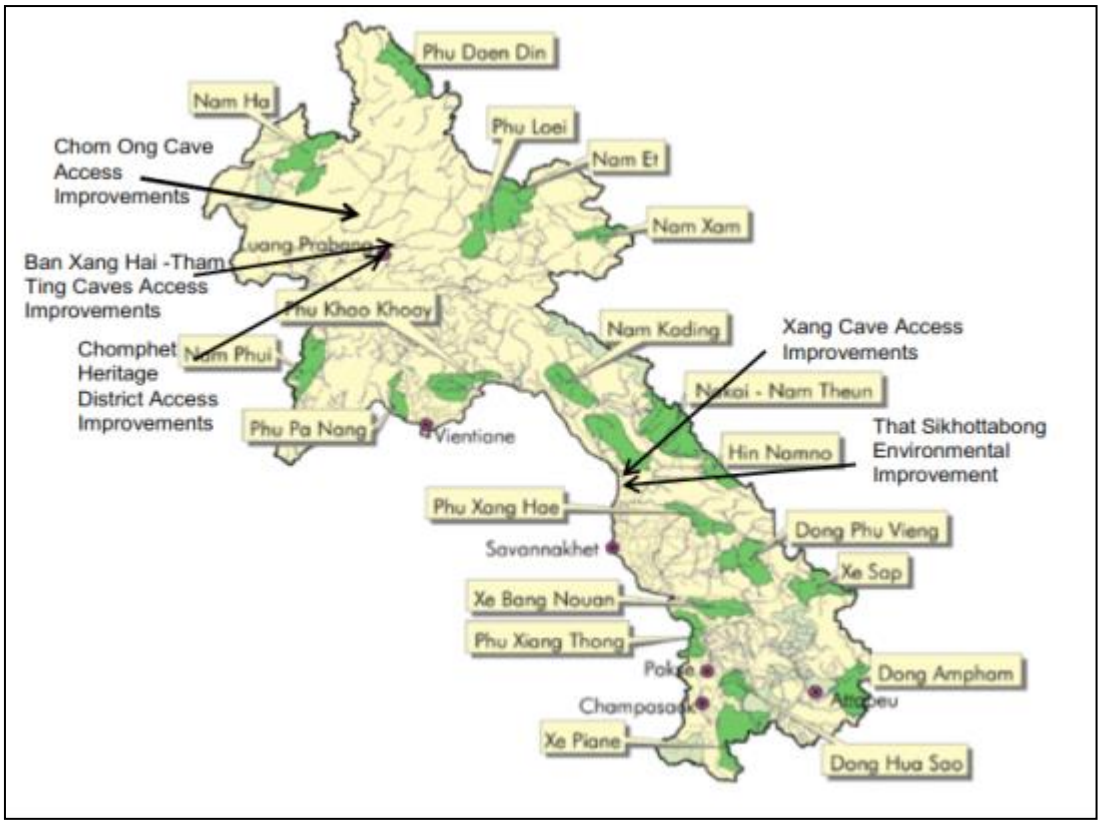

Figure V-1 National protected areas of LAO PDR [21]

B. KhammouneProvince

1 Physical Geography

74. Khammoaune province is located in the middle of the country. The borders of the province are formed by Bolikhamxai and Savannakhet provinces to the north and south respectively, by Viet Nam on the east, and by the Mekong River and Thailand on the west (Figure II-1).

75. Khammouaneprovincecoversatotalareaof16,315 km^2 or 6% of the total area of the country[36]. Mountainous areas extend 5,726 km^2 with flat highland areas covering3,051 km^2or about 19% of the province. Flat lowland areas encompass 7,538 km^2 or about 46% of the province.

76. Thakhek is the capital city of Khammouane province. The town is located on the east bank of the Mekong river across from Thailand. The town was built on the floodplain of the Mekong River which provides the characteristic flat terrain of the area. Land use in the area including the two subprojects areas is primarily agriculture with light commercial property near Thakhek town.

2 Climate Change

a) Current Climate

77. Lao PDR has a warm temperate climate[5] featuring dry winters and hot summers. The dry season occurs between November and February while the wet season occurs between May and October. The dry season is generally cooler, though temperatures rise significantly in March and April prior to the onset of the rains.

78. Similar to other regions of Lao PDR the climate of Thakhek is dominated by the tropical monsoon with distinct rainy and dry seasons. Seasonal temperature and precipitation for Thakhek is summarized in Table V-1 below.

Table V-1 Annual temperature and precipitation for Thakhek Khammoune province

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C	29	31	33	34	33	31	29	30	30	31	30	28	30.8
Average low °C	13	17	19	22	24	24	24	24	23	20	18	14	20.2
Precipitation mm	3	28	41							64	10	8	

79. Temperature averages between 17ºC and 31ºC over the year, with lowest temperatures of around 13ºC occurring in January. Relative humidity varies from around 45% in March to close to 100% in December, January and February. Evaporation averages over 55 mm, exceeding 45mm for most of the year.

b) Climate Change Predictions

80. Climate change predictions for the Mekong region as a whole, based on a range of different scenarios, models and geographical scales, agree that the Mekong subregion is predicted to experience a temperature rise of between 0.01ºC and 0.036ºC per year. Seasonal precipitation patterns, pointing to a longer dry season and increased incidence of extreme weather events such as typhoons are also predicted[6].

[5] Peel, M. C., Finlayson, B. L., and McMahon, T. A, (2007), Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences, University of Melbourne

[6] MRC (2010). Impacts of climate change an development on Mekong flow regime, First assessment - 2009. MRC technical paper. MRC Vientiane.

81. More specific predictions have been made in a 2008 study[7] using data prepared at a resolution of approximately 50km using interpolation of observed values, based on mid-range emissions scenarios and analysis of the findings of 24 Global Climate Models (GCMs), applied to 18 major catchments in or around the Mekong basin.

82. The 2008 study predicted an increase in temperature of 0.8 to 0.9^{o}C between the present based on the historical average and the predicted 2030 median temperature based on selected GCMs.

83. In terms of precipitation the study indicated a slight increase of 11-15mm in annual average including greater dry season level of precipitation, although there is significant uncertainty as the different GCMs predict a range of future precipitation levels.

84. The predictions concur with those of the Intergovernmental Panel on Climate Change (IPCC) for its Fifth Assessment Report, which while having a broader focus, also uses a number of climate models.

85. For the Fifth Assessment Report, the IPCC has based predictions on Representative Concentration Pathways (RCPs) and a suite of climate models. The RCPs are based on greenhouse gas concentrations and four have been developed, reflecting possible climate futures which vary in terms of levels of greenhouse gasses emitted. The predictions of climate change have been applied at nine regional levels, with Lao PDR falling in the Asia region.

86. The Fifth Assessment Report presents the results of multi model analysis on two separate RCPs, comparing the change in annual temperature from the 1986-2005 mean for the middle and the late part of the 21st century. The presentation includes an indication of the extent to which models agree on the extent of the change.

87. The IPCC predicts a slight increase in precipitation in the project area, under RCP 2.6 (where emissions of greenhouse gasses peak between 2010 and 2020 then decline, and under RCP 8.5 (where emissions of greenhouse gasses continue to rise throughout this century). A strong agreement between models is indicated for these changes in precipitation.

88. For temperature, a change of around 2^{o}C by the mid-21st century and 3^{o}C by the late 21st century is predicted for RCP 8.5. For RCP 2.6 the change over the 21st century is in the range of 0.5 to 1^{o}C [8].

[7] Eastham, J., F. Mpelasoka, M. Mainuddin, C.Ticehurst, P. Dyce, G. Hodgson, R. Aliand M. Kirby, (2008). Mekong River Basin Water Resources Assessment: Impacts of ClimateChange. CSIRO: Water for a Healthy Country National Research Flagship

[8] IPCC (2014). Climate Change 2014, Impacts Adaptation and Vulnerability Part B: Regional aspects, p1335. Geneva www.ipcc.ch

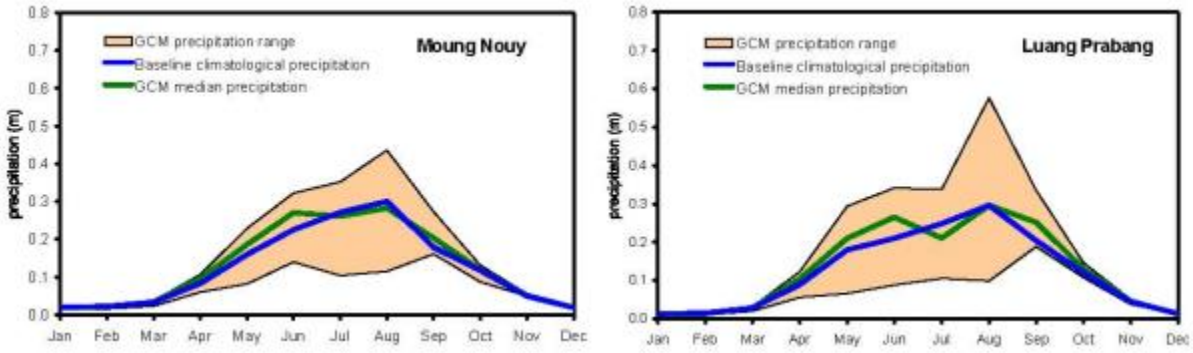

Figure V-2 Baseline vs Future monthly mean precipitation for two provinces. Source: Eastham et al, 2008.

89. The Climatic Research Unit (CRU) of the University of East Anglia has developed data for areas around the globe with a resolution of 0.5 x 0.5 degree grids, using archived data from weather stations globally and a process of interpolation.[9] This data, known as CRU TS 3.23 enables changes over the 20th century to the present to be viewed.

90. Plots for annual temperature show a high temperature period in the late 1920s, after which it dropped to a plateau between the 1950s and 1970s, rising to regain the levels of the late 1920s around the year 2000. Over the last decade, temperatures appear to rise although greater variability is also apparent.

[9] Harris, I., Jones, P.D., Osborn, T.J. and Lister, D.H. (2014), Updated high-resolution grids of monthly climatic observations – the CRU TS3.10 Dataset. Int. J. Climatol., 34: 623–642.

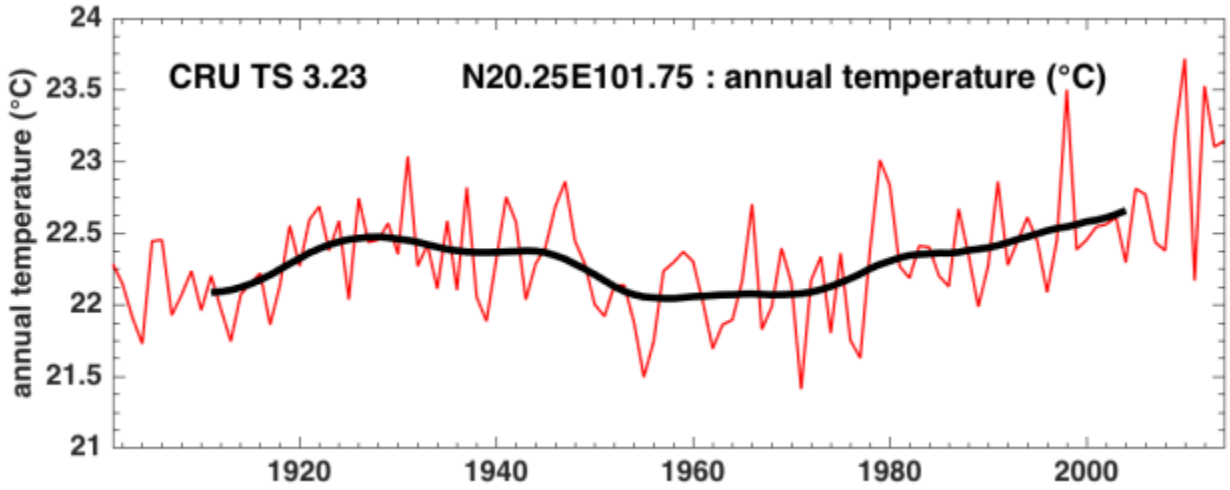

Figure V-3 Changes in annual temperature in Lao over the last century

91. Precipitation changes show a slight drop around the 1950s, followed by a steady rise until the late 1980s, and a further rise since then which appears to continue although again greater variability is apparent.

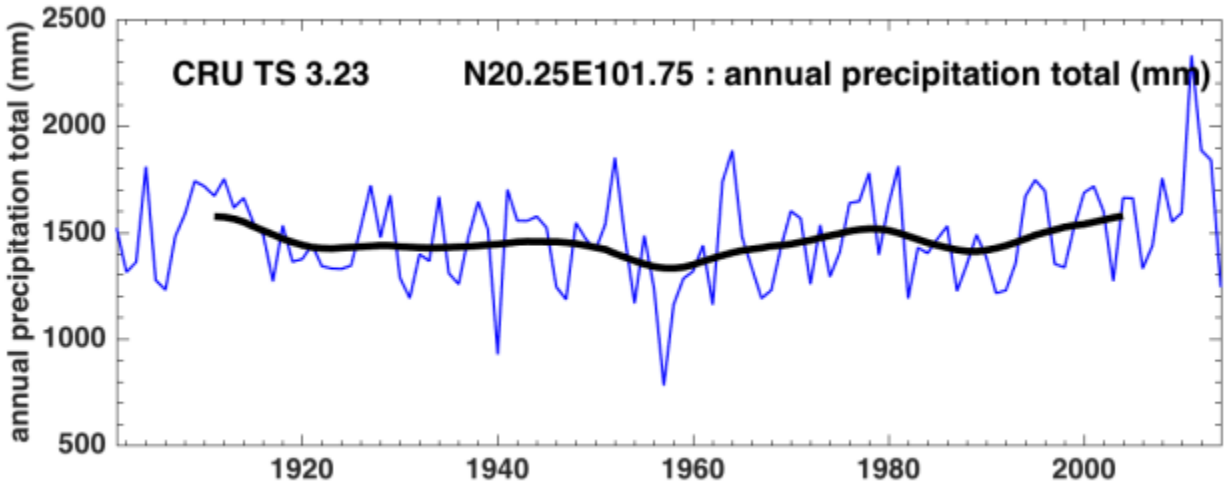

Figure V-4 Changes in annual precipitation in Lao over the last century

c) Summary

92. In summary, the climate change predictions indicate a range of outcomes, particularly over different emissions scenarios. The IPCC predictions suggest greater precipitation with climate

change, although significant risks of drier conditions also exist. Higher precipitation can be expected.

93. Damaging floods do occur in Lao PDR, and severe floods have occurred in recent years. Floods in 2015 were described as unprecedented, and severe damage occurred as a result of tropical storm Haima in 2011. The predicted increases in precipitation can be expected to result in greater severity of flooding events.

94. In small catchments, this means greater risks of landslides within the catchments, from the build-up of soil moisture under conditions of prolonged precipitation, exacerbated by increased scour from higher stream flows. Under extreme conditions, agricultural fields, irrigation infrastructure and homes may be affected.

95. Predictions vary slightly as to changes in the level of precipitation. These do not appear to show strong changes for precipitation during the dry season, but there are existing levels of uncertainty regarding the dry season availability of water in the streams under current conditions.

96. This is significant because a minimum flow necessary for the integrity of the aquatic ecosystem may be absent.

97. In conclusion, shorter periods of more intense rainfall may occur and a conservative estimate of a 15-20% increase in intensity should be allowed for in hydraulic calculations.

98. Floods may occur more often but as the flood level is based on local topography and time of concentration this is unlikely to be at higher levels than occur now.

3 Forests

99. Forest cover within the province is estimated to be 812,600 ha representing 47% of the total land area of the province of which 248,763 ha is accessible and 563,837 ha is of limited access. Forests are classified into the following five categories: protected forest, conservation forest, production forest, regeneration forest, and degraded or un-stocked forest.[10]

100. Over the past 10 years forest area has declined by 8.1% as a result of land conversion for agriculture and livestock, forest fire, slash and burn and shifting cultivation practices, improper and excess logging, land clearance for infrastructure development, industrial plants, hydropower plants, and improper exploitation or harvest of forest products over the natural growth rate.

4 Hydrology

101. The majority of water use is for agriculture, aquaculture, and livestock. Water withdrawals

[10] DONRE, 2-13. Provincial Action Plan 2011-2015

required for hydroelectric development is expected to generate about 1,130 megawatts of electricity. The abundant water resources provide enough water for the industrial sector, irrigation and domestic water supply.

5 Water Resources.

102. Khammouane has abundant surface water resources. There are high-quality freshwater resources insufficient supply to meet the demands of socio-economic development of the province. Specific development is agriculture as well as small and medium hydropower plant development. Total estimated freshwater availability is 66,000m^3 per person compared to current consumption of 288m^3 per person. It is estimated that about 80% of the urban population can have access to clean water, while about 61% of the rural population of the province will have access to clean water in the future.[11]

6 Water Quality

103. There is evidence of decreasing quality of water in urban areas as a result of discharge of untreated wastewater from communities, hotels, hospitals, and commercial establishments. Surface water is also being contaminated from farming, processing industries, and mining activities. This has not so far been a major problem, but is expected to become a serious concern in the future. Deterioration of natural water sources and reservoirs has occurred as a result of sedimentation, soil disturbance and erosion of rivers and streams.

7 Noise and Air Quality

104. During the feasibility and fact finding missions it was noted that traffic along the road was light and comprised mainly motorbikes of village residents.

105. The air quality was considered fair. Noise and dust was limited to the light vehicle traffic along the roads, and from sound generated from the few home steads along the road and in the village. No quantitative air quality data was available from DONRE or the Thakhek area.

8 Agriculture

106. Land is classified into 8 categories defined as follows: agricultural land, forest land, construction land, industrial land, transportation routes, cultural sites, land for national defence and public security, and wetlands. In Khammouane province, there is approximately 200,000 ha of farm land which consists of 80,000 ha of rice and 120,000 ha of secondary crops.

9 Fisheries

107. There is a small stream near the Xang cave entrance. Based on anecdotal evidence from the village head there is no fish caught in this waterway. However, as the river is a tributary of the

[11] DONRE, 2-13. Provincial Action Plan 2011-2015

Mekong River it may permit fish migration across the flood plain during the rainy season. However, no information was available from DONRE on fish species or numbers.

10 Protected Areas

108. There are three National Biodiversity Conservation Areas (NBCA), four provincial forest protection areas, and twelve district forest conservation areas established in the province (Figure V-5). As a result, Khammouane has 717,675 ha of reserved forest. Forest resources play a key role in the province's revenue generation, and are a focal point for subsistence and additional income generation for rural inhabitants.

109. The three National Biodiversity Conservation Areas (NBCAs) are Nakai - Nam Theun NBCA, Phou Hin Poun NBCA, and Hin Nam Nor NBCA. These represent 40% of the total area of the province (Figure V-5). The NBCAs provide cultural and social value, as well as being used for scientific research. They are equivalent to Protected Areas. The three protected areas in Khammouane province are shown below. The nearest NBCA, Phou Hin Poun NBCA is 10 km from the Xang Cave site. The other two NCBAs are at a further distance away.

Figure V-5 Three protected areas of Khammouane province (green shade)

11 Biodiversity

110. Khammouane province is one of the most biodiversity-rich provinces of the country. The

NBCAs support at least 8,100 species of wild life including 128 species of reptiles and amphibians,160 species of birds, and 113 species of mammals. There are 87 families of fish found in the province. There are 1,300 species of wildlife habituating in primary sanctuaries. However, part of this biodiversity has been destroyed alongside the original forest resources of the province. Many species of plants, wildlife and aquatic animals are at risk and endangered.

12 Rare and Endangered Wildlife

111. The subproject area does not support terrestrial rare or endangered wildlife species, nor is it near national park or nature reserve.

13 Archaeological Study

112. An archaeological study was carried out in June 2016 on both sub-project sites. A full report has been submitted under separate cover. The key points are included below.

a) Archaeological Assessment of Xang Cave Access Road and Villages

113. There was no evidence visible during the site visit that Xang Cave has archaeological remains older than 200 years. Nevertheless, as caves in Laos have commonly been used over the millennia for occupation and other cultural activities, including human burials, the infrastructure improvement activities should be cognizant that archaeological materials may be identified during excavations.

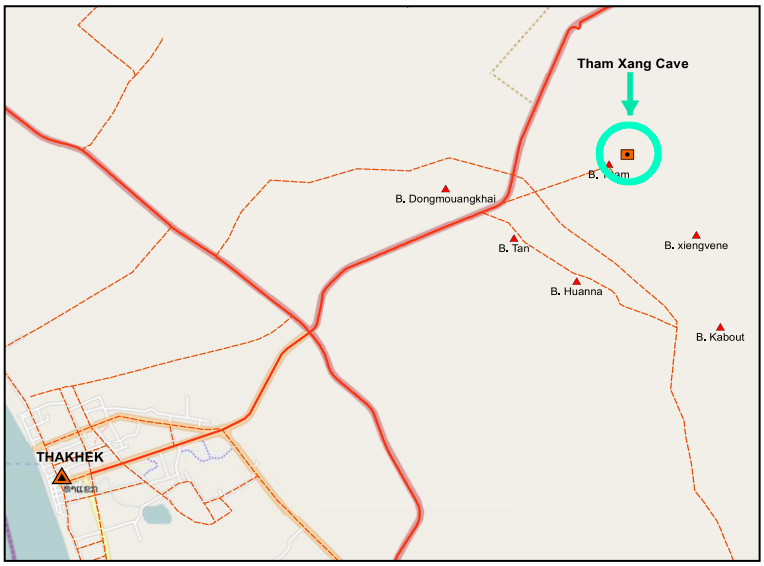

Figure V-6 Map Showing Location of Xang Cave Access Road and Villages

114. The proposed construction of roads and bridges associated with Xang do not appear to be likely to cause damage to archaeological sites, as they appear in most cases to be sited within the foot prints of existing infrastructures.

b) Archaeological Assessment of That Sikhottabong Environmental Improvement

115. No portable artefacts were observed on the surface of the That Sikhottabong grounds during the site visit. However, it is highly likely that finds will be recovered during excavations for infrastructure improvements.

Figure V-7 Map Showing That Sikhottabong site

116. In such situations, many architectural features, particularly brick walls and foundations, likely underlie current surfaces, and current and recent usage has buried the remains of ancient occupations. Such features are not visible to pedestrians as modern use of the site had covered over these archaeological remains.

117. Excavations needed for the infrastructure may reveal artefacts and possibly features from the last 1500 years of use of the site, even though the improvements will stay within the footprints of existing roads and buildings. It is recognised that these existing structures have already disturbed underlying cultural remains, but the new improvements could encounter further archaeological deposits.

VI. Anticipated Environmental Impacts and Mitigation Measures

A. Project Area of Influence

118. The project area of influence is the immediate environs around the caves entrance, the Stupa complex and the approach roads. The direct impacts are not expected to extend more than a few hundred metres from the sites. The benefits will extend several tens of kilometres to the nearby villages.

B. Adaptation to Climate Change

119. The designs of the infrastructure and environmental improvement technologies at feasibility stage are climate change resilient. Climate change is defined here as the GCM-projected changes to the frequency and severity of rainfall events, local runoff and flooding events. The access road upgrades all include lateral drainage to channel runoff and prevent erosion.

120. All structural facilities such as public toilets, buildings and open public areas will be at grades that will be lifted above flooding levels. Similarly, the bridge crossing technologies in Khammouane will be designed to accommodate changes to seasonal river flow regimes. It is recommended that a 20% increase on the Q value be allowed for in hydraulic calculations. [12]

C. Impacts and Mitigation due to Location- Xang Cave

1 Protected Areas

i. Impacts

121. No protected forest exists along the road or in the villages of Ban Xieng Vaen and Ban Tham which are the approach roads to the cave. The access road traverses mostly farmland with intermittent scrub forest clumps. The forest next to the cave is protected in that cutting of trees is forbidden or controlled. It is not classified as a habitat of endangered species.

ii. Mitigation

122. The construction working area will be clearly demarcated and the workforce made aware that there should be no encroachment to areas outside of the working area.

i. Impacts

[12] Q is the volumetric flow rate in cubic metres per second of the stream over which a bridge is crossing.

123. The cave is located on the northern boundary of Ban Tham village just inside a protected forest. Although Xang cave is located in protected forest the tourist gathering area is located in the village.

ii. Mitigation

124. Construction area will be clearly demarcated and workforce made aware of the protected forest and that no trees are to be cut.

i. Impacts

125. It is 10 km southwest of the Phou Hin Poun NBCA. No rare or endangered wildlife are known to inhabit the area including the cave. There are no species of conservation value associated with the protected forest.

ii. Mitigation

126. None needed.

i. Impacts

127. The Xang Cave has both archaeological and religious significance due to interesting rock formations, one in the form of an elephant, and the Buddhist shrines and other ancient artefacts. A high percentage of visitors are Lao and Thai who visit to pray.

ii. Mitigation

128. Chance find procedures have been put in place. If sites are of high archaeological and cultural value relics may be found during excavation works. If this occurs the contractor must immediately stop work and seek guidance. A Chance Find Protocol is included in the EMP and is contractually binding on the contractor. The contractor must liaise with MICT and follow stop work procedures if needed.

i. Impacts

129. The village and surrounding area is located on the Mekong River flood plain. Risk of flooding and pollution from the river is an acknowledged possibility.

ii. Mitigation

130. The road will be raised on embankment above the flood level. The ford crossing is at grade so flooding is automatically allowed for in the design and is not an issue.

- **Land Acquisition**

i. Impacts

131. Residential land required for road upgrades in Ban Tam village will require acquisition of some garden land and trees which will affect 3 households.

ii. Mitigation

132. This has been addressed in the Resettlement Plan.

- **Fisheries**

i. Impacts

133. The construction of the ford and foot bridge across the small river in front of the cave could interfere with fish movement in the river. While the Ban Tam village head indicated that no fish existed in the river, the Fisheries Section of the MAF in Vientiane stated that fishes from the adjacent Mekong River use the many small tributaries during annual flood plain migrations for feeding and spawning just before and during the rainy season.

ii. Mitigation

134. The Contractor must liaise with DONRE and take note of the fish migration times during the year. Works should be scheduled to avoid these times. As most bridge or ford type works try to avoid the rainy season as a matter of course, and prefer to work in the dry season when water levels are lowest and work is easier, this should not be onerous for the contractor. This requirement is stated in the EMP.

D. Impacts and Mitigation due to Location- Sikhottabong

1 Sites of Special Ecological Interest

i. Impacts

135. The Stupa compound is not located in protected forest, conservation forest, or a protected area. No rare or endangered wildlife are known to inhabit the Stupa area.

ii. Mitigation

136. None required.

- **Cultural Aspects**

i. Impacts

137. The That Sikhottabong Stupa is one of Lao PDR's most sacred religious sites.

ii. Mitigation

138. All activities within the stupa enclosure must be conducted with the deepest respect for the cultural values of the site. Contractors should be fully briefed on appropriate behaviour within the enclosure and made aware of restrictions. The contractors are required to check if there are

any prayer times or similar sensitive activities during which potentially disruptive works may need to be suspended. This is stated in the EMP.

E. Impacts and Mitigation during Pre-construction Phase - Xang Cave

- **UXO Clearance**

i. Impacts

139. Care must be taken to ensure that sites for earthworks e.g., excavations, trenches are free of (UXO) prior to construction.

ii. Mitigation

140. A UXO Clearance Certificate must be obtained prior to site possession and ground breaking by the contractor. If any sites are suspected to have unexploded ordnance they should be surveyed by UXO Lao. If such ordnance is detected clearing work will need to be commissioned prior to undertaking civil works. After removal is complete a clearance certificate must be issued and approved by the Detailed Design and Supervision Consultant (DDSC).

- **River Sand Usage**

i. Impacts

141. Use of river sand for construction purposes is prohibited without prior permission. The two stream crossings may require the removal of river bed material. This can only be reused with permission or if to be removed as overburden then it can only be dumped in an agreed location, with the approval of the DDSC.

ii. Mitigation

142. Sand or aggregate extraction from rivers should only be done at DONRE approved locations and in licensed areas. Dumping of spoil material must be at places approved by the Client Representative.

- **Borrow Areas**

i. Impacts

143. It may be necessary to use materials from borrow pits, borrow areas or quarries for construction. Materials may need to be moved along borrow roads. Such activities can cause noise, dust and traffic management impacts.

i. Mitigation

144. The works are close to Thakhek town where there is significant ongoing construction activity so it is unlikely that establishment of new borrow pits or quarry areas will be required.

There are large limestone quarries and borrow pits situated less than 10 km from the proposed construction site. However, all materials supplied from such borrow areas must either be already licensed by private operators or approved by DONRE. The contractor must submit copies of such permits to the DDSC before moving any such materials.

- **Spoil Disposal**

ii. Impacts

145. Spoil disposal may or may not be needed depending on the amount of excavation necessary for the bridge / stream crossing. Dumping of wet overburden randomly on public or private property is expressly forbidden as it may cause soil contamination, siltation runoff and flooding.

iii. Mitigation

146. If any overburden has to be dumped the contractor must submit a dumping plan identifying such sites and demonstrating that the contractor has permission to do so.

- **Construction Camps**

i. Impacts

147. It may be necessary to establish a construction camp for accommodating workers, storing materials and as a laydown area for prefabricated parts. Such camps must have the prior approval of the DDSC before they can be used or occupied.

ii. Mitigation

148. It is preferred that workers are accommodated in locally rented property rather than on temporary camp quarters for reasons of hygiene and sanitation. Alternatively, there is ample vacant land available along the road alignment to establish a small construction camp or materials storage area. If such a camp is necessary, it must be approved by DONRE and DPWT before occupancy.

F. Impacts and Mitigation during Pre-construction Phase - Sikhottabong

1 UXO Clearance

i. Impacts

149. Care must be taken to ensure that sites for earthworks e.g. excavations, trenches are free of (UXO) prior to construction.

ii. Mitigation

150. A UXO Clearance Certificate must be obtained prior to site possession and ground breaking by the contractor. Given that this area is already well developed this is unlikely to be necessary but should still be checked.

- **River Gravel Usage**

i. Impacts

151. Use of river gravel for construction purposes is prohibited without prior permission. There is a large amount of gravel needed for the internal road upgrades and the car park.

ii. Mitigation

152. Gravel extraction from rivers should only be done at DONRE approved locations and in licensed areas. All materials must be supplied from sources approved by the Client Representative or with the approval of the DDSC.

- **Borrow Areas**

i. Impacts

153. It may be necessary to use materials from borrow pits, borrow areas or quarries for construction. Materials may need to be moved along borrow roads. Such activities can cause noise, dust and traffic management impacts.

ii. Mitigation

154. All materials must be supplied from borrow areas either already licensed by private operators or approved by DONRE. The contractor must submit copies of such permits to the DDSC before moving any such materials.

- **Spoil Disposal**

i. Impacts

155. Spoil disposal may or may not be needed depending on the amount of excavation necessary. Dumping of overburden within the compound or outside on public or private property is expressly forbidden.

ii. Mitigation

156. If any overburden has to be dumped the contractor must submit a dumping plan identifying such sites and demonstrating that the contractor has permission to do so.

- **Construction Camps**

i. Impacts

157. It may be necessary to establish a construction camp for accommodating workers, storing materials and as a laydown area for prefabricated parts. Such camps must have the prior approval of the CSC before they can be used or occupied.

ii. Mitigation

158. It is preferred that workers are accommodated in locally rented property rather than on temporary camp quarters for reasons of hygiene and sanitation. Alternatively, there is ample vacant land available along the road alignment to establish a small construction camp or materials storage area. If such a camp is necessary it must be approved by DONRE and DICT before occupancy. The contractor should state the location of any such camp.

G. Impacts and Mitigation during Construction Phase

1 Impacts Common to All Subproject

i. Impacts

159. Both sites are of extremely high archaeological and cultural value. Valuable relics may be found during excavation works. If this occurs the contractor must immediately stop work and seek guidance.

ii. Mitigation

160. A chance find management plan must be in place for cultural artefacts and property before works commence.

i. Impacts

161. Activities common to both subprojects are road upgrades, new carparks, improvements to facilities at the different tourist sites such as upgraded or new tourist reception buildings, walkways and paths, public toilets, and solid waste management.

ii. Mitigation

162. Measures to mitigate and manage potential common impacts associated with the construction phase of the infrastructure developments are given below. The regulations on construction in Lao PDR are not well developed. To minimize the impact of construction on the public, and workers, national regulations guidelines for worker and public safety in the workplace should be followed. The IFC World Bank Environment, Health, and Safety Guidelines (2007) that govern the safe and orderly operation of civil works should be followed if national directives are incomplete or absent. Measures to be followed include, but are not limited, to the following:

- All construction vehicles and equipment should be maintained in proper working order, and not operated at night if possible, to minimize noise.

- Speed limits should be posted and adhered to by construction vehicles.
- Where possible construction vehicles should use different roads or dedicated lanes of roads not shared by the public.
- Dedicated fuel storage areas must be established away from public areas and marked clearly. It is preferable to use established gas stations for refilling vehicles rather than store fuel on site.
- Storage of bulk fuel should be on kerbed concrete slabs away from the public and workers camps.
- Fuel storage areas and tanks must be clearly marked, protected and lighted.
- Contractors should be required to have an emergency plan to handle fuel and oil spillage.
- Open excavations should be fenced, and trenches covered where public walkways or vehicles must cross.
- Trees and other vegetation at all construction sites and along road corridors should be protected with minimal removal.
- No tree removal is allowed in protected and conservation (preservation forests).
- The creation of new borrow pits must be approved by DONRE, and begin with a plan to restore the pit to the original state as soon as possible with vegetation and fencing and signage to protect the public.
- Aggregates (e.g., sand, gravel, rock) that are transported by truck should be covered.
- Prolonged use of temporary storage piles of fill should be avoided, or covered, or wetted regularly to prevent dust and erosion
- Regular use of water sprays should be employed at construction sites to minimize dust.
- Local workers should be used as much as possible to prevent or minimize influx of migrant workers, and incidence of social disease and community unrest.
- Worker camps must have adequate domestic waste collection facilities and sufficient pit latrines that are located away from public areas and surface waters as per Law on Industry No.01/99/NA (1999).
- Sediment control and silt traps should be constructed around all excavation / trench sites and along all surface waters to prevent soil erosion and contamination of surface water by sedimentation.

- There are no planned works inside the caves or Stupa. Contractors must warn their staff not to encroach into the caves or the Stupa building. All activities within the Stupa enclosure must be conducted with the deepest respect for the cultural values of the site. Contractors should be fully briefed on appropriate behaviour within the enclosure and made aware of restrictions. The contractors are required to check if there are any prayer times or similar sensitive activities during which potentially disruptive works may need to be temporarily suspended.

2 Roads and Access

i. Impacts

163. There are possible impacts on roadside lands and vegetation during construction.

i. Mitigation

164. Minimizelossanddamageofroadsidevegetationandagriculturebykeepingroad widening to minimum, and keeping heavy equipment off the shoulder areas as much as possible. Similar care must be implemented in the villages.

3 Fish Migration

i. Impacts

165. There are possible impacts on fisheries during construction of stream crossings.

ii. Mitigation

166. To avoid possible interference with fish migrations through the river crossing work should be conducted during the dry season. This season also is best for doing the river crossing works. The bridging technology must noting anyway block flow and fish migration during all seasons. Civil works in the stream bed should be contained to the smallest area possible to minimize loss and damage to existing aquatic habitats.

H. Impacts and Mitigation during Operation Phase - Xang Cave

- **Xang Cave Access Improvements**

i. Impacts

167. The potentially significant impact of increased in tourism in the area is increased solid waste, litter and local pollution from the toilet blocks and ABR system. A potential impact of the upgraded access road to the cave is an increase in traffic accidents and injuries.

ii. Mitigation

168. Septate from the ABR systems that support the new toilet blocks must be regularly

removed from the chamber stage and disposed in nearby DONRE-approved landfill. The toilet facilities must be cleaned and maintained regularly. Solid waste bins must be emptied regularly.

169. Enforced, posted speed limits, and road signage should be installed to control speed, and to assist drivers navigate the roads.

i. Impacts

170. Although the aim of the project is to increase tourism and bring benefits to the area there can be negative impacts due to this increase. Extra infrastructure and facilities are to be provided but these may be inadequate in the long term. Degradation of these facilities can lead to discouragement of more tourists and an actual drop in the number of visitors who find the location less attractive.

i. Mitigation

DICT should initiate a monitoring program to ensure that the attractiveness of the site is not lost through degradation from overuse. If such degradation is detected, possibly through a drop-in visitor numbers, then improved site management or increase in tourist facilities should be considered.

I. Impacts and Mitigation during Operation Phase - Sikhottabong

i. Impacts

171. A potentially significant impact of growth in tourist activity in the area is increased solid waste and litter originating from inadequately managed rubbish bins and from the solid waste transfer station. If not managed and emptied regularly, the transfer station could become a source of odors and vectors.

172. The new toilet blocks and ABR septic system could create pollution and aesthetic issues if the toilets and ABR system are not managed properly.

ii. Mitigation

173. The ABR system that supports the new toilet blocks must be maintained with regular septate removal. Septate must be routinely removed from the chamber stage and disposed in nearby DONRE-approved landfill.

The transfer station will be located outside the north gate of the complex.

The toilet facilities must be cleaned and maintained regularly. Solid waste bins must be emptied regularly. Discussions on this have taken place with the PIU Director in Khammouane. The Sikhottabong Village Association (SVA) is currently charged with all maintenance of public utilities

in the Stupa area. They will continue in this role post construction. The SVA receives funds from the ticket sales for the Stupa compound. A portion of this gate revenue is given to the SVA for Operation and Maintenance on the site.

iii. Impacts

174. In a similar manner to those described above, although the aim of the project is to increase tourism there can be negative impacts due to this increase. Degradation of the feature should be monitored.

iv. Mitigation

DICT should initiate a monitoring program to ensure that the attractiveness of the site is not lost through degradation from overuse.

J. Impacts and Mitigation Post Construction - Xang Cave

175. All materials must be removed from site

K. Impacts and Mitigation Post Construction - Sikhottabong

176. All materials must be removed from site.

L. Benefits

1 Benefits Common to Both Sites

177. The targeted benefits common to all subprojects are improved access and environmental conditions at the tourist sites leading to improved tourism which ultimately is increased tourist numbers and revenue. This will generate more revenue to local shopkeepers and businesses providing services to tourists.

2 Xang Cave Access Improvements

178. The improved access to the cave coupled with the expanded and improved tourist facilities will increase both the capacity and experience of tourists at the site. The subproject will directly benefit 1,900 people living in Ban Tham and Ban Xieng Vaen.

3 Sikhottabong Environmental Improvement

179. The Sikhottabong Stupa is one of the most popular and valued cultural properties in Lao PDR. The heritage values of the compound indicates the cultural and tourist appeal of the site.

180. It is expected 35,000 residents of Thakhek and environs will benefit from expanded public green space, improved sanitation, and better traffic management at the site.

VII. The EMP Procedure

A. Environmental Management Plan (EMP)

181. The Environmental Management Plan (EMP) gives guidance on how to mitigate the environmental concerns identified in connection with this project. The EMP deals with practical mitigation and management measures to be taken during implementation to avoid, reduce, and mitigate adverse environmental impacts.

182. The EMP is considered to be a breach of contract and can result in financial penalties being imposed on the contractor.

The Environmental Management Plan is given in Annex B.

B. Construction Environmental Management Plan (CEMP)

183. The EMP is general in nature as certain specific details, such as location of works areas, construction camps or borrow pits are not known at the time of tender issue. After appointment and **before** mobilization the successful contractor must prepare his own version of the EMP known as the Construction EMP (CEMP). This must give specific details of locations of borrow areas, borrow roads, workers camps and other facilities.

184. The Construction EMP (CEMP) must be submitted to the DDSC for their approval within 30 days of contract signing and approval must be obtained before any works commence.

C. Capacity Building and Training Plan

The implementation of the EMP will include capacity building of the PMU and the PIUs. It is noted that PMU and PIU will need strengthening, particularly on monitoring and reporting, and it is accepted that contractors may need training on the practicalities of following the CEMP.

At the time of preparation of the CEMP, training will be given to the contractors, the PMU and the PIU. DONRE will also be invited to attend. At regular intervals (to be determined) capacity building training will be given. There is a line item included in the DDSC budget of $10,000.00 for such training. It is planned that training exercises at $2,500 a time for capacity building exercises will be carried out with the PIU under the supervision of the International Environmental Specialist person and the National Environmental Specialist.

The subject matter of the environmental training will be based on the needs assessment of the PMU which will be the first step in the training.

VIII. Public Consultation

A. Approach

185. A stakeholder consultation strategy was developed to meet the requirements of meaningful consultation as stipulated by ADB SPS (2009). The strategy embodied the principles of meaningful engagement, transparency, participation, and inclusiveness to ensure that affected and marginalized groups such as women, and the poor, were given equal opportunities to participate in the design of the project. The stakeholder consultations on environment issues built upon the parallel social impact assessment of the various subprojects.

186. The approach to stakeholder consultations for environmental concerns or issues associated with the subprojects in Lao PDR consisted of the following three avenues of inquiry and data collection:

- As part of the household and village leader interviews conducted by the social development team.
- Separate group consultations with provincial agencies and other stakeholders conducted by social development team with an additional survey assistant hired during the interim mission.
- Individual interviews conducted by the international environmental specialist with provincial and national environmental management agencies.

B. Identification of Stakeholders

187. Stakeholders were identified and engaged in a participatory manner. Stakeholder communication to date has focused on institutional stakeholders, affected communities, and persons directly affected by proposed subproject interventions. Project stakeholders include:

- Institutional stakeholders including the (i) project EAs and PIUs (ii) provincial and national agencies; private sector groups, chambers of commerce and potential participants in private public partnerships (PPP) for management of tourist's sites;
- Mass organizations such as the Lao Women's Union (LWU) and the Lao Front for National Construction (LFNC) which provided input for the design of the various subproject interventions, and which might participate in implementation of measures and interventions;
- Communities living in the subproject areas who will benefit from the project, and who have an interest in identifying measures to enhance or maximize the benefits, communities within the subproject area who may be directly and/or adversely affected, and who have an interest in the identification and implementation of measures to avoid or minimize negative impacts;

- Vulnerable and/or marginalized groups who have an interest in the identification and implementation of measures that support and promote their involvement and participation in the project.

C. Discussion Guide

188. Questions and information requests were posed to stakeholders to guide discussions of the individual and grouped stakeholders. These are given for reference in Annex C.

D. Summary of Public Consultation

189. The public and stakeholder consultations for environmental issues associated with the subprojects in the province were held with the parallel social surveys and social impacts assessment of the subprojects. The summary of stakeholder views is given in Annex D.

190. The initial stakeholder consultations were held in 2014. They were repeated in October 2016 with essentially the same group of stakeholders. The original stakeholder consultations showed overall positive support for the project and subsequent follow up inquiries confirmed that this opinion had not changed.

E. Ongoing Public Consultation

Although public consultation has been carried out before the project commenced there will be ongoing further consultation with the public and interested or affected stakeholders throughout the life of the project. The DDSC will ensure that regular community liaison takes place in order to address any concerns. This requirement is included in the TOR of the resident engineer.

IX. Grievance Redress Mechanism and Public Disclosure

A. Response to Complaints

191. Villagers and APs are encouraged to voice complaints and these are to be promptly investigated and reported through the contractor to PIU / PCU and so to DICT. The Construction Environmental Officer will be required to respond to the complaints and investigate in the first instance. It is preferable that residents voice their feelings directly to the contractor rather than resort to written complaints or possibly the press. The intent is to resolve any bad feelings at once and maintain a good neighbour attitude. This is known as "Responsible Care". The contractor will be helped by the consultants to maintain a relationship based on mutual respect with all stakeholders. It should also be pointed out to the contractor that in the event of unwarranted or unjustified complaints being made against the contractor PCU will defend them.

The contractor must place a signboard up near the works explaining the project and giving a contact phone number and address. This phone number must be responded to on a 24/7 basis. All calls received must be answered in a polite and respectful manner. It is important that the Environmental Officer(s) who take the calls are trained to be courteous. All complaints must be logged and a response set in motion as soon as reasonably possible. All complaint records should be reported in the quarterly project progress and semi-annual monitoring reports.

192. Response to complaints will be based on the following schedule:

- Complaint made to contractor or others
- Response by contractor or construction supervision consultants' inspectors.
- Weekly compiling of checklists by inspectors. Copies of checklists to be given to contractors as official notification of action being required, confirmation of receipt obtained by contractor signing copy, and joint inspection carried out if necessary.
- Monthly progress reports by inspectors by consolidating weekly reports.
- Corrective Action Reports (CARs) from contractors, as soon as action taken.
- Monthly progress meetings with PIU, DDSC and contractors at which CARs from previous month examined and checked.
- Three monthly progress reports to ADB detailing problems and Corrective Actions taken.
- Regular checks by the Local Environmental Specialist (PCU) and regular oversight checks by International Environmental Specialist. (DDSC)
- Checks with complainants that they are satisfied

Review of progress must be checked on a daily basis by the DDSC inspectors. Any urgent issues must be drawn to the contractors' attention immediately. Failure by the contractor to respond in a timely or adequate manner must be raised with them at the monthly progress meetings.

B. Grievance Redress Mechanism

193. A well-defined grievance redress mechanism (GRM) and resolution mechanism will be established to address all affected stakeholder's grievances and complaints regarding environment, land acquisition, compensation and resettlement in a timely and satisfactory manner. The grievance redress mechanism and appeal procedures will be explained in a project information booklet (PIB) that will be distributed to all stakeholders.

194. Stakeholders or persons affected by the subprojects are entitled to lodge complaints regarding any environmental issue or any aspect of the land acquisition and resettlement requirements such as entitlements, rates and payment and procedures for resettlement and income restoration programs. Stakeholder complaints can be made verbally or in written form. In the case of verbal complaints, the committee on grievance redress will be responsible for making a written record during the first meeting with the stakeholders.

195. A Grievance Committee will be organized in villages comprising local leaders designated for such tasks. The designated officials shall exercise all efforts to settle affected stakeholder issues at the village level through appropriate community consultation. All meetings shall be recorded by the grievance committee and copies shall be provided to affected stakeholders. A copy of the minutes of meetings and actions undertaken shall be provided to the DICT, PIUs, DONREs and ADB upon request.

196. The procedures for grievance redress are set out below. The procedure described below should apply easily to both social and environmental issues and be consistent with the legal process for resolution of disputes in Lao PDR, and exemplifies the desired collaboration among the different levels of government as recently described by Decision 7536/MONRE (2012).

Stage 1: Complaints from affected stakeholders for the first time shall be lodged verbally or in written form with the village head or commune leader. The complaints shall be discussed with the affected stakeholder and the designated Head of Grievance Committee or members of the committee. It will be the responsibility of the Head of Grievance Committee to resolve the issue within 15 days from the date the complaint is received. All meetings shall be recorded and copies of the minutes of meetings will be provided to APs.

Stage 2: If no understanding or amicable solution can be reached or if no response is received from the grievance committee within 15 days from filing the complaint, the affected stakeholder can elevate the case to the District Grievance Committee. The District Grievance Committee is expected to respond within 15 days upon receiving the affected stakeholder's appeal.

Stage 3: If the affected stakeholder is not satisfied with the decision of the District Office, or in the absence of any response, the APs can appeal to the Provincial Grievance Committee (PGC). The PGC will review and issue a decision on the appeal within 30 days from the day the complaint is received.

Stage 4: If the affected stakeholder is still not satisfied with the decision of the PGC or in the absence of any response within the stipulated time, the affected stakeholder's, as a last resort may submit his/her case to the provincial court. The court will address the appeal by written decision and submit copies to the respective entities which include the DICT, DONRE, DGC/PGC and the affected stakeholder. If, however, the affected stakeholder is still not satisfied the court's decision, the case may be elevated to the provincial court. If, however, the decision of the provincial court is still unsatisfactory to the affected stakeholder, the affected stakeholder may bring the complaints to the Higher Court.

197. The External Monitoring Organization (EMO) will be responsible for checking the procedures and resolutions of grievances and complaints. The EMO must have expertise and experience in social and environmental issues associated with infrastructure developments. The EMO may recommend further measures to be taken to redress unresolved grievances. The Project Supervising Consultants will provide the necessary training to improve grievance procedures and strategy for the grievance committee members when required.

149. The executing agency will shoulder all administrative and legal fees that will be incurred in the resolution of grievances and complaints if the affected stakeholder wins the case. Other costs incurred by legitimate complaints will also be refunded by the project if the affected stakeholder wins their case.

150. In cases where affected stakeholder does not have the writing skills or are unable to express their grievances verbally, affected stakeholder is encouraged to seek assistance from the recognized local groups, district DONRE staff, or NGO or other family members, village heads or community chiefs to have their grievances recorded in writing, and to have access any environmental or social surveys or valuation of assets, to ensure that where disputes do occur, all the details have been recorded accurately enabling all parties to be treated fairly. Throughout the grievance redress process, the responsible committee will ensure that the concerned affected stakeholder is provided with copies of complaints and decisions or resolutions reached.

198. If, efforts to resolve disputes using the grievance redress procedures remain unresolved an affected stakeholder has the right to directly discuss their concerns with the ADB Southeast Asia Department through the ADB Lao PDR Resident Mission (LRM). If Aps are still not satisfied with the responses of LRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).

C. Public Disclosure

199. The subproject components were explained to potentially affected stakeholders during public consultations. The formal dissemination of information is the beginning of continued information disclosure and stakeholder involvement as the project is implemented. As part of the stakeholder communication strategy regular information exchange meetings with stakeholders is required throughout implementation of the subprojects.

200. The IEE must be easily available to the stakeholders contacted during examination in written and verbal forms in the local language. The IEE will be available on the provincial DICT web sites, at DICT offices, district offices, and subproject sites. Similarly, all project reporting with specific reference to stakeholder consultation minutes, environmental monitoring, and reports on EMP implementation released by the EA/PCU will be available at the same offices and web sites. The IEE will also be available on the ADB web site. After implementation, all environmental and EMP reporting submitted by the EA/PCU will also be available on the ADB web site. This point was reiterated to the stakeholders during the consultations in October 2016.

D. Role of PIU / Contractor

201. It is intended that one GRM or Grievance Committee will handle all potential grievances. This will be organized in villages comprising local leaders designated for such tasks. The designated officials shall exercise all efforts to settle affected stakeholder issues at the village level through appropriate community consultation.

202. However, it should be noted that the GRM is considered as a last resort. The contractor is required to appoint an Environment Health and Safety officer (EHSO). The EHSO should be the first point of contact to handle any grievances relating to site activities.

203. Of course, the contractor can only handle matters arising from construction. For operational matters or issues over land acquisition resort to the GRM may be needed.

X. Analysis Of Alternatives

204. The no-project alternative would result in(i) continued development of pollution problems at the sites as a result of inadequate solid and domestic waste management; and (ii) increasing constraint of tourist visitor numbers due to a lack of facilities to accommodate comfortably the real potential growth in tourism. Moreover, contributing to the effect of insufficient facilities capacity for tourist growth would be the effect of the negative aesthetics of the steadily increasing pollution at some sites.

XI. Conclusions

205. There have been no major changes to the design since 2014.

206. Khammouane province includes the National Biodiversity Conservation Areas (NBCA) of Nakai-Nam Theun and Phou Hin Poun. Sub-project activities will not impact on them as they are over 10kms away.

207. There are no known rare or endangered wildlife species or critical habitats in the subproject areas.

208. Potential environmental impacts are largely restricted to the construction phase of the subproject components. Common construction-related disturbances include noise, dust, erosion, sedimentation, solid and liquid waste pollution, workers camp issues, reduced access, increased vehicles and traffic disruptions.

209. There will be no actual works in the cave itself nor in the Stupa. Previous plans to install lighting and stairs in the cave have been dropped. There are no planned works inside the Stupa.

210. An EMP has been prepared. This identifies potential impacts, gives the mitigation required, stipulates environmental monitoring plans, gives indicative costs for EMP implementation, and specifies the institutional responsibilities for the environmental management of the subproject.

211. All activities within the stupa enclosure must be conducted with the deepest respect for the cultural values of the site. Contractors should be fully briefed on appropriate behaviour within the enclosure and made aware of restrictions. The contractors are required to check if there are any prayer times or similar sensitive activities during which potentially disruptive works may need to be temporarily suspended.

212. Potential long-term environmental impacts of the subprojects relate to operation and maintenance (O&M) of the improved sanitation and solid waste systems that will be established at the sites. The new public toilet blocks have Anaerobic Baffled Reactor (ABR) septic tanks which are a simple yet effective technology for sewage treatment. They are particularly suited for use as sanitation systems in remote, high density tourist areas.

213. Like all such systems the toilets and the ABR tanks must be regularly maintained with digested septate sludge routinely removed and disposed of in government approved disposal areas. Due to their high efficiency in biodegradation this is an infrequent operation and is only required when the tanks are full, which can be at several years intervals.

214. Improved solid waste management is provided by provision of garbage bins, a solid waste transfer station and recycling facilities. Garbage bins should be emptied daily and not left until full or overflowing.

215. There will be an increase in tourism but this is a planned outcome of the project. The provision of better traffic management due to improved roads, car parking, additional toilet facilities, litter collection, more waste bins and a small solid waste transfer station will minimise the impacts of extra tourists. The management of the solid waste and sanitary facilities will be undertaken by the Sikhottabong Village Association (SVA) who are currently charged with all maintenance of public utilities in the Stupa area. They will continue in this role post construction. The SVA receives funds from the ticket sales for the Stupa compound. A portion of this gate revenue is given to the SVA for operation and maintenance of the site.

216. Although the aim of the project is to increase tourism and bring benefits to the area there can be negative impacts due to this increase. Extra infrastructure and facilities are to be provided but these may be inadequate in the long term. Degradation of these facilities can lead to discouragement of more tourists and an actual drop in the number of visitors who find the location less attractive. DICT should initiate a monitoring program to ensure that the attractiveness of the site is not lost through degradation from overuse. If such degradation is detected, possibly through a drop-in visitor numbers, then improved site management or increase in tourist facilities should be considered.

217. The stakeholder consultations and household and village level interviews underscored the need for effective management of construction-phase impacts such as noise, dust, traffic disruptions, and worker and public safety. However, the local residents were in favor of the planned improvements and supported the project. Follow-up meetings with the consulted stakeholders in October 2016 confirmed this opinion.

218. The Government of Lao PDR requires that an Environmental Assessment (EA) be conducted for the subprojects in accordance with the national EIA regulatory framework and guidelines. The detailed design Engineering Team applied for the approval in 2016 during the design stage. Their application was approved and the Environment Certificate issued on 24 February 2017.

219. The IEE confirms that the sub-projects are Category B and that there are no overriding reasons why the project should not proceed.

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XIV. Annex A Environmental Certificate

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ແຂວງຄຳມ່ວນ

ພະແນກຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ ແຂວງ

ເລກທີ...226..../ພຊສ.ຄມ

ຄຳມ່ວນ, ວັນທີ 24 ກຸມພາ 2017

ໃບຢັ້ງຢືນກ່ຽວກັບສິ່ງແວດລ້ອມ

- ອີງຕາມ ກົດໝາຍ ວ່າດ້ວຍ ການປົກປັກຮັກສາສິ່ງແວດລ້ອມ (ສະບັບປັບປຸງ) ເລກທີ 29/ສພຊ, ລົງວັນທີ 18 ທັນວາ 2012;
- ອີງຕາມຄຳແນະນຳຂອງລັດຖະມົນຕີວ່າການກະຊວງຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ ສະບັບເລກທີ 8029/ກຊສ, ລົງວັນທີ 17/12/2013 ວ່າດ້ວຍ ຂະບວນການສຶກສາເບື້ອງຕົ້ນ ກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມຈາກໂຄງການລົງທຶນ ແລະ ກິດຈະການຕ່າງໆ
- ອີງຕາມຂໍ້ຕົກລົງຂອງລັດຖະມົນຕີວ່າການກະຊວງຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ ສະບັບເລກທີ 1476/ກຊສ, ລົງວັນທີ 09 ມີນາ 2012 ວ່າດ້ວຍການຈັດຕັ້ງ ແລະ ເຄື່ອນໄຫວ ຂອງພະແນກພະແນກ ຊັບພະຍາ ກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ ແຂວງ.

ພະແນກ ຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ ແຂວງຄຳມ່ວນ (ພຊສ)

ຕົກລົງເຫັນດີ ຢັ້ງຢືນຮັບຮອງ ບົດລາຍງານການສຶກສາເບື້ອງຕົ້ນ ກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ຂອງໂຄງການຍົກລະດັບທາງດິນແດງ ເປັນເສັ້ນທາງປູຢາງຂອງຂຶ້ນເຂົ້າຖ້ຳຊ້າງ-ບ້ານຊຽງແຫວນ ແລະ ໂຄງການປັບປຸງເສັ້ນທາງ ແລະ ສິ່ງອຳນວຍຄວາມສະດວກ ຢູ່ໃນຂອບເຂດພະທາດສີໂຄດຕະບອງ

ໂດຍເຈົ້າຂອງໂຄງການຕ້ອງປະຕິບັດຕາມເງື່ອນໄຂດັ່ງນີ້:

1. ຮັບຜິດຊອບຕໍ່ການຈັດຕັ້ງປະຕິບັດວຽກງານ ການປ້ອງກັນຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ທີ່ໄດ້ລະບຸໄວ້ໃນບົດລາຍງານພ້ອມດ້ວຍແຜນການຄຸ້ມຄອງສິ່ງແວດລ້ອມ ຂອງໂຄງການຍົກລະດັບທາງດິນແດງ ເປັນເສັ້ນທາງປູຢາງຂອງຂຶ້ນເຂົ້າຖ້ຳຊ້າງ-ບ້ານຊຽງແຫວນ ແລະ ໂຄງການປັບປຸງເສັ້ນທາງ ແລະ ສິ່ງອຳນວຍຄວາມສະດວກ ຢູ່ໃນຂອບເຂດພະທາດສີໂຄດຕະບອງ, ໃນກໍລະນີມີບັນຫາທາງດ້ານສິ່ງແວດລ້ອມ ເກີດຂຶ້ນທີ່ບໍ່ໄດ້ສຶກສາໄວ້ໃນບົດລາຍງານດັ່ງກ່າວ ເຈົ້າຂອງໂຄງການຕ້ອງຮັບຜິດຊອບເພີ່ມເຕີມ ໃນການປັບປຸງແຜນຄຸ້ມຄອງສິ່ງແວດລ້ອມສະບັບນີ້ ມີມາດຕະການແກ້ໄຂບັນຫາເຫຼົ່ານັ້ນ ພ້ອມທັງຮັບປະກັນໃຫ້ມີງົບປະມານພຽງພໍ;
2. ເຈົ້າຂອງໂຄງການຕ້ອງເອົາໃຈໃສ່ ແລະ ມີມາດຕະການຄຸ້ມຄອງຕື່ມ ໃນການຮັກສາຄວາມປອດໄພບໍລິເວນກໍ່ສ້າງ;
3. ໃຫ້ເຈົ້າຂອງໂຄງການເອົາໃຈໃສ່ຄຸ້ມຄອງບໍ່ໃຫ້ເກີດມີມົນລະພິດ ໃນຂອບເຂດກໍ່ສ້າງ ແລະ ເຂດໃກ້ຄຽງທີ່ຕິດພັນກັບໂຄງການຮັບປະກັນໄດ້ບໍ່ໃຫ້ມີຂໍ້ຂັດແຍ່ງໃນດ້ານຕ່າງໆເກີດຂຶ້ນ ໃນໄລຍະດຳເນີນໂຄງການ, ຖ້າຫາກເກີດມີ ເຈົ້າຂອງໂຄງການຕ້ອງໄດ້ຮັບຜິດຊອບແກ້ໄຂໃຫ້ທັນການ ແລະ ເປັນທຳ ໂດຍປະສານສົມທົບກັບອຳນາດການປົກຄອງແຕ່ລະຂັ້ນ;
4. ປະກອບບົດລາຍງານປະຈຳເດືອນ ກ່ຽວກັບ ການຄວບຄຸມຕິດຕາມສິ່ງແວດລ້ອມ ຂອງໂຄງການແລ້ວສົ່ງໃຫ້ພະແນກຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມແຂວງ, ຂະແໜງສິ່ງແວດລ້ອມແຂວງ, ເພື່ອຊາບ ແລະ ຕິດຕາມກວດກາ ;
5. ມອບໃຫ້ ຂະແໜງສິ່ງແວດລ້ອມແຂວງ ສົມທົບກັບຂະແໜງການ ແລະ ອົງການປົກຄອງ ທີ່ກ່ຽວຂ້ອງ ເຮັດໜ້າທີ່ຕິດຕາມກວດກາ ການຈັດຕັ້ງປະຕິບັດແຜນການຄຸ້ມຄອງສິ່ງແວດລ້ອມສະບັບນີ້ຢ່າງເຂັ້ມງວດ.

ໃບຢັ້ງຢືນສະບັບນີ້ ມີຜົນນຳໃຊ້ໄດ້ ນັບແຕ່ມື້ລົງລາຍເຊັນເປັນຕົ້ນໄປ.

ຫົວໜ້າພະແນກຊັບພະຍາກອນທຳມະຊາດ

ແລະ ສິ່ງແວດລ້ອມ ແຂວງຄຳມ່ວນ

UNOFFICIAL TRANSLATION OF ENVIRONMENTAL COMPLIANCE CERTIFICATE

Lao People's Democratic Republic

Peace Independence Democracy Unity Prosperity

==========00==========

Khammouane Province

Provincial Department of Natural Resources and Environment No. 226/DONRE.KHM

Khammouan, 24 February 2017

ENVIRONMENT CERTIFICATE

- Pursuant to the law on environmental protection, referring No 29/NA, dated 18 December 2012.
- Pursuant to the guidance of the initial study on environment impact of the investment and operation of the project No 8029/MONRE, dated 27 December 2013.
- Pursuant to the Minister's decree on the operation and movement of Provincial Department of Natural Resources and Environment, dated 09 March 2012.

Department of Natural Resources and Environment, Khammouane Province (DONRE.KHM) hereby approves the Initial Environmental Examination for Access and Environmental Improvements at Xang Cave–Xiang Vaen Village and That Sikhottabong.

The project owner, Department of Information, Cultural and Tourism should follow the following conditions:

1. Be directly responsible for the implementation of the Initial Environmental Examination's Environmental Management Plan for Access and Environmental Improvements at Xang Cave – Xiang Vaen Village and That Sikhottabong. If environmental and social issues occur that are not assessed in the report and plans, the project owner must be responsible for updating the environmental and social management plan, and solve those issues, with adequate budget.
2. The project owner is required to closely monitor management measures to ensure safety in construction sites.
3. The project owner is required to monitor and control pollution in construction sites and nearby areas and ensure that no conflict occurs during project implementation. In case a conflict occurs, the project owner is required to respond immediately to find fair solutions, while closely coordinating with local authorities to implement grievance redress measures.
4. Environment Monitoring Reports will be made monthly and submitted to the Department of Natural Resources and Environment, Environment Division (Khammouane Province), for follow up.

5. The Department of Natural Resources and Environment, Provincial Environment Division (Khammouane Province), in cooperation with local authorities is authorized to monitor the implementation of the Environment Management Plan.

The certificate shall enter force on the date is signed (24 February 2017).

Director of Department of Natural Resources and Environment, Khammouane Province

(signed and seal) Sikhai Khamsavanh

XV. Annex B Environmental Management Plan

A. Project Environmental Management Plan (EMP)

220. The Environmental Management Plan (EMP) gives guidance on how to mitigate the environmental concerns identified in connection with this project. The EMP deals with practical mitigation and management measures to be taken during implementation to avoid, reduce, and mitigate adverse environmental impacts.

221. The EMP requires activities by the contractor that may have cost implications for them. They must allow for these in his bid price. This may impact on their competitiveness but nonetheless such costs must be included or the bid may be deemed a non-compliant bid.

222. The EMP is included in the tender documents for civil works. It will form part of the contract between the client and the selected contractor. It is essential that the contractor recognises that the requirements of the EMP will be contractually binding on the contractor. Failure to comply with the EMP is considered to be breach of contract and can result in financial penalties being imposed on the contractor.

223. The conformity of contractors with environmental contract procedures and specifications shall be regularly monitored by the DDSC during implementation.

224. Complaints by the contractor that he cannot absorb any costs associated with environmental protection required by the EMP will not be accepted as these were identified in the tender issue.

B. Construction Environmental Management Plan (CEMP)

225. The EMP is general in nature as certain specific details, such as location of works areas, construction camps or borrow pits are not known at the time of tender issue. After appointment and **before** mobilization the successful contractor must prepare his own version of the EMP known as the Construction EMP (CEMP). This must give specific details of locations of borrow areas, borrow roads, workers camps and other facilities.

226. The Construction EMP (CEMP) must be submitted to the DDSC for their approval within 30 days of contract signing and approval must be obtained before any works commence.

C. Updating CEMPs

227. The CEMP is a dynamic document that can be updated regularly. Situations may change or works be completed and so the specific section in the CEMP becomes no longer relevant. In that case the contractor has the right to amend the CEMP at any time at his discretion.

228. The contractor will normally be required to attend monthly progress meetings with the DDSC. At each monthly meeting the contractor will routinely be asked if there are to be any

changes to the CEMP. If there are none then this is duly noted in the minutes of the meeting. If the contractor wishes to change the CEMP, then they may submit a revised version for the approval of the DDSC. The revised version supersedes the previous version. The contractor does not have to wait for a monthly meeting but may submit a revised CEMP at any time he wishes.

D. Environmental Monitoring

229. The essence of monitoring is to ensure Compliance with the EMP. The contractors have a duty to comply with this and the relevant legislation. The supervising consultant must check their activities and report to DICT. In the event of noncompliance DICT can exert pressure on the contractor to comply.

E. Measurements

230. It will be necessary to carry out measurements to establish if the regulations are being met. In fact, simple compliance with the standards is not necessarily the final objective. There is no harm in the contractor "going beyond compliance" and running an operation better than that required by the law. The measurements to be made and regulations / standards to be met are given below. There will be a "hierarchy" of monitoring and measurements. This would be based on:

- Contractors
- Construction Supervision Consultants inspectors
- PCU environmental staff
- DICT
- MONRE

231. Initially, contractors should check daily that all operations are being conducted correctly. In general, "good housekeeping" must be employed and checked by visual inspection. Dust must be controlled by covering of stockpiles and water sprays. Solid waste, engine oil and grease, must be taken away by waste removal contractors and records kept.

232. Construction supervision inspectors must make daily spot checks and weekly formal checks on site operations. They must cross check all of the above requirements and view records for waste disposal. They must also investigate any pollution incidents or complaints. They must use checklists for record purposes and make sure that the complaint or incident is brought to the notice of the contractor immediately, verbally and with a follow up written notice.

233. In addition, PCU staff should make monthly visits to site to audit and check compliance of reporting. They should also review the reports submitted by the consultants to the DICT and report to the DICTPCU project manager.

F. Timing of Monitoring

234. The timing of the monitoring is important. The following list is for guidance and is indicative only.

- Rainwater runoff from sites must be checked every three months or after heavy rain if overflowing is reported. Measurements in streams and water courses must be made.
- Dust emissions on site must be checked weekly by visual inspection and monthly by examining records of water spraying. Ambient air quality must be checked over a 24-hour continuous period at sensitive receptors in the event of complaints.
- Noise levels must be checked every three months at site perimeters, or in the event of a complaint, at night as well as during the daytime. In the event of a complaint noise levels will be checked and equipment will be hired.
- Correct removal and disposal of food waste and waste engine oil and grease must be checked weekly by visual inspection of the camps and checking of records from the waste disposal contractors.
- Noise and vibration must be checked at sensitive receptors in the event of complaint.
- Reinstatement of borrow pits and quarries must be checked prior to handover.

235. In addition to regular monitoring, unannounced spot checks may be made by PMU on contractor's operations. All of the above procedures should be carried out by the site inspectors, in conjunction with PMU and where appropriate MONRE / DONRE. The results should be formally recorded every week and compiled into a monthly report. This should be submitted to the DDSC and discussed with PCU and the contractors as necessary but at a minimum on a monthly basis. Monthly reports should be compiled into quarterly and semi-annual reports to be submitted to ADB.

G. Review Procedures

236. Successful implementation of the CEMP will require combined efforts from contractors, consultants and DICT. The CEMP is a dynamic document and may be subject to change by the contractor as the work progresses. Periodic reviews may be necessary and these should in fact be encouraged.

H. Staffing for Environmental Monitoring

237. The contractors will have a member of staff designated as an Environmental Officer who will supervise implementing the CEMP. DICT will retain supervision consultants. The Resident Engineers terms of reference includes checking the EMP.

The RE will submit reports to the DICT. The results must also be incorporated in the quarterly project progress and semi-annual monitoring reports submitted to ADB.

I. Institutional Arrangements & Responsibilities

157. The Ministry of Information and Culture and Tourism (MICT) which is the executing agency (EA) for the project will take overall responsibility for successful implementation of the EMP. The EA will establish a Vientiane-based Project Coordination Unit (PCU) within the Tourism Development Department which, among other things, will provide Safeguards and Monitoring Coordination for the EMP. The provincial Department Information and Culture and Tourism (DICT) in which the project implementation unit (PIU) will be created will implement the EMP with support from the PCU.

159. External support of the PIU for the implementation of the EMP will be provided by the International and National Environment Specialists (ES) of the Detailed Design and Supervision Consultant (DDSC).

J. Monitoring EMP and Costs

The monitoring regime and estimate for costs is given below.

Table XV-1 Environmental Monitoring Costs

Issue	**What to Monitor**	**Where to Monitor**	**How to Monitor**	**When to Monitor**	**Who will Monitor**	**Estimated Costs US$ for Monitoring EMP**
During Road construction Works	Safety provided Spoil disposal site Traffic management	Maintenance site	Visual inspection	Weekly	PMU / PIU Contractors Environmental Officer	Included in PMU / PIU / DDSC costs
Noise and vibrations	Lao PDR allowable dB levels of Noise and Vibration Standards	Maintenance site	Site measurements or at complainant's houses	As required or in response to complaints	PMU / PIU Contractors Environmental Officer	Sound meter Equipment plus technician will be hired as and when required. Allow $100 / day Allocate cost to contractor

Issue	**What to Monitor**	**Where to Monitor**	**How to Monitor**	**When to Monitor**	**Who will Monitor**	**Estimated Costs US$ for Monitoring EMP**
Dust and air pollution	Dust dispersion	Maintenance Site Community vicinity	High Volume Sampler if required Visual observations on dust deposition and interviews with residents	Monthly	PMU / PIU DPWT Contractors Environmental Officer DoNRE	Allow $500 / day Allocate cost to contractor
Encroachment of private lands and agricultural lands	Damage to private land Spoil dumping	Properties land, agricultural land	Visual observation	Monthly	PMU / PIU DPWT Contractors Environmental Officer DAF	Included in PMU / PIU / DDSC costs
Workers health and sanitation	Any workers diseases	Worker's camp	Inspection at Camp sites	Monthly	PMU / PIU Contractors Environmental Officer	Included in PMU / PIU / DDSC costs
Solid waste disposal	Solid waste Management	Worker's camp	Inspection at Camp site	Monthly	PMU / PIU Contractors Environmental Officer	Included in PMU / PIU / DDSC costs
Training of PMUs / PIUs	Delivery of Training Courses	PMU Offices	Deliver training	4 times during project life	DDSC	US$10,000
Training of Contractors	Understanding of CEMP implementation	PIU offices	Deliver training	After contract signing and before construction starts	DDSC	Included in US$10,000 above
Training by national consultant	Capacity Building	PMU Offices	Deliver training	As required	DDSC	Included in DDSC fees

Issue	What to Monitor	Where to Monitor	How to Monitor	When to Monitor	Who will Monitor	Estimated Costs US$ for Monitoring EMP
Training by international consultant	Delivery of Training on CEMP	PMU Offices	Deliver training	As required	DDSC	Included in DDSC fees

K. EMP in Tabular Form for Tender Documents

The EMP in tabular form is given below. This should be included in the tender documents and passed to the contractor as the basis for preparation of CEMP.

Table XV-2 Environmental Management Plan

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
Pre-Construction and Detailed Design Phase								
Confirmation of required resettlement plan and payment of compensation	Grievances aired.	1. Affected persons informed prior to implementation.	All affected persons in subproject areas	Before detailed designs initiated	See resettlement plans	See resettlement plan	PCU/PIU	Resettlement committees
Disclosure and engagement of community	Community Protests.	2. Complete Public Consultation, Information Disclosure and agreement on Grievance Redress Mechanism.	For all construction sites.	A kick-off public consultation meeting will be held before construction works start.	Quarterly	No marginal cost	PIU	PIU/ Contractor
Contact Fisheries Section of MAF	Interference with fish migration	3. Clarify periods during rainy season when fish migration to Mekong river floodplains occurs	Vientiane / Thakhek	Before contractor commences work on stream crossings	Advice from contractor on scheduling	No marginal cost	PIU	PIU/ Contractor
Obtain Government approvals for Borrow areas	None licensed borrow areas cannot be used. negative impact	4. Contact quarry owners and obtain copies of permits or request DONRE to issue required permits and certificates.	Entire subproject	Before construction	As required	No marginal cost	PIU/DONRE	Contractor / CSC
Submit CEMP	Positive environmental impacts	5. Contractor to take EMP from tender documents and convert to CEMP by adding site specific details.	All sites	Within 30 days of contract signing.	Before construction initiated	No marginal cost	PIU	Contractor/ PIU
Confirm Government approval of construction waste disposal sites	Land contamination and flooding	6. Notify DONRE to confirm locations of sites for disposal of construction wastes and overburden.	Entire subproject	Before construction	As required	No marginal cost	PIU/DONRE/ DAF/DPWT	Contractor/ PIU
UXO survey, & removal	Injured worker or public	7. Ensure GoL and UXO LAO is consulted and clears areas where necessary	All construction sites.	Beginning of subproject	Once	See Monitoring Plan below	EA/PIU	UXO LAO

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
Raise Contractors awareness of need to comply with CEMP.	Prevent or minimize impacts	8. Brief contractors on implications of CEMP and stress need for compliance to avoid financial penalties.	For all construction sites	Beginning of construction	Once	No marginal cost	DDSC	PIU & contractors
Construction Phase								
Recruitment of workers	Spread of sexually transmitted disease	9. Use local workers as much as possible thereby reducing number of migrant workers	All work forces.	Throughout construction phase	Worker hiring stages	No marginal cost	EA/PIU	Contractor's bid documents
Worker camps	Hygiene sanitation and social problems	10. If possible, put workers in rented accommodation to avoid setting up work camp. 11. If camps are essential locate worker's camps away from human settlements. 12. Ensure adequate housing and waste disposal facilities including pit latrines and garbage cans. 13. A solid waste collection program must be established and implemented that maintains a clean worker camps 14. Locate separate pit latrines for male and female workers away from worker living and eating areas. 15. A clean-out or infill schedule for pit latrines must be established and implemented to ensure working latrines are available at all times. 16. Worker camps must have adequate drainage. 17. Local food should be provided to worker camps. 18. Provide all workers with sufficient potable water (bottled water) to avoid dehydration 19. Guns and weapons not allowed in camps. 20. Impose zero tolerance policy on drugs or alcohol in camp. 21. Transient workers should not be allowed to interact with the local community. 22. HIV Aids education should be given to workers. 23. Workers warned that gambling or fighting is a summary dismissal offence. 24. Encourage gender equity so at least 30% of workforce are female. 25. Camp areas must be restored to original condition after construction completed.	All worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC/PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
Implement construction materials acquisition, transport, and storage sub-plan	Pollution, injury, increased traffic, disrupted access	26. All borrow pits and quarries should be approved by DONRE. 27. Pits and quarries should not be located near surface waters, forested areas, critical habitat for wildlife, or cultural property or values. 28. If aggregate mining from fluvial environments is required small streams and rivers should be used, and dry alluvial plains preferred. 29. All topsoil and overburden removed should be stockpiled for later restoration. 30. All borrow pits and quarries should have a fence perimeter with signage to keep public away. 31. After use pits and quarries should be dewatered and permanent fences installed with signage to keep public out, and restored as much as possible using original overburden and topsoil. 32. Unstable slope conditions in/adjacent to the quarry or pit caused by the extractions should be rectified with tree planting. 33. Define and schedule how fabricated materials such as steel, wood structures, and scaffolding will transported and handled. 34. All aggregate loads on trucks should be covered.	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC/PIU	contractor
DBST production, and application	Air pollution, land and water contamination, and traffic & access problems,	35. Piles of aggregates at sites should be used/or removed promptly, or covered and placed in non-traffic areas 36. Store DBST materials well away from all human activity and settlements, and cultural (e.g., schools, hospitals), and ecological receptors. Bitumen production and handling areas should be isolated. 37. Contractors must be well trained and experienced with the production, handling, and application of bitumen. 38. All spills should be cleaned immediately and handled as per hazardous waste management plan, and according to GoL regulations.	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Implement Spoil management sub-	Contamination of land and surface	39. Uncontaminated spoil to be disposed of in GoL-designated sites, which must never be in or	All excavation areas	Throughout construction	Monthly	See Monitoring Plan for	DDSC & PIU & DONRE	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
plan	waters from excavated spoil, and construction waste	adjacent surface waters. Designated sites must be clearly marked and identified. 40. Spoil must not be disposed of on sloped land, near cultural property or values, ecologically important areas, or on/near any other culturally or ecologically sensitive feature. 41. Where possible spoil should be used at other construction sites, or disposed in spent quarries or borrow pits. 42. A record of type, estimated volume, and source of disposed spoil must be recorded. 43. Contaminated spoil disposal must follow GoL regulations including handling, transport, treatment (if necessary), and disposal. 44. Suspected contaminated soil must be tested, and disposed of in designated sites identified as per GoL regulations.		phase		contaminated soil analyses		
Implement Solid and liquid construction waste sub-plan	Contamination of land and surface waters from construction waste	45. Management of general solid and liquid waste of construction will follow GoL regulations, and will cover, collection, handling, transport, recycling, and disposal of waste created from construction activities and worker force. 46. Construction sites should have large garbage bins. 47. A schedule of solid and liquid waste pickup and disposal must be established and followed that ensures construction sites are as clean as possible. 48. Solid waste should be separated and recyclables sold to buyers in community. 49. Collection, storage, transport, and disposal of hazardous waste such as used oils, gasoline, paint, and other toxics must follow GoL regulations. 50. Wastes should be separated (e.g., hydrocarbons, batteries, paints, organic solvents) 51. Wastes must be stored above ground in closed, well labelled, ventilated plastic bins in good condition well away from construction activity	All construction sites and worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU & DONRE	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
		areas, all surface water, water supplies, and cultural and ecological sensitive receptors. 52. All spills must be cleaned up completely with all contaminated soil removed and handled with by contaminated spoil sub-plan.						
Implement noise and dust sub-plan	Dust Noise	53. Regularly apply water to exposed soil and construction roads. 54. Cover or keep moist all stockpiles of construction aggregates, and all truckloads of aggregates. 55. Minimize time that excavations and exposed soil are left open/exposed. Backfill as soon as activity completed. 56. As much as possible restrict working time between 07:00 and 17:00. 57. Maintain equipment in proper working order 58. Replace unnecessarily noisy vehicles and machinery. 59. Vehicles and machinery to be turned off when not in use. 60. Construct temporary noise barriers around excessively noisy activity areas where possible.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor
Implement Utility and power disruption sub-plan	Loss or disruption of utilities and services such as water supply and electricity	61. Contact local utilities and services with schedule, and identify possible contingency back-up plans for outages.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU & Utility company	contractor
Implement tree and vegetation removal, and site restoration sub-plan	Damage or loss of trees, vegetation, and landscape	62. Contact provincial forestry department for advice on how to minimize damage to trees and vegetation, and to work in protected forest at Xang Cave. 63. No tree removal is allowed in protected forest 64. Restrict tree and vegetation removal to within RoWs. 65. Within RoWs minimize removals, and install protective physical barriers around trees that do not need to be removed. 66. All RoWs to be re-vegetated and landscaped after construction completed. Consult provincial forestry department to determine the most	All construction sites.	Beginning and end of subproject	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
		successful restoration strategy and techniques.						
Implement Erosion control sub-plan	Land erosion	67. Berms, and plastic sheet fencing should be placed around all excavations and earthwork areas. 68. Earthworks should be conducted during dry periods. 69. Maintain a stockpile of topsoil for immediate site restoration following backfilling. 70. Protect exposed or cut slopes with planted vegetation, and have a slope stabilization protocol ready. 71. Re-vegetate all exposed soil immediately after activity is completed.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Implement worker and public safety sub-plan	Public and worker injury, and health	72. Proper fencing, protective barriers, and buffer zones should be provided around all construction sites. 73. Sufficient signage and information disclosure, and site supervisors and night guards should be placed at all sites. 74. Worker and public safety guidelines should be followed (Lao PDR OSH Program section III). 75. Speed limits suitable for the size and type of construction vehicles, and current traffic patterns should be developed, posted, and enforced on all roads used by construction vehicles. 76. Standing water ponds which may encourage vector breeding should be filled in. 77. A construction site safety program should be developed and distributed to workers. 78. Worker induction briefing on construction hazards and safety should be given at beginning of construction phase. 79. "Tool Box" briefings should be given every morning at roll call on safety issues. 80. Appropriate safety clothing and footwear should be mandatory for all construction workers. Workers should be warned that failure to wear PPEs will result in dismissal. 81. Adequate medical services must be on site or	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
		nearby all construction sites. 82. Drinking water must be provided at all construction sites. 83. Sufficient lighting must be used during necessary night work. 84. All construction sites should be examined daily to ensure unsafe conditions are removed.						
Civil works	Degradation of water quality & aquatic resources	85. Erosion channels must be built around aggregate stockpile areas to contain rain-induced erosion. 86. Earthworks should be conducted during dry periods. 87. All construction fluids such as oils, and fuels should be stored and handled well away from surface waters. 88. No waste of any kind is to be thrown in surface waters. 89. No washing or repair of machinery near surface waters. 90. Pit latrines to be located well away from surface waters. 91. No unnecessary earthworks in or adjacent to water courses. 92. No aggregate mining from rivers or lakes. 93. All irrigation canals and channels to be protected the same way as rivers, streams, and lakes	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Civil works	Degradation of terrestrial resources	94. All construction sites should be located away forested or all plantation areas as much as possible. 95. No unnecessary cutting of trees. No tree removal in protected forest at Xang Cave 96. All construction fluids such as oils, and fuels should be stored and handled well away from forested and plantation areas. 97. No waste of any kind is to be discarded on land or in forests/plantations.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PIU	contractor
Civil works: chance finds plan	Damage to cultural property or values, and	98. As per detailed designs all civil works should be located away from all cultural property and values. DICT identified potential sites and types	All construction sites	At the start , and throughout	Monthly	No marginal cost	DDSC & PIU	

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
	chance finds	of PCR in pre-con phase. 99. Chance finds of valued relics and cultural values should be anticipated by contractors. Site supervisors should be on the watch for finds. 100. Upon a chance find all work stops immediately, find left untouched, and PIU notified to determine if find is valuable. Culture section of DICT notified by telephone if valuable. 101. Work at find site will remain stopped until DICT allow work to continue.		construction phase				
Implement Construction and urban traffic sub-plan	Traffic disruption, accidents, public injury	102. Schedule construction vehicle activity during light traffic periods. Create adequate traffic detours, and sufficient signage & warning lights. 103. Post speed limits, and create dedicated construction vehicle roads or lanes. 104. Inform community of location of construction traffic areas, and provide them with directions on how to best co-exist with construction vehicles on their roads. 105. Demarcate additional locations where pedestrians can develop road crossings away from construction areas. 106. Increase road and walkway lighting. 107. Use site staff for traffic control.	All construction sites	Fulltime	Monthly	No marginal cost	DDSC & PIU	contractor
Implement Construction Drainage sub-plan	Loss of drainage & flood storage	108. Provide adequate short-term drainage away from construction sites to prevent ponding and flooding. 109. Install temporary storm drains or ditches for construction sites 110. Ensure connections among surface waters (ponds, streams) are maintained or enhanced to sustain existing storm water storage capacity. 111. Protect surface waters from silt and eroded soil.	All areas with surface waters	Design & construction phases	Monthly	No marginal cost	DDSC & PIU	contractor
Construction - Specific Mitigations for Civil Works for Upgrading of All Bridges, and New Ford on Rivers								
Civil works for new ford in river	Erosion / Sedimentation / Silt traps	112. Implement subproject during the dry season 113. Minimize all digging and infilling as much as possible, cover excavated material until removed. 114. Install silt traps to prevent silt laden rainwater	River crossing in front of cave	Throughout construction period	Monthly	No marginal cost	DDSC & PIU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
		runoff from site. Clean and empty silt traps regularly.						
Civil works for new ford in river	Blockage of fish passage, loss of aquatic habitat	115. Implement subproject during the dry season. Construct temporary channel around ford construction area, minimize in-river civil works for ford construction	River crossing in front of cave	Throughout construction period	Monthly	No marginal cost	DDSC & PIU	contractor
Upgrading bridge top	Erosion / Sedimentation	116. Implement subproject during the dry season 117. Remove old bridge top without dropping materials into river. Use erosion berms and install industrial silt curtain parallel in river to separate entire construction zone from river.	River crossing in main access road to Ban Tham village	Throughout construction period	Monthly	No marginal cost	DDSC & PIU	contractor
Upgrading internal bridges in Stupa compound	Erosion / Sedimentation / loss of aquatic habitat	118. Implement subproject during the dry season 119. Minimize use of heavy equipment in streams/rivers	Stupa compound	Throughout construction period	Monthly	No marginal cost	DDSC & PIU	contractor
Construction - Specific Mitigations for Civil Works in Xang Cave Area								
Upgrading facilities near cave	Possible loss or damage to protected forest	120. After consultation with forestry department, demarcate construction area and apply avoid working near, removing or damaging trees 121. Workers are not to enter in or near to cave entrance. 122. As well as the EHS Induction briefing for all workers a "tool box" briefing will be held each morning reminding them to observe the restrictions on working locations.	Near Xang Cave	Throughout construction period	Monthly	No marginal cost	DDSC & PIU	contractor
Construction - Specific Mitigations for Civil Works in That Sikhottabong Compound								
Implementation of all subproject activities	Disruption of tourist visits, and merchant activities	123. Schedule subproject activities during low tourist season 124. Inform merchants in compound of schedule of activities 125. Workers are not to enter in or near to Stupa entrance. 126. As well as the EHS Induction briefing for all workers a "tool box" briefing will be held each morning reminding them to observe the restrictions on working locations.	Entire compound	Throughout construction period	Monthly	No marginal cost	DSC & PIU	contractor
Operation of Upgraded Access Road to Ban Tham Village								
Operation of upgraded road to	Increased risk of traffic accident or	127. Enforce well marked speed limits, provide guard rails along road where needed, and	Upgraded road	Fulltime	Biannual	O&M	DSC & PIU	Traffic Police

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost (USD) for implementing EMP	Responsibility	
							Supervision	Implementation
Ban Tham village	injury.	educate village communities on new road safety.						
Operation of Improved Tourist Facilities at Xang Cave and Stupa Compound Sites								
Operation of improved tourist facilities	Solid and domestic waste pollution	128. Ensure ABR waste system is maintained with septate removed regularly and disposed in DONRE- approved areas that may need to be identified. 129. Garbage bins must be emptied and garbage removed regularly, and disposed in DONRE-approved site that may need to be identified 130. Ensure solid waste transfer station and MRF in Stupa compound is operated properly and according to specification	Xang Cave and Stupa compound	Regularly	Biannual	O&M	DICT/DPWT	Sikhottabong Village Association (SVA) is currently charged with all maintenance of public utilities in the Stupa area.
Monitoring of degradation	Increased tourist numbers can actually degrade the main reason for the visit.	131. DICT should initiate a monitoring program to ensure that the attractiveness of the site is not lost through degradation from overuse. If such degradation is detected, possibly through a drop-in visitor numbers, then improved site management or increase in tourist facilities should be considered. 132.	Xang Cave and Stupa compound	Regularly	Biannual	O&M	MICT/MPWT	DICT
Post Construction Completion								
Site Clearance	Waste materials let behind that pose threat to environment or hazard to animals	Camp areas must be restored to original condition after construction completed.	All construction sites and worker's camps	After construction finished	Once	No marginal cost	DDSC	contractor

XVI. Annex C Discussion Guide

238. Five questions and information requests (TableXIII-1) were posed to stakeholders to guide discussions of the individual and grouped stakeholders.

239. To help orient the discussions of environmental issues and concerns of subprojects a list of environmental components (TableXIII-2) was introduced to the stakeholders ahead of the question and answer period. The stake holders were encouraged to add their own components of environment to the discussions.

Table XVI-1 Guiding Questions & Information Requests for Stakeholder Consultations

1. What will be the benefits of the subproject?

Please list benefits of project.

2. Do you have any environmental concerns with the subproject?

Please list environmental concerns of project.

3. Do you any have environmental concerns with the construction activities of the subproject?

Please list environmental concerns of construction phase activities.

4. Do you have environmental concerns with the completed operation phase of the completed subproject?

Please list environmental concerns of the operation of completed subproject.

5. Do you think the subproject design or operation should be changed to prevent negative environmental, or community impacts?

Please list changes to subproject that you think will prevent or reduce negative environmental, or community impacts?

Table XVI-2 Example environmental components to guide stakeholder discussions.

- drinking water quality and availability
- surface water quality and quantity
- groundwater quality and quantity
- air quality
- climate
- land and soil quality
- coastal zone, ocean, rivers, reservoirs,
- trees, other vegetation,
- terrestrial resources e.g. minerals, salt beds, geology
- terrestrial & aquatic animals, e.g. fish, birds, small mammals ecological protected areas (e.g. national parks, wildlife sanctuaries),
- land & coastal zone uses (e.g. agriculture, fisheries, forestry, navigation, aquaculture, commercial, other),
- public safety,
- public movement & access
- physical cultural values (e.g. pagodas, cemeteries, monuments)

XVII. Annex D Stakeholder Views

Benefits identified by stakeholders:

- Transportation convenience
- Increase income and living conditions
- Facilitate trade
- No dust in the street & cleaner village/house
- Improved environment/nature
- Village improvement/development
- Increase tourists

	Questions and Issues Raised	Project Response
Construction phase issues	• Dust and noise from the construction activities • Unsafe traffic caused by construction vehicles causing increased risk of public injury particularly of children • Increased traffic accidents • Flooding • Reduced access and travel along road due to construction traffic • Soil erosion and river sedimentation • Erosion of riverbanks	•The EMP for the 2 Khammouane subprojects prescribes mitigation sub-plans for common civil works disturbances caused by road upgrades such as dust (e.g. regular wetting) and noise pollution, erosion & sedimentation management of traffic, and traffic safety, and management of solid and hazardous waste. • Improved drainage to prevent flooding is integral to the designs of both subprojects
Operational phase issues (few issues)	• Issues of dust, noise, and problems associated with the increased traffic on the completed upgraded access roads. • Safety on upgraded roads • Environmental damage and pollution • Non-compliance with regulations	• The completed upgrade double bituminous surface treatment (DBST) access road will minimize the production of dust. • The EMP calls for enforced posted speed limits on the upgraded sections of access road
Stakeholder suggested impact mitigation measures	• Establish detours around road construction zones • Water the road and drive slowly as possible • Improved traffic control • Install sidewalks • Accompany by adultoid from school • Build retaining concrete wall • Better environmental management • Improve drainage • Impose and enforce strict regulations • Install barricade where needed • Water the road and reduce speeds • Children need accompany by adult	• Operational noise is addressed in EMP with the specification for DPWT to enforce with spot checks that vehicles using the roads are in good working condition • Capacity development and training of DICT/DPWT on environmental management by project and DONRE will occur

Table XVII-1 Summary of stakeholder views of the subprojects in Khammouane Xang Cave Access Improvements and That Sikhottabong Environmental Improvement