

# Initial Environmental Examination

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July 2012

## LAO: Greater Mekong Subregion Corridor Towns Development Project

Prepared by the Ministry of Natural Resources and Environment and Savannakhet Provincial  
Department of Natural Resources for the Asian Development Bank.

## CURRENCY EQUIVALENTS

(as of 1 August 2012)

Currency Unit	–	kip (KN)
KN1.00	=	\$0.00012
\$1.00	=	KN8,013

## ABBREVIATIONS

DBTZA	–	Dansavanh Border Trade Zone Authority
DED	–	detailed engineering design
DoF	–	Department of Forestry
DPRA	–	Development Project Responsible Agency
DPWT	–	District Public Works and Transport Office
DNREO	–	District Natural Resource and Environment Office
EA	–	environmental assessment
EIA	–	environment impact assessment
ECA	–	Environmental Compliance Audit
ECC	–	Environmental Compliance Certificate
ECO	–	Environmental Control Officer
EMP	–	environment monitoring plan
EMMU	–	Environment Management and Monitoring Unit
ESD	–	Environment and Social Division
ESIA	–	Environment and Social Impact Assessment
ESO	–	environmental site officer
EA	–	executing agency
EWEC	–	East-West Economic Corridor
FDI	–	foreign direct investment
FGD	–	focus group discussion
FS	–	Forest Strategy
FYSEDP	–	Five Year Socio Economic Development Plan
GDP	–	gross domestic product
GMS	–	Greater Mekong Subregion
GoL	–	Government of Lao PDR
IA	–	implementing agency
IEE	–	initial environmental examination
IUCN	–	International Union for Conservation of Nature
IWRM	–	Integrated Water Resource Management
Lao PDR	–	Lao People's Democratic Republic
LFA	–	Land and Forest Allocation
LWU	–	Lao Women Union
MAF	–	Ministry of Agriculture and Forestry
MAF	–	Ministry of Agriculture and Forestry
MIC	–	Ministry of Information and Culture
MIH	–	Ministry of Industry and Handicraft
MoU	–	Memorandum of Understanding
MoF	–	Ministry of Financial
MONRE	–	Ministry of Natural Resources and Environment
MPCTC	–	Ministry of Post, Construction, Transport and Communication
MPWT	–	Ministry of Public Works and Transport

MPI	–	Ministry of Planning and Investment
MRF	–	materials recovery facilities
MRC	–	Mekong River Commission
NAPA	–	National Adaptation Plan of Action
NBSAP	–	National Biodiversity Strategy and Action Plan
NGOs	–	nongovernment organization
NLMA	–	National Land Management Authority
NPA	–	national protected area
NSEDP	–	National Socio Economic Development Plan
NTA	–	National Tourism Authority
NTFP	–	non-timber forest product
NUSS	–	National Urban Sector Strategic
O&M	–	operation and maintenance
PAFO	–	Provincial Agriculture and Forestry Office
PES	–	project environment specialist
PEI	–	Poverty Environment Initiative
PIC	–	Provincial Information and Cultural Office
PIU	–	project implementation unit
PMU	–	project management unit
PCU	–	project coordination unit
PNREO	–	Provincial Natural Resource and Environment Office
PLMO	–	Provincial Land Management Office
PPI	–	Provincial Planning and Investment Office
PPH	–	Provincial Public Health Office
PPA	–	Provincial Protected Area
PPP	–	public private partnership
PTO	–	Provincial Tourism Office
PWREO	–	Provincial Water Resources and Environment Office
RBC	–	River Basin Committee
REA	–	rapid environment assessment
REDD	–	Reducing Emissions from Deforestation and Forest Degradation
TSS	–	total suspended solids
SEC	–	Socio-Economic and Culture
UDAA	–	Urban Development and Administration Authority
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.

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## I. EXECUTIVE SUMMARY

1. The towns of Kaysone Phomvihane, Phine, and Dansavanh are the three subproject locations for the Corridor Towns Development Project (CTDP) in Lao People's Democratic Republic (Lao PDR). Lao PDR together with Cambodia and Viet Nam form the three target countries of the parent Greater Mekong Subregion (GMS) Corridor Towns Development Project CTDP (ADB TA 7644-REG). Through infrastructure developments in the three towns the goal of the CTDP is to develop the existing East West Economic Corridor (EWEC) in Lao PDR from a transportation corridor into an economic corridor as part of the overall economic development of the Greater Mekong Sub-region.

2. The initial environmental examination (IEE) of the CTDP subprojects in Lao PDR presented herein consolidates the initial three IEEs that were prepared for each subproject town. The consolidated IEE has been re-formatted and edited pursuant to the requirements of Asian Development Bank's Safeguards Policy Statement (2009).

### A. Project Summary

3. The CTDP in Lao PDR is an ADB Category B project at the feasibility design phase, and is defined by the following subprojects and infrastructure component developments:

Subproject	Subproject component
Kaysone Phomvihane,	1) Upgraded solid waste management and sanitary landfill <ul style="list-style-type: none"><li>Decommissioning existing landfill</li><li>Modern landfill technology including leachate collection and treatment system</li><li>New compactor trucks</li></ul>
	2) Materials recovery facility <ul style="list-style-type: none"><li>Higher volume with modern, efficient technology</li></ul>
	3) Wastewater treatment plant and improved drainage <ul style="list-style-type: none"><li>Three, aerobic pond treatment plants</li><li>Stormwater drainage canals</li><li>Interceptor pipelines</li></ul>
	4) Mekong riverbank protection <ul style="list-style-type: none"><li>Modern slope protection materials and techniques</li></ul>
	5) Improved urban roads and drainage <ul style="list-style-type: none"><li>Road widening, lateral drainage, lighting, and signage</li></ul>
Phine	6) Improved urban roads and drainage <ul style="list-style-type: none"><li>Road widening, lateral drainage, lighting, and signage</li></ul>
Dansavanh	7) Improved urban roads and drainage <ul style="list-style-type: none"><li>Road widening, lateral drainage, lighting, and signage</li></ul>

4. The proposed new sanitary landfill in Kaysone Phomvihane will receive solid waste from the municipality. It will likely contain a liner of clay depending on soil permeability and the overall sensitivity of groundwater. An adjacent leachate treatment facility is planned, along with provision of two new compactor trucks. The quality of treated leachate and the receiving environment for disposal have not been finalized. A modern, materials recovery facility (MRF) will be constructed adjacent to the new sanitary landfill. The MRF will be contained in a specially designed building that provides central solid waste depot sites.

5. A major component of the development of the new sanitary landfill is the decommissioning of the existing dumpsite that is adjacent to the planned site for the new landfill. A separate environmental compliance audit (ECA) will be conducted by the PPTA consultant to determine the present and likely future impacts of the old dumpsite on the environment.

6. The proposed three new wastewater treatment plants (WWTPs) in Kaysone Phomvihane will treat urban wastewater aerobically in ponds before the treated effluent is discharged to existing drainage system and ultimately to the Mekong river. Raw wastewater will be conveyed to the WWTPs in upgraded combined waste-stormwater drainages. Aerobic pond sludge will either be disposed in a landfill or to agricultural lands. The quality of the treated effluent and waste sludge at disposal has not been finalized.

7. The bank of the Mekong river adjacent to Kaysone Phomvihane will be fortified with modern slope stabilization materials and procedures. The top of the riverbank will be widened and developed into public and commercial space for use by the Kaysone Phomvihane community.

8. The upgrades to the urban roads and drainage in Kaysone Phomvihane, Phine and Dansavanh will occur adjacent to, and along sections of the national highway that passes through the towns. The road upgrades will consist of road widening, installation of lights, trees, and upgraded lateral drainage.

## **B. Potential Impacts**

9. In general the examination of the pre-construction, construction, and operational phases of the subprojects, which included input from community stakeholder meetings, indicates that the potential environmental impacts of the subprojects in Lao PDR will be short-term civil construction-related which can be mitigated. The construction impacts of elevated dust, noise, traffic disruptions, erosion and sedimentation, liquid and solid waste, erosion, and public and worker safety can be mitigated and managed effectively with good construction management practices.

10. Potential long-term environmental impacts of the infrastructure developments concern the operation of the three WWTPs and sanitary landfill. The potential impacts of the WWTPs arise from uncertainties with the sensitivity and assimilative capacity of receiving drainage systems, and ultimately the Mekong river to the treated effluent from the aerobic treatment ponds. Similarly, the sensitivity of groundwater, and downstream surface water to the operation of the new sanitary landfill needs to be clarified at detailed design stage. The expected quality and disposal procedures for planned treated leachate from landfill also needs to be clarified at detailed design stage. The final design of the sanitary landfill depends in part on the results of the ECA of the existing dumpsite.

11. Potential impacts of the Mekong riverbank protection component focus on the effects of construction on water quality, habitat for aquatic biota, navigation, and other uses of the river. Mitigation measures have been specified to isolate and minimize the construction-related impacts from the community.

12. The stakeholder meetings conducted in the subproject towns underscored the need for effective management of noise, dust, traffic disruptions, and traffic safety during the construction phase. The concerns of stakeholder included the increased truck and automobile traffic that is anticipated as a result of the operation of the completed subproject components.

13. Available data and information indicate an absence of critical wildlife habitat, rare or endangered species, ecological protected areas, and cultural property and values at the three subproject sites. However, because the sites of subprojects components are not finalized a re-review of local sensitive ecological resources should occur at detailed design stage.

14. Potential induced environmental impacts of the subprojects are increased natural resource consumption and environmental degradation which could stem from the planned impact of the CTDP of socioeconomic development in the towns. These induced environmental impacts would potentially accumulate regionally along and adjacent to the EWEC. However, the localized-scale of the subproject infrastructure investments along with future management and regulation by the EA and MoNRE should offset those potential impacts.

## **C. Conclusions**

15. The consolidated IEE concludes that the description of the feasibility design of the project combined with available information on the affected environments is sufficient to identify the scope of potential environmental impacts of the project. However, clarification of the affected environments is needed which can occur during the detailed designs of the subprojects.

16. Individual Environmental Management Plans (EMP) for the subprojects are found under separate cover. The EMPs provide detailed impacts mitigation and environmental monitoring plans, and the institutional responsibilities and capacity needs for the environmental management of the subprojects. The EMPs will need to be updated to meet the detailed designs of the subprojects.

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## II. INTRODUCTION

### A. Project Overview

17. The Corridor Towns Development Project (CTDP) is designed to facilitate the transformation of transport corridors into economic corridors that would attract further investments in economic and environmental infrastructures to spur economic growth and sustained development. The expected impact of the CTDP will result in the corridor towns becoming the nucleus of economic activities, thereby contributing to the emergence of economic growth centers along the transport corridors in the Greater Mekong Subregion (GMS). The outcomes of the CTDP will lead to provision of adequate urban and infrastructure and essential services to facilitate growth and increase urbanization.

18. The GMS countries envision that regional cooperation is essential to establish an economic link through improvements in infrastructure that would trigger increased trade and investments and spur economic growth. The cohesive efforts of the GMS countries and the committed support of the Asian Development Bank (ADB) and other financial institutions and donor agencies enhanced the establishment of regional markets, promoted cross-border movements of people, goods and services and more importantly developed a strong sense of collective action for a common economic purpose. Within a span of a decade, development investments were focused on putting in place priority transport infrastructure that forged the link between the GMS countries and stimulated the emergence of economic corridors along these key transport routes.

19. Together with the ADB, the participating national Governments recognized the need to build on the considerable benefits of increased trade and traffic flows along these transport routes. The favorable location of the corridor towns is viewed as a comparative advantage to further boost economic activity given the necessary enabling environment for strategic local economic development plan, investment programs and the strengthening of the institutional capacities at provincial and district levels. The next critical step in the GMS strategic focus demands the transformation of the transport corridors into full fledge economic corridors that would sustain the investment in essential infrastructure, and help contribute to poverty reduction in the GMS.

20. The primary objective of ADB's assistance to the GMS is the sustained increase in trade and transportation and the efficient movement of goods and services across common borders. In this regard, the transformation of transport corridors into economic growth nodes is considered essential in achieving levels of economic competitiveness of the GMS while advocating a strong sense of participation and involvement of a broad base stakeholder in the region. ADB's Regional Cooperation Strategy and Program (RSCP) is anchored on strategic thrusts towards strengthening connectivity and facilitating cross border movement, integrating national markets to promote economic efficiency and private sector development, institutional capacity strengthening as well as addressing critical social and environmental issues.

21. Lao People's Democratic Republic (Lao PDR) is a land-locked country bordering Thailand to the west, Viet Nam to the east, Peoples' Republic of China (PRC) to the north, Myanmar to the Northwest, and Cambodia to the south. In Lao PDR, the three corridor towns of Kaysone Phomvihane, Phine and Dansavanh are located in the province of Savannakhet (Figure 1). This IEE covers the proposed subprojects within the three corridor towns of Kaysone Phomvihane, Phine and Dansavanh (Table 1).

**Table 1. Summary of components of three subprojects of Lao PDR**

Subproject Town	Subproject component
Kaysone Phomvihane,	Upgraded solid waste management and sanitary landfill <ul style="list-style-type: none"> <li>Decommissioning of existing landfill</li> <li>Modern landfill technology including leachate collection and treatment system</li> <li>New compactor trucks</li> </ul>
	Materials recovery facility <ul style="list-style-type: none"> <li>Higher volume with modern. efficient technology</li> </ul>
	Wastewater treatment plant and improved drainage <ul style="list-style-type: none"> <li>Three, aerobic pond treatment plants</li> <li>Stormwater drainage canals</li> <li>Interceptor pipelines</li> </ul>
	Mekong riverbank protection <ul style="list-style-type: none"> <li>Modern slope protection materials and techniques</li> </ul>
	Improved urban roads and drainage <ul style="list-style-type: none"> <li>Road widening, lateral drainage, lighting, and signage</li> </ul>
Phine	Improved urban roads and drainage <ul style="list-style-type: none"> <li>Road widening, lateral drainage, lighting, and signage</li> </ul>
Dansavanh	Improved urban roads and drainage <ul style="list-style-type: none"> <li>Road widening, lateral drainage, lighting, and signage</li> </ul>

## B. Assessment Context

22. The CTDP was assigned Environmental Category B which requires an initial environmental examination (IEE) pursuant to the ADB's safeguard policy,<sup>1</sup> and environmental assessment guidelines.<sup>2</sup> A category B project will have potential adverse impacts that are less adverse than those of category A project, are site-specific, largely reversible, and can be mitigated with an environmental management plan.<sup>3</sup> The Government of Lao People's Democratic Republic (GoL) requires that an IEE be conducted for the subprojects.

23. The detailed designs for the infrastructure components in the three towns have not been prepared. The IEE and environmental management plans (EMPs) were prepared based on the information on the construction and operational phase activities of the town subprojects

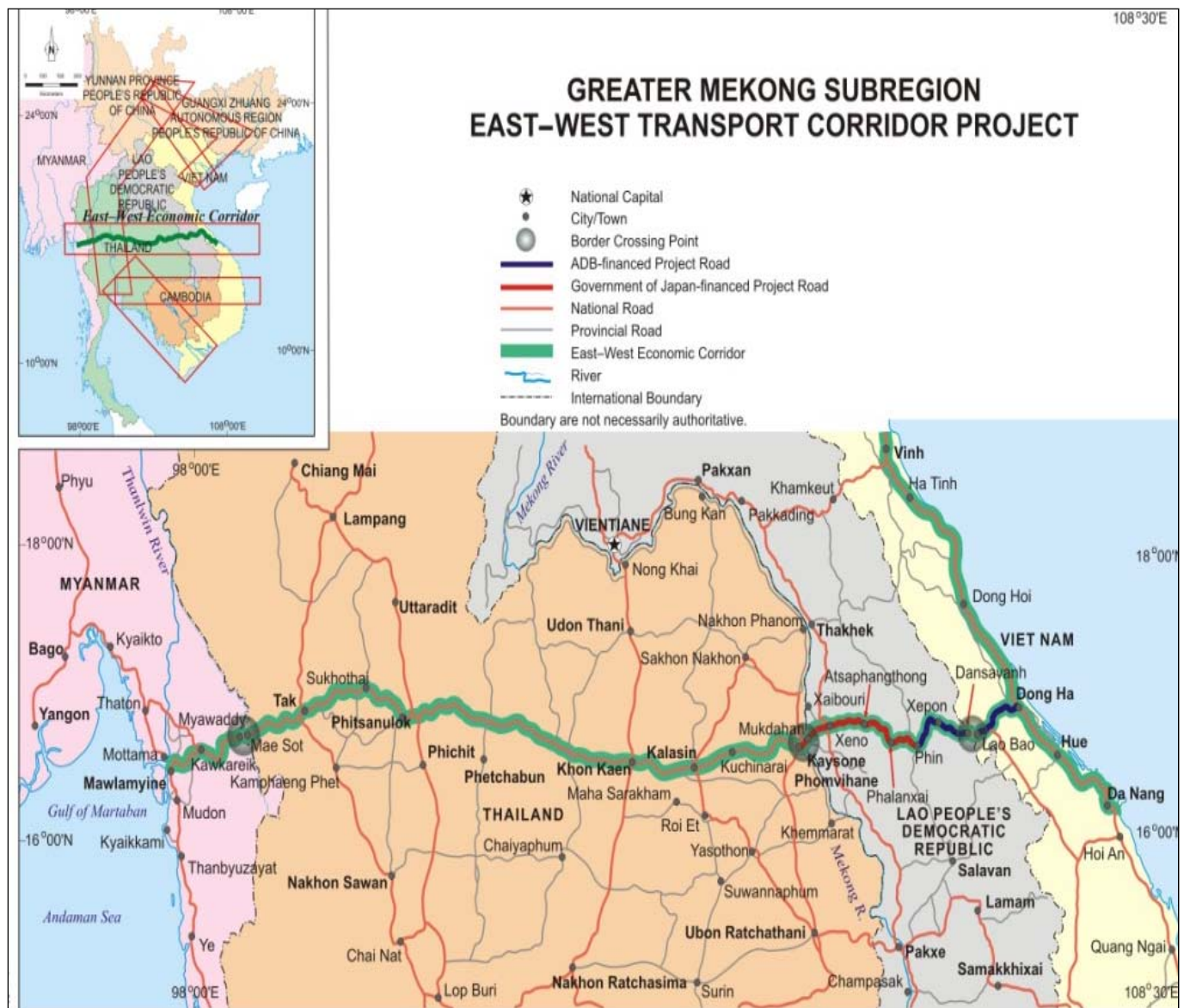
<sup>1</sup> ADB, 2009. Safeguard Policy Statement, ADB Policy Paper.

<sup>2</sup> ADB, 2003, Environmental Assessment Guidelines.

<sup>3</sup> Footnote 2, pg 19.

available at the feasibility stage of the CTD. The IEE was prepared using available data and information on sensitive ecological and cultural receptors that exist at the different town sites. The three EMPs will be updated where necessary to meet the future detailed designs of the corridor town subprojects.

**Figure 1. Three subproject towns in Lao PDR along east-west corridor**



### **C. Consolidated IEE**

24. The IEE combines the original three IEEs that were prepared for the three town subprojects. The IEEs were consolidated to simplify the environmental safeguard documentation for the CTDTP by reducing duplication of information. Similarly, the original nine EMPs that were prepared for each subproject component were consolidated into three single EMPs for each town subproject. The stand-alone EMPs are found under separate cover.

## **III. POLICY, LEGAL, AND REGULATORY FRAMEWORK**

### **A. National Environmental Laws, Strategies, and Policies.**

25. 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. From mid-2011 there has been change through the establishment of the new Ministry for Natural Resources and the Environment (MONRE), formerly the Water Resources and Environment Administration (WREA). The policies, laws relevant to environmental protection are listed below.

26. Detailed descriptions of the laws, policies, and regulations related to environmental protection, including the national environmental assessment procedure are found in Appendix A.

#### **1. Laws**

- 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)

#### **2. Strategies, Plans, Policy**

- The 7th National Social and Economic Development Plan (NSEDTP) (2011-2015)
- National Forestry Strategy to 2020 (FS2020)
- National Biodiversity Strategy to 2020 & Action Plan 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)

### **3. Environmental Standards and Criteria**

27. 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 DOD, NH<sub>3</sub>-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. National Environmental Assessment Procedure and Directives**

28. 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 (EA) in accordance with the regulations of WREA.<sup>4</sup> WREA 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).

29. A Development Project Responsible Agency (DPRA) carries out the initial EA in accordance with the Regulation. The DPRA screens the project to determine whether the initial EA must be expanded into an IEE as specified in Article 9 of the Regulation. A more in depth Environmental Impact Assessment (EIA) may be required if this is shown to be needed following a review of the IEE, as specified in Articles 11, 12, 13, and 14 of this Regulation. A detailed description of the national EA procedure for Lao PDR is found in Appendix A.

30. Key directives and regulations for EA in Lao PDR are as follows:

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

#### **C. ADB Safeguard Policy**

31. The ADB Safeguard Policy Statement (ADB 2009) clarifies the rationale, scope and content of an EA and is supported by technical guidelines (e.g., Environmental Assessment Guidelines 2003). 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

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<sup>4</sup> WREA now incorporated in the new MONRE

impacts. An environmental assessment for Category C projects is not required but environmental implications need to be reviewed.

#### IV. DESCRIPTION OF SUBPROJECTS

32. Table 2 summarizes the different infrastructure developments of each subproject. The Kaysone subproject consists of five types of infrastructure developments while the subprojects of Phine and Dansavanh each consist of only urban road and drainage improvements.

**Table 2. Summary of infrastructure developments of the three subprojects**

<b>Infrastructure Development</b>	<b>Subproject</b>
Upgraded solid waste management and sanitary landfill <ul style="list-style-type: none"> <li>• Closure existing landfill</li> <li>• Modern landfill technology including leachate collection and treatment system</li> <li>• New compactor trucks</li> </ul>	Kaysone Phomvihane
Materials recovery facility <ul style="list-style-type: none"> <li>• Higher volume with modern efficient technology</li> </ul>	Kaysone Phomvihane
Wastewater treatment plant and improved drainage <ul style="list-style-type: none"> <li>• Three aerobic pond plants</li> <li>• Stormwater drainage canals</li> <li>• Interceptor pipeline</li> </ul>	Kaysone Phomvihane
Mekong riverbank protection <ul style="list-style-type: none"> <li>• Modern slope protection material and techniques</li> </ul>	Kaysone Phomvihane
Improved urban roads and drainage <ul style="list-style-type: none"> <li>• Road widening, lateral drainage, lighting, and signage</li> </ul>	Kaysone Phomvihane, Phine, Dansavanh



## **A. Need for Subprojects in Kaysone Phomvihane, Phine, and Dansavanh**

### **1. Kaysone Phomvihane**

33. Kaysone Phomvihane is a border town that serves as a major agricultural processing center and an emerging prime destination for manufacturing industries and business enterprises. Its strategic location across the Mekong River from the town of Mukdahan in Thailand offers considerable opportunities for increased economic activities and investments. With the increasing cross border trading and commercial exchanges, the town is emerging as a dynamic economic center for public and private sector investments.

34. The rapid growth in urban population and expansion of the town center generated complex environmental and social challenges. Given limited resources, local authorities are having difficulties addressing the growing demands for essential urban infrastructure and respond to the requirements of an urbanizing local economy.

### **2. Phine**

35. Phine is a market town located at an important road junction along the EWEC with a bypass road connecting to neighboring towns and provinces. The town center is characterized by a thriving trading and commercial activity for goods and services produced in Savannakhet and those imported from neighboring countries particularly Thailand and Viet Nam. The increasing local economic activities brought about by improved road and transport network along National Road 9 (NR9) is stimulating local opportunities for gainful employment among local residents and for establishing business enterprises among the private sector. The poor condition of the interior roads, however is adversely affecting socio-economic conditions in the town center.

The improvement of the road with the construction of drainage structures will provides convenient access of local residents to social and economic services. It will also mitigate the adverse effects of perennial flooding of the major access road in the town center where majority of the residential houses and commercial establishments are located.

### **3. Dansavanh**

36. Dansavanh bordering Viet Nam is emerging as a trading center and a prime location for a special economic zone. The town which is within the jurisdiction of the District of Sepone is located along the 20 kilometer (km) stretch of the National Road No. 9 (NR9) leading to the border crossing of the Lao PDR-Viet Nam border. Within a land area of approximately 4,800 hectares (ha), Dansavanh is the site of the special economic zone managed by the Dongsavanh Border Trade Zone Authority (DBTZA).

37. Similar to Kaysone Phomvihane and Phine the poor conditions of the interior roads parallel to both sides of NR9 are negatively affecting economic development, and overall quality of urban life and business. The improvement and upgrading of the interior roads will offer economic opportunities for the emergence of a new town centers and will decongest the existing crowded town center. The provision of adequate access and mobility are considered essential measures to cope up with the requirements of increasing economic activities and a growing urban population brought about by the influx of in-migrants from neighbouring provinces and countries like Viet Nam and Thailand.

## **B. Solid Waste Management in Kaysone**

### **1. Existing Solid Waste Management**

38. The rapid growth of the town center and sub-urban areas in Kaysone Phomvihane has created considerable demands for essential urban environment infrastructure. The collection, transport and disposal of solid waste have become the perennial concerns of the local residents given the inadequacy of the existing solid waste management system, with only some 40-50 % of the solid waste being collected and with unacceptable operation of the existing dumpsite.

39. Waste production has increased in the district from 16,920 tonnes in 2006 to 18,784 tons in 2010, of which only 10,015 tons were disposed in 2010 (WREA, 2010). Average of daily waste production is 52 tons or 0.72 kilogram (kg) per capita-day daily.

40. The existing dumpsite (Figure 2) has four disposal cells of an approximate total area of 5 ha. Two cells are partly excavated and partly filled with solid waste. Culverts established between the cells, leading to a discharge point into an open canal leading to lowest end and a dike at the lowest end of the site with a small retention pond upstream. A discharge pipeline is going through the dike and is equipped with a sliding gate, currently out of function. Discharge is led to a small stream going through the downstream rice fields.

41. The existing dumpsite was established in 1999 through a UNDP/NORAD program. The original 16 ha site included:

An access road from the main road;

Simple administration building now inadequate for the present requirements;

- Internal roads surrounding landfill cells currently in poor condition;
- Four, 1.25 ha disposal cells partly excavated and partly filled;
- Culverts between cells leading to a discharge point into an open canal; and
- Dike at the lowest end of site with a small leachate retention pond.

42. The discharge pipeline that extends through the dike with a sliding gate is currently out of operation. Untreated discharge is fed to a small stream which empties into rice fields. The current operation is inadequate. The small backhoe in use is not able to cover the waste. Fires on the landfill are common, likely set to get extract metals. There are scavengers / waste pickers operating at the existing landfill.

43. The existing recycling system is based on informal collection in the city of the most valuable fractions, selling them to junkyards and dealers. A private recycling contractor is operating a rudimentary MRF at the disposal site. The percentage recycled is assumed low; in the range of 5-10 % of the total waste stream. The current fees are \$16/year for each serviced household and varying fees for commercial customers. No system exists for hazardous waste (HW).

### **2. Objectives for Solid Waste Management**

44. The subproject aims to improve and expand the solid waste management and contribute to making Kaysone Phomvihane a clean and liveable town for residents and business development. Original objectives for solid waste management are as follows:

- To establish new cells with sanitary landfilling at or adjacent to existing site;
- Update mitigating measures at existing site for proper disposal of solid waste;
- Procure additional equipment and facilities for improved solid waste collection;
- Introduce biological treatment of selected organic waste types through aerobic composting;
- Procure additional equipment for improved operations at expanded landfill;
- Implement public education, and motivation and awareness campaigns to support the improved solid waste management system;
- Promote public private partnership in the operation and maintenance of the new sanitary landfill and new MRF;
- Establish a modernized solid waste management system that offers high collection service coverage, improved recycling, with adequate end-disposal of waste with minimal negative impacts; and
- Achieve an immediate minimum of 20% recycling with a long-term goal of 45% recycling rate.

### **3. Design Features of Improved Solid Waste Management System**

45. Improved solid waste management in Kaysone Phomvihane will consist of an upgraded collecting system, modern sanitary landfill design, composing plant, an MRF, and capacity building summarized as follows:

#### Collection system

- 1000, 240 litre plastic bins on wheels with lids;
- 100, 5 cubic meter (m<sup>3</sup>) steel containers; and
- two compacting trucks with mechanical loading equipment for bins and containers

#### Sanitary landfill site

- 17,000 square meters (m<sup>2</sup>) site excavated to 3 meters (m), with approx. 5 year lifespan for 8-10 m waste;
- Gravity fed leachate collection and treatment system based on aeration and settlement ponds;
- landfill equipment - second hand bulldozer and compactor;
- upgraded personnel building; and
- upgraded all-weather access and internal roads

#### Composting plant

46. The Urban Development Administration Authority (UDAA) intends to establish separate biological treatment of food and organic waste from markets to produce good soil conditioner. Aerobic treatment using windrow composting with forced regular mixing is a proven inexpensive approach.

#### Capacity building

47. Institutional capacity development will be provided to promote public/private partnerships in the operation and management of the MRF, where municipal government will provide regulatory guidance and institutional support. It is critical that all operators of the upgraded system undergo extensive training in modern SW handling.

Figure 2 shows an aerial photo of the existing landfill site and illustrates the locations of the components of the planned sanitary expansion. The letter annotations in Figure 2 are defined as follows:

- A. Personnel building and surrounds (to be upgraded);
- B. Internal roads (to be upgraded) around existing cells;
- C. New 1.7 ha sanitary landfill excavated to 3 m; and
- D. Location of gravity-fed leachate collection and treatment system comprised of aeration and settlement ponds.

**Figure 2. Aerial view of four cells of existing landfill with planned upgrades**



48. The sanitary landfill expansion on the site of the existing landfill will have the following technical components:

- Improved paved access road
- Guard and recorder house if necessary
- Weighing bridge if necessary
- Administrative building (office, wardrobes, showers, toilets)
- Additional service building with storage etc.
- Landfill equipment depot with simple workshop
- Natural gas extraction and preferably utilization if feasible
- Proper all weather, laterite internal road system
- Surrounding run-off ditches or dikes to divert surface water

- Underlying cell liner if soil conditions risk of groundwater contamination
- Underlying leachate drainage system of sand or gravel with central pipeline
- Leachate collection and biological treatment plant
- Upgraded perimeter fencing
- Complete signage and lighting at tipping area if necessary
- Reception station for hazardous waste
- Ground water monitoring well(s) downstream the landfill
- Construction of a 50 m reinforced concrete bridge across Houay Alone to connect the interior lateral road to the northern end of the NR9. The Bridge deck shall be 7m of carriageway and 1m of both way extending for sides walking as the total of bridge deck width to be 9m Min.
- Construction of road junctions to connect the interior lateral roads to the main road along NR9. The road junctions measure from 100 m to 300 m in length.
- Capacity building for operation and maintenance of the main road, drainage structures and related facilities.

#### **4. Decommissioning of Existing Kaysone Dumpsite**

49. The existing dumpsite will be closed as part of the preparations for the construction of the new sanitary landfill. Table 3 outlines the indicative procedure to close the dumpsite based on a preliminary assessment of the environmental conditions of dumpsite. The closure process outlined in Table 3 is indicative because the final, detailed procedure that is developed to close the dumpsite must wait for the results of an Environmental Compliance Audit (ECA) that will be conducted on existing dumpsite.

#### **5. Environmental Compliance Audit**

50. An ECA of the dumpsite will be conducted pursuant to the requirements of the SPS (2009).<sup>5</sup> The ECA will draw from the results of a separate groundwater quality study, and will be conducted to clarify the following general issues.

1. Requirements of existing regulatory framework for landfills in Lao PDR;
2. Groundwater quality above (upstream), underneath, and below (downstream) of the existing dumpsite;
3. Permeability of soils, and hydrogeology underlying dumpsite area and site of new sanitary landfill.
4. The content and toxicity of the cells of the dumpsite;
5. The influence of existing dumpsite on the environment;
6. Closure procedure for existing dumpsite including top coverage, and/or transfer of cell contents to adjacent new sanitary landfill; and
7. Influence of existing dumpsite on design of new sanitary landfill.

51. The detailed terms of reference for the ECA and the groundwater quality study are found in Appendix D. The results of the ECA will be used to determine the final detailed design of the new sanitary landfill. The report of the ECA will form an appendix of the IEE.

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<sup>5</sup> SPS (2009), SR1, Appendix 1, para 10

**Table 3. Preliminary assessment and procedure to decommission dumpsite in Kaysone.****Background:**

Four hectares of the 16 ha designated for landfill in Kaysone Phomvihane have been occupied by the existing dumpsite (Figure 2). The dumpsite consists of four cells of approximately 1.25 hectares (ha) which are expected to be fully utilized in the next few years as a response to increasing development in the area.

No bottom drainage system was installed with the disposal cells. A liner was not installed because initial surveys suggested the underlying soils are impermeable. A gravity-fed culvert system was installed that leads to a central outlet from which leachate is discharged to a canal. At this point a dike contains a leachate pond in which some leachate treatment occurs before being discharged to adjacent rice fields. However, recent groundwater sampling, and observations at the dumpsite indicate that leachate from the dumpsite is likely seeping into the ground.

A portion of the MSW is chronically on fire which apparently reduces water pollution, while contributing to local air pollution. Another key condition is that in the tropical climate and with MSW being exposed to air in thin layers, most of the organic components are already aerobically biodegraded leaving plastics, metals and inert materials with limited potential for water pollution. These conditions should be considered in the future environment compliance audit (ECA), and in design of an appropriate top cover of the cells of the existing dumpsite.

The waste cells are not covered, and waste and litter is spread outside the operational area. The dumpsite operation appears unplanned and unorganised.

The following initial criteria were adopted by the subproject for the decommissioning of the dumpsite:

- a. completely cover the disposed MSW;
- b. prevent rain water and surface water to penetrate down to the MSW; and
- c. provide a solution for oxidation of methane coming from the MSW.

Based on the preliminary assessment the following indicative closure solution has been identified:

1. Level and shape the surface making it convex with a minimum slope of 2% letting rain water flow to the adjacent area.
2. Ensure open cut-off ditches capture and discharge rain water to outside the disposal site area.
3. Lay down 40 centimeters (cms) of impermeable clay excavated from authorized areas at or near the site.
4. Add a 10 cm layer of sandy material excavated from authorized areas at or near the site that provides drainage for rainwater to the sides that distributes gas emanating from MSW below.
5. Lay down a 20 cm top layer of soil suitable for grass re-vegetation, and for supporting bacteria oxidization of methane gas (local soil mixed with earth); and
6. Plant robust grass as top vegetation.

The cost for this the preliminary procedure has not been estimated in detail. The indicative closure process will be finalized with the results of the ECA.

### C. Materials Recovery Facility in Kaysone

52. Solid waste is disposed at the dumpsite located eight road kms from the center of the town. A private company occupies an MRF in a one hectare lot adjacent to the dumpsite which contains two warehouse type buildings for the sorting, storage and baling of recyclables (Figure 4). These materials are obtained by purchase from waste collection crew, pickers and other junkshops.

53. Recovery of the recyclable materials for reuse and recycling is done at varying levels at the waste generation level. Unsanitary picking of waste is done at the bins (34 pickers), waste collection trucks (25 pickers) and the dumpsite (28 pickers). The recovered recyclables are sold to about 26 junkshops in the district and to the MRF near the dumpsite.

54. The proposed MRF component aims to construct an upgraded sanitary and centralized MRF for recovery of recyclable materials and production of compost as part of the promotion of the principles of the 3 Rs namely reduction, recycle and reuse (Figure 3). The MRF will be supported by a parallel government program which will involve the passage and strict implementation of waste segregation at source, segregated waste collection and sustained conduct of information and education campaign on proper solid waste management and practices. Table 5 summarizes the features of new MRF.

**Table 4. Features of MRF of Kaysone subproject**

<b>Location</b>	<b>Kaysone Phomvihane, Savannakhet Province, Lao PDR</b>
<b>Objective</b>	Recovery of recyclable materials and production of compost from municipal solid waste generated at Kaysone Phomvihane and improvement of the solid waste management system
<b>Technology</b>	<ol style="list-style-type: none"> <li>1. Recovery of recyclables through fully manual sorting aided by payloaders for movement of waste and recyclables and by a baler for compaction of the recovered materials</li> <li>2. Production of compost through the windrows method</li> </ol>
<b>Capacity</b>	<ol style="list-style-type: none"> <li>1. The composting plant can receive and process 9 cubic meters of source segregated biodegradables from market waste per day to produce the compost windrows.</li> <li>2. The materials recovery facility (MRF) can process at least 30 cubic meters of dry, source segregated non-biodegradable waste<sup>6</sup> and truck sorted recyclable materials using eight sorters.</li> </ol>
<b>Operating Schedule</b>	The facility shall operate from 7:30 AM to 4:30 PM from Monday to Saturday.
<b>Target Inputs</b>	<ol style="list-style-type: none"> <li>1. The primary inputs of the composting plant correspond to wet, source segregated biodegradable waste materials from the market. The secondary inputs correspond to mixed waste materials from both households and market</li> <li>2. The primary inputs of the MRF correspond to the dry, source segregated waste of the locators of the Savan Seno Special Economic Zone which is now under construction and the truck segregated recyclables which the facility will purchase and resell to the adjacent MRF and recycling centers in the province</li> </ol>
<b>Target outputs</b>	<ol style="list-style-type: none"> <li>1. Recyclable materials which include plastic bottles, tin cans, metal containers, carton and white paper, metal</li> </ol>

<sup>6</sup> These inputs will from the locators of the Savan Seno Special Economic Zone which is now under construction

<b>Location</b>	<b>Kaysone Phomvihane, Savannakhet Province, Lao PDR</b>
	2. Compost
<b>Design Features</b>	The MRF/Composting plant will be housed in a 1,350 square meters (m <sup>2</sup> ) shed type building with paved surface and designated areas for receiving and sorting of waste, shredding of biodegradable materials, windrows, curing and compost storage areas, office, area for equipment, and toilet and wash areas for pickers and facility supervisor/staff. The facility will be equipped with a payloader, baler, shredder, screen, weighing scales, bins and a small power generating set. It shall have a main front door and a side door to respectively facilitate unloading of waste/removal of residuals and loading of compost and recyclables.
<b>General Process Flow</b>	<ol style="list-style-type: none"> <li>1. For the composting plant, source segregated biodegradables waste will be inspected then unloaded into the receiving/sorting area. The biodegradables will be moved manually or by payloader into the shredding area. The shredded biodegradables will be piled into windrows. From the windrows, the compost will be moved by payloader into the curing area and subsequently to the screening and storage and bagging area. The non-biodegradable components will be moved by payloader into to the adjacent landfill for proper disposal.</li> <li>2. For MRF, waste will be inspected then unloaded into the receiving/sorting area. Recyclables will be segregated from the waste pile and stored in designated temporary storage areas. Biodegradable and residual materials will be moved by the payloader into the nearby sanitary landfill cell. Recovered recyclable materials will be weighed, baled or packed and/or sold to the adjacent MRF or recycling facilities in the province or region.</li> </ol>
<b>Management and Operational Arrangements</b>	<ol style="list-style-type: none"> <li>1. The MRF and composting plant will be managed under a public – private partnership arrangement. The province of Savannakhet and Kaysone Phomvihane District through Urban Development Administration Authority (UDAA) will engage a private company to operate the MRF and composting plant.</li> <li>2. A technical supervisor and two staff shall oversee the day to day operations of the two facilities. Eight waste pickers shall undertake the segregation of the recyclable components. The pickers shall be compensated in accordance with the amount of valuable materials recovered. A minimum of four regular personnel will be hired to implement the composting activities including the operation of the payloader, shredder and screen.</li> <li>3. Recovered recyclables shall be sold to the adjacent privately owned MRF and recycling centers in the province.</li> <li>4. Compost shall initially be used in the pilot vegetable garden that will be established adjacent to the facility. It will also be sold to local farmers.</li> </ol>
<b>Key project stakeholders</b>	Waste pickers at dumpsite and urban sector of Kaysone Phomvihane, waste collection crew, UDAA, Kaysone Phomvihane District, junkshop operators
<b>Requirements for sustained operation</b>	<ol style="list-style-type: none"> <li>1. Passage and implementation of a decree which requires 2-level waste segregation at source into wet biodegradables and dry non-biodegradables</li> <li>2. Passage and implementation of a decree requiring segregated waste collection. Non-segregated or mixed waste shall not be collected.</li> <li>3. Passage and implementation of a decree which provides the MRF operator priority in the purchase of segregated dry non-biodegradables from locators, factories, and establishments within the current and future special economic zones</li> <li>4. Capacity building for MRF supervisor and staff</li> </ol>
<b>Implementation Schedule</b>	<ol style="list-style-type: none"> <li>1. Detailed Engineering Design – 3 months</li> <li>2. Bidding and Award of Construction Contract – 4 months</li> <li>3. Construction – 6 months</li> </ol>



Figure 3. Plan of MRF of Kaysone subproject



Figure 4. Location of new MRF at Kaysone existing dumpsite



## **D. Wastewater Treatment in Kaysone**

### **1. Existing Situation**

55. The majority of households rely on water flush latrines and are connected to a pit or chamber for containment of excreta. However, due to the low permeability of the soil and the high groundwater table around Kaysone Phomvihane many soak-a-ways fail to operate effectively resulting in discharge of sewerage from tanks into drainage channels or low lying areas. This results in polluted effluent overflows, environmental degradation and health hazards. Little attention is paid to stagnant water which provides disease vector habitat.

56. Existing septic tanks in general are poorly designed and constructed, which results in solids being carried over to drains or soak-aways, leading to odours, health risks, blockages, and overflows. Kaysone Phomvihane town has sludge vacuum tankers for emptying septic tanks and proper disposal facilities for septic effluents.

57. Household grey water (washing, laundry, kitchen) is discharged directly into the drainage. Along with grease, oil and sediment data for 2007-2008 indicate about 14,000 cubic meters per day (m<sup>3</sup>/day) of wastewater is discharged and drained out into the Mekong River with less than 50% undergoing any treatment. No public sewer network and wastewater treatment plants exist currently for the urban population

58. The drainage system is inadequate. Liquid waste from latrines is being directly discharged into the drainage channels or drains, which may lead to groundwater contamination, and eutrophication of surface waters. Wastewater which drains into the concrete canals cannot be biologically treated naturally. Stagnant water in the canals becomes highly toxic concentrated during the dry season. Backwater from Mekong River is a root cause to make the drainage system ineffective.

### **2. Houay Longkong**

59. The Houay Longkong section, which is the focus of subproject, is an area of 4 ha that is a floodplain in the rainy season. This consists of collective and individual land tenures. Another water outlet from the canals of the town to the Mekong River is at Houay Khilamang as the last section of this stream has low population. Wastewater drains to the Mekong River through natural stream at the ending section of the stream – about 100 m to the Mekong River.

60. The drainage is also of great importance for abatement of flooding. Roadside drains and open canals lead the water either directly, or via smaller streams, to the Mekong River. If the land is low and the river is high flooding will occur anyhow, which is a returning event for e.g. the old town area. The existing drainage facilities are mainly installed under ADB projects and have undergone certain improvements, the last being in 2000-2003 under the ADB Secondary Towns Development Project. The drainage channels were then rehabilitated and flood gates were installed at two of three large outlet points to the river. However, due to mechanical defects, these gates have never been operated and flooding occurs repeatedly. The drainage system is unable to cope with the physical conditions, and the system is frequently blocked by sediments from surface runoffs and waste.

### **3. Design of Wastewater and Drainage Components in Kaysone**

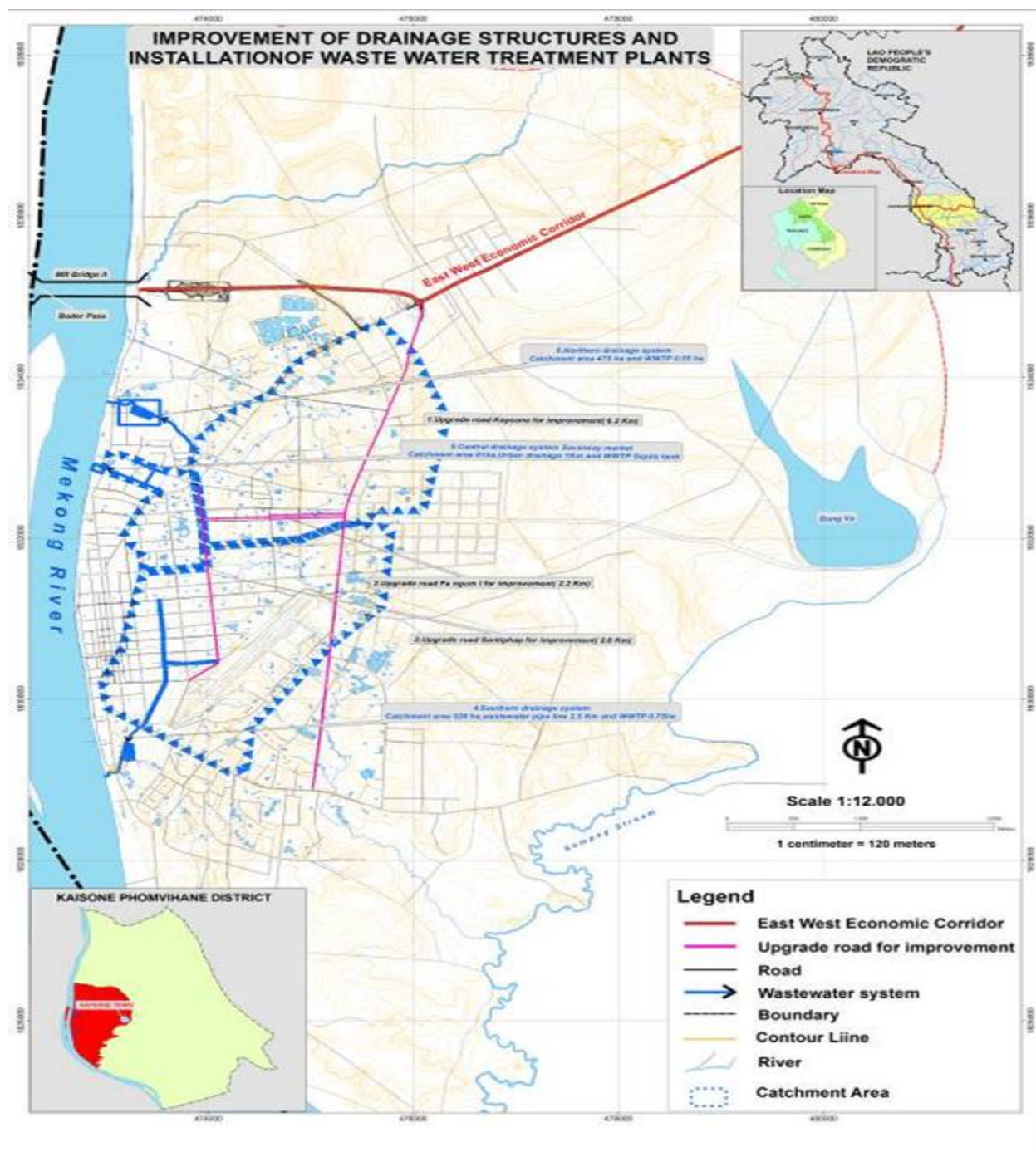
61. Package for southern Houay Longkong drainage system:

- i) Improvement of existing lined open canal where damaged;
- ii) Lining a main sewerage pipes 2.5 km following/parallel the open storm drainage canal to the wastewater treatment plant and sewerage collecting pipes;
- iii) Wastewater treatment plant with surface aerated basin equipped with electric motor with propeller and slinger-ring on vertical shaft and retention pond and Improve the Natural Stabilisation Pond;
- iv) Construct new open canal of about 0.5 km length follow the Houay Longkong with rip-rap slope erosion protection;
- v) The water pumps housed equipped with 2 pump unit capacity not less than 0.5m<sup>3</sup>/s each; and
- vi) Construct of erosion protection the Houay Longkong outlet.

62. Package for Central Savanxay Market area:

- i) Construct an urban drainage (Pipes Culverts, Manholes, Gutters and Chamber etc.) Visoukan and Phongnotha roads and connecting drainage to drain from Phongnotha road to Visoukan road; and
- ii) Construct a wastewater treatment plant at the outlet of Chomekeo stream with Septic Tanks requires land area about 15x30m adjoining the stream outlet.

Figure 5. Overview of wastewater treatment and drainage improvements in Kaysone





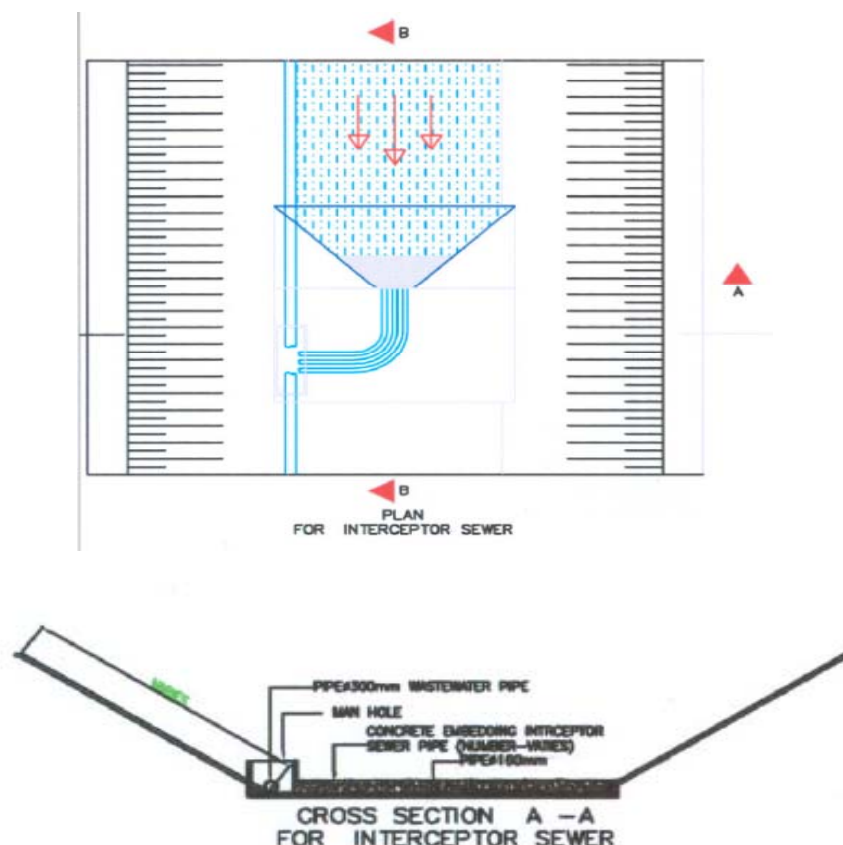
63. Package for Houay Khilamang drainage system:

- i) Installation of sewer pipes total approximately 700-750m in length with diameters ranging from 400 mm to the wastewater treatment plant;
- ii) Construct an urban drainage 1,130m (Pipes Culverts, Manholes, Gutters and Chamber etc.) for area adjacent to the northern side of Savanxay Market drain to Houay Khilamang, at dry season the wastewater will be transmitted to the wastewater treatment plant through wastewater pipe line; and
- iii) Wastewater treatment plant with surface aerated basin equipped with electric motor with propeller and slinger-ring on vertical shaft and retention pond.

**a. Sewer Interceptor Design**

64. For the intercepting wastewater from the area a HDPE pipe fixed to the bottom open drainage canal and with interceptors installed at every intersecting road (Figure 6). For maintenance and cleaning control will install concrete boxes for every 50m. The wastewater pipe will increase to the downstream Ward and will be secured in concrete.

**Figure 6. Overflow interceptor sewer in Kaysone**

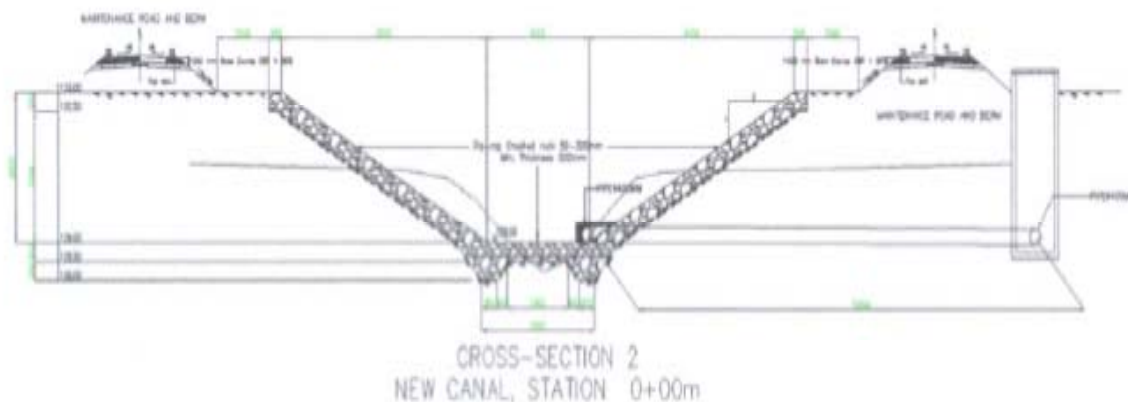


embedding. For the last section after crossing the Phokadouath road, the wastewater pipe shall installed and connected to the newly constructed drainage canal to the wastewater treatment plant. The wastewater pipe will install a manhole for every 40m for the maintenance and cleaning purpose. This option is cheap and practically can be implemented to fit with the existing situation since open drainage canals already exist.

### b. Drainage Canal Design

65. For the construction of the new drainage channel in last section of Houay Longkong natural stream the following option was chosen (Figure 7). The drainage canal after the box culvert under the Phokadouath road, the drainage canal will be constructed with a width 4 m, side slopes 1:2 and 4m height. The bottom of Houay Longkong natural stream varies from 128.5MSL down to 127.00MSL. The bottom slab of outlet culvert is estimated about 124.00 MSL. The bottom of the new constructed canal will be set up the upper end of new canal to join with the bottom of the box culvert under road Phokadouath is about 129.00MSL, with the bottom slope (at gradient  $i=0.002$ ), therefore, at the end of canal would be 128.00 MSL. If the ending of new canal will have a different level of elevation, the erosion, protection and scouring protection will be appropriate arranged. The canal bed will be excavated and some will be filled. The natural soil is sensitive to the deformation and slope stability, the erosion protection would be suitable by loose rip-rap of crushed rock sizes 50 millimeters (mm) to 300 mm with a minimum thickness of 500mm, between crushed rock and soil so the geotextile should be used.

**Figure 7. New drainage canal following the Houay Longkong stream in Kaysone**



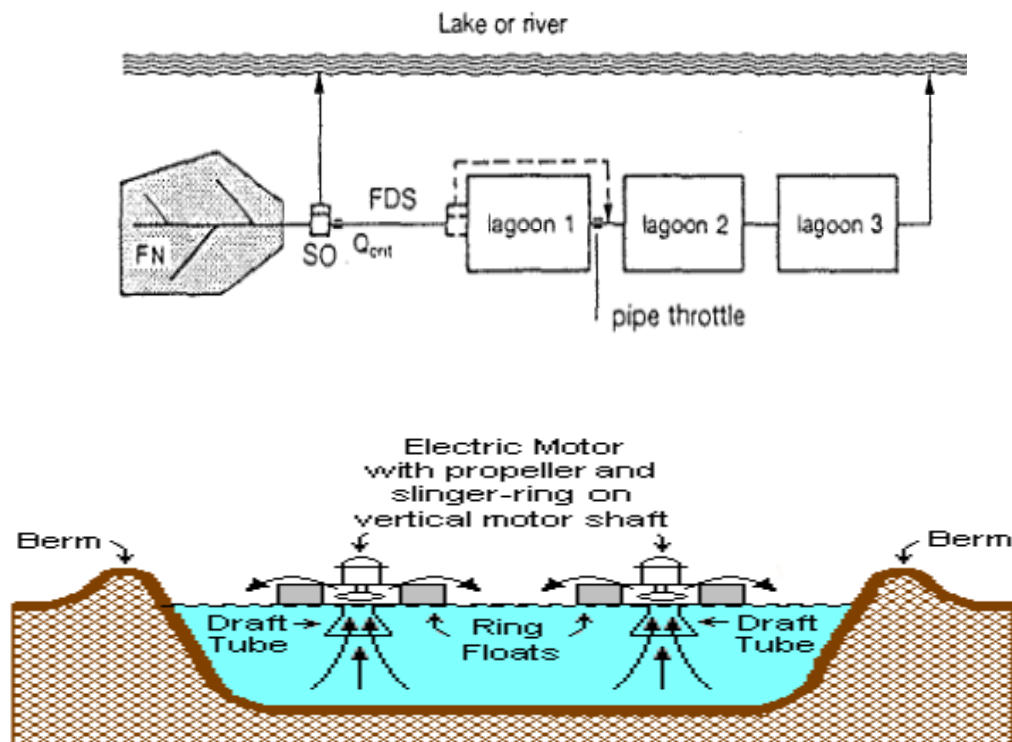
### c. Wastewater Treatment Plant

66. Three WWTPs will be constructed as indicated in section 3 above. Earthen, aerated wastewater treatment plants will be constructed in which mechanical mixing introduces air for BOD removal and to suspend solids. Performance of the plants will depend on aeration. Three cell systems are recommended. Agitation must be sufficient to suspend all solids. Detention time: 1.5 to <3 days. The design for BOD removal is based on first-order kinetics and the complete mix hydraulics model.

67. An aerated pond system would have supplemental air sources to provide dissolved oxygen accomplished with surface mechanical aerators and mixers, or by various forms of diffusers supplied with compressed air from mechanical blowers or compressors (Figure 8). For equal sized ponds, the aerated pond would provide the best treatment due to the mechanical addition of oxygen, and for a given organic loading, would require the least amount of land area

68. The land where proposed for the wastewater treatment plant is empty no construction structures have been on this area due to the flood occurring in wet season. The construction of Aerated Wastewater Treatment Plant Pond is on excavation. The intake/interceptor has an elevation of about 129.00MSL, but the area where proposed wastewater treatment pond is about 130.0 MSL. The top dike would be at elevation between 132.00MSL to avoid potential flooding.

**Figure 8. Typical aerated wastewater treatment plant**



#### **A TYPICAL SURFACE - AERATED BASIN**

Note: The ring floats are tethered to posts on the berms.

**d. Central drainage system around the Savanxay Market area wastewater treatment**

69. With the main objective of wastewater treatment generating from this area before releasing to the nature as the Mekong river and in the consideration of budget availability under the project implementation, the town will need to adopt the most suitable and fitting option in the real situation. On this central drainage system no works to improve the drainage channel on the southern side of Visoukan road is needed except to intercept the wastewater from this drainage after crossing the Chomkeo road to the WWTP.

70. The drainage around the market area will construct under this subproject a total of 1,000m. The drainage will adopt as urban drainage structures (pipes culverts, manholes, gutters and Chamber etc.) with top cover by base course materials and grassing to improve the environment. The north-east drainage of the market will be connected to the southern with the same standard as urban drainage.

71. Wastewater from the market area will be interconnected to the urban drainage and conveyed to the WWTP. The wastewater from the market area will be collected through gutters and chambers then connected to pipes culverts with HDPE. The wastewater is conveyed to the WWTP at Chomkeo stream outlet. The existing culvert crossing Chomkeo road from both sides of Visoukan road, during the low flow weather, the wastewater from these Visoukan road side drainages will be intercepted to WWTP constructed in kind of a septic tank. To adopt this type of treatment plant is the only option. Available land belongs to the government.

72. By implementing the improvement of drainage system around the Savanxay Market and construct of WWTP at the end of drainage system has responded to the requirement of National strategy on environment to the years 2020 and its action plan for the years 2006-2020. Its objectives are to realize environmental management, to implement measure for sustainable development, to secure sustainable use equitable access to water resource and to use land with securing ecosystem.

**E. Mekong Riverbank Protection in Kaysone**

**1. Existing Conditions**

73. The Kaysone Phomvihane River Bank Embankment Protection Subproject will uplift the quality of life and upgrade the living conditions in Kaysone Phomvihane through the improvement of Mekong Riverside area and establishing urban environmental and economic infrastructure. The subproject will reduce flooding and minimize physical damage to houses and businesses. Employment opportunities will be generated by the increased investments along the riverbank.

**2. Sub-project Components**

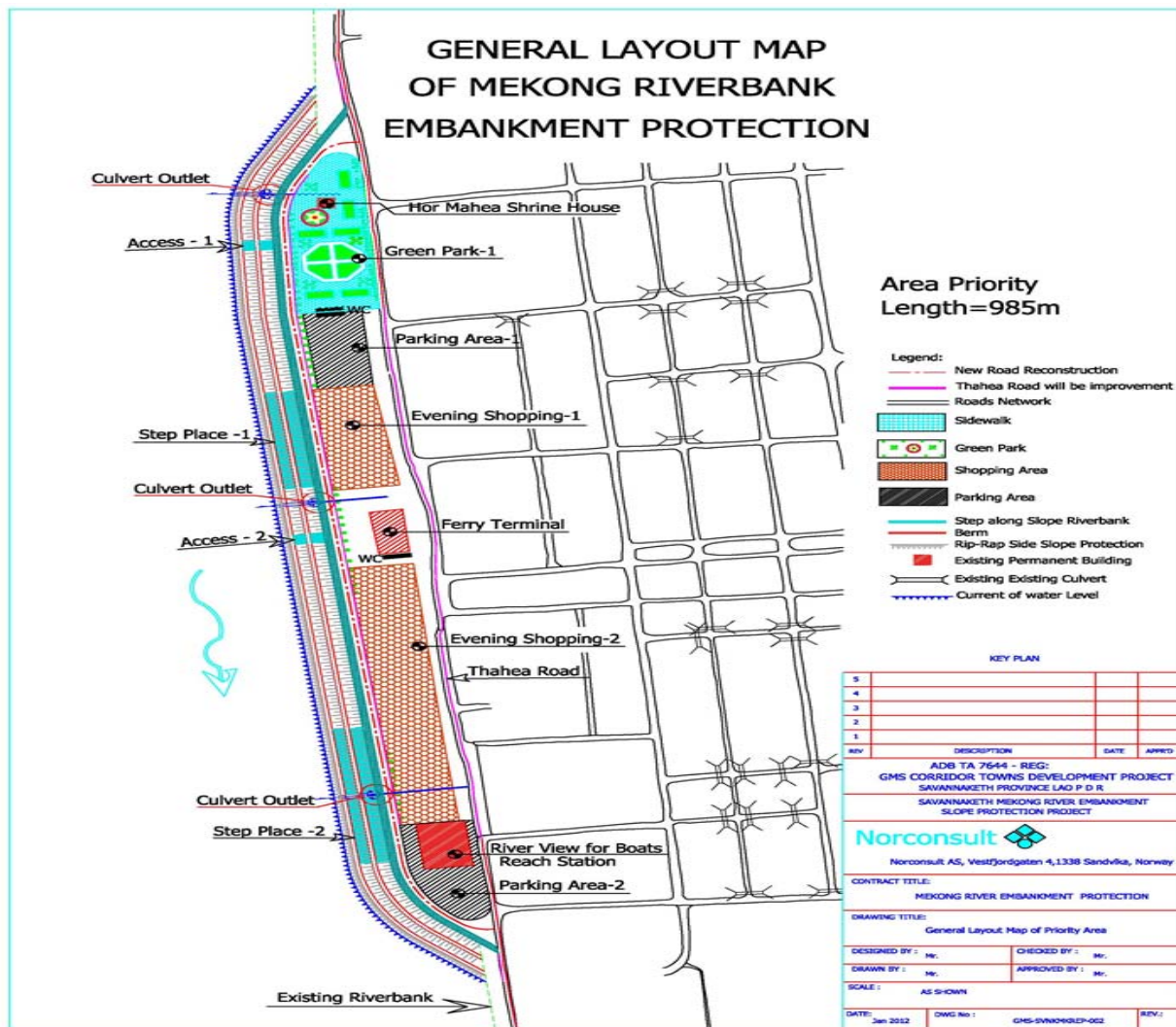
74. The improvement of the Kaysone Phomvihane River Embankment Protection Subproject will involve the land construction an extended riverside area with erosion protection of extending out for 40-50 m for about an 800m long stretch (Figure 9). As part of the master plan for Kaysone Phomvihane, the Mekong riverbank has been studied for about 2.6 km of development.

75. The expanded area is allowing for a wider road and more spacious area for establishment of economic activities such as local trading, restaurants, etc. The components include the following:



- Construction of a platform on piles extending the riverside area for economic/recreation/cultural facility complex of about 800x50m;
- Embankment/riverside protection of the under laying riverside slopes;
- Construction of concrete/asphalt pavements and drainage structures;
- Construction of administration building, comfort rooms and others; and
- Installation of water, wastewater and power supply.

**Figure 9. Layout of Mekong riverbank protection in Kaysone**



## F. Urban Roads in Kaysone Phomvihane, Phine and Dansavanh

### 1. Kaysone Phomvihane

76. This component Kaysone Phomvihane subproject will involve widening and re-sealing with asphalt Kaysone Road and Santhiphap Road providing four lanes with improvements to roadside drainage structures, installation of a median divider, tree planting and street lighting system. The upgrading of Fa Ngum is to include provision of a one-way system with a uniform width of 10 m (widening required on Fa Ngum 1). Tree planting will be undertaken on both sides of the roads along with conversion of the empty lot into a park.

77. The total length of the roads upgrades is 12.9 km (Table 5). The upgraded roads will be wide enough to accommodate an asphalt concrete sealed carriageway and footpaths/covered drains (Figures 10 and 11).

**Table 5. Road upgrades in Kaysone**

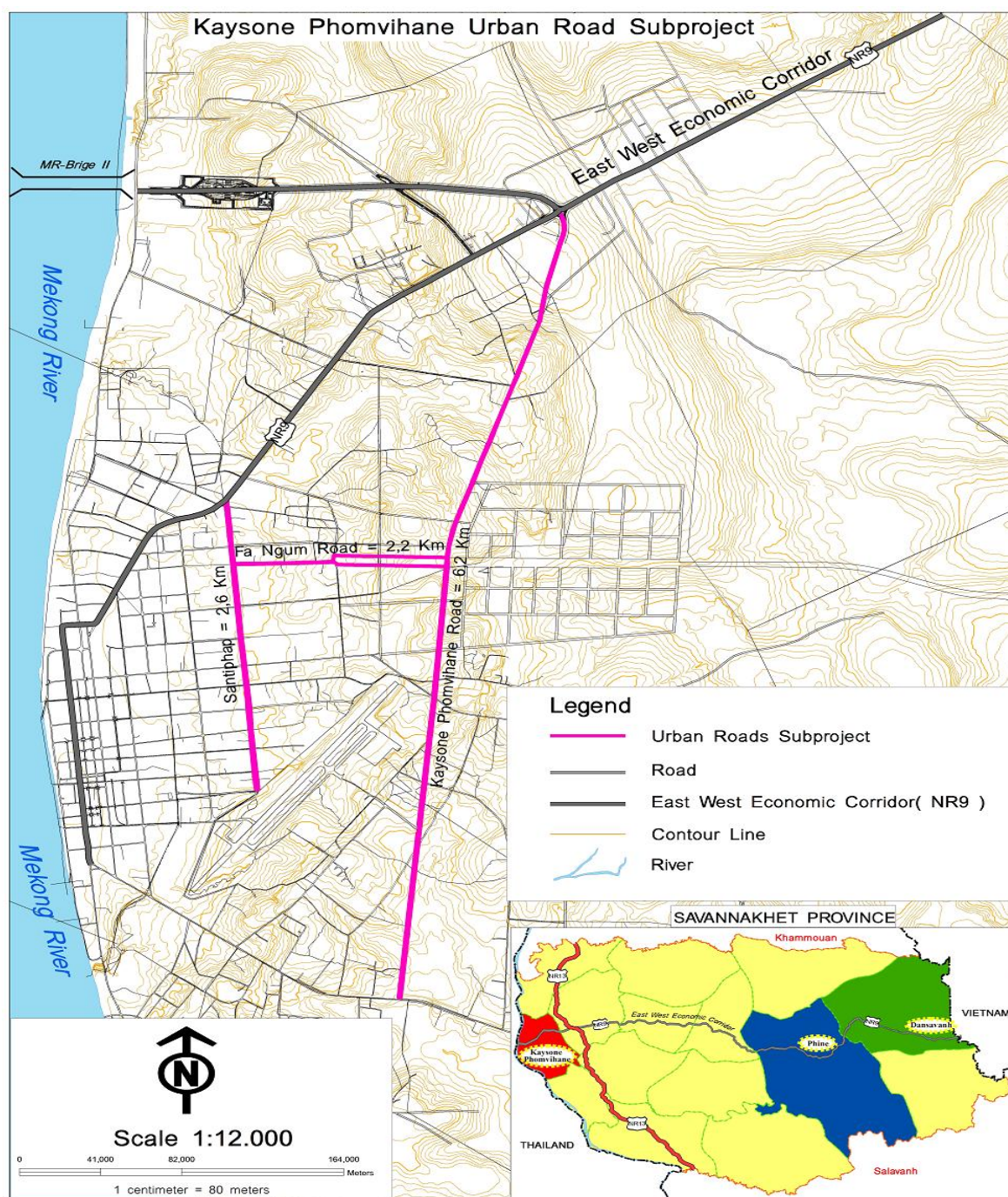
Road	Length (km)	Proposed width (m)
Kaysone	6.7	25
Santhiphap	2.6	20.2
Fa Ngum 1	2.8	10
Fa Ngum 2	0.88	10
Total	12.9	

78. Kaysone Phomvihane Road will be upgraded to a total cross-section width of 25 m to provide four traffic lanes sealed with asphalt concrete (1 x 3.5m and 1 x 3.8m on each side) plus a 1.5m wide shoulder to be used by motorbikes, installation of a 3.4m wide reinforced concrete island median for safety, footpath/covered drain on each side of the road (2m wide) which is sufficient width to re-install water supply pipes, telecommunication and electricity cables. Street furniture will be included, this will be located in the median island; traffic signage, installation of street lighting and tree and grass/shrub planting.

79. Santhiphap Road will be upgraded to a total cross-section width of 20.2 m and improved to a similar standard as described above providing four lanes without the shoulder extension for motorbikes and a narrower median island (1.2 m in width); and

80. At km 0.68 on Fa Ngum Road-1, the system will become one-way around the proposed park area. The road will be upgraded to an asphalt concrete pavement and a 2 x 2m wide footpath will be provided. Installation of the drainage system, culverts, street lighting and tree planting will be according to MPWT specifications (2006).

**Figure 10. Upgraded road network in Kaysone**





- a. Civil works for upgrading and widening 9.42 km interior lateral roads into concrete asphalt pavements
- b. Construction of 15-20m wide open drain canal structures on both sides of the 9.42 km road,
- c. Construction of sidewalks, installation of street lights, and buffer trees along the roadside,
- d. Capacity building for operation and maintenance of main road, drainage structures and related facilities.

82. The 9.42 km interior lateral roads (Figure 13) will consist of 5.4 km existing earth road and a total of 4.2 km new road alignments which will be constructed to connect the lateral roads to NR9. The 4.2 km road will consist of the following:

- 1.82 km road alignment in the north western side of the NR9
- 1.28 km road alignment in the south western side
- 0.70 km road alignment in the south eastern side
- 0.32 km road alignment at the junction of NR9 to the northern bypass.

**TYPICAL ROAD SECTION - OPTION-2**  
**KAYSONE ROAD**

24.40

Centerline

8.50

8.50

2.40

3.50

3.50

1.50

0.50

1.50

3.50

3.50

2.00

0.40

2.00

Asphalt Concrete Pavement  
Prime Coat MC-70

Basecourse Thickness 20cm CBR 80Min  
Subbase Thickness 25cm CBR 30Min  
Subgrade Thickness 30cm CBR >8

SB-Fill = 1,230m³  
BC-Fill = 740m³

Reservation place for Water Supply and Electric

RC CHAMBER FOR SULLAGE CONNECTION

RC Manhole

Figure 12. Network of roads to be upgraded in Phine

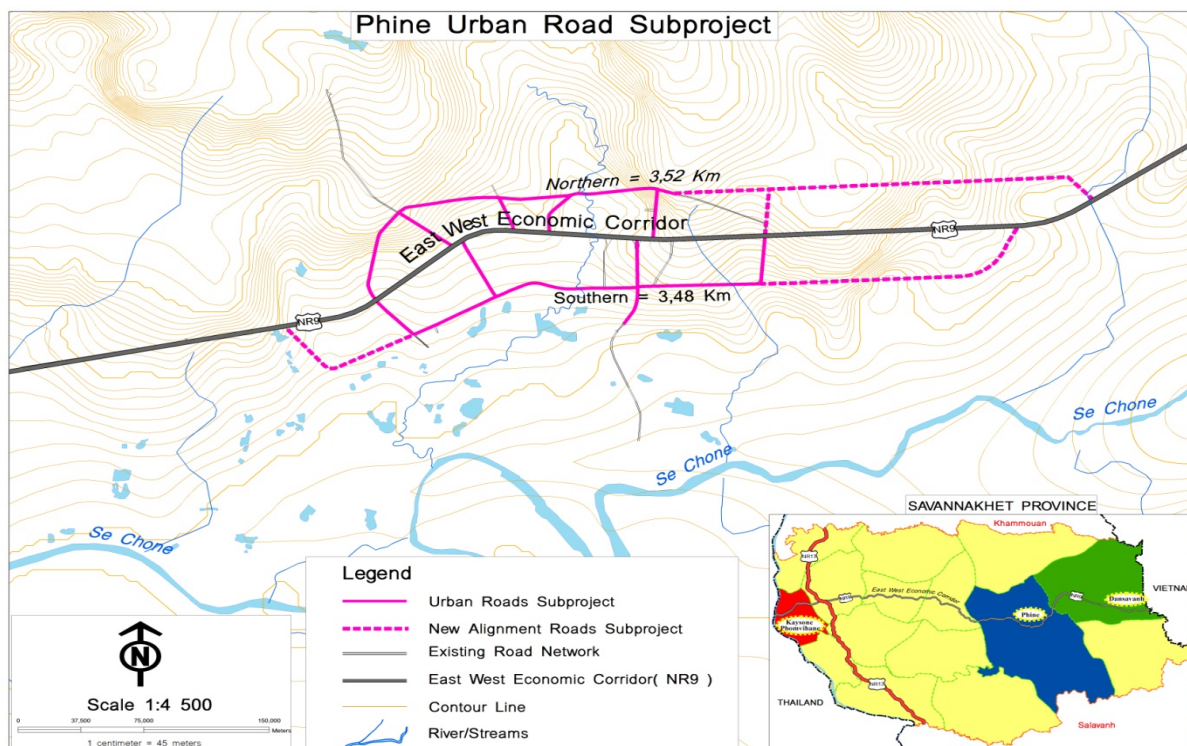
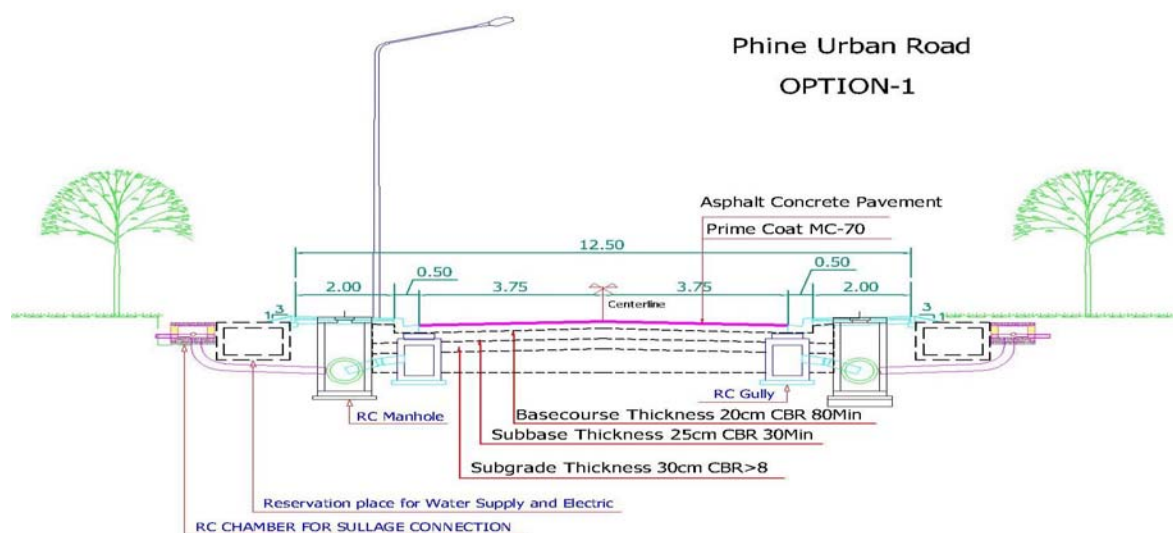


Figure 13. Cross-section of upgraded road in Phine



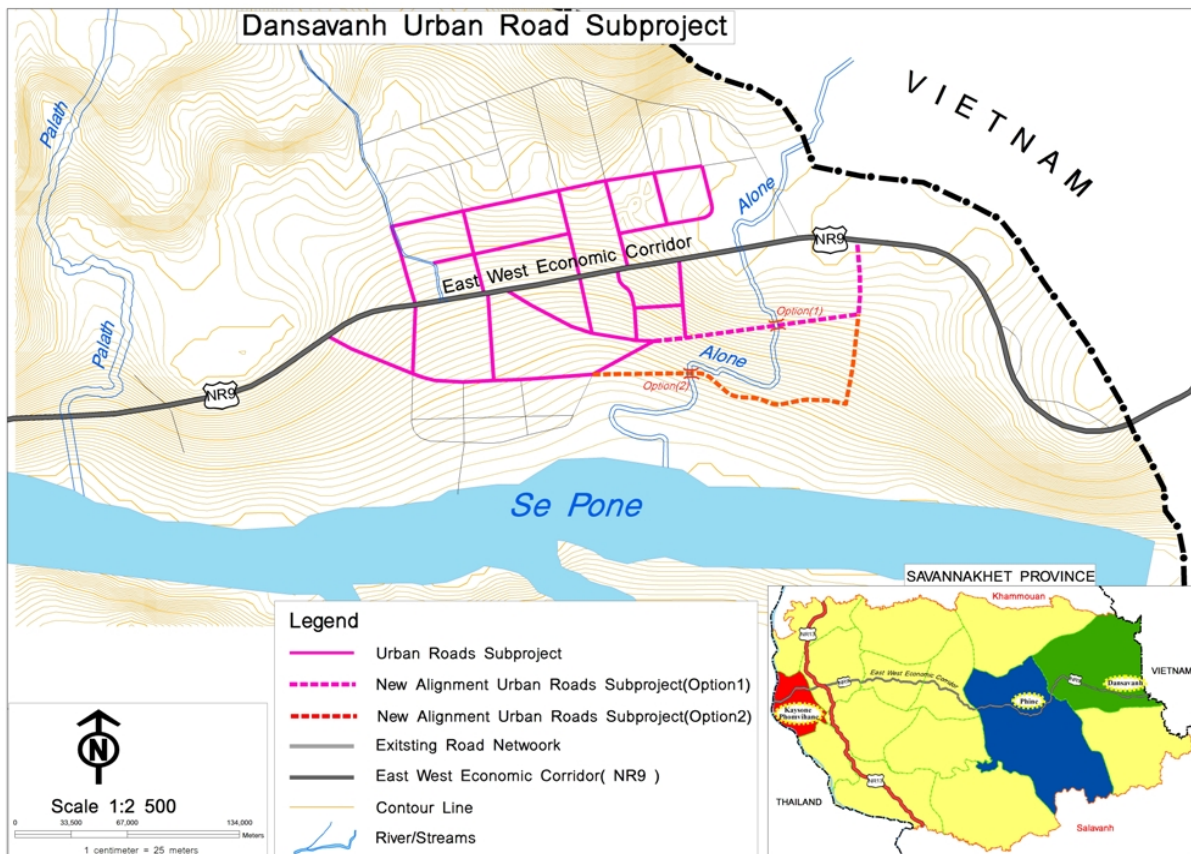
### 3. Dansavanh

83. The Dansavanh urban road upgrade (Figure 14) will involve civil works for the improvement and widening of the interior lateral roads, the installation of drainage structures and construction of a bridge to connect the planned town center to the NR9 (Figure 15).

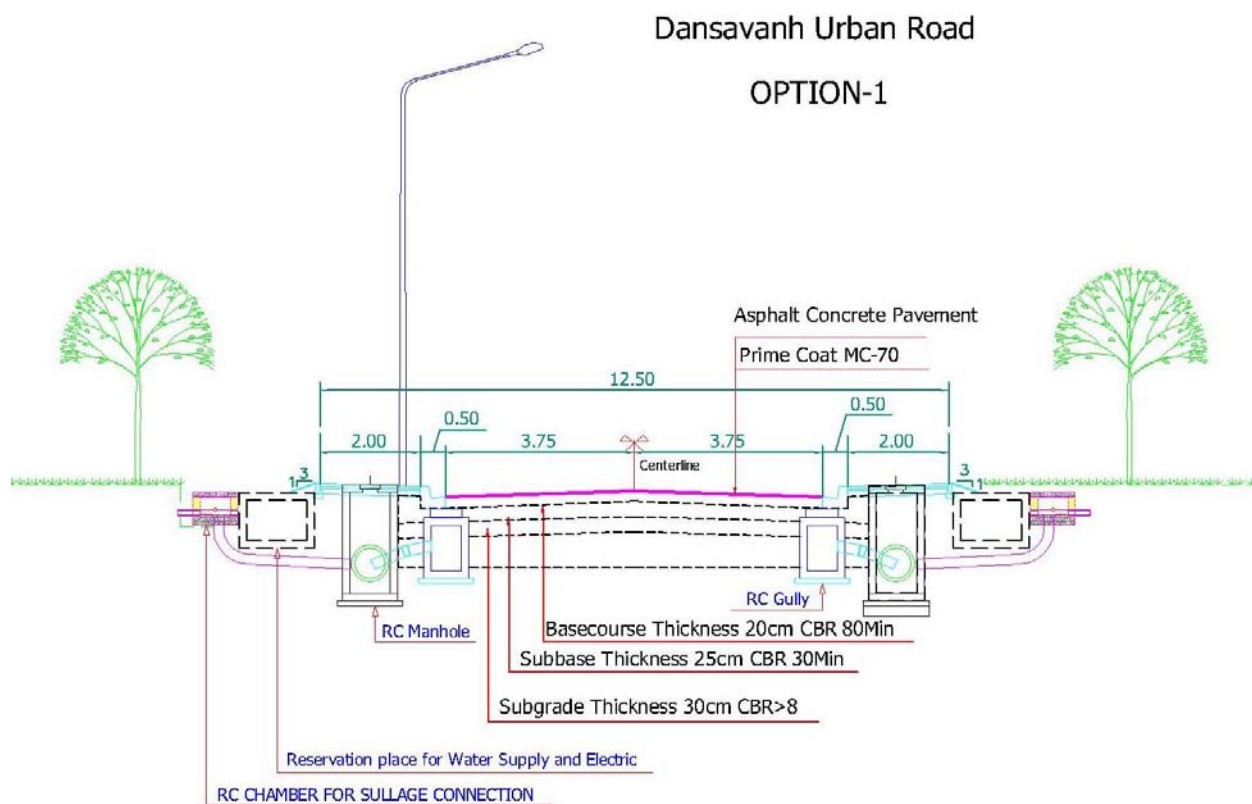
84. Civil works will improve and widen the 4.23 km interior lateral roads from earth road into concrete asphalt pavements. Of the total road length, the southern portion of the interior road is 2.83 km while the northern section is 1.40 km. The improvement works include construction of 3.5 kms of closed storm water drainage structures, and new alignments for 0.73 km of open storm water drainage canals leading to Houay Alone. The interior lateral road will be improved with the construction of walkways, the installation of lighting facilities, planting of buffer trees along roadside. The road will be widened to 7.50 m width.

85. Construction of a 50 m reinforced concrete bridge across Houay Alone will connect the interior lateral road to the northern end of the NR9. The Bridge deck shall be 7m of carriageway with 1m extending off both sides for walking for a total bridge deck width 9m. Construction of road junctions to connect the interior lateral roads to the main road along NR9. The road junctions measure from 100 m to 300 m in length. Capacity building for operation and maintenance of the main road, drainage structures and related facilities.

**Figure 14. Network of road upgrades in Dansavanh**



**Figure 15. Cross-section of upgraded road in Dansavanh**





## V. DESCRIPTION OF ENVIRONMENT

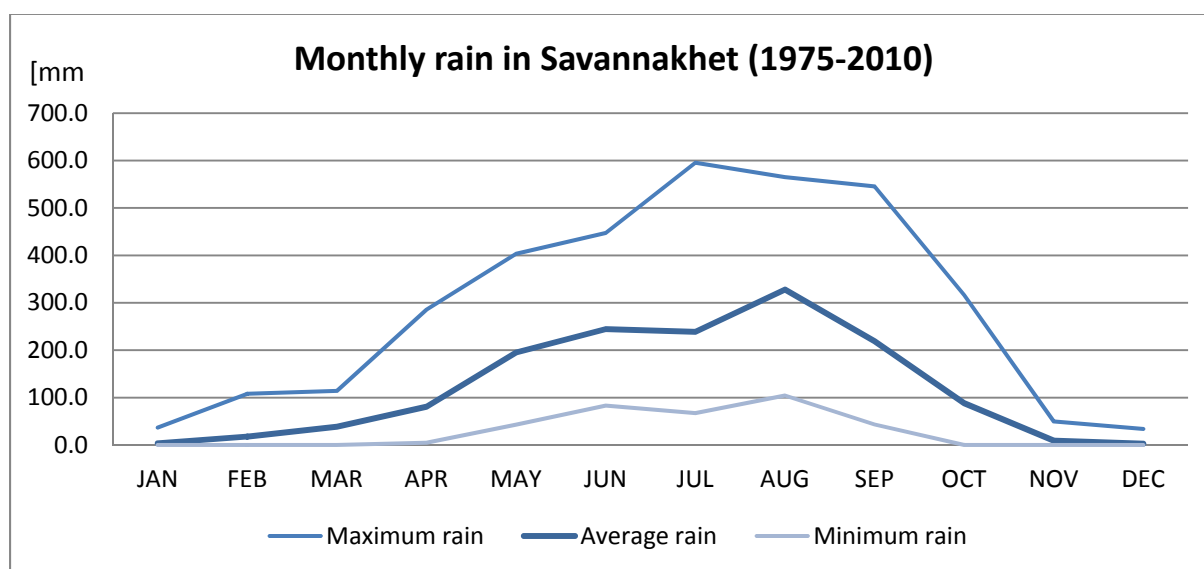
### A. Features Common to Kaysone, Phine, and Dansavanh

#### 1. Climate

86. Savannakhet has the typical tropical monsoon (wet-dry) climate of the region. During the rainy season (June to October), the winds of the southwest monsoon is responsible for an average monthly rainfall of >200 mm, occasionally reaching >500 mm (Figure 16). The dry season (November to April) is dominated by the northeast monsoon. The average rainfall in Savannakhet is 1,598.3 mm per year, which is about 173.5 mm less than the average for the country as a whole.

87. According to the Mekong River Commission (MRC), temperatures can range of Savannakhet from a minimum low of 13°C in January to a maximum high or around 39°C in April. Climate change is an issue in the province, demonstrated by increased rainfall intensity and frequency in certain months as well as high precipitation in the upper part of the Annamite Mountain Range. The climate data recorded in the province shows the years with the highest annual rainfall were 1978, 1984 and 1985, and villagers also confirmed that these years had extreme flooding. According to discussions with villagers, the floods in recent years last longer time (more than 15 days for a heavy flooding event). The years with less rain and serious drought years were 1988, 2007 and 2009.

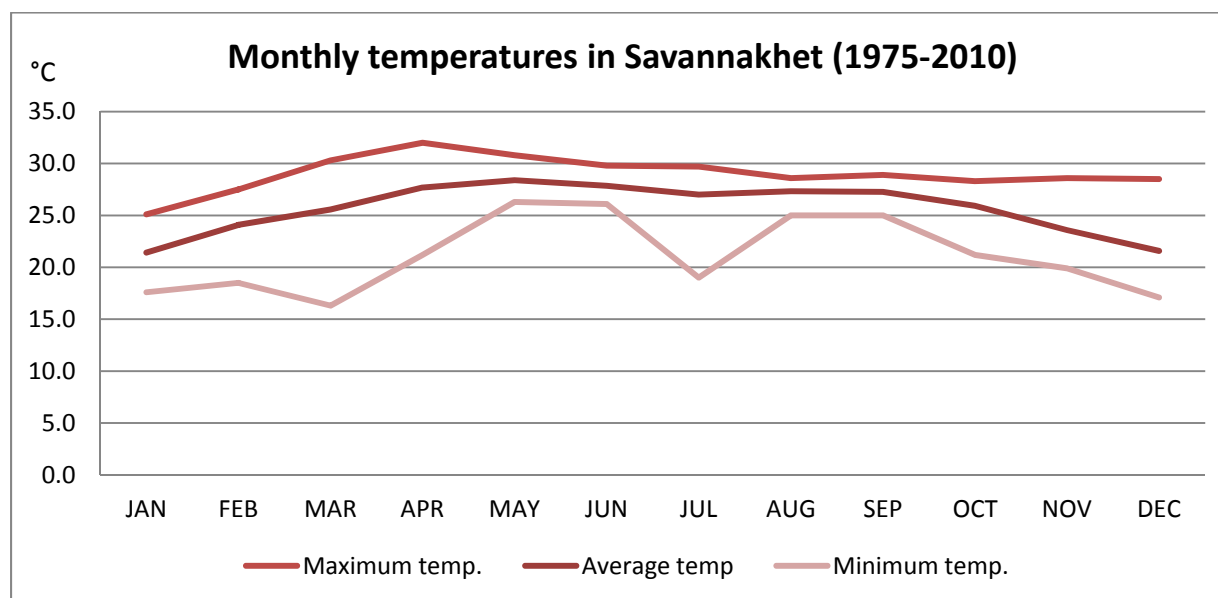
**Figure 16. Seasonal rainfall in subproject areas**





88. Savannakhet is the hottest and driest province of Lao PDR: the average temperature is estimated to be 26.1 degrees centigrade, which is about 2 degrees higher than the national average (Figure 17). The average number of hours of sunlight per year is estimated to be 2,280, which is about 256.8 hours longer than the national average<sup>7</sup>.

**Figure 17. Seasonal temperature in subproject areas**



89. Average daily temperatures in Southeast Asia increased by 0.5 to 1.5°C between 1951 and 2000, and mean temperatures across the Mekong River Basin will most likely increase further over the next 20 years. Similarly, climate change is expected to modify temperatures, rainfall and wind in the Lower Mekong Basin, affecting natural ecosystems as well as agriculture and food production, of serious concern in countries that rely strongly on natural resources. In Lao PDR agricultural and infrastructure losses due to increased storm intensity and frequency, land degradation and soil erosion from increased precipitation and a higher prevalence of infectious diseases are predicted.

## **2. Terrestrial Characteristics**

90. Savannakhet Province has a total forest area of about 1.1 million ha, representing about 52% of the total provincial area (PEI Report (2011)). Of that forest area, about 46% is conservation forest, 40% is protection forest and about 14% is production forest. The main types of forest in the Savannakhet Province are dry dipterocarp, lower and upper mixed deciduous, upper dry evergreen, bamboo, and poorly stocked forests (Figure 18).

<sup>7</sup>PEI, Poverty-Environment Initiative (PEI) (2011). Report on Economic, Social and Environmental Costs and Benefits of Investments in Savannakhet Province. Prepared by International Union for Conservation of Nature (IUCN), Lao PDR and The National Economic Research Institute (NERI), Ministry of Planning and Investment of Lao PDR.

**Forest**

- National Protection Forest
- Provincial Protection Forest
- Eng Mang Conservation Forest
- District Protection Forest
- Protected Forest
- Water Protected Forest
- Provincial Protected Forest
- Production Forest

0 10 20 Kilometers

ສາທາລະນະລາຍ ສະຫວັນ ສາ ສາ ສາ

92. Phine District is located where lowland forest habitats determine the terrestrial ecosystem. The terrestrial ecosystem characteristics are considered good compared to other parts of the. Most of the project area has dry dipterocarp, partly Savannah and some mixed deciduous forests but the mixed deciduous forest is found most in upper areas. The most important tree species still found in the project area is Mai Dou (*Dipterocarpus macrocarpus*).

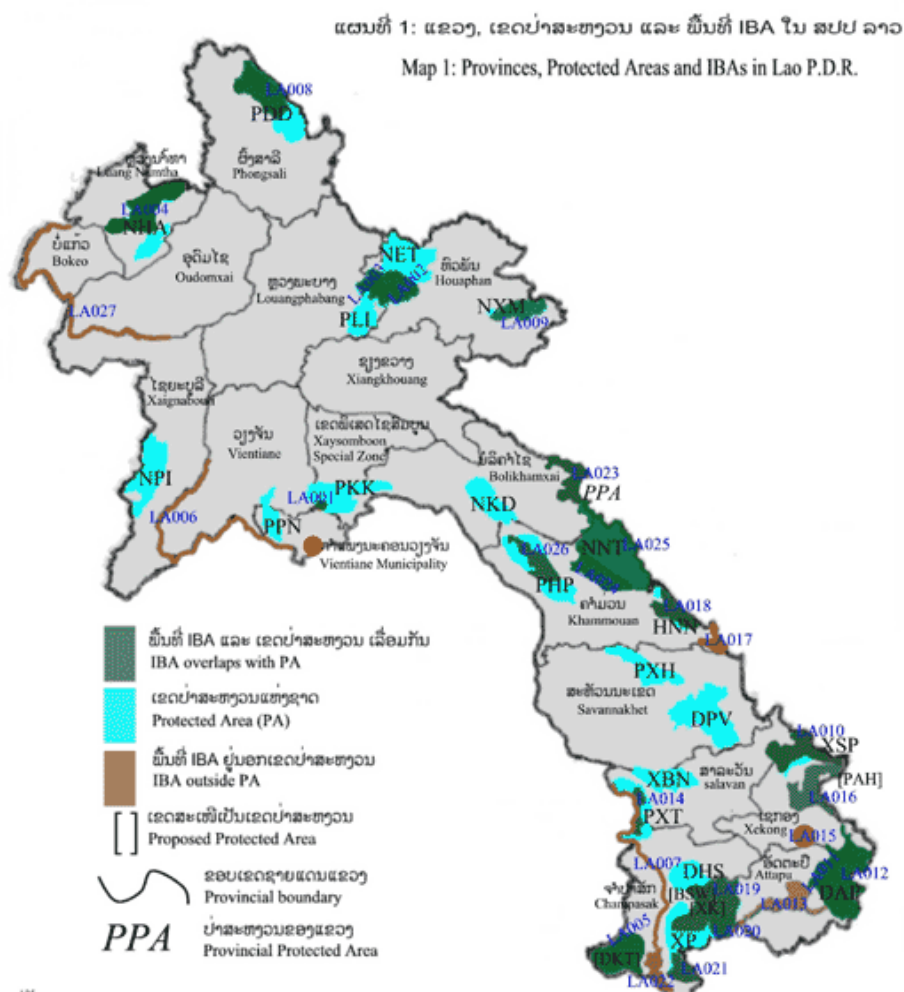
93. Forest cover in some part of Phine District has been converted to rubber tree plantation as the province allowed land concession permits for over 7,500 ha for industrial tree plantation. A number of small and medium sizes of plots, the largest plot is “30 ha” are found in the east of the district. However, the project area is not part of the forest habitat nor is it a refuge for wildlife given its urban characteristics.

94. Dansavanh is surrounded by forested area which includes some degraded forests. However, the terrestrial ecosystem characteristics are considered good. Forest cover and quality around Dansavanh has decreased because most villagers engage in hill rice cultivation and gardening such as bananas and aquilaria (Bong bark). The project area has only a small number of trees in the subproject area.

### 3. Protected Areas and Rare and Endangered Species

95. Lao PDR is relatively wealthy in terms of protected areas (Figure 19). The province also has three National Biodiversity Conservation Areas (Phou Xang He, Dong Phou Vieng and Xe Bang Nouane as well as a number of provincial protected areas. However, the three subproject sites of Kaysone Phomvihane, Phine, and Dansavanh are not near any protected areas. Further, no rare or endangered species or critical wildlife habitat is located in subproject areas.

**Figure 19. Protected areas and IBAs in Lao PDR**



96. The site of the new sanitary landfill in Kaysone Phomvihane District only supports secondary re-growth of trees. Although some number of bird species are present in Kaysone there are no IBAs in or immediately around the subproject area.

97. There are no protected areas or sensitive habitats in the Phine subproject area. Although many bird species are present in Phine area there are no IBAs in or immediately around the subproject area. No rare or endangered terrestrial or aquatic species of flora or fauna are recorded in the subproject area.

98. Many bird species are present in Dansavanh district, however, there are no IBAs in or immediately around the subproject area. Mixed deciduous and evergreen forests are important habitat for some mammals including sambar, barking deer, civets, wild pigs, a number of reptiles etc. Most wildlife found is quite far away to the north of the town. No sensitive habitats or rare or endangered terrestrial species of flora or fauna are recorded in subproject.

99. The complete species lists compiled for each subproject area are located in Appendices C1-3.

## **B. Kaysone Phomvihane**

### **1. Aquatic Ecology Characteristics**

100. The main aquatic ecosystems around Kaysone Phomvihane are found in the Mekong River, its tributaries and various streams as part of the larger catchment area of Mekong. The most extensive knowledge of aquatic resources is related to fish while other aquatic resources such as amphibians, reptiles, molluscs, crustaceans, and water insects have not been well researched.

101. Fish species found in the area of Kaysone Phomvihane are mostly Panin (Tilapia), Panai (Nile Tilapia), Pakheng (*Cirrhinus sp.*). Occasionally, they are more fish species found in the area, migrating up the streams and canals in wet season including Pakhao (*Akysis bantamensis*), Padouk (*Clarias batrachus*), Pakho (*Channa striata*), Pakha yang (*Cirrhinus sp.*), Pakadeut, Pakhao, Pasiew etc. None of the fish species are rare or endemic.

102. Aquatic animals and amphibians are also found in the area and many associated with paddy fields. No sensitive habitats or rare or endangered aquatic species of flora or fauna are recorded from the project area.

## **2. Socio-Economic and Cultural Setting**

### **a. Demographic Characteristics**

103. Based on the 2005 Population and Housing Census (National Statistics Center), the population of the town was approximately 74,000. In 2010 the total number of households was 12,252, which gives an average household size in the town of 5.8. In terms of sex distribution, the female population numbering 38,914 and accounting for 51% of the total population was slightly higher than the male population of 37,991 (49%). This distribution is the expected trend for the next few decades.

104. The town has a relatively high population density of 75 persons per ha compared with the district-wide population density of 17 people/ha, the old city center area is the most densely populated/settled area within the town.

**Table 6. Population projections in Kaysone Phomvihane**

Year	Population in town	Population in SSEZ	Total Population
2010	76,900	2,000	78,900
2015	84,900	6,000	90,900
2020	93,700	8,000	101,700
2025	103,500	11,000	114,500
2030	114,200	14,000	128,200

Source: Final Report. JICA (January 2010)

105. According to the FYSEDP, the population of the town in 2010 was in the order of 77,000, which fell somewhat short of the population as projected in the JICA study.<sup>8</sup> The FYSEDP contains projected populations to 2030 by which time the population of the town is expected to have increased by approximately 37,000 people. The population of the town and the special zone is expected to be in the order of 128,200 by 2030.

106. The 2005 Census recorded 9,469 people migrating from Savannahket and in-migration in the order of 5,500 people. With further development of the SSEZ in-migration is expected to increase as the industries establishing there will represent a significant pull to the area. As at 30 June 2011, the SSEZ Authority indicated that 24 companies had applied to establish within the zone (Site C), these industry locators are expected to generate 25,000 jobs while in Site A (administration and entertainment complexes) which is to be implemented during 2012 - 2025 the locators could generate employment up to 22,000 jobs (including approximately 2,000 workers at the proposed golf club).

### **3. Poverty Incidence and Vulnerable Groups**

107. The Prime Minister's Decree No.285/PM (13 October 2009) established the most current poverty lines, based on average per capita monthly income as derived from data analyzed in the Fourth Lao Expenditure and Consumption Survey (LECS-4). The poverty lines are given as follows: (i) national poverty line - per capita income below 192,000 kip/month; (ii) urban poverty line - per capita income below 240,000 kip/month; and rural poverty line - per capita income below 180,000 kip/month.

108. Based on the thresholds given above, the poverty rate of Savannahket province is recorded at 43% which is higher than the national rate of 34%. There are three districts in the province that are classified as among the poorest districts in the country but Kaysone Phomvihane is not one of the three due to its favourable conditions.

109. According to Decree 192, vulnerable people are classified in Kaysone Phomvihane as marginalized and vulnerable include the poor, those engaged in the informal sector including: casual and seasonal labourers; landless farmers; small vendors and street sellers and those who have limited access to, or are unable to take advantage of, urban economic opportunities. In the town, there are also a number of people who make livelihoods from picking through the rubbish at the landfill and selling plastic, cardboard/paper and aluminum cans to a private recycling operator.

<sup>8</sup> JICA; Final Report - Preparatory Survey on Formulation of Basic Strategies for Regional Core Cities Development in Lao PDR (January 2010)

#### 4. Economic Activities and Employment

110. Given its strategic presence along the transport corridor, Kaysone Phomvihane has emerged as the focal point for development of secondary and tertiary industries that are established in the province of Savannakhet. The service sector and the industry and commercial sectors are the major source of employment and income for local inhabitants who work in both private business establishments and government institutions.

111. Local employment and job opportunities are expected to increase over the next two decades with the anticipated increase in the number of industry locators in the SSEZ which is approximately 2 km from the town center.

112. Based on gross domestic product (GDP), over the three year period 2007 to 2010, the economy of Kaysone Phomvihane grew from 9.4% to 9.8%. Per capita GDP increased from \$712 in 2006 to \$1,027 in 2010 and is expected to be as high as \$1,464 by 2014. There has been a gradual shift away from the agriculture sector (with a share of 20.9% of GDP in 2006 to 20.3% in 2010) and services sector (GDP share reducing from 48.2% in 2006 to 46.6% in 2010) to the industrial/commercial sector (increasing its share of GDP from 30.8% to 32.9%). It is the industrial/commercial sector which is expected to continue to grow, potentially reaching 45.6% by 2014.

**Table 7: GDP over 2006-2009 and estimates for 2010-2014 in Kaysone Phomvihane**

Sector	Year							
	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14
GPD growth rate (%)		9.41	9.68	9.75	9.82	9.97	10.85	10.89
Agriculture-Forestry (%)	20.9	20.9	20.7	20.5	20.3	20.0	19.6	19.1
Industry-Commerce-Handicraft (%)	30.8	31.2	31.8	32.3	32.9	33.4	34.3	35.1
Service (%)	48.2	47.8	47.4	47.0	46.6	46.7	46.1	45.6
GDP per capita (US\$)	712	870	945	1,027	1,116	1,215	1,333	1,464

Source: 2009 Statistic Survey, Planning Office, Kaysone Phomvihane

113. In 2010 the town had 368 factories (food processing, garment making, wood processing and furniture making, concrete products and aggregates) with a total production output valued at 450.3 billion kip.

114. Although the agriculture sector is declining, rice is still the predominant agricultural product in Kaysone Phomvihane, with volume produced accounting for about 20% of national production since 1990s. Rice production is undertaken over an area of 14,681 ha. In addition to rice production, the area is becoming known as a rubber and eucalypt growing area; there are 180 ha planted with rubber trees and 105 ha planted with eucalypts.

115. The number of hotels, lodging houses and restaurants are increasing to accommodate the growing number of visitors and tourists in Kaysone Phomvihane. These establishments which are mostly in the town center are providing local employment to service providers.

116. About 60% of households in the town are engaged in activities in the commercial and services sector and reflects the increasing number of medium and large trading and commercial enterprises in the town. Over a third (38%) of households are still engaged in agriculture including small-holder farming, rice production, livestock and poultry raising and fish farming.

**Table 8: Main sector of economic activity in Kaysone Phomvihane**

Sector	% of HHs
Agriculture and forestry	38.3
Handicraft	1.3
Commerce and service	59.9

Source: 2009 Statistics Survey, Planning Office, Kaysone Phomvihane

117. The 14 to 60 year age group constitutes more than two-thirds (68%) of the labor force. In general it has been noted by the Planning Office that the labor-force overall has low levels of skills and education. There are inadequate funds available through provincial government programs to support vocational skills training and upgrading of human resources.

#### Services and Infrastructure

118. In the town there are 40 kindergartens, 71 primary schools, 21 secondary schools and one university. In terms of access to health care services and facilities the town provides a hospital, 13 health centers, 34 pharmacies and 39 private clinics.

119. There are three large markets/trading centers and two small markets operating in the town. These markets are outlets for locally produced vegetables, fruit, meat and processed goods. In the town centre there are 3,226 commercial and shops registered generating earnings in the order of 9.7 billion kip.

#### Transportation Services and Facilities

120. Kaysone Phomvihane is accessible by land, air and waterways. The completion of the Second Mekong River Friendship Bridge is providing easy access of freight forwarder, passenger bus, and tour buses to Mukdahan, Thailand or from Thailand to Savanakheth. The Friendship Bridge also provides easy links to Viet Nam via NR9, there are shuttle buses travelling to Mukdahan (Thailand) and Quang Tri (Viet Nam). The bus terminal in the town center provides national (Vientiane, Pakse, Thakek as well as to other provinces in southern Lao PDR) and international services for trips to other parts of Lao PDR and to Thailand and Viet Nam (Quang Tri, Da Nang, Thua Tien Hue and Ha Noi). There are 12 shuttle buses per day from Mukdahan to Savanavegas Casino.

121. Kaysone Phomvihane has an international airport located in the southern part of the town with total area of 104 ha, and a 1,650 m long runway. The domestic flights through Savannakhet between Vientiane and Pakse operate three times per week, and international flights to Siem Reap (Cambodia) and Bangkok (Thailand) also operate three times per week.

#### Water Supply System

122. The state-owned water supply enterprise - Nam Papa - operates and manages the water supply and sanitation system in the town. Of the district population of 118,748 in 2010, Nam Papa supplied potable water to about 75,000 people, covering 63% of the population. The area served by the town supply includes the six village development clusters under the jurisdiction of the UDAA. The existing water supply system was established in 1974 and completed in 1977. The facility includes a water treatment plant with a capacity of 15,000 m<sup>3</sup>/day and a main

transmission and distribution pipeline network of 54 km. The water treatment and supply facilities have deteriorated due to limited financial capacity and resources for O&M.

**Table 9. Population served by municipal water supply system**

Item	Year				
	2004	2006	2007	2008	2010
Population in district (no.)	107,664	113,114	115,852	118,748	124,541
Population in service area (no.)	66,620	70,677	72,797	74,981	76,905
Serviced area (ha)	1,340	1,340	1,340	1,340	1,340
Household connections (no.)	10,207	10,766	11,093	11,426	12,402
HH service rate (%)	60	60	63	61	62

**Source: Nam Papa, Province of Savannakhet (2011)**

123. In 2003, a grant from Japan provided technical and financial assistance to Nam Papa for the rehabilitation of the water intake and water treatment plant facilities. As a result, the system managed to retain its original daily capacity. In its efforts to meet the water supply requirements of the increasing number of households in the town center and adjacent areas, in 2010 Nam Papa agreed a Memorandum of Understanding (MOU) with a Malaysian private sector group for expansion of the water supply system to provide an additional capacity of 7,000 m<sup>3</sup>/day.

#### Sewer and Sanitation

124. The sanitation system involves individual treatment in each household, buildings and business establishments using pour-flush or dry latrines discharging to septic tanks and soak pits (which overflow to the drainage system). In 2005, approximately 71% of households in Kaysone Phomvihane had access to sanitary toilet facilities; by 2010 this had increased to 97%.

125. Wastewater from other uses including ablutions, laundry, and food preparation is mostly discharged directly to the storm water drainage system without any treatment. There are no grease/sediment traps installed for pre-treatment of grease and oil from either households or small commercial enterprises. Small industries usually discharge waste directly to the drainage system following simple treatment via storage tank. The inadequate installation of effluent pipes from septic tank is causing leakage of sewage thus polluting soil and ground water.

126. Between 2007 and 2008, approximately 14,000 m<sup>3</sup>/day of wastewater was generated and discharged directly to the drainage system and Mekong River. While just under half of the volume of wastewater is treated, somewhat reducing the pollution load through the simple on-site treatment systems, with the expanding urban areas and increasing number of households, the quantity of sewage and increasing pollution loads flowing to the Mekong River is expected to increase each year.



### Solid Waste Management

127. The solid waste management system in Kaysone Phomvihane involves the collection of garbage from residential areas, hauling it to the designated dumpsite which is about 12 km away from the town center. The landfill was established in 1996 and covers an area of approximately 16 ha. Households pay 11,000 kip per month for garbage collection.

128. Hotels, restaurants and other business establishments are responsible for taking their solid waste to the dumpsite. Solid waste is carried to the landfill by two garbage trucks where it is dumped into a hole and then spread out by a backhoe. When the hole is full, it is covered by soil or clay.

129. The UDAA is responsible for solid waste management including the operation and maintenance of the landfill. The service area of UDAA's solid waste management system covers more than 10,000 households mostly in the town center. UDAA reports that the average volume of solid waste created per urban household in is about 3.5 kg per day.

### Flood Control and Drainage

130. The existing drainage system in the town center area consists of roadside drains and open channels where flood water flows through natural streams and creeks before finally discharging to the Mekong River. Flooding often occurs in the old town area during high water in the Mekong River when flood waters cannot be drained away.

131. In the low-lying areas, flooding occurs for 2-3 days adversely affecting the movement of people, goods and services. The drainage network and flood mitigation system is an old system that was improved during 2000 - 2003 under the ADB-assisted Secondary Towns Development Project (covering Savannakhet and four other areas). At that time, the primary, secondary and tertiary drainage channels in the town area were rehabilitated, and flood gates were installed at the outfall to the Mekong River.

132. At present, there are three large discharge points from the town to the natural canals that eventually flow to the Mekong River. However, only two of these locations have flood gates to prevent water from the Mekong River flowing back to the urban area. These gates have never been operational due to mechanical defects. As a result, flooding occurs during heavy rains when the Mekong River is at high water level.

### Urban Roads

133. The PDWT is also the agency responsible for the road network and transport planning. The JICA study indicated a total road network of 192.5 km within the Kaysone Phomvihane Town. The total main roads have 55 km of paved roads and 10.5 km of unpaved. The minor paved roads are 46.6 kilometers and unpaved is 77.4 kilometers. In addition, nearly 3 km of access road and footpath was constructed under a Japanese grant between the intersection located on National Road 9 and the Second Friendship Bridge.

134. Sections of the road network have also been improved and constructed under the ADB-assisted Secondary Towns Development Project. A number of narrow interior urban roads traverse the old town center, running parallel to and perpendicular with the main road along the Mekong River.

135. Good road conditions (15 - 20 m width) provide easy access for traffic to and from the Second Friendship Bridge. While the lateral roads in the interior of the town are constructed with bitumen surfaces, the majority of these interior roads have been constructed without drainage structures while other road sections are not properly connected to natural drainage canals, and therefore are frequently flooded.

### Support Infrastructure to Special Economic Zones

136. The SSEZ is a thriving hub of trade and services within the GMS consists of support infrastructure including: i) the EWEC linking Thailand, Lao PDR and Viet Nam along NR 9 and also along the north-south axis with NR 13 linking Cambodia, Lao PDR and the People's Republic of China; ii) the Second Friendship Bridge across the Mekong River; iii) Savannakhet International Airport; iv) the 115kV power grid and supply; and v) the Government fully supports the development and has invested \$7.3 million to establish the office facilities in Site A in addition to the funds for resettlement and compensation.

137. On the 18<sup>th</sup> of May 2007, SaSEZ signed agreement with Malaysian developer-Pacifica Streams Development Company to develop a commercial and Industry Park in Site C to attract foreign investment along the EWEC. Company divided into 4 phase for develop, on 16 June 2010, Company is progressing their work of phase 1 by developing industrial lots with providing basic infrastructure. By end of June 2011 24 investors (including eight national and had received permission to establish in Site C.

**Table 10: Industries locating in SSEZ in Kaysone Phomvihane**

<b>Investor nationality</b>	<b>Industry/enterprise</b>	<b>No. of</b>
Lao PDR	Vehicle assembly; concrete; freight	8
Malaysian	Motorcycle assembly	3
Hong Kong	Garment	2
Japan	Vehicles; tin smelting	2
Holland	Small parts manufacture (Boeing)	2
South Korean	Vehicle assembly	1
Thailand	Import-export goods	1
Belgium	Diamond cutting	1
France	Concrete processing	1
Australia	Import equipment/material for gold mining	1
JV Lao PDR - Malaysia	Import second-hand vehicles	1

Source: Pacifica Streams Development Company (July 2011)

## **5. Land Use**

138. The land use of Kaysone Phomvihane District is mainly residential and industrial, paddy fields, woodland and grassland. The forest is found to the east of the town - basically around Dong Nata provincial protected area.

139. The emergence of Kaysone Phomvihane as a town started with the movement of people from the area adjacent to the Mekong River, to the eastern and northern areas of what is now the town center. The completion of the Second Friendship Bridge, linking Kaysone Phomvihane to Mukdahan in Thailand has encouraged the spread of residential and commercial establishments along NR 9 requiring further conversion of previously unused lands and agricultural areas. With the increased trade and traffic volume, the land use pattern has changed to accommodate the use for residential and commercial purposes. At present, residential and commercial mixed uses account for 64% of urban land use. The mixed use policy is provided for in the Master Plan of the town.

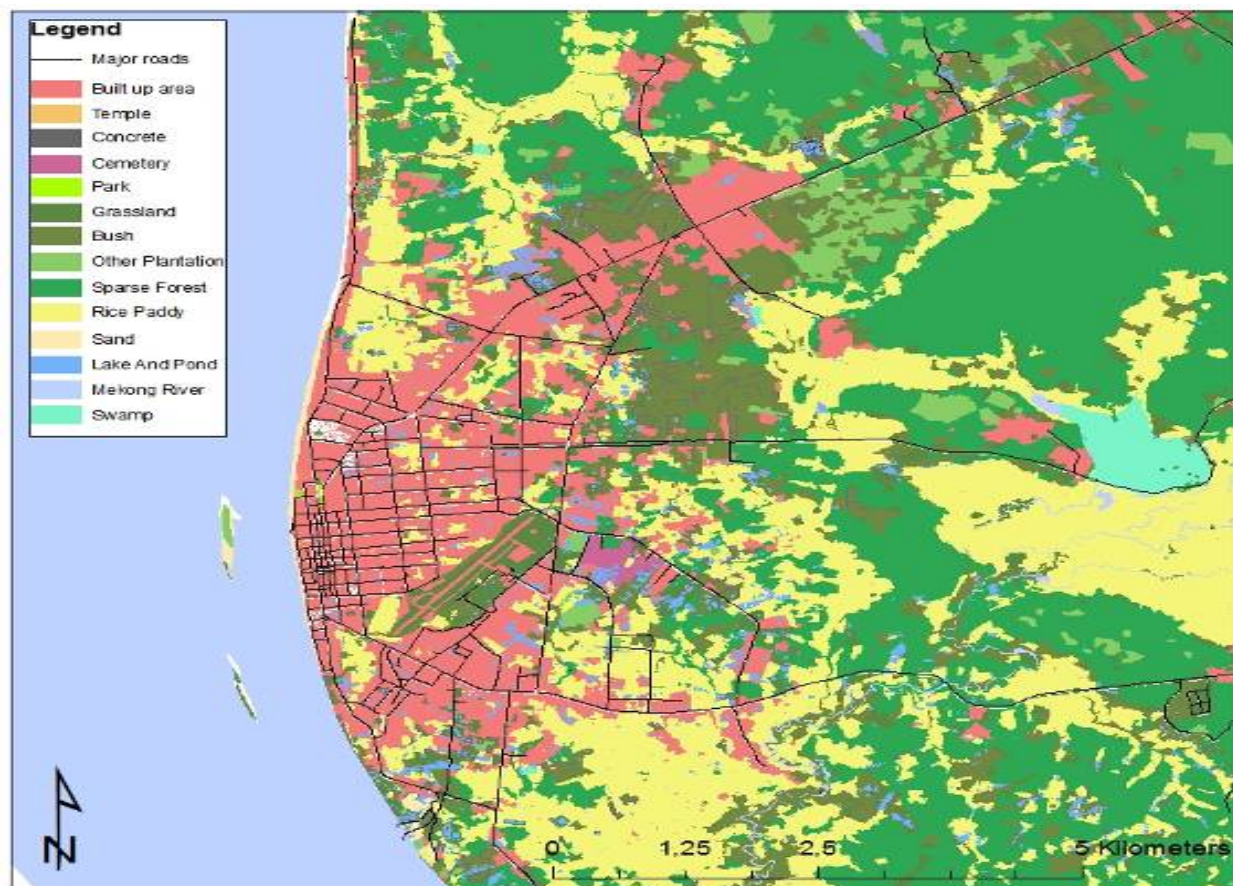
140. The centre of Kaysone Phomvihane is the old town center built during the colonial period. The town center is characterized by thriving trading and commercial activities including production of goods in Savannakhet and trade of goods imported from Thailand and Viet Nam. The town center is divided into zones or areas including the old city center with heritage buildings remaining from the French period.

141. Around the old city center is the core business district including banks, shops, hotels and restaurants located along the major city thoroughfare. Along the Mekong River, facing Moukdahan, there are also a number of hotels, small restaurants and eateries, and makeshift recreational facilities that were erected during the traditional boat racing festivals.

142. The provincial and district offices of government agencies are mainly located along the Mekong River as well as a complex located on Fa Ngum Road. There are two public parks in the town, one is within the provincial government complex and features a statue of former President Kaysone Phomvihane, a small museum, and trees. The other park is located next to an old sport stadium on the bank of the Mekong River.

143. It should be noted that a new city center has been designated along the EWEC, which is envisioned to be the future center of economic activities for the district, given the presence of the SSEZ. This location is considered ideal for the expanding commercial and business establishments such as supermarkets and shopping malls, restaurants and hotels. It would also serve as a new tourist destination in the province.

**Figure 20. Land use around in Kaysone Phomvihane**



## **C. Phine**

### **1. Socio-Economic and Cultural Setting**

144. Phine is one of the 15 districts in Savannakhet<sup>9</sup>, the district comprises 100 villages of which five villages make up the main town and urban area of the district.

#### **a. Demographic Characteristics**

145. Phine district is divided into 15 village development clusters comprising 13 urban villages and 87 rural villages. There are 8,325 households and a district population of 56,523 of which 28,528 are female (51%). The town of Phine consists of five villages and an area of 1,249 ha.

<sup>9</sup> Savannakhet province is divided into 15 districts and comprises 1,016 villages (37% urban). The population of the province is 886,986 of which 49% is female.

**Table 11. Population by village in Phine**

Village	No. of households	Av. Household size	No. population		
			Total	Female	Male
Napho	213	5.7	1,217	610	607
Sakhueang	54	6.5	352	182	170
Pasomxay	216	5.9	1,270	631	639
Veunhongkham	180	6.8	1,220	600	620
Phine	246	6.4	1,584	803	781
Total	909	6.2	5,643	2,826	2,817

Source: Phine Annual Report, 2010

146. There are no official records on the number of people moving in and out of Phine. However, information from local authorities indicated that young people migrate out from their villages to seek economic opportunities in the other cities and provinces in Lao PDR and in the neighboring countries of Thailand and Viet Nam. There are workers from Viet Nam coming to Phine to work in rubber and cassava plantations, construction activities and a number have settled in the town and operate small businesses (restaurants and shops). There also a number of Chinese nationals who are involved in commerce and trade along the main road.

## 2. Poverty Incidence and Vulnerable Groups

147. The poverty rate in the town is substantially lower than the district, with 7% of households falling below the poverty line, one village - Sakhueang - has a significantly larger proportion of poor with a third of households falling below the poverty line

**Table 12. Poverty rates of Phine**

Village	No. of households	Poor households	
		No.	%
Napho	213	16	7.5
Sakhueang	54	18	33.3
Pasomxay	216	5	2.3
Veunhongkham	180	6	3.3
Phine	246	16	6.5
Total	909	61	6.7

Source: Phine Annual Report, 2010

## 3. Land Use and Zoning

148. The land use pattern on Phine is a mixed use of agricultural, commercial and services area. The land use plan of the district is incorporated in the Master Plan that was approved by the Provincial Government of Savannakhet in June 2010. Residential and commercial mixed

use areas along the NR 9 occupy approximately 300 ha. The core urban center of the town where the majority of population resides has an area of 81 ha.

149. The municipal authorities have designated some 62 ha within the town center as green space where construction is prohibited. The other major land use is the agricultural zone which covers 265 ha, areas of which are devoted to plantation crops like rubber and cassava and small paddy fields, and vegetable plots. The rest of the area is idle flat and hilly terrain.

150. The town center of Phine is characterized by a thriving trading and commercial activity for goods and services produced in Savannakhet and those imported from neighboring countries particularly Thailand and Viet Nam. The other side of the town serves as the administrative center where Phine District Government offices are located.

151. Phine town is linked with a “sister” town of Xethamouak, a larger urban center than Phine with a larger number of commercial establishments such as restaurants, market, guesthouses, sawmills, spare part shops and motor vehicle repair shops.

#### **4. Economic Activities and Employment**

152. Statistical records from the Planning Office indicated that the local economy of Phine was gradually increasing from 6.9% GDP in 2009 to 7.2% in 2011 (Table 4.1.3). The Planning Office projects that GDP will further increase to 7.7% by 2014. In terms of GDP shares by economic sector, the agriculture and forestry sector has the highest share at about 71.4% in 2010 which is largely due to the dominant agricultural resource base of the municipality. The GDP shares of the services and industry sector which were reported with small increases represent 15.1% and 13.3% respectively. With the strategic location of Phine along the EWEC, the GDP shares of the industry and services sectors are expected to increase with expanding rubber and cassava cultivation along with increasing commercial and industrial establishments.

153. Information from the Planning Office recorded a total of 213 enterprises and commercial shops in 2010. These include ten enterprises in agricultural production and processing, 55 handicraft enterprises, 98 commercial stores and 50 service enterprises. In 2009, the gross domestic value of industry and handicrafts was 32.2 billion kip, representing an increase of 16.5% from 2005. The gross domestic commercial activities were valued at 37.07 billion kip, representing an increase of 16.2% over the previous year.

154. As has been noted, the local economy of Phine is largely influenced by its agricultural resource base. Agriculture and Forestry sectors are biggest share of GDP in Phine. The GDP for agriculture and forestry was valued at 178.57 Billion LAK in 2009, registering an increase of about 14% from the year 2005. The rice production area increased to 6,213 hectares in 2009, representing an increase about 11% from the reported production area in 2005. Aside from the increasing areas cultivated for rice production, rubber plantation is becoming an important industry crop where 4,457 ha are devoted for its production. The other industrial tree plant is eucalyptus which is being grown in 59.25 ha.

155. Economic activity in the service sector is limited to engagement in trade and commerce activities and from the small number of commercial establishments such as lodging houses and eateries in Phine. In 2009, the GDP for the services sector was valued at 39.9 billion kip. The existing market of Phine which is an important source of employment in the services sector was burned down. Local vendors and stallholders have to contend in selling and vending their products in temporary shelters and makeshift stalls. Local authorities expect increases in the service sector activities as soon as the essential urban infrastructures such as improvement of the town center roads and the construction of the new market and trading facilities are in place.

156. Nearly three-quarters (73%) of households in the town are engaged in agricultural activities and 23% are engaged in the industry and handicraft sector and reflects the increasing number of medium and large trading and commercial enterprises in the town. Only a small proportion of households are involved in commercial and services sector handicraft making and home-based activities.

**Table 13. Main sectors of economic activity in Phine**

Sector	% of HHs
Agriculture and forestry	72.6
Industry and handicraft	23.1
Commerce and service	2.3

Source: 2009 Statistics Survey, Planning Office, Phine

## 5. Services and Infrastructure

157. To provide for the health and medical needs of the local population, Phine district has a district hospital with 15 bed capacity, seven health centers and eight medical clinics. The health services are constrained by the inadequacy of health facilities and equipment, medical health officers and personnel.

158. The existing public market was recently destroyed by fire and the local authorities have provided the market vendors temporary location to ply their trade. The site of a new market and trading center is being developed and the municipal government expects that market vendors and stallholders will move to the new market site which is situated about 2 km from the former site and located along the NR 9. The new market and trading center is managed and operated by the private sector.

159. The major transport system within the town and adjacent villages are the motor bikes and the Songtheo which are operated by individuals and family members. There has been a reported increase in the number of motorbikes which has become the key transport facility among the local residents. There are buses registered in Phine, but there is no bus terminal facility. Inter-provincial buses and shuttle vehicles pick up passengers at any point along the main road. Cross country tour buses plying their route along the NR 9 pass through the town center of Phine and do not stop for refreshments and passenger comfort needs due to the absence of a terminal facility. These international buses travel to and from Thailand and through Dansavanh to Dong Ha, Thua Tien Hue, Da Nang and Ha Noi in Viet Nam.

160. There is an ongoing construction of rest area and service station with facilities for such as bathrooms, toilets, souvenir shops in Phine. This facility is a component activity of the ADB-assisted Sustainable Tourism Project in Lao PDR.

161. The water supply system in the town center of Phine is operated and managed by Phine Nam Papa, a branch unit of Provincial Nam Papa Savannakhet, which is a State-Owned Water Supply Enterprise. Phine Nam Papa supplies clean water to the served area about 1,249 hectares covering five villages near the town center and mostly located along NR 9. The projected population target to be served by the water supply system is 5,400 persons or 840 households in the town center.

162. In Phine town center, urban road and roadside drains have not been installed and no interconnection of drainage system has been established. The waste water and sewerage remain on the roadside surface which serves as breeding grounds for mosquitoes or parasites. Flooding in urban areas occurs due to accumulation of runoff following heavy rain. Seasonal flooding in urban areas is not a concern of community in Phine. However the pressing issue is now roadside drains are unable to take waste water and sewerage from the populated areas and extending to the lowest WWTP.

163. The solid waste management system in Phine is contracted by the local government to a private service provider whose system involves collection of the solid waste in containers and haulage to the dumpsite. About 30,000kip per month is collected from each household as the solid waste management fee. Under the private contract management, the service provider uses two trucks and manages a 1 ha of land fill (dump size 25x25m) which is situated some 5 km from the town center.

164. Phine District has a total of 121.2 km of road network of which 49 km are asphalted roads, about 10 km are tracks constructed in the town center. These roads were built at low construction cost using low filled lateritic materials. The main roads in the town center along NR 9 comprise about 5 km and provide access to residential areas and commercial establishments.



There access roads that are planned within the periphery of the town center in anticipating of the growth of the urban areas in Phine. These new road networks within the town are included in the FYDP.

## D. Dansavanh

### 1. Aquatic Ecology Characteristics

165. Common fish species found in the project area of Dansavanh District are Pakhao (*Akysis bantamensis*), Padouk (*Clarias batrachus*), Pakho (*Channa striata*), Pakha yang (*Cirrhinus sp*), Pakadeut, Pasiew, Panin (Tilapia), Panai (Nile Tilapia), Pakheng (*Cirrhinus sp.*) etc. Seasonally there are more fish species found in the area, that migrate up the streams in the wet season. Aquatic animals and amphibians are also found in the area and much associated with paddy fields such as frogs, tree frogs, snails, crabs etc. No sensitive habitats or rare or endangered aquatic species of flora or fauna are recorded from the project area though.

### 2. Socio-Economic and Cultural Setting

#### a. Population, Ethnicity and Demography

166. Dansavanh Border Trade Zone comprises of 8 villages with a population of 7,296 inhabitants and 1,226 households. Dansavanh BTZ has a total land area of approximately 4,000 hectares. Based on the Five Years Socio Economic Plan of the Dansavanh BTZ, the population growth rate is projected at 2 percent.

167. There are three major ethnic groups in the Zone area, namely the Phouthai (a sub-group of Lao-Tai ethno-linguistic group) which accounts for 39% of the population, the Tri (a sub-group of Mon-Khmer ethno-linguistic group) which represents 60% and Makong group (also part of Mon-Khmer group) which has 11% of the population. In Dansavanh town the major group is the Tri ethnic group. With the projected growth rate, the population in the town is expected to increase regularly to 8,894 by 2020 and to 10.841 by 2030.

**Table 14. Population by village in Dansavanh municipality**

No.	Village	HHs	Families	Population			Ethnic Minorities					
							Phouthai		Tri		Makong	
				Total	Female	Male	Total	Female	Total	Female	Total	Female
1	Dansavanh	330	428	1815	959	856	524	366	1,191	593	0	0
2	Feuang	152	176	864	430	434	383	183	481	247	0	0
3	Houaysane	221	257	1,293	655	638	832	421	461	234	0	0
4	Dongsavanh	210	233	1,050	460	590	686	304	380	156	0	0
5	Keng	102	121	567	287	280	185	99	295	142	87	46
6	Sanoun	131	164	710	347	363	0	0	710	347	0	0
7	Kadup (Kadap)	49	66	261	127	134	253	119	0	0	8	8
8	Sakiphine	131	162	736	363	373	0	0	0	0	736	363
	<b>Total</b>	<b>1,226</b>	<b>1,607</b>	<b>7,296</b>	<b>3,628</b>	<b>3,668</b>	<b>2,863</b>	<b>1,492</b>	<b>3,518</b>	<b>1,719</b>	<b>831</b>	<b>417</b>

Source: Annual Report 2010, DBTZ

168. The ethnic groups in the province are mainly Phouthai, Tri and Makong but a small proportion of Lao PDR live in the area. The population growth is mostly from migrants from other parts of the country as well as neighboring countries for running small shops and business in the area.

### 3. Employment and Commerce

169. In order to boost trade, investment and stimulation economic growth of the GMS “East-West Economic Corridor”, Savannakhet Province of Lao PDR is in good position to make regional trade links. Dansavanh is located at the end of National Road No.9 before entering to Viet Nam through Lao Bao – the international border. In 2000-2009, GDP increased up to 12.5%, mainly from agriculture, industry and services. In Sepone District the GDP per capita registered an increase from \$434 in 2007 to \$560 in 2010 which would be similar to that in the Dansavanh Town.

170. The largest percentage of households in Sepone are engaged in agriculture and forestry at 97.21%, with income generation based on agricultural products, while industry and handicraft is only 0.19% and commerce and services at 2.60 percent.

**Table 15. Population by household sector in Dansavanh**

No.	Number of Household working in	Percentage
1.	Agriculture and Forestry	97.21 %
2.	Industry and Handy craft	0.19 %
3.	Commercial and Service	2.60 %
	Total	100%

*Source: 2009 Statistic Survey, Planning Office, Sepone*

#### **4. Social Services**

171. Education is considered an important precondition for the stimulation of the growth, of socio-economic development and investment, and that has been encouraged to promote with response to the growth of the province' economic development. In this regard, little information available for Dansavanh Town but some available for Sepone district. A total of 84 primary schools and 4 secondary schools in Sepone District, of which Dansavanh BTZ has complete primary schools in most 8 villages and one secondary school located in Ban Houy San. Illiterate rate of this district as well as the town is likely higher compared to the provincial average since they are all ethnic, located in rural areas and insufficient public facilities. While, many school children in Ban Dansavanh use drug and involve in burglary.

172. The health sector is quite poor in the Dansavanh Town, only one small health center which is available in basic health/illness checking up. Most of sickness and for who can afford to pay for treatment is often to use the health service in Viet Nam.

173. Dansavanh town is considered poor in public facilities, for the whole Sepone District just 31 villages or 35.23% have access to electricity and the electricity is purchased from Viet Nam.

174. Dansavanh BTZ is promoted as a special economic zone to attract both local and international investors. According to records, this year Dansavanh BTZ has received a significant number of requests for potential investments in hotels and factories. The area received 10.6.9 billion kip in budget allocation for its investment program over 2003-2010 as support to about 30 projects which include: 14 road construction projects; 6 government office buildings; 5 water supply construction projects; 3 electricity network installation projects; 1 UXO clearance program; and a land conversion project.

#### **5. Livelihoods**

175. Livelihoods are the activities, means, entitlements and assets by which people sustain their households and make a living, and they should be understood as systems, considering all of the components, as well as the relationship between, and priorities of, those components. Livelihood systems are essentially needs based and comprise production and enterprise activities integrated in such a way as to respond to the food security and cash income requirements of households.

176. The table below provides an indication of the subsistence levels of households in the Project Area, which reflecting the largely urban/peri-urban location are lower than in rural settings. Overall a fifth of households mostly produce the food their household consumes, with a larger proportion of households headed by men (21%) than women (14%) being dependent on home produced food.

**Table 16. Subsistence levels of households in Dansavanh**

<b>Sex of head of household</b>	<b>Food consumed by household (%)</b>	
	<b>Mostly home produced</b>	<b>Mostly purchased or traded</b>
Female	14.3	85.7
Male	21.0	79.0
Total	19.5	80.5

**Source: Dansavanh Inventory of Losses October 2011**

177. The AHs receive multiple sources of income including from sales of agricultural goods and products (54%), trade or sales including small household business (31%) income from daily or casual labor (15%), wages and salary (5%) and some households also receive and a small proportion (2%) receive income from non-labor sources including remittances and pensions.

178. In terms of the relative importance of the income, 52% of AHs stated that the income from selling small goods, trade or small household business was the primary or most important sources of income while for 20% the primary household income came from either casual or daily labor or agriculture. Only a small proportion of households stated that wages form either the government (public service) or private sector was the primary source of income for the household.

## VI. PUBLIC CONSULTATION

179. Government of Lao PDR Decree 112 sets out specific requirements for consultation of communities and stakeholders in the EIA/SA process. Article 7 sets out the rights and duties of project-affected people and stakeholders which include complete information disclosure on potential adverse impacts or benefits if the project proceeds. Involvement in the EIA/SA process is required through provision of appropriate and sufficient information to people and communities affected.

180. For the CTDLP-LAO PDR consultation has taken the form of (i) interviews with village leaders, focus discussion groups (FGDs) and household interviews/surveys; (ii) discussions about impacts and mitigation measures, and discussions about implementation of EMPs and SMPs; and, (iii) provision of opportunity to review, respond to, or comment on the IEEs and PSAs/REGPs.

181. Article 8 of Decree describes the participation process, and establishes joint responsibility between the project developer and MONRE to ensure the participation of affected people and communities and other stakeholders in the process of project feasibility study (including survey and exploration etc), impact assessment, and review of documents prepared during that process.

182. The Guidelines on Public Involvement in Environmental and Social Impact Assessment (2009) detail requirements of proper consultation and participation in support of Decree 112 with the following objectives:

- Ensure public involvement is conducted accordingly to proper methods, regulations and Environmental Protection Law of Lao PDR;
- Ensure project affected people receive fair and just compensation from development projects; and
- Prevent and mitigate environmental and social impacts that may be caused by projects; and to ensure that development projects are designed in a sustainable manner.

183. The guidelines define public involvement as a process that disseminates information about a project while collecting opinions and suggestions from interested and/or affected parties in order to assess impacts caused by the project before making a decision. As defined in the Guidelines public involvement includes the following:

- Dissemination of information of proposed project through news boards, leaflets, newspaper and other media;
- Coordination and collaboration with relevant local authorities (including provincial and district level Department of Natural Resources and Environment [DONRE]) to organize consultation meetings in villages;
- Organization of meetings at village level to disseminate information about a proposed project, including the potential benefits and environmental/social impacts that may be generated by the project;
- Listening to opinions and comments of local people and incorporating suggestions and recommendations into project documents; and

- Updating of project documents (by the developer) based on information received from consultation meetings.

#### **A. Summary of Stakeholder Views of CTD: Lao PDR**

184. The focus group discussion (FGD) showed high levels of support for the subprojects to be developed under CTD with specific benefits identified. Some negative impacts have also been identified. The detailed records of the public consultations for each subproject are found in Appendices B1-3.

##### **1. Kaysone Phomvihane: Solid Waste Management**

185. The primary stakeholders are the households and commercial enterprises (including market stall holders) who will benefit from regular and reliable solid waste collection and improvement in their immediate urban environment. Waste pickers are primary stakeholders who must be afforded opportunities to participate in any formalized waste selling/recycling scheme and must not be excluded from picking through waste as a result of improving operations at the site as this would further marginalize them and deepen their poverty. The private contractors and/or municipality should be encouraged to formally employ these people as sorters when the MRF is operational.

**Table 17. Summary of stakeholder views of solid waste management in Kaysone**

<b>Stakeholder</b>	<b>Primary</b>	<b>Secondary</b>	<b>Key Stakeholders' Interest in the Project</b>
Households in beneficiary area	X		Improved and regular waste collection and management reduces localized pollution from informal and illegal rubbish dumping; Improved public health status and living conditions in immediate area; Improved environment and reduced nuisance (smell and flies) for households currently adjacent to, close proximity of, existing dump-site; Opportunities to earn additional income from 'recyclables'; Opportunities to participate in recycling, environmental health and hygiene awareness raising campaign
Private contractors	X		Increased business opportunities in offering regular and reliable waste collection services
People trading in waste products; Waste pickers	X		MRF can formalize recycling and trade in waste; Must not be excluded from picking through waste at the dump-site or landfill as contributes to large proportion of income; Potential employment as sorters when MRF operational; Provides opportunity for income generation through sale of waste collected from town or sorted at landfill; Opportunities to participate in recycling, environmental health and hygiene awareness raising campaign
Wider community		X	Improved public health status and living conditions (reduced nuisance - smell and flies); Opportunities to earn additional income from 'recyclables'; Opportunities to participate in recycling, environmental health and hygiene awareness raising campaign

186. Private contractors may benefit from offering collection services in an improved solid waste management system. Secondary beneficiaries are the wider town population who will benefit in less direct but no less tangible ways, for example health benefits and an improved

urban environment (reduced litter, reduced waste build-up, reduced potential for flies and disease vectors).

## 2. Kaysone Phomvihane: Wastewater Treatment and Drainage

187. The primary stakeholders are the households and commercial enterprises (including market stall holders) who currently live along the open channels that convey combined wastewater and run-off and will benefit from improvement in health (reduced WBIs and missed work and school days) and their immediate urban environment.

188. This component will also contribute to addressing flooding issues along with the road improvement subproject. Secondary beneficiaries are the wider town population who will benefit in similar ways, for example health benefits and an improved urban environment (reduced potential for flies and disease vectors).

**Table 18. Summary of stakeholder views of wastewater treatment and drainage in Kaysone Phomvihane**

Stakeholder	Primary	Secondary	Key Stakeholders' Interest in the Project
Households in beneficiary area	X		Improved and regular wastewater collection and treatment reduces localized pollution; Improved public health status and living conditions in immediate area (adjacent to existing open channels and sewers); Improved environment and reduced nuisance (smell and flies) for households; Potential increase in land values as result of foregoing; Opportunities to participate in environmental health and hygiene awareness raising campaign; Opportunities to participate in construction as workers
Private investors and business operators		X	Induced business opportunities from incremental improvements in urban environment and improved services and infrastructure; Do not have to install individual WWTPs or sewerage connections
Small business operators	X		Removal of barriers to trade from bad smells putting off customers and improvements to livelihoods; Improved income generation during construction;
Municipality	X		As major stakeholder in infrastructure and service provision; Potential to levy higher fees/taxes with improved services; Can encourage additional investors to area as services expanded to cover wider area and meet basic requirements for infrastructure and service provision
Wider community		X	Improved public health status and living conditions (reduced flooding, reduced nuisance - smell and flies); Opportunities to participate in environmental health and hygiene awareness raising campaign

## 3. Kaysone Phomvihane: Mekong Riverbank Protection

189. The primary stakeholders are the households and commercial enterprises (including evening market stall holders) along the riverbank and pedestrians and tourists who will benefit from a larger area along the riverbank and improved services and facilities and formalization of the river-side area. Secondary beneficiaries are the wider town population who will benefit from improved riverbank protection (reduced risk of erosion or flooding/over-topping in certain areas).

**Table 19. Summary of stakeholder views of Mekong riverbank protection in Kaysone**

Stakeholder	Primary	Secondary	Key Stakeholders' Interest in the Project
Households in beneficiary area	X		Improved safety along the riverbank; Potential for improved income generation during construction (selling goods); Opportunities to participate in construction as workers; Loss of seasonal gardens need to be compensated
Private contractors	X		Can bid for construction package
Small business operators (stall holders)	X		Larger area, can expand businesses or new businesses can establish; Improved conditions and access to utilities; More formalized parking area makes area safer and more attractive; Require compensation for loss of income during construction and until businesses can be re-established
Riverbank gardeners	X		Will lose area of riverbank currently gardened (corn) during dry season; Will be compensated for crop losses through implementation of RP
Wider community		X	Improved riverbank area for recreation, traditional festivals and events and aesthetics; Improved public image of a key attraction in the town

#### **4. Urban Road and Drainage Improvements: Kaysone Phomvihane, Phine, and Dansavanh**

190. The primary stakeholders are the people living or operating businesses along the three roads, road users, road-side stall holders and street vendors, as well as the wider population catchment that rely on the roads for access to facilities and services.

191. The benefits, as identified by the FGDs, were considered to include participation in construction and opportunities for local contractors, increased selling opportunities for street vendors, local cafés and food sellers during construction, and following construction the improved roads would benefit most people, with specific benefits identified for enterprises and those engaged in marketing with it being easier to carry goods and traffic volumes increasing.

192. Transport operators (passenger transport services and cargo/freight cartage) are another primary beneficiary who can respond to improved access and increased demand for services. Secondary beneficiaries are those who will benefit in less direct ways, for example street vendors, marketers and merchants could potentially have more customers once the congestion and parking issues are resolved.

193. Concerns of stakeholders centred on traffic congestion and safety during construction and operation phases of the road improvements. Issues are identified in bold in Table 19 below.



**Table 20. Stakeholder views of road improvements in Kaysone Phomvihane, Phine, and Dansavanh**

Stakeholder	Primary	Secondary	Key Stakeholders' Interest in the Project
Road users, members of households in catchment of roads	X		Improved access to markets, key social services (health and education services) and urban employment opportunities; Reduced local flooding from improved drainage (household and public health); Small household retail businesses will become more profitable as traffic volumes and local incomes rise; Potentially increased incentives to produce higher value agricultural products as transport to markets improve; Increased incomes from produce and cash crop marketing will allow families to invest in better housing and healthcare which will improve wellbeing and living standards; Increased access to vocational education, training and employment opportunities among youth in district centre; <b>Concerns regarding safety and accidents need to be addressed</b>
Transport operators	X		Increased business opportunities to carry passengers and goods; School and tourist bus and taxi services will improve; <b>Need for awareness raising with drivers in respect of speed and safe driving</b>
Street vendors and markets along the roads	X		<b>Temporary impacts during construction will need to be addressed;</b> Improved access, increased traffic and passenger flow and reduced congestion can increase volume of sales; Access and mobility improved (convenience, comfort and ease of travel)
Health and education personnel		X	Services in schools and the health centre disrupted during rainy season flooding can resume without interruption; <b>Need to work with Police and transport operators to ensure road safety (reduced road accidents and injury)</b>
Police/traffic police	X		Improved security (including street lighting) deterrent for petty and local criminals; Civil defence capability of local area improved; <b>Need to enforce existing road rules;</b> Involved in delivery of road safety campaign
Businesses, processors and exporters		X	Assuming other constraints to the sector/industry are overcome, production in the area will increase, diversify and modernize as it becomes easier to get products to market; Improved access will encourage further investors in the special economic zones
Municipality	X		As major stakeholder in infrastructure and service provision; Potential to levy higher fees/taxes with improved services; Can encourage additional investors to area as services expanded to cover wider area
Merchants		X	Improved access and increased traffic and passenger flow can increase volume of sales to small businesses and households

**B. Project Response to Stakeholder Concerns**

194. The overall response of the consulted stakeholders to the subprojects in Kaysone Phomvihane, Phine, and Dansavanh was positive as summarized in Tables 17-20. The negative views of the subprojects highlighted in Tables 17-20 focused on traffic congestion and safety during the construction phase of the subprojects, and during operation of the completed upgraded road segments in the three subproject towns.

195. The EMP for the upgraded roads and drainage components of the subprojects will include specific sub-plans that will prescribe measures to minimize congestion, and prevent traffic-related accidents on those roads.

196. Stakeholders that were not consulted or were unavailable during the initial consultations will be contacted. Particular attention will be given to the people living or working as close as 0.5 km from the sanitary landfill. The community near the finalized discharge area of the treated effluent from WWTP also need to be contacted.

## **VII. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

197. The assessment of potential impacts of the CTD in Lao PDR is structured by the five primary types of infrastructure developments that will be implemented at the three subproject towns defined as follows:

- a) Solid Waste Management: (Kaysone Phomvihane);
- b) Materials Recovery Facility: (Kaysone Phomvihane);
- c) Wastewater Treatment and Drainage: (Kaysone Phomvihane);
- d) Mekong Riverbank Protection: (Kaysone Phomvihane); and
- e) Urban Road & Drainage: (Kaysone Phomvihane, Phine, and Dansavanh).

198. The organization of the impact assessment by infrastructure investment follows the Project Description. The Kaysone subproject will dominate assessment of impacts because that subproject consists of all five types of infrastructure investments. The assessment of the urban road upgrades of all three subproject towns will conclude the assessment, and will highlight subproject-specific impacts.

### **A. Overview of Benefits of Subprojects**

199. The benefits of the completed subprojects will be registered at two spatial and temporal scales. As clearly indicated in the Introduction the planned impact of the project will be regional socioeconomic development in the vicinity of each subproject town, and cumulatively along the east-west economic corridor of the GMS (Figure 1).

200. At a smaller scale will be the direct effects (outcomes) of the subprojects on quality of life within each subproject town. Urban transportation will be significantly improved in all three towns, while community sanitation, solid waste management, and flood control will be improved in the town of Kaysone Phomvihane. The investments in Kaysone will reduce waterborne disease, and make the urban environment a much cleaner place to live. The investments in all subproject towns will improve and develop livelihoods.

201. The specific benefits of the individual subproject components on which the direct outcomes of the subprojects above are based are expressed in the need specific statements for each subproject component in the Project Description. The remedial measures required by each subproject components will indicate the specific urban issues that will be addressed.

202. In addition to the project design-described benefits of the subprojects are the most significant benefits that were articulated by the affected community stakeholders who were consulted during the IEEs. The summary of stakeholder views in Tables 17 – 20 express those views.

### **B. Subproject Impacts and Mitigations**

203. The assessment of potential negative impacts of the primary infrastructure developments is structured chronologically according to subproject implementation starting with the pre-construction preparation phase, followed by the construction phase, and ending with the post-construction operation phase of the commissioned infrastructure developments. This

assessment structure is carried forward and shapes the three environmental management plans for each of the three subprojects.

## **1. Pre-construction Phase**

204. Negative impacts associated with the pre-construction phases of the infrastructure developments concern land acquisition or resettlement. At the feasibility design stage the need for local resettlement and or compensation for loss of land or structures will occur for the wastewater treatments component in Kaysone, the urban road upgrades in Kaysone, Phine, and Dansavanh, and the Mekong riverbank protection component in Kaysone.

205. The number of households affected by the Kaysone WWTPs is estimated at 39. The number of households that will be affected by the RoWs for the road upgrades in Kaysone, Phine, and Dansavanh are expected to be 213, 103, and 109, respectively. The estimated number of households that will be affected by the RoW for the Mekong riverbank protection works is 35.

206. The new landfill and MRF to be located adjacent to the existing landfill in Kaysone is not expected to require resettlement or compensation for lost land. The details of actual required resettlement will be finalized in the resettlement action plan (RAP) that is prepared for the CTDP, and filed under separate cover.

207. Key impact mitigation measures of the pre-construction phase of all three subprojects are:

- 1) Completion and initiation of the resettlement and compensation plan (RAP) for the CTDP-Lao PDR;
- 2) Completion of detailed designs of the three subprojects in Kaysone, Phine, and Dansavanh; and
- 3) Updating and initiation the three subproject EMPs.

208. The EMPs will need to be reviewed and updated where necessary during pre-construction phase to meet the detailed designs of the subproject components to ensure that additional or changes to impacts arising from detailed designs are addressed by the EMPs.

### **a. Transition to New Sanitary Landfill**

209. A major component of the pre-construction detailed design stage will be the finalization of the design and location for the new sanitary landfill. The influence of the existing dumpsite on the design of the new sanitary landfill requires careful assessment. The ECA and leachate and groundwater quality assessment (Appendix D) for the existing dump site will provide the information needed for the detailed design, and ultimate management of the old dumpsite and new sanitary landfill. At the time of writing the ECA was in progress.

210. Updating the three EMPs during the pre-construction detailed design stage will involve finalization of sub-plans to manage potential impact areas such erosion, sedimentation of surface waters, noise, dust & air quality, spoil disposal, traffic, and worker and public safety at the project sites. Similarly, a subplan for the transition to the new sanitary landfill in Kaysone Phomvihane will be needed during the construction and operation of the completed landfill. The

subplans will draw on the results of the ECA. The impact mitigations of the pre-construction phase are detailed in the EMPs (see section X).

## **2. Construction Phase**

### **a. Common potential impacts of infrastructure developments**

211. The potential environmental impacts of the subprojects in Kaysone Phomvihane, Phine, and Dansavanh are dominated by the construction phase of the individual subproject components. Common potential impacts arising from civil and earthworks will consist of for example, reduced and/or blocked public access, disrupted business and recreation, noise, dust and air pollution from NO<sub>x</sub>, SO<sub>x</sub>, & CO caused by increased truck traffic and heavy equipment use, soil and surface water pollution caused by equipment operation and maintenance, public and worker accidents, increased traffic accidents, land erosion and surface water sedimentation, drainage and flooding problems, solid waste and domestic pollution from worker camps, social disease and community problems caused by migrant workers. These short-term impacts will occur at different levels of magnitude depending on the activity at all construction areas of the infrastructure developments of the four subprojects.

### **i. Common mitigation measures**

212. Management measures to mitigate potential common impacts associated with the construction phase of the infrastructure developments are exemplified below. The mitigation measures are detailed further in the EMPs.

- 1) Care must be taken to ensure that sites for earthworks (e.g., excavations, trenches) that are suspected to have unexploded ordnance should be surveyed by the GoL prior to construction. If such ordnance is detected clearing work will need to be commissioned prior to undertaking civil works.
- 2) Open excavations should be fenced, and trenches covered where public walkways or vehicles must cross.
- 3) A chance find management plan must be in place for cultural artifacts and property.
- 4) Regular use of wetting agents should be employed at construction sites to minimize dust.
- 5) All construction vehicles and equipment should be maintained in proper working order, and not operated at night if possible to minimize noise.
- 6) Speed limits should be posted and adhered to by all construction vehicles.
- 7) Where possible construction vehicles should use different roads or dedicated lanes of roads shared by the public.
- 8) Trees and other vegetation at all construction sites, along urban road corridors, Mekong river shoreline, and at WWTP sites should be protected.
- 9) Present and past land use should be reviewed to assess whether excavated soils are contaminated spoil. Contaminated spoil should be disposed at a landfill or a location approved by MoNRE.
- 10) Berms and/or silt curtains should be constructed around all excavation/trench sites and along all surface waters to prevent soil erosion and surface water sedimentation. In particular is protection of the Mekong river from the civil works to be conducted along the river.

- 11) 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.
- 12) Worker camps must have adequate domestic waste collection facilities and sufficient pit latrines that are located away from public areas and surface waters.
- 13) Dedicated fuel storage areas must be established away from public areas and marked clearly.
- 14) To minimize the impact of construction on the public, and workers the World Bank Environment, Health, and Safety Guidelines (2007) that govern the safe and orderly operation of civil works should be followed.
- 15) Aggregates (e.g., sand, gravel, rock) that are transported by truck should be covered.
- 16) Prolonged use of temporary storage piles of fill should be avoided, or covered, or wetted regularly to prevent dust and erosion.
- 17) Sand extraction in rivers for road embankment fill should be done at licensed areas only.
- 18) Storage of bulk fuel should be on covered concrete pads away from the public and worker camp. 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.

#### **b. Infrastructure-specific Construction Impacts and Mitigations**

213. Potential construction impacts specific to an infrastructure type of a subproject are identified below. The potential impacts elaborate some common impacts identified above.

##### **i. Sanitation landfill**

###### Groundwater

214. The excavations for the cells of the new sanitary landfill site could penetrate or become too close to the local water table. The hydrogeology in the area of the proposed landfill site has not been adequately documented. Further, the permeability of the soils in the landfill area is unclear (e.g., Table 21), and requires closer examination. The permeability of the soil will determine whether a liner will be required for the new sanitary landfill.

215. The ECA on the existing dumpsite will determine the permeability of the soils, and will improve understanding of the sensitivity of groundwater to the new sanitary landfill. The ECA will also determine the present and future exposure of the new landfill to groundwater and soil contamination from the existing dumpsite.

216. The proposed landfill site reportedly is not near surface waters. However, as part of the review of sensitivity of groundwater, a review of the sensitivity of local surface waters downstream of the proposed site to runoff from the landfill during rainy season conditions should be conducted.

##### **ii. WWTPs**

### Groundwater

217. Similar to the new sanitary landfill, the excavation of the aerobic treatment ponds for the three WWTPs could penetrate or become too close to the water table. A review of the depth of the water tables, soil permeability, and subsurface flow of local aquifers should be conducted during the pre-construction phase. This study should be coordinated with the same study required for the sanitary landfill in. The detailed designs of the WWTPs need to confirm whether local groundwater and surface waters are vulnerable to possible leakage from aerobic ponds, whether ponds need clay or concrete linings.

### **iii. Mekong riverbank protection**

#### Water quality

218. The major civil works that will occur at the shore of the Mekong river will cause extensive siltation and sedimentation which will negatively affect aquatic biota, and downstream human use of the river. Significant pollution from solid and liquid construction wastes being discharged into the river could also occur. A proper silt curtain with anchors along the lower edge, and floatation along the upper edge should be installed in the river parallel to the construction area. The curtain should extend upstream and downstream of the entire construction area, and should separate all shoreline earthworks from the river. Where possible onshore berms should be constructed to contain, and minimize soil erosion to the river.

#### Aquatic Biota

219. The Mekong river supports a finfish and shellfish community (Appendix C1) which will be affected by the earthworks along the riverbank. Fish habitat at the shoreline will be lost from the development of the riverbank protection and commercial space (Figure 9). During the construction phase resident fish will be repelled from the area negatively affecting local fishing activities.

#### River navigation

220. The major civil and earthworks plus the construction barge traffic to/from the construction area will potentially disrupt public and commercial use of the river. Contractors should minimize blockage of the river, and clearly post signage warning boat traffic of ongoing construction along the shore. A well marked construction barge lane should be installed to keep barge and boat traffic of the river separate during the construction phase.

### **iv. All infrastructure components**

#### Terrestrial and Aquatic Resources, and Cultural Property and Values

221. There are no reported rare or endangered animals and plants in the affected subproject areas, or cultural property and values that will be affected by the infrastructure developments. However, because the final locations of some facilities & components of the infrastructure developments will only be determined at the detailed design phase of the subprojects, the potential exists for valued ecological and cultural resources to be negatively affected.

222. Thus, as part of the detailed design stage when siting is finalized, and when the EMPs are updated, a review of the proximity and sensitivity of all valued eco-cultural resources of the subproject areas in relation to finalized infrastructure development locations should be undertaken.

### 3. Operation Phase

#### a. New sanitation landfill

##### Contamination of groundwater, surface waters, and land

223. The landfill and leachate treatment facility could contaminate groundwater and possibly downstream surface waters depending on natural surface drainage and subsurface flow. The sensitivity of groundwater and surface waters downstream of the finalized sites for the sanitary landfill and leachate treatment facility during the rainy and dry season conditions need to be reviewed.

224. The detailed designs of the landfill need to be completed in view of potential impacts on groundwater, and surface waters and land with specific focus on the requirements for a liner, planned surface drainage diversion channels around the landfill, leachate collection and treatment specifications, treated leachate disposal, management of truck traffic in/out of landfill, and expected lifespan of the landfill. A groundwater quality monitoring program is required (see EMP).

#### i. Residual impact of decommissioned dumpsite

225. The ECA of the existing dumpsite will determine the present impacts of the dumpsite on the environment. The ECA will also estimate the long-term impacts of dumpsite after it is decommissioned, and after all possible remedial actions for the dumpsite that are specified by the ECA are completed. The closed dumpsite could contaminate the soil and groundwater under the new landfill site, which would frustrate the function of the sanitary landfill. The legacy of the existing dumpsite, and the effectiveness of the sanitary landfill with protecting the environment will be determined by the results of the ECA.

##### Negative Aesthetics and Community Health

A landfill can create conditions for odour, disease vector habitat, vermin, and risk of injury to local community from unrestricted access to landfill site. Mitigations for the potential impacts of the operation of a landfill on the community are included in standard international operations guidelines (e.g., O&M) for landfills. Example key mitigations for potential community impacts are as follows:

1. Confirm landfill is far away from residential and urban areas;
2. Install a tall perimeter fence that ideally is also treed around entire landfill property;
3. Install sufficient signage along perimeter warning the public to stay away from landfill;
4. Post a fulltime guard at landfill who monitors the perimeter by vehicle;
5. Grade and cover solid waste with appropriate thickness of soil/aggregate to minimize exposure of waste to open air, disease vectors, and vermin;
5. All loaded solid waste trucks on route to landfill must be covered, and solid waste trucks should be rinsed and kept clean daily.

##### Traffic disruption and road accidents

226. Speed limits along road to landfill [and MRF] should be clearly posted and enforced. Roads should be well lighted at night. Signage for road conditions should be well placed.

##### Increased air pollution



227. As much as possible all vehicles and trucks that travel to and from the landfill [and MRF] must be kept in good working order, and inspected regularly by authorities.

#### **b. WWTPs**

##### Contamination of environment and community impact

228. The three waste treatment plants in Kaysone Phomvihane will collect and treat wastewater that is currently discharged untreated diffusely throughout Kaysone Phomvihane. The treated wastewater will be discharged to single points in the receiving environment. At feasibility stage the quality of the treated effluent that will be discharged from the aerobic treatment ponds was not final.

229. The planned immediate receiving environments for the treated effluent from the WWTPs in Kaysone consist of the Houay Longkong, and Houay Khilamang drainage systems, and near the Chomekeo stream. However, the ultimate receiving environment is the Mekong river into which the urban drainage systems discharge.

230. Thus, the obvious risk is contamination of the proposed receiving environments from the WWTP effluents. This could occur if the effluent is not treated to specification, or the receiving environment cannot assimilate (i.e., dilution and bioaccumulation) the concentrated effluent thereby creating a pollution problem. Therefore, sensitivity of the affected reaches of the Mekong river to the effluent from the WWTPs needs to be reviewed during the detailed design phase.

##### Negative Aesthetics and Community Safety

231. The other potential risk is the operation of the WWTPs will negatively affect the community. Potential environmental impacts of the operation of the WWTPs are summarized below.

1. Change to the community landscape of the nearby homesteads due to noise, odour, and overall negative aesthetics of the WWTP;
2. Increased traffic in area, and traffic accidents caused by staff and plant operations;
3. Increased air pollution and noise from increased vehicle traffic;
4. Contamination of shallow groundwater from aerated treatment ponds;
5. Pollution of land, local surface waters, or groundwater from discharged treated effluent that does not meet original effluent quality designs, or effluent quality standards (Appendix A);
6. Pollution of Mekong river leading to impairment of downstream uses of the river;
7. Contamination of land surface water, or groundwater from spills or uncontrolled discharge of untreated and treated wastewater due to pipeline or equipment failure;
8. Increased incidence of vector carried disease arising from standing water; and
9. Increased injury people in nearby community from exposure to WWTP or pipeline operations.

### **i. Mitigations**

232. Most of the required mitigations for the potential impacts listed above will be addressed directly by the detailed engineering design specifications for the siting, operation, and management of the WWTP and pipelines.

233. However, at the time of writing the detailed designs of the WWTPs and pipelines were not completed. In particular, not finalized are:

- 1) specifications for the treated effluent quality other than the declaration that effluents will meet GoL industrial discharge standards (Appendix A);
- 2) final locations of the effluent discharge sites; and
- 3) design and operation specifications for aerobic lagoons, and management of waste sludge to ensure soil, groundwater and surface waters are not negatively affected.

234. Clarification of depth and sensitivity of local water tables and aquifers to treatment lagoons and sludge management is required. The detailed engineering designs of the WWTPs needed to be completed to be able to specify the engineering process-mitigations to manage the impacts above identified.

235. Furthermore, the water quality of the Mekong river that will receive the treated effluent via the wastewater canals needs to be determined. The update to the environmental baseline will be done during the pre-construction phase along with the updates to the EMPs.

236. The composite impact mitigation for the wastewater treatment systems consists of:

- a) sustained safe collection and transport wastewater to the WWTPs;
- b) consistent treatment of wastewater to effluent quality design specifications;
- c) the ability of the receiving environments to assimilate the treated effluent at all times of year;
- d) the ability of the WWTP to manage and dispose safely treatment byproducts such as sludge; and
- e) the ability of the WWTP to not intrude into normal community life through negative aesthetics.

237. Specific mitigations for the potential impacts of the operation of the WWTP and pipeline networks are provided below. The mitigations are detailed in the EMPs.

1. A five metre treed perimeter berm built around each WWTP facility including the treatment lagoons to isolate the WWTP facility from the nearby community to reduce noise odour and overall negative aesthetics of the WWTP;
2. Enforced well marked speed limits will be posted on roads used by WWTP staff, with WWTP vehicles kept in good working order;
3. A carefully designed system of treatment lagoons that does not contaminate groundwater and land;

4. A regular effluent and sludge quality testing protocol;
5. All equipment and processes maintained in good working order with back-up equipment and processes in place in critical areas;
6. Engineering and management systems in place to prevent and address emergency spill and discharge situations;
7. All staff properly trained with regular refresher courses;
8. Adequate domestic waste management procedures; and
9. All standing water and wastewater covered as much as possible;

**c. Urban roads in Kaysone Phomvihane, Phine, and Dansavanh**

Increased traffic accidents

238. Speed limits should be clearly posted and enforced. Roads should be well lighted at night. Signage for road conditions should be well placed.

Increased air pollution

239. As much as possible all vehicles must be kept in good working order, and inspected regularly by authorities.

**4. Induced and Cumulative Impacts**

240. Complementing the planned impact of the CTDP of socioeconomic development at each subproject town and along the EWEC are the potential negative impacts of increased urban development which would occur at different spatial scales. An immediate potential impact of urban development is increased traffic-related accidents, and air pollution.

241. At the town level the new and upgraded infrastructure will create immigration to the towns. Potential induced impacts will be increased land development and pressure on existing infrastructure not developed by the CTDP. New zones for housing and commercial development could follow to support and be supported by the expanding populations of the towns.

242. Socioeconomic development from the CTDP could cause increased consumption of natural resources, and pollution along and adjacent to the EWC. Regional economic development commonly is linked to environmental degradation and natural resource consumption. Socioeconomic development of a region is normally manifest by population growth and the increase in living standards which lead directly to increased individual and family consumption leading directly and indirectly to increased natural resource consumption, and waste production, and environmental pollution.

243. The potential induced and cumulative impacts of the subprojects are largely managed by the scale of the infrastructure investments. While economic growth is the decided impact, the outcome/outputs of the investments are meant to increase the quality of life of only the existing

local communities. Further, the EAs are expected to work with the community and the MoNRE to manage the growth in an environmentally sustainable manner.

## VIII. ANALYSIS OF ALTERNATIVES

### A. Solid Waste Management

244. There has been a previous site identification, screening and selection process to arrive at a suitable site for a disposal site. According to the local authorities, several sites were assessed in 1995 and the existing one was recommended. A current review concludes that the site is in accordance with national and professional requirements as presented in the following table and thus could be utilized in the future SWM system. The compliance with various criteria has been assessed as good, medium or poor, and no criteria should be assessed as poor.

245. The site has been assessed as suitable for continued use as landfill site (Table 21). An Options analysis was also carried out for the method to be selected for solid waste management (SWM). The general objectives and selection criteria for treatment and disposal were:

- Select the least cost solutions compatible with what is considered appropriate technology under current economic and development conditions in Lao PDR.
- Collect and dispose of solid waste through solutions creating a minimum of damage and inconvenience for humans and the environment, while at the same time causing a minimum of demand on natural resources.
- Plan all technical facilities at the same environmental standard; small treatment and disposal facilities with less stringent environmental and operating requirements should be discouraged.
- All solutions must take into consideration the particular local conditions.
- All existing national environmental standards should be applied.

246. The following treatment and disposal methods are internationally recognized as pertinent for municipal solid waste (MSW) and potentially being applicable in a Lao PDR context:

- Incineration of most of the waste stream, or alternatively incinerate selected, high calorific waste categories.
- Composting of waste with high organic content.
- Centralized sorting of mixed MSW or selected waste streams.
- Sanitary landfilling with bio-gas collection and utilization.

247. It is an important condition that MSW treatment plants have a clear economy-of-scale. Typically, the unit treatment cost (USD/ton) for a large treatment facility may be less than a third of a small facility.

248. Sanitary landfilling is still the most common treatment and disposal method in most industrialized countries. Properly designed and operated landfills have limited environmental impacts.

**Table 21. Existing Site Compliance with Disposal Site Location Criteria**

<b>Criteria</b>	<b>Compliance with criteria</b>	<b>Comments</b>
Minimal distance from town center. (Reduced transport costs)	Good	Currently 8 km from the town center. This is as close as realistically possible when following the master plan development in the next 15-20 years. The site also has a good location adjacent to the main road.
Minimum volume requirement: minimum 20 years of operation, preferably more.	Good/medium	Available volumes exists for min. 20 years of operation. Adjacent land is available and idle and beyond 20 years of operation the site could be extended.
Little or no insight. (sheltering topography or vegetation)	Good	Surrounded by dense vegetation with very limited insight.
no inhabitants at the area and no neighbours within min. 300 m	Good	Nearest house (only a few) 0,5 km away
Favourable Soil/ground conditions. (highly recommended; impermeable soils) and no underlaying or adjacent potential or existing groundwater or surface water sources	Good/medium	Soils: Alluvial/colluvial silty sand and sand with sections of finer materials. Although the available soil survey indicate impermeable soils, the leachate survey and observations indicate that the soil permits the water to seep down. Consequently, the use of additional liner has been included (local suitable clay) in the feasibility assessment. No stability problems are expected under the local soil conditions and landfill design. No groundwater interests or wells in the downstream neighbourhood. Existing hydrogeological and soil study from 1998 concludes that there is a low risk of deep seepage of leachate to the underlaying groundwater.
Good and adjacent availability of cover material.	Good	Most of the cover material may be provided through initial 1-3 m excavation of the site.
Suitable recipient for leachate.	Medium	The leachate will be treated before discharge to the downstream stream and rice fields.
No flooding at the site	Good	The flood situation is important, and consultations with the local EA and the elevated location is concluding that the site is not a flood prone area.
Uncomplicated ownership of area.	Good	The site of 16 ha is readily available.
Limited or no ambient area use and interests.	Good	The existing site with adjacent area has no land use except for agriculture within a wide distance from the site.
Available existing infrastructure.	Good	Since the site has a beneficial location and electricity lines, water supply well and access road are available.
No other environmental constraints (protected natural areas etc)	Good	The site is not in wetlands or in an area with valuable fauna/flora importance. It is an elevated dry land with no critical vegetation.
None (or limited) other political constraints,.	Good	No other plans in the adjacent area. Site readily available.
No other natural conditions concerns	Good	Not subject to earthquakes or similar.

Source: PPTA analysis and Norconsult International Database

**Table 22. Sanitary landfill issues**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• very flexible with regard to change in quantities and characteristics of MSW</li> <li>• Landfill gas (LFG) extraction and utilization may provide a profitable resource recovery method</li> <li>• low requirements for skilled/specialized workers</li> <li>• low costs, both in investments and annual costs</li> <li>• very flexible in combination with RRR activities and other treatment methods</li> </ul>	<ul style="list-style-type: none"> <li>• potential major negative environmental impacts if improperly designed and/or operated</li> <li>• difficult to completely eliminate all environmental or social impacts</li> <li>• very low resource recovery if LFG utilization is not introduced</li> <li>• occupies and limits the use of large areas</li> <li>• with a limited and dense populated area sites may be difficult to find and establish</li> <li>• a larger portion of the country is on limestone and soil aquifer, requiring extra precautions against groundwater contamination</li> </ul>

249. A sanitary landfill provides the possibility of extracting and utilizing the energy-rich landfill gas (LFG).

250. Incineration is a widespread treatment method in many western countries. Normally it is combined with utilization of the generated energy, preferably with the utilization of both electricity and surplus heat. Also, worldwide, this method is becoming more and more recognized; although the experience to date in many countries outside the most industrialized is not very encouraging, mostly because of very wet MSW and lack of operational and financial capacities. The costs per treated ton are very high and the net income of sale of (only) electricity is low. In addition the required operational skills are high, and the method should not be appropriate for the current conditions in Lao PDR.

251. In Lao PDR with a relatively low percentage of combustible components like paper, cardboard, plastics, textiles etc., the waste composition will normally not make incineration an acceptable nor sustainable solution. However, the method has been described and analyzed as an option, in order not to exclude any available method.

252. The warm and humid climate as well as the high proportion of biodegradable, organic material is favorable conditions for composting. However, some sort of pre-treatment or separation schemes could preferably be included.

253. Based on an assessment of available composting technologies, it is recommended to base the composting solution on low-technology aerobic windrow composting with frequent mechanical mixing.

254. Composting is considered suitable only for waste with a high content of organic material, like market and yard waste, etc. For mixed MSW, the reject percentage could be high (40-50 percent) for production of compost of sufficiently high quality. In most developed countries, modern composting is mainly based on source-separated organic fractions of MSW.

**Table 23. Incineration issues**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• volume reduction</li> <li>• detoxification of hazardous waste</li> <li>• reduced leachate and landfill gas production at the landfills</li> <li>• energy recovery</li> <li>• landfill stabilization</li> </ul>	<ul style="list-style-type: none"> <li>• very high costs, both investment and operation</li> <li>• technically sophisticated</li> <li>• require highly skilled operators</li> <li>• secondary pollution impacts, particularly air pollution</li> <li>• adverse public sector reactions</li> </ul>

**Table 24. Composting issues**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• low-tech solution (the proposed solution)</li> <li>• reduces the quantities that need to be landfilled, and particular of components with potential environmental impacts</li> <li>• properly prepared end-product is environmentally friendly and provide a high quality soil conditioner for municipal or agricultural use</li> </ul>	<ul style="list-style-type: none"> <li>• only suitable for a portion of the MSW, unless a large percentage of reject for disposal is accepted</li> <li>• insufficient demand for compost at unsubsidized production cost. For Lao PDR soil conditioners may be available</li> <li>• rather high unit cost of production</li> <li>• limited resource utilization of the total MSW stream</li> <li>• may cause negative environmental impacts if not properly operated</li> </ul>



255. Without quite extensive post-treatment, like sieving etc., compost based on MSW has a limited use. It is internationally accepted to see this compost as soil conditioner, not a fertilizer. In most western countries the compost is used by the municipality in parks, at road side slopes, as vegetation cover at landfills, etc.

256. Based on experience from elsewhere it is considered economic feasible to compost only about 20% of the total MSW stream. This percentage of the MSW may be achieved through rather low-cost and simple pre-sorting separation schemes. A higher percentage of composting may require extensive and expensive additional source separation schemes.

257. Small scale, manual back yard composting of garden waste and possibly vegetable waste from households should be strongly encouraged and stimulated in medium and high income areas, with large plot sizes, and in rural communities.

258. Central sorting of mixed MSW may be done in plants with different complexities, from very simple plants with mechanical sorting of more bulky components (cardboard, plastics, metals, etc.) to more complex plants with mechanical pre-sorting, conditioner and a main sorting line where these components of items that have an economic value are manually picked and sorted.

**Table 25. Central sorting issues**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• high yield resource recovery (material recycling)</li> <li>• limited impact on the environment (enclosed plants)</li> </ul>	<ul style="list-style-type: none"> <li>• can only receive a portion of the MSW (normally not mixed/wet household waste)</li> <li>• can be complex and expensive to operate</li> <li>• sophisticated facilities: high initial investment and operating costs</li> <li>• very limited domestic market for the potential materials and varying international markets with large price fluctuations</li> </ul>

**Table 26. Summary comparison of SWM methods**

<b>Aspects</b>		<b>Sanitary Landfilling</b>	<b>Incineration</b>	<b>Composting</b>	<b>Low-tech Central Sorting</b>
Environmental impact		Acceptable (proper operation)	Good to very good	Acceptable to good	Good to very good (high % rejects)
Resource recovery		Acceptable (LFG)	Good to very good	Barely acceptable (soil conditioner)	Good
Local operation and maintenance capability (appropriateness)		Good to very good (appropriate technology)	Not Acceptable	Good (low-tech solutions)	Acceptable
Need/market for end-product		Good to very good (LFG electricity + reclaimed land)	Very good (electricity)	Acceptable to good (compost as soil conditioner)	Good to very good (but difficult market for some recycled materials)
Efficiency (% of total MSW stream handled)		Very good (~ 100%)	Good (~ 70-80%)	Acceptable (10-30%)	Good (30-40%)
Treatment (O&M) Costs Unit Price USD/tonne	Small size plant 50 t/d	20	142	32	32
	Medium size plant 100 t/d	13	108	25	22

## **B. Wastewater Treatment**

259. For the improvement of the southern portion of Kaysone Phomvihane drainage system various options were studied as below:

### **1. Sewage interceptor**

**Option 1:** for the intercepting of wastewater from the area, by using a HDPE pipe fixing to the bottom open drainage canal and with installing interceptors at every intersecting roads 10 numbers. For maintenance and cleaning control will install concrete boxes for every 50m. The wastewater pipe will increase to the downstream ward, the pipe shall be secured in concrete embedding. For the last section after crossing the Phokadouath road, the wastewater pipe shall installed and connected to the newly constructed drainage canal to the wastewater treatment plant. The wastewater pipe will install a manhole for every 40m for the maintenance and cleaning purpose. This option1 is cheap and practically can be implemented to fit with the existing situation since drainage open canal are already existing.

**Option 2:** was envisaged to construct separately wastewater drainage conduit in parallel with the existing drainage canal. The wastewater drainage conduit shall be installed on the one side of canal at an elevation lower than storm drainage of the intersecting roads. For every road intersection the entering storm drainages have to accommodate expensive road crossing and 4 interceptors from the side drainages of each intersecting roads, causing inconvenience during the construction. Moreover, would be expensive to arrange for connecting the households wastewater pipes to main wastewater pipe line, which today draining directly into canal. It would be far too expensive effort to inter connected the sewerage system from both sides of drainage canal to the proposed separate wastewater drainage conduit by option 2.

**Conclusion:** Option 1 for the wastewater pipe with installing interceptors at every intersecting roads, and maintenance and cleaning the concrete boxes every 50m will be arranged, practically, technically is easy to perform, environmental and economically considerable.

## 2. Drainage canal

260. For the new construction of the drainage channel of last section of Houay Longkong natural stream have been envisaged 2 options:

**Option 1:** The drainage canal after the box culvert under the Phokadouath road, the drainage canal will be constructed with a width 4 m, side slopes 1:2 and 4m height. The bottom of Houay Longkong natural stream varies from 128.5MSL down to 127.00MSL. The bottom slab of outlet culvert is estimated about 124.00 MSL. The bottom of the new constructed canal will be set up the upper end of new canal to join with the bottom of the box culvert under road Phokadouath is about 129.00MSL, with the bottom slope (at gradient  $i=0.002$ ), therefore, at the end of canal would be 128.00 MSL. If the ending of new canal will have a different level of elevation, the erosion, protection and scouring protection will be appropriate arranged. The canal bed, will be excavated and some will be filled. The natural soil is sensitive to the deformation and slope stability, the erosion protection would be suitable by loose rip-rap of crushed rock sizes 50mm to 300mm with a minimum thickness of 500mm, between crushed rock and soil so the geotextile should be used.

**Option 2:** The drainage canal to be constructed all lined open canal following through Houay Longkong stream with the typical drainage canal used in Vientiane urban development and management project. For calculation the canal will be constructed with bottom width 4 m, side slopes 1:1.5 and 4m height. The bottom of natural Houay Longkong stream is varies from 128.5MSL down to 127.00MSL within the canal section, therefore, the canal will bedding will need cut and filling. The natural soil is sensitive to the deformation and slope stability with the steep slope design is not favourable. The bottom with the reinforced concrete slab and concrete tiles for side slope protection will expensive to repair of any deformation and expensive construction cost of about 30% higher Option 1.

**Conclusion:** Option 1 for the drainage canal with erosion protection would be suitable by loose rip-rap of crushed rock sizes 50mm to 300mm with minimum thickness 500mm, is considering practically easy to construct, technically easy to fix if any deformation, environmental friendly fit with nature and economic considerable.

### 3. Wastewater treatment plant

261. For the construction of the WWTP have been envisaged two options:

**Option 1:** Construct Aerated WWTP is earthen impoundment in which mechanical mixing introduces air for BOD removal and to suspend solids. Performance depends on aeration. Three cell systems are recommended. Agitation must be sufficient to suspend all solids. Detention time: 1.5 to <3days. The design for BOD removal is based on first- order kinetics and the complete mix hydraulics model. An aerated pond system would have supplemental air sources to provide dissolved oxygen, this is usually accomplished with surface mechanical aerators and mixers, or by various forms of diffusers supplied with compressed air from mechanical blowers or compressors as shown in the Figure. For equal sized ponds, the aerated pond would provide the best treatment due to the mechanical addition of oxygen, and for a given organic loading, would require the least amount of land area

262. The land where proposed for the WWTP is empty no construction structures have been on this area due to the flood occurring in wet season. The construction of Aerated Wastewater Treatment Plant Pond is on excavation. The intake/interceptor has an elevation of about 129.00MSL, but the area where proposed wastewater treatment pond is about 130.0 MSL. The top dike would be at elevation between 132.00MSL to avoid potential flooding.

**Option 2:** An anaerobic pond is a deep impoundment, essentially free of DO. The biochemical processes take place in deep basins, and such ponds are often used as preliminary treatment systems. Anaerobic ponds are not aerated, heated or mixed. It requires a large land that is not available.

**Conclusion:** Option 1 Aerated ponds require less land. They are usually designed with a shorter retention time. They have been used to treat raw, screened or primarily settled municipal wastewater, as well as higher strength biodegradable industrial wastewater. The process is reliable, relatively easy to operate and cost effective. The advantages include reliable BOD<sub>5</sub> removal; significant nitrification of  $NH_3$  possible with sufficient mean cell resident time; treatment of influent with higher BOD<sub>5</sub> in less space; and reduced potential for unpleasant odors.

#### 4. Central drainage system around the Savanxay Market area

263. To improve the wastewater generating from Savanxay Market and bus terminal areas, including from the southern catchment Soukhavadi, Samosone Phokadouath has envisaged the following options:

**Option 1:** With the main objective of wastewater treatment generating from this area before releasing to the nature as the Mekong river and in the consideration of budget availability under the project implementation, the town will need to adopt the most suitable and fitting option in the real situation. On this central drainage system subproject no works to improve the drainage channel on the southern side of Visoukan road is seeded except to intercept the wastewater from this drainage after crossing the Chomkeo road to the wastewater treatment plant. The drainage around the market area will construct under this subproject a total of 1,000m. The drainage will adopt as urban drainage structures (pipes culverts, manholes, gutters and Chamber etc.) with top cover by base course materials and grassing to improve the environment. The north-east drainage of the market will be connected to the southern with the same standard as urban drainage. Wastewater from the market area will be interconnected to the urban drainage and conveyed to the wastewater treatment plant. The wastewater from the market area will be collected through gutters and chambers then connected to pipes culverts with HDPE. The wastewater is conveyed to the wastewater treatment plant at Chomkeo stream outlet. The existing culvert crossing Chomkeo road from both sides of Visoukan road, during the low flow weather, the wastewater from these Visoukan road side drainages will be intercepted to waste water treatment plant constructed in kind of a septic tank. To adopt this type of treatment plant is the only option. Available land belongs to the Government.

264. By implementing the improvement of drainage system around the Savanxay Market and construct of wastewater treatment plant at the end of drainage system has responded to the requirement of National strategy on environment to the years 2020 and its action plan for the years 2006-2020. Its objectives are to realize environmental management, to implement measure for sustainable development, to secure sustainable use equitable access to water resource and to use land with securing ecosystem;

**Option 2:** The drainage system will construct as the same for option 1, but the wastewater plant can construct alongside of drainage line and Visoukan road. With this option is too complicated and expensive to arrange for having wastewater from southern Visoukan roadside drainage is too deep.

**Conclusion:** Option 1 technically is easy to construct, cheap solution and economically considerable, and only the land available, environmental friendly.

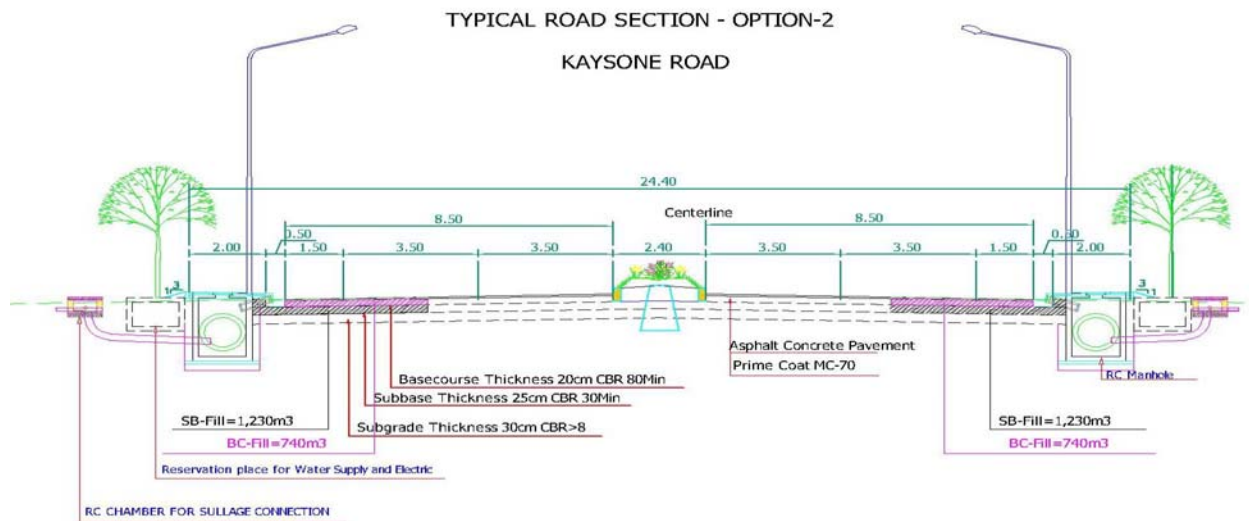
#### C. Mekong River Bank Protection

265. The river bank protection sub-project location is determined by the existing town layout and therefore options were not considered beyond certain design solutions.

#### D. Urban Roads

266. The location of the urban roads sub-project is determined by the planning priorities of the EA in terms of necessary road upgrading. Several options as regards width of the carriageway and road reservation were considered.

267. Based on an overall assessment of quality and cost, it is proposed to go for Option 2 below, which provides adequate standard in terms of cross-section geometry and drainage. During the Detailed Engineering Design, it may be considered to introduce catch basins as inlets for the drainage against increasing the distance between the manholes.



## IX. INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

268. Due to differing perceptions, values, objectives and responsibilities among different stakeholders, a range of environmental and social conflicts could occur among and between affected people, resettled villages, district authorities, central government and others. Obviously, avoidance is preferable to resolution, but that is not always possible.

269. While the consultative and participatory nature of the impact assessments and RP are aimed at reducing disagreements and conflicting positions, in instances where disagreements do occur, it is important that they are resolved quickly before positions harden and the conflict escalates. The earlier that discord is recognized and dealt with, the higher the chance of a successful outcome. Disagreements apply to direct social issues such as quality of life or affected livelihoods, and issues of environmental impact that may or may not affect the community directly.

270. The grievance process proposed for the three subprojects is based on existing, as well as traditional village, conflict resolution strategies. Justice departments at district and provincial levels are responsible for resolving village conflicts and property disputes, while the LWU are active in solving problems faced by women and the elderly.

271. Thus, the grievance redress mechanism meets the key cultural norms of potentially affected communities which will make the mechanism relevant, and maximize its effectiveness. However, to ensure understanding of the community the grievance redress mechanism will be introduced at the first organized stakeholder meetings at the beginning of the pre-construction phase when the public consultation process is resumed (see EMPs).

272. While every effort will be made to resolve conflicts by mutual agreement of the parties involved, in some cases, arbitration and adjudication on disagreements and conflicts by an external mediator will be required. Responsibility for arbitration and the means of adjudication will vary according to the parties involved, but will need to be referred to a higher level of authority than the parties concerned.

**Table 27. Overall Strategy for Dispute Resolution**

<b>Nature of conflict</b>	<b>Final decision/adjudication</b>	<b>Key mediator/arbitrator</b>
Intra-village dispute	Majority decision of village meeting	Village Chief
Inter-village dispute	Joint agreement of appointed village	Relevant district
Village/district dispute	Joint agreement of both parties endorsed by	Grievance Committee
District/province	Joint agreement of both parties endorsed by	Provincial authorities

273. If an AP, AH or group is not satisfied with, or has a complaint about, an aspect of the resettlement or compensation package, or if for any reason the compensation does not materialize according to the procedures set out in the RP and as agreed between the AP and implementing agency, he or she has the right to make a claim. The various phases or stages of conflict development and appropriate interventions are summarized below.

**Table 28. Phases of Conflict and Possible Interventions**

Stage	Intervention
Conflict avoidance	Consultation and participation in planning, decision making
Simple disagreements	Informal negotiation, discussion and mediation
Early conflict development	Reference to village leader and committee
Conflicting positions taken	Reference to resettlement committee (district level)
Intractable conflict	Refer conflict to Provincial or National Court

274. To ensure that the basic rights and interests of APs are protected, that their concerns are adequately addressed, and that entitlements are delivered in full and in a timely manner, a grievance procedure has been designed for the Project and is outlined below. There are basic steps to resolve grievances, as described below.

**Step One** - The first step is for the AP or a group of households to approach the appropriate ward/village level committee,<sup>10</sup> through the village head, and present the grievance. In most cases issues can be resolved through discussions and mediation at this level. If the complaint or grievance cannot be resolved at village level, or if the claimant is not satisfied with the decision, the next step can be taken, either by the claimant or the ward/village committee on his/her behalf.

**Step Two** - The second step is to present the grievance or complaint at the district level. This will be to a committee, established for the purpose, and comprising representatives from the Justice Department, the Cabinet, LWU and LFNC. This committee must respond to any complaint or claim within 15 days.

275. At this district level the FPMU along with the IA would be primary witnesses in order to both: (i) respond to the claimants grievance in terms of prior activities undertaken, etc; and, (ii) ensure that the claim is reviewed within the context of the existing policy, regulations, procedures and entitlement limits, and that the compensation awarded does not go beyond established matter of practice. The findings of the committee will be obligatory. The committee must maintain a public book showing all complaints and grievances received and the decisions made. These records will be monitored as part of both internal and external monitoring procedures. The committee cannot award compensation in excess of what is established as a matter of practice, or not within budgets within which they are operating.

276. If the above action does not yield satisfactory results, the claimant has the right to present their case at the provincial level.

**Step Three** - The third step is access to the Provincial Court. It will be in the interest of the EA and IA, resettlement committee, and affected parties to resolve issues before they are brought to the Provincial Court.

**Step Four** - If the grievance can still not be resolved, or the AP is not yet satisfied with the findings, the fourth and final step is that the claimant has the right to present the case at National Court. Access to the courts is obviously a last resort.

277. The EA will be responsible for meeting the administrative and legal costs that will be incurred in the resolution of complaints and grievances.

<sup>10</sup> Some wards/villages already have a committee that deals with resettlement and grievance issues, in other cases villages do not, in which case they will establish a Village Development Committee.



## **X. ENVIRONMENTAL MANAGEMENT PLANS**

278. Environmental management plans for each subproject have been developed, and are found under separate cover.

## **XI. CONCLUSIONS AND RECOMMENDATIONS**

279. The examination of the three CTD subprojects of Kaysone Phomvihane, Phine, and Dansavanh in Lao PDR indicates that potential environmental impacts are mostly construction-related, and can be mitigated with standard construction practices for the protection of the environment and local community.

280. Potential impacts of the operation of the completed WWTPs and new sanitary landfill need to be addressed at the detailed design stage of the CTD. The treated effluent quality of the aerobic treatment system of the three WWTPs needs to be clarified, and the sensitivity and assimilative capacity of the receiving environments of the drainage canals, and ultimately the Mekong river needs to be clarified.

281. The final design of the sanitary landfill depends in part on the results of the ongoing environmental compliance audit (ECA) that is being conducted on the existing dumpsite that is adjacent to the planned site for the sanitary landfill. The dumpsite will be decommissioned in preparation for the new sanitary landfill. The ECA will assess the present and future impact of the dumpsite on the environment, and will determine the closure procedure for the dumpsite.

282. The public consultation meetings underscored the need for effective management of noise, dust, traffic disruptions, and safety during the construction phase of the project. Follow-up meetings with the consulted stakeholders to address any construction-related issues are required which will begin at the beginning of the pre-construction phase. The EMPs that have been prepared for the three subproject towns explicitly identify the need to re-initiate the stakeholder consultation process at the beginning of pre-construction phase. Included will be the introduction of the grievance redress mechanism for the stakeholders which has been developed based on cultural norms and GoL requirements.

283. The civil construction impacts of elevated dust, noise, traffic disruptions, erosion and sedimentation, and public and worker safety can be managed effectively with standard construction practices (e.g., World Bank 2007).

284. The reported absence of critical habitats, rare or endangered species, biodiversity values, ecological protected areas, or affected cultural or heritage structures focuses potential impacts on the local community and worker population. However, in parallel with preparation of the detailed designs a select re-review of the existence and sensitivity of valued ecological and cultural resources including groundwater is needed to clarify potential impacts of the detailed designs. It is recommended that as part of the update of the EMPs at the detailed design stage, that supplementary data/information be reviewed.

285. The IEE concludes that the feasibility designs of the project combined with available information on the affected environments, and the separate ECA on the existing dumpsite are sufficient to understand the scope of potential environmental impacts of the subprojects. Providing that significant changes do not occur to the design of one or more of the subproject components, and that the supplementary sensitive receptor data, and final design information

identified above is provided, that further detailed environmental impact assessment (EIA) of the subprojects is not required.

286. The separate EMPs developed for the subprojects provide impacts mitigation plans, environmental monitoring plans, and specify the institutional responsibilities and capacity needs for the environmental management of the subprojects. The IEE recommends that the EMPs be reviewed and updated at the detailed design phase to ensure that EMPs address fully the final subproject designs.

## **XII. REFERENCES**

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## Appendix A: Description of Policy, Legal, & EIA Framework

### 1. Laws

287. Law on Environmental Protection No. 02/99/NA (1999): sets out the basic principles of environmental protection at Article 5, stating that all persons and organizations residing in the Lao PDR have an obligation to protect the environment. It does stipulate that those who generate an environmental impact are responsible for the resulting damage caused. Directs that environmental management and monitoring units be established at all levels of government, with responsibilities to include such things as: establishing and enforcing sector environmental plans; taking action to mitigate environmental damage; issuing orders to adjust, suspend, remove or close down activities that cause negative impacts. It states at Article 8(3) that development projects and operations that have or will have the potential to affect the environment shall submit an Environmental Impact Assessment (EIA) report in accordance with the regulations of WREA. WREA is responsible for environmental management and monitoring, and the issuance of an Environmental Compliance Certificate (ECC).

288. Law on Industry No. 01/99/NA (1999): indicates all businesses shall ensure the protection of the environment in accordance with the Environment Protection Law. Solid and liquid wastes shall be treated in accordance with the relevant MIH waste discharge regulations (Article 19).

289. Law on Hygiene, Prevention and Health Promotion No.01/NA (2001): focuses on controlling the elements of the environment which are dangerous or may be dangerous to the body, to mental health and social status of human (Article 2); promoting the investment in hygiene, prevention and health promotion (Article 5); community hygiene to be in place (Article 11); to ensure the building access to hygiene principles (Article 14); the care of working conditions for workers (Article 18); to ensure the cleanness of goods exposed, be far away from dirty sources, cemetery and rearing animal places (Article 22). All facilities to be in place particularly wastewater management, solid waste management systems and anti-fire management system.

290. Law on Water and Water Resources (1996): currently under revision specifies that the GoL is responsible for the prevention of adverse impacts from water and all acts that cause the depletion of water; water resources must be managed and used according to centralized, comprehensive and integrated management principles and according to the 'allocation plan' which gives individuals and organizations the right to use water. The law includes several key points about regulating use and environmental impacts: Medium and large-scale use of water requires approval, registration and/or a contract. Large-scale use must be accompanied by a feasibility study, an ESIA and detailed measures to deal with the impact. The Law regulates 'Water Source Development activities', stating that these activities require approval from the relevant authorized agency and must comply with 'socio-economic and environmental development plans, the master plan, periodic development plans of each sector, and the construction plan for each approved project'. These must also ensure the preservation of water and prevent adverse impacts on the environment.

291. Law on Land (2003): is relevant to environmental and wetland management, as well as the management of the country's land resources. The Land Management Authorities are responsible for, among other things, coordinating with concerned sectors and local administrations to plan the use of land, to protect and develop land, and to define land areas for certain uses; they can allocate land use rights to lease or grant concessions, and withdraw the

right to land use. Various articles allow for the lease or concession of land from the State. In terms of environmental protection, Article 6 obliges individuals and organizations to 'protect the land to ensure that it is in a good condition'. It also states that land use shall not have a negative impact in the natural or social environment.

292. Law on Roads (1999): provides directives for transportation of hazardous materials via Lao PDR roads. Also designates weight limits on vehicles traveling on Lao PDR roads. It states that construction activities that the road contractor shall perform includes protection of the environment (Article 15); Ministry of Communications, Transport, Post and Construction (MCTPC) is authorized to manage and use material from borrow pits, quarries, gravel, sand etc, from authorized locations (Article 18); Reasonable compensation must be paid to individuals whose land is expropriated for roads, relocation of replacement structures, and loss of trees and crops (Article 19); and it states that it is prohibited to construct within the road reserve (Article 21).

293. Law on Forestry (2007): while under revision defines distinct uses of forest or forest products (e.g. tourism, recreational sites, logging) and specifies which 'Forest Category' each 'use' may be conducted within. Those wishing to engage in 'business operations in the forest' must seek approval from the Forest and Forest Land Management Authority. Utilizing forests for business purposes 'shall avoid causing any negative impacts to forest and forest production areas, nature, the environment and society'. Degraded forestland and barren forestland can be used for other activities; the level of degradation is vaguely defined at Article 3 as forestland areas where forest has been heavily and continually damaged and degraded, causing a loss in the balance in organic matter, which means that the forest may not be able to regenerate naturally. The Law also defines buffer zones as the forest and forestlands from 100m to 500m in width surrounding protected areas.

294. Law on Cultural, Historical and Natural Heritage (2005): addresses a number of environmental protection issues. It states that socio-economic development shall proceed side by side with protection and conservation of the national heritage. It defines cultural, historical and natural heritage, noting that natural heritage may have scenic or ecological value. The Law also sets out zoning and measures for protection of heritage sites. Areas of national natural heritage shall be registered, especially those containing heritage of high value, such as biodiversity areas, conservation forests, wetlands, caves, and so on . Although it states that sources of biodiversity which have national natural heritage, e.g. wetlands, ponds and marshes, shall be administered by inspection and registration, as proposed by the concerned sectors. It also sets out regulations for protection of national heritage, such as the need to obtain prior approval for development in any national natural heritage area from the Ministry of Information and Culture (MIC) and other concerned sectors.

295. Law on Fisheries (2010): was developed specifically for the fisheries and aquaculture sector. The Food and Agriculture Organization (FAO) and other organizations carried out a "Legislative Review of Fisheries and Aquaculture in the Lao PDR" to provide guidance to this process. The review noted that (in 2008) unlike in most countries, Lao PDR had not enacted a separate fisheries and aquaculture legislation and that the sector was regulated under the Forestry Law.

## **2. Strategies & Policies**

296. The 7th National Social and Economic Development Plan (NSED) (2011-2015): seeks to define future directions for the development of Lao PDR. It includes mainly agriculture and

forest, energy, mining and environmental protection and natural resource management. It provides the basis for sectoral and provincial plans, some framework for environmental protection/sustainability efforts; its stated aim is to “Ensure the sustainability of development by emphasizing economic development with, cultural and social progress, preserving natural resources and protecting the environment”<sup>11</sup>.

297. National Forestry Strategy to 2020 (FS2020): analyzes the status of the Lao PDR forest sector and provides targets and recommendations for its development. Importantly, it sets out the categories of forests: production forests; conservation forests; protection forests; regeneration forests; and degraded forests. Targets for the sector include: stabilization of shifting cultivation by 2005 and its eradication by 2010; improvement of forest cover and quality. It also notes the establishment of NPAs in order to protect natural areas and species of fauna and flora to ensure the balance of nature, and for protecting watersheds<sup>12</sup>.

298. National Biodiversity Strategy to 2020 & Action Plan to 2010 (NBSAP): aims to protect biodiversity resources and to ensure their sustainable use. It notes that implementation requires cooperation and coordination from all levels of government and society. Water resources are one of many issues addressed in NBSAP document. It states that “water resources such as ground water, lakes, rivers, streams and wetlands should remain clean and abundant, and where necessary, be improved, through their protection, conservation and sustainable use”.

299. Urban Master Plan (2001) No. 58/PM: includes the land use plan, road network planning, drainage system planning, solid waste management system and building regulation. Most of the current urban development activities such as road network improvements, drainage structure rehabilitation and solid waste management.

300. National Water Resources Strategy and Action Plan [draft]: addresses water needs, and governance of basic subsistence water use. Developed in 2010, it provides the Government's direction and decision making for water resources management, summarized in nine major policy statements which address the major issues which face the water sector. It notes that increasing scarcity/competition is a driving need for development of the policy and that water is a valuable national asset, with economic as well as social and environmental values. Further, decision-making should be based on consultation and local involvement. The most relevant of the nine policy statements are: the development of IWRM plans for priority (sub) basins; allocation of water resources is to prioritize human and ecosystem needs where scarcity exists; the need for water quality protection; and efforts to reduce the impacts of flood, drought and climate change. The policy also forms the basis for drafting a five year strategy & action plan (2011-2015). In the action plan, 22 activities are identified under the nine policy statement areas<sup>13</sup>. There is no specific mention of wetlands in either document, although wetlands can be tied to other water issues, such as groundwater, water quality, and so on. The impact of prioritization of human needs in water allocation requires further discussion.

301. Strategy on Climate Change (2010): discusses global climate change, as well as the expected climate change and development situation for Lao PDR. This strategy sets out objectives and strategic directions for addressing climate change, with goals including reinforcing sustainable development, increasing the resilience of economy and natural

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<sup>11</sup>Ministry of Planning and Investment. 2010. *7th National Social and Economic Development Plan (2011-2015): Executive Summary* [Draft & unofficial translation].

<sup>12</sup>Prime Minister's Office. 2005. *Forestry Strategy to the Year 2020 of the Lao PDR*.

<sup>13</sup>WREA. July 2010. *National Water Resources Strategy and Action Plan for the Years 2011 to 2015* [Draft].

resources, enhancing cooperation, and improving public awareness. This is followed by adaption and mitigation options in key strategic areas, such as agriculture, energy, water resources, health, and so on.

302. National Adaptation Programme of Action to Climate Change (NAPA) (2009): references regional predictions of the potential impacts of climate change. It identifies urgent needs for adaptation, priority activities and potential barriers to implementation. Urgent needs for the water sector include: Awareness rising on water resource management; flood mapping and early warning systems; strengthening institutional capacity; surveying of underground water sources in drought-prone areas; multi-use reservoirs in drought-prone areas; conservation and development of major watersheds; flood protection barriers; improved navigation; and repairing infrastructure damaged in floods. The NAPA's emphasis for this sector is thus on flood, drought and disaster preparedness, with only broad mention of watershed conservation.

303. Strategic plan on disaster risk management in Lao PDR (2020, 2010) and Action Plan (2003-2005): sets out lessons learned from disaster experiences, a strategy and approach on disaster management, goals for 2005, 2010 and 2020, and implementation methods and budget. The natural disasters listed include flood, drought, landslides, fire, as well as disease. However, the role of environmental degradation & changing climate is also noted. There is recognition of previous emphasis on relief and mitigation, rather than prevention. The Strategy aims to: safeguard sustainable development; shift more to preparedness; build community capacity; and promote environmental protection.

### **3. National Environmental Assessment Procedure**

304. According to the Environmental Protection Law (1999), development projects and operations that have or will have the potential to affect the environment shall submit an Environmental Impact Assessment (EIA) report in accordance with the regulations of WREA<sup>14</sup>. WREA is responsible for environmental management and monitoring, and the issuance of an Environmental Compliance Certificate (ECC). Details of the procedures mentioned in the Regulation on Environment Assessment No: 1770/WREA (3/10/2000) as below.

305. Each Development Project Responsible Agency (DPRA) must ensure that any development project in the Lao PDR carries out Environmental Assessment (EA) in accordance with the content determined in this Regulation, and any regulation of its own line ministry. The Environment Assessment must include at least a Project Description to enable DPRA to perform a project environment screening under Article 7 of this Regulation. If the project is not exempt under Article 8 of this Regulation, the EA must include an Initial Environment Examination (IEE) as specified in Article 9 of this Regulation. An Environmental Impact Assessment (EIA) may be required if this is shown to be needed following a review of the IEE, as specified in Articles 11, 12, 13, and 14 of this Regulation.

306. All project proposals that are submitted to the DPRA by a project owner, and all project proposals that are prepared by a DPRA must include a brief description of the project, including the following:

- Name of the Project owner.
- Type of project.
- Scope of the project.

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<sup>14</sup> WREA now incorporated in the new MONRE

- Project location.
- Intended product.
- Raw materials to be used.
- Estimate of the quantity and quality of any solid, liquid, or air-borne wastes resulting from project construction or operation.
- Number and origin of project's intended labour force for construction and operation.
- Anticipated positive and negative environmental and social impacts of the project.
- Environmental mitigation measures that will be implemented during the project construction, operation and closure (if applicable)

307. The DPRA must circulate the project proposal document to relevant government sectors and local authorities, and must consider their comments in its environmental screening decision. Line ministries may request that additional information must be provided in the project description to support their internal review of the proposal.

308. Within 30 days of receiving a project description, the DPRA must complete the screening and explain the screening decision in writing to WREA in the case of national projects or to PWREO for local projects. Within 15 days of receiving the screening findings the respective environment office shall either notify the DPRA that it concurs with the decision, or shall instruct the DPRA to reconsider, taking into account relevant information or guidance. Within 7 days after receiving the record of decision from the respective environment office, the DPRA must notify the project owners of the result of the project screening to abide by the record of decision. The DPRA must also notify the Environmental Management and Monitoring Unit (EMMU) of the concerned line ministries or local administration authorities for information and monitoring purposes.

309. For those projects found by screening to be exempt from further EA, WREA will issue an environmental compliance certificate within 15 days after receiving the screening record of decision from DPRA. There are two types of certificate; one with conditions and one without conditions. Those projects determined to require further EA must proceed to IEE.

310. For foreign investment projects, the IEE report must be written in Lao and English. Line ministries in their internal EA guidelines may set additional requirements for the contents of IEE reports and the number of copies of reports that are to be submitted.

311. If the IEE report concludes that no EIA is needed, an EMP must be developed within the IEE report, which must have the following contents:



- Measures to prevent and minimize environmental impacts.
- Programs for environment control and monitoring.
- Responsibilities, organization, schedule and budget for implementation of the EMP and other issues that the DPRA may deem necessary for the protection of the environment.

312. During the IEE process, if it is found that the project needs an EIA, the IEE report must contain Terms of Reference for the subsequent EIA.

313. The IEE report and the IEE's EMP must receive approval from the DPRA before WREA can issue the environmental compliance certificate to the project owner. For projects requiring EIA, the project owner must, during the detailed design phase, prepare the detailed EMP based on the general EMP of the IEE already approved by WREA.

314. The project owner is directly responsible for the monitoring and evaluation of the EMP. The DPRAs in central level are responsible for the inspection of the implementation of the monitoring and evaluation for the project environment where projects are approved at the central level.

315. In order to ensure the effective implementation, the project must establish an environmental unit. The members of such unit may come from the company itself, hired staff, from an outside organization or be entities working on contractual basis.

316. The project owner of the Environmental Unit must establish monthly reports on project environmental monitoring to be sent to the concerned agencies, which include WREA, and the Environmental Management and Monitoring Units (EMMUs) of the concerned line ministries for information and supervision.

317. The WREA and the responsible line agency EMMU retain authority to directly control project activities, in order to ensure that project owners effectively carry out and regularly monitor their environmental protection duties.

318. National Environmental Standard Order No. 2734/PMU-WREA (2009), all projects should follow the national environmental standard which links to water quality for drinking – the ground water and surface water (Article 4), also the quality of soil for agriculture, quality of air and noise to be met at control levels. All factories where wastewater discharge, the water quality can be measured and to ensure that BOD not over 40 mg/l, NH<sub>3</sub>-N not over 4 mg/l, TSS not over 40 mg/l and pH not over 9 mg/l. Specifically, various chemicals may be used for processing of some factories and that specific requires for certain chemical is set in this standard.

319. Manual of Environmental Impact Assessment Procedures for Road Projects in the Lao PDR (1997), MPWT. It serves as an interim document guiding EIA procedures for road projects, outlines potential impacts and suggests mitigation measures.

320. Regulation and Guidelines for the Environmental Assessment of Road Projects (1999), MPWT. It serves as interim document guiding incorporation of environmental protection into road project preparation; establishes a "Code of Sound Environmental Practice".

321. Environmental Impact Assessment for Industry and Processing Handicraft Order No. 1222/MIH (2005), the projects which requires EIA, IEE and Environmental Management Plan depending on a project size, a quantity of products per day and a number of workers. At least IEE is required for the project with a capacity of products of  $\geq 50$  ton per day and  $\geq 40$  workers. In addition, the industrial and processing projects can be located unless official permission is issued and follow the guidelines for IEE/EIA processes (Article 5). Local communities and other stakeholders should be involved in all processes of IEE/EIA of projects (Article 9).

<b>Law or Decree</b>	<b>Article</b>	<b>Relating To</b>	<b>Content</b>
<i>Constitution of the Lao People's Democratic Republic (1991, amended 2003)</i>	17	Environment in general	"All organizations and citizens must protect the environment and natural resources: land, underground, forests, fauna, water sources and atmosphere."
<i>Environmental Protection Law (1999)</i>	5	Environment in general	Conservation takes priority over mitigation and restoration. Socio-economic development planning must include planning for environmental protection
<i>Environmental Protection Law (1999)</i>	8	EIA Process	MONRE is main agency to issue regulations for EIA. People affected by projects, mass organizations, and local administrations are to be involved in the EIA process
	10	Responsibility of those engaged in development works	Those engaged in development works must adhere to safeguards, and to standards and regulations issued by GOL agencies
	14	Responsibility of those engaged in development works	Those engaged in development works must abide by laws on land, forests, water, etc.
	16	Responsibility toward cultural, historical, natural heritage sites	Those engaged in development works must abide by laws and regulations to protect such heritage sites
	22	Pollution control	All are responsible for control of pollution, and applying technologies appropriate to control such pollution
	23	Hazardous wastes / emissions	Restrictions to hazardous wastes and means to control such wastes and emissions
	28	Damage to environment	Those causing damage to environment are responsible for repair through appropriate GOL agencies
	38, 39	Local environmental management and monitoring	Stipulates responsibilities of local administrations (provinces, municipalities, special districts, districts) to establish environmental management and monitoring units
	40	Local environmental responsibilities	Stipulates responsibilities of village administrations to follow environmental regulations
<i>Water and Water Resources Law (1996)</i>	4	Rights to use water resources	Defines rights, obligations, and procedures to gain approval for use of water resources

<b>Law or Decree</b>	<b>Article</b>	<b>Relating To</b>	<b>Content</b>
	18	Permission for use	Stipulates that medium and large scale uses require feasibility studies, EIAs, and mitigation plans, before permission is granted for use of the resource
	22	Principles in water resource development management	Stipulates that water resource development must be consistent with national and sector plans, must ensure preservation of the natural beauty of the resources, and must protect against harmful effects of water
<i>Water and Water Resources Law (1996)</i>	25	Promotion of Watershed and Water Resource Protection for Hydropower Development	Stipulates that 'hydropower projects must be developed with due concern for environmental protection, flood protection, water supply, irrigation, navigation, fisheries and others.'
	29	Water and water resource protection	Requires that water resources be protected from becoming spoilt, polluted, or drying up, and that forest and land resources be protected to help protect the water resources
<i>Lao Forestry Law (amended 2007)</i>	5	Policy on forest and forest land	The GOL has the policy to preserve, regenerate, and develop forests and forest land to help preserve the environment, water resources, biodiversity, and people's livelihoods.
	9 to 13	Forest types	Classify the various types of forests according to use, including forests for village use
	26	Preservation of water resources in forest zones	Stipulates the preservation of water resources in forest zones for those areas where waterways originate and flow, including strict management and regulations to control logging, shifting cultivation, and destructive forest uses
	70	Conversion of forestland	Stipulates that forestland can be converted to other land type if it brings a high level of benefits to the nation and to livelihoods of the people, and is included in the national development plan
	71	Types of converted forestland	Stipulates that for uses such as dam construction, the timber and forest resources to be harvested in those areas are property of the State

<b>Law or Decree</b>	<b>Article</b>	<b>Relating To</b>	<b>Content</b>
<i>Wildlife and Aquatic Law (2007)</i>	31	Use for Household purposes	Allows use by village households of wildlife and aquatic species in the common and general category list in particular seasons or permitted areas, using tools or equipment that do not adversely affect habitats or compromise the species population.
	32	Customary Use	Allows use of wildlife or aquatic species in the common and general category list by village households for “necessary cultural beliefs.”
	52	Prohibitions	Prohibits taking of wildlife, including parts of the animals, from their habitats; tormenting wildlife and aquatics; illegal catching, hunting, trading and possession; catching aquatic and hunting in conservation zones, in breeding season, or when pregnant; devastation of habitats and feeding zones.
<i>Land Law (2003)</i>	6	Protection of Land and Environment	Declares that all individuals and organizations are obliged to protect the land from degradation,
	14	Changes in Land Category	Land use can be changed if it does not cause social or environmental harm and if prior approval is obtained from the authorities.
<i>Decree on Land Lease or Concession (2009)</i>	39	Obligation of Person or Legal Entity Who Leases or Obtains Concession	The person or legal entity who leases land or obtains a concession is obligated, among other things, “not to cause any damage to the quality of land and negative impact to the natural environment and the society.”
<i>Road Law (1999)</i>	15	Public Road Construction	Construction of public roads must include protection of the environment
<i>Prime Ministerial Decree No. 112/PM on Environmental Impact Assessment (2010)</i>		Stipulates the need for Environmental Impact Assessment	Stipulates rights of those affected by projects, and need for participation. Outlines the process of conducting the EIA, preparing environmental management and monitoring plans, social management and monitoring plans, issuing environmental compliance certificates, monitoring compliance with the various plans, establishing the institutional framework including grievance procedures.
<i>Decree on Compensation and Resettlement of People Affected by Development Projects (2006)</i>		Establish the procedures for compensation and resettlement for project affected people	Defines the principles, rules, and measures to mitigate adverse impacts and to compensate for damages that may result from involuntary acquisition or repossession of land and of fixed or movable assets, including changes in land use and restrictions to access of community or natural resources

### XIII. APPENDIX B1: RECORD OF PUBLIC CONSULTATION IN KAYSONE

#### Consultation Undertaken During PPTA

322. Consultation has been undertaken at various stages/points throughout the Project.

**Table 2 -1 – Stages of Consultation in the Project**

<b>Project stage</b>	<b>Purpose</b>	<b>Tools/Process</b>
Inception stage and pre-feasibility study	<ul style="list-style-type: none"> <li>Identify stakeholders;</li> <li>Identify key poverty reduction and social development options;</li> <li>Identify work required (plans for action/mitigation plans, frameworks, or other measures)</li> </ul>	<ul style="list-style-type: none"> <li>Incorporation of feedback on initial project concepts;</li> <li>Stakeholder analysis and workshops, confirm who will be involved and how;</li> <li>Screening of issues</li> </ul>
SLEDPs	<ul style="list-style-type: none"> <li>Establish levels of participation of stakeholders in current planning;</li> <li>Prepare socio-economic profiles;</li> <li>Identify existing opportunities and constraints on urban development;</li> <li>Identify existing opportunities for participation</li> </ul>	<ul style="list-style-type: none"> <li>Key informant interviews (KIs) and focus group discussions (FGDs) with stakeholders;</li> <li>Workshops;</li> <li>Data collection - participatory rapid appraisal (PRA) techniques;</li> <li>Participatory SWOT analysis</li> </ul>
Feasibility study - field investigations	<ul style="list-style-type: none"> <li>Confirm problem analysis;</li> <li>Assess needs, demands, and capacities of beneficiaries;</li> <li>Foster maximum positive impact for women/girls;</li> <li>Develop appropriate mitigation plans, frameworks or other measures if negative effects are unavoidable</li> </ul>	<ul style="list-style-type: none"> <li>Data collection - participatory rapid appraisal (PRA) techniques, and household survey;</li> <li>Willingness/ability to pay survey;</li> <li>Poverty and gender analysis;</li> <li>Stakeholder analysis;</li> <li>Risk reduction options;</li> <li>Analysis focused on affected persons and/or communities</li> </ul>
Draft RP/PSA preparation and reporting	<ul style="list-style-type: none"> <li>Detailed identification of risks and impacts;</li> <li>Ensure social concerns are addressed in designs;</li> <li>Involve stakeholders in agreement on preferred design;</li> <li>Maximize poverty reduction and social development impact;</li> <li>Minimize negative impacts (RP)</li> </ul>	<ul style="list-style-type: none"> <li>Consultation and PRA (incl. responses to draft PSA);</li> <li>Analysis;</li> <li>Review of action/mitigation plans or other measures</li> </ul>
Finalisation of RP/PSA, disclosure	<ul style="list-style-type: none"> <li>Facilitate stakeholder ownership of final design;</li> <li>Confirm poverty reduction and social development outcomes in project design;</li> <li>Confirm alignment with government and development partner policies</li> </ul>	<ul style="list-style-type: none"> <li>Review of design elements based on responses/comments on draft RP/PSA;</li> <li>Review of project compliance with requirements for action/mitigation plans, frameworks, or other measures</li> </ul>

The CTD has been prepared in a participatory manner with consultations with primary stakeholders and beneficiary communities. During the identification of priority subprojects and preparation of the SLEDPs, consultations were held with the EA, IA and other stakeholder agencies and organizations.

323. Consultations have also been undertaken specifically for the environmental and social impact assessments in an integrated manner, and will be reported in the various reports and plans prepared for each subproject. The purpose of the consultations undertaken for the subprojects has been to; (i) introduce the CTD and subprojects; (ii) briefly identify impacts and receive feedback on the impacts and any proposed mitigation measures; (iii) disclose the eligibility and entitlements for compensation under the CTD; and (iv) record the response of beneficiary communities to the CTD and anticipated impacts, both positive and negative, of each subproject.

324. A Consultation and Participation Plan (CPP) and Stakeholder Communication Strategy (SCS) have been prepared for the CTD. The CPP details the consultations taken to date and establishes the framework for ongoing consultation and participation as the Project moves into its implementation stage.

### Focus Group Discussions

325. For the FS and subproject discussions, consultations have been held with affected/beneficiary communities through focus group discussions (FGDs) with small groups of men and women from the communities. As described in Section 4, a household survey was also undertaken to understand the characteristics of beneficiary households and their access to urban services and facilities.

326. Consultations with small groups of men and women were undertaken in four villages in the vicinity of the subprojects with 73 participants.

**Table 2-2– Consultative Meetings with Beneficiary Villages**

Date	Location	No. of male participants	No. of female participants	Total
04.10.11	Ban Nalao	11	11	22
08.10.11	Ban Lattanalangsy	8	7	15
14.10.11	Ban Nakae	9	7	16
16.10.11	Ban Sok	10	10	20
Total		38	35	73

Source: PPTA Consultations (October 2011)

### Results of Women's FGDs

327. The FGDs with women identified their main livelihood activities as farming (mainly rice cultivation), part-time gardening, bamboo weaving, running small household businesses and shops (including informal stalls by the road-side), casual work (during the garlic and vegetable growing season), market trading, providing part-time house cleaning services, and running small restaurants and bars along the Mekong River in the evenings.

328. The women discussed problems facing poor families, women in poor households had limited abilities in terms of education, skills and access to regular or reasonably well-paid employment, often they cannot provide basic needs for their households (food and clothing). Also noted was the homelessness of many poor families, or they live in very small houses and huts without proper facilities such as running water, latrines, and electricity, they located by the sides of streams or drainage channels and then suffer during rainy season due to floods and sickness. It was commented that many poor households are headed by widows, they have to manage the household and try and earn money, they are faced by many hardships.

329. The women considered the main challenges and issues facing the town in terms of development included; low household incomes; insufficient employment opportunities (especially for poor households) even students who graduate with qualifications cannot get jobs; most people have a lack of skills or experience for the jobs that do exist; increasing social problems associate with crime (burglaries) and drug use; lack of funds for trading; in some households the men do not work, they go out drinking and come home late-they do not help support the household; insufficient market supply of vegetables; inadequate infrastructure especially roads, poor rubbish collection creating nuisance (flies and rats) and creating poor village environments; the lack of sufficient drainage and poor maintenance leading to blocked drains and pipes caused flooding, many houses were damaged by floods and children became ill; lack of regulated micro-finance facilities offering low interest loans and increasing household debt due to informal credit traders (high interest charged by “loan sharks”); health facilities were difficult to access and were not well serviced or equipped, dengue fever is a real problem in many villages.

330. The development priorities identified in the women’s FGDs included; rehabilitation of the roads and improvement of drainage especially to address the very difficult access during the rainy season; improving sewerage as “bad and stagnant” water remained for long periods (such problems along Santhipap Road were particularly mentioned); improving waste management to prevent nuisance, illness and bad odors; provide improved and more accessible health services and facilities; establish factories (or provide incentives for investment) such as garment or bottled water factories; and, provision of connections to the national electricity grid. The women’s groups identified interventions or measures to address the problems which included establishing micro-credit facilities or revolving funds in the villages (as part of village development funds) for women wanting to establish sewing or handicraft groups; creating jobs for people (especially recent graduates so they stay in town and do not move to other areas); and, supporting children (or their families) to stay on at school so they can at least complete secondary school.

331. When discussing the wastewater treatment plant and sewerage subproject the women noted that this would improve health, particularly for those people living along the currently open channels which convey wastewater, effluent and storm-water run-off, the women also noted that the sewers get blocked with rubbish because the solid waste collection service is not frequent enough. In the rainy season wastewater backs up and floods the low-lying areas adjacent to the Mekong River, some houses are below the road and get flooded, children fall ill (fever, stomach ailments and eye infections) because the flood waters (which can contain sewage and wastewater) can take a long time to recede. Stagnating pools of water are breeding grounds for mosquitoes.

332. The women’s groups felt that there would be general environmental improvements with this subproject with a cleaner environment, and reduced exposure to various illnesses (including dengue fever). The women’s groups determined that the disturbance (dust, noise, need to remove stalls located across the drains during installation of new pipes) in any one area would not be for very long, after the pipes had been installed they could go back to selling etc. The women wondered if it would be possible to ensure that construction vehicles only used certain routes, the roads had been damaged by many construction trucks in the past and they wanted to avoid further any damage. Difficulties in access to the properties was raised, it was explained that, similar to the road improvement subproject, a plan would need to be devised to ensure that access was not impeded during construction.

333. The urban roads improvement subproject was seen to address a number of problems, the main roads were currently seen as too narrow vehicles that parked along the roadside blocked the entrances to the many commercial establishments along the road including one of the main markets, the road pavement is damaged and has many potholes, there are no street lights and it is unsafe at night, inadequate drainage (blocked drains, drains only on one side of the road, and drains being too small for the storm-water creates localized flooding and makes for difficult travel.

334. The women considered that they would benefit greatly from the improvements as they were the majority of stall-holders and goods sellers in the area. The women raised issues about road safety, they were concerned that an improved road surface would encourage drivers to drive faster than they do currently, there is a need for road safety campaigns aimed at bus and truck drivers as well as school children and for the police to enforce traffic and safety regulations. How the construction would be handled concerned the women, their businesses would be disrupted and some of them might even have to move away while the road was being widened, the effects of this on their household income was raised.

335. During these discussions and also during consultations with households affected by involuntary resettlement (IR) impacts it was explained that livelihood restoration measures covered compensation for loss of wages and/or employment during the construction period.

336. Women noted that improving the solid waste management system would require more frequent removal of rubbish and collection of all and not just some of the waste. They noted that the rubbish collection trucks often miss many areas or do not collect all of the rubbish and that causes rubbish to pile up, creating bad smells and encouraging flies and disease, some women thought that breathing in bad smells causes breathing problems; in one FGD it was commented that "solid waste and odor are big issues". The women were of the view that while the solid waste management subproject would benefit the whole community, women would benefit to a greater degree because they were at home and in the village for longer periods than the men and therefore suffered from the problems created by build-up of solid waste and rubbish much more.

337. The Mekong River embankment protection subproject was seen to have less direct benefit. The women noted that some people would lose their gardens and that the stalls and evening market would be disrupted during construction of the protection works but eventually people would move back there to better facilities, this would benefit the stall-holders and restaurant owners but not necessarily the wider community.

338. Relevant to each of the subprojects, the women identified that employment during construction and opportunities to sell food, water and small goods to the workers were benefits over and above the improvements to health and access brought about by the subprojects.

339. The FGDs touched on environmental and climate change issues to determine whether effects had been noticed. The women noted that there was more rain during the wet season; it starts sooner and is for a longer period, the rains are much heavier (changes in rainfall intensity being noticed). This results in the levels of Mekong River and streams and channels being higher and often causing floods. The weather is hotter than usual and there are more frequent droughts. The women noted that destruction of crops because of drought, and that bamboo and fruit trees being affected by rain and flood were major impacts, adaptation measures included the need to pump water and/or install irrigation systems and change the types of vegetables being grown, other measures included trying to plant the vegetables on higher ground (including raising the ground levels with extra soil) and covering the gardens with plastic sheets to protect from heavy rain.



## Results of Men's FGDs

340. The main livelihood activities identified by the men's groups included farming (rice cultivation, market gardening, livestock raising mainly goats, ducks and chickens), tuk-tuk drivers, gold-traders, a number of men operated stalls and small beer shops along the Mekong River in the evenings, seasonal migration to Thailand to work as manual laborers, rubbish collection and waste picking, other livelihood activities undertaken by men in the town included casual labor in a range of activities, and cleaning drains and clearing road-side vegetation. More qualified men were engaged as electricians or carpenters and some even worked in the government.

341. The men's groups noted many of the same socio-economic issues and challenges that were identified by the women, including increasing number of youth becoming addicted to drugs especially amphetamines, the men linked increases in petty crime including burglaries to drug problems and additions; unemployment; and lack of village development funds or revolving funds for providing small lines of credit to people wanting to set up small businesses but did not have sufficient collateral for a bank loan.

342. The men also noted that some households getting into big debt by borrowing from local money-lenders; inadequate infrastructure and urban services including inadequate solid waste collection services combined with people not understanding the consequences (or not caring about) of dumping rubbish in the village creating an unclean environment and health impacts (the men noted fly infestations especially during the dry season months of April and May), an inadequate safe water supply, no wastewater treatment, and poor condition roads (including lack of street lighting) and drainage in the villages hampering access.

343. Discussing any issues that particularly face the poor, the men's FGDs commented that the poor suffer more from the above as they have fewer opportunities and alternatives, many are landless and often even lack their own houses and live in make-shift accommodation. It was also noted that the poor have to use unclean and unsafe water sources because they cannot afford to connect to the town water supply to pay the bills, drinking water from the local streams etc makes them sick.

344. The development priorities of, and interventions suggested by, the men's FGDs reflected the ranking of the problems, with the first priority seeking to address the infrastructure problems such as water supply, improving sanitation and solid waste management, improving access by widening and paving the roads, and installing proper wastewater treatment facilities, followed by job creation and provision of support for undertaking vocational training, and establishing a drug rehabilitation centre. The men were also of the view that village development funds which could provide financial support at low interest was an intervention that could assist in getting men into jobs.

345. During discussions about the wastewater treatment plant and sewerage subproject, the men's groups noted that treatment plants and a well-designed pipe network were necessary to make sure the sewerage was treated and disposed of properly and also get rid of the bad odor from the drains and open channels. The groups considered installing the new pipes underground was essential for safety (children have fallen into the existing open channels) and to improve access to properties which is currently provided by simple planks of wood laying across the open drains. Negative impacts were identified as the loss of the market garden land at two of the WWTP sites and the need to remove small structures and sellers along the road and affect access when the pipes were being installed. Apart for the land acquisition, the men considered that the subproject would not create long-term negative impacts, just temporary ones. In the long-term the subproject would benefit the whole community.

346. In respect of the urban roads improvement subproject, the discussion was similar to that held by the women's groups, the main roads were currently seen as too narrow vehicles that parked along the roadside blocked the entrances to the many commercial establishments along the road, the roads make for difficult and unsafe travel – there are no street lights and the pavement is damaged and has many potholes, and the drainage is insufficient and causes flooding problems. The men considered that the community would benefit from the improvements but on an individual level, a number of the men raised the issue of the right-of-way taking their land in the late 1990s.<sup>15</sup>

347. Like the women's groups, the men noted that the solid waste improvement subproject was necessary to address growing concerns about village pollution and health impacts. Either, the waste collectors left large amounts of rubbish along the streets and roads, or certain areas were not covered by the collection services, and people resorted to collecting the rubbish themselves and some people rely selling waste as part of their household income. The odor from uncollected rubbish was getting worse and also poses health hazards. The men's FGDs considered that all people would benefit from the subproject as flies and odor and their impacts would be reduced.

348. The men noted that awareness raising of recycling and packing and storing waste properly was essential, and that many people were either ignorant or did not care.

349. In respect of the Mekong River embankment subproject the men were most concerned with how the stalls they operated would be affected, it was explained they compensation for lost income would be provided for the construction period and until the stalls were re-established after the construction works were completed. Some men saw that the larger area would allow them to expand their businesses and other people could set up small businesses there, this could create more of a "night market" and promote the riverbank area. The works would "tidy up" the riverbank making it more attractive for tourists.

350. The men considered that through the subprojects there will be many people that could be engaged during the construction period, it was stressed during the consultations that use of local labor should be a priority. They also thought there would be opportunities for women to sell food and other goods to the workers.

351. With regard to climate change issues, the groups identified changes in both the dry season and wet season; in the dry season the temperature is hotter and there have been droughts that last through to the beginning of the rains, while in the wet season the length and intensity of rainfall and subsequent flooding creates problems during the rice harvest. The key impacts identified included crop damage and lower production levels, and sickness associated with both drought and flooding. Some of the coping mechanisms have been to change the type of vegetables grown to more hardy species, some farmers simply have to try and replant the rice if it is not too late in the season.

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<sup>15</sup> This issue is further discussed in the RP prepared for Kaysone Phomvihane.

## **Key Informant Interviews**

352. A number of KIIs were conducted during the development of the SLEDP and further KIIs were undertaken for the PSA. During the SLEDP process the KIIs were undertaken in order to find out; (i) how best to increase participation in local development planning; and (ii) what the benefits for socio-economic development of the town might be, and also to identify any negative impacts. During the KIIs undertaken for the PSAs, the foregoing was elaborated upon and another important part of the discussions was to identify what additional measures, by linking with existing or ongoing programs (being implemented by government or others) in the town, could be incorporated into the Project to maximize the benefits.

### Lao Women's Union – Savannakhet

353. The membership of the Lao Women's Union (LWU) is high representing 35% of the female population of the province. Higher education is attained by a few women but in general women have limited skills and lack confidence to branch out in non-traditional roles or sectors of employment, there is a need to provide women with basic and/or expanded skills and encourage them to participate in community development. Many poor and low-income women have very few skills and do not know how to access programs to help them advance even in small ways.

354. The provincial LWU has participated in training offered by national LWU and also sent members to receive training and upgrade degrees and diplomas in Viet Nam. The LWU also runs its own programs and partners with other agencies providing training on a range of topics. Important programs run by LWU in recent years have included the establishment of village development funds, village savings groups and credit cooperatives and the land ownership certificate program to ensure that land is registered in the name of both male and female heads of household. In 2009 with UNICEF and World Vision International (WVI) LWU has established rice banks in poor villages in eight districts.

355. The LWU participates in meetings and workshops in respect of planning and preparation of plans, participation could be increased further by ensuring that LWU is more actively involved in key decision making processes and a regular exchange of information between LWU and provincial government so the issues facing women in the province are kept on the development agenda.

### Chamber of Commerce & Industry

356. The Chamber of Commerce and Industry (CCI) in Savannakhet is very active in the town. The CCI represents some 165 businesses and enterprises and comprises four different associations and six groups with a membership of 200. The CCI noted that the last five years there has been a steady increase in business growth, especially in the transport, small trade, and tourism sectors. The CCI has been active in promoting training programs and runs courses to improve labor and skills within the business community.

357. There are seven different and distinct business zones in the town. Currently there are no private-public partnerships or ventures that CCI members participate in. With the exceptions of Nam Papa, Electricity du Laos and a couple of other state owned enterprises, the majority of businesses in the town are private ventures.

358. According to the CCI the main problems facing the business sector in the town include; (i) insufficient funding and resources; (ii) lack of solidarity between business operators (only 165 of the 1000 enterprises registered in the town are members of the CCI); and (iii) poor condition of, or inadequate, urban infrastructure and services which impedes business growth and is a disincentive for investment.

359. In respect of participation in local development and preparation of socio-economic development plans, the CCI is regularly asked to send representatives to meetings during plan preparation. The CCI considers it could be more useful and provide better insights through completion of a business sector survey or questionnaire that could be included in analysis for the plan preparation. The CCI could then participate in meetings to evaluate the surveys and questionnaires and provide commentary on how to translate the comments into the plans.

### Tourism Authority

360. The Director General of the Provincial Tourism Department participated in the KII. The tourism authority represents operators in the tourism service sector (restaurants, guesthouses and hotels) as well as promoting provincial tourism in general. The authority represents 18 hotels, 108 guesthouses and 139 restaurants and cafes. The average occupancy of accommodations is 68% per month, this includes national visitors and business travelers as well as tourists.

361. In respect of participation in local development and preparation of socio-economic development plans, as a part of provincial government, the authority is asked to attend the preparatory and decision-making meetings. Director Generals of departments as well as Provincial Committee Party members are asked to participate in this level of planning.

362. The Tourism Authority could better participate in such planning if each department was permitted to make a brief presentation about critical issues and development goals. Currently, departments attend meetings but are asked to respond to a tabled agenda rather than departments being more proactive in putting forward most pressing concerns and suggestions to address those concerns.

### Non-Governmental Organizations and Development Partners

363. KIIs were undertaken with NGOs/training centers and other development partners to understand aspects of employment, unemployment and skill level/training requirements.

364. The Non-profit Association for Rural Mobilization and Improvement (NORMAI) was established in the town in 2006 and is under the umbrella organization of Lao Union of Science and Engineering Associations. NORMAI currently operates in three districts in Savannakhet (in addition to another district in Khammuane), NORMAI does not operate in the districts covered by the CTD. The objective of NORMAI is to improve the quality of life of its target populations (school leavers, the poor, drop-outs) by improving capacity assisting in accessing training and training resources and up-skilling for particular types of employment. NORMAI also works with government and international organizations to support rural communities in respect of food security.

365. The development agency of the Netherlands - SNV - has been operating in six districts in Savannakhet (including Phine and Sepon) for nearly two years. It is partnering with European Union as well as AusAID and Ministry of Health (MOH) to provide programs covering small-scale water supply and sanitation<sup>16</sup>, biogas, and rice banks.

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<sup>16</sup> Through the Sustainable Sanitation and Hygiene for All (SSHA) program.

366. WVI has been working in Lao PDR since the early 1990s and is supporting community development projects and programs in seven districts in Savannakhet including in Sepon and Phine. According to WVI key problems to be addressed include unemployment, lack of skills and migration from rural areas to the towns increasing pressure on infrastructure and the few jobs opportunities that exist. Programs include assisting in HIV and STIs awareness programs led by others, disaster relief, support to school building, training for the poor, and fish farming and chicken raising to improve agricultural livelihoods.

367. WVI expressed interest in working with the CTDP to implement measures that fit within its core program/sector areas such as HIV awareness and prevention and anti-trafficking.

#### Village Leaders

368. KIIs were undertaken with the leaders of four randomly selected villages - Houamueang Nuea, Nalao, Phonsavang Tai, and Sayaphoume - to provide background information on levels of participation of villages in provincial and town planning. The villages represent a cross-section of those included in the subproject areas and comprise between 290 households (Houamueang Nuea) and 980 households (Phonsavang Tai).

369. The main problems facing the villages include lack of basic infrastructure and services such as solid waste management, flood control and drainage, roads in poor condition, lack of sanitation as well as social problems such as crime and drug use.

With the exception of Nalao which has programs run by ILO and Ministry of Labour and Social Welfare (awareness and promotion of the rights of children) and JICA sponsoring the Lao Bar Association to undertake a community development program, none of the village leaders noted that there were any special projects or programs being implemented in their villages. The leaders commented that awareness raising on a range of issues and topics was required.

370. In respect of participation in local development and preparation of socio-economic development plans, village administration representatives are invited to the District Administration Office for meetings. However, during the discussion for the KIIs it became evident that this is more of information passing exercise (from province to district to village) than true participation and information and issues/concerns sharing. The village leaders are then asked to pass the information on and disseminate to the villagers. When asked how the village administration could better participate in development and planning decisions in the town, keeping closer liaison and coordination with town and district officers along with better information flow between administration levels rather than top down were mentioned.

#### Waste Pickers

371. KIIs with people who pick through waste (known as waste pickers or rag pickers); two women and four men were undertaken. Some background data on these households reveals that the average size of the household of the waste pickers is six people and ranged from four-person households to 12-person households. The number of years picking waste ranged from one year to nine years, and in three households the person interviewed was the only member of the household picking waste; in the other households two-three other people also picked waste. None of the people interviewed stated that the other people in their household picking waste were children (i.e. 15 years old or younger). In four of the six households waste picking was the main or primary income source, and in two households it was the second source of income. In two households waste picking was the sole source of income.

372. The total income earned in a month ranged from 400,000 kip to 750,000 kip, and as shown in the table below, represents between 13% and 100% of household income from all sources (the average proportion across the six households being 62% of monthly household income).

**Table 2-3 Data from KIs with Waste Pickers**

No. of years picking waste	No. of people in HH picking waste	Total income from waste picking (kip)	Total monthly income (kip)	% from waste picking	Main income	Secondary income
3	3	400,000	700,000	57	Waste picking	Waste collection
5	2	600,000	600,000	100	Waste picking	
5	2	500,000	600,000	83	Waste picking	
1	1	750,000	750,000	100	Waste picking	
9	1	750,000	6,000,000	13	Rice growing	Waste picking
1	1	750,000	4,000,000	19	Other	Waste picking

Source: KIs CTD PPTA (December 2011)

373. The people involved in waste picking indicated that poverty, homelessness, lack of skills and education and illiteracy and inability to find other forms of work were the main reasons they picked through rubbish. One person interviewed stated that of the four working age members all four were unemployed. Other of the people interviewed noted they sometimes did other casual work but waste picking they could every day and they knew they could earn between 600,000 and 750,000 per month by selling recyclables.

374. Each of the waste pickers noted that they had no collateral in order to rent a stall space or premises or start-up for a small business, in order to do something else they would need to training and ongoing assistance such as a small loan and management support.

## ATTACHMENT A – FGD PARTICIPANT LIST

No. attending	10
Date:	Oct 16, 2011

No	Name	Designation	Location
1	Mr. Khamphoumy	Farmer	Ban Sok
2	Mr. Khammon	Farmer service and general	Ban Sok
3	Mr. Khampheng	Farmer	Ban Sok
4	Mr. Man	Farmer service and general	Ban Sok
5	Mr. Somsy	Farmer service and general	Ban Sok
6	Mr. Sisavanh	Farmer	Ban Sok
7	Mr. Kibouta	Farmer service and general	Ban Sok
8	Mr. Khampoun	Farmer service and general	Ban Sok
9	Mr. Sor	Farmer service and general	Ban Sok
10	Mr. Khaophone	Farmer service and general	Ban Sok

## ATTACHMENT B – FGD PARTICIPANT LIST

No. attending	10
Date:	Oct 16, 2011

No	Name	Designation	Location
1	Mrs. Som	Farmer and housewife	Ban Sok
2	Mrs. Sing	Farmer and housewife	Ban Sok
3	Mrs. Phone	Farmer and housewife	Ban Sok
4	Mrs. Phan	Farmer and housewife	Ban Sok
5	Mrs. Phuang	Farmer and housewife	Ban Sok
6	Mrs. Hom	Farmer and housewife	Ban Sok
7	Mrs. Viengkhone	Farmer and housewife	Ban Sok
8	Mrs. Nean	Farmer and housewife	Ban Sok
9	Mrs. Neang	Farmer and housewife	Ban Sok
10	Mrs. Kongmy	Farmer and housewife	Ban Sok

## ATTACHMENT C – FGD PARTICIPANT LIST

No. attending	9
Date:	Oct 14, 2011

No	Name	Designation	Location
1	Mr. Vone	Tuk Tuk Driver	Nakae
2	Mr. Douang	Casual woker	-
3	Mr.Phasouk	Casual woker	-
4	Mr.Siphachanh	Casual woker	-
5	Mr. Monethong	Casual woker	-
6	Mr. Nounnam	Casual woker	-
7	Mr. Phone	Casual woker	-
8	Mr.Sisavay	Casual woker	-
9	Mr.Sisouk	Casual woker	-

## ATTACHMENT D – FGD PARTICIPANT LIST

No. attending	7
Date:	Oct 14, 2011

No	Name	Designation	Location
1	Mrs. Khamsaen	Service and housewife	Nakae
2	Mrs. Malayvanh	Service and housewife	Nakae
3	Mrs. Khamkhang	Service and housewife	Nakae
4	Mrs.Simmaly	Service and housewife	Nakae
5	Mrs. Bouasavanh	Service and housewife	Nakae
6	Mrs. Phonepasong	Service and housewife	Nakae
7	Mrs. Keomanimone	Vice-head of the Village	Nakae



## ATTACHMENT E – FGD PARTICIPANT LIST

No. of attending	7
Date:	Oct 8, 2011

No	Name	Designation	Location
1	Khampasong	Worker	Lattanalangsy Tai
2	Phengsy	Worker and service	Lattanalangsy Tai
3	Buakham	Worker and service	Lattanalangsy Tai
4	Khengkham	Worker and service	Lattanalangsy Tai
5	Nilamit	Worker	Lattanalangsy Tai
6	Somephet	Worker and service	Lattanalangsy Tai
7	Thanongsak	Worker and service	Lattanalangsy Tai

## ATTACHMENT F – FGD PARTICIPANT LIST

No. attending	7
Date:	Oct 8, 2011

No	Name	Designation	Location
1	Mrs. Phet thanousay	Service and housewife	Lattanalangsy Tai
2	Mrs. Sengphan	Service and housewife	Lattanalangsy
3	Mrs. Hatsady	Service and housewife	Lattanalangsy
4	Mrs. Ouen	Service and housewife	Lattanalangsy
5	Mrs. Chanphachang	Service and housewife	Lattanalangsy
6	Mrs. Chanthachone	Service and housewife	Lattanalangsy
7	Mrs. Dom	Service and housewife	Lattanalangsy

### IEE Specific Consultation

#### Consultation with Officials

Date	Name	Position	Organisation	Topic of discussion	Contact
26/9/2011	Mr. Inthapanya Noukhan	Deputy Head	PNREO	Mandates, regulations and staffing	O20 55457330
26/9/2011	Viengkham	Officer	PPWT	Mandates and activities related to urban environment	
30/9/2011	Dr. Anoulack	Head	Sanitation and Water Supply, PPH	Mandates and activities related to urban environment	020 22242893
30/9/2011	Mrs.Dalounny Akhamonty	Head	Environment, UDAA	Mandates and current issues of urban environment management	020 55741302

#### Village consultation on wildlife and fish information

7/10/2011	Mr. Sounthone	Farmer	Ban Sok	Wildlife and fish interview	
7/10/2011	Mr. Kham	Farmer	Ban Sok	Wildlife and fish interview	
7/10/2011	Mr. Som	Farmer	Ban Sok	Wildlife and fish interview	
7/10/2011	Mr. Khom	Worker	Ban Thahe	Wildlife and fish interview	
7/10/2011	Mr. Bounmy	Worker	Ban Thahe	Wildlife and fish interview	
7/10/2011	Mr. Sok	Worker	Ban Thahe	Wildlife and fish interview	

## Village Consultation

Date	Village	Attending			Issues Raised by people
		Men	Women	Total	
Oct 4	Nalao	11	11	12	<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>
Oct 7	Ban Sok	3		3	<ul style="list-style-type: none"> <li>▪ Wildlife and fish interview</li> </ul>
Oct 7	Ban Thahe	3		3	<ul style="list-style-type: none"> <li>▪ Wildlife and fish interview</li> </ul>
					<ul style="list-style-type: none"> <li>▪</li> </ul>
Oct 8	Lattanalangsy	7	7	14	<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>
					<ul style="list-style-type: none"> <li>▪</li> </ul>
Oct 14	Ban Nakhe				<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>
Oct 16	Ban Sok				<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>

#### XIV. APPENDIX B2: SPECIES LIST IN KAYSONE SUBPROJECT AREA

The following lists record species found in the general Project area. No rare or endangered species of flora or fauna will be negatively impacted by the Project.

##### Birds

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Wastewater	Sub-Project 2 Urban Road	Sub-Project 3 Landfill
							✓
1	Nok kot peu	Greater Coucal	<i>Centropus sinensis</i>	LI	✓		
2	Nok En	Asian house Martin	<i>Delichon dasympus</i>		✓		
3	Nok En	Plain Martin	<i>Riparia paludicola</i>		✓		✓
4	Nok En	House Swift	<i>Apus affinis</i>		✓	✓	✓
5	Nok En	Ban Swallow	<i>Hirundo rustica</i>		✓		✓
6	Nok hon	Red-whisker Bulbul	<i>Pycnonotus jocosus</i>				✓
7	Nok khouk	Striped throated Bulbul	<i>Pycnonotus finlaysoni</i>				✓
8	Nok kadepdoao	Richard's	<i>Anthus richardi</i>		✓	✓	
9	Nok kadepdoao	Paddy field Pipit	<i>Anthus rufulus</i>		✓		
10	Nok kadepdoao	White Wagtail	<i>Motacilla alba</i>		✓		
11	Nok kadepdoao	Mekong Wagtail	<i>Motacilla samveasnae</i>		✓		
12	Nok kadepdoao	Citrine Wagtail	<i>Motocilla citreola</i>		✓		
13	Nok pit kon khao	White-rumped Munia	<i>Lonchura striata</i>		✓	✓	✓
14	Nok pit	Eurasian tree Sparrow	<i>Passer montanus</i>		✓	✓	✓
15	Nok khao	Barn Owl	<i>Tyto alba</i>	LII	✓		✓
16	Nok khao	Brown fish Owl	<i>Ketupa xlonensis</i>	LII			✓
17	Nok kapba	Great-eared nightjar	<i>Eurotopodus macrotis</i>				✓
18	Nok khao duea	Spotted Dove	<i>Streptopelia chinensis</i>	LII	✓		✓
19	Nok khao	Red-collared Dove	<i>Streptopelia tranquebar.</i>		✓		✓
20	Nok wak	White breasted waterhen	<i>Amaurornis phoenicurus</i>		✓		✓
21	Nok khao sai	Oriental Pratincole	<i>Glareola maldivarum</i>		✓		
22	Nok khao sai	Small Pratincole	<i>Glareda lacteal</i>		✓		
23	Nok kee ka deuan	Sandpiper spp.	<i>Triga stragnatilis</i>		✓		
24	Nok Ngang khao	Cattle Egret	<i>Bubulcus ibis</i>				✓
25	Nok yang	Intermediate Egret	<i>Mesophoyx intermedia</i>				✓

26		Yellow Bittern	<i>Lyobrychus sinensis</i>				✓
27	Nok zeo	Bronzed Drongo	<i>Dicrurus aeneus</i>				✓
28	Nok Eing	Common Myna	<i>Acridotheres tristis</i>		✓	✓	✓
29	Nok kadepdoao	Olive-backed Pipit	<i>Anthus hodgsoni</i>				
30	Nok pit dam	Black headed Bunting	<i>Emberiza melanocephala</i>		✓	✓	✓

### Mammals

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Wastewater	Sub-Project 2 Road	Sub-Project 3 Solid waste
1	Nou	Rat sp.	<i>Rattus sps.</i>		✓	✓	✓
2	Chia dang weuk	Short-nose fruit Bat	<i>cynopterus spp.</i>	LII	✓		✓
3	Ling lom noy	Pigmy Loris	<i>Nycticebus pygmaeus</i>	VU, LI			✓
4	Ngen hangkan	Large indian Civet	<i>Viverra zibetha</i>	LI			✓
5	Chonphon	Mongoose spp.	<i>Herpestes</i>	LI			✓
6	Sua lai hin on	Marble Cat	<i>Pardofelis marmorata</i>	LI			✓
7	Ka nai	Tree squirrel	<i>Callosciurus spp.</i>				✓
8	Ka chon	Striped Squirrel	<i>Tamiops mclellandii</i>				✓
9	Katai	Siamese Rabbit	<i>Lepus peguensis</i>	LII			✓

### Reptiles

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Wastewater	Sub-Project 2 Urban Road	Sub-Project 3 Landfill
1	Ngou kieu hang ham	White-lipped pit viper	<i>Trimeresurus albolabris</i>				✓
2	Ngou chong Ang	King Cobra	<i>Ophiophagus hannah</i>	LI			✓
3	Ngou pa	Striped water snake	<i>Enhydryis jagorii</i>		✓		✓
4	Ngou khodeng	Red-neck Keelback	<i>Rhaddophis subminiatus</i>		✓		✓
5	Ngou pa	Gerard's water snake	<i>Gerarda prevostiana</i>		✓		✓
6	Ngou seauk khouy	Striped Keelback	<i>Amphiesma stolata</i>				✓
7	Kap kae	Tockay	<i>Gekko gekko</i>		✓	✓	✓
8	Khee chiem	Spotted house Gecko	<i>Gekko monachus</i>				
9	Khee chiem	Sandstone Gecko	<i>Gekko petricolus</i>		✓	✓	✓
10	Khee chiem	Spiny tailed house Gecko	<i>Hemidactylus frenatus</i>		✓	✓	✓
11	Ka pom	Golden fence lizard	<i>Calotes versicolor</i>		✓	✓	✓
12	Ka pom pik	Common Gliding Lizard	<i>Draco vorans</i>		✓	✓	✓

13	Kathang	Common butterfly Lizard	<i>eiolepis belliana</i>				✓
14	Len	Bengal Monitor	<i>Varanus bengalensis</i>	LII			✓
15	Khee ko	Many-line sun skink	<i>Mabuya multifasciata</i>		✓	✓	✓

**Amphibian**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Wastewater	Sub-Project 2 Urban Road	Sub-Project 3 Landfill
1	Kop		<i>Hoplobatrachus rugulosus</i>		✓	✓	✓
2	Kiat Kha kham		<i>Rana spp.</i>		✓	✓	✓
3	Kiat chana		<i>Rana spp.</i>		✓	✓	✓
4	Kiat lai mo		<i>Rana spp.</i>		✓	✓	✓
5	Kiat tapad		<i>Polypedates leucomystax</i>		✓	✓	✓
6	Khan khak				✓	✓	✓
7	Oung		<i>Calluella guttulata</i>				✓

**Fish**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Wastewater	Sub-Project 2 Urban Road	Sub-Project 3 Landfill
1	Pa kho	Snake head fish	<i>Channa striata</i>		✓	✓	✓
2	Pa douk na	Catfish	<i>Clarias batrachus</i>		✓	✓	✓
3	Pa douk oui	Catfish spp.	<i>Clarias macrocephalus</i>		✓	✓	✓
4	Pa kadeut		<i>Tricopodus trichogaster</i>		✓	✓	✓
5	Pa khang lai		<i>Crossocheilus sp.</i>		✓		
6	Pa cheo		<i>Esomus metallicus</i>		✓	✓	✓
7	Pa cheo na ngen		<i>Orygaster anomaluna</i>		✓	✓	✓
8	Pa cheo ao		<i>Rasbora aurotaenia</i>		✓	✓	✓
9	Pa kang		<i>Channa gachua hamilton</i>				✓
10	Pa khao		<i>Systemus aurotaeniata</i>		✓	✓	✓
11	Pa kheng		<i>Anabas testudineus</i>				
12	Pa nin	Tilapia sp.	<i>Oreochromis niloticus</i>		✓	✓	✓
13	Pa nai	Nile tilapia	<i>Oreochromis spp.</i>		✓		
14	Pa pok		<i>Systomus orphoides</i>		✓	✓	✓
15	Pa kat		<i>Betta cf. splendens regan</i>		✓	✓	✓

16	Pa pak			✓	✓	✓
17	Pa seu			✓		
18	Pa pao	<i>Tretrapdon sp.</i>		✓		
19	Pa tong	<i>Chitala ornata</i>		✓	✓	
20	Pa tong kai	<i>Notopterus spp.</i>		✓		
21	Pa keng	<i>Cirrhinus sp.</i>		✓	✓	✓
22	Pa chat	<i>Scaphoidontichthys sp.</i>		✓		✓
23	Pa vienphai	<i>Danio sp.</i>		✓		✓
24	Pa xueam			✓		✓
25	Pa kha yang	<i>Cirrhinus sp.</i>		✓	✓	✓
26	Pa mak wai			✓		✓
27	Pa bou	<i>Oxeleotris marmorata</i>				
28	Pa ien	<i>Monopterus albus</i>		✓	✓	✓

**Remarks:** CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; CI: Appendix I of CITES; CII: Appendix II of CITES; LI: List I - prohibit species of Lao Wildlife Law; List II - management species of Lao Wildlife Law.

**List of key fish species in the Mekong River associated with the River bank with distribution in Savannakhet project area.**

No	Lao name	Common name	Scientific name	Remarks
1	Pa kot luang	Sutchai river catfish	<i>Hemibagrus filamentus</i>	
2	Pa phia	Black sharkminnow	<i>Labeo chrysophekadion</i>	
3	Pa na mu	Catfish	<i>Helicophagus waandersii</i>	
4	Pa ka	Goonch	<i>Bagarius yarrelli</i>	
5	Pa va	Two-headed carp	<i>Bangana betri</i>	
6	Pa kuang	Small scale croaker	<i>Boesemania</i>	
7	Pa mu man	Redtail leach	<i>Botia modesta</i>	
8	Pa ka ho	Giant barb	<i>Cattocarpio siamesis</i>	
9	Pa phone	Small scale river carp	<i>Cirrhimnus microlepis</i>	
10	Pa sa ee	Striped river barb	<i>Mekongina erythrospila</i>	Key stone sp.
11	Pa nang	Silver sheatfish	<i>Micronema apogon</i>	
12	Pa tong na	Bronze featherback	<i>Notopterus notopterus</i>	
14	Pa tong kai	Indochina featherback	<i>Chitala blanci</i>	
15	Pa tong kuai	Clown featherback	<i>Chitala ornata</i>	
16	Pa I thai	Nilem carp	<i>Osteochilus hasseltii</i>	
17	Pa beuk	Giant Mekong catfish	<i>Pangasianodon gigas</i>	Most important
18	Pa souy	Sutchi river catfish	<i>Pangasianodon hypophthalmus</i>	
19	Pa nyang	Bocourt's catfish	<i>Pangasius bocourti</i>	

20	Pa phob	Sharp-nosed catfish	Pangasius conchophilus	
21	P suey hang	Krempf's catfish	Pangasius krempfi	
22	Pa hua muam	Yellow-finned catfish	Pangasius mekongensis	
23	Pa peung	Black-spotted catfish	Pagasius larnaudii	
24	Pa nyon thong	Red-finned catfish	Pangasius pleurotaenia	
25	Pa nyon hang hian	Elongate catfish	Pangasius elongates	
26	Pa yawn	Long-barbel catfish	Pangasius macronema	
27	Pa leum	Giant catfish	Pangasius sanitwongsei	Most important
28	Pa taap	Pelagic river carp	Paralauca typus	Key stone sp.
29	Pa soi	Siamese mud carp	Cirrhinus siamensis	Key stone sp.
30	Pa chok	Soldier rive barb	Cyclocheilichthys	
31	Pa sood	Eye-spot barb	Hampala dispar	
32	P sood	Barred barb	Hampala macrolepi dota	



## XV. APPENDIX C1: RECORD OF PUBLIC CONSULTATION AT PHINE

375. Detailed subproject discussions, consultations have been held with affected/beneficiary communities through focus group discussions (FGDs) with small groups of men and women from the communities. A household survey was also undertaken to understand the characteristics of beneficiary households and their access to urban services and facilities.

376. As shown in Table 2.1, consultations with small groups of men and women were undertaken in four villages in the vicinity of the subprojects with 73 participants.

**Table 2.1 – Consultative Meetings with Beneficiary Villages**

Date	Location	No. of male participants	No. of female participants	Total
21.10.11	Sakhouang	7	5	12
22.10.11	Napho	5	6	11
22.10.11	Sakhouang			
Total				

Source: PPTA Consultations (October 2011)

### Results of Women's FGDs

377. The FGDs with women identified their main livelihood activities as farming (mainly rice cultivation), gardening, textile weaving, trading, running small household businesses and shops (including informal stalls by the road-side), collecting fish and non-timber forest products (NTFPs) for household consumption and sale, and undertaking various domestic chores during the day and evening.

378. The women discussed problems facing poor families, largely these include suffering rice shortages and needing to borrow from friends and relatives, limited abilities in terms of education and skills and lack of access to regular or reasonably well-paid employment. It was commented that many poor households are headed by widows, they have to manage the household and try and earn money, they are faced by many hardships.

379. The women considered the main challenges and issues facing the town in terms of development included; lack of water supply for both domestic use, gardening (vegetables) and irrigation (rice cultivation); inadequate market supplies and lack of range of goods; many women without access to a close-by well had to travel to the river for water, this took up much time and carrying water is hard work; low household incomes and inability to access income generating opportunities.

380. The development priorities identified in the women's FGDs included; building a dyke or dam (especially on Houay Khoun was mentioned) to collect rain during wet season and make it available during the dry season; upgrading and rehabilitation of the roads including drainage especially to address the very difficult access during the rainy season; expanding the town's water supply as many households still relied on well-water.

381. The urban roads improvement subproject was seen as having the potential to address a number of problems and was considered to benefit all the people of the town. The main roads were currently seen as too narrow and being earth roads were very difficult to pass in the rainy season, inadequate drainage (blocked drains or no drains) exacerbated this problem causing localized flooding. After further discussion the women considered that they would benefit greatly from the improvements as they were the majority of stall-holders along the roads who were affected by the mud and flooding during the rainy season, they also thought that improved access would encourage traders for nearby Xemthamouak to bring goods to sell or come to buy goods from Phine. The women also identified employment during construction as a benefit, some women were keen to participate as laborers while others saw opportunities to sell food, water and small goods to the workers.

382. Possible negative effects were those associated with construction i.e. noise, dust and issues with access (disrupting travel and movements about the town). It was explained that the environmental management plan (EMP) would deal with dust and noise as well as other potential effects of construction. The contractor would be required to minimize disturbance to access and would be required to provide a plan for ensuring that access to properties and establishments was not impeded. How the construction would be handled concerned the women, their shops and stalls would be disrupted and some of them might even have to move away while the road works were undertaken, the effects of this on their household income was raised. During these discussions and also during consultations with households affected by involuntary resettlement (IR) impacts it was explained that livelihood restoration measures covered compensation for loss of wages and/or employment during the construction period.

383. Discussing environmental and climate change issues, the women noted that there was more rain during the wet season; it starts sooner and is for a longer period, the rains are much heavier (changes in rainfall intensity being noticed). During the dry season the weather is hotter than usual and there are more frequent droughts. The women noted that outright destruction of rice crops or reduced productivity because of drought were the most obvious impacts, some women commented that the rice nurseries no longer functioned because the rice seedlings had died. Adaptation measures included shifting cropping season i.e. delaying the planting of rice to the end of June (rather than in May).

### **Results of Men's FGDs**

384. The main livelihood activities identified by the men's groups included farming (rice cultivation and part-time small scale gardening of vegetables), livestock raising, basic labor such as house building/painting, carpentry, some men were engaged in handicraft making while others were involved in trading

385. The men's groups noted that the main socio-economic issues and challenges facing the town included insufficient paddy land, largely as a result of the conversion of agricultural land to rubber and cassava plantations (owned and operated by Vietnamese and Chinese), limiting the land left for people to grow rice while some men could be employed on the plantations many are being left without land to grow rice for their families, the second issue noted was the same as for the women's groups – lack of water, especially in the dry season. The town water supply needed to be expanded to cover more households and assistance was required for irrigation wells, reservoirs and canals. It was noted that while there were many groundwater sources they were too deep (30 m – 70 m) for households to reach.

386. Discussing any issues that particularly face the poor, the men's FGDs commented that the poor suffer more from the above as they have fewer opportunities and alternatives, many are landless, and cannot even offer labor to other farmers since so much land has been converted into plantation. It was also noted that the poor have to use unclean and unsafe water sources because they are either too far away from the town network or cannot afford to connect to the town water supply to pay the bills, drinking water from the local streams etc makes them sick.

387. The development priorities of, and interventions suggested by, the men's FGDs reflected the ranking of the problems, with the first priority seeking to address the infrastructure problems such as water supply, and improving access by widening and paving the roads, and installing proper drainage.

388. In respect of the urban roads improvement subproject, the discussion was similar to that held by the women's groups, the roads were difficult to pass as they were narrow and not sealed, the roads (and some surrounding properties) flooded in rainy season as there was no proper drainage. The men considered that through the subproject local people that could be engaged during the construction period, it was stressed during the consultations that use of local labor should be a priority.

389. With regard to climate change issues, the groups identified changes in both the dry season and wet season; in the dry season the temperature is hotter and there have been droughts that last through to the beginning of the rains, while in the wet season the length and intensity of rainfall and subsequent flooding creates problems during the rice harvest. Droughts were seen as the key impact by the men's groups, resulting in hardening of the ground, crop damage and lower production levels. Some of the coping mechanisms have been to change the cropping season (as mentioned by the women) and to build pipes to pump water from the rivers to the fields.

### **Results of FGDs with Ethnic Groups**

390. In addition to the FGDs about more general urban development issues, additional meetings were held to discuss issues in respect of ethnicity in the villages in Phine Town. It was first commented that the Katang and Phoutai have been living in mixed villages with the Lao PDR for more than 100 years. The different groups have inter-married and now represent extended families comprised of Katang, Lao, Phoutai, with some men even marrying Hmong women who have migrated into Phine town.

391. Asked to describe how they perceive themselves, they see themselves first and foremost as Lao, they hold Lao citizenship, and undertake most social, political and commercial exchange in Lao language. This was confirmed by data from the household survey which indicates that Lao is the main language used.

392. The town celebrates the festivals of the different groups together, for example Pi Mai (traditionally Lao festival) and Cha Rae (traditionally Katang festival) are celebrated by anyone who wishes to participate.

393. The participants noted that there are no special agencies or government offices with a mandate for working with non-Lao people in the town because there are no unique characteristics exhibited by the non-Lao that require additional or specific assistance over and above those that are exhibited by vulnerable people regardless of which ethnic group they may be affiliated; the poor, elderly (especially elderly women) and households headed by divorced or widowed women were mentioned in this regard.

394. Phine is an urbanized area and economic and socio-cultural activities are undertaken in similar ways regardless of ethnic group. There is a high level of support for the urban roads improvement subproject with the potential benefits being recognized for the communities and households irrespective of ethnic group.

### **Key Informant Interviews**

395. A number of KIIs were conducted during the development of the SLEDP and further KIIs were undertaken for the PSA. During the SLEDP process the KIIs were undertaken in order to find out; (i) how best to increase participation in local development planning; and (ii) what the benefits for socio-economic development of the town might be, and also to identify any negative impacts. During the KIIs undertaken for the PSAs, the foregoing was elaborated upon and another important part of the discussions was to identify what additional measures, by linking with existing or ongoing programs (being implemented by government or others) in the town, could be incorporated into the Project to maximize the benefits.

### **Lao Women's Union – Savannakhet**

396. The membership of the Lao Women's Union (LWU) is high representing 35% of the female population of the province. Higher education is attained by a few women but in general women have limited skills and lack confidence to branch out in non-traditional roles or sectors of employment, there is a need to provide women with basic and/or expanded skills and encourage them to participate in community development. Many poor and low-income women have very few skills and do not know how to access programs to help them advance even in small ways.

397. The provincial LWU has participated in training offered by national LWU and also sent members to receive training and upgrade degrees and diplomas in Viet Nam. The LWU also runs its own programs and partners with other agencies providing training on a range of topics. Important programs run by LWU in recent years have included the establishment of village development funds, village savings groups and credit cooperatives and the land ownership certificate program to ensure that land is registered in the name of both male and female heads of household. In 2009 with UNICEF and World Vision International (WVI) LWU has established rice banks in poor villages in eight districts.

398. The LWU participates in meetings and workshops in respect of planning and preparation of plans, participation could be increased further by ensuring that LWU is more actively involved in key decision making processes and a regular exchange of information between LWU and provincial government so the issues facing women in the province are kept on the development agenda.

### **Tourism Authority**

399. The tourism authority represents operators in the tourism service sector (restaurants, guesthouses and hotels) as well as promoting district-wide tourism in general. The authority represents two hotels and two restaurants/cafes.

400. The average occupancy of the accommodations is approximately 6,500 pax/year which includes national visitors and business travelers as well as tourists. Peak occupancy occurs during the August – October period.

401. The authority mentioned that guesthouse owners complain about insufficient and poor quality water being supplied to their establishments including a bad odour emanating from taps/pipes in the guesthouses.

402. The main constraint on tourism in the town is the lack of accommodation and restaurants/cafes and inadequate infrastructure which means the town does not present well in terms of promoting tourism.

403. In respect of participation in local development and preparation of socio-economic development plans, the authority noted it was not invited to participate in meetings or discussions about plans and town development.

### **Village Leaders**

404. In addition to the FGDs in the main subproject areas, KIIs were undertaken with the leaders of two additional villages – Veunhongkham and Phine - to provide background information on levels of participation of villages in provincial and town planning.

405. The main problems facing the villages include lack of basic infrastructure and services such as sealed roads off the main road from the town (and providing the main access to residential areas either side of NR 9), insufficient water supply (need for expansion of existing supply network), solid waste management, and flood control and drainage.

Phine village has a number of programs/projects including Poverty Reduction Fund (PRF) concerned with building schools, roads and a weir; JICA undertaking a fishery project; CIDA construction of a bridge; SRMP covering rural roads; and a UXO clearance program. In Veunhongkham the village has two main programs being the PRF project mentioned above and UXO clearance.

406. In respect of participation in local development and preparation of socio-economic development plans, village administration representatives are invited to the District Administration Office for meetings. However, during the discussion for the KIIs it became evident that this is more of information passing exercise (from province to district to village) than true participation and information and issues/concerns sharing. The village leaders are then asked to pass the information on and disseminate to the villagers. When asked how the village administration could better participate in development and planning decisions in the town, keeping closer liaison and coordination with town and district officers along with better information flow between administration levels rather than top down were mentioned.

### IEE Specific Consultation

#### Official Consultation

Date	Name	Position	Organisation	Topic of discussion	Contact
26/9/2011	Mr. Noukhan Inthapanya	Deputy Head	PNREO	Mandates, regulations and staffing	O20 55457330
26/9/2011	Viengkham	Officer	PPWT	Mandates and activities related to urban environment	
30/9/2011	Dr. Anoulack	Head	Sanitation and Water Supply, PPH	Mandates and activities related to urban environment	020 22242893
30/9/2011	Mrs. Dalounny Akhamonty	Head	Environment, UDAA	Mandates and current issues of urban environment management	020 55741302
23/10/2011	Mr. Samly Pansoulinthong	Head	DWRWEA	Mandates and current issues of DWRWEA, urban environment, option for water supply improvement	
23/10/2011	Mr. Phomma Mekthepphavong	Staff	DWRWEA	Urban environment	
23/10/2011	Mr. Khamtan	Staff	DPWT	Urban environment	

**Village consultation on wildlife and fish information**

Date	Name	Position	Organisation	Topic of discussion	Contact
20/10/2011	Mr. Buaphan	Party member	Ban Napho	Wildlife and fish interview	
20/10/2011	Mr. Phonesay	Village chief	Ban Napho	Wildlife and fish interview	
20/10/2011	Mr. Dam	Unit head	Ban Napho	Wildlife and fish interview	

**Village Consultation**

Date	Village	Attending			Issues Raised by people
		Male	Female	Total	
20/10/2011	Ban Napho	5	5	10	<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>
20/10/2011	Ban Sakheuang	7	5	13	<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>

## XVI. APPENDIX C2: SPECIES LIST IN PHINE SUBPROJECT AREA

The following lists record species found in the general Project area. No rare or endangered species of flora or fauna will be negatively impacted by the Project.

### Birds

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
1	Nok kot peu	Greater Coucal	<i>Centropus sinensis</i>	LI	✓	
2	Nok En	Asian house Martin	<i>Delichon dasympus</i>		✓	
3	Nok En	Plain Martin	<i>Riparia paludicola</i>		✓	
4	Nok En	House Swift	<i>Apus affinis</i>		✓	✓
5	Nok En	Ban Swallow	<i>Hirundo rustica</i>		✓	
6	Nok hon	Red-whisker Bulbul	<i>Pycnonotus jocosus</i>			
7	Nok khouk	Striped throated Bulbul	<i>Pycnonotus finlaysoni</i>			
8	Nok kadepdoao	Richard's	<i>Anthus richardi</i>		✓	✓
9	Nok kadepdoao	Paddy field Pipit	<i>Anthus rufulus</i>		✓	
10	Nok kadepdoao	White Wagtail	<i>Motacilla alba</i>		✓	
11	Nok kadepdoao	Mekong Wagtail	<i>Motacilla samveasnae</i>		✓	
12	Nok kadepdoao	Citrine Wagtail	<i>Motocilla citreola</i>		✓	
13	Nok pit kon khao	White-rumped Munia	<i>Lonchura striata</i>		✓	✓
14	Nok pit	Eurasian tree Sparrow	<i>Passer montanus</i>		✓	✓
15	Nok khao	Barn Owl	<i>Tyto alba</i>	LII	✓	
16	Nok khao	Brown fish Owl	<i>Ketupa xlonensis</i>	LII		
17	Nok kapba	Great-eared nightjar	<i>Eurotopodus macrotis</i>			
18	Nok khao duea	Spotted Dove	<i>Streptopelia chinensis</i>	LII	✓	
19	Nok khao	Red-collared Dove	<i>Streptopelia tranquebar.</i>		✓	
20	Nok wak	White breasted waterhen	<i>Amaurornis phoenicurus</i>		✓	
21	Nok khao sai	Oriental Pratincole	<i>Glareola maldivarum</i>		✓	
22	Nok khao sai	Small Pratincole	<i>Glareda lacteal</i>		✓	
23	Nok kee ka deuan	Sandpiper spp.	<i>Tringa stragatilis</i>		✓	
24	Nok Ngang khao	Cattle Egret	<i>Bubulcus ibis</i>			
25	Nok yang	Intermediate Egret	<i>Mesophoyx intermedia</i>			



No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
26		Yellow Bittern	<i>Lyobrychus sinensis</i>			
27	Nok zeo	Bronzed Drongo	<i>Dicrurus aeneus</i>			
28	Nok Eing	Common Myna	<i>Acridotheres tristis</i>		✓	✓
29	Nok kadepdoao	Olive-backed Pipit	<i>Anthus hodgsoni</i>			
30	Nok pit dam	Black headed Bunting	<i>Emberiza melanocephala</i>		✓	✓

**Mammals**

No	Lao phonetic	Common name	Scientific name	Cons. Status		
1	Nou	Rat sp.	<i>Rattus sps.</i>		✓	✓
2	Chia dang weuk	Short-nose fruit Bat	<i>cynopterus spp.</i>	LII	✓	
3	Ling lom noy	Pigmy Loris	<i>Nycticebus pygmaeus</i>	VU, LI		
4	Ngen hangkan	Large indian Civet	<i>Viverra zibetha</i>	LI		
5	Chonphon	Mongoose spp.	<i>Herpestes</i>	LI		
6	Sua lai hin on	Marble Cat	<i>Pardofelis marmorata</i>	LI		
7	Ka nai	Tree squirrel	<i>Callosciurus spp.</i>			
8	Ka chon	Striped Squirrel	<i>Tamias mclellandii</i>			
9	Katai	Siamese Rabbit	<i>Lepus peguensis</i>	LII		

**Reptiles**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
1	Ngou kio hang ham	White-lipped pit viper	<i>Trimeresurus albolabris</i>			
2	Ngou chong Ang	King Cobra	<i>Ophiophagus hannah</i>	LI		
3	Ngou pa	Striped water snake	<i>Enhydrys jagorii</i>		✓	
4	Ngou khodeng	Red-neck Keelback	<i>Rhaddophis subminiatus</i>		✓	
5	Ngou pa	Gerard's water snake	<i>Gerarda prevostiana</i>		✓	
6	Ngou seauk khoy	Striped Keelback	<i>Amphiesma stolata</i>			
7	Kap kae	Tockay	<i>Gekko gekko</i>		✓	✓
8	Khee chiem	Spotted house Gecko	<i>Gekko monachus</i>			
9	Khee chiem	Sandstone Gecko	<i>Gekko petricolus</i>		✓	✓
10	Khee chiem	Spiny tailed house Gecko	<i>Hemidactylus frenatus</i>		✓	✓

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
11	Ka pom	Golden fence lizard	<i>Calotes versicolor</i>		✓	✓
12	Ka pom pik	Common Glidding Lizard	<i>Draco vorans</i>		✓	✓
13	Kathang	Common butterfly Lizard	<i>eiolepis belliana</i>			
14	Len	Bengal Monitor	<i>Varanus bengalensis</i>	LII		
15	Khee ko	Many-line sun skink	<i>Mabuya multifasciata</i>		✓	✓

**Amphibian**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
1	Kop		<i>Hoplobatrachus rugulosus</i>		✓	✓
2	Kiat Kha kham		<i>Rana spp.</i>		✓	✓
3	Kiat chana		<i>Rana spp.</i>		✓	✓
4	Kiat lai mo		<i>Rana spp.</i>		✓	✓
5	Kiat tapad		<i>Polypedates leucomystax</i>		✓	✓
6	Khan khak				✓	✓
7	Oung		<i>Calluella guttulata</i>			

**Fish**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Sub-Project 1 Water supply	Sub-Project 2 Road
1	Pa kho	Snake head fish	<i>Channa striata</i>		✓	✓
2	Pa douk na	Catfish	<i>Clarias batrachus</i>		✓	✓
3	Pa douk oui	Catfish spp.	<i>Clarias macrocephalus</i>		✓	✓
4	Pa kadeut		<i>Tricopodus trichogaster</i>		✓	✓
5	Pa khang lai		<i>Crossocheilus sp.</i>		✓	
6	Pa cheo		<i>Esomus metallicus</i>		✓	✓
7	Pa cheo na ngen		<i>Orygaster anomaluna</i>		✓	✓
8	Pa cheo ao		<i>Rasbora aurotaenia</i>		✓	✓
9	Pa kang		<i>Channa gachua hamilton</i>			
10	Pa khao		<i>Systemus aurotaeniata</i>		✓	✓
11	Pa kheng		<i>Anabas testudineus</i>			

12	Pa nin	Tilapia sp.	<i>Oreochromis niloticus</i>		✓	✓
13	Pa nai	Nile tilapia	<i>Oreochromis spp.</i>		✓	
14	Pa pok		<i>Systomus orphoides</i>		✓	✓
15	Pa kat		<i>Betta cf. splendens regan</i>		✓	✓
16	Pa pak				✓	✓
17	Pa seu				✓	
18	Pa pao		<i>Tretrapdon sp.</i>		✓	
19	Pa tong		<i>Chitala ornata</i>		✓	✓
20	Pa tong kai		<i>Notopterus spp.</i>		✓	
21	Pa keng		<i>Cirrhinus sp.</i>		✓	✓
22	Pa chat		<i>Scaphodontichthys sp.</i>		✓	
23	Pa vienphai		<i>Danio sp.</i>		✓	
24	Pa xueam				✓	
25	Pa kha yang		<i>Cirrhinus sp.</i>		✓	✓
26	Pa mak wai				✓	
27	Pa bou		<i>Oxyleotris marmorata</i>			
28	Pa ien		<i>Monopterus albus</i>		✓	✓

CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; CI: Appendix I of CITES;

CII: Appendix II of CITES; LI: List I - prohibit species of Lao Wildlife Law; List II - management species of Lao Wildlife Law.

## **XVII. APPENDIX D1: RECORD OF PUBLIC CONSULTATION IN DANSAVANH**

### **Results of Focus Discussion Groups**

407. For the FS and detailed subproject discussions, consultations have been held with affected/beneficiary communities through focus group discussions (FGDs) with small groups of men and women from the communities. A household survey was also undertaken to understand the characteristics of beneficiary households and their access to urban services and facilities.

408. In addition to the consultations undertaken for the RP, consultations with the village chiefs and six small groups of men and women were undertaken in Dansavanh (different groups) and Nalon villages.

#### **Consultative Meetings with Beneficiary Villages**

<b>Date</b>	<b>Location</b>	<b>No. of male participants</b>	<b>No. of female participants</b>	<b>Total</b>
20.10.11	Dansavan	6	6	12
02.11.11	Nalon	14	10	24
02.11.11	Dansavan	12	7	19
<b>Total</b>		<b>32</b>	<b>23</b>	<b>55</b>

Source: PPTA Consultations (October 2011)

## Results of Women's FGDs

409. The FGDs with women identified their main livelihood activities as farming (mainly rice cultivation), gardening, trading, running small household businesses and shops, collecting non-timber forest products (NTFPs) for household consumption and sale, and some women are involved in traveling to Lao Bao to buy goods for selling back in Dansavan.

410. The women considered the main challenges and issues facing the town in terms of development included; very poor road conditions which affected daily living, especially for women who were street vendors and children walking to school during the rainy season; lack of water for irrigation (rice cultivation); lack of sanitary toilets especially for poorer households; inadequate market supplies and lack of range of goods; and, low household incomes and inability to access income generating opportunities.

411. The development priorities identified in the women's FGDs included; upgrading and rehabilitation of the roads including drainage especially to address the very difficult access during the rainy season; and addressing the solid waste issue, the town does not have a proper dump and numerous "informal" dump sites spring up which cause smells flies and are unsightly. There is only one person that collects the garbage and he cannot keep up with the amount of waste needing to be collected and disposed of.

412. The urban roads improvement subproject was seen as having the potential to address a number of problems and was considered to benefit all the people of the town. The main roads were currently seen as too narrow and being earth roads were very difficult to pass in the rainy season, inadequate drainage (blocked drains or no drains) exacerbated this problem causing localized flooding. The women also thought it prevented visitors and tourists from visiting other places in the town, they would stop on the main road but none would venture further.

413. The women considered that they would benefit greatly from the improvements as they were the majority of shop-holders or street vendors who were affected by the mud and flooding during the rainy season, they also thought that improved access would encourage traders to and from Lao Bao. The women also identified employment during construction as a benefit, some women were keen to participate as laborers while others saw opportunities to sell food, water and small goods to the workers. The women did mention they saw the construction labor opportunities as being more appropriate for the men.

414. In respect of the two bridge alignments, the women's groups favored option 2 (500 m) even though it would require relocation of households. The alignment of option 1 will be in very close proximity to the cemetery and is not preferred by the villagers. The villagers consider that relocation of the households to the area by the helicopter pad is preferable. Even though it would require relocation of households a new bridge is supported because it would provide a shorter route (for both vehicles and pedestrians) to the market and other facilities in the town.

415. Possible negative effects were safety issues (speed, accidents etc), those associated with construction i.e. noise, dust and issues with access (disrupting travel and movements about the town). The women were concerned that improving the roads would lead to faster driving and potentially more accidents, there were already a large number of heavy vehicles (trucks and buses) going to and from the border gate and traffic was bad and dangerous on the main road, improving the smaller roads in the villages might mean more accidents there as well. A road safety campaign – which included the truck and bus drivers who are seen as the main culprits of bad driving and speeding – was required. It was explained that the environmental management plan (EMP) would deal with dust and noise as well as other potential effects of construction. The contractor would be required to minimize disturbance to access and would be required to provide a plan for ensuring that access to properties and establishments was not impeded. How the construction would be handled concerned the women, their shops and stalls would be disrupted and some of them might even have to move away while the road works were undertaken, the effects of this on their household income was raised. During these discussions and also during consultations with households affected by involuntary resettlement (IR) impacts it was explained that livelihood restoration measures covered compensation for loss of wages and/or employment during the construction period.

416. Discussing environmental and climate change issues, the women noted that there was more rain during the wet season; it starts sooner and is for a longer period, the rains are much heavier (changes in rainfall intensity being noticed). During the dry season the weather is hotter than usual and there are more frequent droughts. The women noted that outright destruction of rice crops or reduced productivity because of drought were the most obvious impacts, some women commented that the rice nurseries no longer functioned because the rice seedlings had died. Adaptation measures included shifting cropping season i.e. delaying the planting of rice to the end of June (rather than in May).

## Results of Men's FGDs

417. The main livelihood activities identified by the men's groups included farming (rice cultivation and part-time small scale gardening of vegetables, banana), livestock raising, house building/painting, carpentry, daily or casual labor, some men were engaged in handicraft making while others were involved in trading, some men provided motorbike taxi services taking people to and from the border gate.

418. The men's groups also noted that the access and road conditions were one of the most pressing problems in the town. The development priorities of, and interventions suggested by, the men's FGDs reflected the ranking of the problems, with the first priority seeking to address the infrastructure problems such as water supply, and improving access by widening and paving the roads, putting in a bypass to alleviate traffic congestion on NR 9 and installing proper drainage.

419. The men noted that in general there is a high level of support for the project, the town residents can see the benefits of upgrading the road network. They noted they suffer excessive dust during the dry season and muddy/inaccessible roads during the rainy season.

420. The men noted high levels of frustration amongst the villagers because many road improvement proposals, including a new bridge, have been discussed in the past (for about ten years) and nothing has happened. Some people have not developed their land or built the houses they want as they are unsure of what is happening with the road widening; this is particularly the case with households potentially affected by the bridge - they have known about the possibility of relocation for a long time but nothing official has been provided. Other households have been accumulating construction materials to upgrade their houses and build latrines but they have put this off as they are unsure of the impacts on their land.

421. The men's groups also favored the second bridge alignment, they could not understand the rationale of placing a bridge so close to the existing bridge, it would do nothing to ease the traffic difficulties and would still mean they had to travel further during flooding when access was difficult. Option 1 would cause greater community impact from their perspective, it would be very close to the cemetery and the forest associated with the cemetery, this was a special to them and they did not want it disturbed. The men's groups supported the second bridge alignment (500 m), but not the first (160 m).

422. The men considered that through the subproject local people that could be engaged during the construction period, it was stressed during the consultations that use of local labor should be a priority.

423. With regard to climate change issues, the groups identified changes in both the dry season and wet season; in the dry season the temperature is hotter and there have been droughts that last through to the beginning of the rains, while in the wet season the length and intensity of rainfall and subsequent flooding creates problems during the rice harvest. Droughts were seen as the key impact by the men's groups, resulting in hardening of the ground, crop damage and lower production levels. Some of the coping mechanisms have been to change the cropping season (as mentioned by the women) and to build pipes to pump water from the rivers to the fields.

## **Results of FGDs with Ethnic Groups**

424. In addition to the FGDs about more general urban development issues, additional meetings were held to discuss issues in respect of ethnicity in the villages in Dansavanh Town. The different groups have inter-married and now represent extended families comprised of Tri, small numbers of Katang and Makong, Lao, and Phoutai, there has been inter-marriage with Vietnamese.

425. Asked to describe how they perceive themselves, they see themselves first and foremost as Lao, they hold Lao citizenship, and undertake most social, political and commercial exchange in Lao language. This was confirmed by data from the household survey which indicates that Lao is the main language used, although a number of households also use Vietnamese when dealing/trading in Lao Bao or with Vietnamese who visit the town. The Tri is an ethnic group that is also in Viet Nam, they have close links with other ethnic groups in the town and also with the Vietnamese. There are a number of Makong households from Nong District who have migrated to Dansavanh over the past 15 or so years, they have assimilated with the Tri and the Lao. Dansavanh is an urbanized area and economic and socio-cultural activities are undertaken in similar ways regardless of ethnic group.

426. As noted in Section 5.2.2 and 5.2.3, there is a high level of support for the urban roads improvement subproject with the potential benefits being recognized for the communities and households irrespective of ethnic group. The consultations have ascertained support for the Project from the IP groups in the town

## **Key Informant Interviews**

427. A number of KIIs were conducted during the development of the SLEDP and further KIIs were undertaken for the PSA. During the SLEDP process the KIIs were undertaken in order to find out; (i) how best to increase participation in local development planning; and (ii) what the benefits for socio-economic development of the town might be, and also to identify any negative impacts. During the KIIs undertaken for the PSAs, the foregoing was elaborated upon and another important part of the discussions was to identify what additional measures, by linking with existing or ongoing programs (being implemented by government or others) in the town, could be incorporated into the Project to maximize the benefits.

## **Lao Women's Union – Savannakhet**

428. The membership of the Lao Women's Union (LWU) is high representing 35% of the female population of the province. Higher education is attained by a few women but in general women have limited skills and lack confidence to branch out in non-traditional roles or sectors of employment, there is a need to provide women with basic and/or expanded skills and encourage them to participate in community development. Many poor and low-income women have very few skills and do not know how to access programs to help them advance even in small ways.

429. The provincial LWU has participated in training offered by national LWU and also sent members to receive training and upgrade degrees and diplomas in Viet Nam. The LWU also runs its own programs and partners with other agencies providing training on a range of topics. Important programs run by LWU in recent years have included the establishment of village development funds, village savings groups and credit cooperatives and the land ownership certificate program to ensure that land is registered in the name of both male and female heads of household. In 2009 with UNICEF and World Vision International (WVI) LWU has established rice banks in poor villages in eight districts.



430. The LWU participates in meetings and workshops in respect of planning and preparation of plans, participation could be increased further by ensuring that LWU is more actively involved in key decision making processes and a regular exchange of information between LWU and provincial government so the issues facing women in the province are kept on the development agenda.

### **Lao Women's Union – Dansavanh**

431. The LWU representative in the town confirmed a number of the issues raised by provincial LWU. There have been no programs to address the specific needs of women provided to the town for many years. The women in the town face a number of issues and problems including limited employment opportunities, low education and skill levels, and low levels of awareness about how to become involved in local decision-making which affects them and their families. The LWU would be keen to participate in any programs supported under the CTD that could help women.

### **Lao Front for National Construction**

432. The Lao Front for National Construction (LFNC) is the mass organization responsible for looking after the issues, concerns and needs of ethnic groups. However there are no special programs or projects for ethnic groups/communities run by LFNC or in partnership with other agencies in the town. They are represented at all levels of government.

433. In Dansavanh the largest ethnic group is the Tri (Mon-Khmer group) accounting for 58% of the total population. In respect of participation in local development and preparation of socio-economic development plans, the LFNC is invited to participate as part of village development committee (VDC).

### **Village Leaders**

434. KIIs were undertaken with village leaders to provide background information on levels of participation of villages in provincial and town planning. The main problems facing the villages include lack of basic infrastructure and services such as solid waste management, flood control and drainage, illegal cross-border logging of the town's hinterland areas, and lack of access to/from residential areas by good roads.

435. The Poverty Reduction Fund (PRF) is operating in villages and has supported some small projects such as the gravity fed water supply system.

436. In respect of participation in local development and preparation of socio-economic development plans, village administration representatives are invited to the District Administration Office for meetings. However, during the discussion for the KIIs it became evident that this is more of information passing exercise (from province to district to village) than true participation and information and issues/concerns sharing. The village leaders are then asked to pass the information on and disseminate to the villagers. When asked how the village administration could better participate in development and planning decisions in the town, keeping closer liaison and coordination with town and district officers along with better information flow between administration levels, including the DBTZA, rather than top down were mentioned.

### **ATTACHMENT A – FGD PARTICIPANT LIST**

No. of men attending	6
Date:	Oct 20, 2011

No	Name	Designation	Location
1	Mr. Sonephet Otieng	Village chief	Ban Dansavanh
2	Mr. Vandy Chanthongthip	Village deputy chief	Ban Dansavanh
3	Mr. Lam Nguen	Village militia	Ban Dansavanh

4	Mr. Bounpone	Village militia	Ban Dansavanh
5	Mr. Alai	Village militia	Ban Dansavanh
6	Mr. Atot	Village militia	Ban Dansavanh

#### ATTACHMENT B – FGD PARTICIPANT LIST

No. of attending	6
Date:	Oct 20, 2011

No	Name	Designation	Location
1	Mrs. Viengkham	Village Deputy Chief	Ban Dansavanh
2	Mrs. Choummaly	Housewife	Ban Dansavanh
3	Mrs. Lakhone	Housewife	Ban Dansavanh
4	Mrs. Thongmone	Housewife	Ban Dansavanh
5	Mrs. Lammian	Housewife	Ban Dansavanh
6	Mrs. Chai	Housewife	Ban Dansavanh

**IEE Specific Consultation**

## Official Consultation

Date	Name	Position	Organisation	Topic of discussion	Contact
26/9/2011	Mr. Inthapanya Noukhan	Deputy Head	PNREO	Mandates, regulations and staffing	020 55457330
26/9/2011	Viengkham	Officer	PPWT	Mandates and activities related to urban environment	
30/9/2011	Dr. Anoulack	Head	Sanitation and Water Supply, PPH	Mandates and activities related to urban environment	020 22242893
30/9/2011	Mrs. Dalounny Akhamonty	Head	Environment, UDAA	Mandates and current issues of urban environment management	020 55741302
20/10/2011	Mr. Chanphengsay	Deputy Head	Dansavanh	Mandates and current issues of Dansavanh BTZ structure and urban environment related, coordination and delivery.	
20/10/2011	Mr. Outhin	Official	Dansavanh	Same as above	
20/10/2011	Mr. Phou Khong	Official	Dansavanh	Same as above	
20/10/2011	Mr. Bounhom	Official	Dansavanh	Same as above	

**Village consultation on wildlife and fish information**

Date	Name	Position	Organisation	Topic of discussion	Contact
20/10/2011	Mr. Somphet Oteng	Village Chief	Ban Dansavah	Wildlife and fish interview	
20/10/2011	Vanday Chanthongthip	Deputy Chief	Ban Dansavah	Wildlife and fish interview	
20/10/2011	Mr. Lam Nguen	Millitia	Ban Dansavah	Wildlife and fish interview	

**Village Consultation**

Date	Village	Attending			Issues Raised by people
		Male	Female	Total	
20/10/2011	Ban Dansavah	6	6	12	<ul style="list-style-type: none"> <li>▪ Discussion on their main socio-economic pressures and problem.</li> <li>▪ Opinion for addressing socio-economic problems.</li> <li>▪ Development priorities</li> <li>▪ Impacts from the project construction</li> <li>▪ Environment and climate change issue</li> </ul>
					<ul style="list-style-type: none"> <li>▪</li> </ul>

## XVIII. APPENDIX D2: SPECIES LIST IN DANSAVANH SUBPROJECT AREA

The following lists record species found in the general Project area. No rare or endangered species of flora or fauna will be negatively impacted by the Project.

### Birds

No	Lao phonetic	Common name	Scientific name	Cons. Status	Road Project
1	Nok kot peu	Greater Coucal	<i>Centropus sinensis</i>	LI	✓
2	Nok En	Asian house Martin	<i>Delichon dasympus</i>		✓
3	Nok En	House Swift	<i>Apus affinis</i>		✓
4	Nok En	Ban Swallow	<i>Hirundo rustica</i>		✓
5	Nok hon	Red-whisker Bulbul	<i>Pycnonotus jocosus</i>		✓
6	Nok khouk	Striped throated Bulbul	<i>Pycnonotus finlaysoni</i>		✓
7	Nok kadepdoao	Paddy field Pipit	<i>Anthus rufulus</i>		✓
8	Nok pit kon khao	White-rumped Munia	<i>Lonchura striata</i>		✓
9	Nok pit	Eurasian tree Sparrow	<i>Passer montanus</i>		✓
10	Nok khao	Barn Owl	<i>Tyto alba</i>	LII	✓
11	Nok khao	Brown fish Owl	<i>Ketupa xlonensis</i>	LII	✓
12	Nok kapba	Great-eared nightjar	<i>Eurotopodus macrotis</i>		✓
13	Nok khao duea	Spotted Dove	<i>Streptopelia chinensis</i>	LII	✓
14	Nok khao	Red-collared Dove	<i>Streptopelia tranquebar.</i>		✓
15	Nok wak	White breasted waterhen	<i>Amaurornis phoenicurus</i>		✓
16	Nok Ngang khao	Cattle Egret	<i>Bubulcus ibis</i>		✓
17	Nok yang	Intermediate Egret	<i>Mesophoyx intermedia</i>		✓?
18	Nok zeo	Bronzed Drongo	<i>Dicrurus aeneus</i>		✓
19	Nok Eing	Common Myna	<i>Acridotheres tristis</i>		✓
20	Nok kadepdoao	Olive-backed Pipit	<i>Anthus hodgsoni</i>		✓
21	Kai pa	Red jangle fowl	<i>Gallus gallus</i>		✓
22	Nok Khoum	Barred buttonquail	<i>Turnix Suscitator</i>		✓
23	Nok sai	Fulvous b. Woodpecker	<i>Jendrocopos macei</i>	LII	✓
24	Nok khon dok	Green-eared Barbet	<i>Megaliama fiostrica</i>		✓

Mammals					Road Project
No	Lao phonetic	Common name	Scientific name	Cons. Status	
1	Nou	Rat sp.	<i>Rattus sps.</i>		✓
2	Chia dang weuk	Short-nose fruit Bat	<i>cynopterus spp.</i>	LII	✓
3	Ling lom noy	Pigmy Loris	<i>Nycticebus pygmaeus</i>	VU, LI	✓
4	Ngen hangkan	Large Indian Civet	<i>Viverra zibetha</i>	LI	✓
5	Ngen Om	Common palm Civet	<i>Paradoxurus herma.</i>		✓
6	Chonphon	Mongoose spp.	<i>Herpestes</i>	LI	✓
7	Sua lai hin on	Marble Cat	<i>Pardofelis marmorata</i>	LI	✓
8	Ka nai	Tree squirrel	<i>Callosciurus spp.</i>		✓
9	Ka chon	Striped Squirrel	<i>Tamiops mclellandii</i>		✓
10	Mou pa	Wild pig	<i>Tamiops mclellandii</i>		✓
11	Fan	Barking deer	<i>Tamiops mclellandii</i>		✓
Reptiles					Road Project
No	Lao phonetic	Common name	Scientific name	Cons. Status	
1	Ngou kieu hang ham	White-lipped pit viper	<i>Trimeresurus albolabris</i>		✓
2	Ngou chong Ang	King Cobra	<i>Ophiophagus hannah</i>	LI	✓
3	Ngou kanpong	Kriat	<i>Bungurus candidus</i>		✓
4	Ngou Leum	Striped water snake	<i>Enhydris jagorii</i>		✓
5	Ngou pa	Striped water snake	<i>Enhydris jagorii</i>		✓
6	Ngou khodeng	Red-neck Keelback	<i>Rhaddophis subminiatus</i>		✓
7	Ngou pa	Gerard's water snake	<i>Gerarda prevostiana</i>		✓
8	Ngou seauk khouy	Striped Keelback	<i>Amphiesma stolata</i>		
9	Kap kae	Tockay	<i>Gekko gekko</i>		✓
10	Khee chiem	Spotted house Gecko	<i>Gekko monachus</i>		
11	Khee chiem	Spiny tailed house Gecko	<i>Hemidactylus frenatus</i>		✓
12	Ka pom	Golden fence lizard	<i>Calotes versicolor</i>		✓
13	Ka pom pik	Common Gliding Lizard	<i>Draco vorans</i>		✓
14	Kathang	Common butterfly Lizard	<i>eiolepis belliana</i>		✓
15	Len	Bengal Monitor	<i>Varanus bengalensis</i>	LII	✓
16	Pa fa ong?	Asiantic Soft-shell turtle	<i>Amyda cartilaginea</i>	VU	✓

17	Khee ko	Many-line sun skink	<i>Mabuya multifasciata</i>		✓
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**Amphibian**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Road Project
1	Kop		<i>Hoplobatrachus rugulosus</i>		✓
2	Kiat Kha kham		<i>Rana spp.</i>		✓
3	Kiat chana		<i>Rana spp.</i>		✓
4	Kiat lai mo		<i>Rana spp.</i>		✓
5	Kiat tapad		<i>Polypedates leucomystax</i>		✓
6	Khan khak				✓
7	Oung		<i>Calluella guttulata</i>		✓

**Fish**

No	Lao phonetic	Common name	Scientific name	Cons. Status	Road Project
1	Pa kho	Snake head fish	<i>Channa striata</i>		✓
2	Pa douk na	Catfish	<i>Clarias batrachus</i>		✓
3	Pa douk oui	Catfish spp.	<i>Clarias macrocephalus</i>		✓
4	Pa kadeut		<i>Tricopodus trichogaster</i>		✓
5	Pa khang		<i>Crossocheilus sp.</i>		✓
6	Pa sieow		<i>Esomus metallicus</i>		✓
7	Pa sieow na ngen		<i>Orygaster anomaluna</i>		✓
8	Pa sieow ao		<i>Rasbora aurotaenia</i>		✓
9	Pa kang		<i>Channa gachua hamilton</i>		✓
10	Pa khao		<i>Systemus aurotaeniata</i>		✓
11	Pa kheng		<i>Anabas testudineus</i>		✓
12	Pa nin	Tilapia sp.	<i>Oreochromis niloticus</i>		✓
13	Pa nai	Nile tilapia	<i>Oreochromis spp.</i>		✓
14	Pa pok		<i>Systomus orphoides</i>		✓
15	Pa pak				✓
16	Pa seu				✓
17	Pa pao		<i>Tretrapdon sp.</i>		✓
18	Pa tong		<i>Chitala ornata</i>		✓
20	Pa keng		<i>Cirrhinus sp.</i>		✓
21	Pa chat		<i>Scaphoidontichthys sp.</i>		✓



22	Pa xueam			✓
23	Pa kha yang		<i>Cirrhinus sp.</i>	✓
24	Pa ien		<i>Monopterus albus</i>	✓

**Remarks:** CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; CI: Appendix I of CITES;  
CII: Appendix II of CITES; LI: List I - prohibit species of Lao Wildlife Law; List II - management species of Lao Wildlife Law

## **XIX. APPENDIX E: TOR FOR ENVIRONMENTAL COMPLIANCE AUDIT**

### **GMS – Corridor Development Project – Lao PDR - Landfill rehabilitation**

- I. Draft TORs for Environment Compliance Audit (including toxicity tests / sampling ) and leachate management
- II. Draft TORs to be included in the Detailed Design Consultancy as further guidance
- III. ToRs for the leachate sampling analysis and toxicity tests for heavy metal contamination

#### **I. Draft TORs for Environment Compliance Audit**

##### **A. Objective of Environment Compliance Audit (ECA):**

437. The objective of the ECA is to determine all activities related to the proposed closure of the existing waste dump site are in accordance with ADB's safeguard principles and requirements for borrowers, and to identify and plan appropriate measures to address outstanding compliance issues which could be termed as "legacy" or cause reputational risk for ADB. Where non-compliance is identified, a corrective action plan agreed on by ADB and the borrower will be prepared as part of the ECA.

##### **B. Scope of work:**

438. The consultant will conduct an environment audit for the open dumpsite as required by the ADB SPS (2009) Appendix 1, para 10 as applicable for ADB financing for "existing facilities". The Consultant will:

- (i) Review the dumpsite (size, length of operation, types of wastes received (MSW and/or hazardous wastes), average weight of solid wastes discharged on a monthly basis, depth of dumped wastes, etc.); relevant physical and biological environmental, and socioeconomic conditions in/around the site [rainfall, temperature, soil characteristics (permeability, porosity), predominant wind direction, occurrence of typhoons/floods, surface water bodies nearby (flows, quality), beneficial water uses in the vicinity (drinking water from shallow wells, irrigation, bathing), groundwater table and depth, nearby land uses, health status of the community including morbidity and mortality rates, among others].
- (ii) Conduct an on-site assessment, to identify environment concerns, i.e., ascertain the presence of hazardous wastes including heavy metals in the solid wastes, leachate, ground water, surface water, and soil in the vicinity (within 300 mts radius) of the site.
- (iii) Identify other environmental, health and safety issues associated with the operation of the open dumpsite.

- (iv) Review the site's compliance with the applicable national/local environmental laws, regulations and standards, and selection criteria for siting of dumpsites or landfills. The latter is important in view of the proposed ADB funding of the site expansion.
- (v) Assess possible rehabilitation options and/or the proposed closure options including the capping design for adequacy of environment safety and compliance with environment safeguards.
- (vi) Prepare the open dump site rehabilitation plan (including the possibility of an excavation plan), closure plan and a monitoring plan. Recommend measures to address other issues identified in (iii).
- (vii) Prepare a corrective action plan (based on above findings including those from the toxicity tests and leachate sampling) define necessary remedial actions, the budget for such actions, and the time frame for resolution of noncompliance (if any).
- (viii) Prepare an ECA report. The following outline of the audit report may be considered: facilities description; summary of national/local environmental laws, regulations, standards; audit and site investigation procedure; findings and areas of concern; options explored and option selected; and Corrective Action Plan for each area of concern including costs and schedule of implementation.
- (ix) Ensure that the audit report (including a corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of the Safeguard Requirements (SR) 1.
- (x) Assess options for capping, closure and / or excavation of waste from the dump site based on information obtained from the leachate tests.

***The following is guidance provided to substantiate this analysis :***

- a. In-case it is found that the leachate (refer to findings of TOR II below) from the open dumpsite is contaminating the groundwater/wells and the surface water posing a threat to public health, the borrower should explore options to better control or minimize the leachate production in addition to capping.
- b. It may be noted that the SPS, SR-1 (para. 34) cites that where avoidance is impossible, the borrower is required to minimize or control the intensity or load of pollutant emission and discharge.
- c. Given the small scale of the waste volume or open dumpsite area, options may include partial or full excavation of the wastes for dumping into the adjacent new sanitary landfill when ready. Partial excavation through vertical drilling of the perched leachate could be explored if the underlying soils are of high permeability but not saturated. On the other hand, if the underlying soils are saturated, drilling into the waste would need to extend into the underlying soils in order to intercept the leachate. The identification of pooled/perched leachate however, would be difficult and this is the challenge. There will also be

occupational health and safety issues to address. The remaining waste after compacting, leveling and sloping to 3% to facilitate drainage flow, will need to be covered using a cap with high design standard.

- d. On the other hand, full excavation of the wastes and the underlying contaminated soils could also be explored, with the wastes and soil transferred into the new sanitary landfill. In fact, if it could be established, based on the analysis of the leachate characteristics (refer to findings of TOR II below) that the wastes had stabilized, portions of the excavated wastes, after screening and passing the laboratory tests and relevant government standard, could be used as landfill barrier (if this meets the recommended hydraulic conductivity of  $1 \times 10^{-7}$  cm/sec) or if not, as soil for landfill daily cover. This would constitute some savings for the landfill operator. Fractions of the waste could also be recovered as compost after passing the government's standards for compost use and perhaps with nutrient supplementation, if needed. Other feasible options could be explored by the solid waste management expert.
- (xi) Recommend an Institutional mechanism to ensure implementation of the tasks (i) to (xv) above

## **II. ToRs for the leachate management, sampling analysis and monitoring and toxicity tests for assessing heavy metal contamination**

- (i) Assess the quantity and strength of the generated leachate on key factors : (i) amount and characteristics of the discharged waste; (ii) climatic conditions; (iii) cell size and phasing of the disposal area; (iv) operational techniques applied at the landfill / dumpsite; (iv) final top cover applied / proposed
- (ii) Carry out leachate sampling and toxicity tests across the cross-section (random sampling) of the open dumpsite, within and outside the periphery of the cells and laboratory tests to determine the heavy metal contents of the solid wastes, leachate, ground water, surface water, and soil in the vicinity (300 mts radius) of the dumpsite.
- (iii) **Conduct Waste composition analysis : - Physical-chemical characteristics -** Total solids (TS), volatile solids (VS), moisture content (MC), and ash content of waste samples and total organic carbon (TOC)
- (iv) Parameters for standard heavy metal standard leachate monitoring - include parameters such as pH, concentrations of Cl, turbidity, NH<sub>3</sub>-N,
- (v) **Heavy metals concentration** - Heavy metals such as Hg, Cd, Pb, Cr, Ni, Zn, and Cu

- (vi) **characterization of leachate:** The leachate samples to be analyzed for pH, BOD (biochemical oxygen demand), COD (chemical oxygen demand), NH<sub>4</sub>-N, cations and anions.
- (vii) Recommend a leachate management strategy, including potential for recirculation of waste, based on the above findings (task (i) to (vi). The consultant may customize to local conditions and formulate a strategy based on the following principle - of containment, collection and disposal of leachate – i.e., generated leachate is collected from a liner system of low impermeability, sent through a drainage system and normally led or pumped for treatment before final discharge to a surface water body. This strategy would help to enhance stabilization and mineralization of the disposed waste.
- (viii) Assess options for optimal solutions for leachate management based on the following guidance:
  - a. The identified option in as far as management of leachate is concerned, should complement the current proposal to cap the open dumpsite using the standards. So the options to choose from, could involve (i) one with active leachate management (through various options) plus open dumpsite capping using the government's standards for a landfill design, and (ii) another that only involves capping using the same government capping design standard.
  - b. The severity of the public health risks will be a telling factor in the economic costs and benefits for each option, and in the ultimate choice.
- (ix) Assess options for optimal solutions for leachate monitoring based on the following guidance:
  - a. Monitoring for the presence of heavy metals in the groundwater/shallow wells and surface water over a long time until the relevant government standards are met. Some literature recommends bio-monitoring in the surface water because of the attenuation and dispersion of chemicals in the surface water and also because of the masking effect.
  - b. Overtime, the target should be to achieve the government standards for the different classes of surface water and beneficial water uses. Meanwhile, access to contaminated water sources or soils should be banned, if called for based on lab results.
- (x) Recommend an Institutional mechanism to ensure implementation of the tasks (i) to (ix) above
- (xi) **Additional guidance :** -
  - o With regard to solid wastes, the USEPA-developed procedure called the Toxicity Characteristic Leaching Procedure (TCLP) can be assessed for application applied to determine the leachability of the heavy metals at various environmental conditions. This will inform the hazardous levels of the solid waste by comparing these with TCLP limits.

- The Standard Methods or other suitable methods could be used to conduct/analyze the other tests. It is also important to know the characteristics of the leachate and to compare these with the characteristics of the stabilized wastes to determine the potential for waste resource recovery.

### **III. Guidance points for Draft TORs for detailed design of the proposed new landfill**

439. The following guidance is provided for the detailed design consultancy for design of the new sanitary landfill. The Consultant will ensure that environmental considerations for the proposed new sanitary landfill include but not limited to:

- an environmental assessment including an environmental management plan, and disclose this document in accordance with the information disclosure requirements of SR 1. (For the facility expansion involving the construction of a new sanitary landfill, the SPS requirement for a project lending modality applies, where in the borrower requires to prepare an EA)
- an environmental assessment to ensure that the landfill design complies with the government of Lao standards for the construction of landfills, if it has one.<sup>17</sup>
- analysis of an optimal leachate management approach
  - e.g., an emerging leachate management approach for landfill waste decomposition is to treat landfills as bio-reactors (not as dry tombs) where leachate gets re-circulated back to the heap and in some systems, with aeration and in others, without re-aeration.
- Ensure a mechanism for sustainability of landfill operations and the achievement of its environmental outcome, depending on the sustained availability of the financing to operate and maintain it.
  - As good practice - Refer to the World Bank publication (Guidance Note on Leachate Management for MSW Landfills, 1999) reports “that leachate management constitutes by far the largest investment and operational costs (70 to 80%) for a landfill, and therefore should have a significant influence on the actual tipping fees to be charged for disposal of each ton of waste. The choice of leachate management system therefore becomes extremely important during the initial stages of landfill planning and development.” Since leachate will continue to be produced even after landfill closure, there is a possibility (due to many factors) that leachate will eventually be released to the environment and hence the use of a treatment system that is simple to operate and that continues to treat the waste at a certain level, even if it fails, is recommended. In warmer climates such as in Lao, the use of a biological treatment (aerated lagoons) with a polishing stage using artificial wetlands before final discharge is suggested.

<sup>17</sup> In Viet Nam, the standards (TCXDVN 261:2001) require all landfills to have a waste fill area, leachate treatment system, and auxiliary facilities. Gas vents are only required if the landfill site receives 50,000 tons/year of waste

**XX. APPENDIX F: RESULTS OF ENVIRONMENTAL COMPLIANCE AUDIT**

440. The separate report on the ECA, the groundwater quality sampling & analysis study, and the required action plan for the existing dumpsite in Kaysone will be provided here when the ECA and associated studies are completed.