

# **Appendix 15.A**

## **Final Report of Initial Environmental Examination on Pakbo-Saravan 115kV Transmission Line**

# Pakbo-Saravan 115kV Transmission line

## Initial Environmental Examination

For



By



EARTH SYSTEMS LAO  
*Environment – Water - Sustainability*

August 2009

## DISTRIBUTION RECORD

Copy No.	Company	Name
1	JICA Study Team	Mayumi Goto
2	EDL	Vilaphorn Visounnarath

## DOCUMENT REVISION LIST

Revision Status/Number	Revision Date	Description of Revision	Approved By
Rev0	August 3, 2009	DRAFT	N. Murphy
Rev1	August 24, 2009	DRAFT2	K. Wallace
Rev2	August 28, 2009	FINAL1	K. Wallace
Rev3	September 11, 2009	FINAL2	K. Wallace
Rev4	September 14, 2009	FINAL3	K. Wallace

This report is not to be used for purposes other than those for which it was intended. Environmental and socio-economic conditions change with time. The consulting team does not imply that the conditions described in this report are representative of past or future conditions. Where this report is to be made available, either in part or in its entirety, to a third party, the consulting team reserves the right to review the information and documentation contained in the report and revisit and update findings, conclusions and recommendations.

## TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b>	<b>II</b>
<b>LIST OF ACRONYMS</b>	<b>VII</b>
<b>EXECUTIVE SUMMARY (LAO)</b>	<b>VIII</b>
<b>EXECUTIVE SUMMARY</b>	<b>XIII</b>
<b>1. INTRODUCTION</b>	<b>1</b>
1.1 Background	1
1.2 Project Owner	1
1.3 Environmental and Social Assessment Process	3
1.4 Purpose of this Study	3
1.5 Administrative and Legal Framework for Environmental and Social Considerations	3
1.5.1 Administrative Framework	3
1.5.2 Legal Framework	4
1.5.3 Description of Relevant Lao Legislation	6
1.5.4 The Environmental Approval Process	7
1.5.5 IEEs for Similar Projects in Lao PDR	7
<b>2 PROJECT DESCRIPTION</b>	<b>9</b>
2.1 Location of the Project	9
2.2 Project Design	9
2.2.1 Sub-station Design	11
2.2.2 Tower Design	11
2.2.3 Right of Way	12
2.2.4 Access Road	13
2.2.5 Quantity and Quality of Raw Material to be Used	14
2.2.6 Quantity and Quality of Waste Products Generated by the Project	16
2.2.7 Project Costing	16
2.3 Project Activities and Schedule	16

<b>3</b>	<b>PROJECT ALTERNATIVES</b>	<b>18</b>
3.1	Alternatives Considered in Project Design	18
3.1.1	Transmission Line Alignments	18
3.1.2	Sub-station Locations	19
3.2	Not Proceeding with the Project	19
<b>4</b>	<b>ENVIRONMENTAL DESCRIPTION OF THE PROJECT AREA</b>	<b>22</b>
4.1	Physical Resources	22
4.1.1	Topography and Drainage	22
4.1.2	Climate	23
4.1.3	Geology and Soils	24
4.1.4	Hydrology	25
4.2	Biological Resources	27
4.2.1	Vegetation Along the Transmission Line Route	27
4.2.2	Village Forest affected in Phou Xieng Thong Buffer Zone	29
4.2.3	Protected Areas	29
4.2.4	Biodiversity in Agricultural Landscapes	30
4.2.5	Aquatic Habitats and Resources	31
<b>5</b>	<b>SOCIO-ECONOMIC DESCRIPTION OF THE PROJECT AREA</b>	<b>33</b>
5.1	Social Setting	33
5.1.1	Affected Population	33
5.1.2	Ethnicity, Religion and Cultural Heritage	34
5.2	Economic Overview	36
5.2.1	Regional Economy	36
5.2.2	Project Area	37
5.3	Agriculture and Land Use	40
5.3.1	Land Tenure	40
5.3.2	Agricultural Land Use Patterns	43
5.3.3	Forest Resource Use	45
5.3.4	Land Disputes, Issues and Concerns	45
5.3.5	Livestock	45
5.4	Social Conditions and Services	46

5.4.1	Health	46
5.4.2	Sanitation	46
5.4.3	Education	47
5.4.4	Gender Considerations	48
5.4.5	Energy Consumption, Generation and Electrification	48
5.4.6	Road Access	49
5.5	Unexploded Ordinance	49
<b>6</b>	<b>PUBLIC INVOLVEMENT</b>	<b>50</b>
6.1	Project Stakeholders	50
6.1.1	Project Affected Persons	50
6.1.2	Affected Communities	51
6.1.3	Government	51
6.1.4	Non Government Organisations	51
6.1.5	The Company, Developer and Financier	52
6.2	Summary of Public Involvement Activities Undertaken during the IEE	52
6.2.1	Government Consultations	52
6.2.2	Community Consultations	53
6.2.3	Open Stakeholders Consultations	54
<b>7</b>	<b>IDENTIFICATION OF BIOPHYSICAL AND SOCIO-ECONOMIC IMPACTS AND MITIGATION MEASURES</b>	<b>55</b>
7.1	Introduction: Impact Matrix	55
7.2	Biophysical Impacts and Mitigation Measures	56
7.2.1	Biodiversity	56
7.2.2	Other Impacts	61
7.3	Socio-Economic Impacts and Mitigation Measures	65
7.3.1	Resettlement and Land Acquisition	65
7.3.2	Land Use Restrictions and Loss of Commercial Trees	68
7.3.3	Crop and Land Disturbance	69
7.3.4	Other Issues	70
<b>8</b>	<b>ENVIRONMENTAL PLAN (EMP)</b>	<b>73</b>
8.1	Institutional Structure for Management	73



Pakbo – Saravan 115 kV Transmission Line

8.2	Management and Mitigation Program	74
9	<b>CONCLUSIONS</b>	<b>84</b>
10	<b>REFERENCES</b>	<b>85</b>

**TABLES**

Table 0-1 Villages with residential and / or commercial structures within the current TL ROW. ....	xvi
Table 1-1 Government of Lao PDR Legislative and Policy Framework .....	5
Table 1-2 Relevant international policy and guidelines.....	6
Table 2-1: Provinces and districts .....	9
Table 2-2 Line Design Features.....	11
Table 2-3 Type, Weight and Number of Transmission Tower to be used for the Project	12
Table 2-4 Project Schedule.....	17
Table 3-1 Comparison of transmission line alternatives .....	18
Table 4-1 Summary of normal meteorology of Savannakhet 2000-2008.....	23
Table 4-2 Summary of normal meteorology of Saravan 2000-2008 .....	24
Table 4-3 Average Water Level (m) of Xe Banghieng River 2000-2007 .....	26
Table 4-4 Average Water Level (m) of Xe Done River 2000-2008 .....	26
Table 4-5 Forest in the Right of Way .....	27
Table 5-1 Summary of households impacted by the proposed line .....	34
Table 5-2 Main Ethnicity and Main Religion by village in the Project Area. ....	35
Table 5-3 Percentage distribution of occupation in agriculture, fishery and non farm activities by province and district of the project area.....	37
Table 5-4 Perceptions of wealth and Income of families in the Project Area .....	38
Table 5-5 Vulnerable households in the Project Area.....	39
Table 5-6 Rice Insufficiency in the Project Area .....	40
Table 5-7 Land Titling Activities in the Project Area.....	41
Table 5-8 Average productivity of rainfed rice by district and villages in the project area .....	44
Table 5-9 Forest resources in the Project Area .....	45
Table 5-10 Sources of household water in the project area.....	47
Table 5-11 School enrolment (5-16 yrs).....	48
Table 7-1 Environmental and social impacts .....	55
Table 7-2 Impact on Forested and Plantation Areas.....	58

Table 7-3 Land and assets impacted by tower and sub-stations in the ROW ..... 66

Table 7-4 Villages with residential and / or commercial structures within the current TL ROW. .... 67

Table 8-1 Environmental Management Plan..... 75

**FIGURES**

Figure 1-1 Transmission System in Lao PDR (source: Long-term Power Development Plan 2007-2016, EDL et al 2009)..... 2

Figure 1-2 Structure of the ESIA Department in WREA - Source: WREA (2009)..... 4

Figure 2-1 The project area..... 10

Figure 2-2 ROW for 115kV Transmission line (Source: EDL 2009)..... 13

Figure 3-1 Alternative transmission line routes ..... 21

Figure 4-1 Land Use in the Project Area..... 28

Figure 6-1 Stakeholders workshop advert ..... 54

**APPENDICES**

Appendix 1 Stakeholder Consultation Information Brochure (English and Lao)

Appendix 2 List of Stakeholders Consulted

- Table 1: List of Stakeholders Consulted: Field Mission 1, June 2009
- Table 2: List of Stakeholders Consulted: Field Mission 2, July 2009
- Table 3: List of Stakeholders, Workshop, August 2009
- Table 4: Villages Consulted

Appendix 3 Workshop Report

- Workshop Agenda
- Workshop Minutes
- Workshop Photos
- Workshop Attendance

Appendix 4 Environmental Checklist

Appendix 5 Environmental and Social Management Plan (see separate document)

Appendix 6 Resettlement Action Plan (see separate document)



## LIST OF ACRONYMS

DMS	Detailed Measurement Survey
DOE	Department of Electricity (MEM)
EDL	Electricite du Lao
EMP	Environment Management Plan
EMU	Environmental Management Unit (EDL)
EO	Environment Office (EDL)
ESD	Environmental and Social Division (DOE)
ESIAD	Environmental and Social Impact Assessment Division (WREA)
ESL	Earth Systems Lao
GOL	Government of Lao PDR
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
LAFA	Land and Forest Allocation Program
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
PAPs	Project Affected Persons
RAP	Resettlement Action Plan
ROW	Right of Way
TEPCO	Tokyo Electric Power Company, INC.
TL	Transmission Line
WREA	Water Resources and Environment Administration

## EXECUTIVE SUMMARY (LAO)

### ບົດສະຫຼຸບຫຍໍ້

ໃນປະເທດລາວ ເຄືອຄ່າຍພະລັງງານໄຟຟ້າ ມີຢູ່ 4 ເຄືອຄ່າຍ: ເຄືອຄ່າຍພາກເໜືອ, ພາກກາງທີ 1, ພາກກາງທີ 2 ແລະ ເຄືອຄ່າຍພາກໃຕ້ ເຊິ່ງດຳເນີນການປະຕິບັດວຽກແບບເອກະລາດ ແລະບໍ່ເຊື່ອມຕໍ່ຫາກັນ ແລະກັນ. ສະພາວະຕົວຈິງ ໃນປະຈຸບັນນີ້ ເຮັດໃຫ້ດ້ານເຕັກນິກບໍ່ມີຄວາມສະດວກ ແລະ ດ້ານການໃຊ້ງົບປະມານກໍບໍ່ມີປະສິດທິຜົນ. ຕົວຢ່າງ ຄວາມຕ້ອງການຊື້ໄຟຟ້າຄືນມາຈາກປະເທດໄທ ເຊິ່ງໃນຕົວຈິງ ປະເທດໄທຍັງຮັບຊື້ໄຟຟ້າຈາກ ສປປລາວ ສະເໝີ. ການຊື້ໄຟຟ້ານັ້ນຈະມີ ລາຄາສູງ ແຕ່ກໍຈຳເປັນເພື່ອສະໜອງໃຫ້ບາງທ້ອງຖິ່ນທີ່ຂາດແຄນ ແລະໃນຂະນະທີ່ ເຂດບາງເຂດທ້ອງຖິ່ນກໍມີເກີນຄວາມຕ້ອງການ. ສິ່ງນີ້ເກີດຂຶ້ນເປັນປະຈຳ ແລະ ຜົນສຸດທ້າຍກໍເຮັດໃຫ້ສູນເສຍງົບປະມານ ເຊິ່ງຮັບຮູ້ວ່າ ມັນກາຍເປັນບັນຫາອັນຫຼໍ່ແຫຼມຂອງຊາດ. ເພື່ອແກ້ໄຂບັນຫາດັ່ງກ່າວ ໂດຍການສະໜັບສະໜູນຈາກລັດຖະບານຍີ່ປຸ່ນ, ລັດຖະບານແຫ່ງ ສປປລາວ ໄດ້ມີແຜນການທີ່ຈະເຊື່ອມຕໍ່ 2 ເຄືອຄ່າຍພະລັງງານ: ເຄືອຄ່າຍ ພາກກາງ 1 ແລະ ພາກກາງ 2, ແລະ ພາກກາງ 2 ແລະ ເຄືອຄ່າຍພາກໃຕ້. ເຄືອຄ່າຍພາກກາງ 1 ແລະ ພາກກາງ 2 ໄດ້ເລີ່ມເຊື່ອມຕໍ່ເຂົ້າກັນແລ້ວ.

ຈຸດປະສົງໃນການເຊື່ອມຕໍ່ສາຍສິ່ງແມ່ນ:

- ເພື່ອປັບປຸງເຄືອຄ່າຍພະລັງງານໄຟຟ້າແຫ່ງຊາດ,
- ເພື່ອເພີ່ມສະມັດຕະພາບໃນການຄຸ້ມຄອງຂອງພາກສ່ວນພະລັງງານໄຟຟ້າ
- ເພື່ອສົ່ງເສີມກິດຈະກຳທາງດ້ານເສດຖະກິດ, ແລະ
- ເພື່ອເປັນການກອບສ່ວນໃນການຕອບສະໜອງຄວາມຈຳເປັນຂັ້ນພື້ນຖານຂອງຄົນໃນ ສປປລາວ

ໃນບົດລາຍງານນີ້ ເໝັນໜັກໃສ່ ສາຍເຊື່ອມຕໍ່ໄຟຟ້າ 115ກວ ຂອງແຂວງສະຫວັນນະເຂດ - ສາລະວັນ ເຊິ່ງໄດ້ສະເໜີໃຫ້ເຊື່ອມຕໍ່ ເຄືອຄ່າຍພາກກາງ 2 ກັບເຄືອຄ່າຍພະລັງງານໄຟຟ້າພາກໃຕ້.

ຜູ້ສະໜັບສະໜູນ, ຜູ້ໃຫ້ທຶນ, ແລະ ຜູ້ຮັບເໝົາ ແມ່ນມີດັ່ງລຸ່ມນີ້:

- ຊື້ຜູ້ພັດທະນາໂຄງການ: ລັດວິສາຫະກິດໄຟຟ້າລາວ (ຟຟລ)
- ຊື້ຜູ້ໃຫ້ທຶນຊ່ວຍເຫຼືອ: ອົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ (JICA)
- ຊື້ຜູ້ຮັບເໝົາ: ບໍລິສັດ ພະລັງງານໄຟຟ້າໂຕກຽວ ຈຳກັດ (ເທັບໂກ)

ບໍລິສັດ ເອີດຊີສະແຕມລາວ ໄດ້ຖືກມອບໝາຍໜ້າທີ່ໃຫ້ ສຶກສາການປະເມີນຜົນກະທົບດ້ານສິ່ງແວດລ້ອມ ຂັ້ນຕົ້ນ (IEE) ແລະ ກະກຽມແຜນການຄຸ້ມຄອງທາງດ້ານສິ່ງແວດລ້ອມ (EMP) ແລະ ແຜນການຍົກຍ້າຍຈັດ ສັນ (RAP) ສຳລັບ ສາຍເຊື່ອມຕໍ່ໄຟຟ້າ 115ກວ ແຂວງສະຫວັນນະເຂດ - ສາລະວັນ

**ການອະທິບາຍໂຄງການໂດຍຫຍໍ້**

ສາຍສິ່ງໄຟຟ້າ ທີ່ສະເໜີນັ້ນຈະມີຄວາມຍາວປະມານ 220ກມ ຈາກ ສະຖານນີ້ຍ່ອຍປາກບໍ່ ທີ່ແຂວງ ສະຫວັນນະເຂດ ໄປຜ່ານສະຖານນີ້ຍ່ອຍເຕົາຖ່ານ ໄປຫາສະຖານນີ້ຍ່ອຍທີ່ວາງແຜນສ້າງຂຶ້ນທີ່ ແຂວງສາລະ ວັນ. ເສັ້ນທາງສາຍສິ່ງໄຟຟ້າ ຈະຜ່ານ 7 ເມືອງ ຂອງ 2 ແຂວງ. ຈຸດເຊື່ອມຕໍ່ ຂອງສາຍສິ່ງໄຟຟ້າ ຈະຢູ່ໃກ້ຄຽງ ກັບເສັ້ນທາງ (ເລກທີ 13 ແລະ 15), ແລະ ຜ່ານເຂດປ່າສະຫງວນພູຊຽງທອງ ພາຍໃນຂອບເຂດ 500ມ ແລະ ເຂດປ່າສະຫງວນເຊບັ້ງນວນ 5ກມ ແລະ ຜ່ານແມ່ນ້ຳໃຫຍ່ 3ສາຍ (ເຊບັ້ງທຽງ, ເຊບັ້ງນວນ ແລະ ເຊ ໂດນ).

ໂຄງການ ຈະປັບປຸງສະຖານນີ້ຍ່ອຍ “ປາກບໍ່” ທີ່ມີຢູ່; ນຳໃຊ້ສະຖານນີ້ຍ່ອຍທີ່ໄດ້ການວາງແຜນໄວ້ ຢູ່ແຂວງ ສາລະວັນ ແລະ ກໍ່ສ້າງສະຖານນີ້ຍ່ອຍຕົວໃໝ່ ຢູ່ເຕົາຖ່ານ.

ແລວໄຟຟ້າ 3 ແລວແຕກຕ່າງກັນໄດ້ຖືກພິຈາລະນາ ສຳລັບ ສາຍສິ່ງໄຟຟ້າທີ່ສະເໜີດັ່ງກ່າວ (ເບິ່ງຮູບ 41):

- ທາງເລືອກທີ 1: ສະຖານນີ້ຍ່ອຍ ປາກບໍ່ ໄປຫາ ສະຖານນີ້ຍ່ອຍໃໝ່ ເຕົາຖ່ານ ໄປສະຖານນີ້ຍ່ອຍສາລະວັນ.
- ທາງເລືອກທີ 2: ສະຖານນີ້ຍ່ອຍປາກບໍ່ ໄປຫາສະຖານນີ້ຍ່ອຍ ແກ້ງກອກ ໄປຫາ ສະຖານນີ້ຍ່ອຍໃໝ່ ເຕົາ ຖ່ານ ໄປສະຖານນີ້ຍ່ອຍສາລະວັນ
- ທາງເລືອກທີ 3: ສະຖານນີ້ຍ່ອຍ ປາກບໍ່ ໄປຫາສະຖານນີ້ຍ່ອຍ ເຊໂປນ ໄປສະຖານນີ້ຍ່ອຍ ສາລະວັນ.

ທາງເລືອກທີ 1 ໄດ້ຖືກຄັດເລືອກເອົາເປັນເສັ້ນທາງເສື່ອມຂອງສາຍສິ່ງ ເຖິງແມ່ນວ່າ ທາງເລືອກນີ້ ຈະໃຊ້ເນື້ອທີ່ ຫຼາຍກວ່າທາງເລືອກທີ 3 (550ຮຕ ຕໍ່ 523ຮຕ), ແຕ່ທາງເລືອກທີ 1 ຈະມີຜົນກະທົບ ຕໍ່ກັບເຂດບ້ານຍົກຍ້າຍ ຈັດສັນໜ້ອຍກວ່າ ຍ້ອນມັນຈະຖືກເນັ່ງໄປຕາມເສັ້ນທາງທີ່ມີຢູ່ແລ້ວ ແລະ ກໍ່ຈະມີຜົນກະທົບໜ້ອຍກວ່າທາງ ເລືອກທີ 3 ເຊິ່ງທາງເລືອກທີ 3 ນີ້ ຕ້ອງການ ໃຫ້ມີເສັ້ນ ທາງເຂົ້າໄປຕີ່ມ ແລະ ຈະຜ່ານບາງພື້ນທີ່ ປ່ອນ ທີ່ບໍ່ຄວນ ຖືກລົບກວນອີກດ້ວຍ.

**ສະພາບການດ້ານສິ່ງແວດລ້ອມໃນເຂດພື້ນທີ່ຂອງໂຄງການ**

ໂຄງການ ຕັ້ງຢູ່ເຂດລຸ່ມແມ່ນ້ຳຂອງ ທີ່ມີນ້ຳຖ້ວມເຖິງ ເຊິ່ງຕາມລັກສະນະພູມມິສາດໂຂງທີ່ດິນດຍທີ່ໄປ ດິນແມ່ນຢູ່ເຂດທີ່ວຽງ ແລະ ຕ່ຳ.



ສາຍສົ່ງນັ້ນຈະຜ່ານເຂດ 3 ເຂດທີ່ມີຄວາມແຕກຕ່າງທາງດ້ານທໍລະນີວິທະຍາ ທິດທາງເໜືອເຂດໂຄງການສ່ວນໃຫຍ່ປະກອບດ້ວຍດິນຊາຍເປັນຊັ້ນຈາກສະໄໝຫຼັງຂອງ ເມໂຊໂຊອິກ (ກໍ່ຄືໄລຍະຊ່ວງເຄິ່ງຫຼັງຂອງສະໄໝ ກຣີຕາໂຊສ). ສ່ວນໃຫຍ່ແມ່ນເມັດຊາຍອ່ອນໆ, ມີຫີນເກືອ ແລະ ຫີນບູນ (ກີມທໍລະນີສາດ ແລະ ບໍ່ແຮ່, 1990). ເຂດເບື້ອງໃຕ້ສ່ວນໃຫຍ່ ຈະປະກອບຈາກສະໄໝກາງ ເມໂຊໂຊອິກ (ຫຼັງຕຣີອາຊິກຫາຕົ້ນກຣີຕາໂຊສ). ດ້ວຍຫີນເກີດຈາກຕະກອນ ແລະ ຊັ້ນຖ່ານຫີນບາງໆມາແທນທີ່. ບາງສ່ວນນ້ອຍໆຂອງ ແລວໃນເຂດເໜືອ ແລະ ເຂດໄຕ້ ຈະຜ່ານເຂດດິນຊາຍ ທີ່ປະກອບຕົວຂຶ້ນຈາກແມ່ນ້ຳຂອງ ແລະ ສາຂາມັນ.

ດິນໃນພື້ນທີ່ຂອງໂຄງການ ຈະປະກອບມີດິນໜຽວເລັກນ້ອຍ ແລະ ພິຈາລະນາເປັນວ່າມີການລະບາຍນ້ຳໄດ້ດີ ແຕ່ຍັງເປັນດິນທີ່ບໍ່ສົມບູນ ໂດຍສະເພາະໃນເຂດພື້ນທີ່ຕ່ຳ ເພາະວ່າມີການກະສິກຳ ແລະ ປູກຝັງຫຼາຍ (ຟຟລ, 2006).

ເຂດພື້ນທີ່ໂຄງການ ແມ່ນຕັ້ງຢູ່ ເອເຊຍຕາເວັນອອກສຽງໃຕ້ ທີ່ມີອາກາດຮ້ອນ ແລະ ຝົນ ລົມມໍລະສຸມ. ຄ່າສະເລ່ຍອຸນຫະພູມໃນແຕ່ລະເດືອນ ຂອງເຂດພື້ນທີ່ໂຄງການ ແມ່ນຈະຢູ່ປະມານ 23.5 (ໃນເດືອນ ທັນວາ ແລະ ມັງກອນ) ຫາ 30.5 (ໃນເດືອນເມສາ) ໃນອຸນຫະພູມສະເລ່ຍ 27.5 ຕໍ່ປີ.

ຄ່າສະເລ່ຍ ນ້ຳຝົນ ແຕ່ລະປີ ໃນ 9 ປີທີ່ຜ່ານມາ ແມ່ນ ຫຼາຍກວ່າ 1,600 ມມ ຢູ່ແຂວງສະຫວັນນະເຂດ ແລະ ປະມານ 2,200 ມມ ຢູ່ ແຂວງສາລະວັນ. ໃນສອງແຂວງດັ່ງກ່າວ ຈະມີປະມານ 85% ຂອງນ້ຳຝົນ ໃນເດືອນເມສາ ຫາກັນຍາ.

ການສຶກສາທຳອິດ ໄດ້ໃຫ້ເຫັນວ່າ ສິ່ງປູກຝັງສ່ວນຫຼາຍທີ່ມີຢູ່ຕາມເສັ້ນທາງສາຍສົ່ງໄຟຟ້າ ແມ່ນເຊື່ອມໂຊມ ຍ້ອນມີການບຸກເບີກ ສຳລັບ ດິນປູກຝັງ ເຊັ່ນ ດິນນາ. ແຕ່ເຖິງຢ່າງໃດກໍ່ຕາມ, ແຜນທີ່ຂອງດິນປູກຝັງ ຕາມເສັ້ນທາງສາຍສົ່ງ ໄດ້ສະແດງໃຫ້ເຫັນວ່າມີ ເຂດພື້ນທີ່ປ່າໄມ້ຈຳນວນໜຶ່ງ. ແຜນທີ່ປູກຝັງ ຈາກພະແນກສຳຫຼວດແລະວາງແຜນປ່າໄມ້ ໄດ້ຊີ້ແຈງວ່າ ຕາມເສັ້ນທາງສາຍສົ່ງ ແມ່ນເປັນເຂດປ່າໂຄກ.

ການສະເໜີສາຍສົ່ງໄຟຟ້າ ແມ່ນຜ່ານລະຫວ່າງ ເຂດປ່າປ້ອງກັນ, ປ່າສະຫງວນ ພູຊຽງທອງ ແລະ ປ່າສະຫງວນເຊບັ້ງນວນ.

**ສະພາບດ້ານສັງຄົມ ໃນເຂດໂຄງການ**

ແລວສາຍສົ່ງໄຟຟ້າ ຈະໄປຜ່ານ 7 ເມືອງ, ມີ 4 ເມືອງ ຢູ່ໃນແຂວງສະຫວັນນະເຂດ (ເມືອງໄກສອນ, ຈຳພອນ, ໄຊພູທອງ ແລະ ສອງຄອນ), ແລະ 3 ເມືອງໃນແຂວງ ສາລະວັນ (ລະຄອນເພັງ, ວາປີ ແລະ ສອງຄອນ). ຕາມທາງສາຍສົ່ງ ຈະມີຜົນກະທົບຕໍ່ດິນ ໃນຂອບເຂດ 81 ໝູ່ບ້ານ. ໃນ 81 ໝູ່ບ້ານນີ້ ຈະມີ 904 ຄອບຄົວທີ່ຖືກກະທົບໂດຍກົງຕໍ່ ການສູນເສຍທີ່ດິນ ແລະ/ຫຼື ຊັບສິນ.

ຊົນເຜົ່າ ທີ່ຢູ່ໃນເຂດພື້ນທີ່ຂອງໂຄງການ ແມ່ນຄືກັນກັບສະຖິຕິແຂວງ ທີ່ມີຈຳນວນຄົນສ່ວນໃຫຍ່ (95%) ເປັນຄອບຄົວໄຕ ແລະ ສາດສະໜາພຸດ ທີ່ປົນກັບພວກຖິຜີ.

ຕາມການສຳຫຼວດ ແຫ່ງຊາດ (NSC 2005), ໃນ 7 ເມືອງ ທີ່ຢູ່ເຂດໂຄງການ ຈະມີຫຼາຍກວ່າ 80% ຂອງຈຳນວນປະຊາກອນທີ່ເຮັດວຽກທັງໝົດ ເປັນຊາວໄຮ່ນາ.

**ການປະເມີນຜົນກະທົບ**

ຜົນກະທົບທາງດ້ານສິ່ງແວດລ້ອມ ຂອງໂຄງການ ຈະຖືກກະທົບ ທາງດ້ານຊີວະນາໆພັນ ທີ່ໄກກັບ ປ່າ  
ສະຫງວນພູຊຽງທອງ ແລະ ປ່າສະຫງວນ ເຊບັ້ງນວນ ແລະ ກະທົບຖືກເຂດຍົກຍ້າຍຈັດສັນ<sup>1</sup>. ຜົນກະທົບທາງ  
ສິ່ງ ແວດລ້ອມອື່ນໆ ສ່ວນຫຼາຍແມ່ນກ່ຽວຂ້ອງກັບການກໍ່ສ້າງ ແລະ ຄາດວ່າຈະເປັນພຽງແຕ່ຊົ່ວຄາວເທົ່ານັ້ນ.

ໂດຍທົ່ວໄປ, ການປະເມີນຂະໜາດຂອງຜົນກະທົບ ສະແດງໃຫ້ເຫັນວ່າ ຜົນກະທົບທາງສິ່ງແວດລ້ອມ ແມ່ນ  
ຄາດວ່າມີຜົນກະທົບຕໍ່າ. ເສັ້ນທາງສາຍສົ່ງໄຟຟ້າ ແມ່ນໄດ້ເລືອກເອົາແລວທີ່ມີຜົນກະທົບທາງດ້ານສິ່ງແວດ  
ລ້ອມ ແລະ ສັງຄົມທີ່ຕໍ່າທີ່ສຸດ. ເກືອບທຸກພາກສ່ວນ, ດ້ານຊີວະນາໆພັນໃນເຂດພື້ນທີ່ ຂອງສາຍສົ່ງ  
ໄຟຟ້າທີ່ຈະຜ່ານ ໄດ້ລົດລະດັບລົງ ຍ້ອນວ່າມີກິດຈະກຳໃນການປູກຝັງ, ການລ່າສັດ, ແລະ ການເກັບເຄື່ອງ  
ປ່າຂອງດົງ ແລະ ຜະລິດຕະພັນໄມ້.

ຄວາມຍາວທັງໝົດຂອງ ການສະເໜີສາຍສົ່ງໄຟຟ້າ ແມ່ນ 5.5ກມ<sup>2</sup>. ແລວສາຍສົ່ງໄຟຟ້າ ຜ່ານດິນຂອງ 904  
ຄອບຄົວ ໃນ 81 ໝູ່ບ້ານ. ລະດັບຂອງຜົນກະທົບ ຈະແຕກຕ່າງ ລະຫວ່າງໝູ່ບ້ານ ແລະ ທີ່ດິນທີ່ນຳໃຊ້ໃນ  
ແລວສາຍສົ່ງໄຟຟ້າ. ຕາມເສັ້ນທາງແລວສາຍສົ່ງທີ່ໄດ້ສາເໜີໃນປະຈຸບັນ, ການບຸກເບີກຖາງປ່າ ແລະ ການ  
ກໍ່ສ້າງຂອງເສົາໄຟຟ້າ ອາດຈະກະທົບໃສ່ ໂຮງງານໜຶ່ງ ແລະ ທີ່ດິນຂອງໝູ່ບ້ານ ແລະເຮືອນທີ່ຢູ່ໃນ 8 ໝູ່  
ບ້ານ (ເບິ່ງຕາຕະລາງດັ່ງລຸ່ມນີ້):

---

<sup>1</sup> ຜົນກະທົບ ພື້ນທີ່ການຍົກຍ້າຍ ໃຫ້ເຫັນຢູ່ໃນ ບົດງາຍງານ ການສຶກສາຜົນກະທົບທາງສິ່ງແວດລ້ອມຂັ້ນຕົ້ນ ແລະ  
ປະຊຸມພົວພັນກັບຜູ້ທີ່ມີສ່ວນຮ່ວມ ເພື່ອການຫຼີກລ້ຽງຢູ່ໃນແລວສາຍສົ່ງ. ການປັບປຸງເຫຼົ່ານີ້ ແມ່ນຕ້ອງການໃຫ້  
ຍືນຍັນໃນຊ່ວງ DMS.

ຕາຕະລາງ 11: ບ້ານ ແລະ ສະຖານທີ່ຄ້າຂາຍ ໃນແລວສາຍສົ່ງໄຟຟ້າ

ແຂວງ	ເມືອງ	ນ້ຳເບີ	ຊື່ບ້ານ	ຈຳນວນຫຼັງຄາເຮືອນ ແລະ ຊັບສິນທີ່ຖືກກະທົບ
ແຂວງ ສະຫວັນນະ ເຂດ	ໄກສອນ	1	ດົງນາຄຳ	1
		2	ດົງໝາກຍາງ	1
	ສອງຄອນ	3	ໜອງນົກຂຽນ	4
		4	ທົ່ງສີເມືອງ	1
		5	ຄືບມ່ວນ	17
		6	ນາຄະຍົມ	1
ແຂວງ ສາລະວັນ	ລະຄອນເພັງ	7	ພວງສະຫວັນ	3
		8	ພວງມະໄລ	5

ຜົນກະທົບທາງເສດຖະກິດສັງຄົມ ຂອງສາຍສົ່ງໄຟຟ້າ ຈະແມ່ນການຈັດສັນຍົກຍ້າຍບ້ານ ຕາມແລວສາຍສົ່ງໄຟຟ້າ, ການສູນເສຍທີ່ດິນນຳໃຊ້ (ປ່າໄມ້ ແລະ ດິນປູກຝັງ) ໃນເຂດຂອງສະຖານນີ້ຢ່ອຍ, ເສົາໄຟຟ້າ, ການສູນເສຍຂອງປ່າໄມ້ ແລະ ຕົ້ນໄມ້ເສດຖະກິດ .

ແຜນການຍົກຍ້າຍຈັດສັນ ໄດ້ສະເໜີໃຫ້ມີການຫຼີກລ້ຽງ ແລວສາຍສົ່ງໄຟຟ້າ ສົ່ງຜົນກະທົບຕໍ່ເຂດພື້ນທີ່ໝູ່ບ້ານ, ເຂດເສດຖະກິດ ແລະ ກໍ່ສ້າງເຮືອນ ແລະ ລວມເຖິງຂອບເຂດການກໍ່ສ້າງ<sup>2</sup>.

<sup>2</sup> ຜົນກະທົບ ພື້ນທີ່ການຍົກຍ້າຍ ໃຫ້ເຫັນຢູ່ໃນ ບົດງາຍງານ ການສຶກສາຜົນກະທົບທາງສິ່ງແວດລ້ອມຂັ້ນຕົ້ນ ແລະ ປະຊຸມພົວພັນກັບຜູ້ທີ່ມີສ່ວນຮ່ວມ ເພື່ອການຫຼີກລ້ຽງຢູ່ໃນແລວສາຍສົ່ງ. ການປັບປຸງເຫຼົ່ານີ້ ແມ່ນຕ້ອງການໃຫ້ຍືນຍັນໃນຊ່ວງ DMS.

## EXECUTIVE SUMMARY

In Lao PDR, there are four electric power networks; the Northern network, the Central 1 network, the Central 2 network and the Southern network, which are independently operated and not interconnected. The current situation creates technical inconvenience and financial inefficiency. For instance electricity needs to be purchased back from Thailand which constantly buys electricity from Lao PDR at a high price to cover a shortage in a certain region when another region has surplus. This often happens, and the consequent financial loss is recognised as a critical national problem. In order to solve this problem the Government of Lao PDR with support from the Government of Japan is planning to connect the two of these power networks - central 1 and central 2 and central 2 and the southern network. The construction work for the connection of Central 1 and the Central 2 networks has already started.

The objectives of network interconnection include:

- To improve the National power network,
- To increase the efficient management of the power sector,
- To enhance economic activities, and
- To contribute to fulfilling the basic human needs of Lao PDR.

This report focuses on the Savannakhet – Saravan 115 KV Transmission line, which is proposed to connect the Central 2 network with the South power network.

Proponent, financier and contractor details are as follows:

**Name of Developer:** Electricite du Lao (EDL)

**Funded by:** Japan International Cooperation Agency (JICA)

**Head Contractor:** Tokyo Electric Power Company, INC. (TEPCO)

Earth Systems Lao has been commissioned to conduct an independent Initial Environment Examination (IEE) and prepare an Environmental Management Plan (EMP) and a Resettlement Action Plan (RAP) for the Savannakhet – Saravan 115 Kv Transmission line.

### Brief Project Description

The proposed transmission line will run for approximately 220km from Pakbo sub-station in Savannakhet Province through a sub-station at Taothan to a planned sub-station in Saravan Province. The transmission line route passes through seven (7) districts across the two provinces. The transmission line corridor is adjacent to existing roads (Route 13 and Route 15), and passes within 500m of the Phou Xieng Tong National Protected

Area (NPA) and 5km of the Xe Bang Nuan NPA and crosses three major rivers (Xe Banghiang, Xe Bang Nuan Xe Done).

The project will upgrade the existing sub-station, Pakbo; make use of a planned sub-station at Saravan, and construct one new sub-station at Taothan.

Three different alignments were considered for the proposed transmission line (Figure 3-1):

1. Option1.Pakbo Sub-station to a new Taothan Sub-station to the Saravan Sub-station
2. Option2.Pakbo Sub-station to the Kengkok Sub-station to a new Taothan Sub-station to the Saravan Sub-station
3. Option3.Pakbo Sub-station to a new Xepon Sub-station to the Saravan Sub-station

Option# 1 has been selected as the optimum route. While the ROW is larger than the ROW for Option #3 (550 ha versus 523 ha), Option# 1 will affect fewer village settlement areas and, as it will travel along existing roads, will have a lower impact than Option #3, which would require the construction of access roads and would traverse fairly undisturbed areas.

### **Environmental Conditions in the Project Area**

The Project is located in the Mekong Floodplain, where the topography of the land is generally flat and low-lying.

The line will traverse three different geological formations. In the north, the Project Area is comprised largely of Late Mesozoic (mainly mid-late Cretaceous) with an underlying layer of sandstone. It is predominately fine-grained towards the top with thick evaporates, primarily rock salt and gypsum (Department of Geology and Mine, 1990). The southern section is comprised mainly of Mid-Mesozoic (late Triassic to early Cretaceous) rock with terrestrial sediments (primarily sandstone) and thin coals in places. Small sections of the line in both the north and south will traverse Quaternary alluvial deposits from the Mekong River and tributaries.

The soils in the Project Area have low clay content and are considered to be well drained, but less fertile, particularly in the lower areas because of over cultivation and farming (EDL, 2006).

The Project Area is located in the Southeast Asia tropical monsoon climate. The average monthly temperatures in the Project Area range from about 23°C (in December and January) to 30°C (in April), with an average annual temperature of 27°C.

The average annual rainfall over the past 9 years is just over 1,600 mm in Savannakhet and about 2,200 mm in Saravan. In both provinces, approximately 85% of rainfall occurs between May and September.

Preliminary investigations indicate that remaining vegetation along the proposed transmission line route is generally fragmented and degraded, with the majority of the vegetation along the route having been cleared for agricultural land such as rice paddies. Nonetheless, field vegetation mapping along the transmission line route identified several currently forested areas. Available vegetation mapping from the Lao



PDR Forest Inventory Planning Department (FIPD 2002) indicates that, in both provinces, the most common vegetation type present along the proposed route is Dry Dipterocarp Forest.

The proposed transmission line passes between two National Protected Areas (NPAs), Phou Xieng Thong NPA and Xe Bang Nuan NPA.

### **Social Conditions in the Project Area**

The transmission line ROW will traverse through seven districts, four of which are in Savannakhet province (Kaysone, Champhone, Xaiphouthong and Songkhonee) districts, and three in Saravan province (Lakhonphen, Vapi and Saravan) districts. The ROW will affect land within the village boundaries of 81 villages. Within these 81 villages, 904 households will be directly affected by loss of land and / or assets.

Ethnicity in the project area is similar to the provincial wide statistics where the majority of people (92%) are from the Tai Family and practice Theravada Buddhism mixed with elements of animism.

According to the national census (NSC 2005), in the seven districts that comprise the Project Area, over 80% of the total active population work as farmers.

### **Impact Assessment**

The key environmental impact of the Project will be the potential impacts on biodiversity due to the proximity to the Phou Xieng Thong and Xe Bang Nuan NPA and impacts on resettlement areas.<sup>3</sup> Other environmental impacts are largely associated with construction, and tend to be temporary in nature.

Overall, the assessment of magnitude of the potential impacts indicates that the environmental impacts are expected to be minor. The transmission line route has been selected to minimize impact on environmental and social resources. For the most part, biodiversity in the areas through which the transmission lines will pass has been degraded due to intensive human use for agriculture, hunting, and collection of NTFPs and TFPs.

The total area of the ROW for the length of the proposed transmission line is 217.7Km. The ROW travels through the land of 904 households within 81 villages. The level of impact will vary between villages depending on the proximity of the village settlement and land uses within the proposed ROW. Based on the current proposed alignment, the clearance of the TL ROW and the construction of towers would impact on one factory and on village residential land and houses of eight villages (refer to below).

---

<sup>3</sup>Impacts on resettlement areas identified in the draft IEE report and communicated at the stakeholder workshop have now been avoided with line realignment. These adjustments will need to be confirmed during the DMS. .

**Table 0-1 Villages with residential and / or commercial structures within the current TL ROW.**

Province	District	Village No.	Village Name	No. HH and / or Assets Affected
Savannakhet	Kaysone	1	Dongnakham	1
		2	Dongmakyang	1
	Songkhonee	3	Nongnokkhen	4
		4	Thongsimeuang	1
		5	Khummouan	17
		6	Nakangom	1
Saravanh	Lakhonepheng	7	Puangsavanh	3
		8	Puangmalay	5

The key socio-economic impacts of the transmission line will be the resettlement of households within the ROW, the loss of productive land (forests and agricultural land) within the footprint of the sub-station and the towers and the loss of forests and commercial trees within the ROW.

The RAP proposes the realignment of the TL to avoid any impact on village residential areas, commercial or residential structures and related out-buildings<sup>4</sup>.

---

<sup>4</sup> Impacts on resettlement areas identified in the draft IEE report and communicated at the stakeholder workshop have now been avoided with line realignment. These adjustments will need to be confirmed during the DMS.

# 1. INTRODUCTION

## 1.1 Background

In Lao PDR, there are four electric power networks; the Northern network, the Central 1 network, the Central 2 network and the Southern network, which are independently operated and not interconnected (see Figure 1-1). The current situation creates technical inconvenience and financial inefficiency. For instance electricity needs to be purchased back from Thailand which constantly buys electricity from Lao PDR at a high price to cover a shortage in a certain region when another region has surplus. This often happens, and the consequent financial loss is recognised as a critical national problem. In order to solve this problem the Government of Lao PDR with support from the Government of Japan is planning to connect the two of these power networks - central 1 and central 2 and central 2 and the southern network.

The objectives of network interconnection include:

- To improve the National power network,
- To increase the efficient management of the power sector,
- To enhance economic activities, and
- To contribute to fulfilling the basic human needs of Lao PDR.

This report focuses on the Savannakhet – Saravan 115 KV Transmission line, which is proposed to connect the Central 2 network with the South power network.

## 1.2 Project Owner

Proponent, financier and contractor details are as follows:

**Name of Developer:** Electricite du Lao (EDL)

**Funded by:** Japan International Cooperation Agency (JICA)

**Head Contractor:** Tokyo Electric Power Company, INC. (TEPCO)

**Contact Address:**

Electricite du Laos (EDL)/ JICA Study Team, Lao PDR

JICA Laos Project Office

PO. Box 309, Nongbone Road,

Vientiane, Lao PDR



Figure 1-1 Transmission System in Lao PDR (source: Long-term Power Development Plan 2007-2016, EDL et al 2009)

## 1.3 Environmental and Social Assessment Process

Earth Systems Lao has been commissioned to conduct an independent Initial Environment Examination (IEE) and prepare an Environmental Management Plan (EMP) and a Resettlement Action Plan (RAP) for the Savannakhet – Saravan 115 Kv Transmission line.

The results of a preliminary screening exercise and consultation with EDL and the Water Resources and Environment Administration indicated that a full Environmental and Social Impact Assessment is not required. The results of this IEE concur with that assessment.

## 1.4 Purpose of this Study

The main objectives of the IEE are to:

- Characterise physical, biological, social and economic characteristics of the transmission line corridor and sub-stations.
- Assess the potential environmental and social impacts of the transmission line and stations' construction, operation and closure.
- Identify land and infrastructure (built) assets that would be lost due to Project construction.
- Propose management measures to control and mitigate the identified impacts.
- Introduce the public and other stakeholders to the Project and the Environmental and social impact assessment process, through various consultations

## 1.5 Administrative and Legal Framework for Environmental and Social Considerations

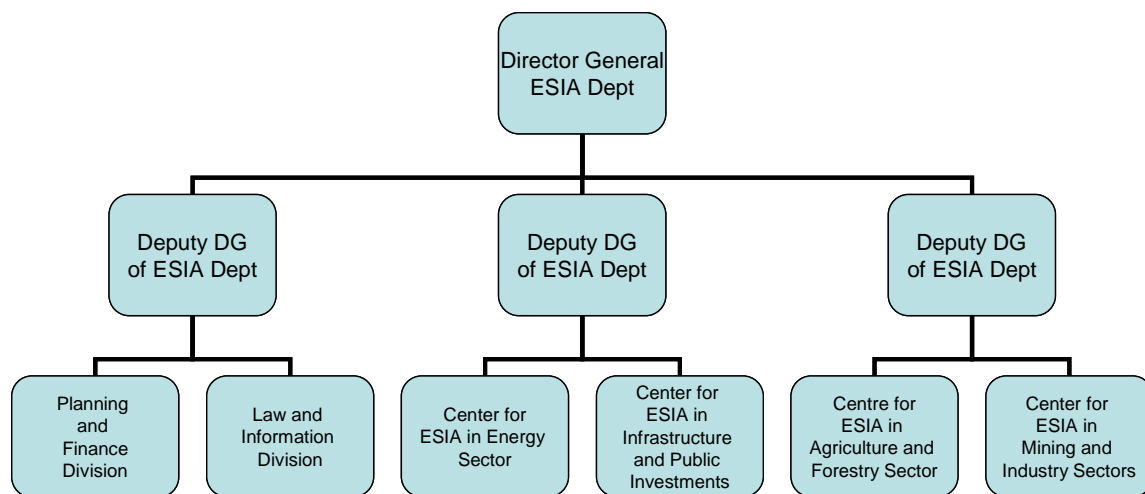
### 1.5.1 Administrative Framework

There are two main government agencies responsible for overseeing the environmental and social assessment process of transmission line projects in Lao PDR:

- **Environment and Social Impact Assessment Department, Water Resources and Environment Administration (WREA)**

During 2008 the Water Resources and Environment Administration carried out internal restructuring, replacing the former Environmental Impact Assessment Division with the Environment and Social Impact Assessment Department. This new department is responsible for administering the Government's ESIA responsibilities. The new ESIA Department currently has 82 staff across six divisions (see Figure 1-2) including the Centre for ESIA in the Centre for ESIA in the Energy Sector.

WREA is currently conducting a review of its environmental and social legislative framework. The Environmental Protection Law is being amended and a new ESIA Regulation has been drafted. Both these documents are expected to be passed by the Government in 2009. The revisions are expected to confirm WREA mandate in environmental and social impact assessment including: administration / coordination of the ESIA process; review of ESIA, EMMPs, SMMPs and RAPs; drafting and issuing of Environmental Compliance Certificates; reviewing and proposing environmental and social obligations in Concession Agreements to the Minister of WREA; conducting / coordinating environmental and social monitoring and inspection activities; and disclosing information about ESIA to the public.



**Figure 1-2 Structure of the ESIA Department in WREA - Source: WREA (2009)**

- **Environmental and Social Management Division, Department of Electricity (DOE), Ministry of Energy and Mines (MEM)**

The Environmental and Social Management Division (ESD) of DOE has previously been tasked with the lead role in overseeing environmental and social impact assessments for transmission line projects in Lao PDR. Under the revised ESIA Regulation, WREA will assume these responsibilities. The ESD will continue to play a key role in the ESIA process, advising developers of environmental and social regulatory requirements and providing comment on all environmental and social assessment documents and management plans.

### **1.5.2 Legal Framework**

This IEE has been formulated in accordance with Lao PDR law and international policy and guidelines. Relevant national regulatory tools and standards are listed in Table 1-1. Relevant international policy and guidelines are listed in Table 1-2.

**Table 1-1 Government of Lao PDR Legislative and Policy Framework**

Title	Date
Environment Protection Law	1999
Regulation on Environmental Assessment in Lao PDR	2000
Law on Water and Water Resources	1996
The Electricity Law	2008
Forestry Law	2007
Decree to Implement the Law on Water and Water Resources	2001
Implementing Decree for the Environment Protection Law	2001
Regulation on the Management of the National Biodiversity Conservation Areas, Aquatic and Wild Animals	2001
MIH Department of Electricity – Power Sector Environmental Policy	2001
MIH Department of Electricity – Environmental Impact Assessment for Electricity Projects	2001
MIH Department of Electricity – Regulation on Implementing Environmental Assessment for Electricity Projects in Lao PDR	2001
MIH Department of Electricity Environmental Management Standard – Social Impact Assessment for Electricity Projects	2001
National Growth and Poverty Eradication Strategy	2002
Land Law	2003
MIH Department of Electricity – Environmental Management Standard for Electricity Projects	2003
Lao Electric Power Technical Standards	2004
Technical Guidelines for Resettlement and Compensation	2005
National Socio-economic Development Plan 2006-2010	2005
Decree on Compensation and Resettlement of People Affected by Development Projects	2005
Regulations for Implementing the Decree on Compensation and Resettlement	2005
Law on National Heritage	2005
Decree on the implementation of the National Policy on Health Impact Assessment	2006
Wildlife and Aquatic Animals Law	2007
National Policy on Environmental and Social Sustainability of the Hydropower Sector in Lao PDR	2007
Regulation for Health Impact Assessment (Draft)	2007
Public Involvement Guidelines (draft)	2009
Regulation for Environmental and Social Impact Assessment (Draft)	2009
<i>UN Framework Convention on Climate Change</i>	1992

Title	Date
<i>Kyoto Protocol</i>	1997

**Table 1-2 Relevant international policy and guidelines**

Title	Date
<i>JICA, Guidelines for Environment and Social Considerations</i>	2004
<i>World Bank OP 4.01 Environmental Assessment</i>	1999
<i>World Bank OP 4.12 Involuntary Resettlement</i>	2002
<i>World Bank OP 4.10 Indigenous Peoples</i>	2005
<i>World Bank OP 4.11 Physical and Cultural Resources</i>	2006
<i>IFC Policy on Social and Environment Sustainability</i>	2006
<i>IFC Health, Safety and Environment Guidelines (General)</i>	2007

### **1.5.3 Description of Relevant Lao Legislation**

In 2001, the Department of Electricity produced three relevant standards:

- Environmental Impact Assessment for Electricity Projects
- Social Impact Assessment for Electricity Projects
- Environmental Management Plans for Electricity Projects
- Lao Electric Power Technical Standards

The standards were written in response to the Implementing Decree of the Environmental Protection Law, 2001, which outlines the responsibilities of each Ministry to develop sector specific standards.

In 2003, these standards were updated and synthesised into the Environmental Management Standard for Electricity Projects, which is comprised of five (5) different sections:

- Environmental Screening
- Social Impact Assessment
- Resettlement
- Environmental Management Guideline from Socio-Economic and Culture
- Responsibilities

The DOE has also produced the Power Sector Environmental Policy, 2001. This clearly outlines an environmental and social commitment for all electricity projects. The Policy aspires to environmental assessment and management to an international standard for all electricity generation projects, with legislative compliance as a minimum standard for all projects. The Policy also commits to sustainable development, natural resource



conservation, pollution minimisation, sound communication with all relevant stakeholders, and continual improvement in environmental performance.

*The Land Law, 1997*, describes the system of land tenure, with all land the property of the nation, and remaining under control of the Government of Lao. However, the law recognises and protects private land use rights. These rights can be transferred, granted by the state, or inherited, provided taxes payable on the land have been paid. Land is categorised in accordance with the form of use, and various principles are outlined in the legislation in regard to each type of land. This law provides an important framework for any land compensation, as despite the lack of title ownership, the land use rights are a tradeable commodity. The land classification administration is also important for determining the various categories of land use within the Project Area.

*The Forestry Law, 2007*, outlines principles and responsibilities relating to all forest resources, including soil, flora, fauna, water, living and non-living resources. All forest land is owned by the state who has the ability to give user rights to communities in return for sustainable management of the resource. A land use system under the Ministry of Agriculture and Forestry, demarcates land to reflect its agricultural and forestry capabilities. The village-based land classification system is based on 3 categories: forestry areas, agricultural areas, and non-agricultural areas. This legislation is relevant to issues of land use within the Project Area.

*The Law on Water and Water Resources, 1996*, outlines a similar approach with all water and water resources remaining the property of the State. If relevant approvals are gained by an applicant seeking to use water resources, individuals or entities may attain water use rights. Article 29 stipulates a range of responsibilities for all water users, including the preservation of water resources, the efficient use of water, and the responsibility to maintain water quality, including the environmental and aesthetic qualities of water bodies.

*The Law on Natural Heritage, 2005*, outlines the procedures for artefact discovery, archaeological excavations, and the rights of the Ministry of Information and Culture in the ownership and preservation of items of cultural, natural and historical heritage.

#### **1.5.4 The Environmental Approval Process**

This IEE EMP and associated RAP documents need to obtain approval from Department of Electricity (DOE), Ministry of Energy and Mines (MEM), and the Water Resources and Environment Administration (WREA) prior to an Environmental Compliance Certificate (ECC) being issued as stipulated in the Regulation on Environment Assessment, Regulation No. 1770/STEA.

#### **1.5.5 IEEs for Similar Projects in Lao PDR**

Two IEEs have been completed for similar transmission line projects in Lao PDR. These include:

## Pakbo – Saravan 115 kV Transmission Line

- Korea Electric Power Corporation (2007), IEE and EMP for 115KV Transmission Project from Champassak Province (Lao PDR) to Strung Treng (Cambodia)
- Electricite du Laos (2006), IEE and EMP for 115KV Transmission Line Project and Associated Sub-station in Saravan.

These two (2) IEE reports, as well as IEE reports for transmission lines in other countries, were reviewed as part of this study. In addition, as the consulting team was part of the inception phase of detailed feasibility study for the ADB-funded Ban Sok (Lao PDR) – Pleiku (Vietnam) Transmission Line, the unpublished results of the inception phase of this study were also reviewed.

Best practice management and mitigation measures that were utilised in the reviewed IEEs have been carried over to this IEE. Institutional structure and responsibilities for environmental and social management proposed in this report as consistent with the structure and responsibilities provided in the other two Lao IEE reports.

## 2 PROJECT DESCRIPTION

### 2.1 Location of the Project

The proposed transmission line will run for approximately 220km from Pakbo sub-station in Savannakhet Province through a sub-station at Taothan to the Saravan sub-station in Saravan Province. The transmission line route passes through seven (7) districts across the two provinces (see Table 2-1)

**Table 2-1: Provinces and districts**

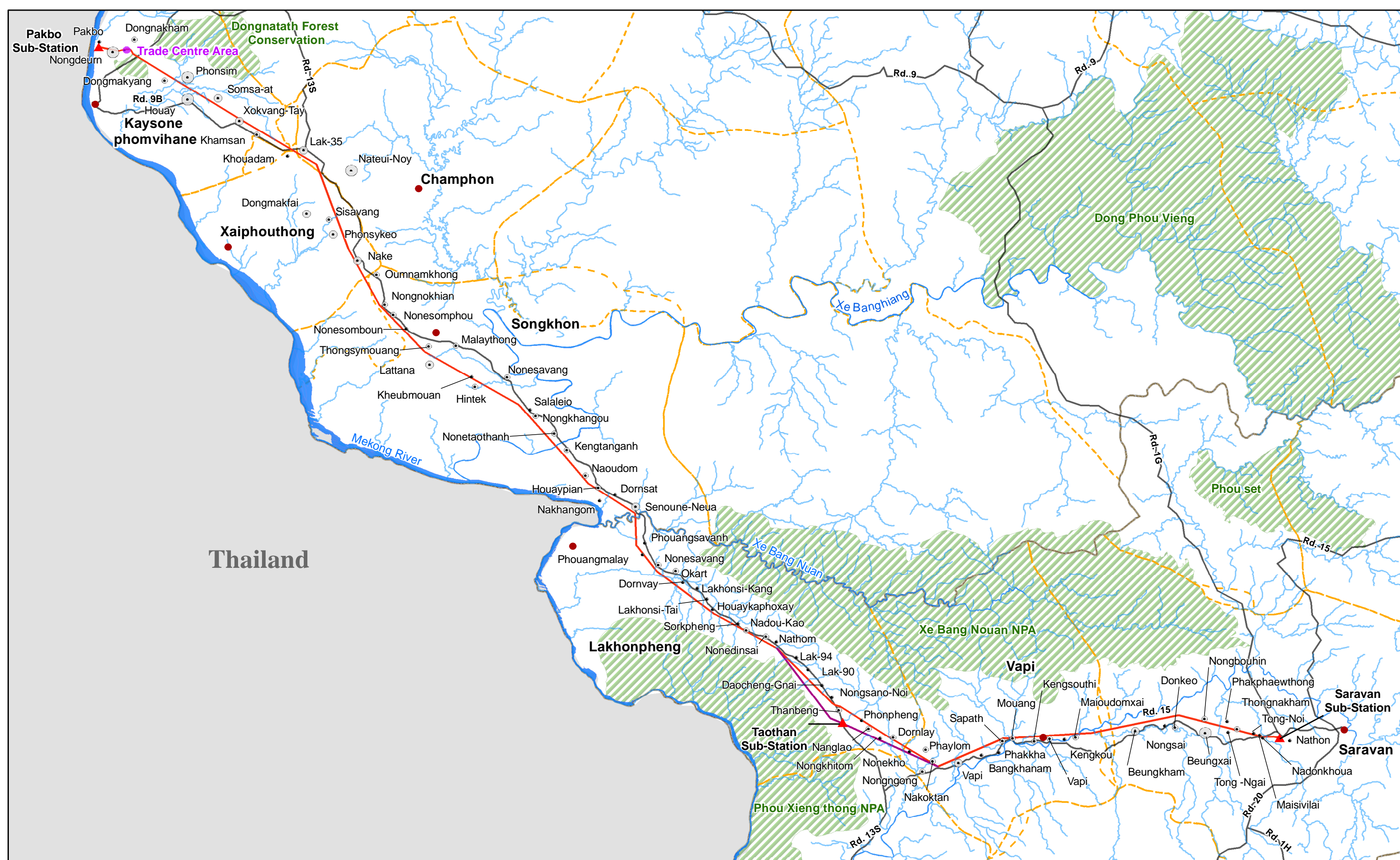
Province	District
SAVANNAKHET	Kaysone Phomvihane
	Xaiphouthong
	Champhon
	Songkhone
SARAVAN	Lakhonpheng
	Vapi
	Saravan

The transmission line corridor is adjacent to existing roads (Route 13 and Route 15). It passes within 500m of the Phou Xieng Tong National Protected Area (NPA) and 5km of the Xe Bang Nuan NPA and crosses three major rivers (Xe Banghiang, Xe Bang Nuan, Xe Done (Figure 2-1).

The transmission line route has been adjusted as a result of a change in the location of the sub-station in Lakongpheng District in late July (see section 2.2.1 below). This realignment is shown on Figure 2-1. More recently adjustments to the line have been made by project engineers to avoid resettlement impacts as described in section 7.3.1. These changes and their associated impacts will need to be confirmed during the detailed measurement survey.

### 2.2 Project Design

The Project includes the construction of 220 km of 115 kV transmission line, and one sub-station at Taothan. The Project will utilise the existing sub-station at Pakbo and planned sub-station at Saravan.



**Figure 2.1 The Project Area**

**Households**


- < 110
- 111 - 220
- 221 - 350
- > 351


- ▭ Province Boundary
- ▭ District Focus
- - - District Boundary
- ▨ National Protected Area

- Main Road
- Streams
- ▭ Main River
- Jica Transmission Line 115 KV

- District Centre Point
- Trade Centre Area
- ▲ Sub-Station
- Realignment (due to new sub-station location)



  
 EARTH SYSTEMS LAO  
 Environment - Water - Sustainability

  
 0 5 10 20 km  
 Scale: 500,000 (A3)  
 Projection: Wgs 84, UTM Zone 48 North

### 2.2.1 Sub-station Design

The project will upgrade the existing station at Pakbo; utilise a planned sub-station in Saravan, and construct one new sub-station at Taothan. The new sub-station will be an open air design on an area of approximately 1 hectare. It will consist of main transformers, switchgear instruments and will take into consideration impacts of noise, vibration and other impacts on the surrounding environment.

The original sub-station site near Ban Nongnou was changed to a location near Ban Taothan after the field surveys had been completed. According to the EDL this land is owned by the Government. Satellite imagery obtained from Google Earth (2009) indicates that the site is approximately 300 metres from Ban Taothan.

### 2.2.2 Tower Design

It is estimated that a total of 544 towers will be needed for this project including a mixture of tension towers and angle towers. Table 2-2 and Table 2-3 provide an overview of tower design features. The proposed type of tower is 'self-supporting and broad base lattice galvanized steel' towers with concrete foundations. Tower height is 24 – 40 m and average footprint of each tower is 52.99 m<sup>2</sup>.

**Table 2-2 Line Design Features**

Line design features	Savannakhet – Saravan 115kv line
Line length	217.7 km
Type	Galvanized steel towers with concrete foundations
Number of towers	544
Average span between towers	400 metres
Tower height	34 – 40 m
Tower land area	51.84 - 90.25 m <sup>2</sup>
Right of way (Row)	25 metres (12.5m either side of line)
Existing Sub-stations	Pakbo
Planned sub-station	Saravan
New sub-station	Taothan (1ha)

**Table 2-3 Type, Weight and Number of Transmission Tower to be used for the Project**

Type of Steel Tower	Number of Tower	Land Required per Tower (m2)	Total Area Required (m2)	Total Area Required (ha)
<b><i>Pakbo - Taothan</i></b>				
A 1	317	51.84	16,433.28	1.64
A 2	14	56.25	787.5	0.08
B 1	28	60.84	1,703.52	0.17
C 1	6	60.84	365.04	0.04
D-I	2	60.84	121.68	0.01
D 2	1	90.25	90.25	0.01
DE-I	2	60.84	121.68	0.01
<i>Sub-total</i>	<i>370</i>		<i>19,622.95</i>	<i>1.96</i>
<b><i>Taothan - Saravan</i></b>				
A 1	151	51.84	7,827.84	0.78
A 2	4	56.25	225	0.02
B 1	14	60.84	851.76	0.09
C 1	2	60.84	121.68	0.01
D 1	1	60.84	60.84	0.01
D 2	0	90.25	0	0
DE	2	60.84	121.68	0.01
<i>Sub-total</i>	<i>174</i>		<i>9,208.8</i>	<i>0.92</i>
<b>TOTAL</b>	<b>544</b>		<b>28,831.75</b>	<b>2.88</b>

### 2.2.3 Right of Way

Right of Way (ROW) for the transmission line is twenty five (25) metres (12.5 metres from the centre line (see Figure 2-2). The total area for the 220 km line is 5.5km<sup>2</sup>. According to Lao Electrical Power Technical Standards (MIH 2004) for safe clearance to a live conductor for a 115 kV transmission line the following clearances will be maintained:

- Common place ground clearance: 5.98 metres
- Mountainous area: 5.48



## Pakbo – Saravan 115 kV Transmission Line

- Navigable river: 2.48 metres (above mast height)
- Un navigable river: 5.48 metres
- Road crossing: 6.48 metres
- Building: not permitted

Tall trees within 12.5 m on both sides of the centre line must be cut to ground level. Trees beyond the 12.5 m are on both sides will be trimmed and pruned to 2.48 m to maintain clearance

This project will follow common EDL clearance practice. On government land, any trees that have the potential to grow above 3 m will be cleared. On private land, trees that can survive at less than 3m will be pruned and maintained below this height.

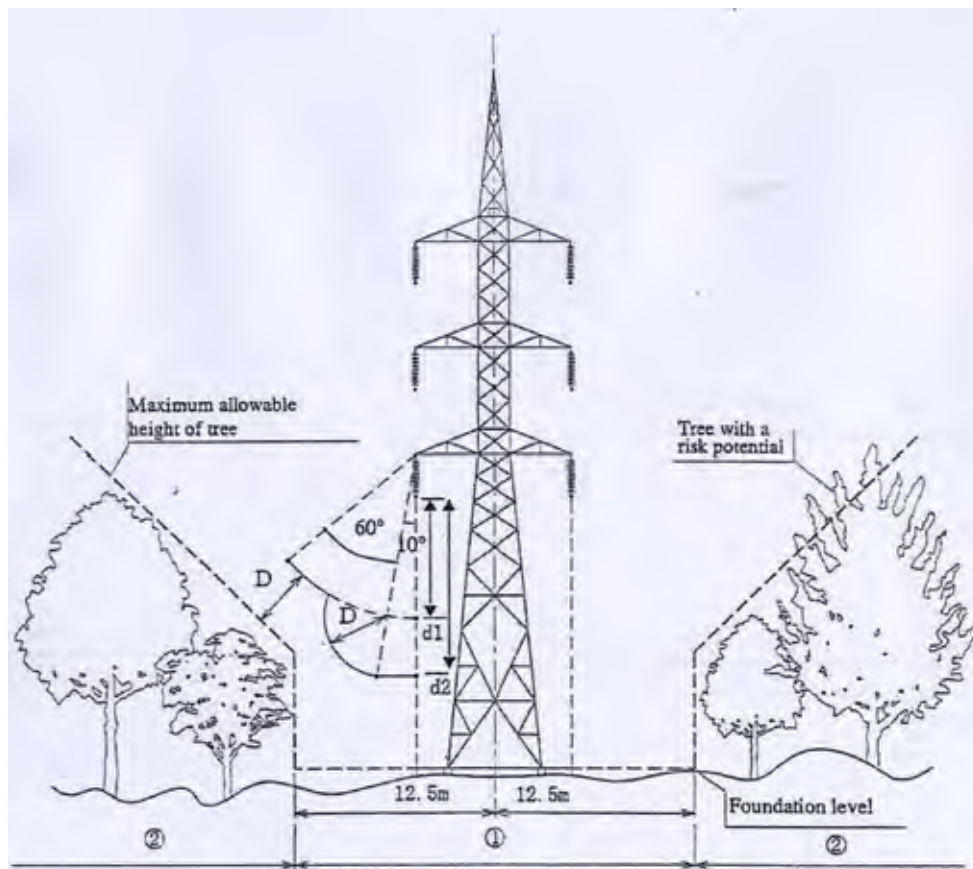


Figure 2-2 ROW for 115kV Transmission line (Source: EDL 2009)

### 2.2.4 Access Road

As the line runs close to national roads 13 and 15 at this stage access to the line is considered good. The proponent has not planned any additional access tracks at this stage.

### 2.2.5 Quantity and Quality of Raw Material to be Used

All electrical components and other materials required for project construction were estimated by TEPCO and Nippon Koei Co., Ltd. in collaboration with project owner (EdL). They may include transformers, conductor wires, insulators, steel towers, concrete for tower bases, and others. The estimated quantities of materials for the construction of transmission lines and sub-stations are as follows:

#### a) Transmission Lines

Items	Unit	Q'ty
Tower	Ton	3,500
Conductor	Km	1,300
OPGW 60mm <sup>2</sup>	Km	250
OH G.W.	Km	250
Insulator	Unit	40,000
Insulator String Unit	Set	3,700
Dumper for Conductor, GW and OPGW	Unit	8,800
Sleeve for Conductor and GW	Unit	850
OPGW Joint Box	Unit	50
GW and OPGW Unit	Set	580

#### b) Sub-stations

Items	Unit	Q'ty
<b>Pakbo</b>		
115 kV transmission line bays including protection & control	Set	2
Extension of 115kV busbar with structure	Lot	1
Steel structures (gantries)	Lot	1
Conductors, cables, accessories, connectors, hardware, etc	Lot	1
Items	Unit	Q'ty
<b>Taothan</b>		
3 Phase 115/22 kV Transformer, 10 MVA	Set	2



Auxiliary Transformer, 22/0.4 kV, 200 KVA	Set	1
115 kV transformer bays including protection & control	Set	2
115 kV transmission line bays including protection & control	Set	4
115 kV transformer protection and control	Set	2
115 kV line feeder protection and control	Set	4
115 kV & 22 kV busbar with structure	Lot	1
115 kV & 22 kV steel structures (gantries)	Lot	1
22 kV transformer bays including protection & control	Set	2
22 kV line feeder bays including protection & control	Set	8
22 kV static capacitor banks including protection & control	Set	2
Conductors, cables, accessories, connectors, hardware, etc	Lot	1
Control building	Lot	1
Distributed Control System (DCS)	Lot	1
Optical fiber communications system including ODF, PABX, etc.	Lot	1
VHF radio telecommunications system	Lot	1
110 V & 48 V battery banks and chargers	Set	2
AC & DC distribution boards	Set	1
Earthing, lighting and lightning protection systems	Lot	1
<b>Items</b>	<b>Unit</b>	<b>Q'ty</b>
<b>Saravan</b>		
115 kV transmission line bays including protection & control	Set	2
Extension of 115kV busbar with structure	Lot	1
Steel structures (gantries)	Lot	1
Conductors, cables, accessories, connectors, hardware, etc	Lot	1

### c) Transmission Towers

Total volume of concrete for tower foundations (m<sup>2</sup>) = 4,300 m<sup>2</sup>.

### **2.2.6 Quantity and Quality of Waste Products Generated by the Project**

The major waste created by the Project will be vegetation from the ROW clearance. Prior to disposal, local residents will be given access to this waste so that they can utilise it for firewood, raw materials, charcoal production, etc.

In the case where the alignment passes the natural forests (where commercial timbers are present), the trees with more than 15 cm diameter will be listed and logged by the Provincial Agriculture and Forestry Department (Provincial Forestry Section) and District Agriculture and Forestry Office (DAFO), and the Provincial Industry and Commerce Department will be responsible for the sale of this timber. Where the alignment passes to the plantation forests, all trees will be removed and sold by the owners.

In addition to vegetation waste, it is anticipated that between 10 m<sup>3</sup> and 12 m<sup>3</sup> of soil will be excavated from each tower base, resulting in a total of approximately 6,000 m<sup>3</sup> of spoil. A part of these soils will be spread around the tower bases to facilitate natural re-vegetation and or use as fill in depressions nearby so as to minimize destruction to the tower bases. Most of the excavated soil, however, need to be taken away and disposed of the appropriate site in comply with the requirement of local authority. The dispose site of the excavated soil needs to be acquired before a commencement of any construction activities.

### **2.2.7 Project Costing**

Total cost of the project is estimated at US\$ 37,773,700

- Transmission Line: \$24,247,000.00
- Sub-station facilities: \$8,014,300
- Other costs include Consultants fee and Contingency<sup>\*\*</sup>: \$5,512,400

## **2.3 Project Activities and Schedule**

The draft schedule post feasibility is provided in Table 2-4 below and includes:

- Detail Design and Preparation Stage: (7 months)
- Bid and Contract with Contractors: (6 months)
- Works for Transmission Lines and Sub-station Construction: (23 months).

---

<sup>\*\*</sup> Land and R.O.W. compensation is included in Contingency

**Table 2-4 Project Schedule**

Work Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
<b>Detail Design Stage (by consultant)</b>																																								
Contract signed with the Consultants	▲																																							
Preliminary route survey and soil boring		■	■	■																																				
Detail design				■	■	■																																		
Preparation of Bid Document						■	■	■																																
<b>Bid and Contract with Contractors</b>																																								
Bid announcement								▲																																
Preparation of Bid document by contractors									□	□	□																													
Bid opening and evaluation											■	■																												
Contract negotiation and signed with contractors													■																											
<b>Works for Transmission lines</b>																																								
Check survey and soil boring														■	■																									
Cleaning of right of way																	■	■	■	■																				
Construction of access road																	■	■	■	■																				
Facility design and approval														□	□	□	□	□	□	□																				
Manufacturing and transportation																	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
UXO survey																						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
UXO clearance, if any																							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Foundation work																							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Tower erection work																								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Stringing work																										■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Test and commissioning																																						■	■	
<b>Works for Substation Facilities</b>																																								
Detail design, survey, and soil investigation																	■	■																						
Facility design and approval																	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
Manufacturing and transportation																		□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
Civil work																																								
Erection work																																								
Test and commissioning																																							■	■

■ : Works in Laos □ : Works outside of Laos

## 3 PROJECT ALTERNATIVES

### 3.1 Alternatives Considered in Project Design

Throughout the design process, a number of different alternatives have been considered. Alternatives that have different environmental and social impacts are discussed in the sections below.

#### 3.1.1 Transmission Line Alignments

Three different alignments were considered for the proposed transmission line (Figure 3-1):

1. Pakbo Sub-station to a new Taothan Sub-station to the Saravan Sub-station
2. Pakbo Sub-station to the Kengkok Sub-station to a new Taothan Sub-station to the Saravan Sub-station
3. Pakbo Sub-station to a new Xepon Sub-station to the Saravan Sub-station

The first 37 km from Pakbo Sub-station to Ban Natuey-Noi (where Road 13 S meets the road to the Champhone District centre) is the same for all three options. From there, option #3 heads east, initially along Road 9 to the Sepon Sub-station, and then from there it heads southeast to the Saravan Sub-station along Road 1G. Option #2 initially heads southeast to the Kengkok station, and then rejoins Option #1 near Pakxong.

Options #1 and #2 run between the Xe Beng Nouan NPA and the Phou Xian Thong NPA for approximately 50 km, and Option #3 runs south of the Dong Phou Viang NPA and north of the Xe Bang Nouang NPA for approximately 70 km of its length.

The table below compares the key environmental and social impacts of the three routes.

**Table 3-1 Comparison of transmission line alternatives**

Impact	Option 1	Option 2	Option 3
Land acquisition:			
Right of Way	550 ha	580 ha	523 ha
Sub-station	1 ha	1 ha	1 ha
Villages within 500m of the line	19	30	28
Distance from Protected Areas:			
Phou Xian Thong	500 m*	500 m	NA



## Pakbo – Saravan 115 kV Transmission Line

Impact	Option 1	Option 2	Option 3
Xe Bang Nouan	4.8 km	4.8 km	1 km
Dong Phou Viang	NA	NA	12 km
UXO Risk	Low	Low	Medium
Comment	Alignment through disturbed areas (by roads and villages) for a majority of the route.		Alignment through fairly undisturbed area for about 50% of the route.

\* Realignment due to the new location of the sub-station may decrease the distance between the line and the Phou Xian Thong NPA. Larger amounts of deciduous forest on the buffer of the NPA will be impacted.

Option# 1 has been selected as the optimum route. While the ROW is larger than the ROW for Option #3 (550 ha versus 523 ha), Option# 1 will affect fewer village settlement areas and, as it will travel along existing roads, will have a lower impact than Option #3, which would require the construction of access roads and would traverse fairly undisturbed areas. Option #1 has a lower risk of UXO contamination than that of Option #3

### 3.1.2 Sub-station Locations

A number of different locations for sub-stations were considered. As part of Alignment Option #3, a new sub-station was proposed in the Sepon District of Savannakhet, and for Options #1 and #2, at least two different sites were identified:

- Nongnou; and
- Taothan.

Both sites are in the Lakhonpheng District of the Saravan Province. As Saravan Province is the owner of the land of planned Taothan substation, in consultation with the Saravan Provincial Government, the land for planned Taothan Substation site was agreed to be given to EDL. Accordingly, EDL has selected the Taothan site. There will be no compensation incurred for this land.

## 3.2 Not Proceeding with the Project

The purpose of the Project is to connect the Central 2 with Southern power grid in Lao PDR so that the surplus power from the South can compensate for the expected power shortage in the Central 2 grid. Without the construction of the proposed transmission line, the Central 2 grid will experience interruptions in power supply, and / or will be required to purchase electricity from Thailand. With an excess of energy, the South grid will export electricity to Thailand, where the Central 2 grid will

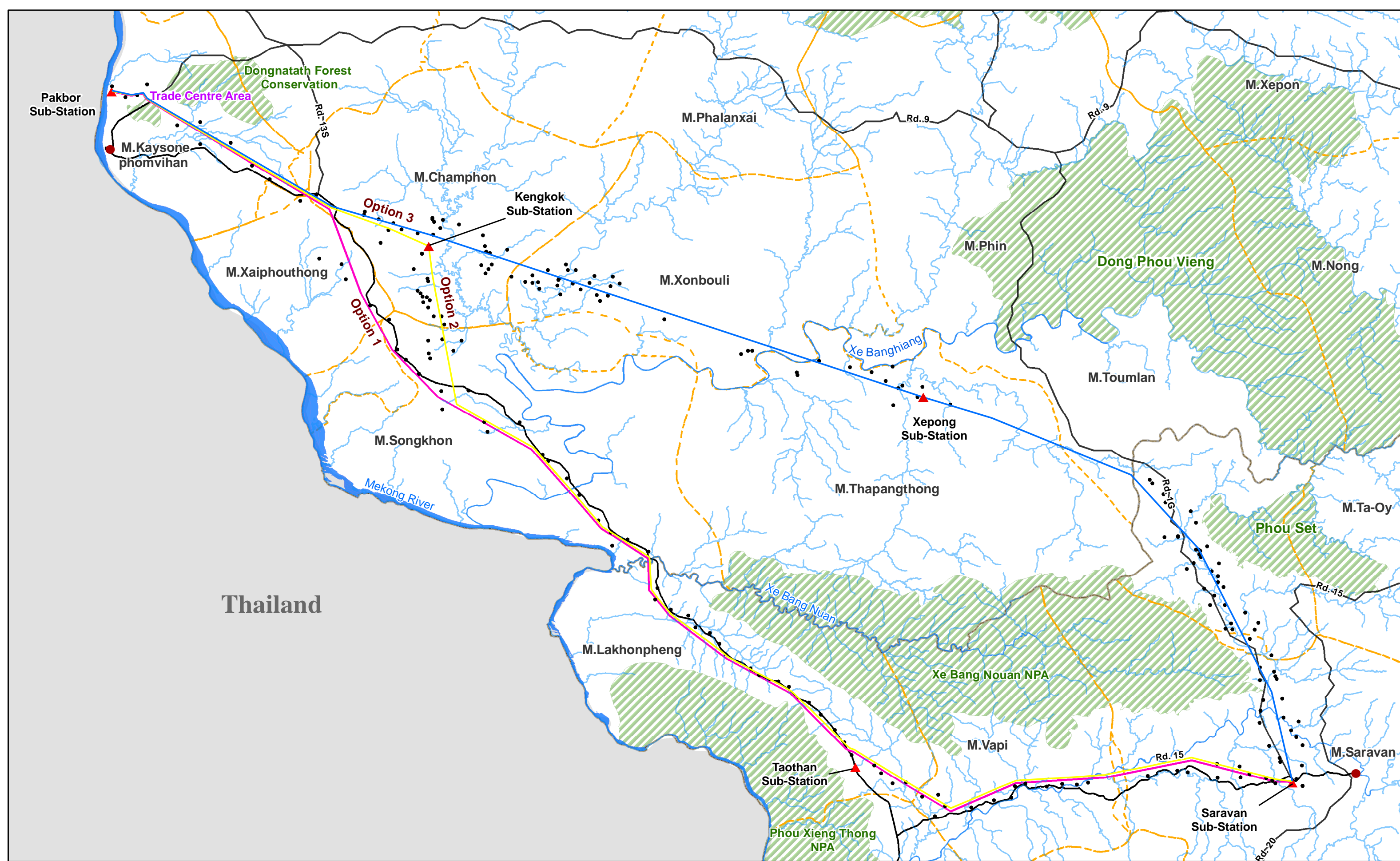


## Pakbo – Saravan 115 kV Transmission Line

purchase electricity from Thailand at a higher cost than the original sale from the South grid.

The environmental and social impacts of the proposed project proceeding are assessed in Chapter 8. The direct consequences for Lao PDR of not proceeding with the Project can be summarized as follows:

- The land, water and air impacts associated with the construction and operation of the proposed transmission line and sub-stations will not occur.
- Landowners who would be directly affected by the Project would not receive compensation. Any concerns of local communities about loss of land and assets would be alleviated.
- Lao PDR will spend additional money importing electricity to the Central 2 grid. The study on Power Network System Plan in Lao PDR – Interim Report (May 2009) estimated that the construction of the proposed interconnection line will allow Lao PDR to save approximately US \$20 million (1.9 billion Yen) per year by decreasing the amount of energy imported from Thailand (TEPCO and Nippon Koei, 2009).



**Figure 3.1 Alternative Transmission Line Routes**

- |  |                         |  |            |  |                 |  |   |
|--|-------------------------|--|------------|--|-----------------|--|---|
|  | Province Boundary       |  | Streams    |  | Village Point   |  | Alternative Transmission line, Option 1 |
|  | District Boundary       |  | Main Road  |  | Sub-Station     |  | Alternative Transmission line, Option 2 |
|  | National Protected Area |  | Main River |  | District Centre |  | Alternative Transmission line, Option 3 |



EARTH SYSTEMS LAO
   
 Environment - Water - Sustainability

0 5 10 20
   
 km
   
 Scale: 500,000 (A3)
   
 Projection: Wgs 84, UTM Zone 48 North

## 4 ENVIRONMENTAL DESCRIPTION OF THE PROJECT AREA

Savannakhet and Saravan provinces are located in the Southern of Lao PDR. Savannakhet has a total area of 21,774 km<sup>2</sup>, and is bordered by Saravan Province in the south, Khammouane Province in the north, Vietnam to the east and Thailand to the west. Savannakhet is divided into 15 districts.

Saravan is about half the size of Savannakhet, with a total area of 10,691 km<sup>2</sup>, which is divided into 8 districts and located to the south of Savannakhet and north of Sekong province (with Vietnam and Thailand on the east and west, respectively) (NSC, 2007).

The transmission line ROW will traverse through seven districts, four of which are in Savannakhet province (Kaysone, Champhone, Xaiphouthong and Songkhonee) districts, and three in Saravan Province (Lakhonphen, Vapi and Saravan) districts (see Figure 2-1 The Project Area). The general terrain of these areas is flat and mainly used for agricultural practices (NSC, 2007).

### 4.1 Physical Resources

#### 4.1.1 Topography and Drainage

The Project is located in the Mekong Floodplain, where the topography of the land is generally flat and low-lying.

The topography of Savannakhet Province varies from the low-lying floodplains of the Mekong River in the west to foothills and the mountains of the annamite chain in the east. The average height above sea level varies across the province, from 100 masl in the west to about 1300 masl in the east (IUCN, 2008; Somphong, 2004). The Project Area is located on the floodplains in the western part of Savannakhet.

Saravan province topography is divided into three geographical areas: plains, plateau, and mountain regions. The plains region comprises 40% of the Province, and lies mainly from the northeast to northwest of the province. This area is rich with fertile soil used for agricultural. Part of the Project Area lies within this region. The plateau region makes up to 20 percent of the province area and cover only in Laongam district, which lies to the south of the province. This region is commonly used for agriculture and forestry activities. The mountain region covers two districts: Taoy and Samoi, which are located to the east of the province, and according to Department of Agriculture and Forestry, is the ideal area for short-term and mid-term industrial forestry (IUCN, 2008).



### 4.1.2 Climate

The Project Area is located in the Southeast Asia tropical monsoon climate. Two monsoons, the northeast and then southwest, dominate the climate conditions and create two distinct seasons. The northeast monsoon lasts from November to February, and brings cold, dry air from China into Southeast Asia. During this time, there is only infrequent light rainfall. Between March and April, the weather starts to warm, and between April and October the southwest monsoons – consisting of warm winds and humid conditions – bring seasonal rain (IUCN, 2008).

To establish a meteorology baseline of the Project Area, the data from two (2) Department of Meteorology and Hydrology (GOL) monitoring stations in the vicinity of the Project Area (one in Savannakhet and another in Saravan) was used. In general, overall meteorological parameters are the same at the two stations, with the exception of rainfall, which is about 30% higher in Saravan. A summary of meteorological data for Savannakhet is available in Table 4-1 and for Saravan is available in Table 4-2.

**Table 4-1 Summary of normal meteorology of Savannakhet 2000-2008**

Symbol	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max Temperature (°C)	30	31	34	35	33	32	31	31	31	31	30	29	32
Mean Min Temperature (°C)	15	17	21	24	25	25	24	25	24	22	19	16	21
Mean Temperature (°C)	23	24	28	30	29	29	28	28	28	27	24	23	27
Mean Max Humidity (%)	93	94	91	91	92	91	94	94	94	93	92	92	93
Mean Min Humidity (%)	43	46	46	51	59	65	69	71	67	59	51	49	56
Mean Humidity (%)	68	70	69	71	76	78	81	83	81	76	72	71	75
Total Rainfall (mm)	2	23	53	74	262	226	327	302	247	83	13	4	1,616

Source: Department of Meteorology and Hydrology, 2008

The average monthly temperatures in Savannakhet over the past nine (9) years (2000-2008) ranged between 23°C (in December and January) to 30°C (in April), with an average annual temperature of 27°C. The maximum recorded temperature was 35°C (April) and the minimum was 15°C (January). Temperature patterns in Saravan are consistent with those in Savannakhet, with the average monthly temperatures ranging between 24°C (December and January) and 30°C (April) and the same average annual temperature of 27°C.



## Pakbo – Saravan 115 kV Transmission Line

Average humidity in Savannakhet ranges from 68% (in January) to 83% (in August), and from 63% to 86% in Saravan. The average annual humidity in Savannakhet is 74% and in Saravan is 75%.

The average annual rainfall over the past 9 years is just over 1,600 mm in Savannakhet and about 2,200 mm in Saravan. In both provinces, approximately 85% of rainfall occurs between May and September.

**Table 4-2 Summary of normal meteorology of Saravan 2000-2008**

Symbol	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max Temperature (°C)	32	33	35	35	33	31	30	30	30	31	31	30	32
Mean Min Temperature (°C)	17	19	22	24	25	25	24	24	24	22	20	18	22
Mean Temperature (°C)	24	26	29	30	29	28	27	27	27	27	25	24	27
Mean Max Humidity (%)	90	86	84	88	92	93	95	96	96	95	93	92	92
Mean Min Humidity (%)	40	40	43	49	60	68	73	77	71	63	53	48	57
Mean Humidity (%)	65	63	63	68	76	81	84	86	84	79	73	70	74
Total Rainfall (mm)	0	20	37	82	227	292	485	563	327	154	10	2	2,199

Source: Department of Meteorology and Hydrology, 2008

### 4.1.3 Geology and Soils

The geological basement land in the region is the Indochina craton or crustal block (Milne-Home, et al., 2003).

The line will traverse three different geological formations. In the north, the Project Area is comprised largely of Late Mesozoic (mainly mid-late Cretaceous) with an underlying layer of sandstone. It is predominately fine-grained towards the top with thick evaporates, primarily rock salt and gypsum (Department of Geology and Mine, 1990). The southern section is comprised mainly of Mid-Mesozoic (late Triassic to early Cretaceous) rock with terrestrial sediments (primarily sandstone) and thin coals in places. Small sections of the line in both the north and south will traverse Quaternary alluvial deposits from the Mekong River and tributaries.

The soil in Savannakhet has low clay content – sixty-three percent (63%) of the total area of the province is occupied with soils with clay contents of 0-10% only. Only 20% of the province has soil with a clay content of over 20%. This clay content amount decreases generally from the eastern to western regions of the province, and



## Pakbo – Saravan 115 kV Transmission Line

therefore, the soils of the Project Area are likely to have low clay content (Inthavong, et al., 2008).

Soils in Saravan Province are largely consistent with those in Savannakhet. The soils are considered to be well drain but less fertile, particularly in the lower areas because of over cultivation and farming (EDL, 2006).

### **4.1.4 Hydrology**

The transmission line ROW is located in the watershed of the Mekong River, though sections of line also traverse sub-catchments of the Mekong, including: Xe Bangkeing, Xe Nouan and Xe Done watersheds.

The Mekong River is the longest river in South East Asia and the 12th longest in the world. It is the 10th largest river in the world by discharge (MRC, 2008). The Mekong starts on the Tibetan Plateau and flows south through China, Myanmar, Lao PDR, Thailand, Cambodia and Vietnam to the South China Sea. Where the Mekong is adjacent to the Project Area, this stretch of the River creates the international border between Lao PDR and Thailand. The Mekong has a total catchment area of 795,000 km<sup>2</sup>.

The hydrology of the Mekong is dependent on the monsoon cycle described in section 4.1.2 – discharge in the wet season (May to November) can be up to twenty times greater than during the dry season (December to April). The source of flow also varies by season – with 40% of dry season flow, but only 15% of wet season flow coming from China. In general, Lao PDR comprises 25% of the total catchment area of the Mekong and contributes 35% of the flow (MRC, 2005).

Approximately 50% of sediment discharged into the South China Sea comes from China (MRC, 2008).

The Mekong can be split into 6 reaches based on hydrology, physiography, land use and development. The Project is located in Reach 3, which extends from Vientiane / Nongkhai to Pakse. In Reach 3, the influence of flow from China is minimised by the increasing flow contributions from large left bank tributaries – Nam Ngum, Nam Theun, Nam Hinboun, Xe Bang Fai, Xe Bang Hieng and Xe Done Rivers (MRC, 2005).

The available water levels data is only for two rivers, the Xe Banghieng and Xe Done Rivers. At Xe Banghieng River, the data was collected from Lahanam and Sopnam stations. For Xe Done River, it was collected from Saravan and Khongsedone stations. Table 4-3 and Table 4-4 present the water level of the two rivers collected from mentioned stations. The water level of both rivers rises from 3 m to 6 m during raining season, particularly from July to September of each year. At other times of the year the water level can rise up to 1.5 m per month. Comparing between the two rivers, the water level of the Xe Banhieng River (6.2 m) tends to be higher than in the Xe Don (5\_m).

**Table 4-3 Average Water Level (m) of Xe Banghieng River 2000-2007**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean
2000	2.31	2.19	2.13	2.31	3.15	3.12	4.95	4.53	6.14	4.43	3.14	2.61	3.42
2001	1.91	1.62	1.69	1.62	2.03	3.31	4.70	6.96	5.65	2.79	2.50	2.17	3.08
2002	1.76	1.53	1.41	1.44	2.13	3.35	6.66	7.12	6.55	3.28	2.52	1.20	3.24
2003	1.79	1.54	1.36	1.52	1.88	2.68	2.83	5.21	6.05	3.14	2.43	2.11	2.71
2004	1.62	1.88	1.52	1.73	1.95	2.53	3.15	5.92	6.93	2.53	2.12	2.01	2.82
2005	1.50	1.30	1.28	1.30	1.64	1.84	4.40	9.12	8.31	5.26	2.89	2.55	3.45
2006	2.04	1.68	1.73	1.76	1.70	1.48	4.29	6.83	3.52	5.06	1.92	1.81	2.82
2007	1.69	1.44	1.47	1.47	2.02	2.01	3.04	4.23	3.71	7.34	4.24	2.40	2.92
Mean	1.83	1.65	1.57	1.64	2.06	2.54	4.25	6.24	5.86	4.23	2.72	2.11	3.06

Source: Department of Meteorology and Hydrology, 2008

**Table 4-4 Average Water Level (m) of Xe Done River 2000-2008**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean
2000	2.06	1.93	1.86	1.99	2.93	3.41	5.69	4.54	5.05	1.67	1.54	2.30	2.91
2001	2.11	2.01	1.95	1.90	2.45	3.48	4.40	4.96	4.64	3.15	2.64	2.35	3.00
2002	2.12	1.95	1.87	1.89	2.14	2.98	5.32	5.48	4.69	3.06	2.45	2.23	3.01
2003	2.07	2.00	1.97	2.00	2.44	3.20	3.23	5.06	5.58	3.00	2.35	2.17	2.92
2004	1.42	1.35	1.28	1.38	1.58	2.39	3.28	5.14	4.33	2.44	1.89	1.78	2.36
2005	1.92	1.83	1.78	1.86	2.13	2.38	3.83	5.90	4.89	4.00	2.42	2.20	2.93
2006	2.08	1.96	1.90	1.98	2.20	2.28	5.10	5.42	3.92	4.39	2.60	2.26	3.01
2007	2.12	2.02	1.98	1.97	2.46	2.51	3.74	4.42	3.59	4.50	2.70	2.37	2.87
2008	2.05	2.02	1.96	2.04	2.50	2.91	2.83	4.26	3.98	2.86	2.39	1.85	2.64
Mean	2.00	1.90	1.84	1.89	2.31	2.84	4.16	5.02	4.52	3.23	2.33	2.17	2.85

Source: Department of Meteorology and Hydrology, 2008

## 4.2 Biological Resources

### 4.2.1 Vegetation Along the Transmission Line Route

Preliminary investigations indicate that remaining vegetation along the proposed transmission line route is generally fragmented and degraded, with the majority of the vegetation along the route having been cleared for agricultural land such as rice paddies (see section 5.3.2). Nonetheless, field vegetation mapping along the transmission line route identified several currently forested areas (see Figure 4-1).

Within Saravan Province, approximately 7 significant patches of forest were identified along the proposed route, covering about 22 km along the alignment. This forest primarily occurs where the alignment passes in the vicinity of Phou Xieng Thong NPA and Xe Bang Nuan NPA within Lakhonpheng District.

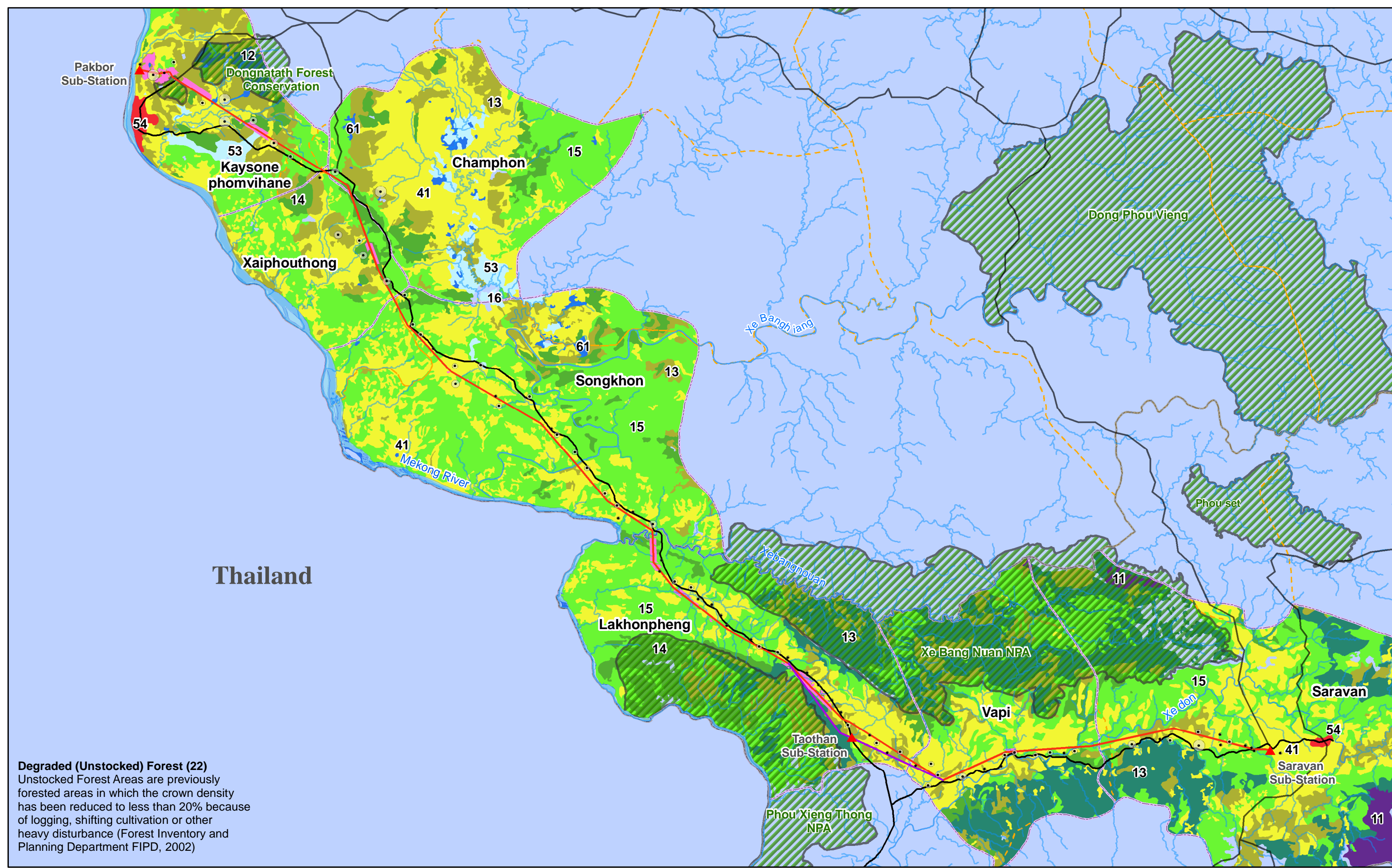
In Savannakhet Province, approximately 8 significant patches of forest were identified, covering about 18 km of the alignment. These forested areas are primarily located in Kaysone Phomvihane District close to Pakbo sub-station.

Available vegetation mapping from the Lao PDR Forest Inventory Planning Department (FIPD 2002) indicates that, in both provinces, the most common vegetation type present along the proposed route is Dry Dipterocarp Forest (see Table 4-5). Other vegetation types present in smaller areas include Unstocked Forest and Lower Mixed Deciduous Forest. Each of these vegetation types are described below based on GOL classifications (FIPD 2002).

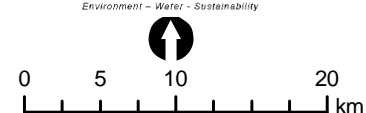
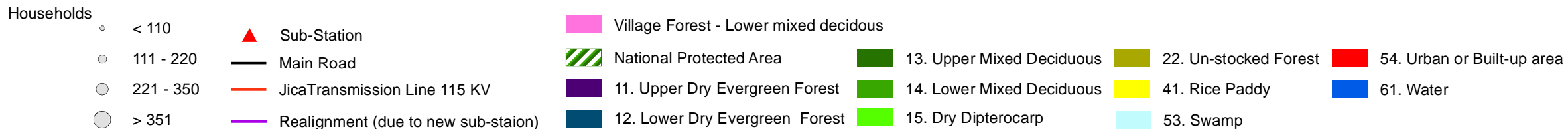
**Table 4-5 Forest in the Right of Way**

District	Line distance on village land (metres)	Total area of TL ROW (m <sup>2</sup> )	Estimated land (Forest land)		Estimated land (Agricultural land)	
			Mixed deciduous forest	Dry dipterocarp and unstocked	Rice Paddy	Plantation
Champhone	25382	634550	0%	86%	14%	0%
Kaysone	4654	116350	36%	16%	43%	4%
Xaiphouthong	23786	594650	3%	32%	65%	0%
Songkhonee	54327	1358175	17%	39%	44%	0%
Lakhonpheng	52803	1320075	9%	48%	44%	0%
Vapi	31952	798800	1%	21%	78%	0%
Salavan	24814	620350	0%	35%	65%	0%
<b>Total</b>	<b>217718</b>	<b>5442950</b>	<b>9%</b>	<b>40%</b>	<b>50%</b>	<b>1%</b>

Source: FIPD 2002



**Figure 4.1 Land Use in the Project Area**



Projection: Wgs 84, UTM Zone 48 North

- **Dry Dipterocarp Forest**

Dry Dipterocarp Forest occurs in open stands. The tree diameter is comparably small and the height of the stand varies from 8 to 25 m. The crowns do not spread out widely. This type of forest is typically found in places with shallow soil, where the hard pan emerges above the ground, and on laterized soil. On the most poor and shallow soils the trees are crooked and do not exceed 10m in height. Many species within Dry Dipterocarp Forests are characterised by being fire resistant and having thick bark. Examples of such species include Mai Sabeng (*Dipterocarpus intricatus*), Mai Chick (*Shorea obtuse*), Mai Sat (*Dipterocarpus obtusifolius*), Mai Suak (*Terminalia tomentosa*) and Mai Hang (*Shorea siamensis*).

- **Unstocked Forest**

Unstocked Forest Areas are previously forested areas in which the crown density has been reduced to less than 20% because of logging, shifting cultivation or other heavy disturbance. If the area is left to grow undisturbed it becomes forest again. Abandoned ray areas and disturbed stands with a crown density less than 20% are also classified as Unstocked Forest.

- **Lower Mixed Deciduous Forest**

Lower Mixed Deciduous Forest occurs at an altitude below 200 m, and deciduous tree species represent more than 50% of the stand. The forest storeys are not as dense as those of evergreen types and most of the seedlings and saplings are deciduous trees. Most often bamboo occurs in this type of forest.

#### **4.2.2 Village Forest affected in Phou Xieng Thong Buffer Zone**

In Saravan Province, the proposed transmission line route passes through a significant stretch of forest, which is adjacent to Phou Xieng Thong NPA. The forest covers a stretch of approximately 9.5 km of the transmission line route between the village lands of Ban Phonedinsai and Ban Nongsano, which each have a small area of forest potentially impacted along the route.

Villages within this buffer zone with the largest areas of forest potentially impacted due to vegetation clearance for the transmission line are Ban Lak 94, Ban Lak 90 and Ban DaoCheng Gnai. A smaller part of the transmission line alignment also passes through forest within Ban Nathom village land. A variety of forest types occur within this general area including Dry Dipterocarp Forest, Unstocked Forest and Lower Mixed Deciduous Forest (FIPD 2002). The socio-economic surveys of villages along the transmission line found that forest resource use was of great importance to the livelihoods of local villagers (see Section 5.3.3).

#### **4.2.3 Protected Areas**

Meetings with government officials and surveys in villages indicate that there are no provincial and or district level project areas within the project area. This will need to be confirmed at DMS stage.



## Pakbo – Saravan 115 kV Transmission Line

The proposed transmission line passes between two National Protected Areas (NPAs), Phou Xieng Thong NPA and Xe Bang Nuan NPA.

Based on currently available information regarding the NPA boundaries, the proposed transmission line passes within approximately 400 m of Phou Xieng Thong NPA, and the proposed alignment is less than 5 km from the north eastern side of the NPA for approximately 25 km of its length. Phou Xieng Thong NPA covers approximately 1,003 km<sup>2</sup>. The Park has important biodiversity values as it is the only Lao NBCA on the Mekong River, extending along some 100 km of its course and incorporating both rocky and sandy river banks. Extensive tracts of high quality semi-evergreen forest occur in the Park. The Park also contains characteristic rocky flats at elevations of 300-500 m, which are a rare habitat in Lao PDR. The vegetation of the NPA is primarily Mixed Deciduous Forest which is generally in very good condition. Wetlands within the NBCA provide important habitat for a range of wildlife. Village surveys indicate that endangered Asian elephants and Tigers are present in the Park. Other species of conservation significance include the Green peafowl, the Asiatic black bear, Banteng, gibbons and gaur.

For Xe Bang Nuan NPA, the proposed transmission line is located on the south-western side of the park. Based on currently available information regarding the NPA boundaries the transmission line passes within approximately 5 km of the NPA, and is within 6 km of the south-western boundary for approximately 30 km of its length. Xe Ban Nouan NBCA covers approximately 1,260 km<sup>2</sup> and includes a range of vegetation types including Mixed Deciduous Forest, Dry Dipterocarp Forest and Evergreen Forest. Important habitat is also provided by the rocky flats in western and central areas of the NPA, and by numerous saltlicks. A large number of threatened wildlife species occur in the Park, including endangered Asian elephants and Tigers. Other species of conservation significance include the Banteng, Gaur, Clouded leopard and the Dhole. Birds of conservation significance recorded in the Park include the Siamese fireback and the Red collared woodpecker.

### **4.2.4 Biodiversity in Agricultural Landscapes**

As a significant portion of the proposed transmission line route passes through agricultural land. Lao PDR is also known for harbouring a high genetic diversity of rice species. Lao PDR and northern Thailand are recognised as the centre of origin of the glutinous rice types (STEA, 2004). Since the early 1990s, more than 13,500 rice samples have been collected in Lao PDR, representing more than 3,000 rice varieties. Lao PDR's contribution to the International Rice Genebank at the International Rice Research Institute (IRRI) ranks the second highest. It is also recognised that there is substantial Indigenous knowledge of the traditional rice varieties in Lao PDR (ADB 2006). The high agricultural diversity within rice paddies in the project region is demonstrated by a study of agricultural biodiversity in Savannakhet Province. A total of 184 wild herbaceous species and 17 cultivated species were recorded in paddy vegetation within two villages. Nineteen of the wild species were used by local people (Kosaka et al. 2006).





Aquatic diversity is also known to be high within agricultural landscapes in Lao PDR. For example a study of rice paddies in three villages in northern Lao PDR identified 23 species of fish, 10 amphibians, 7 reptiles, 16 insects, 5 crustaceans, 8 molluscs and 16 aquatic plants (FAO 2003). Studies indicate that a total of almost 200 aquatic species are consumed in agricultural areas in Lao PDR (James 2006). The consumption of such species within agricultural areas is thought to make a significant contribution to the diet of rural communities in Lao PDR.

A large study currently being undertaken by the FAO on aquatic biodiversity and human nutrition has indicated that 50% of fish consumed by households comes from rice-based ecosystems. In the project region, a study of 11 villages in Atsaphangtong district, Savannakhet province, found that every household surveyed used the ricefield fishery to some extent (Newman-Meusch, 1996).

#### **4.2.5 Aquatic Habitats and Resources**

Although socio-economic data for the potentially impacted districts indicates that fishing is not a major livelihood activity in the project area (e.g. Table 5-3), aquatic resources may be of significant importance to local villagers for both subsistence use and trade. Many aquatic habitats within Lao PDR are also known to harbour a high biodiversity of both flora and fauna. Aquatic habitats within agricultural landscapes are discussed in Section 4.2.4 above.

Field surveys along the proposed transmission line route identified that approximately 500 metres of the alignment intersects a wetland in the central part of Kaysone Phomvihane District within Savannakhet Province. The transmission line route will also cross three major rivers (Xe Banghiang, Xe Bang Nuan and the Xe Don) as well as many smaller tributaries which may support aquatic resources. The route also passes within approximately 2.5 km from the Mekong River. The Mekong river and its tributaries are of global significance for fisheries and aquatic biodiversity, with approximately 500 indigenous fish species identified within Lao PDR (STEA, 2004).

Xe Banghiang is one of the largest rivers in Lao PDR with a catchment area of 19,400 sq.km and average annual runoff of 16,000 MCM. The river contains a high diversity of fish species, including several species of catfish (Kottelat 1997) and is considered a significant migration route for fish species which travel up the river from the Mekong river to spawn. The river is also one of the few remaining locations of the Critically Endangered Giant Ibis (*Thaumatibis gigantea*) and White Shouldered Ibis (*Pseudibis davisoni*) (IUCN 2008).

Limited information is publicly available regarding the aquatic habitats and resource use of the Xe Bang Nuan and Xe Don. Xe Bang Nuan is a tributary of the Mekong river, and forms part of the border between Saravan and Savannakhet Provinces. The river also runs through the Xe Bang Nuan NPA within Lao PDR. Previous surveys conducted on the river identified at least 28 fish species (Kottelat 1997). The Xe Don is also a large river which drains into the Mekong. The river is known to support a range of significant birdlife. Birds present in the river system include the



## Pakbo – Saravan 115 kV Transmission Line

river lapwing which is only one of a community of declining birds of sandbar habitats (Duckworth et al 1998).

## 5 SOCIO-ECONOMIC DESCRIPTION OF THE PROJECT AREA

This section provides a summary of the detailed socio-economic information provided in the Resettlement Action Plan (RAP). It draws upon secondary information, such as national, provincial and district census data and primary data collected during stakeholder consultation meetings and household surveys undertaken in June and July 2009. Stakeholder consultation meeting and household surveys included:

- Meetings with Central, Provincial and District Government of Lao PDR officials;
- Village-level meetings (i.e. meetings with the village committees) with the 19 villages with settlement areas located within 500 metres of the selected transmission line alignment and with an additional 62 villages where the transmission line ROW affects land within the village boundary.
- Household surveys of 250 randomly selected households in 37 of the 81 villages affected by the transmission line project.

More information on the methodology is provided in Section 6 of this report and in the attached RAP.

### 5.1 Social Setting

Savannakhet has the second largest population in Lao PDR with 825,902 people (NSC, 2005). The province is divided into 15 districts and has a total of 1,543 villages and 131,216 households, with an average household size of 6.3 people. The average size of each village in Savannakhet is 14 km<sup>2</sup>.

Saravan has a population of 324,327 people (NSC, 2005). Saravan is divided into 8 districts and has 724 villages and 53,013 households, with an average household size of 6.1 people. The average size of each village in Saravan is 15 km<sup>2</sup>.

The transmission line ROW will traverse through seven districts, four of which are in Savannakhet province (Kaysone, Champhone, Xaiphouthong and Songkhonee) districts, and three in Saravan province (Lakhonphen, Vapi and Saravan) districts (see Figure 2-1).

#### 5.1.1 Affected Population

The ROW will affect land within the village boundaries of 81 villages. Within these 81 villages, 904 households will be directly affected by construction and presence of the transmission line – a small number will experience loss of land and / or assets. Table 5-1 presents a summary of the geographic distribution of the affected population.

**Table 5-1 Summary of households impacted by the proposed line**

Province	District	Villages	No. of Affected Households
<b>2</b>	<b>7</b>	<b>81</b>	<b>904</b>
<b>Savannakhet</b>	<b>4</b>	<b>35</b>	<b>462</b>
	Kaysone	8	101
	Champhone	2	22
	Xaiphouthong	6	96
	Songkhone	19	243
<b>Saravan</b>	<b>3</b>	<b>46</b>	<b>442</b>
	Lakhonpheng	21	211
	Vapi	13	137
	Saravan	12	94

Source: ESL Village-Level Surveys 2009

The average household size for the project affected villages is 7.8 persons per household, which is higher than the Savannakhet and Saravan provincial averages of 6.3 and 6.1 persons per household respectively (NSC, 2006).

Based on information provided by nineteen (19) villages, the average growth rate was 12 percent, with individual village growth rates ranging from 2% to 50%. The number of births over the last 12 months was more than double the number of deaths; and number of people migrating to these villages was about 30% higher than the number of people emigrating. The primary reasons for immigration were marriage and looking for new economic opportunities and land. The main reasons for emigration were marriage and moving closer to relatives.

### **5.1.2 Ethnicity, Religion and Cultural Heritage**

Lao PDR's population is characterised by significant ethnic diversity. The 2005 Population and Household Census identified 49 different ethnic groups (NSC 2006). In Savannakhet, the main ethnicity is the Tai Family or 'Lao Loum' consisting of Lao (62%), Phou Thai (15%), and Makong (9%). In Saravan, the main ethnicity is the same as in Savannakhet consisting of Lao (61%), Katang (13%) and Souay (8%) (NSC 2005, 2006 & 2007).

Ethnicity in the project area is similar to the provincial wide statistics. The majority of people (92%) are from the Tai Family and practice Theravada Buddhism mixed with elements of animism (see Table 5-2).

Other ethnic groups present in the Project Area include Katang, Ta-Oy and Xuay / Suiy which are all members of the Mon-Khmer language family. In the Project Area, these groups are almost entirely located in Saravan Province. The Saravan District of



## Pakbo – Saravan 115 kV Transmission Line

Saravan Province was the most diverse, with 52% Lao, 18% Xuay / Suiy, and 28% Ta-Oy (see Table 5-2)

The majority of people in the project area are Buddhist (96%), followed by Christian (3%). Those practicing the Christian faith are located entirely within the Savannakhet Province in Xaiphouthong, Champhone and Songkhonee Districts.

**Table 5-2 Main Ethnicity and Main Religion by village in the Project Area.**

Province	District	Ethnicity						Religion	
		Lao	Phouthai	Xuay/ Suiy	Katang	Ta- Oi	Other	Buddhist	Christian
Savannakhet	Kaysone Phomvihane	84%	11%	0%	0%	0%	4%	100%	1%
	Xaiphouthong	100%	0%	0%	0%	0%	0%	89%	11%
	Champhone	96%	0%	0%	0%	0%	4%	96%	4%
	Songkhonee	100%	0%	0%	0%	0%	0%	96%	5%
Saravan	Lakhonpheng	95%	0%	0%	5%	0%	0%	100%	0%
	Vapi	100%	0%	0%	0%	0%	0%	100%	0%
	Saravan	52%	0%	18%	1%	28%	2%	90%	0%
<b>Average</b>		<b>90%</b>	<b>2%</b>	<b>3%</b>	<b>1%</b>	<b>4%</b>	<b>1%</b>	<b>96%</b>	<b>3%</b>

Source: ESL surveying 2009

Village level surveying found all ethnic groups to have a long association with the local area and the minority groups have generally been absorbed into the mainstream Lao-speaking society and are treated without discrimination as Lao citizens within the administration and civic society

The following cultural related aspects that are relevant to the Project and the planning of social mitigation measures were observed:

- Buddhists practice cremation, and therefore, do not tend to have important burial sites.
- Some communities still practice elements of Animism and spirit forests do exist in project villages.
- The traditional Lao principle of the husband moving to live with and work for his wife's parents is still widely practiced in the project area.
- Both Lao Loum and Mon-Khmer households in the project area generally own wooden houses with corrugated iron roofs positioned on high wooden (or concrete) poles. Some houses have bricked in lower levels.
- Approximately 5% of houses are concrete/brick with tiled roofs and were constructed fairly recently (within the past 5 years).
- The majority of Lao Loum villages have a temple which is used both for religious events and village meetings.

## Pakbo – Saravan 115 kV Transmission Line

Important Lao Loun and Buddhist cultural celebrations that take place in the project area include:

- Lao New Year (Boun Pi May), celebrated in mid April and lasting for a week, this is a festival to welcome the new Buddhist calendar year.
- Rocket festival (Boun Bang Fay) is celebrated at the start of the rainy season (mid May). It is known as a celebration calling for rain and fertility.

Additional important Buddhist holidays are listed in the RAP. Some of the people in the project area still practice elements of animism including the following ceremonies:

- Annual ceremony for the spirits of ancestors;
- Ceremonies in case of natural calamities; and
- Funeral ceremony, practiced immediately after the death of a villager practice, must ensure that the spirit is erased from and not disturbing the house.

## 5.2 Economic Overview

### 5.2.1 Regional Economy

#### Savannakhet Province

According to the Savannakhet Socio-Economic Development Plan 2008 (Savannakhet Province, 2009), the economic growth rate for the province in 2007-2008 was 13.8%.

Agriculture is the largest sector in the economy. Rainfed rice is by far the largest crop cultivated covering an area of 162,242 ha with an average production of 3.5 ton/ha and a total annual production of about 567,000 tonnes. Irrigated rice (28,256 ha) and dry season crops (19,115 ha) are also important.

The province has 29 companies investing in tree and crop plantations, such as, rubber, Eucalyptus, Acacia, sugar cane, and cassava. In 2008, across the province, a total of 30,000 ha of land were cleared for these plantations.

In 2008, there were 2,801 factories registered within the province including, 28 considered large, 50 medium, 2,195 small and 528 family sized factories. The numbers of factories has increased since 2007; however, the total value of production has decreased by 50% compared to last year. In 2008 the province imported more than \$200 million worth of goods, which was more than double the previous year.

#### Saravan Province

According to the Saravan 2007-2008 Socio-Economic and Development Plan (Saravan Province 2008), the economic development objective of the province is to shift the economy from subsistence production toward market products. In 2008, the province recorded a 9% economic growth rate and a GDP of \$202 million.



## Pakbo – Saravan 115 kV Transmission Line

Agriculture is the largest sector in the economy and is focused on crop cultivation and tree plantations. Rice is the key crop, and annual production in 2007-08 was recorded at 256,500 tonnes. Coffee is also an important crop that is grown in the southern parts of the province. Coffee production was reported at 16,474 tonnes in 2008. Crop and tree plantations include cassava, which has increased ten-fold in recent years – now covering an area of 2,119 ha and producing about 53,000 tonnes – and rubber and other tree plantations, which cover approximately 4,400 ha.

The services sector in the province is growing with a focus primarily on tourism. Tourism arrivals have increased three-fold – from about 8,000 people in 2005 to 24,000 people in 2008.

Industry in the province is focused on the development of energy and mineral resources (eg. Xeset II Hydropower Project). In 2008, there were 74 licensed factories in the province, the majority of which process wood for exporting to other provinces and across the border to Thailand and Vietnam. Total export value for the province was about \$11 million in 2008. In addition to wood, other exports include energy and coffee and other agricultural products. Import value is about five times higher than export value at about \$49.4 million in 2008.

### 5.2.2 Project Area

#### Employment

As described above, the regional economy in both provinces is still predominately agriculture based. See Table 5-3 for information on the distribution of occupation in agriculture, fishery and non-farm activities at the national, provincial and district levels.

According to the national census (NSC 2005), in the seven districts that comprise the Project Area, over 80% of the total active population work as farmers. With the exception of the Kaysone Phomvihane District in Savannakhet, where only 45% of workers are farmers, the other six districts reported at least 90% of residents engaged in farming activities. Kaysone Phomvihane District has such a significant proportion of non-farming activity because it contains the provincial capital and trading centre of the province, Savannakhet City.

Results of village level surveying follow the general employment trends outlined above, i.e. all villages surveyed regard agriculture and agricultural trading as their top two important economic activities.

**Table 5-3 Percentage distribution of occupation in agriculture, fishery and non farm activities by province and district of the project area**

Level		Total Active Population	Farmer	Fisher-man	Livestock farmer	Mixed farmer	Non-farm activity
			%				
Country	Lao PDR	2,738,892	63%	0.1%	0.2%	13%	24%
Province	Savannakhet	431,045	86%	0.0%	0.1%	1%	13%

Level		Total Active Population	Farmer	Fisher-man	Livestock farmer	Mixed farmer	Non-farm activity
			%				
District	<i>Kaysone Phomvihane</i>	49,466	45%	0.2%	0.2%	1%	54%
	<i>Xaiphouthong</i>	26,201	95%	0%	0%	0%	5%
	<i>Champhone</i>	52,144	91%	0%	0%	0.2%	9%
	<i>Songkhone</i>	46,163	94%	0%	0%	0%	6%
	<b>Sub-Total</b>	<b>173,974</b>	<b>79%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>1%</b>	<b>20%</b>
Province	<b>Saravan</b>	<b>167,166</b>	<b>80%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>13%</b>	<b>7%</b>
District	<i>Lakhonpheng</i>	21,140	93%	0%	0%	0.1%	7%
	<i>Vapi</i>	15,606	93%	0%	0%	0%	7%
	<i>Saravan</i>	42,667	90%	0%	0%	0.1%	10%
	<b>Sub-Total</b>	<b>79,413</b>	<b>91%</b>	<b>0%</b>	<b>0%</b>	<b>0.1%</b>	<b>9%</b>
<b>Total Project Area Districts</b>		<b>253,387</b>	<b>83%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>17%</b>

Source: NSC, 2005

### **Wealth and poverty in the villages**

During village level surveying in the Project Area, village chiefs were asked to group village households into three categories – wealthy, average and poor, and then estimate the average annual income of households in those categories. Table 5-4 summarizes the collective perceptions of wealth among the survey participants in the Project Area. Of the 81 affected villages, approximately 17% of families are considered very well off, 70% sufficiently well off and 13% considered not well off (or poor). Of the poor families, most are ‘poor with some land’, which generally means they have some means to grow food such as rice; and a very small percentage are ‘poor with no land’. The socio-economic survey showed that poor households with no land were generally those of elderly people who had ceased to be active in farming, and had, for example, allocated land to sons and daughters. There is little if any evidence of landlessness as a causal factor in poverty. Kaysone Pomvihane District, Savannakhet Province and Saravan District, Saravan Province recorded higher percentages of poor families than the other districts. Kaysone Phomvihane district also recorded the highest percentage of landless families. Respondents in Champhone District, Savannakhet did not consider any of the families in these villages as poor.

**Table 5-4 Perceptions of wealth and Income of families in the Project Area**

District	Very well off		Sufficiently well off		Poor with SOME land		Poor with NO land		Avg income p.a
	%	Avg income p.a	%	Avg income p.a	%	Avg income p.a	%	Avg income p.a	
Kaysone Phomvihane	13	15.0	67	9.4	19	4.1	2	5.0	20.8
Xaiphouthong	20	15.0	68	12.8	11	5.1	2	2.0	26.7





## Pakbo – Saravan 115 kV Transmission Line

District	Very well off		Sufficiently well off		Poor with SOME land		Poor with NO land		Avg income p.a
	%	Avg income p.a	%	Avg income p.a	%	Avg income p.a	%	Avg income p.a	
Champhone	18	20.0	82	10.0	0	0.0	0.0	0.0	20.0
Songkhonee	12	30.3	75	13.4	11	4.3	2	1.2	39.1
Lakhonpheng	10	31.7	78	13.8	10	3.3	2	2.1	43.9
Vapi	27	24.8	66	10.9	6	2.9	1	0.7	39.2
Saravan	18	26.2	53	12.2	24	4.8	5	3.8	40.4
<b>Average</b>	<b>17</b>	<b>23.3</b>	<b>70</b>	<b>11.8</b>	<b>11</b>	<b>3.5</b>	<b>2</b>	<b>2.1</b>	<b>32.9</b>

Source: ESL surveying 2009

### ***Income and expenditure***

The majority of families in the project area source income from the sale of agricultural products. The estimated average yearly income for families in the project area is 32.8 million kip ranging from 20.8 million kip in Kaysone Phomvihane District, Savannakhet Province to 43.9 million kip in Lakhongpheng District, Saravan Province (see Table 5-4). Village surveying indicates that this income is mainly spent on food. Other expenses include medical health care, education and other household items. For many villages, another significant expenditure is land tax.

### ***Vulnerable households***

Village surveying in the 81 project villages indicates that 12.5% of households are considered vulnerable. The categories of vulnerability and the percentage of households within each category in each district are provided in Table 5-5. The two most common vulnerabilities are single female-headed households and landless households.

**Table 5-5 Vulnerable households in the Project Area**

Province	District	Single female-headed	No labour	Infirm / elderly	Landless	Other	Total
Savannakhet	Kaysone Phomvihane	14.3%	0.8%	1.1%	9.6%	0.4%	26.2%
	Xaiphouthong	4.0%	1.3%	2.5%	1.5%	1.5%	10.7%
	Champhone	1.7%	0.2%	0.5%	0.2%	0.0%	2.5%
	Songkhonee	10.8%	2.7%	0.8%	4.1%	0.4%	18.9%
Saravan	Lakhonpheng	5.7%	2.1%	0.7%	2.6%	0.0%	11.1%
	Vapi	3.6%	0.8%	0.6%	0.9%	0.0%	6.0%
	Saravan	4.4%	2.0%	0.1%	5.5%	0.0%	11.9%
<b>Average</b>		<b>6.4%</b>	<b>1.4%</b>	<b>0.9%</b>	<b>3.5%</b>	<b>0.3%</b>	<b>12.5%</b>

Source: ESL surveying 2009

### ***Rice sufficiency***

Results of surveying in 19 of the project villages indicate that 77% of households in the project area have rice sufficiency year round. A further 15% of households are rice sufficient for at least 9 months of the year. The remaining 8% are spread out across Kaysone Phomvihane, Xaiphoutong, Songkone, Lakongpeng and Salavan districts – of these households, 50% are able to buy rice during times of shortage, 30% borrow and 15% trade or provide labour in exchange for rice. Insufficiency is not seen as an issue in the more urban villages of Kaysone Phomvihane District where all households can buy the rice they need.

**Table 5-6 Rice Insufficiency in the Project Area**

District	Rice insufficiency in a given year			
	No insufficiency	1 to 3 Months	4 to 6 months	7+ Month
Kaysone Phomvihane	60%	11%	7%	21%
Champhone	83%	17%	0%	0%
Xaiphoutong	69%	26%	6%	0%
Songkone	77%	12%	5%	6%
Lakongpheng	83%	15%	2%	0%
Vapo	95%	5%	0%	0%
Saravan	68%	21%	5%	5%
<b>Total</b>	<b>77%</b>	<b>15%</b>	<b>4%</b>	<b>5%</b>

Source: ESL surveying 2009

## **5.3 Agriculture and Land Use**

### ***5.3.1 Land Tenure***

All land in Lao PDR is ultimately owned by the state. The state, however, has a range of instruments with which it can allocate land rights and ownership of land and forests to villages and individuals.

#### ***Land and Forest Allocation Program (LAFAP)***

Since 1996, a nation-wide program, under the direction of the Ministry of Agriculture and Forests (MAF), has been aimed at devolving most decisions about land use and land allocation to the village level through its Land and Forest Allocation Program (LAFAP). In most cases, nine land use categories are applied to villages including five forest categories three agricultural (village land reserves, production land, and highland agricultural land) and one for the site of the village settlement. These

agreed uses are then roughly mapped and a map of the allocation plan is often displayed in a central place in the village.

Of the nineteen surveyed villages in the Project Area, sixteen villages have been part of the LAFA. The majority of the land area in the village is allocated for agricultural purposes, following by residential and/or commercial activity and different types of forest resources.

### **Land Titling**

In Lao PDR, land is owned by the national community and the State is charged with its management (Land Law 2003). The Government uses a range of instruments to allocate land rights and ownership of land and forests to villages and individuals. Those common in the project areas include (DOF2007):

- Land Title, issued by the Provincial or Municipal Land Management Authority gives permanent land use rights
- Temporary Land Use Certificate, issued by the district government through the land use planning and land allocation process, gives a land use deed for 3 years after which time a land title applied for.
- Certificate for Original Acquisition of Land, issued by the agriculture and forestry sector, gives permanent land use rights

The governments land titling program is currently being implemented in the project area. 56 of the 81 project villages have had the land titling conducted. In 49 of these villages, activities have concentrated on settlement land areas, with over 96% of this land being titled. Agricultural land titling is also underway in 32 of these villages although the percentage of land titled averages only 22%. All villages have land certificates for agricultural land and pay annual tax.

Note: Legal ownership of land is based on recognised rightful occupation and use or inheritance, so that the lack of a formal title is, under Lao land law and WREA guidelines, not necessary for recognition of ownership and for compensation in involuntary land loss.

**Table 5-7 Land Titling Activities in the Project Area**

Prov.	District	No.	Village name	Land Titling	% Land Titling (settlement)	% Land Titling (Agriculture)	Land Certificate tax payment
SVK	Kaysone	6	Ban Pakbor	..	n/a	n/a	..
		5	Ban Nongduern	..	n/a	n/a	..
		1	Ban Dongnakham	..	n/a	n/a	..
		2	Ban Phonsim	..	n/a	n/a	..
		4	Ban Dongmakyang	..	n/a	n/a	..
		3	Ban Houay	..	n/a	n/a	..



Prov.	District	No.	Village name	Land Titling	% Land Titling (settlement)	% Land Titling (Agriculture)	Land Certificate tax payment
SLV		7	Ban Somsa-at	..	n/a	n/a	..
		8	Ban Xokvang-Tai	..	n/a	n/a	..
	Champhone	16	Ban Lak 35	..	100	90	..
		15	Ban Nateuy	..	100	90	..
	Xaiphouthong	9	Bna Khamxan		0	0	..
		11	Ban Khasavang+Khoua		0	0	..
		12	Ban Sisavang		0	0	..
		10	Ban Dongmakfai		0	0	..
		13	Ban Phonsikeo		0	0	..
		14	Ban Nakae+++		0	0	..
	Songkhonee	28	Ban Oumnamkhong	..	100	0	..
		18	Ban Nongnokkhan	..	100	0	..
		32	Ban Nonesomphou	..	100	0	..
		33	Ban Nonesomboune	..	100	0	..
		20	Ban Lattana	..	100	0	..
		17	Ban Thongsymouang	..	100	0	..
		19	Ban Malaythong	..	100	0	..
		27	Ban Khummouan		0	0	..
		31	Ban Hintek		0	0	..
		34	Ban Nonesavang	..	100	0	..
		24	Ban Salaleio	..	100	0	..
		26	Ban Nongkhangou	..	100	0	..
		25	Ban Nontaothanh	..	100	0	..
		30	Ban Kengtanganh	..	100	0	..
		21	Ban Naoudom	..	100	0	..
		29	Ban Houaypian	..	100	0	..
		23	Ban Nakhanhom		0	0	..
		35	Ban Donxat	..	100	30	..
	22	Ban Senouan Nuea	..	100	0	..	
	Lakhonepheng	47	Ban Phouangsavanh	..	97	10	..
		54	Ban Phouangmalay	..	98	7	..
		37	Ban Okart	..	95	16	..
		36	Ban Nonsavang	..	99	33	..
		55	Ban Nongkhitom		0	0	..
		39	Ban Donvay		0	0	..
38		Ban Nathom	..	95	10	..	
46		Ban Lakhonsy-Tai	..	98	23	..	
53		Ban Houaykaphoxay	..	98	14	..	
52		Ban Xokpheng	..	98	12	..	
51		Ban Nadoukao	..	99	7	..	
41		Ban Nonedinsai	..	99	29	..	
44		Ban Lak 94	..	96	14	..	
48		Ban Lak 90	..	99	20	..	
43		Ban Phoudaochang	..	99	8	..	
45		Ban Nongsano	..	95	8	..	
49		Ban Tangbeng	..	98	20	..	
50	Ban Phonepheng		0	0	..		

Prov.	District	No.	Village name	Land Titling	% Land Titling (settlement)	% Land Titling (Agriculture)	Land Certificate tax payment	
		42	Ban Nanglao	..	45	10	..	
		40	Ban Lakhonsy-Kang	..	96	23	..	
		56	Ban Donelay		0	0	..	
	Vapi		69	Ban Vapi	..	100	15	..
			57	Ban Phaylom	..	10	0	..
			67	Ban Nonkho	..	100	10	..
			64	Ban Nakoktan	..	100	10	..
			68	Ban Nongngong	..	100	15	..
			63	Ban Bangkhanam	..	100	10	..
			62	Ban Phakha	..	100	10	..
			66	Ban Sapath	..	100	10	..
			65	Ban Mouang	..	100	10	..
			58	Ban Kengsouthi	..	100	10	..
			59	Ban Lao	..	100	10	..
			60	Ban Kengkou		100	10	..
			61	Ban Mai oudomxai	..	100	0	..
	Salavan		70	Ban Bungkham		0	0	..
			74	Ban Nongsai		0	0	..
			71	Ban Bungxai		0	0	..
			79	Ban Donekeo		0	0	..
			77	Ban Thongnakham		0	0	..
			75	Ban Nonbouhin		0	0	..
			81	Ban Phakphaewthong		0	0	..
			80	Ban Nadonkoua	..	100	100	..
			76	Ban Tong-noi		0	0	..
			78	Ban Maisivilay		0	0	..
72	Ban Nathon		0	0	..			
73	Ban Tong-Ngai		0	0	..			
			<b>TOTAL</b>	<b>56</b>	<b>96</b>	<b>22</b>	<b>79</b>	

Source: District Government Information 2009

### 5.3.2 Agricultural Land Use Patterns

Agricultural and land use patterns in the project area are dominated by traditional Lao Loum lowland sedentary agriculture practices. A small amount of upland rotating agriculture is practiced, primarily in the villages in the Saravan province. There is only limited irrigation infrastructure in the Project Area and a majority of villages rely on seasonal rain in the months of May to October.

#### Rice production

Permanent rain-fed rice production is the most common agriculture activity in the project area. Upland agriculture (rice and other crops) is only practiced in 4 of the surveyed villages, one in Savannakhet and other 3 in Saravan province.

Average yield of rainfed rice cultivation per district and in the project affected villages is presented in Table 5-8. Average yield of rainfed rice in the project area is lower than average provincial levels. Production per household varies from 3.3 tonnes per ha per year in Vapi District to as low as 2 tonnes per ha per year in Kaysone Phomvihane, Songkone and Saravan Districts.

**Table 5-8 Average productivity of rainfed rice by district and villages in the project area**

Province and District	Total Number of household **	District statistics*	Project area**	
		Average Productivity of Rainfed Rice (t/ha/yr)	Average Productivity of Rainfed Rice (t/ha/yr)	Average of Area of Rice Paddy per HH (Ha)
Savannakhet		3.5	2.2	6.6
Kaysone Phomvihane	241	3.9	2	2.6
Xaiphouthong	225	n/a	2.5	11.7
Champhone	n/r	n/a	n/r	n/r
Songkhone	581	n/a	2	5.5
Saravan		3.8	2.5	3.7
Lakhonpheng	648	3.2	2.1	4.9
Vapi	654	3.5	3.3	2.8
Saravan	238	3.7	2	3.4

\*Source: agriculture production statistics

\*\*Source: ESL surveying 2009

### Vegetable and Fruit gardens

The majority of villages in the project area produce fruits and vegetables. Some of the common vegetable grown are cucumber, leafy steam vegetables (lettuce, salad), chilly and banana etc. These vegetables are generally grown for household consumption rather than for trade.

### Plantations

Over 60% of surveyed villages in the project area have allocated land for tree plantations. Eucalypt plantations are the most common (present in 8 of the 19 villages) however these are relatively small ranging from 1 to 30 ha in size. Teak plantations are grown in 4 villages and range between 1 and 5 ha. Two villages have rubber plantations, both over 100 ha. These plantations are either collectively owned by the village or by private households. There is one Kapok plantation located near Nongduern Village, Kaysone District which falls within the transmission line ROW. This plantation is owned by an individual resident, Mr. Bounlieng. The full plantation is 26 ha, and it was planted in 1999.

### 5.3.3 Forest Resource Use

The majority of forest in the project area is degraded deciduous or unstocked forest in agricultural landscapes. Small pockets of higher quality deciduous forests do exist (see section 4.2 Biological resources).

Forests form a crucial economic base and cultural asset for the rural communities, particularly people who live in very remote areas. Forests provide a variety of products for local villages including wildlife, Timber Forest Products (TFPs) and Non-Timber Forest Products (NTFPs) which at the local level provides an important supplementary subsistence for household consumption and usage, and for income generation.

Village surveying found that 5 of the 19 villages did not have any forest resources. Of the remaining 14 villages 23 separate forest resources were identified including production forests, protection forests, spirit forest and degraded forests (see Table 5-9). Average land areas give an indication of the size of these forest by forest type, although individual forested areas were found to range significant between 1 ha and 400 ha.

**Table 5-9 Forest resources in the Project Area**

Forest type	Percentage of villages with forest type	Average land (ha)
Village production forest	21%	16.3
Village protection forest	32%	86.7
Village spirit forest	47%	5.3
Village degraded forest	21%	66.3

Source: ESL surveying 2009

### 5.3.4 Land Disputes, Issues and Concerns

In the Project Area, land disputes between family members are most common. Other disputes include concerns regarding compulsory land acquisition, inadequate compensation (road, construction mining, etc.) and disagreements with forestry officials over encroachment or use of forest resources.

The top five (5) land issues and concerns for the villagers in the Project Area include (in order of importance) limited water resources, pests, poor soil quality, lack of labour, and no or limited suitable available agricultural land.

### 5.3.5 Livestock

For the majority of farmers in Lao PDR, the sale of livestock is an important source of cash income. Common livestock raised include buffalo, cattle, pig and poultry. When



faced with rice-shortage or the need for “emergency” spending, households usually sell a cow or buffalo.

In the project area, livestock are raised as a source of income for the villagers and during surveying this was ranked 3<sup>rd</sup> behind the sale of rice and labouring. On average, there are about 13 chickens/ducks, 1-2 pigs and 1-2 cattle per household.

## **5.4 Social Conditions and Services**

### **5.4.1 Health**

In Savannakhet there are 15 hospitals and 105 village group health care centres and 854 medicine boxes covering about 97.93% of villages in the province.

In Saravan there are 8 hospitals and 43 village group health care centres and 456 medicine boxes covering about 67% of villages in the province.

There are a number of NGOs working specifically on health related issues in the project area including:

- Belgian Technical Co-operation (BTC): Strengthening National Water Supply and Sanitation Strategy
- Village Focus International (VFI): Health, Education and Leadership (HEAL)

All project villages recorded regular visits from the government vaccination programme.

Sick villagers within the project area generally first seek treatment from the closest district health care centre and travel to the provincial hospital only if the issue is severe. Villagers tend to travel to district health centres, instead of getting treated at home or with the assistance of a village health volunteer, because district health centres are easily accessed via roads.

The main causes of death in the Project Area were reported to be liver disease (infection or cancer), followed by general cancers (unidentified), diabetes, malaria, lung infection and old age. For the past 12 months, reported health issues including, malaria, dengue, diarrhea, infant mortality and HIV / AIDS have been mainly concentrated in the villages in Saravan Province. Villages in Savannakhet reported very few health issues although one village reported two cases of HIV / AIDS.

### **5.4.2 Sanitation**

Access to clean water is a key determinate of household health. Available water sources in the Project Area include tap water; deep and shallow wells; river or stream; and rain water. While the majority of the villages located in Savannakhet Province rely on wells for their water supply, in Saravan sources of water include a mixture of gravity fed water, well and river / steam (see Table 5-10).



**Table 5-10 Sources of household water in the project area**

Province	Gravity-fed	Well (deep and shallow)	River/ stream	Rain
Savannakhet	0%	95%	0%	5%
Saravan	21%	62%	16%	0%

Sanitation infrastructure in the project area is still relatively poor. High numbers of households in Savannakhet (54%) and Saravan (78%) were reported to still use the forest and or agricultural fields as their latrine – despite the majority of villages having permanent house structures. The use of bucket toilets is significantly higher in those villages located in Savannakhet (46%) than in Saravan Province (22%).

### 5.4.3 Education

According to the 2005 census, 73% of the Lao population aged 15 years and above were literate, with more men literate (83%) than women (63%). Literacy rates varied significantly across the country with Savannakhet and Saravan reporting literacy rates of 69% and 62%, respectively (NSC, 2006). Literacy levels in project area districts range from 88% in Kaysone Phomvihane District to 67% in Saravan district.

There are a number of NGOs working specifically on education and literacy in the project area including:

- Global Association for People and the Environment/Village Focus International (GAPE/VFI): VESL (Village Education in Southern Laos)
- Action with Lao Children (ALC): Reading Promotion Project
- Room to Read Laos (RtR): Enhancing the Education of Lao Children
- Shanti Volunteer Association (SVA): Improving Education Environment for Children

In terms of education infrastructure, all but one village surveyed had its own primary school, and for secondary school education, the majority of children travel to larger villages or the district centre. Tertiary and vocational education facilities are located in the provincial capitals of Savannakhet, Saravan and Pakse; and in Vientiane Capital.

High levels of school attendance among youth in the project area were recorded with male and female school enrolment 89% and 74% respectively.

Table 5-11 provides school enrolment by district for children aged 5 to 16 years. Non enrolment is highest in Xaiphoutong and Songkhone districts, Savannakhet. These same two districts have low levels of lower and higher secondary school enrolment. Significantly high levels of higher secondary school enrolment were found in Champhone District, Savannakhet.

**Table 5-11 School enrolment (5-16 yrs)**

Province	District	Not enrolled	Primary	Lower Secondary	Higher Secondary
<b>Savannakhet</b>	Kaysone	20%	46%	26%	9%
	Champhone	25%	25%	25%	25%
	Xaiphouthong	32%	54%	11%	3%
	Songkhone	37%	53%	5%	6%
<b>Saravan</b>	Lakhonpheng	26%	58%	12%	4%
	Vapi	28%	38%	28%	6%
	Saravan	28%	53%	18%	3%
	<b>Total</b>	<b>28%</b>	<b>47%</b>	<b>18%</b>	<b>8%</b>

The most common barriers to regular school attendance in the Project Area include the need to assist the family with livelihood / income generating activities and household work and insufficient numbers of schools, teacher and teaching material

Language is not seen as a major barrier to the environmental and social assessment process. The vast majority of people in the project area speak Lao Tai as their first language. The few villages where Mong-Khmer is spoken were found to also have excellent Lao Tai language skills, with the exception of some women of minority ethnic sub-groups.

#### **5.4.4 Gender Considerations**

Field surveying included consideration of gender-specific issues, and where possible, collected data was disaggregated by sex. Key gender-specific findings of the Project Area include:

- Approximately 6% of households in the Project Area are single woman-headed households;
- There are pockets of the Project Area, particularly in Saravan province, where enrolment is very low, particularly among women;
- Women in the project area are less likely to have the ability to understand complex language, particularly in written documents; and
- HIV / AIDS cases were reported in both Provinces.

#### **5.4.5 Energy Consumption, Generation and Electrification**

According to the National Census (NSC 2005) 53% and 42% of households in Savannakhet and Saravan, respectively, have access to grid electricity. The survey found levels of connection in the project villages to be well above these census figures.

All villages surveyed are connected to the electricity grid. Individual household connection varies from 90% connection in villages in Savannakhet Province to 73%



## Pakbo – Saravan 115 kV Transmission Line

connection in villages in Saravan Province. Perhaps due to the high levels of connection, alternative sources of electricity in the project area are not common.

Electricity is mainly used for lighting and household appliances (eg TV and radio). Very few households use electricity for cooking purposes, the majority relying on fuel wood (59%) or charcoal (31%) as their main source of energy.

### **5.4.6 Road Access**

Road access in the Project Area is generally good. Villages in Savannakhet Province and Lakhongpheng District, Saravan Province are all close to the National Highway No. 13 – a paved road with all season access. Village roads leading off this main highway are unsealed and therefore may prove to be difficult during the wet season.

Villages in the Vapi and Saravan Districts, Saravan Province are located on or close to National Road 15. This road is unsealed and has a number of ferry river crossings. During the peak of the rainy season access to these villages along this road becomes extremely difficult.

## **5.5 Unexploded Ordinance**

Lao PDR is one of the most heavily bombed countries in the world with over 2 million tonnes of bombs and weaponry deployed over the country during the Indo China War between 1963 and 1974. Almost 30 percent of UXOs (Unexploded Ordinance) failed to explode as designed. Since that time and event after the war ended in 1975, the country remains littered with UXO's (includes big bombs, mortar, cluster munitions and sub-munitions, and landmines).

Parts of the Project Area may still be contaminated; however generally, UXO's were not recorded as a significant issue during village surveying. More than half of the surveyed villages reported that no land within the village boundaries was affected by UXO. Those villages that did report UXOs were mainly in Saravan and Vapi district. These villages also reported that land mine clearance teams had completed work in their villages and that over the last five years, few UXO incidents had occurred.

## 6 PUBLIC INVOLVEMENT

Throughout the IEE process, formal and informal consultations were undertaken with key stakeholders, including Central, Provincial and District Government Officials and affected persons and communities. Informal consultation included the regular discussion and the inclusion of local residents and local Government staff in field surveys. Formal consultation included structured meetings with Government authorities and village authorities, as well as individual household surveys.

This chapter summarises the process undertaken and the outcomes of the community and government consultation undertaken for the IEE.

The primary objectives of stakeholder consultation include:

- Provide information on the transmission line project, describing:
  - Purpose of the project;
  - Layout of the project and project infrastructure elements;
  - Schedule and method of construction;
  - Likely environmental and social impacts of the project construction, operation and closure.
- Inform them of the IEE being undertaken including:
  - The nature and schedule of field investigations and surveys;
  - A description of the stages of environmental and social assessment in project development in Lao PDR).
- Collect environmental and social information and data on the project area,
- Record public concerns about the Project; and
- Record public ideas for impact mitigation and maximizing any environmental/social benefits of the Project.

### 6.1 Project Stakeholders

Key project stakeholders include Project Affected Persons (PAPs); affected villages; Government authorities (Central, Provincial, District); the Project Owner; and non-Governmental Organisations (NGOs). Each group of stakeholders is discussed in detail below.

#### 6.1.1 Project Affected Persons

PAPs include persons losing land and / or assets to the Project. Such individuals need to be distinguished from other residents within the affected communities because they suffer specific losses of land and / or assets. Loss of land may be



## Pakbo – Saravan 115 kV Transmission Line

permanent (where towers and sub-stations will be located) or temporary – during construction and vegetation clearance activities.

Initial surveying has identified around 904 households and 6,147 people that have either land and / or assets located within the ROW.

### **6.1.2 Affected Communities**

The preliminary survey of the transmission line ROW indicates that eighty-one (81) villages have land within the ROW.

### **6.1.3 Government**

The Government of Lao PDR is a major stakeholder. The key Ministries and Departments involved in this Project include:

- Ministry of Energy and Mines:
  - Department of Electricity
  - Department of Energy Promotion and Development;
  - Electricite du Laos (power utility owned by the Government of Lao PDR).
- Water Resources and Environment Administration
- Ministry of Finance

Other Ministries, Departments and mass organisations that may be involved in environmental and social management include the Ministry of Agriculture and Forestry, the National Land Management Authority, Ministry of Health, Ministry of Education and the Lao Women's Union.

Ministries and departments involved at the Central level will often rely on their Provincial and district counterparts for implementation, and therefore the Savannakhet and Saravan Provincial Governments as well as the District authorities of the seven affected districts are also key stakeholders. Government employees at the village level (village chiefs and committee members) also have an interest in the impacts on the people they represent.

### **6.1.4 Non Government Organisations**

Initial consultation identified at least 6 NGOs that operate within the Project Area. These NGOs have invested time and resources in the Project Area, and therefore have an interest in Project activities and potential impacts, particularly impacts on livelihoods and biodiversity in the Project Area.

### **6.1.5 The Company, Developer and Financier**

Electricite du Lao, Tokyo Electric Power Company, Nippon Koei and the Japan International Cooperation Agency as the project owner, developer and financier of the project, are also key stakeholders.

## **6.2 Summary of Public Involvement Activities Undertaken during the IEE**

Consultation with stakeholder groups took the following forms:

- Formal meetings with concerned Central, Provincial and District Government departments;
- Interviews with village heads;
- Community/village focus group meetings;
- Household surveys and interviews with heads of households with land or built assets likely to be directly impacted by the project;
- Formal meetings with concerned NGOs and development agencies.
- Two open consultation sessions to report the findings of the IEE, the next steps in the environmental approvals process and to get feedback from stakeholders.

To aid in this process Lao/English language information briefs about the Project and IEE and large maps showing the project layout were used to support stakeholder consultation. The information briefs used in consultation are provided in Appendix 1.

### **6.2.1 Government Consultations**

Meetings were conducted with government officials at the central, provincial and district level:

- Central Government:
  - Department of Electricity (DOE)
  - Water Resources and Environment Administration (WREA)
  - National Land Management Authority (NLMA)
  - Ministry of Agriculture and Forestry (MAF)
- Provincial Government
  - Savannakhet
    - Governors Office
    - Department of Electricity & Mines
    - Provincial WREA



## Pakbo – Saravan 115 kV Transmission Line

- Provincial Land Management Authority
- Provincial Agriculture and Forestry Office
- Saravan
  - Governors Office
  - Department of Electricity & Mines
  - Provincial WREA
  - Provincial Land Management Authority
  - Provincial Agriculture and Forestry Office
- District Governments in the 5 districts:
  - Governors Office
  - Land Management Authority
  - Agriculture and Forestry Office

At each meeting, a brief description of the project was provided, and the IEE process was explained (using the project information brochure – see Appendix 1). Participants were given an opportunity to provide comments, advice and information relevant to the project. Standard forms were used to record discussions.

Provincial and District Government officials were also asked to provide relevant environmental and social information to the study team, such as District census data, land use allocation information, etc. District Government officials accompanied the teams during village surveying.

Appendix 2 provides a full list of government officials consulted.

### **6.2.2 Community Consultations**

Community consultations were conducted in three (3) phases during two field missions during June and July 2009:

- Phase 1 Village level meetings with the village committees of 19 identified affected project villages within 500 metres of the proposed transmission line;
- Phase 2 Village level meetings with the village committees of and additional 62 villages identified as affected project villages; and
- Phase 3 Village level meetings and interviews with 250 randomly selected households in 37 of the 81 villages affected by the transmission line project.

During each consultation, a brief description of the project was provided, and the IEE process was explained using the project information brochure. Participants were given an opportunity to provide comments, advice and information relevant to the project. Standard survey questionnaires were used to record discussions. Photos were taken of village level meetings.

Appendix 2 provides a full list of villages and households consulted.

### 6.2.3 Open Stakeholders Consultations

Two open stakeholder consultations were held in Savannakhet and Saravan Provinces during the first week of August 2009. The aim of these consultations was to report the findings of the IEE, outline the next steps in the environmental approvals process and to get feedback from stakeholders.

An advertisement for these consultation sessions was placed in 3 national newspapers, the Vientiane Times, Vientiane Mai, Pasa Son (see Figure 6-1)

Appendix 4: Workshop Report, provides the agenda, minutes and a full list of workshop attendees.



Figure 6-1 Stakeholders workshop advert