

付録 15.A

初期環境影響評価(IEE)報告書

Pakbo-Saravan 115kV Transmission line

Initial Environmental Examination

For



By



EARTH SYSTEMS LAO
Environment – Water - Sustainability

August 2009

DISTRIBUTION RECORD

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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:

ຊື່ຜູ້ພັດທະນາໂຄງການ: ລັດວິສາຫະກິດໄຟຟ້າລາວ (ຟຟລ)

ຊື່ຜູ້ໃຫ້ທຶນຊ່ວຍເຫຼືອ: ອົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ (JICA)

ຊື່ຜູ້ຮັບເໝົາ: ບໍລິສັດ ພະລັງງານໄຟຟ້າໂຕກຽວ ຈຳກັດ (ເທັບໂກ)

ບໍລິສັດ ເອີດຊີສະແຕມລາວ ໄດ້ຖືກມອບໝາຍໜ້າທີ່ໃຫ້ ສຶກສາການປະເມີນຜົນກະທົບດ້ານສິ່ງແວດລ້ອມ ຂັ້ນຕົ້ນ (IEE) ແລະ ກະຖາມແຜນການຄຸ້ມຄອງທາງດ້ານສິ່ງແວດລ້ອມ (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 ກະທົບຖືກເຂດຍົກຍ້າຍຈັດສັນ¹. 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 5.5ກມ². 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):

¹ 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 ລວມເຖິງຂອບເຂດການກໍ່ສ້າງ².

² 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.³ 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).

³Impacts 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-buildings⁴.

⁴ 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.

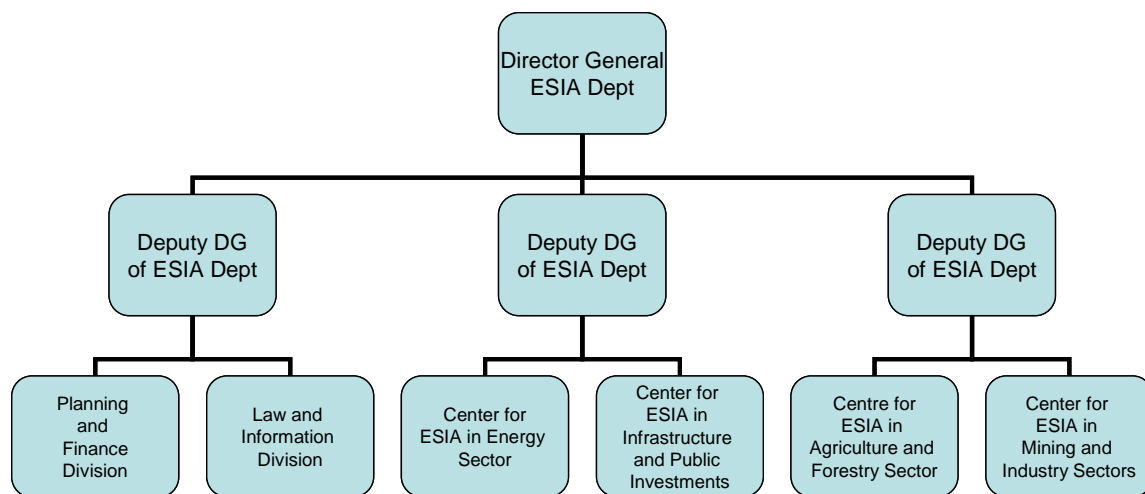


Figure 1-2 Structure of the ESIA Department in WREA - Source: WREA (2009)

- **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.

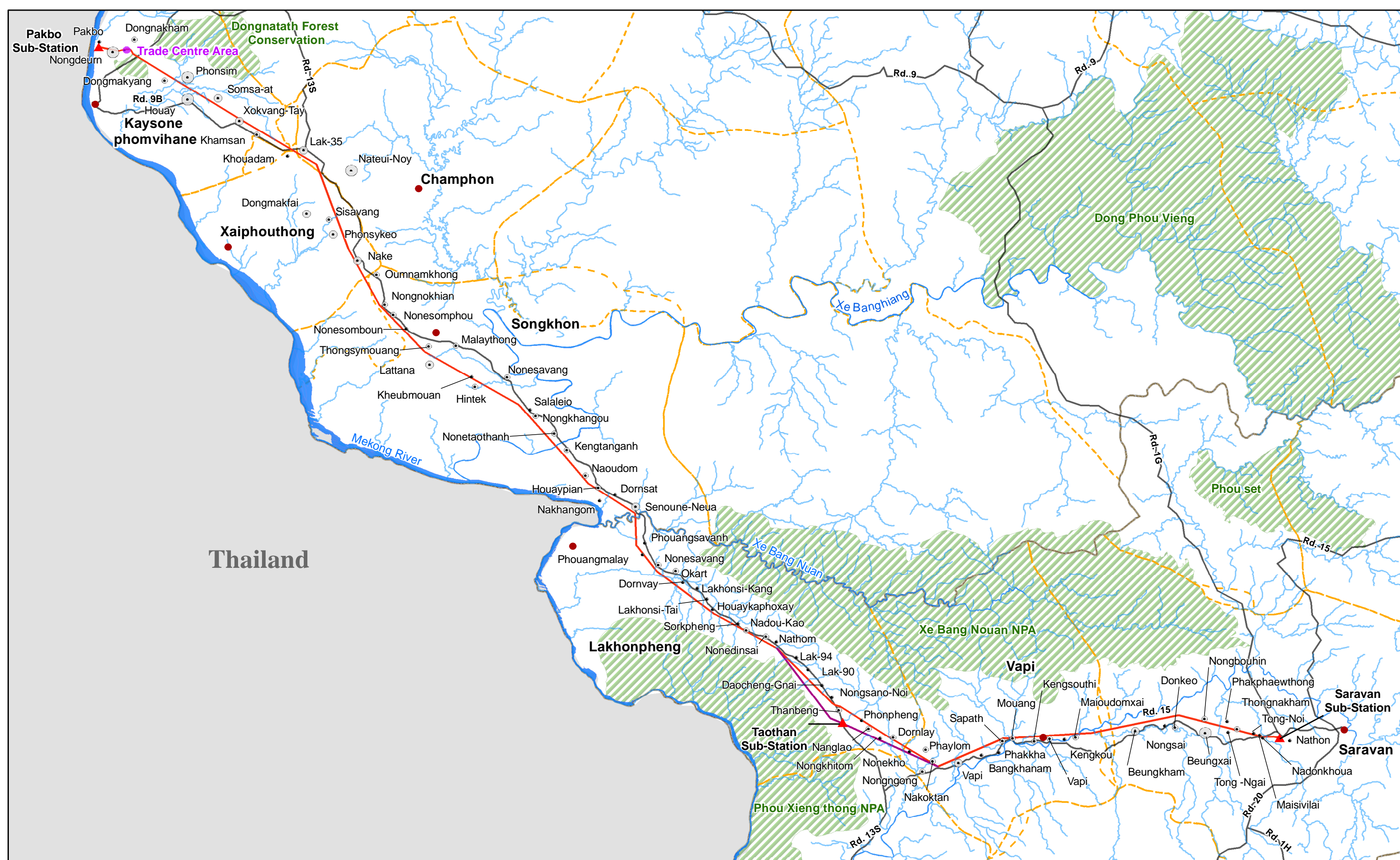


Figure 2.1 The Project Area

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 m².

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 ²
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)
<i>Pakbo - Taothan</i>				
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>
<i>Taothan - Saravan</i>				
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>
TOTAL	544		28,831.75	2.88

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 5.5km². 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.

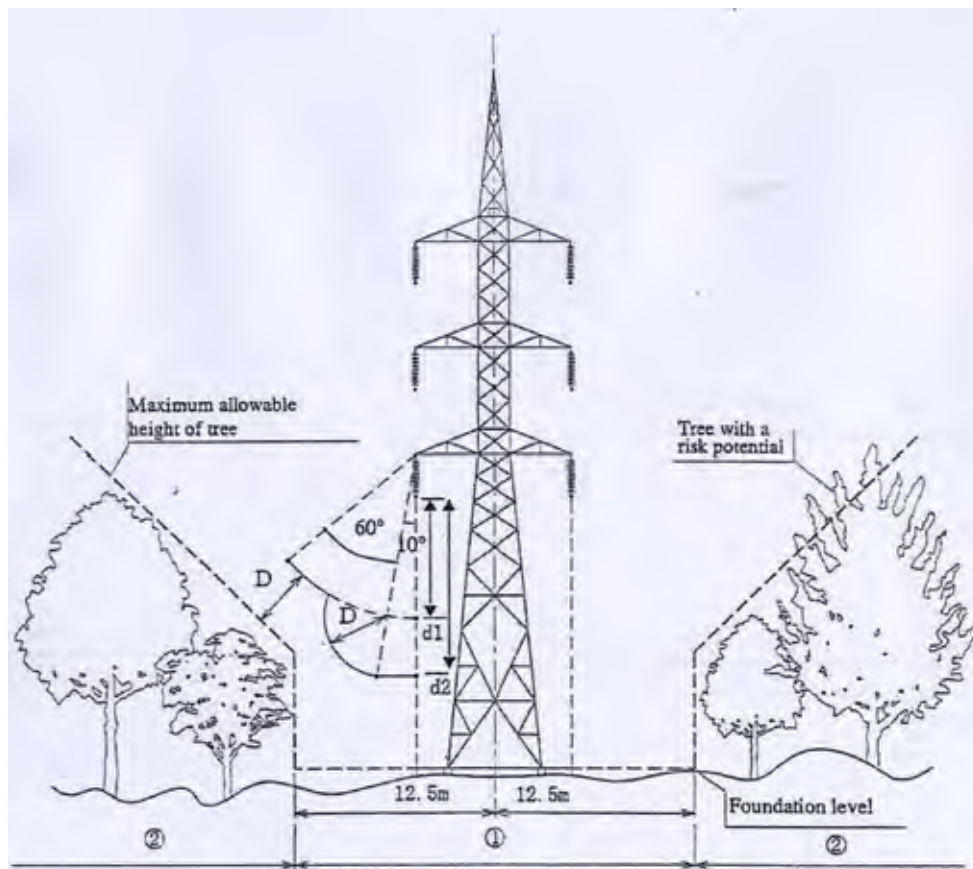


Figure 2-2 ROW for 115kV Transmission line (Source: EDL 2009)

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 ²	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
Pakbo		
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
Taothan		
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
Items	Unit	Q'ty
Saravan		
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 (m²) = 4,300 m².

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 m³ and 12 m³ of soil will be excavated from each tower base, resulting in a total of approximately 6,000 m³ 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^{**}: \$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).

^{**} 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		
Detail Design Stage (by consultant)																																								
Contract signed with the Consultants	▲																																							
Preliminary route survey and soil boring		■	■	■	■																																			
Detail design				■	■	■	■																																	
Preparation of Bid Document						■	■	■																																
Bid and Contract with Contractors																																								
Bid announcement								▲																																
Preparation of Bid document by contractors									□	□	□																													
Bid opening and evaluation											■	■																												
Contract negotiation and signed with contractors												■	■																											
Works for Transmission lines																																								
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																																								■
Works for Substation Facilities																																								
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



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).

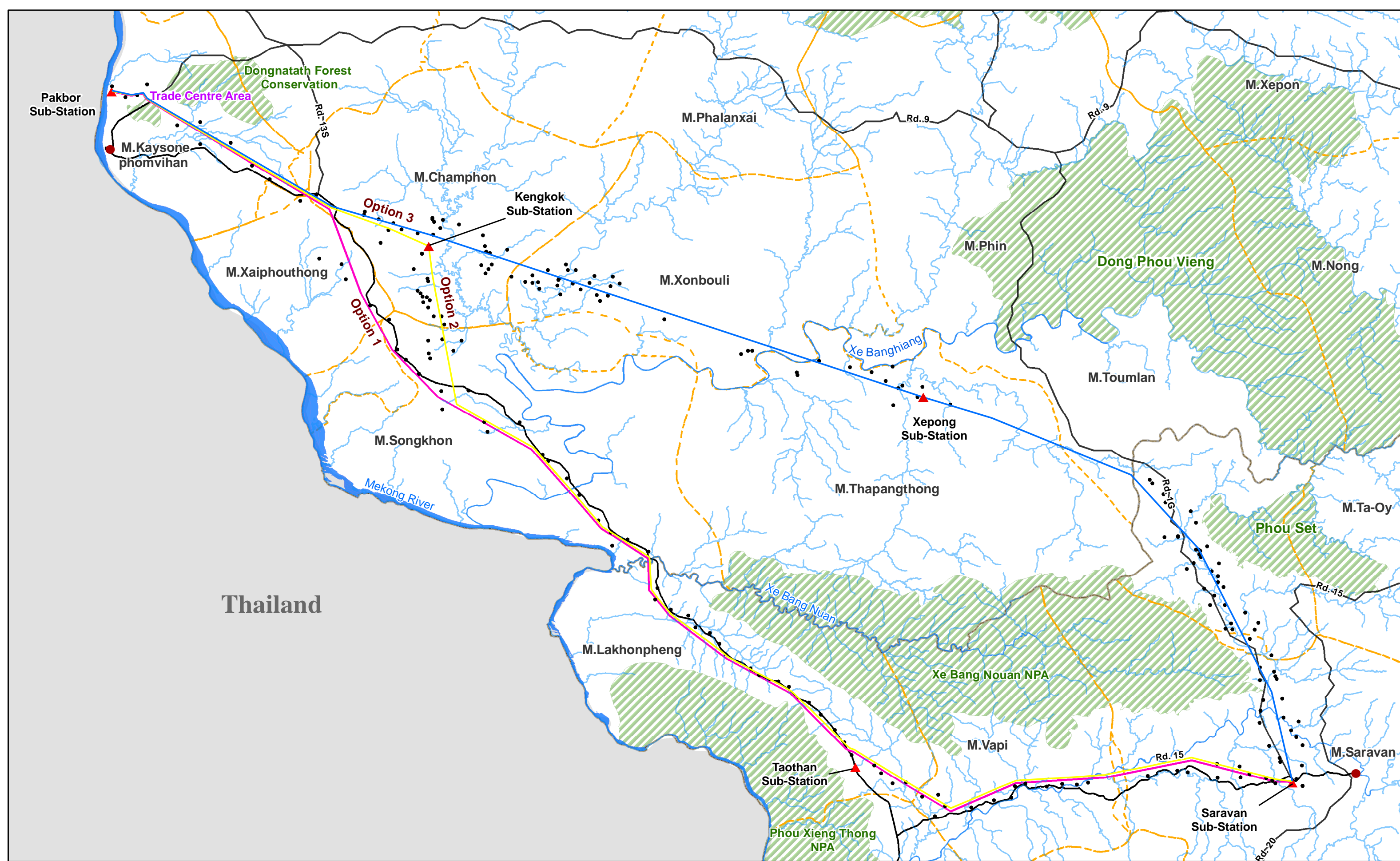


Figure 3.1 Alternative Transmission Line Routes

- | | | | | | | | |
|--|-------------------------|--|------------|--|-----------------|--|---|
| | 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