Draft Initial Environmental Examination

January 2012

LAO: NAM NGIEP 1 TRANSMISSION LINE

Prepared by The Kansai Electric Power Company, Inc. EGAT International Company, Ltd. and Lao Holding State Enterprise for the Asian Development Bank.

ABBREVIATIONS

ACSR/GA	–	Aluminium Conductor Steel Reinforced, using Class A zinc-coated steel wire
ADB	–	Asian Development Bank
AM	–	Accountability Mechanism
APs	–	Affected Peoples
APHA	–	American Public Health Association
ASTM	–	American Society for Testing and Materials
AWWA	–	American Water Works Association
BCS	–	Battery Charging Station
CA	–	Concession Agreement
CA	–	Construction Area
CDEP	–	Committee for Development of Electric Power
CFRD	–	Concrete Faced Rockfill Dam
CPC	–	Committee for Planning and Cooperation
DAFO	–	District Agriculture Forestry Office
DCC	–	District Coordination Committees
DDF	–	Dry Dipterocarp Forest
DEF	–	Dry Evergreen Forest
DGRC	–	District Grievance Redress Committees
DHO	–	District Health Offic
DMH	–	Department of Meteorology and Hydrology
DOE	–	Department of Electricity
EA	–	Environmental Assessment
ECCD	–	Childhood Care for Development
EFOs	–	Environmental Field Officers
EGAT	–	Electricity Generating Authority of Thailand
EIA	–	Environmental Impact Assessment
EdL	–	Electricité du Lao
EM	–	Environmental Manager
EMC	–	Environmental Management Committee
EMMP	–	Environmental Management & Monitoring Plan
EMO	–	Environmental Monitoring office
EMP	–	Environmental Management Plan
EMU	–	Environmental Management Unit
EPF	–	Environmental Protection Fund
EPL	–	Environmental Protection Law
ERIC	–	Environmental Research Institute of Chulalongkorn University
ESD	–	Environment and Social Division
ESMMU	–	Environmental and Social Management Monitoring Unit
FIMC	–	Foreign Investment Management Committee
FS, F/S	–	Feasibility Study
GA	–	Grassland Area

GIS	–	Geographic Information System
GOL	–	Government of Lao PDR
GPS	–	Global Positioning System
GRC	–	Grievance Redress Committees
GSW	–	Green Sand and Molding Waste
HEPP	–	Hydroelectric Power Project
IEE	–	Initial Environmental Examination
IPB	–	Isolate Phase Bus
IPP	–	Independent Power Producer
IUCN	–	International Union for Conservation of Nature & Natural Resources
JBIC	–	Japan Bank for International Cooperation
JICA	–	Japan International Cooperation Agency
JSC	–	Joint Steering Committee
KANSAI	–	The Kansai Electric Power Co.,Inc.
LAN	–	Local Area Network
LANDSAT	–	Land - Use Satellite
Lao PDR	–	Lao People's Democratic Republic
LECS	–	Lao Expenditure and Consumption Surveys
LFNC	–	Lao Front for National Construction
LNCE	–	Lao National Committee for Energy
LWU	–	Lao Women's Union
MAF	–	Ministry of Agriculture and Forestry
MCM	–	Multi-Chip Module
MCTPC	–	Ministry of Communication, Transportation, Post and Construction
MDF	–	Mixed Deciduous Forest
MOEM	–	Ministry of Energy and Mining
MIH	–	Ministry of Industry and Handicrafts
MOC	–	Ministry of Commerce
MONRE	–	Ministry of Natural Resources and the Environment
NAFRI	–	National Agriculture and Forestry Research Institute
NBCAs	–	National Biodiversity Conservation Areas
NEAP	–	Nation Environmental Action Plan
NESMC	–	National Environment and Social Management Committee
NGPES	–	Nation Growth and Poverty Eradication Strategy
NNHP-1	–	Nam Ngiep 1 Hydropower Project
NNT	–	Nakai Nam Thuen
NTFPs	–	Non Forest Timber Products
NW-SE	–	Northeast-Southwest
OHGW	–	Overhead Ground Wire
OPGW	–	Optical Grand Wire
PAFO	–	Provincial Agriculture and Forestry Department
PDP	–	Power Development Plan

PESMC	–	Provincial Environment and Social Management Committee
PGRC	–	Provincial Grievance Redress Committees
PHO	–	Provincial Health Office
PMO	–	Prime Minister's Office
PRF	–	Paddy Rice Field
PRMLCRC	–	Provincial Resettlement Management and Living Condition Restoration Committee
PT	–	Plantation Trees
RAP	–	Resettlement Action Plan
RC	–	Resettlement Committee
RCC	–	Roller Compacted Concrete
RMU	–	Resettlement Management Unit
RSL	–	Residual Static Load
RS	–	Resettlement Section
RWG	–	Resettlement Working Group
SCADA	–	Supervisory Control and Data Acquisition
SDP	–	Social Development Plan
SDS	–	Social Development Section
SEU	–	Social Environmental Unit
SHS	–	Solar Home System
SMO	–	Social Management Office
STEA	–	Science, Technology and Environment Agency
UXO	–	Unexploded Ordnance
UF	–	Unstocked Forest
URF	–	Upland Rice Field
VDCC	–	Village Development Coordination Committee
WCMC	–	World Conservation Monitoring Centre
WG	–	Working Group
WLA	–	Wetland Area
WREA	–	Water Resources and Environment Agency

WEIGHTS AND MEASURES

ASL	–	Above Sea Level
B-C, B/C	–	B: Benefit and C: Cost
BOD	–	Biochemical Oxygen Demand
CIF	–	Cost Insurance and Freight
CPI	–	Consumer Price Index
DC	–	District Current
DO	–	Dissolved Oxygen
EL	–	Elevated Level
EL.( ) m	–	meters above sea level
GWh	–	Giga Watt hour (one million watt hour)
ha	–	hectare
kg	–	kilogram

kg/m^2	–	kilogram per square meter
km	–	kilometer
km^2	–	square kilometer meter
kV	–	kilo Volt
kVA	–	kilo Volt Amperes
kW	–	kilo Watt
m	–	meter
m^3	–	cubic meter
m^3/s	–	cubic meter per second
mg/L	–	milligram per Litre
mm	–	millimeter
MVA	–	Short Circuit Capacity ;(MVA=SCC)
MW	–	Mega Watt (one million watt)
^oC	–	degree Celsius
rmp	–	revolutions per minute
SPC	–	Special Purpose Company
sq	–	square
US$	–	US dollar
V	–	Volt
VDC	–	Vertical Deflection Circuit

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ABBREVIATIONS

Lao PDR Agencies	
CDEP	Committee for Development of Electric Power
CPC	Committee for Planning and Cooperation
DAFO	District Agriculture Forestry Office
DMH	Department of Meteorology and Hydrology
DOE	Department of Electricity
EdL	Electricité du Lao
EMUs	Environmental Management Units
EPF	Environmental Protection Fund
FIMC	Foreign Investment Management Committee
GOL	Government of Lao PDR
Lao PDR	Lao People's Democratic Republic
LECS	Lao Expenditure and Consumption Surveys
LFNC	Lao Front for National Construction
LNCE	Lao National Committee for Energy
LWU	Lao Women's Union
MAF	Ministry of Agriculture and Forestry
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JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KANSAI	The Kansai Electric Power Co.,Inc.

ABBREVIATIONS (Continued)

NGOs	Non Governmental Organizations
VUDAA	Vientiane Urban Department Administrative Authority
Unit/Technical Terms	
ASL	Above Sea Level
B-C, B/C	B: Benefit and C: Cost
BOD	Biochemical Oxygen Demand
CIF	Cost Indurance and Freight
CPI	Consumer Price Index
DC	District Current
DO	Dissolved Oxygen
EL	Elevated Level
EL.( ) m	meters above sea level
GWh	Giga Watt hour (one million watt hour)
ha	hectare
kg	kilogram
kg/m^2	kilogram per square meter
km	kilometer
km^2	square kilometer meter
kV	kilo Volt
kVA	kilo Volt Amperes
kW	kilo Watt
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m^3	cubic meter
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UXO	Unexploded Ordnance
UF	Unstocked Forest
URF	Upland Rice Field
VDCC	Village Development Coordination Committee
WLA	Wetland Area
WG	Working Group

CHAPTER 1

INTRODUCTION

1.1 REPORT INTRODUCTION

The initial environmental examination (IEE) for the 230 kV and 115 kV of Nam Ngiep 1 Hydropower Transmission Lines presents background technical and environmental information, including an environmental management plan (EMP) for project development. The IEE and EMP are based on the existing environment and on the project conceptual design and construction plans.

Construction of transmission lines is to be in keeping with national development goals to meet energy trading and local use, as authorized by the Department of Electricity (DOE), Ministry of Energy and Mines (MOEM).

1.2 PROJECT OWNER

The project owner will be Nam Ngiep1 Power Co., Ltd., whose main office is located in Vientiane. The company is to be incorporated by three developers; Electricity Generation Authority of Thailand (EGAT International Co., Ltd.), the Kansai Electric Power Co. Inc. (Kansai) and Lao Holding State Enterprise (LHSE). Under the terms of the concession between the Lao PDR and the developers to construct the Nam Ngiep 1 hydropower plant, an IEE study must be prepared and reported to the Water Resources and Environment Agency (WREA) of the Lao PDR.

The Environmental Research Institute of Chulalongkorn University (ERIC) committed to conduct statements of environmental assessment (EA) of the hydropower plant and the IEE of the transmission lines that will distribute energy to terminal substations in Nabong and Pakxan. With respect to local legal practices, the National Consulting Company (NCC) has conducted field investigations and public consultations for this initial examination.

1.3 BACKGROUND OF PROJECT DEVELOPMENT

The DOE requires official approval of an environmental assessment (EA) statement for electricity development projects by the Ministry of Natural Resources and Environment (MONRE) previously the Water Resources and Environment Agency (WREA).

The EA statement must consist of environmental effects on the physical, biological, and socio-economic and cultural environments, as well as measures to prevent or mitigate any adverse environmental effects that are expected from the design, construction, operation and closure of the project. According to DOE's regulations as declared in 2001, an investor in a power generation project must apply for the permits to build the hydropower plant before starting any of its activities that may cause impacts to the environment.

Investigation of the routing plan for the high-voltage 230 kV and 115 kV transmission lines from generators installed at the main dam and the re-regulation dam to its distribution units is required to ensure that the proposed routing has been designed with sufficient concern for environmental issues. While most previous hydropower projects that consisted of dams and reservoirs were required to carry out an environmental impact assessment (EIA), their associated transmission systems were generally considered separately for an IEE. For instance, in 2003 JBIC explicitly stated that power transmission and distribution lines were classified as sensitive development, which would be required to provide a report of EIA if those projects involved large-scale logging. Thus, depending on the anticipated environmental impacts, transmission line development could require either an IEE or an EIA. However, given their scope, most transmission line projects generally required only the IEE.

To maximize the benefit from the Nam Ngiep 1 Hydropower Project (NNHP 1), a transmission line system of 230 kV must be constructed to transmit electrical power from a hydropower house to the Nabong collector substation and a transmission line system of 115 kV must be constructed to transmit power to the Pakxan substation. According to the feasibility studies by Nippon Koei (2001 and 2002), alternative routes of the transmission lines were described with DOE consent. The IEE is required for the Nam Ngiep transmission line project in order to have the environmental certificate issued before the hydropower project can commence.

This report presents details of the IEE study for the NNHP 1, including:

1) Consideration of related environmental issues,
2) Description of the objectives of the study,
3) Determination of the scope of the study, and
4) Identification of the methods of study for each aspect. Progress in reviewing the data is presented, as well as results from the first reconnaissance trip.

1.4 OBJECTIVES OF STUDY

The objectives of this study were clarified so it could be prepared as the IEE report for the two transmission line systems: the 230 kV line originating from the main dam of the Nam Ngiep 1 Hydropower site to the Nabong collector substation and the 115 kV line originating from the re-regulation dam southeast of the main dam to the Pakxan substation. The report of IEE aims to make an initial examination of the potential impacts of the project conceptual designs on the existing environmental components, as well as to clarify whether the project will also require an environmental impact assessment (EIA) of potential adverse impacts. In order to fulfill the main tasks of IEE, these objectives were defined:

1) To identify and describe the main environmental and social resources of the areas in and adjacent to the proposed transmission line routes.
2) To identify the nature of any adverse impacts that could occur from the development of the transmission lines, in the absence of environmental protection measures. Adverse impacts were considered for both the construction and the operation phases of the transmission lines.
3) To make an initial examination of the magnitude, scale, and significance of these potential adverse impacts.
4) To recommend preliminary mitigation measures required to avoid or if not possible to minimize such adverse impacts.
5) If deemed necessary, to identify the scope of work to be carried out for a more detailed EIA for this transmission line development.

1.5 SCOPE OF STUDY

The study consists of activities recommended in the Environmental Management Standards issued by the DOE. It consists of four main components:

1) A description of the existing environment in the project area. This involves review of the designs of the transmission line systems and compilation of environmental data associated with the proposed transmission line routes. Particular focus is given to the data and description of baseline conditions that are important to the prediction of impacts and to the determination of measures to avoid and/or minimize anticipated adverse impacts.
2) An evaluation of impact levels and feasible mitigation measures. This study used methods that are standard acceptable EIA procedures for the preliminary evaluation of impact levels for each environmental aspect. Where impacts were quantifiable or had the potential to be observable, measures to prevent or minimize such impacts were identified.
3) Preparation for the public involvement process. This study involved a series of meetings with the public and relevant authorities in the project area to disseminate information about the project and to receive comments and suggestions on issues of concern as well as suggestions for mitigation measures.
4) Preparation and presentation of the IEE report. The study has resulted in the IEE report and associated visual presentations that comply with the requirements of environmental management standards issued by the DOE, Lao PDR.

1.6 STUDY AREA

Both the 230 kV and the 115 kV transmission lines run parallel from the dam sites southeastward, and then split into two separate routes to areas near the Mekong River. The 230 kV line is proposed to run for about 125 kilometers from the main dam to the Nabong substation. The 115 kV line is proposed to run 40 kilometers, starting at the re-regulation dam and ending at the Pakxan substation.

The two lines run parallel from the dam sites south to around the 11th kilometer, where they both continue to run southeast but become gradually more spaced apart. They separate to distinct routes at Ban Nam Pa at the 25th kilometer. From there, the 230 kV line runs to the

west along a narrow strip of flood plain along the Mekong River and ends at the Nabong Substation. The 115 kV line goes along a generally southeasterly route and ends at the Pakxan substation. (Figure 1-1)

Figure 1-1 Alignment of the 230 kV and 115 kV transmission lines.

The study was conducted for general environmental impacts and compensation estimation. The environmental study area was for the evaluation of potential environmental impacts and its corridor along those alignments was wider than the area required for engineering safety. The environmental study areas were defined as an 80 meter wide swath along the 230 kV alignment or 40 meters on either side of the central alignment, while for the 115 kV alignment the area covered was a 50 meter swath or 25 meters on either side. Compensation calculations, however, were based on a 25 meter swath, reflecting the expected width of the right of way. Other nearby sites and their surroundings were included in the study if they were considered important or relevant to the particular environmental component being assessed.

1.7 METHODOLOGY

1.7.1 PRE-SURVEY

Before conducting the field survey, key information about the study areas was reviewed and assessed. For example, household lists, especially of those people who will be by the project, were obtained from the village heads. Other critical data such as the total population, total number of houses and households, and the amounts of land and names of the landowners was also collected. Whenever possible, household heads were interviewed, but when the household heads were absent, either at work or with some other engagement, another reliable senior family member was interviewed instead. To keep the interviewees from being influenced by others, each interview session was held separately.

1.7.2 FIELD SURVEY

The survey to collect social and scientific data was conducted in the proposed study areas and in the vicinity of the proposed alignments of the transmission lines. The field survey consisted of interviews and observation. All field survey activities were under the direction of a survey specialist and the project team leader. These included village consultations, liaison with local authorities, interviews, and investigations. The response of the local people, in particular their perception of the proposed project, was of particular concern. Discussion sessions were also held during the consultations. At all times during the consultations and discussion sessions, particular effort was made so the villagers understood that the project, as proposed, was not being imposed upon them, and that they had the right to determine the outcome of the project.

Prior to the arrival of the field survey units, the local district authorities in the project areas were officially notified about the objectives, scope and duration of the fieldwork activities to be conducted in their districts.

Some of the primary social, economic and cultural data required for the study was collected through questionnaires during field survey. Less structured interviews were also conducted within the project sites to gain as broad an understanding of conditions as possible. The survey covered a variety of social, economic, and environmental aspects, including local villagers' attitudes about the potential impacts of the project on land and forest use and on income generating activities, and information about land acquisition, the extent and types of

wildlife, possible resettlement and compensation, and the status of unexploded ordinance (UXO) in the project area.

Data on the physical and biological environment around the transmission lines were also collected during the field survey. Methods of data collection included interviews in addition to scientific observations such as laboratory analysis to obtain characteristics of surface and ground water, records of flora and fauna including rare or endangered species, and a listing of protected areas. Some of the relevant data were available from previous studies and reports and from publications by government agencies.

1.8 CHALLENGES OF STUDY

Collection of data for the study faced two obstacles.

1) First, the proposed transmission line alignment given at the time of the study was a line drawn on 1: 50,000 maps. This very rough indication of where the transmission lines would run made it difficult to identify accurately the actual physical location where the transmission lines will be placed. This meant that some of the data collected might not be within the actual impacted areas. This affects somewhat the accuracy of the data. Although there are likely to be some changes in alignment when final designs are made, the impacts would not be significantly different than those found in this study.
2) Second, the study was conducted during the rice harvest season in October 2007, which meant that the majority of villagers were preoccupied with the harvesting. Taking time to answer questionnaires or participate in consultation sessions or discussion groups was a burden for many of them. As a result, most of the interviews had to be conducted at night, after people finished their work.

There was also some difficulty in contacting and interviewing the landowners of a few of the affected properties in cases when those owners lived in distant villages.

CHAPTER 2

DESCRIPTION OF THE TRANSMISSON LINES OF THE PROJECT

2.1 GENERAL BACKGROUND

The Nam Ngiep 1 Hydroelectric Power Project was planned for implementation by mostly private sector funds. The feasibility study for phase II of the project, prepared by JICA, recommended that the institutional structure for the project be a consortium of private companies or the private sector investing in a project company, with a concession agreement with the Government of Lao PDR (GOL). This company, recently named the Nam Ngiep1 Power Co., Ltd., was established under shareholder agreement in order to sign loan agreements with lenders and start work on the project.

The work, including engineering, procurement and construction of the project, was planned as a turnkey contract. Detailed design, construction plans, commissioning, operation and maintenance are included in the company objectives. The project company is to pay off loans and recover its investment from power sales. At the end of the concession period, the project facilities would be transferred to GOL under specified conditions, either at zero value or at an amount agreed to in the concession agreement.

The dam, its reservoir, and transmission lines will cover three provinces: Bolikhamxay, Vientiane, and Xieng Khouang, all in the central part of Lao PDR. It is designed at a height of 148 m on the Nam Ngiep River, a tributary of the Mekong River. Electrical capacity would be 272 MW generated at a main power station and annual power generation of 1,515 GWh. A re-regulation power station with 18 MW capacity and annual power generation of 105 GWh would be located downstream of the main power station. The project is developed as an IPP business, with most of the produced power exported to Thailand. Some of the production would also be traded to Electric du Laos (EDL) to contribute to rural electrification.

2.2 TRANSMISSION ALIGNMENT

The 230 kV transmission line for Nam Ngiep 1 is planned for 125 km, connecting the main dam with the Nabong collector substation, while the 115 kV single circuit transmission line would run for 40 km, connecting the proposed re-regulation dam to the Pakxan substation (Figures 2-1 to 2-8).

2.3 ENVIRONMENT FOR DESIGN

The physical topography along the proposed alignment of the transmission lines varies considerably. The transmission lines originate from the project dam sites, run alongside each other before splitting to separate directions, and ending at different sub-stations. The 230 kV line from the powerhouse at the main dam and the 115 kV line from the power house at the re-regulation dam run eastward parallel to each other, about 35 m apart, through the mountains until km 3.7 of the alignment. From here, they continue parallel to the southeast, crossing the Nam Ngiep River before curving to the south at km 11.1 and cross the Nam Ngiep once more. At Ban Nam Pa, km 24.8, the lines separate to different routes. The topography of the route from the dam to Ban Nam Pa is slightly hilly, since the lines follow the foot of the mountain range. At Ban Nam Pa and for the rest of both routes, the topography is generally flat or slightly undulating over lowlands. The 230 kV transmission line curves generally west and southwest to the Nabong sub-station; while the 115 kV transmission line runs generally southeast and south to the Pakxan sub-station.

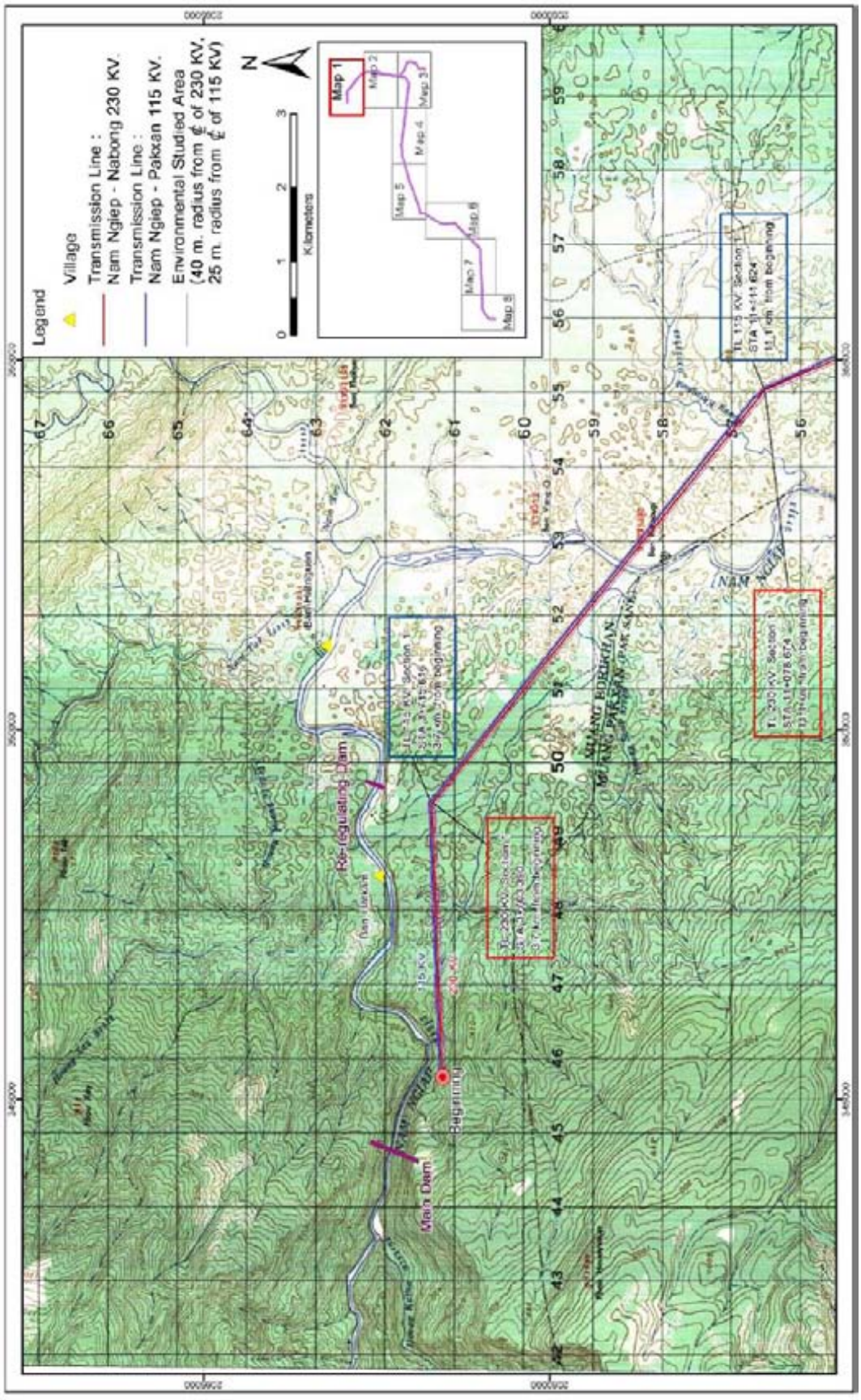


Figure 2-1 Proposed alignment of 230 kV and 115 kV transmission lines: beginning of the lines to km 12.

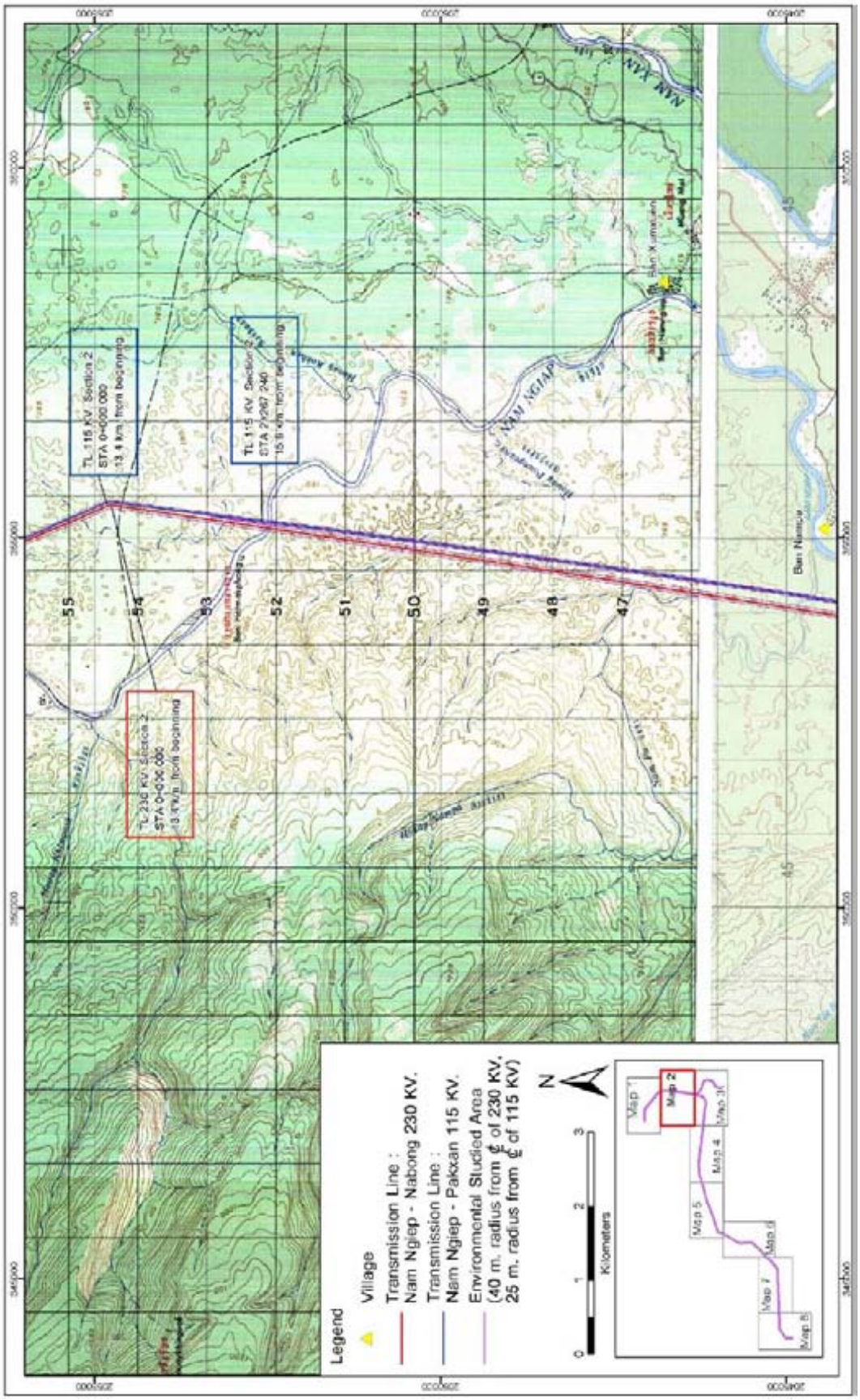


Figure 2-2 Proposed alignment of 230 kV and 115 kV transmission lines: km 12 to km 23.

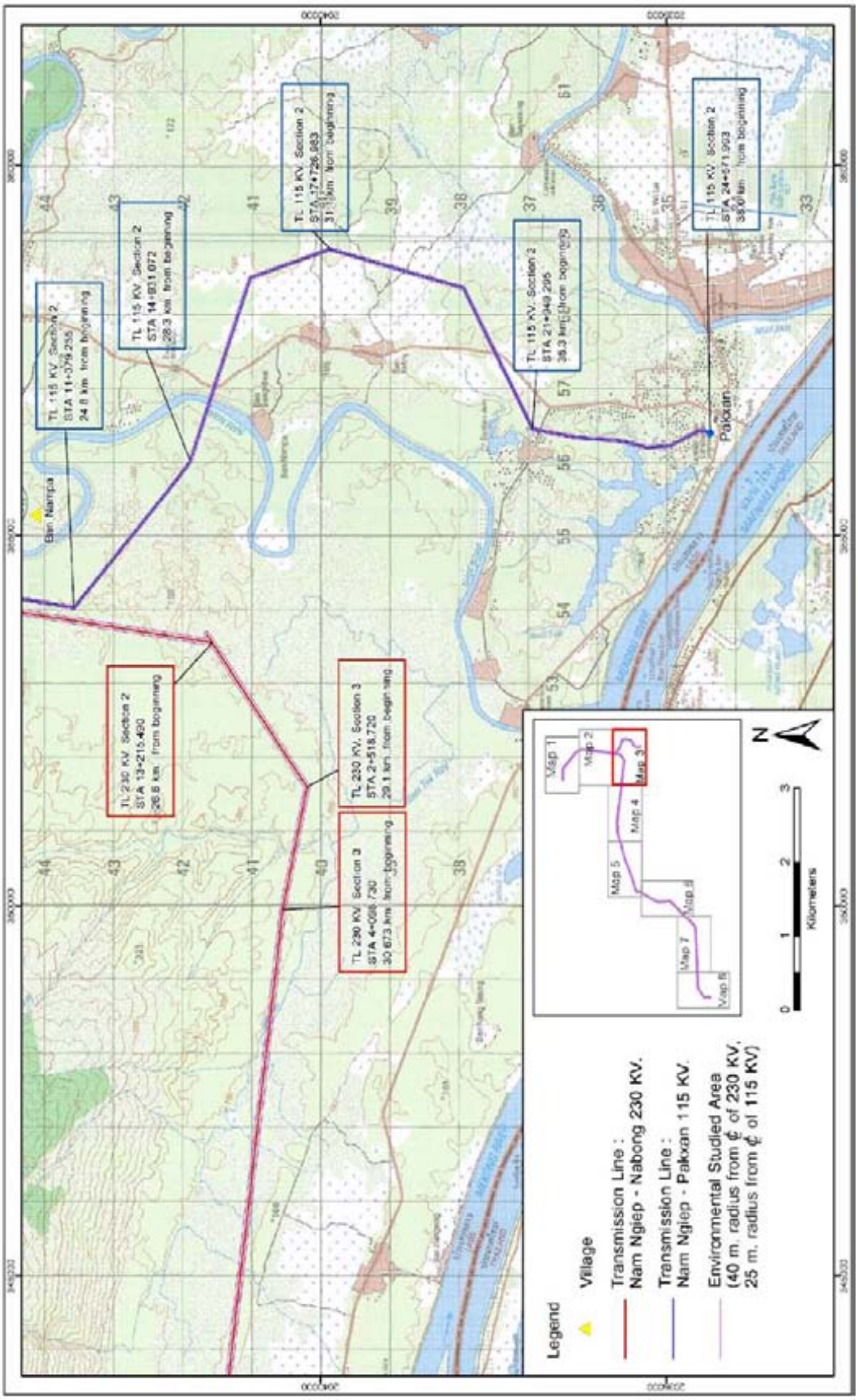


Figure 2-3 Proposed alignment of 230 kV transmission line: km 23 to km 37, and 115 kV transmission line: km 23 to km 40.

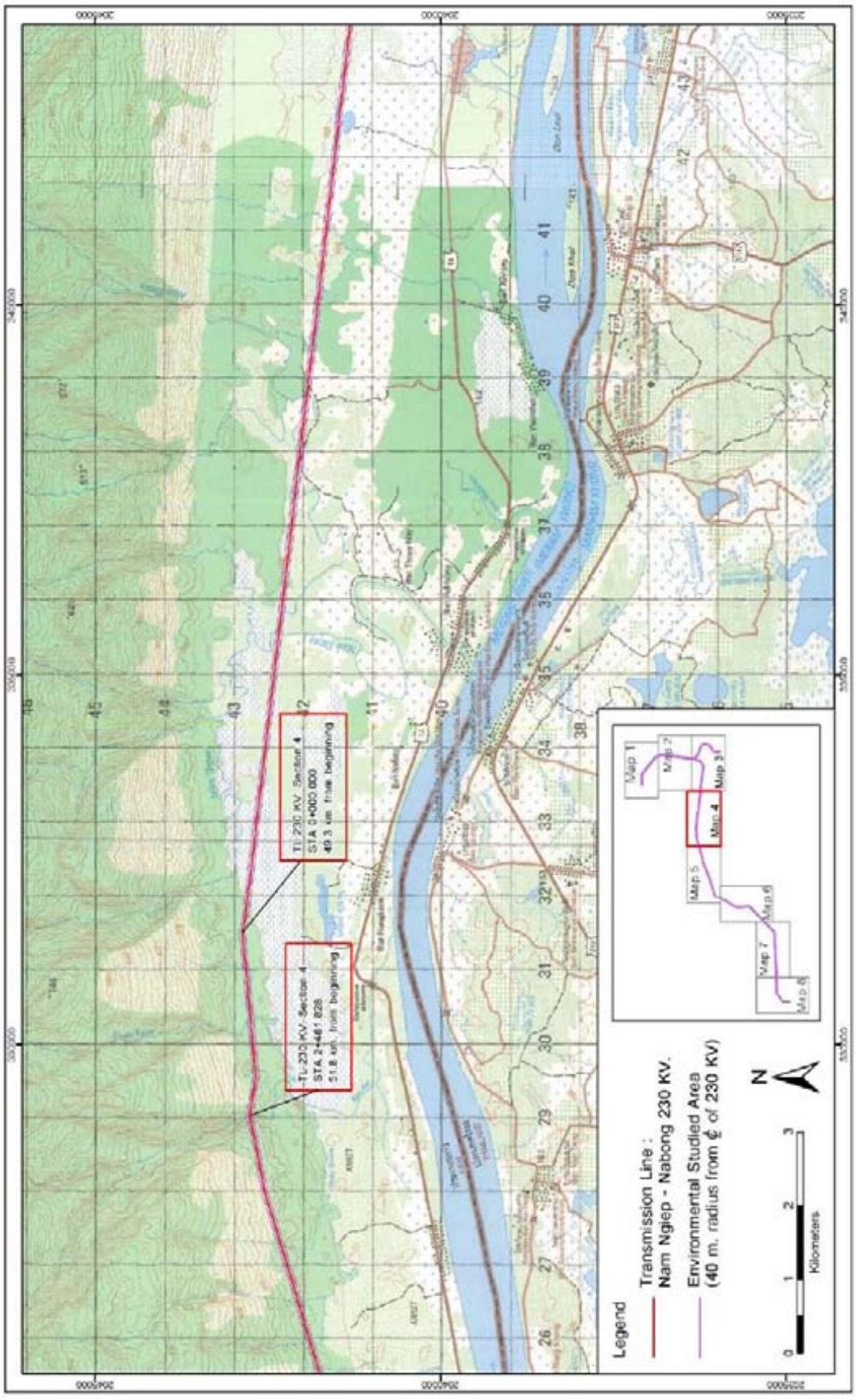


Figure 2-4 Proposed alignment of 230 kV transmission line: km 37 to km 55.

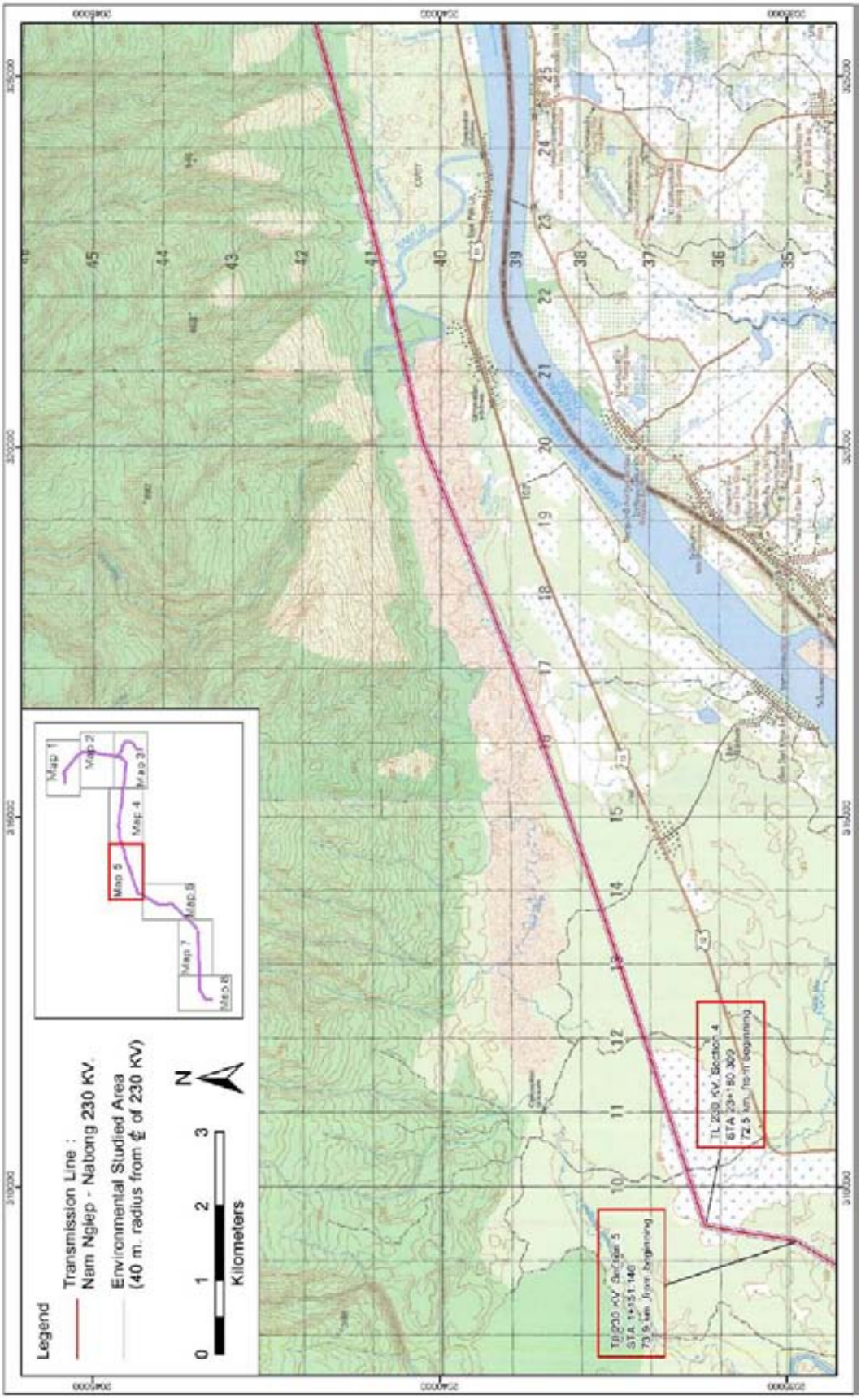


Figure 2-5 Proposed alignment of 230 kV transmission line: km 55 to km 74.

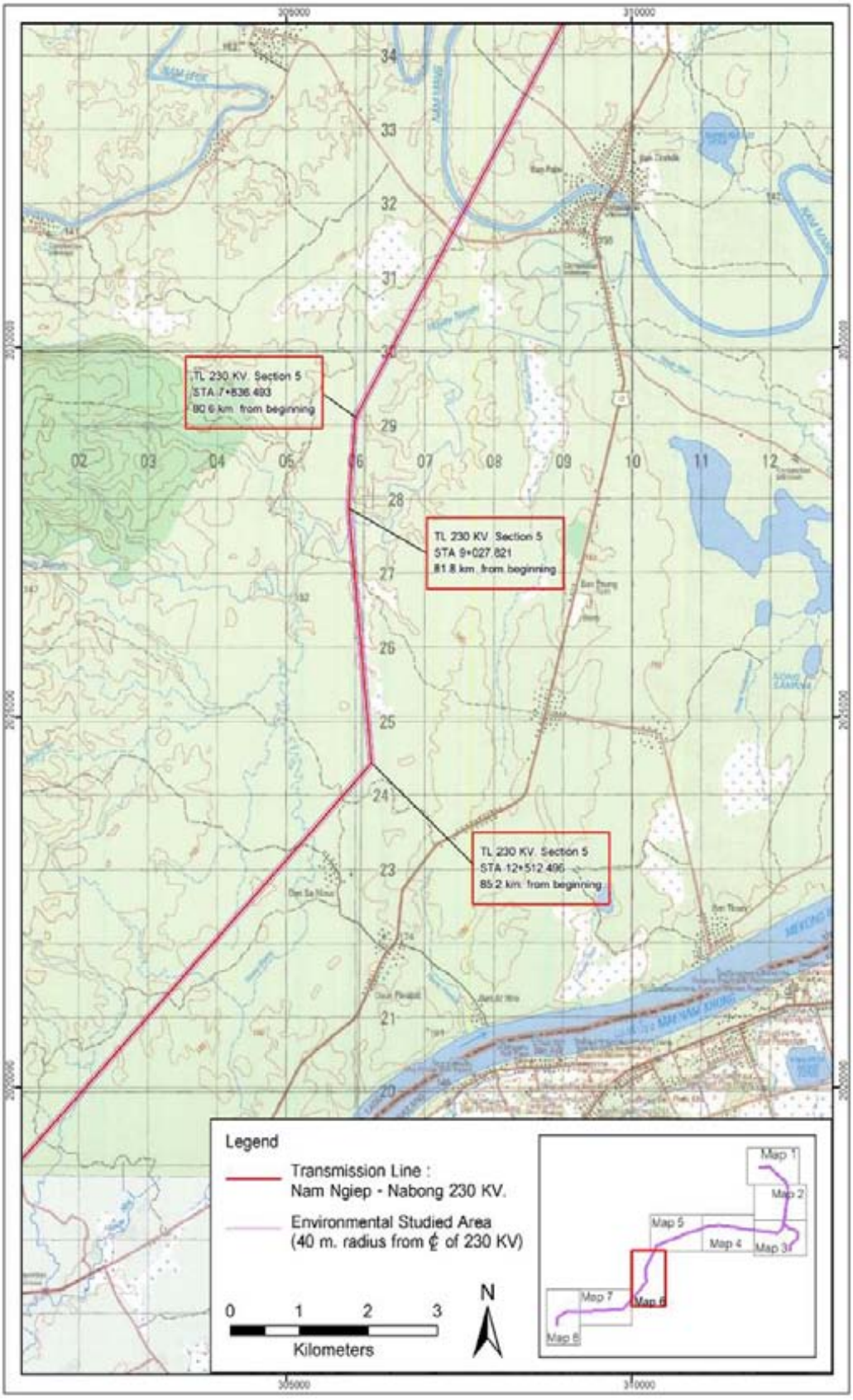


Figure 2-6 Proposed alignment of 230 kV transmission line: km 74 to km 92.

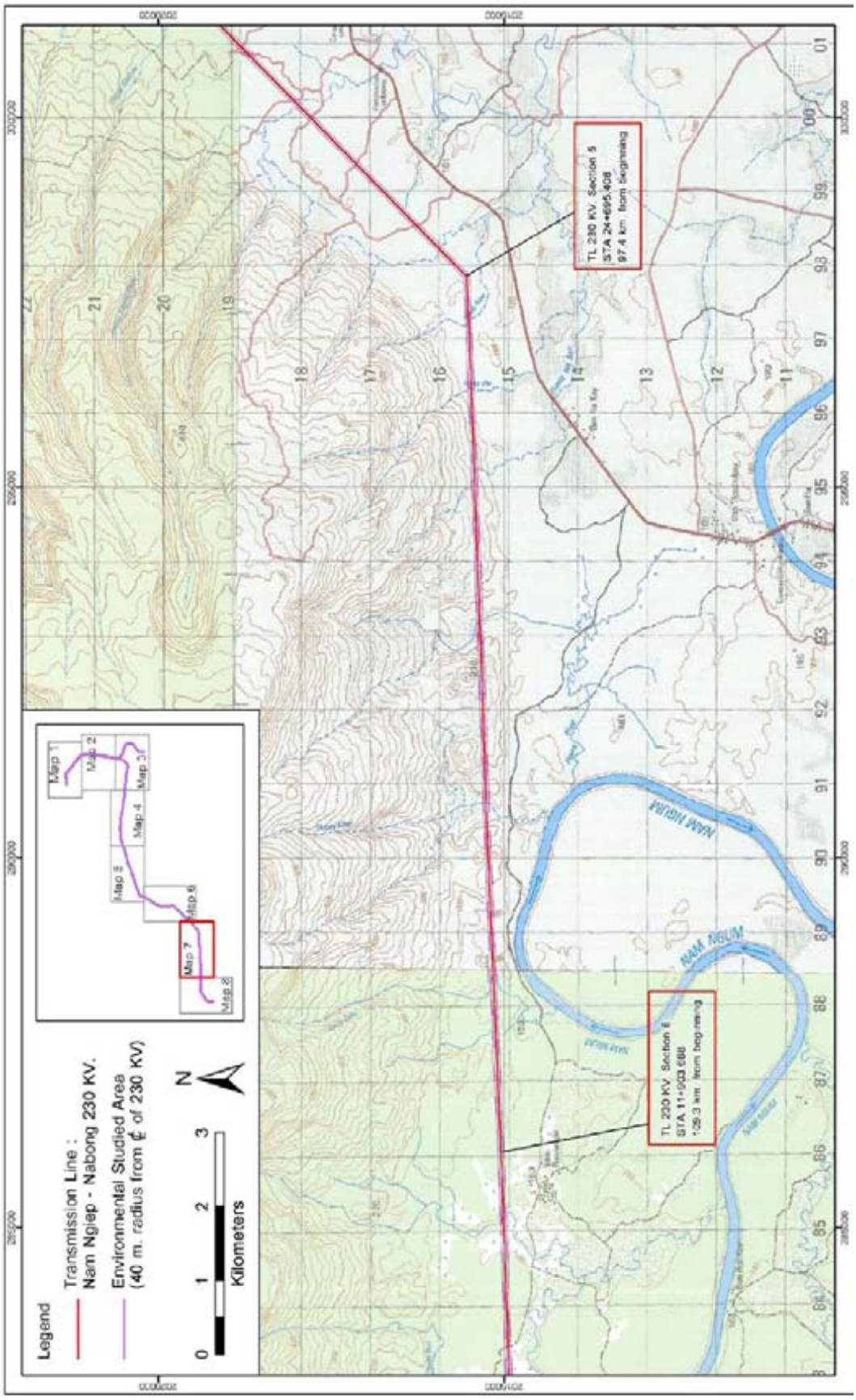


Figure 2-7 Proposed alignment of 230 kV transmission line: km 92 to km 112.

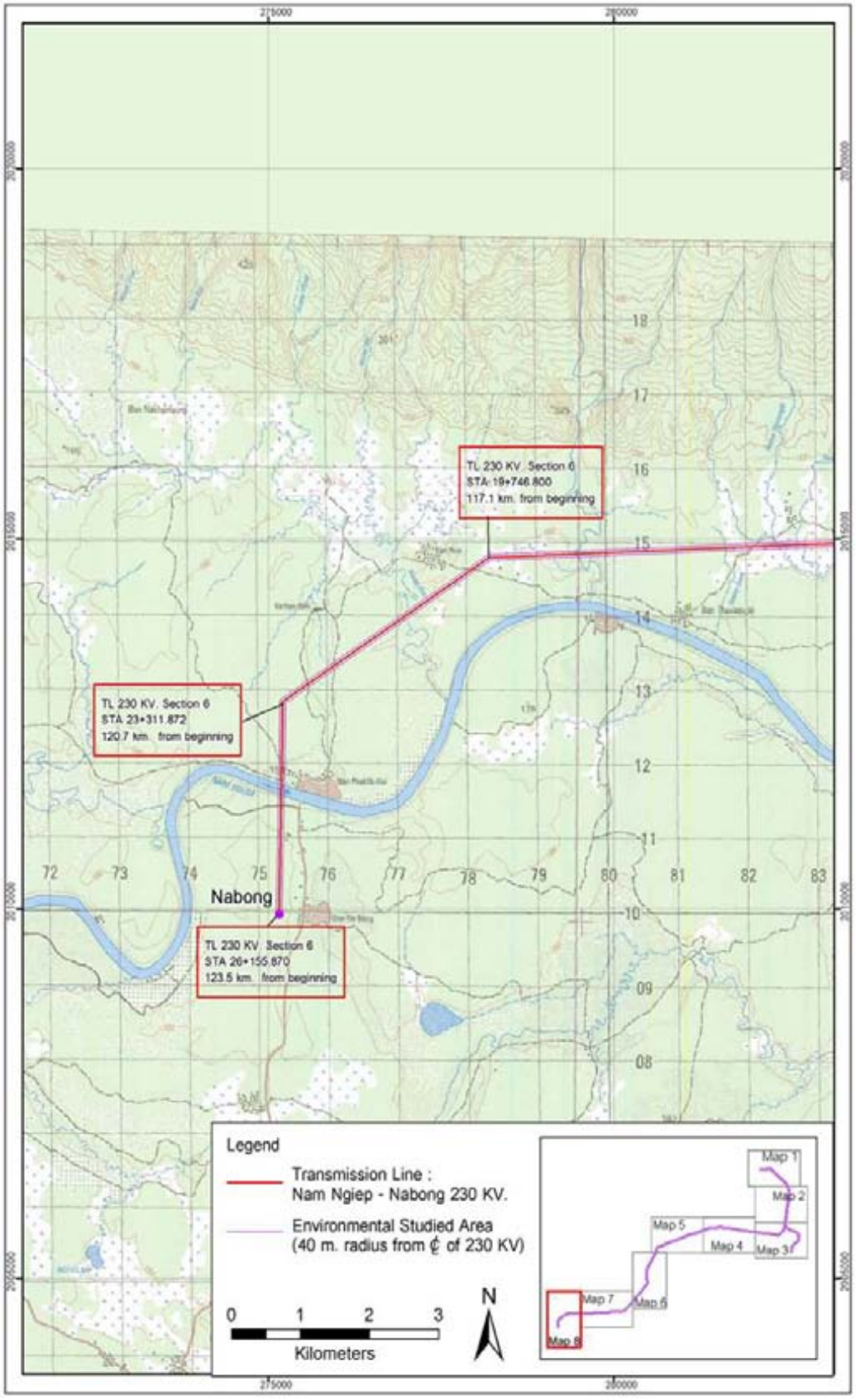


Figure 2-8 Proposed alignment of 230 kV transmission line: km 112 to km 124.

2.3.1 ATMOSPHERIC TEMPERATURES

The proposed transmission line project is located in an area characterized as a monsoon-dominant climate, comprised of distinct tropical wet and dry seasons. Approximately 70 to 80% of the annual rainfall occurs during the southwest monsoon from mid-May to late September or early October. The northeast monsoon leads to drier and cooler conditions from early November to March. A hot season commonly lasts from April to early May.

Air temperatures in the project area would be highest in April, with an average daily maximum of 37°C. During the coolest months of December and January, the average daily maximum is 28 to 30°C. Table 2-1 gives the average temperature data for Pakxan District, Bolikhamxay Province.

Table 2-1 Climate Data at Pakxan District, Bolikhamxay Province

Temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Max. (^{o}C)	27.0	28.9	30.9	35.5	37.4	35.9	35.4	35.6	29.9	27.0	28.8	25.1	31.45
Min. ^{o}C)	11.7	13.9	17.9	20.6	22.7	23.2	23.7	22.1	19.5	18.3	17.1	15.2	18.83

Sources: Department of Meteorology and Hydrology (DMH 2005)

- Maximum air temperature 45°C
- Minimum air temperature 0°C
- Annual mean air temperature 25°C

2.3.2 WIND VELOCITY

The 50 year hourly mean design wind speed of 30 m/s at 10 m height has been applied for this Project.

2.3.3 ANNUAL RAINFALL

The country is characterized by a tropical climate with two distinct seasons: the rainy season from the beginning of May to end of September and the dry season from October through April. Maximum annual rainfall in the country has been recorded at 4,000 mm. While the average annual rainfall in Pakxan is about 2,000 mm, the maximum of 4,000 was taken into consideration when determining the construction schedule.

2.3.4 LIGHTNING (ISOKERAUNIC LEVEL)

Maximum and mean thunderstorm days per year in the project areas were recorded respectively as 40 and 28, in contrast with the maximum of 141 days recorded over the country. The iskeraunic level in the project area was assumed to be 140.

2.3.5 SEISMIC ACTIVITY

Lao PDR has not been a seismically active country, so the seismic load of 0.1G was considered in the design of the substation.

2.4 GENERAL CONDITIONS OF TRANSMISSION LINES AND SUBSTATIONS

This Project is to be on a turnkey basis, including the survey, design, manufacture, inspecting and testing before shipment, insurance, packing, shipment, delivery to port, unloading, customs clearing, transportation from the port to the site, complete erection, site testing and commissioning of the facilities as described herein.

2.4.1 TRANSMISSION LINES

Component of transmission lines to be supplied and constructed under this mission will be:

- The 230 kV, 50 Hz, 3 phases, double circuit line on self-supporting lattice steel structures, using 1272 MCM ACSR/GA conductor with one 3/8 inch nominal diameter high strength grade galvanized steel ground wire and one 24-core OPGW, extending from the Nam Ngiep (main dam) to Nabong substation, approximately 125 kilometers in length. The work for this transmission line includes installation of the tension insulator sets at Gantry and the lead-in to the switchyard equipment at the Nam Ngiep, and supply and installation of optical OPGW and joint box for the OPGW at the nearest towers or Gantry at switchyard of the Nam Ngiep Power Plant and Nabong substation.
- The 115 kV, 50 Hz, 3 phases, single circuit line on self-supporting lattice steel structures, using 336.4 MCM ACSR/GA (LINNET) conductor with one 24-core OPGW, extending from the Nam Ngiep (re-regulation dam) to Pakxan

substation, approximately 40 km in length. The work for this transmission line also includes installation of the tension insulator sets at Gantry and the lead-in to the switchyard equipment at the Nam Ngiep, and supply and installation of optical OPGW and joint box for OPGW at nearest towers or Gantry from the Nam Ngiep Power Plant. During the construction phase, the contractor shall be responsible for design, supply and construction of line crossing between this 115 kV transmission line and the 500 kV Nabong–Nam Theun 1 transmission line which was carried out under the Nam Theun 1 Hydropower Project.

Furthermore, for the portion of line approaching the Pakxan substation, the contractor shall perform stringing of conductors on the lower circuit of four-circuit steel towers of which the upper circuits would be energized.

2.4.2 SUBSTATIONS

The scope of work required for supply and construction for extension of the 115 kV Pakxan substation shall be:

- Construction of 115 kV outdoor substation with main and transfer bus arrangement comprising one set of line feeder bay to Nam Ngiep
- Supply and installation of one set of control panel and line protection panel
- Supply and installation of fiber optic equipment
- Any modification and interfacing works to the existing control, metering and protection panels required for incorporating the above new equipment
- Supply and installation of any control and protection equipment that requires the modification to the existing system in order to complete control and protection function.
- Supply and installation of miscellaneous materials and goods required for extension of outdoor switchgear, such as gantry structures and beams, overhead bus conductors, earth wires, insulator and fittings, etc.
- Site preparation, crushed rock surfacing and other associated civil works required for extension of the existing switchyard

- The associated civil works such as equipment foundations, cable trench, drainage system, wire mesh fences, lamp post structure and foundation, wire and earth works, and others
- Other civil works and mechanical works required for the substation

The contractor shall be responsible for the design, supply and erection of all facilities so that the complete function is guaranteed, without the necessity for any additional works to be initiated by the owner, unless specifically excluded in these bidding documents or agreed upon in writing. This includes manufacture, equipment testing, insurance, transportation, and delivery to site, erection, commissioning and any other necessary works.

2.5 TRANSMISSION LINE DESIGN

2.5.1 GROUND CLEARANCE

The most severe state for ground clearance of conductors could occur when the conductor's temperature rises to 75^{o}C under still air conditions. For this Project, the minimum heights of the conductors above ground are specified in Table 2-2.

Table 2-2 Minimum Specifications for heights of Conductors

Minimum vertical clearances (m)	**115 kV**	**230 kV**
Streets/highways	10.00	10.00
Cultivated areas, ground accessible by vehicles	7.50	8.40
Ground accessible to pedestrians only	7.50	8.40
Crossing navigable river (above maximum water surface)	10.50	11.50
Telecommunication lines	4.50	5.20
Distribution lines 33 kV and shield wires	2.48	3.50
Power lines 115 kV	2.90	4.30
Power lines 230 kV	-	5.80

2.5.2 SIDE CLEARANCE

For any portion of the transmission line that has another transmission line running parallel to it, side clearance required between two transmission lines shall be:

- Between 115 kV and 230 kV transmission lines 12 + 20 meters from center line to center line
- Between 230 kV and 230 kV transmission lines 20 + 20 meters from center line to center line

Total area required for placement of the transmission lines (230 kV and 115 kV) tower was 2.2 ha computed by the following method.

- An estimated 291 lattice tower sites are needed for the 230 kV line, based on an average distance of 430 m between towers site for this 125 km transmission route. The total land acquisition for this portion of the route would be 23,571 m^2 or about 2.4 ha, based on the criteria design of an above –ground base of tower plus 1 m to accommodate the foundations.
- The 40 km section of the 115 kV transmission line requires 114 towers, based on an average of 350 m between towers. The total land acquisition for this section of the transmission line would be 4,104 m^2 or about 0.4 ha, based on the width of anticipated tower base plus 1 m of each side to accommodate the foundations.

CHAPTER 3

OBJECTIVES, SCOPE AND METHOD OF STUDY

The study components are organized into five main categories according to the environmental aspects as follows:

1. Physical Environment

1) Topography
2) Geology and Landforms
3) Erosion
4) Water Quality

2. Biological Environment

1) Forestry and Vegetation Cover /Wildlife/Biodiversity

3. Economic, Social and Cultural Environments

2) Population and Communities
3) Land use
4) Infrastructure Facilities / Industries
5) Water Use and Water Supply
6) Transportation
7) Energy sources / Power Supply
8) Public Health / Public Safety / Occupational Health
9) Waste Management
10) Archaeology
11) Aesthetic/Recreation/Tourism / Culture
12) Land Acquisition and Compensation
13) Economic Conditions

4. Public Consultation

1) Information Center
2) Data/Information Preparation
3) Center Operation

5. Laws and Regulations

3.1 PHYSICAL ENVIRONMENT

3.1.1 TOPOGRAPHY

3.1.1.1 Objective of Study

The study evaluates topographical changes that might be caused by the project and recommends any further assessment study if needed.

3.1.1.2 Scope of Study

The study was conducted by overlaying information of the profiles of the 230 kV and 115 kV transmission lines, and focusing on an area 1 km on both sides of the proposed alignments.

3.1.1.3 Method of Study

The line profiles and coordinates obtained from the engineering study were overlaid on a 1:50,000 scale topographical map, to evaluate which topographical features will be affected by the project, and to determine how the existing topography influences the project designs. Appropriate mitigation measures and recommendations are given.

3.1.2 GEOLOGY AND LANDFORM

3.1.2.1 Objective of Study

The study aims to assess seismic hazards that could affect the project by reviewing geological data (e.g., rock formations, structure and tectonics) of the region covering the proposed transmission lines.

3.1.2.2 Scope of Study

The study focused mainly on the regional scale of the area covering the project transmission lines.

3.1.2.3 Method of Study

Information on regional geology and seismic zones were reviewed from Lao and international literature, including reports interpreting features from satellite images. Records of earthquake (i.e., magnitude and location) were investigated, and combine with the geological information to make the seismic hazard assessment.

3.1.3 EROSION

3.1.3.1 Objective of Study

The study aims to determine erosion prone areas along the proposed route of the transmission lines, according to the construction plan of the transmission line

3.1.3.2 Scope of Study

The area of focus covered the strip 80 meters wide along the proposed 230 kV transmission line and 50 meters wide along the proposed 115 kV transmission line, to determine the possibility of erosion and effects caused by construction and operation activities, in relation to the existing topographic structure.

3.1.3.3 Method of Study

Characteristics that could contribute to erosion such as precipitation, topography, soils, land use and land cover were investigated and assessed with regard to the construction activities. Recommendations to minimize adverse effects are reported.

3.1.4 WATER QUALITY

3.1.4.1 Objective of Study

The study assessed project activities during construction and operation that can affect existing water quality in the waterways near or crossed by the transmission line.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 FORESTS

3.2.1.1 Objective of Study

The study evaluates the project impact on forests, particularly on vegetation cover along the transmission lines.

3.2.1.2 Scope of Study

The study focused mainly on the forest area along the 115 kV and the 230 kV transmission lines, and other areas of concern, such as nearby national biodiversity conservation areas and village or community conserved forests.

3.2.1.3 Method of Study

The study relied on secondary data and interpretation of aerial photography. Field survey and interviews were conducted to verify the reliability of the data.

3.2.2 WILDLIFE

3.2.2.1 Objective of Study

The study evaluates the project impacts on wildlife along the transmission lines.

3.2.2.2 Scope of Study

The study focused mainly on the forest area along the 115 kV transmission lines and the 230 kV transmission lines.

3.2.2.3 Method of Study

The study focused on secondary data and interpretation of aerial photography. Field survey and interviews were conducted to verify the reliability of the data. Based on the assessment, mitigation measures are suggested.

3.2.3 BIODIVERSITY

3.2.3.1 Objective of Study

The study evaluates impacts on biodiversity along the transmission lines and suggests if there is any need for further assessment study.

3.2.3.2 Scope of Study

The study initially clarified the forest diversity in the areas along the 115 kV and the 230 kV transmission lines. Mitigation measures were suggested regarding the engineering design criteria of the lines.

3.2.3.3 Method of Study

The study was based initially on secondary data obtained by literature review and interpretation of aerial photography. Field survey and interviews verified the reliability of the data. Based on the information, further study was suggested.

3.3 ECONOMIC, SOCIAL AND CULTURAL ENVIRONMENTS

3.3.1 POPULATION AND COMMUNITIES

3.3.1.1 Objective of Study

The primary objective is to classify the affected people and the stakeholders related to the project development.

3.3.1.2 Scope of Study

The study focused mainly on communities within the right-of-way strip along the 115 kV and the 230 kV transmission lines.

3.3.1.3 Method of Study

Secondary data was first gathered and analyzed in a preliminary field survey, followed by primary data collection through directed interviews and discussions. These were assessed to evaluate and prioritize any need or issue regarding the project.

3.3.2 LAND USE

3.3.2.1 Objective of Study

The study assesses impacts on current land use patterns in the right-of-way of alignments, and recommends mitigation measures.

3.3.2.2 Scope of Study

The study covered land use patterns within 25 meters of both sides of the central line of the 115 kV transmission lines and within 40 meters of both sides of the central line of the 230 kV transmission lines.

3.3.2.3 Method of Study

The existing land use patterns were reviewed through interpretation of aerial photographs and Landsat satellite images together with 1:50,000 scale geographic maps, to distinguish various patterns of land use. Land uses were verified in field surveys. Analysis then included land use map mosaicking, defining mapping units of land use according to resolutions, then measuring each of the land use patterns. How project construction and operation activities would impact different types of land uses was assessed, and mitigation measures recommended.

3.3.3 INFRASTRUCTURE/FACILITIES/INDUSTRIES

3.3.3.1 Objective of Study

The study reviews current infrastructure, facilities and industries in the project area as a basis for analysis and comparison of various land use changes expected after project development. Mitigation measures are recommended to avoid or alleviated the anticipated impacts on infrastructure, facilities and industries.

3.3.3.2 Scope of Study

The study focused mainly on a 50-meter strip along the 115 kV transmission lines, with the central line as the middle of the strip, and an 80-meter strip along the 230 kV transmission lines, again with the central line as the middle of the strip.

3.3.3.3 Method of Study

Relevant data was collected from related government organizations for review. Field surveys verified the infrastructure development. Analysis of the data assesses potential impacts that would be caused by the project construction and operation activities, and mitigation measures to relieve the impact are recommended.

3.3.4 WATER USE AND WATER SUPPLY

3.3.4.1 Objective of Study

The study collects and compiles data and other information about water sources along the transmission lines, to evaluate the impact potential impacts of the proposed project on water supply and water use in nearby communities. Mitigation measures will be recommended if the impacts are considered significant

3.3.4.2 Scope of Study

The study focused on water sources adjacent to the transmission lines that provide water for the communities.

3.3.4.3 Method of Study

Relevant data were collected from secondary sources and verified in field surveys.

3.3.5 TRANSPORTATION

3.3.5.1 Objective of Study

The study aims to assess impacts on transportation that are caused by the project, and recommend mitigation measures.

3.3.5.2 Scope of Study

The transportation study focused on roads in areas along the transmission routes.

3.3.5.3 Method of Study

Secondary data was obtained from the Traffic Survey Lao PDR., 2000, which provided average daily traffic on the roads that might be affected by the project transmission lines. Local traffic conditions were also observed and confirmed in interviews. The data were then analyzed to predict potential problems due to project construction and operation. Appropriate mitigation measures are recommended.

3.3.6 ENERGY SOURCES/POWER SUPPLY

3.3.6.1 Objective of Study

The study assesses the impact of the transmission lines on energy sources and power supply of communities along the routes of the lines from the project dam sites to the substations.

3.3.6.2 Scope of Study

The study reviewed availability of power supply for villages within 5 km. of the transmission route. Existing power supply was determined, as well as potential impacts from the construction, operation and maintenance of the new transmission lines.

3.3.6.3 Method of Study

The data were evaluated to determine expected impacts on energy supply caused by project construction, operation and maintenance. Recommendations are provided as needed for mitigation and prevention measures.

3.3.7 PUBLIC HEALTH/ PUBLIC SAFETY/OCCUPATIONAL HEALTH

3.3.7.1 Objective of Study

The study identifies health hazards from major works of the construction and operation of the project, and related activities that create potential health hazards to workers and/or those who live or have activities nearby.

3.3.7.2 Scope of Study

The study considered occupational health and public safety matters relating to construction, operation and maintenance of the transmission lines.

3.3.7.3 Method of Study

The initial alignment and criteria designs of the transmission lines were assessed in terms of potential occupational health and public safety risks during construction and during operation and maintenance. During field surveys, meetings were held with authorized persons to discuss occupational health and public safety matters. Mitigation measures and monitoring plans to reduce hazards and protect the health of workers and others nearby are proposed.

3.3.8 WASTE MANAGEMENT

3.3.8.1 Objective of Study

The study determines procedures that may generate waste and provides mitigation measures to ensure zero impacts from any waste generated during construction and operation.

3.3.8.2 Scope of Study

The study focused on activities that will generate waste during the construction, operation, and maintenance of the transmission system.

3.3.8.3 Method of Study

Secondary data were analyzed to determine who is responsible for solid waste collection and disposal, which activities in the project will create solid waste, and what should be the proper methods of disposal. Waste volume can be calculated during detailed designs.

3.3.9 ARCHEOLOGY

3.3.9.1 Objective of Study

This component of the study assesses the potential impacts of the project on historical, archeological, religious, or other sacred or culturally important places within the project area.

3.3.9.2 Scope of Study

Historical, archeological, religious, or other sacred or culturally important places within the project area were identified, and the potential impact of the project on them was assessed. Mitigation measures are recommended where necessary.

3.3.9.3 Method of Study

Possible historic or archeological sites were determined by a combination of interpretation of aerial photographs and maps, and visits and discussions with local residents, including local historical accounts and folk tales. Where necessary, mitigation measures are recommended.

3.3.10 AESTHETIC/RECREATION/TOURISM/CULTURE

3.3.10.1 Objective of Study

The study aims to assess tourism changes, and changes in aesthetics, recreational opportunities, and culture, especially as they affect tourism, due to project development during both the construction period and operation phases. Appropriate mitigation measures for tourism development are suggested according to expected impacts.

3.3.10.2 Scope of Study

The study focused on the communities and areas along the power transmission lines.

3.3.10.3 Method of Study

Secondary data were collected and reviewed from many sources, including central and local government agencies. Field survey was conducted to observe and verify relevant data. The existing data and the project activities were then assessed on the possible effects on aesthetics, recreation, tourism and culture.

3.3.11 LAND ACQUISITION AND COMPENSATION

3.3.11.1 Objective of Study

The objective of this component of the study is to be sure that affected people who would lose assets or opportunities for land use are compensated fairly and within the rule of the law.

3.3.11.2 Scope of Study

The land use study focused on the area within the 50-meter corridor with the center of the corridor the middle line of the 115 kV transmission lines and the 80-meter corridor with the center of the corridor the middle line of the 230 kV transmission lines. However, land acquisition and compensation focused on land loss by footing of pole location and engineering clearance. The engineering clearance of this study was 25-meter corridor with the center of the corridor the middle line of the 115 kV transmission lines and the 40-meter corridor with the center of the corridor the middle line of the 230 kV transmission lines.

3.3.11.3 Method of Study

A census of assets or properties within these corridors that would be affected by the project was conducted, in order to be assessed for compensation.

3.3.12 ECONOMIC CONDITIONS

3.3.12.1 Objective of Study

The study aims to examine the social setting of the study area, including the demographic profile of households, social relationships, and economic conditions of the households, notably their occupations, income and expenses, and land holdings and land use.

3.3.12.2 Scope of Study

The socio-economic impacts were assessed for two phases: the expected impact during construction and the expected impacts during operation. Socio-economic conditions were assessed communities along the transmission lines.

3.3.12.3 Method of study

The socio-economic analysis used combination of secondary sources and survey data. Existing information was obtained from different organizations at national, provincial, and local levels, as well as from other concerned parties. Meetings with government officials and villagers were arranged for interviews and consultation. A formal household survey was

conducted, with the completed data sheet from each household signed by the head of that family to certify that all data provided was correct. The completed sheets were also marked with the official seal of the village head. Less structured interviews were also held with the villagers, in particular with local representatives, village heads, other community leaders, and other key persons in the affected villages.

3.4 VISUAL AND GRAPHIC PRESENTATION

3.4.1 GIS

3.4.1.1 Objective of Study

The purpose is to collect, store, manage, analyze, manipulate and visualize related environmental data of the project, using GIS and mapping techniques; to present environmental impact maps and GIS database that have been derived from a set of physical, biological, socio-economic and cultural studies; and to contribute related geospatial and non-spatial data to an Information Center for further needs and analysis.

3.4.1.2 Scope of Study

GIS and mapping techniques were used to derive and visualize environmental impact maps geospatially and non-spatially (with a GIS database). To prepare a base map of the project area, Landsat-5 images (taken on December 22nd, 2006) were obtained from the Geo-Informatics and Space Technology Development Agency of Thailand and interpreted. This base map was used then for the major environmental studies; and from it the physical, biological, socio-economic and cultural maps were prepared and the GIS database built up.

3.4.1.3 Method of Study

By employing GIS and mapping techniques, details of the hydropower project study could be assessed. Field survey of the project area and discussions with appropriate officials were carried out to confirm the data. After preparing a base map, geospatial and attribute data were obtained from the main environmental studies using GIS and remote sensing techniques and applied. Environmental impact maps and GIS database in conjunction with the physical, biological, socio-economic and cultural environment studies were prepared and reported.

3.4.2 REMOTE SENSING APPLICATION

3.4.2.1 Objective of Study

The objective is to use remote sensing techniques to classify land cover of the project area and its immediate vicinity, as well as to compile geographic information and spatial findings of the study into maps for presentation and further use.

3.4.2.2 Scope of Study

Landsat-5/7 Thematic Mapper images, 30 meter-resolution covering the dam site and its vicinity with minimum 20-kilometers radius were used. The accuracy of the classification was to be done through ground-truthing and observation.

3.4.2.3 Method of Study

Satellite images were obtained and interpreted on land cover where the corridors of the two transmission lines are planned. Field verification was carried out in the project area and its vicinity. Information on key geographic features and other important attributes was collected from all the team members. This information was compiled and presented in the form of base maps and thematic maps using GIS.

CHAPTER 4

REVIEW OF LAWS AND LEGISLATION

The IEE study for the project transmission lines has been prepared in compliance with the GOL's environmental statutes, policies, directives and procedures. The key legal instruments relevant to environmental assessment and protection issues are the Environment Protection Law (1999) and the Decree on Environmental Impact Assessment (2010), the Electricity Law (2008), the Forestry Law (2008), Decree on Compensation and Resettlement of People Affected by Development Project (2006) and the Decree on Environmental Impact Assessment (2010). The following sections provide summaries of the most important articles in those legal instruments.

4.1 ENVIRONMENTAL PROTECTION LAW (1999) AND THE DECREE ON ENVIRONMENTAL IMPACT ASSESSMENT (2010)

The Environmental Protection Law (National Law 02/99) (EPL) provides the legal basis for environmental management of development projects. It establishes the framework for unified environmental management, by aiming to preserve the environment while at the same time making rational and sustainable use of natural resources to contribute to national socio-economic development and to assure the health and improved quality of life of the people. The responsibilities of the government, the public and private entities under the Environmental Protection Law are presented below:

Article 5:

- Environmental conservation comes before mitigation and restoration.
- Planning for environmental protection should be included in socio-economic development planning.
- All persons and organisations have to contribute to environmental protection.
- Whoever causes damage to the environment is responsible for the impact.
- Use of natural resources has to be careful, avoiding pollution and waste.

Article 8:
- MONRE (formerly STEA) must issue regulations for EIA procedures.
- Responsible line agencies must issue guidelines for EIA mechanisms and procedures based on EIA regulations.
- EIA must ensure inclusion of local administration, mass organisations, and the population likely to be affected by a project.

Article 13:
- All persons and organisations have the responsibility to preserve resources.

Article 14:
- Persons or entities using natural resources shall observe the laws on land, forests, water, mining, agriculture and to regulations outlined by the relevant sector.

Article 16:
- Any persons or organisation engaged in activities which harm cultural, historical, or natural heritage sites must comply with regulations outlined by the relevant sectoral and local administration agencies.

Article 22:
- All people and organisations have a responsibility to help in pollution control. All activities causing pollution must use technologies and install necessary facilities for pollution control.

Article 23:
- All persons or organisations have to ensure pollution prevention for waste, chemicals, radioactive, vibration, noise, rays, colours, and odours to protect water, soil and air from pollution.
- It is forbidden to release hazardous smoke, gases, odour, chemicals, and dust.
- The production, import, usage, transport, storage, and discarding of hazardous chemicals and radioactive substances must follow established standards and regulations.
- It is forbidden to emit vibrations, noise, rays and odours in excess of the prescribed limit.
- All kinds of littering are forbidden. It is required to have a disposal site and facilities to separate the various kinds of wastes.
- It is forbidden to import, transport, or move all kinds of hazardous wastes.

Article 25:
- All persons and organisations have the right to notify government officials of any undertaking which may result in an adverse environmental impact.
- Complaints must be addressed to local agencies for environmental management and monitoring units in the area where the damage occurs.

Article 29: ▪ Structural assets of historical, cultural, and national importance must be preserved.

Article 30: ▪ Separate regulations will be established for the management of an Environmental Protection Fund (EPF).

The Decree on Environmental Impact Assessment was issues in 2010 to disseminate and implement Article 8 of the Law on Environmental Protection, in relation to Environmental Impact Assessment and to lay down principles and rules, and adopt measures on establishment, functions, management and monitoring (of the concerned agencies in) environmental impact assessment.

This Decree is applicable to all investment projects. Those which are Category 1 projects are investment projects which are small or create less impacts on the environment and society, but require initial environmental examination. According to the Decree, an Initial environmental examination (IEE) is defined as the initial study, survey, research, and analysis of data to estimate initial impacts on the environment and society, including impacts on health which may arise from investment projects, as well as adopting measures to prevent and minimize possible impacts on the environment and society.

4.2 ELECTRICITY LAW (2008)

The Electricity Law No 03/NA dated 8 Dec 2008, requires a license for the generation and transmission of electricity. The Law also requires:

- That EIAs be prepared for at least the larger hydroelectric dams, along with budget estimates for environmental mitigation measures.
- That transmission lines and related activities are done in such a way as to limit any damages to natural environment and people's property
- That the concessionaire is required to pay compensation for damages to the environment and to the lives and property of people, if any resettlement or other movement of people is required.

4.3 AMENDED LAO FORESTRY LAW (NO. 06/NA-DEC. 2007)

The Amended Forestry Law, No 06/NA (Dec. 2007) stipulates that conversion of public forestland to another land use type is only possible when allowed if it is to bring maximum benefits to the nation and to the wellbeing of people and is included in the national socio-

economic development plan. Such conversion is only allowed in designated areas. Entities given approval for forestland conversion are responsible for paying fees for technical service, royalties and conversion fees. For temporary conversion such as mining exploitation and other production activities, the land must be restored and trees must be replanted. If the State converts the forestland, which is allocated to individuals or organizations for agreed upon and determined purposes, the State shall compensate according to laws and regulations. For permanent forestland conversion into another land use type for long-term purposes, such as for roads or hydropower construction, the State owns the timber and forest resources that are cut or harvested in those forests or forestlands.

4.4 DECREE ON COMPENSATION AND RESETTLEMENT OF PEOPLE AFFECTED BY DEVELOPMENT PROJECT (2005)

This decree defines principles, rules, and measures to mitigate adverse social impacts and to compensate for damages resulting from involuntary acquisition or repossession of land and of fixed or movable assets, including changes in land use, and restriction of access to community or natural resources that affect community livelihood and sources of income. This decree aims to ensure that people affected by projects are compensated and assisted so they can improve or maintain their pre-project incomes and living standards, and are left not worse off than they would have been without the project.

CHAPTER 5

EXISTING ENVIRONMENT

5.1 PHYSICAL ENVIRONMENT

5.1.1 TOPOGRAPHY

The proposed transmission line routes are located in areas alongside or near the Nam Ngiep River, which forms part of the Mekong Lowlands, and near the Mekong River. The entire route is relatively flat, with grades generally between 0 to 1%. Site features found along the proposed route comprise riverbanks, canal and drain banks, road and rail embankments, and low-lying paddy fields. The lower floodplain land in this area is interspersed with shallow water bodies and in places settlements where tree crops are often grown.

Portions of the proposed transmission line route, which extends from the Ngiep River Powerhouse to the Nabong substation, cross major rivers and streams. These waterways include the Nam Ngiep, Nam San, Nam Ngum, Nam Mang, Nam Jing, and Nam Lo. These rivers and streams are sources for the Mekong River. In addition to these waterways, the proposed transmission line traverses a swamp located between Pakxan and Thaphabath.

The elevation of the route ranges between 160 to 290 m above sea level (ASL), with most of the route ranging from 175 to 280 m ASL. The lowest point of the route occurs where the line terminates on the border of Vientiane Province. Seasonal flooding occurs over an estimated 24% of the proposed route, based on levels recorded along the route from the survey, including anecdotal information on flood levels (see Table 5-1). Flood level depths of up to 1.5 m can occur in areas along the proposed transmission line. However, the majority of seasonal flooding is estimated to be less than 1 m deep.

Table 5-1 Estimated Seasonal Flooding Along the Proposed Transmission Line

Transmission Line	Total Line Length	Flood-Prone	
		Length (km)	% of Total Line
230 kV	125 km	25	20
115 kV	14 km	0.5	3.57

5.1.2 GEOLOGY AND LANDFORMS

The geology along the proposed transmission line routes is characterized as containing Cenozoic alluvial plain deposits, terrace alluvial, pediments, alluvial fans, and floodplains. Surface soils found along the route are reasonably uniform. These soils are mainly classified as the Prateah Lang soil group, characterized by a sandy surface layer with clay or loam subsoil. Soil fertility is often low, with little potential to improve rice yields by more intensive management. The soil is subject to being waterlogged due to the low permeability of the underlying subsoil. These soils can be saturated for up to a week, even after short periods of heavy rainfall. The soil is also subject to drought-like conditions due to the low water holding capacity of the sandy surface soils and the difficulty of root penetration into the heavy subsoil.

Information on soil conditions in the Bolikhamxay and Vientiane Provinces were obtained from the National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF) describes the soils in this area as mainly derived from siltstones, and sandstones on an ancient uplifted peneplain, which was heavily dissected by rivers over time. These soils are generally highly weathered, moderately deep (that is, about 1.0 to 1.5 m or more), and well drained. The soil conditions in Central Lao PDR, as well as in the project area and along the proposed transmission lines, are still in good condition with relatively medium to high organic matter and available phosphate. This is especially true in the forestlands and the agricultural lands that have been recently converted from other types of land use. There are also small areas of limestone outcrops, but these are generally steep with shallow soils, and not widely used for agriculture especially on degraded lands.

The soils in this region, such as Alisols, Acrisols, Luvisols, Lixisols and Cambisols, are generally suitable for rice cultivation and tree plantation, including fruit trees, except on steep slopes where severe erosion can occur after heavy rains. Creation of more permanent agricultural systems (that is, those involving annual cropping on flatlands) would require a combination of practices such as adoption of soil and water conservation measures, use of nitrogen-fixing legumes, and application of manure, compost or other soil amendments. A wide range of perennial crops such as various fruit trees, agricultural and industrial crops, and vegetables can also be grown successfully in this region.

5.1.3 EROSION

Areas where the transmission line project will pass through generally are flatter lands and contain a considerable amount of vegetation; thus are less prone to erosion. However, surface erosion can occur where most of the vegetation has been removed, either from extensive logging or from slash and burn cultivation.

5.2 BIOLOGICAL ENVIRONMENT

Information on forest and wildlife habitat conditions along the proposed transmission lines, from the Nam Ngiep Project powerhouses to the Nabong and Pakxan substations is based on a review of forest and land cover maps from 2005, villager interviews, and field observations.

5.2.1 FORESTRY AND VEGETATIVE COVER ALONG TRANSMISSION ROUTES

Vegetative cover along the proposed transmission line alignments from the dam sites to the two substations consists of:

5.2.1.1 Dry evergreen

Dry evergreen forest covered 11.44 ha or about 1 percent of investigated corridor. Small pockets of dry evergreen forest were scattered near Thong Noi Village, Pakxan District. The forest comprised of 80 percent of non-deciduous species, usually bounded by coniferous or conifer/broadleaf formations, and tended to follow local hollows and drainage lines on fertile soils with good moisture retention capacity or near sub-surface springs. The dominant feature was Yang, a local hardwood tree (*Dipterocarpus alatus)* that is valued for its timber and resin. Other tall trees form a multi-layer canopy.

Evergreen species such as ferns and palms were the most distinctive flora, dominating the lowest canopy. Only 2 of the 11 species occurred as a dominant understory species: large leafed fern *Crypsinus* and the rattan palm *Calamus*, were common and intermixed with the species found in mixed deciduous and broadleaf/coniferous forests.

5.2.1.2 Mixed deciduous

Mixed deciduous forest covered 224.38 ha or about 21 percent of the study corridor. This forest type is mainly found in the area of the proposed powerhouse and surrounding uplands. These forests are situated on drier soils, with the dominant species primarily *Dipterocarpus*

alatus, Lagerstroemia floribunda, Pometia pinnata, Schima moronhae, Storeospermum fimbriatum and *Cratoxylon prunifolium*. High-value hardwoods such as *Pterocarpus* are also present, along with *Keetelaria davidiana* (a rare conifer), and scattered *Pinus merkusii*. Many mixed deciduous forests have been selectively logged.

The Mixed deciduous forest has significant understory species. Among the dominant species are *Crypsinus, Salacca, Dalbergia, Abrus, Pteris* and *Wendlandia*. The tall fibrous grass, *Cymbopogon,* is common found in the understory of Mixed Deciduous and Broadleaf/ Coniferous Forests, increasing prominent as disturbance to the tree canopy is greater.

5.2.1.3 Dry Dipterocarp

Dry dipterocarp forests cover 431.98 ha or about 39 percent of the study area. These forests can be found on deep drying soils of poor fertility and have a semi-open canopy structure. Dry dipterocarp forests are more common in lower elevations of the powerhouse area. This ecotype is comprised principally of 13 species dominated by dipterocarps, primarily *Dipterocarpus obtusifolius* with *Dipterocarpus alatus*. These two species often account for up to 85 percent of the total trees.

The Dry Dipterocarp Forest also shares the majority of its dominant understory species with the Mixed Deciduous and Broadleaf/Coniferous Forest.

5.2.1.4 Unstocked Forest

Unstocked forest accounts for 312.42 ha or about 29 percent of the transmission line area. Unstocked forest is defined as forestland that has become degraded through persistent slash and burn cultivations and that no longer will regenerate or is land unsuitable for deep-rooted vegetation. Vegetation consists mostly of weeds and *Imperata* grass.

5.2.1.5 Other land use

Other land use, predominately agriculture, accounted for 114.24 ha or about 10 percent of the study are. This will be discussed in detail in the section of Land Use.

5.2.2 LOCALLY-MANAGED CONSERVATION AREAS

Two small locally-managed conservation areas are in the forest areas near Thong Noi Village in Pakxan District, Bolikhamxay Province. The location of these two area, referred to as Dong Kampha and Nong Boa is shown in Figure 5-1 near the proposed route of the 115kV

transmission line. Any construction activities likely to affect these areas, such as logging along the transmission line, material transport, or temporary camps, should be avoided.

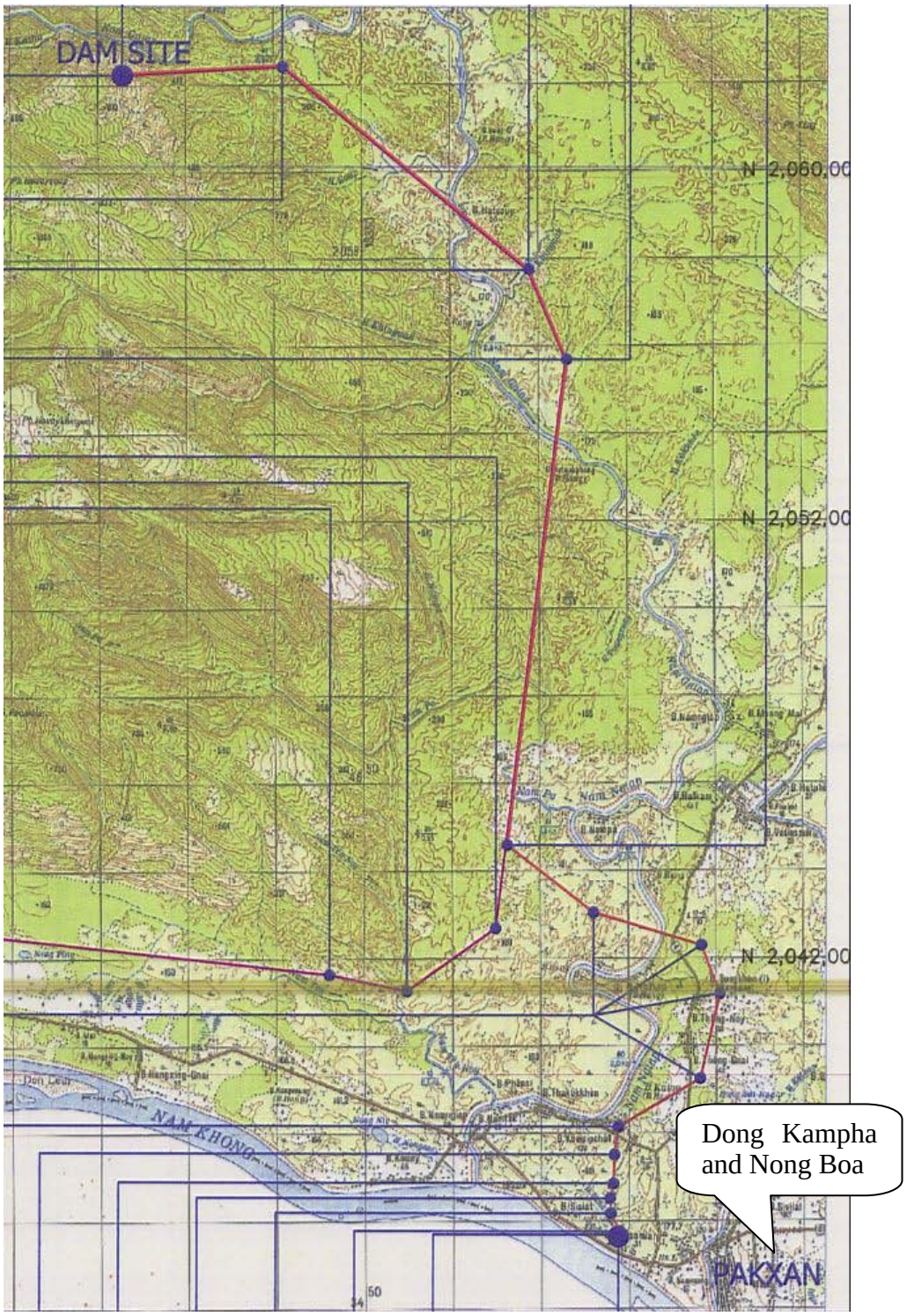


Figure 5-1 Location of biodiversity conservation areas.

5.2.3 WILDLIFE AND NATIONAL BIODIVERSITY CONSERVATION AREAS

Wildlife conditions in the study area, along the proposed transmission line routes, were surveyed and assessed by visual inspection, as well as interviews with villagers, who were asked about their experience with wildlife and conditions for wildlife near their communities.

The field survey and comments from the villagers' interviews revealed that the only significant remaining wildlife habitats near the project are on the steep inaccessible areas of Nam Ngiep and in the Phou Khao Khouay National Biodiversity Conservation Area (NBCA) to the west of the Nam Ngiep River and the parallel transmission lines, and then to the north of the 230 kV transmission line, quite distant from the study area.

Wildlife in the project area, including areas near the transmission line alignments, has been hunted extensively, so much so that the majority of all significant wildlife species have either been eliminated or they have retreated to the comparative safety afforded by the higher and comparatively inaccessible habitats of the highlands and the NBCA.

One issue of particular concern to the construction of the 230 kV transmission line to Nabong is the presence of a small herd of elephants near Ban Na Village, about 37 km from the Nabong substation. These 25 to 30 elephants (about 2 to 4 family groups) migrated from the Nakai Plateau in 2005, before the start of the Nam Theun 2 Hydropower Project. They reside mainly in the Phou Khao Khouay NBCA, but on occasion will wander out to the area of Ban Na Village. The current alignment of the 230 kV Transmission Line, as shown in Figure 5-2, is about 3 km from the village, and so should not have any impact on the elephants

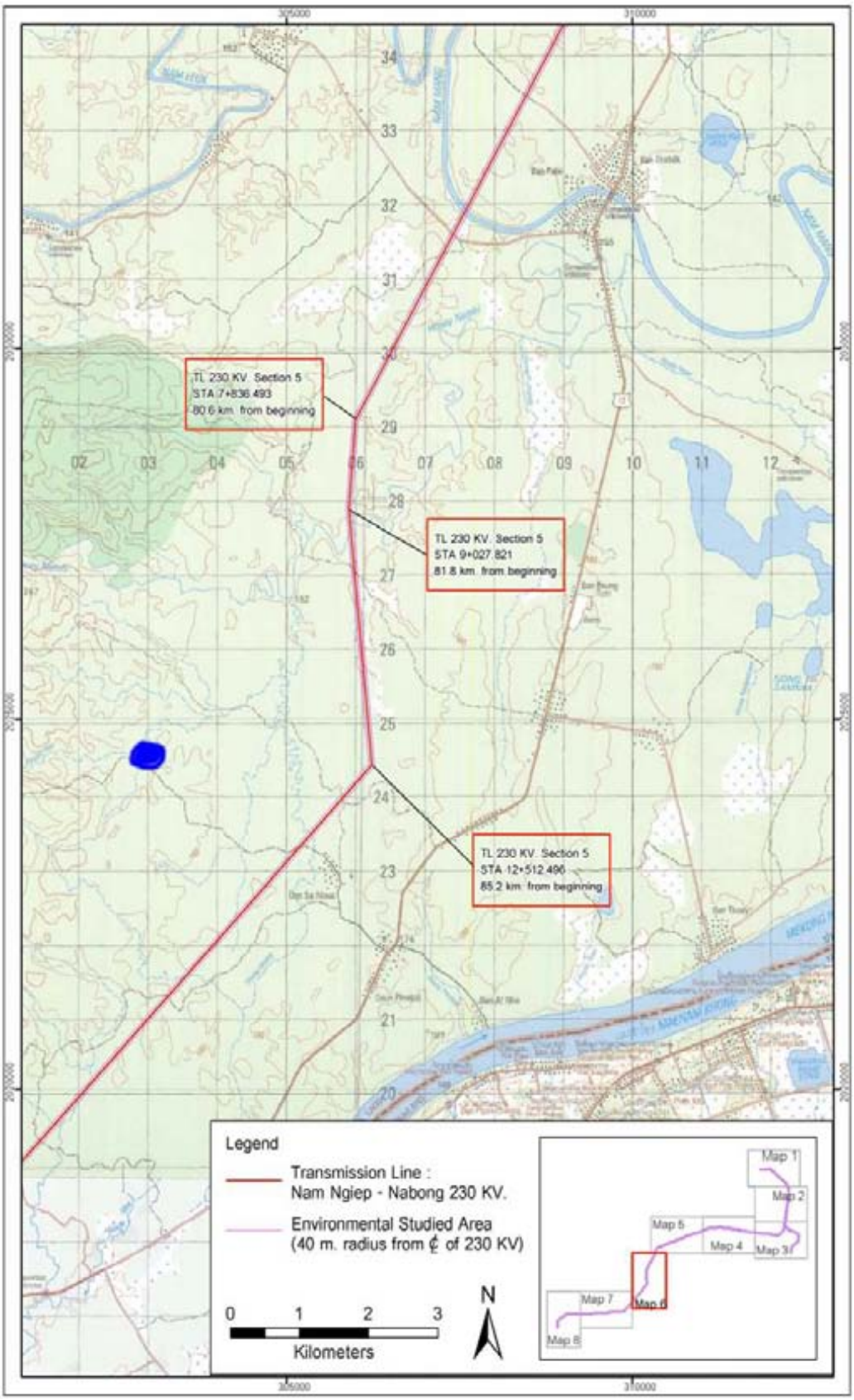


Figure 5-2 Area where herd of elephants frequently sighted.

5.3 SOCIO-ECONOMIC CONDITIONS

5.3.1 POPULATION AND COMMUNITIES

The demographic, ethnic, socio-economic and cultural conditions in areas affected by the proposed transmission lines were documented using primary and secondary data. A survey and associated interviews were conducted in all affected villages and nearly every household. Secondary information was reviewed extensively from annual district reports, provincial censuses (Provincial Statistics Office, 2005), and demographic and other data, numerous studies, reports and other document related to the project. Before conducting the field survey and interviews, a consultation process was carried out with local organizations, such as the District Administration Office, District Agriculture and Forestry Office, and village authorities.

The transmission lines pass through four districts within two provinces (Bolikhamxay Province and Vientiane Capital). Table 5-2 presents the numbers of villages and households in the transmission line project area. The transmission line alignments are likely to cut through 24 villages in 4 districts with 183 affected households.

Table 5-2 Affected Villages, Households and Population Distribution

Province	District	Affected Villages	Total of households	Total of population	No. of affected households	
Bolikhamxay	Bolikhan (3 Villages)	1.Ban Hat Gniun	69	389	3	14 Households
		2.Ban Huaykhoun	368	2,089	4	
		3.Ban Nampa	315	1,870	7	
	Pakxan (5 Villages)	1.Ban Thong Noi	138	720	22	76 households
		2.Ban Thong Yai	73	379	15	
		3.Ban Sanaxay	237	1,066	4	
		4.Ban Anusonxay	390	1,120	33	
		5.Ban Pak Ngiep	161	826	2	
	Thaphabat (10 Villages)	1.Ban Xaysavang	87	123	3	73 Households
		2.Ban Vuenthat	356	523	14	
		3.Ban Paktuay Tai	126	278	7	
		4.Ban Pakthouay Neu	174	391	7	
		5.Ban Nongkuen	256	342	8	
		6.Ban Sisomxay	275	371	10	
		7.Ban Thabok	364	964	5	
		8.Ban Palai	221	315	5	
		9.Ban Somsaath	121	321	7	
		10.Ban Na	179	462	7	

Province	District	Affected Villages	Total of households	Total of population	No. of affected households	
Vientiane	Pak Ngum (6 Villages)	1. Ban Vuenkabao	125	749	1	20 households
		2.Ban Xienglea Na	115	639	8	
		3.Ban Xienglea Tha	237	1,416	4	
		4.Ban Nonh	111	498	4	
		5.Ban Thakokhai	178	378	1	
		6.Ban Nabong	365	456	2	
Total		**24**	**5,041**	**16,985**	**183**	

Source: Field survey, 2007

5.3.1.1 Perceptions of Environmental and Socio-economic Impacts

Villagers in the study area were asked about their perceptions of potential problems for given statements regarding the general conditions of the project area. The responses for the answers were rated from 1 to 4, ranging from "No problem at all" to "Serious problem". The results were assessed by the different districts and presented in Table 5-3.

The survey results indicated the following perceptions regarding the questions:

- A relatively low level of concern was expressed regarding potential environmental impacts with all responses indicating an average perception of “No problem at all”.
- In terms of perceived social impacts, the results show that almost all of the given statements were deemed as “No problem at all”, except for some concern regarding disruption of community cohesion, tradition and culture. This concern was highest from villagers in the Bolikhan and Pakxan Districts. In these districts, survey respondents indicated that they perceived *"Slight problems"* for social impacts. This is likely due to residents of some villages thinking that the proposed alignment may be close to their nearby holy forest areas and cemeteries, which may lead to disruption of their holy areas. These villagers were also concerned that the proposed transmission line would cross close to the village biodiversity conservation areas.
- In terms of economic impact, the results show that the loss of construction (development) and production lands was also seen as a “slight problem.” The villagers perceived that the proposed transmission line would cross their production lands and plantation areas. This in turn may result in the loss of farm products, fruit, and other planted trees. This might be because those areas

may contain some plantation forests. However, as mentioned above, the villagers' perceptions may also depend on other internal and external variables or factors such as educational level, age, gender, occupation, income level, understanding of the questionnaire, and timing of the interview.

Table 5-3 Villagers' Perceptions of Impacts on Environment and Socio-economic

Statement	Districts and Affected Villages				Total (N=155)
	Bolikhan 3 Villages (n = 20)	Pakxan 5 Villages (n = 35)	Thaphabath 10 Villages (n = 59)	Pak Ngum 6 Villages (n = 41)	
Environmental Impacts					
Soil Erosion and sedimentation	1.06	1.07	1.25	1.04	1.11
Disturbed wildlife	1.10	1.12	1.27	1.10	1.15
Destroyed natural habitats	2.51	2.57	1.12	1.72	1.98
Declined ecological value and loss of environmental beauty	2.30	2.00	1.00	1.00	1.57
Soil and water polluted by wastes	1.50	2.00	1.00	1.12	1.40
Others	1.50	2.50	1.10	2.70	1.95
Social Impacts					
Disruption of community cohesion tradition and culture	1.00	1.10	1.10	1.00	1.05
UXO risk to workers & villagers	0.00	0.00	0.00	0.00	0.00
Traditional and moral deterioration, and prostitution	1.10	1.10	1.00	1.00	1.05
Villagers and workers health and safety	1.30	1.20	1.00	1.00	1.13
Others	2.70	1.50	2.00	2.60	2.20
Economic Impacts					
Loss of production on lands	1.00	2.80	2.70	1.50	2.00
Loss of farm products, fruit and other trees	1.20	2.10	2.37	2.09	1.94
Reduce income from cropping	1.30	2.20	2.50	2.00	1.75
Fragmentation of production land	1.10	2.20	2.40	2.10	1.70
Others	1.10	1.50	1.90	1.40	1.48

Note: Means were derived from a scale of 1 to 4 used in the questionnaire, where

1= No problem at all,

2= No problem,

3= Slight problem and

4= Serious problem.

N, n = Indicates number of respondents.

5.3.2 LAND USE

The existing land use along the corridor of the first 5 km of the 230 kV transmission line, extending from the main dam substation and then passing through the dam construction area, was reviewed in the environmental assessment on the construction area in the EIA and SIA reports. For the purposes of this study, impacts on land use are assessed mainly for the transmission lines. The area of concern is the corridor of land along the 125 km of the 230 kV line and the corridor of land along the 40 km of 115 kV line, from the re-regulation dam downstream to the Nabong and Pakxan substations.

Those two lines share the right-of-way along a restricted space of at least 32 meters between the centers of alignment for the first part of the route, assumed to run parallel until Ban Nam Pa, where they separate to go to the Nabong and Pakxan substations. This first segment is about 26 km long, and the study corridor here was 100 meters wide.

After Ban Nam Pa, the study corridor along the 230 kV transmission line to the Nabong substation was 99 km long and 80 m wide, while the study corridor along the 115 kV transmission line to the Pakxan substation was 14 km long and 50 m wide. (See Figures 2-1 to 2-8 in Chapter 2 for the proposed alignment of the transmission lines.)

The land use and vegetative features along the environmental study corridor of the proposed transmission line routes were found to be:

- About 65% of the area made up of forest lands, mostly mixed deciduous and dry dipterocarp forests, with a small portion of evergreen forest.
- Another 26% classified as unstocked forest (deforested), most of which are swidden agriculture or shifting cultivation areas.
- About 8% consisting of paddy fields and other non-swidden agricultural fields, including tree plantations and gardens.
- Built up areas, accounting for 0.50% of the total area.
- Water bodies – rivers, ponds, lakes, and swampy area – accounting for 0.60% of the area.
- Roads and other land uses, accounting respectively for 0.15% and 0.16% of the total area.

There are significant differences in the land uses of the various portions of the transmission line alignments. Table 5-4 shows the land uses in the first portion of the

alignment where the two transmission lines run parallel, from the powerhouses for about 25 km to Ban Nam Pa. Table 5-5 shows the land uses for the rest of the 230 kV transmission line from Ban Nam Pa to the Nabong substation. Table 5-6 shows the land uses for the rest of the 115 kV transmission line from Ban Nam Pa to the Pakxan substation.

Table 5-4 Land Use and Vegetative Cover along the 80-m Width of the Parallel 230 kV and 115 kV Transmission Lines, from Powerhouse to Ban Nam Pa

No.	Land Use and Vegetative Cover	Area (ha)	Percentage (%)
1.	Evergreen Forest	-	-
2.	Mixed deciduous Forest	169.86	82.41
3.	Dry Dipterocarp Forest	31.62	15.34
4.	Unstocked Forest	2.70	1.31
5.	Paddy Field	0.84	0.41
6.	Upland field	-	-
7.	Plantation	-	-
8.	Housing/Built-up Area	-	-
9.	Water Body	1.08	0.53
10.	Road	-	-
11.	Other	-	-
	Total	**206.11**	**100.00**

Table 5-5 Land Use and Vegetative Cover along the 80-m Width of the 230 kV Transmission Line from Ban Nam Pa to Nabong Substation

No.	Land Use and Forest type	Area (ha)	Percentage (%)
1.	Evergreen Forest	-	-
2.	Mixed deciduous Forest	46.57	5.95
3.	Dry Dipterocarp Forest	366.39	46.80
4.	Unstocked Forest	297.24	37.97
5.	Paddy Rice Field	57.90	7.40
6.	Upland Field	5.70	0.73
7.	Plantation	2.77	0.35
8.	Housing/Built-up Area	1.40	0.18
9.	Water Body	4.89	0.62
10.	Road	-	-
11.	Other	-	-
	Total	**782.85**	**100.00**

Table 5-6 Land Use and Vegetative Cover along the 50-m Width of the 115 kV Transmission Line from Ban Nam Pa to Pakxan Substation

No.	Land Use and Forest type	Area (ha)	Percentage (%)
1.	Evergreen Forest	11.44	10.84
2.	Mixed deciduous Forest	7.95	7.54
3.	Dry Dipterocarp Forest	33.97	32.19
4.	Unstocked Forest	12.48	11.83
5.	Paddy Rice Field	27.23	25.81
6.	Upland Field	0.32	0.30
7.	Plantation	3.14	2.98
8.	Housing/Built-up Area	4.68	4.43
9.	Water Body	0.65	0.62
10.	Road	1.77	1.68
11.	Other	1.87	1.78
	Total	**105.51**	**100.00**

The first 25 km of the transmission lines, where both lines run parallel from the power stations to Ban Nam Pa, pass almost entirely through forest.

The remaining nearly 100 km of the 230 kV transmission line passes through almost equal areas of forest and agricultural areas. Most of the agricultural land is officially unstocked forest, upland fields that are legally state property.

As for the remaining 14 km of the 115 kV transmission line, about half of its alignment passes through forest, mostly in the first portion after diverging from the 230 kV line. Another 40 percent is agricultural area, most of which is paddy land, and about 5 percent housing or built-up area. Nearly all the paddy land and built-up area are located toward the end of the transmission line, as it reaches the substation near the city of Pakxan.

Annex A and **Annex B** contains additional details of the affected land use and vegetative cover along the proposed transmission line alignments. **Annex C** shows the locations of significant sites on a map. **Annex D** and **Annex E** contain photographs of land use and types vegetative cover along the proposed transmission line alignments from the Powerhouse to Nabong substation and from Nam Pa village to the Pakxan substation. **Annex F** shows photographs of housing and construction areas along the proposed transmission line alignments. **Annex G** presents detailed maps of land use and types of vegetative cover within the proposed transmission line alignments.

5.3.3 **ARCHAEOLOGY**

All of the 24 villages within the area of the proposed of transmission line area have Buddhist temples and monasteries. There are also a number of village spirit sites *(phi muang, phi thien, phi mau)*. The village temples are generally more than 2 km from the proposed rights-of-way of the transmission lines. For the villages near National Road No.13, most temples are located beside the road. The people in this area value the temples as significant local cultural and traditional features.

The results of the field survey for this IEE study reveal that there are no temples, religious sites and spirit sites located at the proposed poles of the transmission lines, with one exception noted below.

The field study also found a culturally important cemetery *(Pa Saa)* at Ban Thong Yai Village in Pakxan District. The 115 kV transmission line as now planned is likely to pass through a portion of this cemetery. Another site, Prabat Phonsan Temple, in Thaphabat District, is a culturally and historically significant site. It is located next to National Road No.13 near the alignment of the 230 kV transmission line to Nabong substation. As now planned, the 230 kV transmission line is 1 km from the temple, with the visual impact having been taken into consideration in the design of the route sufficiently distant from the temple. (The location of these 2 sites are shown in Figure 5-3.)

Figure 5-3 Locations of Prabat Phonsan Temple and Ban Thong Yai cemetery.

5.3.4 LAND ACQUISITION AND TYPES OF COMPENSATION REQUIRED

5.3.4.1 Land Acquisition

The proposed project consists of two transmission lines that link the NNHP 1 dam with two substations. These lines will require alignments for no more than 1,100 ha of land, and most likely only about 600 or so ha, for the 139 km lengths of both lines. A 125 km section with a 230 kV transmission line runs from the NNHP1 Powerhouse at Bolikhan District along the Nam Ngiep to National Road No.13 at Pakxan District. From there, the transmission line route follows National Road No.13 from Pakxan west to the Nabong Substation, Vientiane Capital District, passing through Thapabath and Pak Ngum Districts. A 115 kV transmission line runs parallel or nearly parallel with the 230 kV, separated by at least 32 meters, then splits apart from the 230 kV line at Ban Nam Pa (near km 25 of the route) to go another 14 km to the Pakxan substation.

The only permanent impact will come from the need for the tower site for the transmission line towers. Very little land will need to be acquired. A total of 372 towers are now being planned. Each of the towers for the 230 kV line will require 324 square meters

(18 x 18 meters) for its base, while each of the towers for the 115 kV line will require 225 square meters (15 x 15 meters). The total land acquisition required will be about 11 ha. No compensation is required for acquisition of common land owned by the government, which covers nearly 90 percent of the area within the alignments (forests and unstocked forests), though for those public lands that people use for cultivation (portions of the unstocked forests), compensation will be made for loss of income.

A tower should ideally be placed on flat, level ground with good soil compaction and a low water table. According to the preliminary survey, the two transmission lines would cross directly through some villages, such as Sanaxay and Anousonexay, in Pakxan District. Some relocation of houses and other structures may be needed for these built-up areas.

5.3.4.2 Permanent Changes in Land Use

Land under the transmission line and within the right-of-way will have to be sufficiently clear of tall vegetation. Forests along the alignment will have to be logged, cleared, and kept clear of tall growth. Arrangements for logging will need to be made by and under the supervision of the provincial and district agriculture and forestry offices. Forest clearing may have some negative environmental impact, but it will increase the grassy area that can be used for grazing by animals in nearby villages.

Tall plants on privately owned lands within the alignment will also need to be removed, and compensation paid for any commercial or productive plants so removed. Although agriculture will be allowed on lands under the transmission lines, the height of the plants grown will need to be controlled, and certain common practices such as burning crop residue will need to be prohibited.

5.3.4.3 Houses and Other Built Structures

To the extent possible, the transmission line alignments will try to avoid houses and other structures. However, given that the area close to the Pakxan substation is fairly built up, some structures will inevitably be affected. Houses and other structures within the right-of-way will need to be moved or taken down.

With the present proposed alignments, only 2 houses owned by the Army (see Annex G, Map Sheet No. 23) and 1 small farm structure (see Annex G, Map Sheet No. 104) will be affected by the 230 kV transmission line, while some 20 houses and other structures will be affected by the 115 kV transmission line (see Annex G, Map Sheets No. 122 and 123). Given that most of these structures are at the end of the transmission line near the Pakxan sub-

station, there is little flexibility to avoid these structures. Any alternative routing to the sub-station would affect at least as many houses and structures.

If the houses or other structures can be moved only a short distance, the Project will pay the costs for moving according to agreement of the Provincial Resettlement and Living Condition Restoration Committee with the affected people. If it is not possible to move the houses or other structures to a nearby area, the Project will provide compensation at replacement value, according to agreement of the Provincial Resettlement and Living Condition Restoration Committee with the affected people, which will include (1) cash compensation for the lost structures of an amount sufficient to purchase replacement materials and hire labor to build the replacement structures of an similar size and standard, (2) a housing plot to build this replacement structures, and (3) an allowance to cover costs of relocation and lost income during the transfer.

5.3.4.4 Temporary Loss of Land

Some land will need to be used during construction, for the placement of materials, the temporary access roads, and the worker's camps. When these are agricultural lands or other lands used for production, compensation will need to be paid for these temporary losses and for any costs of restoring the land to original conditions. Most such temporary loss will be for one crop or one agricultural season. Compensation will be given based on the average yield of the crops lost and the market prices of those crops, for every season of temporary loss of the use of that land, and based on the actual costs of restoring the land to original conditions, if the Project does not itself carry out that land restoration.

CHAPTER 6

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 FACTORS FOR CONSIDERATION IN ASSESSING TRANSMISSION LINE IMPACTS

Unlike other types of linear corridor developments such as roads and railways, which are severely limited by physical constraints like steep gradients and wide river crossings, transmission lines afford considerably more flexibility. Preliminary route selection for the design of transmission lines was based on a review of 1:50,000 scale topographic maps and ground surveys. The consideration and selection of the transmission line route was based on engineering principles together with environmental concerns for the locations of towers, ground clearance and slope, geological condition for foundations and other obstructions.

Construction will involve placement of a total of 372 towers, 262 towers for the 230 kV line and 110 towers for the 115 kV line, based on criteria design of tower ruling spans of 460 m for 230 kV lines and 365 m for 115 kV lines. For maximum safety, minimum construction cost and effective material use - the alignments were created as straight as reasonably possible between the start and end points of the transmission lines, as well as between tower spans.

- Wherever possible, the alignments were located relatively parallel to an existing road or right-of-way of existing transmission lines, thereby facilitating access for construction, operation and maintenance, and reducing the need for new land clearance and disruption to people.
- Stringing method such as tension control should be used to prevent detrimental impacts to sensitive areas such as spirit worship sites during construction.

Aside from these fundamental engineering principles, selection of the proposed routes for the transmission lines should comply with these environmental and social principles:

- Avoid existing residential areas (in particularly houses and other built up areas) to ensure that relocation or resettlement is kept to a minimum.
- Minimize the need to expropriate valuable lands or social, religious or culturally important lands, particularly village forest conservation areas, village cemeteries, and agriculture lands.
- Avoid mature forests and other environmentally sensitive areas, especially the Phu Khao Khoay NBCA, and eco-tourism sites.

The types and variety of potential environmental impacts that can occur from the transmission lines depends on the stage of the project cycle. Impacts are different during construction, operation including maintenance, and termination of the project.

During construction, impacts considered are problems with waste disposal, effects on land features and land uses, effects on ecosystems, and the effects on the economy and lives of local residents.

During the operation and maintenance, impacts include the long-term effects on land features and land uses, ecosystems, and the economy and lives of local residents.

In the decommissioning phase the main impact assessed is on land uses.

Prior to the current IEE study, KANSAI in collaboration with the DOE, conducted a preliminary study and survey for this project to identify suitable alignments for the transmission lines. However, these initial alignments were identified primarily on a topographic map. Field study was not conducted at this stage. As part of the detailed survey for this project, further refinements to the transmission lines will need to be made based on site specific information collected in the field, including concerns raised in public meetings with affected villagers along the proposed transmission line, as well as information and recommendations provided in this report.

6.2 MAJOR IMPACTS AND MITIGATION MEASURES DURING PROJECT CONSTRUCTION PHASE

6.2.1 CONSTRUCTION ACTIVITIES

Construction of the 230 kV and 115 kV transmission lines for the Nam Ngiep 1 Hydropower project will likely involve these activities:

- Clearance of vegetation for tower bases (11 ha) and pruning of vegetation for vertical clearance of conductors along the length of the transmission lines by felling trees, shrubs and bamboo, including disposal of waste from site clearing, to provide adequate clearance between vegetation and the conductor wires.
- Cutting access tracks at various points from the main roads to gain access to the transmission lines. Where soil conditions dictate, the access tracks will be surfaced with suitable material.
- Clearing and grubbing sites for lattice steel towers, with holes dug to permit construction of four tower footings for each steel tower. At locations where rock or densely compacted soil is encountered, rock drills will be used to create holes for the tower anchor bolts. In such cases, on-site compressors will be required to provide compressed air for pneumatic drills.
- Conveying cement and aggregates to the each tower site for the tower footings.
- Transporting metal components and bolts for the lattice steel towers to each tower site for manual assembly and erection of the towers.
- After the towers are in place, installing insulators and pulling wheels hung from each insulator string. Nylon ropes will be used to navigate from one tower to another. Drums of conductor wire will be transported to strategic locations on the alignment and connected to the nylon ropes, then be connected to a gasoline-powered winch secured farther along the alignment. Conductor wire will be secured to the nylon rope, winched in one at a time, to string the conductors from tower to tower through the wheels suspended from the insulators. The conductor wires will be secured to the insulators with appropriate tension.

- Installing grounding rods and/or continuous buried "counterpoise" (grounding) wires as required.
- Constructing temporary equipment stockyards, work camps and field mobile offices for project construction. The main stockyards will located near existing communities, where advantage can be made of existing transportation systems, on existing vacant level land and, wherever possible, in secure fenced-off areas. Work camps along the transmission line are mostly temporary, so the camps will be moved to new open sites along the alignment. It is anticipated that the work camps will be for a small numbers of workers and so will not require any significant infrastructure.
- Suitable rehabilitation and landscaping of sites (e.g., access tracks, storage and camp sites) no longer required once construction is completed. This includes removing debris or other contaminants, and returning the site to the same or better condition than it was found. Where it was necessary to gain access to the alignment across agricultural lands, those lands will be rehabilitated to ensure future productivity.

The assessment of initial impacts is based on the existing proposal, for which detailed plans have not been made. Mitigation measures and monitoring plans are suggested where needed. These measures and monitoring plans are presented for use as a guide for the detailed designs that will need to be made by the contractor.

6.2.2 PHYSICAL ENVIRONMENT

6.2.2.1 Topography, Geology and Landform

– **Impact Assessment**

Most of the project alignment goes through rather flat areas, especially the nearly 100 km of the 230 kV transmission line from Ban Nam Pa to the Nabong Substation and the 14 km of the 115 kV transmission line from Ban Nam Pa to the Pakxan Substation. Even the lands from the powerhouses to Ban Nam Pa are fairly gentle slope.

– **Mitigation Measures**

The new towers should be located in a manner that takes advantage of high points of land. This can reduce the number of towers needed for the project and provided larger vertical clearance. Increased clearance could reduce effects to existing watercourses and

surrounding vegetation. Disturbance to high slope areas from access tracks and sites for tower placement should also be minimized. Tower locations should avoid streams and watercourses, as well as areas of possible flooding, places where waste is collected, and natural swamps.

6.2.2.2 Erosion

– **Impact Assessment**

During construction of the project, for those towers that will be placed near waterways or on slopes, work should only involve minimal excavation to try to avoid soil erosion and potential for sedimentation of watercourses. Excavation should be limited to:

- Digging the minimum area needed for each of the lattice tower concrete support bases for the 230 kV and 115 kV transmission line systems.
- Clearing, excavating and leveling tracks for access to the transmission line alignment or tower base construction sites.

Uncontrolled excavation can lead to a variety of related effects: silt runoff, soil loss, and downstream siltation which in turn decrease water quality. However, even if there is erosion and downstream siltation from this work, the amount should not be so much as to reduce the quality of fish habitats, reduce fish population, and adversely affect the livelihood of local communities. However, one steeper slopes, erosion could affect stability of the structures.

The access tracks to the towers should also be built in ways that are appropriate to the topography and soil conditions, to minimize the potential for erosion.

– **Mitigation Measures**

To the extent possible, the towers should not be placed on steep slopes. When slopes cannot be avoided, excavations for the tower bases must be limited to the immediate area of the tower legs. It is recommended that towers on sloped lands should be designed so the downhill legs are longer than those uphill. The towers can thus be sited without having to excavate a level cut into the slope, which can create future problems with slope stability and erosion. Most construction should be done during the dry season to avoid problems of erosion from fresh excavations during the rainy season.

The number of access tracks should be limited to approximately one every three transmission towers, or about one track every kilometer. Access tracks should be selected at

the closest point to existing roads and trails, and should be an average of not more than one km in length. The tracks should be for light duty equipment, should be no wider than 2.5 m and covered with suitable road topping material in areas where moist soil conditions or the potential for water-borne soil erosion could arise and lead to problems of sediment discharge. Wherever possible, use of existing or dry season farm roads/tracks to gain access to the alignments is greatly preferred to building a new access track. Use of pack animals can also help reduce the risk of erosion in higher slope areas.

Wherever access tracks are constructed and then not required for permanent use, these tracks should decommissioned suitably by rehabilitating the disturbed surface, re-contouring the slope, and seeding the surface to encourage rapid re-vegetation. Internationally accepted best environmental management practices should be used to assess the risk of slope failure and erosion, and prevent potential erosion and sediment discharge problems. It is anticipated that existing sources of aggregate are available for use by the project, so that no major borrow sites or quarries need to be developed for this project.

Major re-vegetation after construction within the footprint of the transmission line towers should not be necessary because of the relatively small size of disturbed areas for the base of the 230 kV and 115 kV towers. The footprints are estimated to be 100 m^2 for towers on the 230 kV line and 49 m^2 for those on the 115 kV line. With most of the alignment situated along low slopes, the area likely exposed to significant erosional forces is quite limited. Natural regeneration should occur quickly during the early part of the first rainy season, so that the possibility of soil erosion within the disturbed area around the transmission line towers would be relatively minimal.

No matter what, internationally accepted best environmental management practices should be used to assess the risk of slope failure and erosion and prevent potential problems. These should include consideration and implementation of both engineering and bioengineering techniques. During the rainy season, construction should be avoided in erosion prone areas and areas where slopes are deemed to be unstable. Erosion mitigation measures should be monitored to ensure their effectiveness and corrective actions should be taken in a timely manner when such measures proved unsuitable or inadequate.

In summary, the project should employ suitable erosion and silt control measures, such as re-vegetation and soil stabilization around towers; use light duty equipment tracks to access tower sites; follow existing tracks where possible; use pack animals where possible to

minimize impacts to soils; situate tower sites to avoid potential mass wasting; limit the area of ground disturbance, by excavating only what is required for the foundation holes for tower legs; use a staggered design for tower legs on steep slopes to avoid the need to create level construction sites; evenly spread soil from foundation excavation around the tower site; if the site is not stabilized through natural re-vegetation, then re-seed and stabilize the ground with suitable grasses and plant species.

6.2.3 BIOLOGICAL ENVIRONMENT

6.2.3.1 Forestry and Vegetative Cover/Wildlife/Biodiversity

– **Impact Assessment**

Generally, removal of vegetation along a transmission line alignment can lead to reduced natural secondary forest and reduced wildlife habitats. Depending on tower locations and construction spots, as well as the swath of open area that would need to be cut for the transmission line, local ecosystems could be harmed. If rare and/or threatened vegetation or wildlife species are in an area, any project development could be detrimental to them.

In the case of this project area, forests have already deteriorated considerably. There is only scattered secondary growth in the successive ecosystem. The construction of the transmission line and on-going maintenance during project operation could curb the ability of further secondary forest recovery.

Reviews of forest cover maps, and results of field reconnaissance and villager interviews show that most of the vegetation affected by the project would be commercial tree species, herbaceous and woody-stemmed shrubs, and bamboo stands.

The existing habitat along most of the study corridor has already been severely degraded from earlier exploitation of the forests and from agriculture. The primary forest has been destroyed by logging and by slash-and-burn cultivation: big trees and commercial species have already been exploited. The proposed route does not appear to traverse any old growth forest and will bypass by some distance the nearest national biological protection area. Some natural forest stands have been identified that will be affected by the transmission lines; these are *Lower Mixed Deciduous Forests*, *Lower Dry Evergreen*, and some *Dry Dipterocarp Forests.*

The main sites of concern along the proposed routes are village cemeteries and sacred forests, though this will be reconfirmed when the detailed alignment and construction plans

have been made, and an area not far from a herd of elephants. If village cemeteries or sacred forests must be traversed, consultations and agreement with the communities must first be reached and arrangements and compensation appropriate to the culture and traditions of the communities must be made. As for the elephants, an estimated 25-30 elephants (about 2 to 4 family groups) are at the confluence of the mixed forest , is at a distant from the proposed of transmission line about 3 km at Ban Na Village, and faraway from Nabong Substation about 37 km.

Because much of the forest along the alignment was already disturbed or completely deteriorated, and the construction can make use of existing access roads, it is expected that the forest resources, vegetation, and wildlife habitats will not be further significantly affected by the proposed transmission line project. In those areas along the proposed route that will require removal of trees in secondary growth stands, the overall impact of such tree removal is deemed to be minor, as only a few of these areas will to be encountered. In some areas, it may also be necessary to remove individual trees or large tree branches that lean into or overhang one side (i.e., 40 m) of the transmission line corridor, if they are deemed to pose a threat to the integrity of the transmission line.

Most of the alignment for the 230 kV transmission line runs parallel to National Road No. 13 and parallel to an existing transmission line, so construction required for new access roads will be minimal. Existing access points near the proposed route could also be used as access roads to transport construction materials to the transmission line. The one major site where remaining natural forest might be affected if the proposed transmission line follows the existing proposed alignment is some secondary evergreen forests (about 3.43 ha) at Ban Thong Noi in Pakxan District.

– **Mitigation Measures**

It was first anticipated that forests and wildlife habitats would not be affected significantly by the proposed transmission lines: the field study confirmed that only some patches of forests may be affected. The most important of these are some locally-managed conservation areas and cemeteries in sacred forests. Since the transmission line alignment will run parallel and proximite to an existing road (i.e., 1.5 to 2 km away) for much of its length, disruption that would normally have been caused by the construction of lengthy access routes should be minimized. It is expected that no new roads will need to be constructed for the transmission lines: only a few small access tracks will be needed to

facilitate movement of heavy equipment or pickup trucks to the tower sites. In areas not yet easily accessible or where the transmission line towers will be located far from the main road, the project should move construction materials for the towers as much as possible on small local roads and along old village tracks or feeder roads and trails.

To ensure that the alignment and new access tracks avoid environmentally sensitivity area, staff of the Environmental Management Office (EMO) of the project should review the detailed alignment survey based on this report and work with the appropriate GOL authorities in monitoring the environmental impacts of the construction of the transmission lines.

If the detailed alignment confirms that the transmission line must pass through small patches of secondary forest because there are no suitable alternative routes, the arrangements for logging will be made by the Provincial Agriculture and Forestry Department (PAFO), in particular the Provincial Forestry Section (PFS) with District Agriculture and Forestry Office (DAFO), as well as any compensatory tree planting that may be required. Right-of-way (ROW) clearing will be carried out by a contractor, whose work will be strictly defined by the contract specifications and special provisions.

For this project, transmission lines will be strung under tension to minimize potential damage to vegetation and soils that would be caused by dragging conductor wires over the ground. Where the terrain is particular difficulty and the risk of damage to undergrowth is possible, consideration will be given to the using alternative methods for construction.

A monitoring program will be implemented by any contractors or subcontractors carrying out the work, who will be responsible for day-to-day monitoring of their activities, and by the EMU and the Project's EMO.

To protect wildlife, strict rules against wildlife hunting and poaching will be imposed on project staff, workers, and all contractors engaged for the project. Penalties will be levied for anyone caught carrying and/or using firearms; or using animal snares and traps. The Project Owner shall be directly responsible for dissemination of all regulations and information concerning the ban on firearms and hunting to its employees. The Project Owner will also be responsible for any misconduct made by its employees.

6.2.4 ECONOMIC, SOCIAL AND CULTURAL ENVIRONMENTS

6.2.4.1 Population and Communities

– **Impact Assessment**

The proposed alignment for the 230 kV transmission line does not pass through any built-up areas, with the exception of some army houses. However, the 115 kV transmission line passes through several communities as it approaches the Pakxan substation. The only public infrastructure that might be affected by the transmission line is some roads that pass through the right-of-way. However, given that the towers are not likely to need to be built on the roads or where there is any other public infrastructure, there should be no disruption of the communities' public infrastructure.

– **Mitigation Measures**

The final project design should try to avoid built-up areas as much as possible, though this will be difficult in the area near the Pakxan substation, given that there is not much flexibility in routing toward this fixed site and the area is already rather built up.

Any public infrastructure that is damaged during construction of the transmission line would have to be repaired, with the Project paying the relevant authorities compensation at replacement cost, according to the compensation principles under the GOL's Technical Guidelines on Compensation and Resettlement in Development Projects (2005)

6.2.4.2 Land Use and Settlements

– **Impact Assessment**

As already mentioned the proposed transmission line route alignment has not been identified precisely at this stage, since the detailed design is to be done by the turnkey project owner/operator. With the current alignment, 2 houses and 1 farm structure are within the right-of-way of the 230 kV transmission line, while about 20 houses and structures are within the right-of-way of the 115 kV transmission line.

– **Mitigation Measures**

During the detailed alignment survey and the determination of the alignment in the field, villagers along the route should be consulted periodically to help them understand the potential impacts of the project on their lives, and to obtain their input on the placement of

the lines. Potential relocation issues, as well as value of their properties and resources should be also recorded during the detailed alignment survey.

Wherever possible, the transmission routes should be re-designed to avoid those villages and houses. The alignments could instead be sited behind, around, or running between villages, instead of crossing through settlements. This would help avoid most of the potential adverse social and economic impacts.

In cases where the location of the transmission line can not avoid crossing villages, or individual houses or other structures, or cannot avoid paddy fields or other agricultural lands, and those structures must be removed or the fields must be altered, then relocation and compensation shall be provided according to the relevant laws and regulations of the Lao PDR. Developer shall provide adequate compensation to villagers for their losses according to the value of those structures or lands that must be removed or altered, based on their existing condition and subject to negotiation and acceptance by the affected homeowners or landowners.

Consultation with local authorities and villagers is necessary and the compensation process must be confirmed before and during construction. In the unlikely event that resettlement is required, the provisions of the Technical Guidelines on Compensation and Resettlement in Development Projects of the Lao PDR concerning resettlement and compensation must be followed strictly. The basic principle of compensation for the loss of land is based on the premise that landowners have the choice whether to accept a cash payment or compensation by land of an equivalent value at another location. Previous experience from other projects indicates that most affected people preferred compensation by land in other locations. It must be stressed that the choice of what type of compensation to accept, whether equivalent in land or cash, is entirely that of the landowner.

The proposed transmission lines, especially the 230 kV line, will also traverse tree plantations. Some plots were found with industrial species such as agarwood, eucalyptus and rubber, while others were planted to acacia and teak. Most were about 6 to 10 years old, with 10 to 25 cm diameter. The proposed transmission lines also cross numerous paddy fields, some of which are irrigated and are able to produce two crops per year. Indicating the period of tower construction and stringing to avoid the rice and other agricultural crop cultivation periods can minimize the impact on crops.

Where it is necessary to construct the transmission line across agricultural land, some of the towers may need to be located on privately owned lands. The developer shall purchase the land on which these towers are located. It was estimated that of the total 372 towers, less than 10 would be located on paddy fields and other agricultural lands. According to initial estimates, the towers for the 230 kV transmission line require approximately 324 sq. m per tower, for the 100 sq. m footprint plus another 4 m wide buffer around the tower. The towers for the 115 kV transmission line will require 225 sq. m. per tower, for the 49 sq. m. footprint and again for another 4 m wide buffer around the tower.

Most of the project should be constructed during the dry season, so fewer crops will be damaged. If crops are damaged, adequate compensation shall be paid to those affected by the project. Developer must also pay compensation to farmers for the lost value of crops if the farmers cannot cultivate crops as usual because of construction of the transmission lines.

As for tree plantations, fruit tree gardens and other crops within the right-of-way, any which are higher than 3 m must be removed. Compensation shall be based on the loss of the agricultural resources and income, rather than on land values, because there will be no acquisition of the land.

Compensation for the land on which the towers are built shall be based on the loss of existing properties where the towers are situated.

As for access routes, as mentioned earlier, the proposed transmission lines run parallel to the main road for much of their length. It is therefore expected that existing roads can be used for access to the new lines with very low impact on existing land uses. Where the transmission lines cross forested areas, existing logging tracks or village roads can be used to access the transmission lines.

During operation, burning of rice straw or plant residue, a common practice in the Lao PDR, must be banned in and near the right-of-way of the transmission lines to prevent possible damage to the lines.

6.2.4.3 Transportation

– **Impact Assessment**

International safety standards for minimum clearance distances have been adopted by Electricite du Laos (EdL) for high, medium and low voltage conductors. Minimum vertical clearances between conductors and the ground, navigable and un-navigable waterways, road

crossings, buildings, antennae, telecommunications lines and other types of utilities have been provided. Table 6-1 compares the vertical clearances used by EdL and project criteria design for 115 kV transmission lines. The proposed transmission line alignment avoids existing utilities wherever possible. Otherwise, minimum safety clearances need to be used.

Table 6-1 Comparison of Vertical Clearances of 115 kV Lines, indicated by EdL and the Project

Min. Specification of Conductor	Vertical Clearance (m)	
	EdL	Project
– Ground Accessible to pedestrians only	7.50	7.50
– Navigable River	5.0 Above mast height	10.50 (above max. water surface)
– Un-navigable River	7.00	N/A
– Road Crossing	8.50	10.00
– Buildings	Not Permitted	N/A
– Antennae	N/A	N/A
– Telecommunications Lines	4.0	4.50
– Mekong River Crossings	16.5 above high water level, or 5.0 above mast height, which-ever is greater	N/A

Note: N/A = Not Applicable

– **Mitigation Measures**

As transmission line construction, particularly tower erection and conductor stringing, moves from location to location, traffic disruption along the roads where erection crews are unloading materials from heavy trucks should be minor. The EdL should adhere to its established practices of posting warning signs and managing traffic to protect the traveling public and project workers. In the event that stringing conductors present a possible risk to traffic on roads or rivers, temporary barriers (such as bamboo scaffolds) will be constructed across the roads and rivers to protect pedestrians, vehicles, boats, and the conductor itself, from potential injury/damage during conductor stringing. In cases where overweight construction materials will have to be transported to the construction and/or substation sites, it may be necessary to reinforce temporarily some of the weaker roads or bridges.

6.2.4.4 Public Health/Public Safety/Occupational Health

– **Impact Assessment**

The main health issues for the project concern the risks to health and safety of the project work force during construction and operation and the possible effects of electromagnetic radiation for those living near the transmissions lines.

Work force health issues concern sanitation and disease control. Safety issues concern injury or death from accidents.

Studies have shown that the electromagnetic field strengths for 115 kV and 230 kV transmission lines at distances of 15 and 30 meters are as low or lower than that of common household appliances.[1] However, it is the constant exposure to the electromagnetic force that is of concern, with a number of health issues believed associated with such exposure, including but not limited to, depression, and migraine headaches. Research results have been mixed, but in general there is agreement that there is a possible increased risk of childhood leukemia to exposures of over 0.4 mG. The electromagnetic radiation from transmission lines are lower than this level when 30 meters from the center line for 115 kV lines and 60 meters from the center line for 230 kV lines.[2]

– **Mitigation Measures**

To ensure worker health and safety, the Contractor will be required to prepare and submit a worker health and safety plan for approval, prior to commencement of construction activities. Workers will undergo a pre-employment medical screening for certification as being fit for work. Workers will also receive health and safety training.

[1] From http://www.who.int/peh-emf/about/WhatisEMF/en/index3.html

[2] See Stakeholder Advisory Group on ELF EMFs (SAGE), First Interim Assessment: Power Lines and Property, Wiring in Homes, and Electrical Equipment in Homes, pp. 43-52. This report calculated the distance according to the standard transmission lines in the UK, of 30 meters for 110 and 123 kV lines, and 60 meters for 275 kV lines, which are considered equivalent to the 115 kV and 230 kV lines of this project.

The main health and safety risks of the project work force will likely be:

- Inadequate sanitation facilities in worker camps
- Introduction of vector borne diseases such as dengue fever, malaria or encephalitis
- Other epidemic or sexually transmitted diseases introduced by migrant workers
- Serious injury or death as a result of a fall from a tower or other construction-related accident
- Serious injury or death resulting from accidental collapse of a tower, or from being struck by a falling object from a tower
- Hand, eye and foot injuries from falls or being struck by falling objects

The public may also be at risk during the construction phase of the project, primarily as a result of:

- Objects falling onto or across public roads during tower/power pole erection or conductor stringing
- Spread of epidemic or sexually transmitted diseases from the migrant work force.

To assure the impact of electromagnetic radiation from the transmission lines is minimized, all houses and other structures within the right-of-way of the transmission line should be relocated or resettled sufficiently outside the right-of-way and as far from the lines as possible: in the case of the 230 kV transmission line, the recommended distance is 60 meters, while for the 115 kV transmission line, the recommended distance is 30 meters. The construction of any buildings within the right-of-way of the lines should be strictly prohibited. Health of those living near the transmission lines should be monitored annually, to determine if there is any increased incidence in diseases believed associated with constant exposure to electromagnetic radiation.

6.2.4.5 Waste Management

– **Impact Assessment**

The main waste expected from the project will be vegetative debris from clearance of the rights-of-way. Improper disposal of construction debris, vegetation and other construction materials can cause visual pollution and diminished ecological values.

– **Mitigation Measures**

Vegetative debris from right-of-way clearance will be stacked outside the area of the right-of-way. Villagers shall be permitted to remove vegetative matter such as bamboo and small trees that have an economic or practical value. The remaining vegetative waste will be removed by safe and sanitary means, Packaging waste from electrical equipment shall be recycled wherever possible (by making them accessible to villages), or otherwise disposed of in approved local landfills.

6.2.4.6 Archaeology, Cultural and Heritage Sites

Cultural and heritage sites in Lao PDR are considered national property. Situating a high voltage transmission line close to an important cultural or heritage feature is of great concern, since the esthetics and thus also the existence value (i.e., the value that it existed without being affected by external influences) of such a site could be diminished. Relocation of monuments or damage to them is culturally unacceptable and could lead to hostility towards the project.

Consultations with local villagers have been conducted during the project field survey to help reduce the potential for such contentious issues. It is strongly recommended that the transmission line be located so as to avoid traversing any culturally or historically important sites. It should be noted that the proposed routing of the 230 kV transmission line took into consideration the proximity to the Prabat Phonsan Temple alongside National Road No. 13. The line was routed to avoid visual impact on the temple.

6.2.4.7 Aesthetic/Recreation/Tourism/culture

1) Aesthetic/Recreation/Tourism

The transmission lines will not impair natural views, damage environmental beauty, diminish amenities of the areas, or reduce the recreational values of resources, because both the 230 kV and 115 kV transmission lines are aligned through areas that are already degraded (i.e., cleared by logging and slash and burn agriculture). There were no outdoor recreation areas or natural open landscapes of importance along the route. The alignments were lined along the bottoms of slopes where it would blend more easily into the background, so visual impact due to elevation of transmission lines was kept minimal.

2) Culture

– **Impact Assessment**

Possible impacts of the temporary migration of workers and work camp followers into the area has been evaluated. Since the line construction would be in distinct and separate locations, the number of workers would be in small and fairly isolated groups, and in any one place for only a short period. It is highly unlikely there would be any social or cultural changes resulting from such activities. Still, there would still be the possibility of increased demand on local resources and accommodation, temporary social disruption, degradation of traditional sites or offense to traditional customs, conflicts between local communities and the workers, and increased crime and prostitution, even if temporary.

– **Mitigation Measure**

To eliminate the conflict betweens local residents and migrant laborers, regulations on behavior of the workers must be established. Local employment shall be priority. The contractor must hold consultation meetings with local authorities to learn of any traditional practices and rules that need to be followed, and to coordinate in the enforcement of laws and regulations. Any entertainment venues or recreational facilities in the vicinity of the project shall be operated strictly according to the local village values and traditions.

6.2.4.8 Land Acquisition and Compensation

– **Impact Assessment**

Two sections of the transmission lines are now planned to cross directly through villages, such as Sanaxay and Anousonexay, in Pakxan District. This would affect an estimated 6.08 ha in the area, lead to a loss of some houses, and also the loss of some agricultural and forest lands.

– **Mitigation Measure**

The final design of the transmission lines, and in particular of the 115 kV line, should attempt as much as possible to avoid houses in the right-of-way. Given that the area close to the Pakxan substation is considerably built up, at least some houses are likely to be affected. Houses should be relocated sufficiently far from the right-of-way, to avoid health impacts from electromagnetic radiation. If relocation is not possible, new housing should be provided, or if the residents prefer, cash compensation. Replacement costs should be no less

than the original value of the assets. During relocation, disruption to the livelihood of local residents should be minimized, with any such losses in income compensated.

Privately owned lands that need to be acquired for the construction of transmission line towers shall be compensated in cash at the market value of the land. Losses in privately owned trees that need to be removed shall be compensated in cash at the market value of the trees or of the produce of the trees.

6.2.4.9 Economic conditions

– **Impact Assessment**

The main impacts on the economic life of the people during construction of the transmission lines will be the loss of land for the transmission towers and the changes in land use on lands proximate to the lines, where trees and other tall plants will not be permitted.

There may be some short-term economic benefits to local businesses from the increase in clientele caused by the influx of temporary workers.

– **Mitigation Measure**

There should be sufficient consultation with local communities to assure any negative economic impacts are minor and recoverable.

6.3 IMPACTS DURING PROJECT OPERATION

6.3.1 TRANSMISSION LINE OPERATION AND MAINTENANCE

The EdL will carry out maintenance along transmission line. EdL's current practice is to inspect transmission lines at least twice a year, checking the condition of towers, conductors, and insulators, as well as clearing or trimming vegetation and cutting any trees higher than 3 m to avoid electrical arching or service interruption. Use of herbicides or chemical poison for such maintenance along transmission lines is not allowed as these chemicals can contribute to contamination of watercourses and threaten the health of people, beneficial insects, birds and other wildlife. Burning to control vegetation along the transmission line is also prohibited.

EdL permits crop cultivation by local people under transmission lines, so long as the crops are not higher than 3 m. EdL also enables local residents who lived along transmission line routes to participate, under contract, to clear and cut vegetation and trees manually along

the transmission line under the supervision of EdL technical staff. Increased participation by villagers in the maintenance of transmission lines is recommended.

6.3.2 PHYSICAL AND BIOLOGICAL ENVIRONMENTS

The transmission lines are suspended above ground, so impacts of the project on physical aspects are expected to be minor during operation and maintenance. Topography, geology and landforms might affect ongoing maintenance of the project, in particular the maintenance of access roads and project structures, as well as associated land maintenance. The project should employ measures to avoid or reduce any adverse effects from operation and maintenance of the project.

6.3.3 ECONOMIC, SOCIAL AND CULTURAL ENVIRONMENTS

6.3.3.1 Population and Communities

– **Impact Assessment**

The availability of a reliable source of electricity, on a 24-hour basis, to supply the energy consumption for Central Region of Lao PDR could significantly contribute to the local quality of life, as well as to the development of regional industry, agricultural production, and commercial activities.

Operation and maintenance will require occasional passage through communities of repair and maintenance teams.

– **Mitigation Measure**

Ensure the operation of project-related facilities is done in a manner that avoids or minimizes negative effects.

6.3.3.2 Land use

– **Impact Assessment**

The main impact of project operations on land use of the local residents might be interference with access to their lands. However, the design criteria of towers provide enough vertical clearance for local roads.

Maintenance might on occasion require the transport of heavy materials or equipment to the transmission lines. However, existence of adequate access routes from the construction

phase would prevent any such movement of materials or equipment from having negative impacts on villagers' lands.

– **Mitigation Measure**

Avoid operational activities that would interfere with access to lands used by local residents.

6.3.3.3 Infrastructure Facilities/Industries

Effect on existing infrastructure facilities and industries during operation and maintenance should be minimized the implementation of appropriate and effective maintenance, in order to avoid the obstruction to use of the infrastructure by local people.

6.3.3.4 Water Use and Water Supply

So long as the transmission towers are not placed immediately beside waterways, and so long as erosion is avoided, no impact is expected on the quality or supply of water.

6.3.3.5 Public Health/Public Safety/Occupational Health

– **Impact Assessment**

The indirect impact on health and the environment due to vegetative control along the rights-of-way should be minimal. Although accidents are not anticipated, they could occur. The towers could affect low flying aircraft. Constant exposure to electromagnetic radiation is shown to contribute to increased rates of childhood leukemia and is thought to contribute to other illnesses (though the evidence for these other illnesses, such as adult leukemia, migraines, and depression is less conclusive).

– **Mitigation Measure**

Herbicides should not be used to control vegetation along the rights-of-way. Burning to clear and control vegetation along the rights-of-way should also be prohibited. Rather, local villagers along routes should be contracted to cut the vegetation along the rights of way and to remove as much as possible to avoid accidental fires.

Signals installed on the transmission lines are required for the safety of low flying aircraft. The warning signals are already included into the project criteria designs.

Houses or other buildings with regular use should be prohibited from the right of way and kept sufficiently far from the transmission lines.

6.3.3.6 Land Acquisition and Compensation

– **Impact Assessment**

To maintain adequate vertical clearance, owners of agricultural lands may lose some opportunity for industrial plantation or other tree plantation beneath the transmission lines.

– **Mitigation Measure**

Compensation for opportunity losses shall be considered and paid to affected villagers based on the results of discussion between the Resettlement Management Unit and affected individuals in collaboration with local authorities, with final decisions on any compensation rates made by the Provincial Resettlement and Living Condition Restoration Committee. However, this compensation should already be provided for the most part during the construction phase of the project

6.4 TERMINATION AND ABANDONMENT PHASE

– **Impact Assessment**

At termination of the project, the right-of-way corridors would be abandoned, so land uses along the rights-of-way would be not need to be controlled for the safety of the transmission lines. It is assumed that the tower bases would remain, so agriculture could be conducted around the bases.

– **Mitigation Measure**

The Project Owner should ensure that the decommissioning of the project is done in a manner that avoids or minimizes any impacts on local land use and avoids conflicts in land ownership or rights of use of the decommissioned right-of-way.

CHAPTER 7

ENVIRONMENTAL MONITORING AND MANAGEMENT PLANS, COMPENSATION, AND INSTITUTIONAL ARRANGEMENTS

This chapter presents the environmental monitoring and management plans, which should be applied to help mitigate adverse environmental impacts and foster beneficial impacts from the construction, operation, and termination of the transmission line project. The environmental monitoring management plan (EMP) is being proposed for the use by the turnkey operator or contractor, in order to comply with the suggested plans of the detail design of the transmission lines, and follow the environmental mitigation measures recommended for construction and operation.

7.1 MITIGATION MEASURES

The mitigation measures and monitoring plans are proposed in accordance with the major impacts that are expected to result from the project. The responsible agencies for each major component are given.

7.1.1 DESIGN AND CONSTRUCTION PHASE

7.1.1.1 Vegetation and Wildlife

Impact Assessment: Removal of vegetation along the alignments

Mitigation Measures: Minimize the impact in the detailed design phase by designing the routes to avoid passing through forests.

Responsibility: developer or contractor.

7.1.1.2 Land Use and Settlements

Impact Assessment: Land lost to the project for tower construction or land with restricted use due to being in the project right-of-way.

Mitigation Measures: Minimize the impact during the detailed design phase by planning routes that do pass through as few agricultural lands or settlements as possible.

Responsibility: developer or contractor, with assistance from the project's Environmental Management Office

7.1.1.3 Health and Safety

Impact Assessment risks of health and safety during construction because of inadequate sanitation facilities in worker camps, and from diseases and accidents.

Possible health impacts to residents close to the transmission lines from electromagnetic radiation.

Mitigation Measures: prepare and submit a worker health and safety plan for approval before starting construction. Warning signs at risk sites must be installed to protect public travelers and workers.

Monitor health of those residents potentially at risk to electromagnetic radiation through household surveys and local hospital data.

Responsibility: developer or contractor for health issues of the workers.

Social Management Unit of the project for the health issues related to electromagnetic radiation.

7.1.1.4 Cultural and Heritage Sites

Impact Assessment Displacement or alteration of sites considered to be valued cultural or historical heritage to local communities may lead to conflict with the affected people.

Mitigation Measures: Minimize the impact by consulting with local residents during detailed field investigations, and avoid those sites during detailed design phase.

Responsibility: the Resettlement Management Unit with assistance from the project's Social Management Office.

7.2 ENVIRONMENTAL MONITORING

During construction of the towers and transmission lines, at all the construction sites less than 300 m from the Nam Ngiep river bank and thus possible to cause pollution to the water from runoff, water quality monitoring should be conducted at least once during construction period in rainy season at three locations: upstream from the construction site, near where there might be runoff from the construction site, and at a reasonable distance downstream from the construction site. However, if the towers or other construction activities are located at least 300 m from the water body and if they are constructed during dry season, so that there would be no runoff from construction materials and so the landscaping can be completed before the next rainy season. Therefore, by planning the construction of the towers nearest waterways at appropriate times when preparing the detail design and work plans of transmission line construction, the need for monitoring can be greatly reduced. Some simple investigation should be done throughout the line, by observation, to assure there are no erosion and no impact on nearby waterways. If possible erosion is observed, more detailed investigation and monitoring may be needed.

7.3 COMPENSATION MEASURES

Compensation will be carried out according to the Prime Minister's Decree No. 192/PM of 2005 on Compensation and Resettlement of People Affected by Development Project and the Technical Guidelines on Compensation and Resettlement of People Affected by Development Projects of 2005. Land needed for the 372 towers must be fully compensated if on privately owned or used land or on community land. Compensation does not need to be paid for the acquisition of State land for the towers.

For other lands within the right-of-way, that does not need to be used for the towers, compensation also needs to be made for any commercial or fruit trees or other high plants that need to be removed to avoid impeding the transmission line. Compensation will also be needed for any losses of income from temporary loss of agricultural land during construction, when lands need to be used for brief periods for access tracks, stockpiling, workers' camps, and other temporary functions.

Houses or other built structures within the right-of-way will have to be relocated to a safe distance from the transmission line, or if that is not possible, the affected persons will have to

be resettled to a house of equal or better standard than their existing structure or paid compensation at full replacement value.

7.3.1 LAND ACQUISITION

Land acquisition will be required to enable placement of the transmission line towers, poles, and substations. The total land acquisition is based on the following calculations:

- An estimated 262 tower sites will be needed for the 230 kV line, based on an average distance of about 460 m between towers site for this 120 km section of the transmission route. The footprint for each of these towers will be 10 m x 10 m or 100 m^2, with an additional buffer 4 meters wide around the tower. Thus a total of 18 m x 18 m or 324 m^2 is required for each tower. A total of about 8.5 ha will need to be acquired for the towers for this transmission line. Over 60 percent of the right-of-way is forest land, and another 30 percent unstocked forest. Much of this is State land that will not require compensation for the land, though there may need to be compensation for the lost income of any crops grown on the land, in particular on unstocked forest used for agriculture, and compensation to communities for any loss of their forests.
- The 40 km section of the proposed 115 kV transmission line route from powerhouse to Pakxan station will require 110 towers, based on an average of 360 m per tower. The footprint for each of these towers will be 7 m x 7 m or 49 m^2, with an additional buffer 4 meters wide around the tower. Thus a total of 15 m x 15 m or 225 m^2 is required for each tower. A total of about 2.5 ha will need to be acquired for the towers for this transmission line. Over 80 percent of the right-of-way is forest land, and another 5 percent unstocked forest. Much of this is State land that will not require compensation for the land, though there may need to be compensation for the lost income of any crops grown on the land, in particular on unstocked forest used for agriculture, and compensation to communities for any loss of their forests.

Table 7-1 shows to the land acquisition estimated for the towers of each transmission line.

Table 7-1 Land Acquisition Calculation for Towers of each Transmission Line

Position	Transmission line	
	115 kV (40 km)	230 kV (120 km)
Footprint of tower	7 m x 7 m or 49 m^2	10 m x 10 m or 100 m^2
Total area required	15 m x 15 m or 225 m^2	18 m x 18 m or 324 m^2
Number of towers	110	262
Total acquisition required	24,750 m^2 or 2.475 ha	84,888 m^2 or 8.4888 ha

7.3.2 COST ESTIMATE FOR PERMANENT LOSS OF LAND

A total of 11 ha of land needs to be acquired for the transmission line towers. If the land for all the towers of the transmission lines has to be purchased, total costs of land acquisition would be about 253,335,000 Kip, or nearly US$ 30,000, as shown in Table 7-2.

Table 7-2 Cost Estimates for Land Acquisition for Transmission Line Towers

Type of Land	Value per ha (Kip)	Approximate area (ha)	Total cost (Kip)
Forest Land	20,000,000	7.564	151,280,000
Unstocked Forest	15,000,000	2.679	40,185,000
Paddy Land	42,000,000	0.747	31,374,000
Other Agricultural Land	25,000,000	0.103	2,575,000
Built-up Area	400,000,000	0.068	27,200,000
Total		11.16	252,614,000

7.3.3 COST ESTIMATE FOR LOSS OF FRUIT TREES AND OTHER COMMERCIAL TREES

The right-of-way of the transmission lane must be clear of tall plants that could impede the transmission lines. The main types of trees that will need to be compensated for are fruit trees and other commercial trees. The indicative values for fruit trees and the types of commercial trees found in the right-of-way are given in Table 7-3. Total compensation for these trees is estimated at 14,220,000 Kip or about US$ 1,675.

Table 7-3 Cost Estimates for Temporary Loss of Fruit and Other Commercial Trees

Supplies	Unit	Quantity units			Cost per unit	Total (Kip)
		Big	Middle	Small		
Fruit Trees	Tree	0	45	0	70,000	3,150,000
Agarwood *(Mai Ketsana)*	Tree	0	72	0	60,000	4,320,000
Teak *(Mai Sak)*	Tree	0	237	0	60,000	14,220,000
Total						**21,690,000**

7.3.4 COST ESTIMATE FOR TEMPORARY LOSS OF AGRICULTURAL PRODUCTION

Some lands may be used only temporarily, during construction of the transmission lines. Those who use the lands for agricultural production or for other productive uses should be paid compensation for the loss of income during the time the land is being used. The

temporary use of state lands will not require compensation for lost income. When the lands that are used temporarily are privately owned agricultural lands or other lands used for production, compensation will need to be paid for these temporary losses and for any costs of restoring the land to original conditions. Most such temporary loss will be for one crop or one agricultural season. Compensation will be given based on the average yield of the crops lost and the market prices of those crops, for every season of temporary loss of the use of that land, and based on the actual costs of restoring the land to original conditions, if the Project does not itself carry out that land restoration. Table 7-4 provided indicative values for the replacement costs of various crops.

Table 7-4 Cost Estimate for Temporary Loss of Agricultural Production

Crop	Unit	Cost per unit (Kip)
Maize	kg	1,600
Rice	kg	2,000
Fruit Crops	kg	10,000
Vegetable Crops	kg	8,000

Source: 2009 prices from http://faostat.fao.org/site/570/default.aspx#ancor, accessed 29 September 2011

7.3.5 ENTITLEMENT MATRIX OF NNHP-1 TRANSMISSION LINES

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
1	Loss of agriculture land	Permanent partial loss of land, where the remaining land remains economically viable.	a) Legal owner with valid title or customary or usufruct rights covered by the census and their natural growth (including children of registered households who may have formed new families after the initial census date, but excluding the relatives of a spouse who previously resided outside the area). b) Persons later accepted for inclusion by the Compensation Working Group or the Grievance Committee under the Grievance Procedure	PAPs will be entitled to: – Cash compensation for acquired land at replacement value, which is to be equivalent to the market price during the year in which compensation is made of land of similar type and category, and free from transaction costs (taxes, registration, land transfer or other administrative fees), at informed request of the AP. – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque.

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
1	Loss of agriculture land	Permanent partial loss of land, where the remaining land remains economically viable.	c) Tenant, leaseholder and sharecropper	PAPs will be entitled to: – Cash compensation equivalent to market value of gross harvest for one year's production or for the remaining period of tenancy/lease, whichever is greater – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque.
			d) PAPs without valid title or without recognized customary or usufruct rights. (encroachers, squatters)	PAPs will be entitled to: – If the PAPs are squatters or encroachers who are poor or otherwise vulnerable, they can be entitled to assistance for loss of income from the loss of the land, including compensation at replacement cost for loss of lands or structures. – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque. – Encroachers who have been determined by the grievance and compensation process to have encroached on the lands primarily for the purpose of gaining compensation from the project will not be entitled to any compensation or assistance.

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
2 (a)	Structures (Residential, commercial, industrial or institutional)	Total permanent loss of structures, or where after partial permanent loss the remaining structure is rendered unviable for continued use, but there remains sufficient land for reorganization.	a) Legal owner with valid title or customary or usufruct rights covered by the census and their natural growth (including children of registered households who may have formed new families after the initial census date, but excluding the relatives of a spouse who previously resided outside the area). b) Persons later accepted for inclusion by the Compensation Working Group or the Grievance Committee under the Grievance Procedure	PAPs will be entitled to the following: – Cash compensation for entire structure at replacement value, at the informed request of the AP. – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque. – Materials transport allowance to new location
			c) Tenant / leaseholder in the partially affected structure	PAPs, if displaced, will be entitled to the following: – Transition allowance equivalent to three months' rent. The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque. – Assistance to find new place to rent – Materials transport allowance to new location
			d) Owner of affected structure without title or customary rights	PAPs will be entitled to the following: – Cash compensation for entire structure at replacement value. The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque. – Materials transport allowance to new location

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
2 (b)	Structures (Residential, commercial, industrial or institutional)	Partial permanent loss of structure and the remaining structure remains viable for continued use.	a) Legal owner with valid title or customary or usufruct rights covered by the census and their natural growth (including children of registered households who may have formed new families after the initial census date, but excluding the relatives of a spouse who previously resided outside the area). b) Persons later accepted for inclusion by the Compensation Working Group or the Grievance Committee under the Grievance Procedure c) Owner of affected structure without title to the land	PAPs will be entitled to the following: – Cash compensation for affected part of the structure at replacement value; and – Allowance to cover repair cost of the remaining structure. – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque. PAPs will be entitled to the following: – Cash compensation for affected part of the structure at replacement value; and – Allowance to cover repair of the remaining structure. – The cash or cheque payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque.
3	Loss of other structures	Secondary structures such as boundary walls, wells, animal sheds, granaries, etc. which are not part of the main structure/house.	Owners of structures	– Compensation in cash at replacement costs. The payment is to be issued or released to both husband and wife, with both signing receipt of the cash payment or cheque.

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
4	Loss of access to common resources and facilities	Loss of access to rural common property resources and urban civic amenities, including community grazing areas, fishery and other riparian resources, NTFPs, community cemeteries	Communities / Households	– For villages not requiring relocation, replacement community forests / NTFP and firewood gathering areas; replacement grazing areas; fish ponds, restocked fishing areas, rehabilitated riparian resources. – For cemeteries and graves: excavation, movement and reburial in a culturally acceptable manner and in a location agreed upon by the APs
5	Loss of standing crops	Standing crops that could not be harvested	Owner of affected crops	PAPs will be entitled to cash compensation equivalent to market value of damaged or lost crops.
6	Loss of fruit trees, perennial plants & trees, and other productive assets	Affected plants and trees Loss of plantation trees Loss of fishponds	Owner of affected plants and trees, or person with customary usage right or right to harvest (to be validated by village authorities)	– For fruit/nut trees, compensation will be paid based on the average annual value of the produce multiplied by the number of remaining productive years of the tree; – For timber trees, cash compensation at replacement cost equivalent to current market value based on type, age and diameter at breast height (DBH) of trees; – For fishponds, replacement fish pond of equal size and/or productivity and amenity plus assistance to stock and feed fish or lump sum cash payment equivalent to years of productivity as agreed with AP; Participation in aquaculture program; – For all productive assets: <u>At least two months notice</u> will be given to PAPs to harvest crops and collect fish prior to any site clearance.

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
7	Loss of public infrastructure and other cultural properties	Loss of public infrastructure (electric supply, water supply, sewerage & telephone lines; public health center; public water tanks) and cultural properties (temples, spirit houses and other historical, cultural and religious structures)	Relevant agencies.	Compensation in cash at replacement cost to respective agencies.
			Communities / Households	– For temples, spirit houses and other historical, cultural and religious structures: dismantling, relocation and reconstruction in a culturally acceptable manner and in a location agreed with APs – For domestic water sources and private wells: provision of good quality domestic water supply to at least the standard of current water supply – For electricity and telecom connections, sewerage/drainage facilities, roads, tracks and bridges, schools, clinics, public health centers: full restoration or replacement to original or better condition and locations agreed with the communities and relevant government authorities.
8	Temporary Losses	Affected structures or other fixed assets	Affected APs	In cash, on the basis of replacement cost of material and labor without deduction for depreciation or salvageable materials for the damages during the period of temporary possession.
		Severely affected structures	Affected PAPs made to shift temporarily from their present location	Entitlement will be in terms of rent allowance to cover the cost of alternate accommodation for the period of temporary displacement.
		Loss of crops and trees	Affected APs	Compensation at market value and for loss of net income from subsequent crops that cannot be planted for the duration of temporary

No.	Type of loss	Application	Definition of entitled person	Entitlement policy
				possession
8	Temporary Losses	Temporary acquisition	Affected APs	No compensation for land if returned to the original user, but a monthly rent as per market value will be paid to APs. PAPs will be compensated immediately and damaged assets will be restored to its former condition.
9	Unforeseen Impacts	In case of any additional impacts identified during implementation, appropriate entitlement measures would be included.		

7.4 ENVIRONMENTAL MONITORING PROGRAM

Transmission lines in Lao PDR are the responsibility of Electricité du Lao (EdL). The EdL and the Project will be responsible for implementing the proposed mitigation measures for the transmission lines. The EdL and the Environmental Monitoring Unit (EMU) established by the Ministry of Natural Resources and the Environment (MONRE) for the NNHP-1 Project will also be responsible for ensuring on a daily basis that the environmental mitigation measures and environmental monitoring activities identified in this IEE report are properly implemented. They will be assisted as needed by the Environmental Management Office (EMO) of the Environmental and Social Division of the Project. The EdL will:

- Provide environmental training concerning the transmission lines to the contractor and sub-contractors involved in the project construction. The training should focus on: environmental protection laws and regulations; environmental management practices for such matters as erosion control, waste disposal, and health and safety; and under what conditions might it be necessary to use their stop work authority.

The EdL and EMU will:

- Conduct temporary and routine monitoring plans of the contractor's construction activities to ensure that work is compliant with environmental specifications and provisions set out in the construction contract.

The Resettlement Management Unit (RMU) established by the Provincial Resettlement Management and Living Condition Restoration Committee (PRMLCRC) will be responsible for ensuring on a daily basis that the social mitigation measures, including compensation, and social monitoring activities in this IEE report are properly implemented. The RMU will be assisted by the Social Management Office (SMO) of the Environmental and Social Division of the Project. The RMU will:

- Implement and monitor social aspects associated with the project, including any compensation, relocation and resettlement.
- Carry out regular consultations with people in the areas affected by and near the transmission lines, to inform them of the plans for the project, seek their input in detailed design and plans in order to minimize adverse social and environmental impacts, and assure they continue to be informed of all aspects of the project as it is being implemented.
- Inform people in the areas affected by and near the transmission lines of the grievance procedure and of the ADB accountability mechanism.

During construction of the transmission lines, the Environmental and Social Division of the Project will hold monthly meetings with the EdL, EMU, and RMU to

- Evaluate their work performance in relation to environmental and social objectives of the project; identify areas of satisfaction and shortcomings in the contractor's work; and provide guidance to resolve areas where the work is deficient.

A grievance procedure is established for the project, through which affected persons can raise grievances and make claims concerning project construction practices, contractor activities, impairment of livelihood from damage to or loss of crops as a result of construction activities, loss of access, and other environmental and social impacts they might face as a result of the project. Given that the NNHP-1 Project will receive Asian Development Bank (ADB) funding, the ADB also has an accountability mechanism (AM) to enable “people

adversely affected by ADB-assisted projects to voice and seek solutions to their problems and also report alleged violations of ADB's operational policies and procedures."[1]

A third party monitor will be contracted by MONRE to monitor compliance with environmental and social aspects of the project, to assure that the Environmental Management Plan (EMP) of the project, including aspects concerning the transmission lines, is implemented effectively.

The third party project monitor must have specialists who are experienced in environmental assessment and monitoring of transmission line and substation construction projects. . The monitor will be responsible for:

- Ensuring that the Environmental Monitoring Unit (EMU) includes monitoring of the transmission lines in its work.
- Reviewing the monitoring guidelines to be used on the project.
- Carrying out periodic environmental audits of project construction works (both those completed and in progress) to identify potential problems that should be corrected, and provide guidance on how such problems might be resolved.
- Providing post audit briefings to the, EdL, EMU, PRMLCRC, RMU, and the Environmental and Social Division of the Project. .

7.4.1 ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

The Contractor will be required to prepare a project EMP (Environmental Management Plan) for construction of the transmission lines, which indicates how the Contractor will implement the mitigation measures and monitoring. The Contractor will also be required to prepare and submit a monthly environmental management report and other occasions reports to the EMU, as required under the Concession Agreement. This monthly report will identify the work undertaken and document any environmental problems encountered during the reporting period, the environmental protection or mitigation measures adopted to resolve such problems, and any follow-up actions required to correct such problems.

[1] Asian Development Bank, "Asian Development Bank Accountability Mechanism," brochure issues March 2009. Accessed from http://www.adb.org/Accountability-Mechanism/default.asp on 27 October 2011.

Upon approval of the NNHP-1 IEE and the EMP, the EdL, with the assistance of the EMU, RMU, and the Project's EMO and SMO, will arrange a dissemination workshop on how the environmental work can be implemented for the transmission line project. The purpose of this workshop should be to make clear to all parties the type and scope of work to be carried out, time schedule and where funds can be accessed when monies are needed for mitigation and compensation. In terms of the schedule and parties to be involved in the monitoring and evaluation, we propose the following, with final timing and responsibilities to be determined in the Concession Agreement:

7.4.1.1 Monthly Monitoring

A monthly time schedule would be approved, in which period the EdL and EMU would send staff to the project site to monitor and evaluate implementation of the EMP. The main tasks would include:

- Consulting with the EdL Branch Liaison Officer and other relevant agencies and offices to determine if the EMP is being implemented and is as effective as expected.
- Conducting selected interviews with residents and others affected by the project to assess progress in the environmental mitigation measures.
- Preparing a field report to the EMU of MONRE, which would be also submitted to Department of Electricity, Ministry of Energy and Mining (MEM), the PRMLCRC, and other relevant agencies.

It is estimated that conducting these monthly monitoring tasks would likely require about five days per month in the field for on-site work and another one to two day(s) for report preparation.

7.4.1.2 Quarterly Monitoring

A joint monitoring and evaluation between the offices responsible for environmental and social monitoring would involve visiting the project site on a quarterly basis (once every three months) during the construction phase of the project. Quarterly monitoring would likely involve:

- Working with EdL Branch Liaison Officer and EMU to review the work progress and to see if the EMP is effective and being conducted within the allotted time frame.

- Describing the possibility of adjustment to EMP, if there is any need to improve the effectiveness of the EMP.
- Consulting with the village representatives and affected people to determine if the compensation and social mitigation measures have been adequately implemented.
- Preparing and distributing the quarterly monitoring field report to concerned parties.

It is estimated that quarterly monitoring tasks would require one week of work on-site in the field.

7.4.1.3 Independent Monitoring and Evaluation

According to the MONRE's guidelines for independent review and also as a requirement of some international donor projects, an independent consultant will be required to review the implementation of the EMP. In this regard, we would recommend that EdL participate in the independent review of the transmission line component as a means to help EdL gain experience for implementing future projects as well as help with the transparency of EdL.

7.5 INSTITUTIONAL ARRANGEMENTS

The institutional arrangements for the construction and operation of the transmission lines will be the same as that for the entire project.

The roles of the GOL at the national level will be provided through the Joint Steering Committee (JSC) and the Ministry of Natural Resources and Environment (MONRE) as the primary supervisory and monitoring body. A Secretariat of the JSC will include key government agencies and organizations involved in the environmental and social components of the Project, specifically EdL, the Department of Environmental and Social Impact Assessment (DESIA) of MONRE, the Department of Energy Promotion and Development (DEPD) of the Ministry of Energy and Mines, and the Resettlement Management Unit (RMU) established for this project.

An Environmental Management Unit (EMU) will be established in MONRE to oversee monitoring of the project. Environmental components will be carried out by relevant government agencies in MONRE and in the Ministry of Agriculture and Forestry (MAF). Provincial and District EMUs will be established, consisting of the heads of the relevant government offices for the various environmental aspects of the Project.

A Provincial Resettlement Management and Living Conditions Restoration Committee (PRMLCRC) has been established to be the lead organization in approving policies and plans, entitlements, and activities, and supervising and monitoring the implementation of social measures, including resettlement, and to provide the mechanism for public involvement, for decisions on compensation, and for the expression and resolution of grievances.

A Resettlement Management Unit (RMU) will be established by the PRMLCRC to coordinate the work of the government in resettling the most severely affected people in the project area, together with the technical assistance, financial support, and related work of the project developers through the Project's Environment and Social Division.

At the project level, the project owners will establish an Environment and Social Division (ESD), responsible for assisting the relevant government agencies and programs in the implementation of the mitigation measures. An Environmental Management Office (EMO) in the ESD will be responsible for environmental mitigation measures and monitoring, while a Social Management Office (SMO) will be responsible for social and economic mitigation measures and monitoring, including assistance with resettlement efforts of the RMU.

The overall institutional framework is shown in the Figure 7-1. This framework is indicative and might be modified during the implementation phase as agreed between the parties.

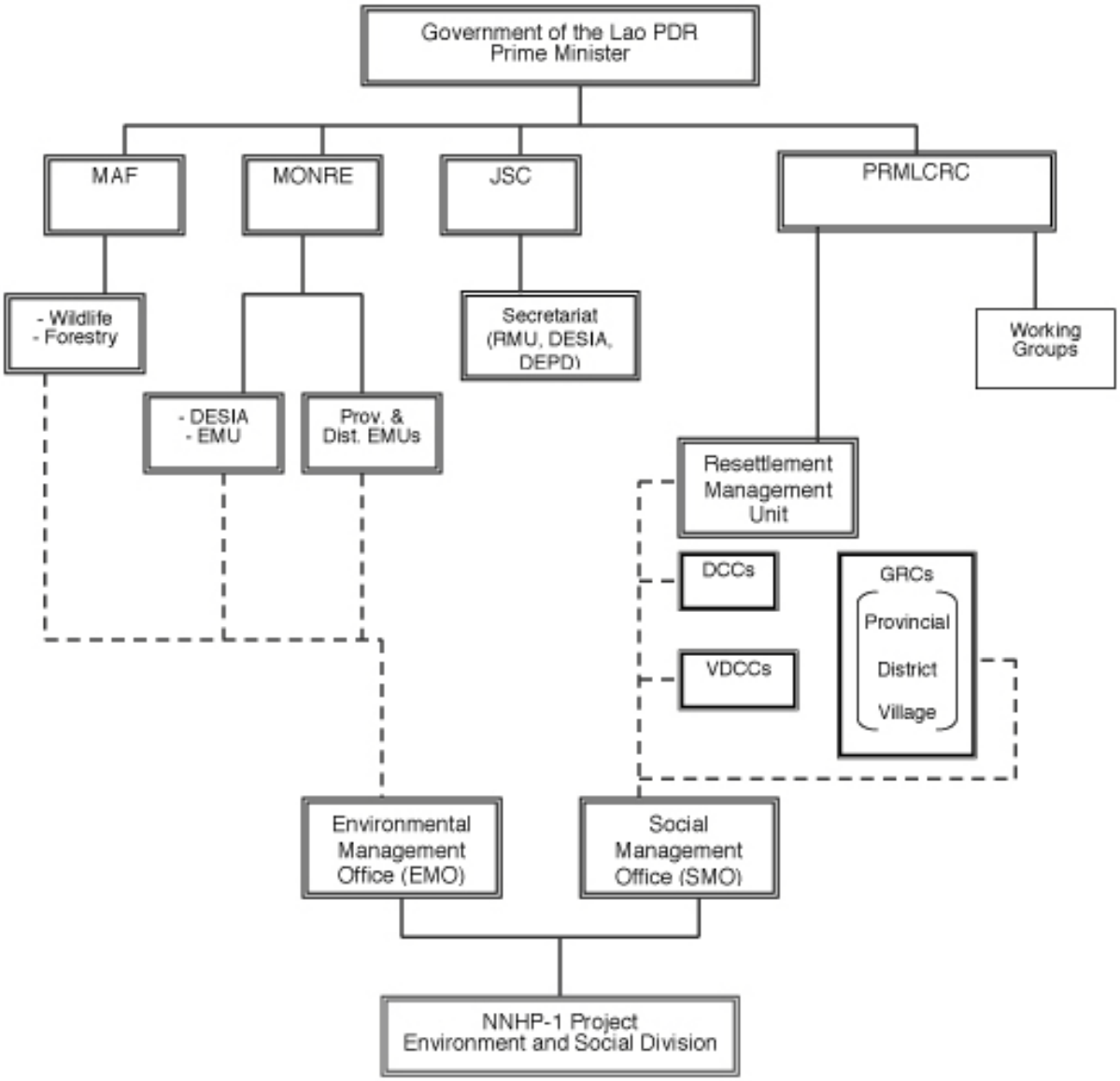


Figure 7-1 Institutional Arrangements for the NNHP-1 Project.

7.5.1 GOVERNMENT INSTITUTIONAL ARRANGEMENTS FOR THE PROJECT

The GOL will establish the national level organizations responsible for setting policy and directions, for supervising and monitoring of NNHP-1. The project will provide additional resources so that these organizations can provide efficient and effective support to the implementation and monitoring of the mitigation measures and development programs under the project.

7.5.1.1 Joint Steering Committee

The Nam Ngiep 1 Project Joint Steering Committee (JSC) will be established by GOL to serve as a task force for the implementation of the NNHP-1 Project. It will be attached to the

Department of Energy Promotion and Development under the Ministry of Energy and Mines. Other members will include representatives from Electricitè du Lao, MONRE and the Resettlement Management Unit of the Project.

The JSC will lead GOL's public relations work and disclosure for the Project; provide GOL engineering staff and facilitate their work; coordinate with GOL project units and various government entities at national, provincial, and district levels; and monitor progress of the project.

7.5.1.2 Environmental Management Unit

The Environmental Management Unit (EMU) will be established by MONRE to monitor the environmental components and mitigation measures of the Project. MONRE will coordinate as appropriate with other departments of GOL with respect to matters such as biodiversity, forests, wildlife, aquatic life and other matters. In addition to its monitoring activities, the EMU is also responsible for responding to any public comments, complaints and inquiries in relation to environmental aspects of the project.

EMU staff will be engaged full time on this project. They can be seconded from other offices or engaged as under contracts.

Provincial EMUs will be established in each of the provinces affected by the project, and District EMUs will be established in each of the districts affected by the project, to assist the EMU in monitoring the environmental impacts and the mitigations measures of the Project. Their work will be conducted with the support of and in coordination with the Environmental Management Office of the Environmental and Social Division of the Project.

7.5.1.3 Provincial Resettlement Management and Living Condition Restoration Committee

The GOL will establish a Provincial Resettlement Management and Living Condition Restoration Committee (PRMLCRC) to overseeing and monitoring the planning and implementation of the resettlement, compensation, livelihood restoration, and other social development activities of the project. The PRMLCRC will establish the Resettlement Management Unit (RMU), the District Coordination Committees (DCC), and the Provincial and District Grievance Redress Committees (PRGC and DGRC); and will supervise and instruct the RMU, the DCCs, and the Village Development Coordination Committees (VDCCs) concerning the implementation of the resettlement, compensation, livelihood

restoration, and other social measures. The PRMLCRC will be responsible for these activities in all areas affected by the Project, and will work closely with the Environment and Social Division of the Project.

Because the majority of resettlement activities will be in Bolikhamxay Province, including all the new resettlement sites, the chairperson of the PRMLCRC will be the Governor of Bolikhamxay Province. The Vice Governors of Vientiane and Xieng Khouang Provinces will serve as vice-chair persons. Other members will be District Heads of all the Districts affected by the Project, Directors of the relevant Provincial government offices, and a representative from the Lao Front for National Reconstruction. The Head of the RMU will serve as Secretary to the Committee.

7.5.1.4 Resettlement Management Unit

A Resettlement Management Unit (RMU) will be established by and serve under the direction of the PRMLCRC, consisting of officials seconded from relevant GOL agencies or personnel hired directly by the RMU. The RMU will administer the resettlement, compensation, livelihood restoration, and other social development activities of the project and ensure participation of all relevant GOL agencies in these activities. The RMU will work in coordination with the Social Management Office (SMO) of the Project..

The RMU and SMO will first work out of the main offices at the construction site, to help with the resettlement of Ban Hatsaykham to Ban Hat Gniun during the first year of the project. A field office will then be established in the resettlement area in Bolikhamxay Province, where most of the resettlement will take place. This office is also to be shared by the RMU and the SMO.

The RMU will be headed by a Director, who should have proven resettlement implementation experience. Three (3) RMU Co-Coordinators shall be senior qualified officials, one from each Province (Bolikhamxay, Vientiane, and Xieng Khouang), with first-hand experience with resettlement, compensation and rural development issues, and selected from GOL line agencies at the provincial level, to work under the direction of the RMU Director and coordinate the implementation of the social measures in their respective provinces. RMU Members will be selected from GOL line agencies at the provincial level, with other technical staff contracted to assist as needed with the implementation of the social measures.

7.5.1.5 District Coordination Committees

The PRMLCRC will establish District Coordination Committees (DCC) on recommendation of the RMU in districts affected by the project. The DCCs will work under the supervision of the PRMLCRC and the RMU, and in cooperation with the SMO. The DCCs will help implement the various resettlement, compensation, livelihood restoration, and other social development works of the Project. This will also include the construction or provision of roads, buildings, rural electrification, bridges, water supply and other infrastructure projects related to resettlement and livelihood restoration works; provision of health services, education, occupational training, and other social development programs; agricultural development programs; and cultural and ethnic minority programs.

The DCCs will consist of the District Governor, as Chairperson, and representatives from the District Natural Resources and Environment Office, the District Public Works and Transportation Office, the District Agriculture and Forestry Office (DAFO), the District Health Office, the District Education Office, the District Information, Culture and Tourism Office, the District Labour and Social Welfare Office, Police, Militia and Army, the Lao Youth Union, the Lao Women Union, LWU, Lao Front for National Construction (LFNC), and other contract staff as required.

7.5.1.6 Village Development Coordination Committees

The DCCs will establish Village Development Coordination Committees (VDCC) as necessary in those villages affected by the project. With the support of the SMO and DCCs, the VDCCs shall be the implementing body for the management and implementation of the resettlement, livelihood restoration, and other social development works and activities. The VDCCs are expected to represent the villagers in the affected areas, and to voice their concerns and assure their needs are met.

The VDCCs will consist of the Head of the Village as Leader of the committee, and village authorities (Mass organisations, public security, defense, etc.), village elder representatives (naeow hom), Lao Women's Union representatives, other skilled members of the community, representatives of all ethnic groups, and representatives of all vulnerable groups, as members.

7.5.2 PROJECT INSTITUTIONAL ARRANGEMENTS

The Project Developers will establish an Environment and Social Division (ESD) of the Project. The ESD will consist of an Environmental Management Office (EMO) to enable the Project to meet all its environmental obligations, and a Social Management Office (SMO) to enable the Project to meet all of its social obligations, including resettlement, compensation, livelihood restoration, and other social development works. These are all to be carried out in close cooperation and in coordination with the relevant government organizations set up to implement environmental and social aspects of the project, such as the EMU, the PRMLCRC, the RMU, the DCCs and the VDCCs, and government agencies responsible for various works.

Among the ESD's responsibilities will be:

- Manage the environmental, social, economic and resettlement components, using consultant inputs as required,
- Monitor and report to the developer on the effectiveness of implementation of the mitigation measures, social development activities, and resettlement program, and
- Coordinate activities during construction and after construction with relevant government agencies, with the aim of improving the environmental performance of the project during its operating phase.

7.5.3 GRIEVANCE REDRESS COMMITTEES

The PRMLCRC in consultation with appropriate authorities will establish the Grievance Redress Committees (GRC) at the village, district and provincial levels, to address any complaints and grievances pertaining to land acquisition, compensation and resettlement that are brought forward by APs.

The GRC will comprise the following members, among others:

a. Representatives of the Provincial Authority and agencies (only for the Provincial Grievance Redress Committees);
b. Representatives of District the Authority and agencies (only for the District Grievance Redress Committees and Provincial Grievance Redress Committees);
c. Village headman;

d. Representative of APs;
e. Representatives from mass organizations, such as the LWU, elder council;
f. Local not-for-profit organizations and
g. Representative from the Project.

The purpose of the grievance procedure is to ensure that APs have the means to assure they are satisfied they have been adequately protected from adverse impacts of the project, or if impacts cannot be avoided that they are satisfied they have obtained adequate compensation and that their entitlements are delivered sufficiently and on schedule. If an affected person or group or community feels they have not been adequately protected or compensated, have not received the entitlements due them, or otherwise believe there have been unfairly affected by the project, that person or group or community has the right to make a claim. The Grievance Procedure will cover both social and environmental issues, since most of the environmental impacts are those that affect people.

The GOL recognizes that the best way to avoid conflicts or grievances is through the process of consultations, disclosures, and participatory planning and decision-making. Thus, the first stage is Conflict Avoidance. This should be done through consultations and disclosures, as well as participation in planning and decision making. If disagreements do arise, but have not yet become firm conflicts, then the issue may still be solved through informal negotiations and other informal means. It is only when problems have become more intractable that they need to be taken to the more formal grievance process. This formal process is presented in Figure 7-2.

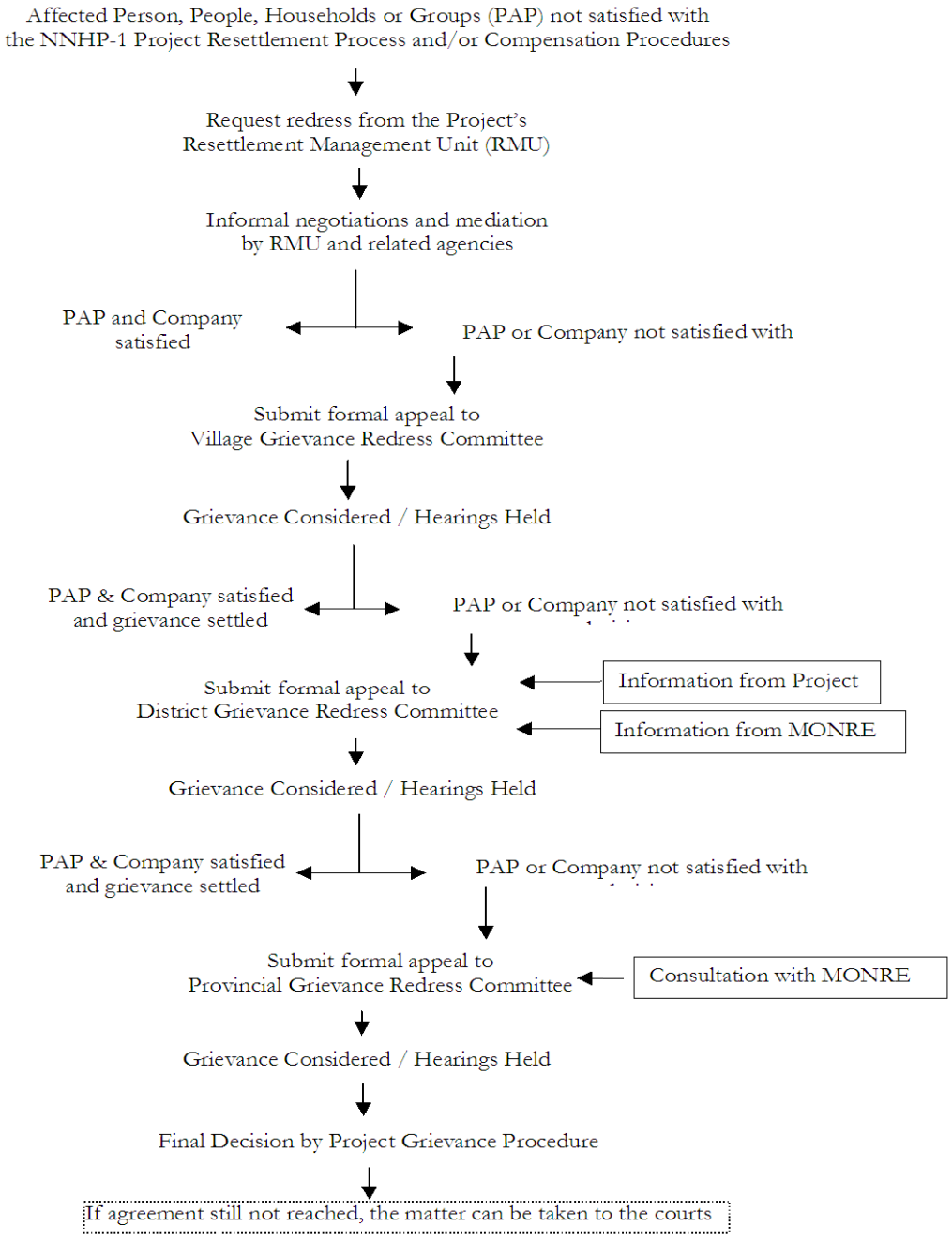


Figure 13-2 Schematic of the Grievance Procedure for the NNHP 1 Project

Figure 7-2 Grievance Procedure for the NNHP-1 Project.

The EMO and SMO of the Environmental and Social Division of the Project and the RMU should be in regular consultation with affected people and communities, and so be able to learn at an early stage of any complaints or grievances that may arise.

If the AP is not satisfied with the decision at the project level, or wishes to initiate the process at the level of the Village Grievance Committee, the AP can submit a complaint. The meeting of the Village Grievance Committee will be held in a public place, no more than 15 days from the date of formal receipt of the grievance. The report of the decision of the Village Grievance Committee must be in writing and must be signed by the members of the committee. The aggrieved party and the Project representatives should also sign and indicate their agreement or disagreement with the decision.

If either the AP or the Project are not satisfied with the decision by the Village Grievance Committee, or if the Project does not abide by the decision of the Village Grievance Committee, an appeal can be made to the District Grievance Committee. The District Grievance Committee will keep a public log of all claim and grievances it receives, including a summary of the decisions made, and must also make public all reports on decisions made by the committee. The meeting of the District Grievance Committee will be held in a public place, no more than 20 days from the date of formal receipt of the grievance. The report of the decision of the District Grievance Committee must be in writing and must be signed by the members of the committee. The aggrieved party and the Project representatives should also sign and indicate their agreement or disagreement with the decision.

If either the AP or the Project is still not satisfied with the decision made by the District Grievance Committee, or if the Project does not abide by the decision of the District Grievance Committee, an appeal can be made to the Provincial Grievance Redress Committee (PGRC). The PGRC will examine and consider the complaint or grievance in consultation with representatives of MONRE and the Project.

If the matter is still not resolved to the satisfaction of the APs and the Project within 20 days after filing the complaint with the PGRC, the matter can be forwarded to the Court of Law. The Court of Law will follow up with relevant authorities to make the final and binding decision.

In cases that the Project is found responsible for negligence of compensation, the Project will cover in full all administrative and legal fees incurred by the APs in the grievance redress process at the District level, the Provincial and MONRE level, and in the Court of Law.

Claims for such payment should be made by the APs to the Project staff of the ESD, and a copy of such claims also submitted to MONRE for record and information.

Complaints and grievances concerning impacts during construction will be considered up to and for no more than one year after the official date of completion of construction of the project. Complaints and grievances concerning impacts from operation of the project will be considered from the official date of the start of operations.

7.5.4 ASIAN DEVELOPMENT BANK ACCOUNTABILITY MECHANISM

Partial funding for the NNHP-1 Project will be provided by the Asian Development Bank (ADB). Environmental and social safeguards of the ADB will also apply to the Project. Among them is the ADB Accountability Mechanism (AM), which provides access to affected persons to the ADB's grievance procedure.

The AM has been set up to allow affected persons the ability "to voice and seek solutions to their problems and also report alleged violations of ADB's operational policies and procedures." This is done in two stages. If a complaint is considered eligible for review there is first consultation with the stakeholders, to try to solve the problems that they have raised. If the results of the consultation process are satisfactory to the complainants, it is not necessary to continue with a compliance review. If the results of consultation process are not satisfactory, the ADB's Compliance Review Panel can recommend to the ADB Board of Directors the eligibility of the complaint for review. If approved, an independent investigation is made to ensure project compliance and to recommend any changes in the project that are needed to ensure that compliance.

Residents and other stakeholders in the area of the transmission lines will be informed of the AM process and provided with a Lao language brochure describing the process and their rights. A copy of this brochure in Lao and English is provided as Annex H to this report.

7.6 TIMING AND BUDGETS

According to the construction schedule of the Nam Ngiep 1 Hydropower Project, the total construction period of the 230 kV transmission line and its substation will be about 30 months and that of the 115 kV transmission line and its substation will be about 8 months.

Budget for EMP management and monitoring focusing on the tasks due to impacts of transmission lines such as consultations, meetings and related work will be approximately US$ 50,000.

CHAPTER 8

PUBLIC INVOLVEMENT

Regarding the Regulations for Implementing Decree No. 192/PM on Compensation and Resettlement of People Affected by Development Projects enacted on November 11, 2005, Article V, the project owner shall properly and strictly undertake public consultation, participation and disclosure with all key stakeholders including women and other affected people. The development of transmission lines is likely to require some land acquisition; so fair and reasonable compensation shall be implemented under the agreement of the stakeholders, especially for affected people. There are 24 villages in the four districts of Bolikhan, Pakxan, Thaphabat, and Pak Ngum that could be directly affected. Initial socio-economic surveys in these communities showed that conflicts could arise if public involvement with these communities is not started at the earliest stages of the project. The initial discussions with residents and community leaders have already been fruitful, and further public involvement should follow up on this initial effort.

8.1 STAKEHOLDERS

This section of the IEE report provides a brief overview of information regarding public consultation for the proposed transmission line project. This public consultation information has been collected through consultations and discussions with the following groups and individuals:

- Representatives from Water Resource and Environmental Administration of the GOL (WREA);
- Provincial Governors;
- Officials from district offices;
- A cross section of village leaders and residents in the 24 villages along the proposed route of the transmission line; and,
- Other potential Project beneficiaries.

During this initial field survey, the responses of local residents were noted, especially their perception of the proposed project. More detailed discussions were held in addition to the survey. At all time during the consultation and discussion sessions, particular effort was made so the villagers were aware that the project, as it is now proposed, is in no way an imposition on the villagers, and that they have every right in determining the outcome of the project.

Prior to the arrival of the field survey units, local district authorities in the project areas were officially notified of the objectives and the timing of the fieldwork that was to be conducted in their districts.

8.2 MAJOR COMMENTS AND OPINIONS

The villages in the proposed project area cover a range of sizes, ethnic mixes, and income levels. Three main issues were raised during these consultations:

- Village officials and residents expressed generally positive reactions to the proposed project
- Residents expressed a strong preference for compensation through allocation of new land rather than by financial compensation, if portions of their land were to be appropriated permanently.
- Residents expressed interest in knowing as early as possible the exact location of the route for the transmission line so that they could clear the existing vegetation from areas that would be affected and take the route into account for crop planning.

Public consultation for the proposed project should continue during the detailed design phase before construction begins. At this stage, affected people, others living near the transmission lines, and other stakeholders should be informed of project plans, asked for advise on ways to minimize environmental and social impacts, and informed about the grievance procedure and the ADB accountability mechanism. Public participation through consultation will also be encouraged as part of the monitoring of activities for this project, and will be a feature of the Project's overall monitoring and evaluation component.

CHAPTER 9

CONCLUSION

The proposed project consists of two new transmission lines transferring electricity from two substations of the NNHP-1 project. The criteria design of these transmission lines regarding engineering safety and the environment applies to two corridors with a total area of a maximum of about 1160 ha: a 80 m wide by 120 km long right-of-way for the 230 kV line and a 50 m wide by 40 km long right-of-way for the 115 kV line. Because the two lines run parallel for the first 26 km, that portion of their rights of way will overlap somewhat, so the actual area required for the two lines may be a bit less. The 230 kV alignment starts at the powerhouse at the main dam, runs along the Nam Ngiep River to National Road No.13 south, then runs parallel to the road to the Nabong Substation, Vientiane Capital. The 40 km corridor of the 115 kV line starts at the re-regulation dam, runs parallel with the 230 kV line until Ban Nampa, and then diverges southeastward to the Pakxan substation in Bolikhamxay Province. The two alignments cross four districts of two provinces: Bolikhan, Pakxan and Thaphabat Districts in Bolikhamxay Province, and Pak Ngum District in Vientiane Capital. The alignments as they are now proposed will affect 183 households in 24 villages.

The project routes were chosen to avoid the remaining environmentally sensitive areas along the alignment, especially the Phou Khao Khoay National Biodiversity Conservation Area, other protected forests, recreation areas, waterfalls, research areas, and any religious or cultural/heritage sites.

Construction activities include vegetative clearance for about 372 tower bases (11 ha) and vegetative pruning for vertical clearance of conductors along the length of the transmission lines. Access tracks would be provided from existing local roads to the transmission route alignment. Cement, aggregates, metal, and other materials would be conveyed to the tower site for the tower structures. Insulators would be installed later and stringing of the lines carried out. Temporary stockyards, work camps and mobile field offices for small numbers of workers will be required. After construction, site rehabilitation and landscaping will be done

in a suitable manner. Operation and maintenance will follow the safety operation and maintenance plans as regulated by the EdL.

The design and construction phase will result in minor adverse impacts on existing secondary forests and vegetative resources. The impacts will not be greater, despite the length of the lines, because the existing forest and vegetative resources along the proposed alignments are already quite deteriorated, and because large sections of the lines will run along existing infrastructure (National Road No. 13 and an existing transmission line). It was expected that no new major roads would be constructed, but there would be only small access tracks built to facilitate movement of materials and equipment by light tractors or pickup trucks to tower sites. In areas where access to the construction sites is difficult, it might be feasible to use old village tracks or existing feeder roads, and even to use pack animals instead of motor vehicles. In summary, it is expected that existing forests, vegetation and wildlife habitats will not be significantly affected by the project. However, the project could indirectly affect some patches of secondary growth forests, as well as plantation trees, community conservation areas and cemeteries. Public consultation is needed to determine how best to minimize some of those impacts, especially for the cemetery and community conservation areas.

The study indicated that about 25 houses and 1 garage could be subject to relocation or resettlement as a result of this project. However, social impacts and cost of compensation might decrease by shifting alignments slightly away from these buildings in the detailed design phase, though most of the affected buildings are in a rather built up area near the Pakxan sub-station, where it would be difficult to make significant changes to the alignment. During the detailed ground survey and investigation, residents along the route should be consulted again regarding their attitudes and opinions, as well as obtaining information about the value of their properties and resources.

Some planted trees of industrial or commercial species will be affected by the vertical clearance that is required for the right-of-way between the spans. These include some agarwood, and 6 to 10 year old para rubber trees, acacia, eucalyptus, and teak, with diameters from 10 to 25 cm. Some paddy fields, including those with irrigation that can plant two crops a year, might also be situated under the lines. The trees may need to be removed if they are found to be a possible impediment to the transmission lines. The paddy fields and other agricultural lands may need to be used temporarily during construction.

The Phabat Phonsan Temple in Thaphabat District, an important cultural and religious site, lies about 1 km from the proposed alignment. Some other cultural, religious, or historical sites of local importance might also be affected by the proposed right-of-way of the transmission lines. A cemetery, known as Pa Saa, located at Ban Thong Yai Village, Pakxan District, would be beneath the 115 kV line as now proposed.

In principle, the right-of-way for the transmission line must be clear of any major objects, including buildings or other structures, and trees or large bushes. While the Phabat Phonsan Temple is now sufficiently far from the alignment, its location must be kept in mind during the detailed design phase, to make sure the transmission line avoids this site. To the extent possible, any site that is of cultural, historical, or religious importance to the local communities should be avoided, so that these sites do not need to be moved or razed, which would likely be considered unacceptable to the local residents. The alignment of the transmission lines should instead by shifted slightly, to avoid such sites. From consultations with local residents conducted during the IEE field survey, it is clear that the line should be shifted away from such sites in order to reduce social impacts and avoid potential conflicts.

Legislative and regulatory mechanisms shall be followed to ensure that compensation will cover the loss of property or of crops, as well as the loss of expected income from agriculture or from other land development. The project owner shall compensate for Permanent loss of any properties within the proposed right-of-way, in particular the lands where the towers will be placed, either by other property of at least equal value to the lost property or cash compensation. The affected persons have the choice of what type of compensation they prefer. The construction contractor shall compensate for any temporary loss of land use, crops, trees, or other resources during the construction phase.

Mitigation measures for the design and construction phase have been proposed that could, if implemented effectively, ensure the adverse impacts resulting from the project would be satisfactorily addressed. A monitoring plan is proposed, with evaluation by a third party to ensure that environmental mitigation is effectively undertaken to address the negative impacts. It is strongly recommended that during construction and for maintenance, first priority be given to hiring workers from affected villages, so local residents can also benefit from the additional income.

As noted previously, the transmission would likely affect some houses and rice huts, so mitigation measures and a compensation plan must be formulated before construction to

ensure that potential impacts are addressed satisfactorily. This IEE, including the environmental management plan and monitoring program as presented in previous chapters, is considered sufficient to meet the EA requirements of the proposed transmission lines for the NNHP-1 power project. Therefore, a more detailed assessment by way of an Environmental Impact Assessment (EIA) is not required for this project.

Table 1 Land use and forest type along the transmission line 125 Km (from Nabong substation to powerhouse)

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 0 to Km 5	Pak Ngum	Nabong	Belong to Village	Unstocked Forest	11.178	5.571
	Pak Ngum	Nabong	Mr Phet	Unstocked Forest	0.675	0.338
	Pak Ngum	Nabong	Belong to Village	Nam Ngum River	0.650	0.325
	Pak Ngum	Thakokhai	Belong to Village	Nam Ngum River	0.661	0.330
	Pak Ngum	Thakokhai	Mr Phet	Teak (237T)	0.609	0.304
	Pak Ngum	Thakokhai	Belong to Village	Unstocked Forest	1.760	0.880
	Pak Ngum	Thakokhai	Mr Ti	Paddy Field	1.113	0.557
	Pak Ngum	Thakokhai	Belong to Village	Unstocked Forest	11.980	5.992
	Pak Ngum	Thakokhai	Belong to Village	Nong (Lake)	0.786	0.393
	Pak Ngum	Nonh	Belong to Village	River	0.791	0.399
	Pak Ngum	Nonh	Belong to Village	Unstocked Forest	17.919	8.918
Km 5 to Km 10	Pak Ngum	Nonh	Mr Khampien	Paddy Field	1.629	0.851
	Pak Ngum	Nonh	Mr Bounta	Abandonment Paddy Field	0.292	0.074
	Pak Ngum	Nonh	Mr Chounmany	Paddy Field	1.529	0.839
	Pak Ngum	Nonh	Mr Mi	Paddy Field	1.776	0.893
	Pak Ngum	Nonh	Mr Kanha	Paddy Field	0.881	0.528
	Pak Ngum	Nonh	Belong to Village	Unstocked Forest	23.895	11.855
	Pak Ngum	Xienglea Tha	Mr Tou Xiengma	Paddy Field	0.373	0.285
	Pak Ngum	Xienglea Tha	Mr Air	Paddy Field	0.549	0.294
	Pak Ngum	Xienglea Tha	Belong to Village	Unstocked Forest	6.269	2.629
	Pak Ngum	Xienglea Tha	Mr Phonh	Paddy Field	0.813	0.525
	Pak Ngum	Xienglea Tha	Mr Thidnoonh	Paddy Field	0.294	0.184
	Pak Ngum	Xienglea Tha	Mr Chine	Paddy Field	1.035	0.633
	Pak Ngum	Xienglea Tha	Mrs pat	Paddy Field	0.989	0.613
	Pak Ngum	Xienglea Tha	Mr Di	Paddy Field	1.243	0.617
	Pak Ngum	Xienglea Tha	Mr kham	Paddy Field	0.993	0.499
	Pak Ngum	Xienglea Tha	Mr Chandam	Paddy Field	0.965	0.482
	Pak Ngum	Xienglea Tha	Mr Luern	Paddy Field	1.286	0.644
	Pak Ngum	Xienglea Tha	Belong to Village	Dry Dipterocarp	11.450	5.725
	Pak Ngum	Xienglea Tha	Mr Nang Att	Paddy Field	1.291	0.645
	Pak Ngum	Xienglea Tha	Mr Lieng	Paddy Field	1.345	0.672
	Pak Ngum	Xienglea Tha	Belong to Village	Unstocked Forest	34.282	17.141

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 15 to Km 27	Pak Ngum	Xienglea Na	Belong to Village	Unstocked Forest	68.130	34.067
Km 27 to Km 28	Pak Ngum	Xienglea Na	Mrs Sipha	Paddy Field	0.561	0.280
	Pak Ngum	Xienglea Na	Army Zone	Unstocked Forest	5.106	2.557
	Pak Ngum	Xienglea Na	Mr Thanut B	Paddy Field	0.275	0.122
	Pak Ngum	Xienglea Na	Mr Thanut A	Unstocked Forest	0.442	0.234
	Pak Ngum	Xienglea Na	Mr Thanut A	Paddy Field	0.535	0.348
	Pak Ngum	Xienglea Na	Army Home	Built Up	0.489	0.163
	Pak Ngum	Xienglea Na	Army Home	Built Up	0.909	0.453
	Pak Ngum	Xienglea Na	Belong to Village	Unstocked Forest	3.518	1.760
Km 28 to Km 37	Pak Ngum	Vuenkabao	Belong to Village	Unstocked Forest	67.798	33.899
Km 37 to Km 42	Thaphabat	Na	Belong to Village	Unstocked Forest	6.421	3.211
	Thaphabat	Na	Mr Kongphanh	Paddy Field	0.672	0.336
	Thaphabat	Na	Mr Lai	Paddy Field	0.232	0.116
	Thaphabat	Na	Mr Khammao	Paddy Field	0.378	0.189
	Thaphabat	Na	Mr Somphon	Paddy Field	0.580	0.290
	Thaphabat	Na	Belong to Village	Unstocked Forest	8.055	4.027
	Thaphabat	Na	Mr Somphone Hung	Paddy Field	0.324	0.163
	Thaphabat	Na	Belong to Village	Dry Dipterocarp	5.793	2.898
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	0.127	0.024
	Thaphabat	Somsaat	Belong to Village	Dry Dipterocarp	4.828	2.401
	Thaphabat	Somsaath	Mr Onta	Paddy Field	0.509	0.353
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	0.502	0.205
	Thaphabat	Somsaath	Mr Mai	Paddy Field	0.490	0.245
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	0.442	0.221
	Thaphabat	Somsaath	Mr lieng	Paddy Field	0.226	0.113
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	1.526	0.801
	Thaphabat	Somsaath	Mr Khean	Paddy Field	0.310	0.117
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	0.348	0.173
	Thaphabat	Somsaath	Mr Somphone	Paddy Field	0.535	0.315
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	2.654	1.279
	Thaphabat	Somsaath	Mr Chanh	Paddy Field	0.244	0.123
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	1.899	0.950

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 42 to Km 47	Thaphabat	Somsaath	Mrs La	Paddy Field	0.321	0.157
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	5.003	2.505
	Thaphabat	Somsaath	Belong to Village	Mixed Deciduous	25.215	12.608
Km 47 to Km 52	Thaphabat	Palai	Belong to Village	Mixed Deciduous	1.815	0.908
	Thaphabat	Palai	Ms Khong	Paddy Field	0.733	0.367
	Thaphabat	Palai	Mrs Pe	Paddy Field	0.393	0.196
	Thaphabat	Palai	Belong to Village	Unstocked Forest	6.432	3.216
	Thaphabat	Palai	Mr Khanthong	Abandonment Paddy Field	0.624	0.314
	Thaphabat	Palai	Belong to Village	Unstocked Forest	0.480	0.238
	Thaphabat	Palai	Mr vath	Kedsana	0.232	0.110
	Thaphabat	Palai	Mr Tou Tue	Paddy Field	0.939	0.476
	Thaphabat	Palai	Belong to Village	Mixed Deciduous	12.699	6.348
	Thaphabat	Palai	Belong to Village	Mixed Deciduous	1.151	0.576
	Thaphabat	Palai	Belong to Village	River (Nam Leuk)	0.520	0.260
	Thaphabat	Palai	Belong to Village	Unstocked Forest	2.926	1.464
	Thaphabat	Palai	Tou Xiengkong	Rubber	1.926	0.967
	Thaphabat	Thabok	Belong to Village	Unstocked Forest	3.251	1.620
	Thaphabat	Thabok	Mr Van	Paddy Field	0.293	0.137
	Thaphabat	Palai	Belong to Village	Unstocked Forest	4.357	2.188
	Thaphabat	Thabok	Mr Vanh	Paddy Field	0.879	0.439
	Thaphabat	Thabok	Mr Bounma	Paddy Field	0.820	0.409
Km 52 to Km 56	Thaphabat	Thabok	Mr Khambone	Paddy Field	0.905	0.453
	Thaphabat	Thabok	Mr hand	Ray	3.621	1.803
	Thaphabat	Thabok	Mr Xom	Ray	2.076	1.048
	Thaphabat	Thabok	Mr Bounthanh	Paddy Field	0.978	0.486
	Thaphabat	Thabok	Ms Thummi	Paddy Field	1.629	0.798
	Thaphabat	Thabok	Mr Khammuan	Paddy Field	1.441	0.736
	Thaphabat	Thabok	Mr Saly	Paddy Field	1.137	0.573
	Thaphabat	Thabok	Tou Xiengthong	Paddy Field	1.365	0.683
	Thaphabat	Thabok	Belong to Village	Dry Dipterocarp	22.420	11.210
Km 56 to Km 77	Thaphabat	Sisomxay	Belong to Village	Dry Dipterocarp Forest	86.230	43.115

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 77 to Km 82	Thaphabat	Sisomxay	Belong to Village	Dry Dipterocarp Forest	75.896	37.948
	Thaphabat	Sisomxay	Belong to Village	River (Nam Lo)	0.497	0.249
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.433	0.620
	Thaphabat	Nongkuen	Mr Att	Unstocked Forest (Farm)	0.994	0.592
	Thaphabat	Nongkuen	Mr Ong	Mixed Deciduous	1.335	0.664
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.194	0.593
	Thaphabat	Nongkuen	Mr Ngu	Abandonment Paddy Field	0.207	0.039
	Thaphabat	Nongkuen	Mr Xom	Unstocked Forest	2.679	1.356
	Thaphabat	Nongkuen	Mr Xom	Paddy Field	0.377	0.245
	Thaphabat	Nongkuen	Mrs Tom	Paddy Field	0.977	0.599
	Thaphabat	Nongkuen	Mr Xom	Unstocked Forest	0.258	0.030
	Thaphabat	Nongkuen	Belong to Village	Mixed Deciduous	4.351	2.164
	Thaphabat	Nongkuen	Mr Si	Paddy Field	0.895	0.448
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	11.287	5.638
	Thaphabat	Nongkuen	Mr Souk	Unstocked Forest	0.534	0.309
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	0.435	0.188
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	2.482	1.235
Km 82 to Km 87	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	8.503	4.242
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.821	0.925
	Thaphabat	Nongkuen	Belong to Village	River (Nam Thouay)	0.459	0.217
	Thaphabat	Nongkuen	Belong to Village	River (Nam Thouay)	0.525	0.272
	Thaphabat	Pakthouay Neu	Belong to Village	Unstocked Forest	0.133	0.094
	Thaphabat	Pakthouay Neu	Mr Tousuan	Paddy Field	0.648	0.357
	Thaphabat	Pakthouay Neu	Belong to Village	Dry Dipterocarp	1.434	0.507
	Thaphabat	Pakthouay Neu	Mr Tou Chouang	Old Paddy Field	0.499	0.388
	Thaphabat	Pakthouay Neu	Belong to Village	Dry Dipterocarp	3.821	1.720
	Thaphabat	Pakthouay Neu	Mr Tou Tonh	Unstocked Forest	0.616	0.417
	Thaphabat	Pakthouay Neu	Mrs Tou Pouk	Paddy Field	0.291	0.203
	Thaphabat	Pakthouay Neu	Mr Tou Sak	Paddy Field	0.442	0.303
	Thaphabat	Pakthouay Neu	Mr Luar	Unstocked Forest	0.087	0.000

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
	Thaphabat	Pakthouay Neu	Belong to Village	Unstocked Forest	0.745	0.367
	Thaphabat	Pakthouay Neu	Mr Tenh	Abandonment Paddy Field	2.929	1.181
	Thaphabat	Pakthouay Neu	Mr Buakham	Unstocked Forest	0.407	0.376
	Thaphabat	Paktuay Tai	Mr Makham	Paddy Field	1.779	0.889
	Thaphabat	Paktuay Tai	Mrs Si	Paddy Field	1.265	0.634
	Thaphabat	Paktuay Tai	Belong to Village	Unstocked Forest	2.472	1.234
	Thaphabat	Paktuay Tai	Mrs Tou Luer	Paddy Field	0.353	0.177
	Thaphabat	Paktuay Tai	Mrs Tou Suan	Abandonment Paddy Field	1.070	0.647
	Thaphabat	Vuenthat	Mr Xiengli	Paddy Field	0.618	0.308
	Thaphabat	Vuenthat	Mr Khong	Paddy Field	0.239	0.120
	Thaphabat	Vuenthat	Mrs Sanh	Paddy Field	0.373	0.186
	Thaphabat	Vuenthat	Mr Tou Auim	Paddy Field	1.239	0.621
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	5.478	2.738
	Thaphabat	Vuenthat	Mr Xieng Pong	Abandonment Paddy Field	0.565	0.282
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	7.744	3.873
	Thaphabat	Vuenthat	Mr Theung	Paddy Field	0.694	0.348
	Thaphabat	Vuenthat	Mr Ngai	Paddy Field	0.748	0.373
	Thaphabat	Vuenthat	Mr Leun	Abandonment Paddy Field	0.578	0.289
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	4.892	2.443
Km 87 to Km 97	Thaphabat	Vuenthat	Mr Tou Phila	Paddy Field	1.460	0.736
	Thaphabat	Vuenthat	Mr Manh	Paddy Field	1.743	0.864
	Thaphabat	Vuenthat	Mr Vong Deun	Paddy Field	1.186	0.597
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	1.419	0.712
	Thaphabat	Vuenthat	Mrs Khium	Dry Dipterocarp	0.997	0.498
	Thaphabat	Vuenthat	Mr Tou Oum	Dry Dipterocarp	0.174	0.075
	Thaphabat	Vuenthat	Mrs Tou Sand	Dry Dipterocarp	0.915	0.467
	Thaphabat	Xaysavang	Belong to Village	Dry Dipterocarp	69.109	34.556
	Pakxan	Pak Ngiep	Belong to Village	Dry Dipterocarp	27.576	13.790
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	31.623	15.900
	Bolikhan	Hat Gniun	Belong to Village	Unstocked Forest	1.614	0.933
	Bolikhan	Hat Gniun	Belong to Village	Nam ngiep River	0.413	0.202
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	15.844	7.987
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	48.060	24.032

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 97 to Km 119	Bolikhan	Hat Gniun	Belong to Village	Unstocked Forest	1.083	0.346
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	43.236	21.633
	Bolikhan	Hat Gniun	Belong to Village	River	0.670	0.335
	Bolikhan	Hat Gniun	Mr Keoun	Paddy Field	0.843	0.421
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	0.949	0.475
Km 119 to Km 125	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	61.772	30.828
Total Area					**988.954**	**494.512**

Table 1 Land use and forest type along the TL 14 km (from Ban Nampa to Pakxan Substation)

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 0 to Km 5	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.75	0.525
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.497	0.449
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.294	0.389
	Bolikhan	Nampa	Mr Kham anh	Paddy Field	0.629	0.082
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	4.189	1.425
	Bolikhan	Nampa	Mr La	Paddy Field	0.209	0.001
	Bolikhan	Nampa	Mr Bounmi	Paddy Field	0.724	0.183
	Bolikhan	Nampa	Belong to Village	Unstocked Forest	1.895	0.603
	Bolikhan	Nampa	Mr Touy	Paddy Field	0.209	0.062
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	0.667	0.201
	Bolikhan	Nampa	Mr Sang	Paddy Field	0.136	0.036
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.981	0.599
	Bolikhan	Nampa	Mr Xieng air	Abandonment Paddy Field	0.119	0.034
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.059	0.318
	Bolikhan	Huaykhoun	Mr Sing	Abandonment Paddy Field	0.393	0.074
	Bolikhan	Huaykhoun	Belong to Village	Mixed deciduous	7.953	2.441
	Bolikhan	Huaykhoun	Mr deng	Abandonment Paddy Field	0.058	0.006
	Bolikhan	Huaykhoun	Mr Khamphone	Paddy Field	0.298	0.09
	Bolikhan	Huaykhoun	Mr Thieng	Garden	1.529	0.554
	Bolikhan	Huaykhoun	Mr Kham	Ray	0.321	-
	Bolikhan	Huaykhoun	Belong to Village	River	0.651	0.196
	Bolikhan	Huaykhoun	Belong to Village	Unstocked Forest	6.082	1.825
	Pakxan	Thong Noi	Mr Tuen	Paddy Field	0.824	0.247
	Pakxan	Thong Noi	Mr Souni, Khanth	Paddy Field	1.950	0.585
	Pakxan	Thong Noi	Mr Phing	Paddy Field	1.250	0.375
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest (Dong kampha)	2.728	0.819

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 5 to Km 10	Pakxan	Thong Noi	Mr Sinuan	Paddy Field	1.085	0.327
	Pakxan	Thong Noi	Mrs Phong	Paddy Field	0.376	0.113
	Pakxan	Thong Noi	Mr Tid boun	Paddy Field	0.730	0.225
	Pakxan	Thong Noi	PakxanDistrict	Evergreen Forest (Nong Bua)	6.995	2.093
	Pakxan	Thong Noi	Mrs Oh	Paddy Field	1.162	0.349
	Pakxan	Thong Noi	Mr Chieng	Paddy Field	0.853	0.256
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest	0.784	0.235
	Pakxan	Thong Noi	Mrs Tuan chai	Paddy Field	0.792	0.238
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest	0.933	0.28
	Pakxan	Thong Yai	Mr BounKhieng	Paddy Field	1.569	0.471
	Pakxan	Thong Yai	Mr Boun hin	Paddy Field	0.804	0.24
	Pakxan	Thong Yai	Mr Lumthong	Paddy Field	0.522	0.099
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	1.26	0.392
	Pakxan	Thong Yai	Mr Somphone	Paddy Field	0.713	0.259
	Pakxan	Thong Yai	Mr Ki	Paddy Field	1.519	0.547
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	0.179	-
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	0.125	-
	Pakxan	Thong Yai	Ms Manh	Paddy Field	0.137	-
	Pakxan	Thong Yai	Mr Minoi	Dry Dipterocarp	0.093	-
	Pakxan	Thong Yai	Mr Minoi	Paddy Field	3.195	1.028
	Pakxan	Thong Yai	Mrs Chanh	Paddy Field	0.874	0.262
	Pakxan	Thong Yai	Mr Somdi	Paddy Field	0.976	0.294
	Pakxan	Thong Yai	Mr Lamphone	Paddy Field	0.409	0.123
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	6.469	1.94
	Pakxan	Thong Yai	Belong to Village	Cemetery	1.873	0.562
	Pakxan	Sanaxay	Mr sisomphou	Paddy Field	2.658	0.797
	Pakxan	Sanaxay	Mr Somdi	Dry Dipterocarp	0.339	0.087
	Pakxan	Sanaxay	Mr Somdi	Paddy Field	1.127	0.368
	Pakxan	Sanaxay	Mr Somdi	Dry Dipterocarp	0.064	-
	Pakxan	Sanaxay	Mr Tou Homh	Paddy field	0.703	0.216
	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	4.278	1.288
	Pakxan	Sanaxay	Mr Hanh	Eucaliptus	0.677	0.202
	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	7.859	2.212
	Pakxan	Sanaxay	Mr Poikeo	Paddy Field	0.229	0.066
	Pakxan	Sanaxay	Ms Vieng	Built Up	0.428	0.001

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 11 to Km 14	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	0.716	0.37
	Pakxan	Sanaxay	Army Zone	Dry Dipterocarp	0.146	0.049
	Pakxan	Sanaxay	Ms Touy	Built Up	0.623	0.337
	Pakxan	Sanaxay	Mr Yai	Kedsana plantaion	0.597	0.147
	Pakxan	Sanaxay	Army Zone	Kedsana plantaion	0.341	0.102
	Pakxan	Anusonxay	Belong to Village	Unstocked Forest	2.66	0.812
	Pakxan	Anusonxay	Mr Khampha	Built Up	0.236	0.073
	Pakxan	Anusonxay	Cabinat office	Built Up	0.689	0.064
	Pakxan	Anusonxay	Belong to Village	Road	1.312	0.585
	Pakxan	Anusonxay	Mr Phongsavanh	Built Up	0.148	0.005
	Pakxan	Anusonxay	Mr kokeo	Built Up	0.045	-
	Pakxan	Anusonxay	Mrs Bang	Built Up	0.132	0.001
	Pakxan	Anusonxay	Mr Inpunh	Built Up	0.146	0.066
	Pakxan	Anusonxay	Mrs Jone	Built Up	0.168	0.083
	Pakxan	Anusonxay	Mr Phonxay	Built Up	0.119	-
	Pakxan	Anusonxay	Mr Khamponh	Built Up	0.141	0.07
	Pakxan	Anusonxay	Mr Soubanh	Built Up	0.101	0.008
	Pakxan	Anusonxay	Mr Khamphanh	Built Up	0.091	0.048
	Pakxan	Anusonxay	Mrs Tou Yan	Built Up	0.036	0.003
	Pakxan	Anusonxay	Mr Nalinh	Built Up	0.032	0.004
	Pakxan	Anusonxay	Mrs Saimany	Built Up	0.144	0.052
	Pakxan	Anusonxay	Belong to Village	Road	0.08	0.036
	Pakxan	Anusonxay	Road	Road	0.281	0.098
	Pakxan	Anusonxay	Mr Lit	Built Up (Garage)	0.005	-
	Pakxan	Anusonxay	Mr Chanthakhan	Built Up	0.017	-
	Pakxan	Anusonxay	Mrs Mi	Built Up	0.044	-
	Pakxan	Anusonxay	Mr Somphon	Built Up	0.104	0.02
	Pakxan	Anusonxay	Mr Inpeng	Built Up	0.198	0.081
	Pakxan	Anusonxay	Mr Pani	Built Up	0.178	0.058
	Pakxan	Anusonxay	Mrs Toukeo	Built Up	0.059	0.006
	Pakxan	Anusonxay	Mr Bounphai	Built Up	0.071	-
	Pakxan	Anusonxay	Road	Road	0.097	0.029
	Pakxan	Anusonxay	Mr Thongphoun	Unstocked Forest	1.847	0.554
	Pakxan	Anusonxay	Pakxan Sub ST	Pakxan Sub ST	0.722	0.167
Total Area					**105.51**	**31.617**

Figure 1 Significant Sites along the proposed of transmission line

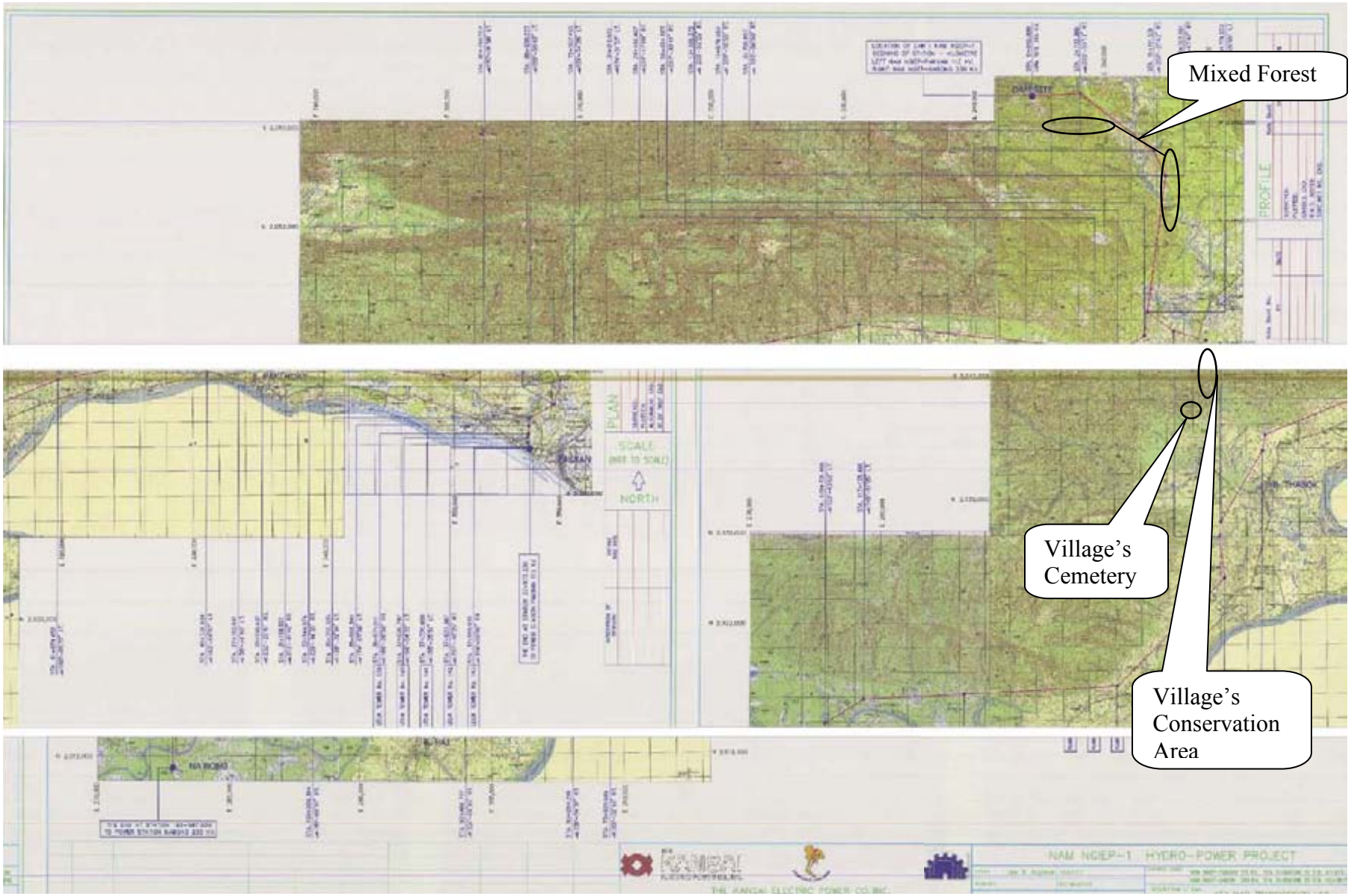


Table 1 Photos of land use and forest type along the proposed of transmission line from powerhouse to Nabong substation

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 00- Km 05	Pak Ngum	Ban Nabong	Belong to Village	Unstock Forest		17.240	30603	
	Pak Ngum	Ban Na bong	Mr Phet	Unstock Forest		0.675	40602	
	Pak Ngum	Ban Na bong	Belong to Village	Nam Ngum River		0.650	40601	
	Pak Ngum	Ban Thakokhai	Belong to Village	Nam Ngum River		0.661	40506	
	Pak Ngum	Ban Thakokhai	Mr Phet	Teak (237T)	001	1.160	40505	
	Pak Ngum	Ban Thakokhai	Mr Ti	Paddy Field	002	1.113	40503	
	Pak Ngum	Ban Thakokhai	Belong to Village	Unstock Forest		13.189	40504	
	Pak Ngum	Ban Thakokhai	Belong to Village	River		0.786	40501	
	Pak Ngum	Ban Nonh	Belong to Village	River		0.791	40408	
	Pak Ngum	Ban Nonh	Belong to Village	Unstock Forest		17.919	40407	
From Km 05- Km 10	Pak Ngum	Ban Nonh	Mr Khampien	Paddy Field	003	1.629	40406	
	Pak Ngum	Ban Nonh	Mr Bounta	Paddy Field	004	0.292	40405	

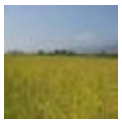
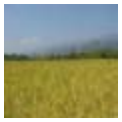
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 05-Km 10	Pak Ngum	Ban Nonh	Mr Chounmany	Paddy Field	005	1.529	40404	
	Pak Ngum	Ban Nonh	Mr Mi	Paddy Field	006	1.776	40403	
	Pak Ngum	Ban Nonh	Mr Kanha	Paddy Field	007	0.881	40402	
	Pak Ngum	Ban Nonh	Belong to Village	Unstock Forest		23.895	40401	
	Pak Ngum	Ban Xiengleatha	Mr Tou Xiengma	Paddy Field	008	0.307	40315	
	Pak Ngum	Ban Xiengleatha	Mr Air	Paddy Field	009	0.549	40314	
	Pak Ngum	Ban Xiengleatha	Belong to Village	Unstock Forest		6.336	40313	
	Pak Ngum	Ban Xiengleatha	Mr Phonh	Paddy Field	010	0.813	40312	
	Pak Ngum	Ban Xiengleatha	Mr Thidnoonh	Paddy Field	011	0.294	40311	
	Pak Ngum	Ban Xienglea tha	Mr Chine	Paddy Field	012	1.035	40310	
	Pak Ngum	Ban Xienglea tha	Mrs pat	Paddy Field	013	0.989	40309	
	Pak Ngum	Ban Xienglea tha	Mr Di	Paddy Field	014	1.243	40308	
	Pak Ngum	Ban Xienglea tha	Mr kham	Paddy Field	015	0.993	40307	

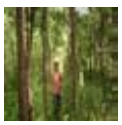
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 05-Km 10	Pak Ngum	Ban Xienglea tha	Mr Chandam	Paddy Field	016	0.965	40306	
	Pak Ngum	Ban Xienglea tha	Mr Luern	Paddy Field	017	1.286	40305	
	Pak Ngum	Ban Xienglea tha	Belong to Village	Dry Dipterocarp		11.450	40304	
	Pak Ngum	Ban Xienglea tha	Mr Nang Att	Paddy Field	018	1.291	40303	
	Pak Ngum	Ban Xienglea tha	Mr Lieng	Paddy Field	019	1.345	40302	
	Pak Ngum	Ban Xienglea tha	Belong to Village	Unstock Forest		34.282	40301	
From Km 15-Km 27	Pak Ngum	Ban Xienglea na	Belong to Village	Unstock Forest		68.130	40209	
	Pak Ngum	Ban Xienglea na	Mrs Sipha	Paddy Field	020	0.561	40208	
	Pak Ngum	Ban Xienglea na	Army Zone	Unstock Forest		5.106	40207	
From Km 27-Km 28	Pak Ngum	Ban Xienglea na	Mr Thanut B	Paddy Field	021	0.275	40206	
	Pak Ngum	Ban Xienglea na	Mr Thanut A	Unstock Forest		0.442	40205	
	Pak Ngum	Ban Xienglea na	Mr Thanut A	Paddy Field	022	0.535	40204	
	Pak Ngum	Ban Xienglea na	Army Home	Built Up		0.489	40203	

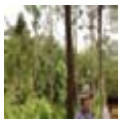
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 27-Km 28	Pak Ngum	Ban Xienglea na	Army Home	Built Up	023	0.909	40202	
	Pak Ngum	Ban Xienglea na	Belong to Village	Unstock Forest		3.518	40201	
From Km 28-Km 37	Pak Ngum	Ban Vuenkabao	Belong to Village	Unstock Forest		67.798	40101	
From Km 37-Km 42	Thaphabath	Ban Na	Belong to Village	Unstock Forest		6.051	30908	
	Thaphabath	Ban Na	Mr Kongphanh	Paddy Field	024	1.042	30907	
	Thaphabath	Ban Na	Mr Lai	Paddy Field	025	0.232	30906	
	Thaphabath	Ban Na	Mr Khammao	Paddy Field	026	0.378	30905	
	Thaphabath	Ban Na	Mr Somphon	Paddy Field	027	0.580	30904	
	Thaphabath	Ban Na	Belong to Village	Unstock Forest		8.055	30903	
	Thaphabath	Ban Na	Mr Somphone Hung	Paddy Field	028	0.324	30902	
	Thaphabath	Ban Na	Belong to Village	Dry Dipterocarp		5.793	30901	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		0.127	30817	
	Thaphabath	Ban Somsaat	Belong to Village	Dry Dipterocarp		4.828	30816	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 37-Km 42	Thaphabath	Ban Somsaath	Mr Onta	Paddy Field	029	0.509	30815	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		0.502	30814	
	Thaphabath	Ban Somsaath	Mr Mai	Paddy Field	030	0.490	30813	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		0.442	30812	
	Thaphabath	Ban Somsaath	Mr lieng	Paddy Field	031	0.226	30811	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		1.526	30810	
	Thaphabath	Ban Somsaath	Mr Khean	Paddy Field	032	0.310	30809	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		0.348	30808	
	Thaphabath	Ban Somsaath	Mr Somphone	Paddy Field	033	0.535	30807	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		2.654	30806	
	Thaphabath	Ban Somsaath	Mr Chanh	Paddy Field	034	0.244	30805	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		1.899	30804	
From Km 42-Km 47	Thaphabath	Ban Somsaath	Mrs La	Paddy Field	035	0.321	30803	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 42- Km 47	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		5.003	30802	
	Thaphabath	Ban Somsaat	Belong to Village	Mix Forest		25.215	30801	
From Km 47- Km 52	Thaphabath	Ban palai	Belong to Village	Mix Forest		1.815	30714	
	Thaphabath	Ban Palai	Ms Khong	Paddy Field	036	0.733	30713	
	Thaphabath	Ban Palai	Mrs Pe	Paddy Field	037	0.393	30712	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		6.432	30711	
	Thaphabath	Ban palai	Mr Khanthong	Abandonment Paddy Field	038	0.627	30710	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		0.476	30709	
	Thaphabath	Ban palai	Mr vath	Kedsana	039	0.232	30708	
	Thaphabath	Ban palai	Mr Tou Tue	Paddy Field	040	0.939	30707	
	Thaphabath	Ban palai	Belong to Village	Mix Forest		14.371	30706	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		2.926	30705	
	Thaphabath	Ban palai	Tou Bounma	Rubber	041	1.926	30704	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		3.251	30703	
	Thaphabath	Ban palai	Mr Van	Paddy Field	042	0.293	30702	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		3.739	30701	
	Thaphabath	Ban Thabok	Mr Vanh	Paddy Field	043	1.296	30611	
	Thaphabath	Ban Thabok	Mr Xiengkong	Paddy Field	044	1.019	30610	
From Km 52- Km 56.5	Thaphabath	Ban Thabok	Mr Khambone	Paddy Field	045	0.905	30609	
	Thaphabath	Ban Thabok	Mr hand	Ray	046	3.621	30608	
	Thaphabath	Ban Thabok	Mr Xom	Ray	047	2.076	30607	
	Thaphabath	Ban Thabok	Mr Bounthanh	Paddy Field	048	0.978	30606	
	Thaphabath	Ban Thabok	Ms Thummi	Paddy Field	049	1.629	30605	
	Thaphabath	Ban Thabok	Mr Khammuan	Paddy Field	050	1.441	30604	
	Thaphabath	Ban Thabok	Mr Saly	Paddy Field	051	1.137	30603	
	Thaphabath	Ban Thabok	Tou Xiengthong	Paddy Field	052	1.365	30602	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 52- Km 56.5	Thaphabath	Ban Thabok	Belong to Village	Dry Dipterocarp		22.420	30601	
From Km 56- Km 77	Thaphabath	Ban Sisomxay	Belong to Village	Dry Dipterocarp		162.624	30501	
From Km 77- Km 82	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		1.433	30415	
	Thaphabath	Ban Nong kuen	Mr Att	Unstock Forest (Farm)	053	0.994	30414	
	Thaphabath	Ban Nong Kuen	Mr Ong	Mix Forest	054	1.335	30413	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		1.194	30412	
	Thaphabath	Ban Nong kuen	Mr Ngu	Abandonment Paddy Field	055	0.207	30411	
	Thaphabath	Ban Nong kuen	Mr Xom	Unstock Forest	056	2.679	30410	
	Thaphabath	Ban Nong kuen	Mr Xom	Paddy Field	057	0.377	30509	
	Thaphabath	Ban Nong kuen	Mrs Tom	Paddy Field	058	0.977	30408	
	Thaphabath	Ban Nong kuen	Mr Xom	Unstock Forest	059	0.258	30407	
	Thaphabath	Ban Nong kuen	Belong to Village	Mix Forest		3.698	30506	
	Thaphabath	Ban Nong kuen	Mr Si	Paddy Field	060	1.549	30405	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
	Thaphabath	Ban Nong kuen	Belong to Village	Dry Dipterocarp		11.287	30404	
	Thaphabath	Ban Nong Kuen	Mr Souk	Unstock Forest	061	0.534	30403	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		0.435	30402	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		13.790	30401	
From Km 82- Km 87	Thaphabath	Ban Pakthouay Neu	Belong to Village	Unstock Forest		0.133	30312	
	Thaphabath	Ban Pakthouay Neu	Mr Tousuan	Paddy Field	062	0.648	30311	
	Thaphabath	Ban Pakthouay Neu	Belong to Village	Dry Dipterocarp		1.434	30310	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Chouang	Abandonment paddy	063	0.499	30309	
	Thaphabath	Ban Pakthouay Neu	Belong to Village	Dry Dipterocarp		3.821	30308	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Tonh	Unstock Forest	064	0.616	30307	
	Thaphabath	Ban Pakthouay Neu	Mrs Tou Pouk	Paddy Field	065	0.291	30306	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Sak	Paddy Field	066	0.442	30305	
	Thaphabath	Ban Pakthouay Neu	Mr Luar	Unstock Forest	067	0.087	30304	

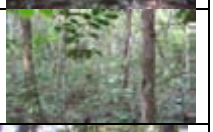
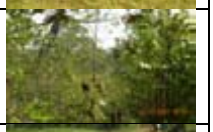
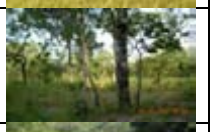
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 82-Km 87	Thaphabath	Ban Pakthouay Neu	Belong to Village	Unstock Forest		0.745	30303	
	Thaphabath	Ban Pakthouay Neu	Mr Tenh	Abandonment paddy	068	2.929	30302	
	Thaphabath	Ban Pakthouay Neu	Mr Buakham	Unstock Forest	069	0.407	30301	
	Thaphabath	Ban Pakthouay Tai	Mr Makham	Paddy Field	070	1.779	30201	
	Thaphabath	Ban Pakthouay Tai	Mrs Si	Paddy Field	071	1.265	30202	
	Thaphabath	Ban Pakthouay Tai	Belong to Village	Unstock Forest		2.472	30203	
	Thaphabath	Ban Pakthouay Tai	Mrs Tou Luer	Paddy Field	072	0.353	30204	
	Thaphabath	Ban Pakthouay Tai	Mrs Tou Suan	Abandonment Paddy Field	073	1.070	30205	
	Thaphabath	Ban Vuenthat	Mr Xiengli	Paddy Field	074	0.618	30118	
	Thaphabath	Ban Vuenthat	Mr Khong	Paddy Field	075	0.239	30117	
	Thaphabath	Ban Vuenthat	Mrs Sanh	Paddy Field	076	0.373	30116	
	Thaphabath	Ban Vuenthat	Mr Tou Auim	Paddy Field	077	1.239	30115	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		5.478	30114	

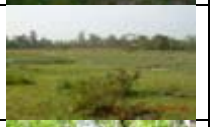
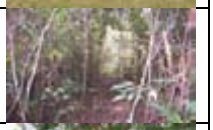
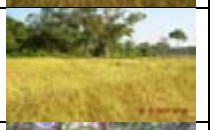
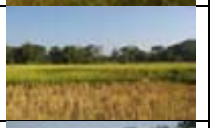
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 82-Km 87	Thaphabath	Ban Vuenthat	Mr Xieng Pong	AbandonmentPaddy Field	078	0.565	30113	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		7.744	30112	
	Thaphabath	Ban Vuenthat	Mr Theung	Paddy Field	079	0.694	30111	
	Thaphabath	Ban Vuenthat	Mr Ngai	Paddy Field	080	0.748	30110	
	Thaphabath	Ban Vuenthat	Mr Leun	Abandonment Paddy Field	081	0.578	30109	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		4.892	30108	
From Km 87-Km 97	Thaphabath	Ban Vuenthat	Mr Tou Phila	Paddy Field	082	1.460	30107	
	Thaphabath	Ban Vuenthat	Mr Manh	Paddy Field	083	1.743	30106	
	Thaphabath	Ban Vuenthat	Mr Vong Deun	Paddy Field	084	1.186	30105	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		1.419	30104	
	Thaphabath	Ban Vuenthat	Mrs Khium	Dry Dipterocarp	085	0.997	30103	
	Thaphabath	Ban Vuenthat	Mr Tou Oum	Dry Dipterocarp	086	0.174	30102	
	Thaphabath	Ban Vuenthat	Mrs Tou Sand	Dry Dipterocarp	087	0.915	30101	

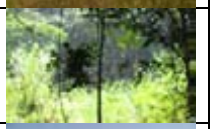
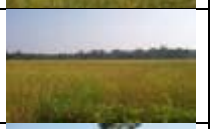
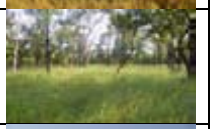
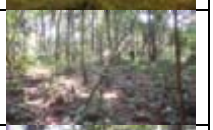
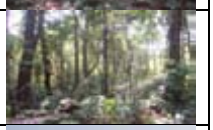
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 87- Km 97	Pakxan	Ban Saysavang	Belong to Village	Dry Dipterocarp		69.109	20601	
	Pakxan	Ban Namngiep	Belong to Village	Dry Dipterocarp		27.576	20501	
	Bolikhan	Ban Nampa	Belong to Village	Dry Dipterocarp		31.623	10201	
From Km 97- Km 119	Bolikhan	Ban Hat Gniun	Belong to Village	Unstock Forest		2.588	10106	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		63.342	10105	
	Bolikhan	Ban Hat Gniun	Belong to Village	Unstock Forest		1.083	10104	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		42.499	10103	
	Bolikhan	Ban Hat Gniun	Mr Keoun	Paddy Field	088	2.230	10102	
From Km 119- Km 125	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		62.741	10101	
	Bolikhan	Ban Hat Gniun	Belong to Village	Unstocked Forest		0.711	10104	
	Bolikhan	Ban Nampa	Belong to Village	Dry Dipterocarp forest		5.901	10201	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		10.997	10103	
	Bolikhan	Ban Hat Gniun	Belong to Village	Water body		0.165	10108	

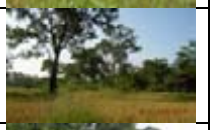
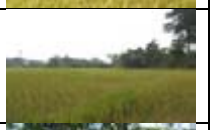
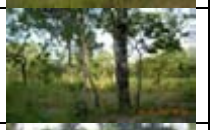
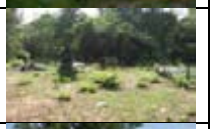
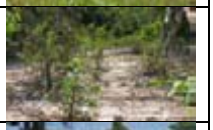
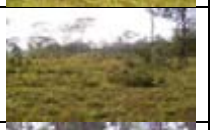
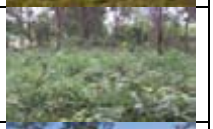
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 119-Km 125	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		15.495	10101	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		3.834	10105	
	Bolikhan	Ban Hat Gniun	Belong to Village	Water body		0.115	10109	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		11.986	10105	
	Bolikhan	Ban Hat Gniun	Mr Keoun	Paddy Field		0.257	10102	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		0.147	10107	

Table 1 Photos of land use and forest type along the proposed of transmission line from Ban Nampa to Pakxan substation

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Nampa	Belong to Village	Dry Dipterocarp	1.750	10202		
Ban Nampa	Belong to Village	Dry Dipterocarp	1.497	10203		
Ban Nampa	Belong to Village	Dry Dipterocarp	1.294	10204		
Ban Nampa	Mr Kham anh	Paddy Field	0.625	10205	001	
Ban Nampa	Belong to Village	Dry Dipterocarp	4.189	10206		
Ban Nampa	Mr La	Paddy Field	0.209	10207	002	
Ban Nampa	Mr Bounmi	Paddy Field	0.724	10208	003	
Ban Nampa	Belong to Village	Unstock Forest	1.895	10209		
Ban Nampa	Mr Touy	Paddy Field	0.209	10210	004	
Ban Nampa	Belong to Village	Dry Dipterocarp	0.667	10211		
Ban Nampa	Mr Sang	Paddy Field	0.136	10212	005	
Ban Nampa	Belong to Village	Dry Dipterocarp	1.981	10213		
Ban Nampa	Mr Xieng air	Abandonment Paddy Field	0.119	10214	006	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Nampa	Belong to Village	Dry Dipterocarp	1.059	10215		
Ban Huaykhoun	Mr Sing	Abandonment Paddy Field	0.393	10301	007	
Ban Huaykhoun	Belong to Village	Mix Forest	7.953	10302		
Ban Huaykhoun	Mr deng	Abandonment Paddy Field	0.058	10303	008	
Ban Huaykhoun	Mr Khamphone	Paddy Field	0.298	10304	009	
Ban Huaykhoun	Mr Thieng	Garden	1.529	10305	010	
Ban Huaykhoun	Mr Kham	Ray	0.321	10306	011	
Ban Huaykhoun	Belong to Village	Unstock Forest	6.182	10307		
Ban Thong Noi	Mr Tuen	Paddy Field	0.882	20101	012	
Ban Thong Noi	Mr Souni, Khanth	Paddy Field	3.693	20102	013	
Ban Thong Noi	Mr Phing	Paddy Field	1.223	20103	014	
Ban Thong Noi	Belong to Village	Evergreen Forest (Dong kampha)	1.505	20104		
Ban Thong Noi	Mr Sinuan	Paddy Field	1.085	20105	015	
Ban Thong Noi	Mrs Phong	Paddy Field	0.376	20106	016	
Ban Thong Noi	Mr Tid boun	Paddy Field	0.730	20107	017	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Thong Noi	Pakxan District	Evergreen Forest (Nong Bua)	6.995	20108		
Ban Thong Noi	Mrs Oh	Paddy Field	1.162	20109	018	
Ban Thong Noi	Mr Chieng	Paddy Field	0.853	20110	019	
Ban Thong Noi	Belong to Village	Evergreen Forest	0.784	20111		
Ban Thong Noi	Mrs Tuan chai	Paddy Field	0.792	20112	020	
Ban Thong Noi	Belong to Village	Evergreen Forest	0.933	20113		
Ban Thong Yai	Mr BounKhieng	Paddy Field	1.569	20201	021	
Ban Thong Yai	Mr Boun hin	Paddy Field	0.804	20202	022	
Ban Thong Yai	Mr Lumthong	Paddy Field	0.522	20203	023	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	1.260	20204		
Ban Thong Yai	Mr Somphone	Paddy Field	0.713	20205	024	
Ban Thong Yai	Mr Ki	Paddy Field	1.519	20206	025	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	0.179	20207		
Ban Thong Yai	Belong to Village	Dry Dipterocarp	0.125	20208		
Ban Thong Yai	Ms Manh	Paddy Field	0.137	20209	026	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Thong Yai	Mr Minoi	Paddy Field	3.195	20210	027	
Ban Thong Yai	Mrs Chanh	Paddy Field	0.874	20211	028	
Ban Thong Yai	Mr Somdi	Paddy Field	0.976	20212	029	
Ban Thong Yai	Mr Lamphone	Paddy Field	0.409	20213	030	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	6.469	20214		
Ban Thong Yai	Belong to Village	Cemetery	1.873	20215		
Ban Sanaxay	Mr sisomphou	Paddy Field	2.658	20301	031	
Ban Sanaxay	Mr Somdi	Dry Dipterocarp	0.363	20302	032	
Ban Sanaxay	Mr Somdi	Paddy Field	1.103	20303	033	
Ban Sanaxay	Mr Somdi	Dry Dipterocarp	0.064	20304	034	
Ban Sanaxay	Mr Touhomh	Paddy Field	1.462	20305	035	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	3.522	20306		
Ban Sanaxay	Mr Hanh	Eucaliptus	0.677	20307	036	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	7.859	20308		
Ban Sanaxay	Mr Poikeo	Paddy Field	0.229	20309	037	

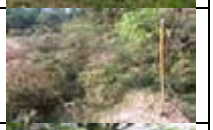
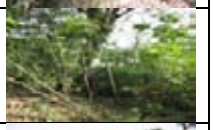
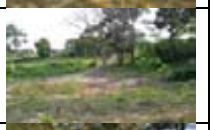
Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Sanaxay	Ms Vieng	Built Up	0.428	20310	038	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	0.716	20311		
Ban Sanaxay	Army Zone	Dry Dipterocarp	0.146	20312	039	
Ban Sanaxay	Ms Touy	Built Up	0.623	20313	040	
Ban Sanaxay	Mr Yai	Kedsana plantaion	0.597	20314	041	
Ban Sanaxay	Army Zone	Kedsana plantaion	0.341	20315	042	

Table 1 The photos of Housing/Construction areas along the proposed of transmission line.

Village	Name of HH	Land Use	Area	Code of Land use	Sketmap	Picture
Ban Anusonxay	Belong to Village	Unstock Forest	2.660	20401		
Ban Anusonxay	Mr Khampha	Built Up	0.236	20402		
Ban Anusonxay	Cabinet office	Built Up	0.689	20403		
Ban Anusonxay	Belong to Village	Road	1.312	20404		
Ban Anusonxay	Mr Phongsavanh	Built Up	0.148	20405		
Ban Anusonxay	Mr kokeo	Built Up	0.045	20406		
Ban Anusonxay	Mrs Bang	Built Up	0.132	20407		
Ban Anusonxay	Mr Inpanh	Built Up	0.146	20408		
Ban Anusonxay	Mrs Jone	Built Up	0.168	20410		
Ban Anusonxay	Mr Phonxay	Built Up	0.119	20411		
Ban Anusonxay	Mr Khamponh	Built Up	0.141	20412		
Ban Anusonxay	Mr Soubanh	Built Up	0.101	20413		
Ban Anusonxay	Mr Khamphanh	Built Up	0.091	20414		

Village	Name of HH	Land Use	Area	Code of Land use	Sketmap	Picture
Ban Anusonxay	Mrs Tou Yan	Built Up	0.036	20415		
Ban Anusonxay	Mr Nalinh	Built Up	0.032	20416		
Ban Anusonxay	Mrs Saimany	Built Up	0.144	20417		
Ban Anusonxay	Belong to Village	Road	0.080	20418		
Ban Anusonxay	Road	Road	0.281	20419		
Ban Anusonxay	Mr Lit	Built Up (Garage)	0.005	20420		
Ban Anusonxay	Mr Chanthakhan	Built Up	0.017	20421		
Ban Anusonxay	Mrs Mi	Built Up	0.044	20422		
Ban Anusonxay	Mr Somphon	Built Up	0.104	20423		
Ban Anusonxay	Mr Inpeng	Built Up	0.198	20424		
Ban Anusonxay	Mr Pani	Built Up	0.178	20425		
Ban Anusonxay	Mrs Toukeo	Built Up	0.059	20426		
Ban Anusonxay	Mr Bounphai	Built Up	0.071	20427		
Ban Anusonxay	Road	Road	0.097	20428		
Ban Anusonxay	Mr Thongphoun	Unstock Forest	1.847	20429		
Ban Anusonxay	Pakxan Sub ST	Pakxan Sub ST	0.722	20430		

Table 1 Land use and forest type along the transmission line 125 Km (from Nabong substation to powerhouse)

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 0 to Km 5	Pak Ngum	Nabong	Belong to Village	Unstocked Forest	11.178	5.571
	Pak Ngum	Nabong	Mr Phet	Unstocked Forest	0.675	0.338
	Pak Ngum	Nabong	Belong to Village	Nam Ngum River	0.650	0.325
	Pak Ngum	Thakokhai	Belong to Village	Nam Ngum River	0.661	0.330
	Pak Ngum	Thakokhai	Mr Phet	Teak (237T)	0.609	0.304
	Pak Ngum	Thakokhai	Belong to Village	Unstocked Forest	1.760	0.880
	Pak Ngum	Thakokhai	Mr Ti	Paddy Field	1.113	0.557
	Pak Ngum	Thakokhai	Belong to Village	Unstocked Forest	11.980	5.992
	Pak Ngum	Thakokhai	Belong to Village	Nong (Lake)	0.786	0.393
	Pak Ngum	Nonh	Belong to Village	River	0.791	0.399
	Pak Ngum	Nonh	Belong to Village	Unstocked Forest	17.919	8.918
Km 5 to Km 10	Pak Ngum	Nonh	Mr Khampien	Paddy Field	1.629	0.851
	Pak Ngum	Nonh	Mr Bounta	Abandonment Paddy Field	0.292	0.074
	Pak Ngum	Nonh	Mr Chounmany	Paddy Field	1.529	0.839
	Pak Ngum	Nonh	Mr Mi	Paddy Field	1.776	0.893
	Pak Ngum	Nonh	Mr Kanha	Paddy Field	0.881	0.528
	Pak Ngum	Nonh	Belong to Village	Unstocked Forest	23.895	11.855
	Pak Ngum	Xienglea Tha	Mr Tou Xiengma	Paddy Field	0.373	0.285
	Pak Ngum	Xienglea Tha	Mr Air	Paddy Field	0.549	0.294
	Pak Ngum	Xienglea Tha	Belong to Village	Unstocked Forest	6.269	2.629
	Pak Ngum	Xienglea Tha	Mr Phonh	Paddy Field	0.813	0.525
	Pak Ngum	Xienglea Tha	Mr Thidnoonh	Paddy Field	0.294	0.184
	Pak Ngum	Xienglea Tha	Mr Chine	Paddy Field	1.035	0.633
	Pak Ngum	Xienglea Tha	Mrs pat	Paddy Field	0.989	0.613
	Pak Ngum	Xienglea Tha	Mr Di	Paddy Field	1.243	0.617
	Pak Ngum	Xienglea Tha	Mr kham	Paddy Field	0.993	0.499
	Pak Ngum	Xienglea Tha	Mr Chandam	Paddy Field	0.965	0.482
	Pak Ngum	Xienglea Tha	Mr Luern	Paddy Field	1.286	0.644
	Pak Ngum	Xienglea Tha	Belong to Village	Dry Dipterocarp	11.450	5.725
	Pak Ngum	Xienglea Tha	Mr Nang Att	Paddy Field	1.291	0.645
	Pak Ngum	Xienglea Tha	Mr Lieng	Paddy Field	1.345	0.672
	Pak Ngum	Xienglea Tha	Belong to Village	Unstocked Forest	34.282	17.141

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 15 to Km 27	Pak Ngum	Xienglea Na	Belong to Village	Unstocked Forest	68.130	34.067
Km 27 to Km 28	Pak Ngum	Xienglea Na	Mrs Sipha	Paddy Field	0.561	0.280
	Pak Ngum	Xienglea Na	Army Zone	Unstocked Forest	5.106	2.557
	Pak Ngum	Xienglea Na	Mr Thanut B	Paddy Field	0.275	0.122
	Pak Ngum	Xienglea Na	Mr Thanut A	Unstocked Forest	0.442	0.234
	Pak Ngum	Xienglea Na	Mr Thanut A	Paddy Field	0.535	0.348
	Pak Ngum	Xienglea Na	Army Home	Built Up	0.489	0.163
	Pak Ngum	Xienglea Na	Army Home	Built Up	0.909	0.453
	Pak Ngum	Xienglea Na	Belong to Village	Unstocked Forest	3.518	1.760
Km 28 to Km 37	Pak Ngum	Vuenkabao	Belong to Village	Unstocked Forest	67.798	33.899
Km 37 to Km 42	Thaphabat	Na	Belong to Village	Unstocked Forest	6.421	3.211
	Thaphabat	Na	Mr Kongphanh	Paddy Field	0.672	0.336
	Thaphabat	Na	Mr Lai	Paddy Field	0.232	0.116
	Thaphabat	Na	Mr Khammao	Paddy Field	0.378	0.189
	Thaphabat	Na	Mr Somphon	Paddy Field	0.580	0.290
	Thaphabat	Na	Belong to Village	Unstocked Forest	8.055	4.027
	Thaphabat	Na	Mr Somphone Hung	Paddy Field	0.324	0.163
	Thaphabat	Na	Belong to Village	Dry Dipterocarp	5.793	2.898
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	0.127	0.024
	Thaphabat	Somsaat	Belong to Village	Dry Dipterocarp	4.828	2.401
	Thaphabat	Somsaath	Mr Onta	Paddy Field	0.509	0.353
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	0.502	0.205
	Thaphabat	Somsaath	Mr Mai	Paddy Field	0.490	0.245
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	0.442	0.221
	Thaphabat	Somsaath	Mr lieng	Paddy Field	0.226	0.113
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	1.526	0.801
	Thaphabat	Somsaath	Mr Khean	Paddy Field	0.310	0.117
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	0.348	0.173
	Thaphabat	Somsaath	Mr Somphone	Paddy Field	0.535	0.315
	Thaphabat	Somsaath	Belong to Village	Unstocked Forest	2.654	1.279
	Thaphabat	Somsaath	Mr Chanh	Paddy Field	0.244	0.123
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	1.899	0.950

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 42 to Km 47	Thaphabat	Somsaath	Mrs La	Paddy Field	0.321	0.157
	Thaphabat	Somsaath	Belong to Village	Dry Dipterocarp	5.003	2.505
	Thaphabat	Somsaath	Belong to Village	Mixed Deciduous	25.215	12.608
Km 47 to Km 52	Thaphabat	Palai	Belong to Village	Mixed Deciduous	1.815	0.908
	Thaphabat	Palai	Ms Khong	Paddy Field	0.733	0.367
	Thaphabat	Palai	Mrs Pe	Paddy Field	0.393	0.196
	Thaphabat	Palai	Belong to Village	Unstocked Forest	6.432	3.216
	Thaphabat	Palai	Mr Khanthong	Abandonment Paddy Field	0.624	0.314
	Thaphabat	Palai	Belong to Village	Unstocked Forest	0.480	0.238
	Thaphabat	Palai	Mr vath	Kedsana	0.232	0.110
	Thaphabat	Palai	Mr Tou Tue	Paddy Field	0.939	0.476
	Thaphabat	Palai	Belong to Village	Mixed Deciduous	12.699	6.348
	Thaphabat	Palai	Belong to Village	Mixed Deciduous	1.151	0.576
	Thaphabat	Palai	Belong to Village	River (Nam Leuk)	0.520	0.260
	Thaphabat	Palai	Belong to Village	Unstocked Forest	2.926	1.464
	Thaphabat	Palai	Tou Xiengkong	Rubber	1.926	0.967
	Thaphabat	Thabok	Belong to Village	Unstocked Forest	3.251	1.620
	Thaphabat	Thabok	Mr Van	Paddy Field	0.293	0.137
	Thaphabat	Palai	Belong to Village	Unstocked Forest	4.357	2.188
	Thaphabat	Thabok	Mr Vanh	Paddy Field	0.879	0.439
	Thaphabat	Thabok	Mr Bounma	Paddy Field	0.820	0.409
Km 52 to Km 56	Thaphabat	Thabok	Mr Khambone	Paddy Field	0.905	0.453
	Thaphabat	Thabok	Mr hand	Ray	3.621	1.803
	Thaphabat	Thabok	Mr Xom	Ray	2.076	1.048
	Thaphabat	Thabok	Mr Bounthanh	Paddy Field	0.978	0.486
	Thaphabat	Thabok	Ms Thummi	Paddy Field	1.629	0.798
	Thaphabat	Thabok	Mr Khammuan	Paddy Field	1.441	0.736
	Thaphabat	Thabok	Mr Saly	Paddy Field	1.137	0.573
	Thaphabat	Thabok	Tou Xiengthong	Paddy Field	1.365	0.683
	Thaphabat	Thabok	Belong to Village	Dry Dipterocarp	22.420	11.210
Km 56 to Km 77	Thaphabat	Sisomxay	Belong to Village	Dry Dipterocarp Forest	86.230	43.115

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 77 to Km 82	Thaphabat	Sisomxay	Belong to Village	Dry Dipterocarp Forest	75.896	37.948
	Thaphabat	Sisomxay	Belong to Village	River (Nam Lo)	0.497	0.249
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.433	0.620
	Thaphabat	Nongkuen	Mr Att	Unstocked Forest (Farm)	0.994	0.592
	Thaphabat	Nongkuen	Mr Ong	Mixed Deciduous	1.335	0.664
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.194	0.593
	Thaphabat	Nongkuen	Mr Ngu	Abandonment Paddy Field	0.207	0.039
	Thaphabat	Nongkuen	Mr Xom	Unstocked Forest	2.679	1.356
	Thaphabat	Nongkuen	Mr Xom	Paddy Field	0.377	0.245
	Thaphabat	Nongkuen	Mrs Tom	Paddy Field	0.977	0.599
	Thaphabat	Nongkuen	Mr Xom	Unstocked Forest	0.258	0.030
	Thaphabat	Nongkuen	Belong to Village	Mixed Deciduous	4.351	2.164
	Thaphabat	Nongkuen	Mr Si	Paddy Field	0.895	0.448
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	11.287	5.638
	Thaphabat	Nongkuen	Mr Souk	Unstocked Forest	0.534	0.309
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	0.435	0.188
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	2.482	1.235
Km 82 to Km 87	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	8.503	4.242
	Thaphabat	Nongkuen	Belong to Village	Dry Dipterocarp	1.821	0.925
	Thaphabat	Nongkuen	Belong to Village	River (Nam Thouay)	0.459	0.217
	Thaphabat	Nongkuen	Belong to Village	River (Nam Thouay)	0.525	0.272
	Thaphabat	Pakthouay Neu	Belong to Village	Unstocked Forest	0.133	0.094
	Thaphabat	Pakthouay Neu	Mr Tousuan	Paddy Field	0.648	0.357
	Thaphabat	Pakthouay Neu	Belong to Village	Dry Dipterocarp	1.434	0.507
	Thaphabat	Pakthouay Neu	Mr Tou Chouang	Old Paddy Field	0.499	0.388
	Thaphabat	Pakthouay Neu	Belong to Village	Dry Dipterocarp	3.821	1.720
	Thaphabat	Pakthouay Neu	Mr Tou Tonh	Unstocked Forest	0.616	0.417
	Thaphabat	Pakthouay Neu	Mrs Tou Pouk	Paddy Field	0.291	0.203
	Thaphabat	Pakthouay Neu	Mr Tou Sak	Paddy Field	0.442	0.303
	Thaphabat	Pakthouay Neu	Mr Luar	Unstocked Forest	0.087	0.000

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
	Thaphabat	Pakthouay Neu	Belong to Village	Unstocked Forest	0.745	0.367
	Thaphabat	Pakthouay Neu	Mr Tenh	Abandonment Paddy Field	2.929	1.181
	Thaphabat	Pakthouay Neu	Mr Buakham	Unstocked Forest	0.407	0.376
	Thaphabat	Paktuay Tai	Mr Makham	Paddy Field	1.779	0.889
	Thaphabat	Paktuay Tai	Mrs Si	Paddy Field	1.265	0.634
	Thaphabat	Paktuay Tai	Belong to Village	Unstocked Forest	2.472	1.234
	Thaphabat	Paktuay Tai	Mrs Tou Luer	Paddy Field	0.353	0.177
	Thaphabat	Paktuay Tai	Mrs Tou Suan	Abandonment Paddy Field	1.070	0.647
	Thaphabat	Vuenthat	Mr Xiengli	Paddy Field	0.618	0.308
	Thaphabat	Vuenthat	Mr Khong	Paddy Field	0.239	0.120
	Thaphabat	Vuenthat	Mrs Sanh	Paddy Field	0.373	0.186
	Thaphabat	Vuenthat	Mr Tou Auim	Paddy Field	1.239	0.621
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	5.478	2.738
	Thaphabat	Vuenthat	Mr Xieng Pong	Abandonment Paddy Field	0.565	0.282
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	7.744	3.873
	Thaphabat	Vuenthat	Mr Theung	Paddy Field	0.694	0.348
	Thaphabat	Vuenthat	Mr Ngai	Paddy Field	0.748	0.373
	Thaphabat	Vuenthat	Mr Leun	Abandonment Paddy Field	0.578	0.289
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	4.892	2.443
Km 87 to Km 97	Thaphabat	Vuenthat	Mr Tou Phila	Paddy Field	1.460	0.736
	Thaphabat	Vuenthat	Mr Manh	Paddy Field	1.743	0.864
	Thaphabat	Vuenthat	Mr Vong Deun	Paddy Field	1.186	0.597
	Thaphabat	Vuenthat	Belong to Village	Dry Dipterocarp	1.419	0.712
	Thaphabat	Vuenthat	Mrs Khium	Dry Dipterocarp	0.997	0.498
	Thaphabat	Vuenthat	Mr Tou Oum	Dry Dipterocarp	0.174	0.075
	Thaphabat	Vuenthat	Mrs Tou Sand	Dry Dipterocarp	0.915	0.467
	Thaphabat	Xaysavang	Belong to Village	Dry Dipterocarp	69.109	34.556
	Pakxan	Pak Ngiep	Belong to Village	Dry Dipterocarp	27.576	13.790
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	31.623	15.900
	Bolikhan	Hat Gniun	Belong to Village	Unstocked Forest	1.614	0.933
	Bolikhan	Hat Gniun	Belong to Village	Nam ngiep River	0.413	0.202
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	15.844	7.987
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	48.060	24.032

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 97 to Km 119	Bolikhan	Hat Gniun	Belong to Village	Unstocked Forest	1.083	0.346
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	43.236	21.633
	Bolikhan	Hat Gniun	Belong to Village	River	0.670	0.335
	Bolikhan	Hat Gniun	Mr Keoun	Paddy Field	0.843	0.421
	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	0.949	0.475
Km 119 to Km 125	Bolikhan	Hat Gniun	Belong to Village	Mixed Deciduous	61.772	30.828
Total Area					**988.954**	**494.512**

Table 1 Land use and forest type along the TL 14 km (from Ban Nampa to Pakxan Substation)

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 0 to Km 5	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.75	0.525
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.497	0.449
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.294	0.389
	Bolikhan	Nampa	Mr Kham anh	Paddy Field	0.629	0.082
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	4.189	1.425
	Bolikhan	Nampa	Mr La	Paddy Field	0.209	0.001
	Bolikhan	Nampa	Mr Bounmi	Paddy Field	0.724	0.183
	Bolikhan	Nampa	Belong to Village	Unstocked Forest	1.895	0.603
	Bolikhan	Nampa	Mr Touy	Paddy Field	0.209	0.062
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	0.667	0.201
	Bolikhan	Nampa	Mr Sang	Paddy Field	0.136	0.036
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.981	0.599
	Bolikhan	Nampa	Mr Xieng air	Abandonment Paddy Field	0.119	0.034
	Bolikhan	Nampa	Belong to Village	Dry Dipterocarp	1.059	0.318
	Bolikhan	Huaykhoun	Mr Sing	Abandonment Paddy Field	0.393	0.074
	Bolikhan	Huaykhoun	Belong to Village	Mixed deciduous	7.953	2.441
	Bolikhan	Huaykhoun	Mr deng	Abandonment Paddy Field	0.058	0.006
	Bolikhan	Huaykhoun	Mr Khamphone	Paddy Field	0.298	0.09
	Bolikhan	Huaykhoun	Mr Thieng	Garden	1.529	0.554
	Bolikhan	Huaykhoun	Mr Kham	Ray	0.321	-
	Bolikhan	Huaykhoun	Belong to Village	River	0.651	0.196
	Bolikhan	Huaykhoun	Belong to Village	Unstocked Forest	6.082	1.825
	Pakxan	Thong Noi	Mr Tuen	Paddy Field	0.824	0.247
	Pakxan	Thong Noi	Mr Souni, Khanth	Paddy Field	1.950	0.585
	Pakxan	Thong Noi	Mr Phing	Paddy Field	1.250	0.375
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest (Dong kampha)	2.728	0.819

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 5 to Km 10	Pakxan	Thong Noi	Mr Sinuan	Paddy Field	1.085	0.327
	Pakxan	Thong Noi	Mrs Phong	Paddy Field	0.376	0.113
	Pakxan	Thong Noi	Mr Tid boun	Paddy Field	0.730	0.225
	Pakxan	Thong Noi	PakxanDistrict	Evergreen Forest (Nong Bua)	6.995	2.093
	Pakxan	Thong Noi	Mrs Oh	Paddy Field	1.162	0.349
	Pakxan	Thong Noi	Mr Chieng	Paddy Field	0.853	0.256
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest	0.784	0.235
	Pakxan	Thong Noi	Mrs Tuan chai	Paddy Field	0.792	0.238
	Pakxan	Thong Noi	Belong to Village	Evergreen Forest	0.933	0.28
	Pakxan	Thong Yai	Mr BounKhieng	Paddy Field	1.569	0.471
	Pakxan	Thong Yai	Mr Boun hin	Paddy Field	0.804	0.24
	Pakxan	Thong Yai	Mr Lumthong	Paddy Field	0.522	0.099
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	1.26	0.392
	Pakxan	Thong Yai	Mr Somphone	Paddy Field	0.713	0.259
	Pakxan	Thong Yai	Mr Ki	Paddy Field	1.519	0.547
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	0.179	-
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	0.125	-
	Pakxan	Thong Yai	Ms Manh	Paddy Field	0.137	-
	Pakxan	Thong Yai	Mr Minoi	Dry Dipterocarp	0.093	-
	Pakxan	Thong Yai	Mr Minoi	Paddy Field	3.195	1.028
	Pakxan	Thong Yai	Mrs Chanh	Paddy Field	0.874	0.262
	Pakxan	Thong Yai	Mr Somdi	Paddy Field	0.976	0.294
	Pakxan	Thong Yai	Mr Lamphone	Paddy Field	0.409	0.123
	Pakxan	Thong Yai	Belong to Village	Dry Dipterocarp	6.469	1.94
	Pakxan	Thong Yai	Belong to Village	Cemetery	1.873	0.562
	Pakxan	Sanaxay	Mr sisomphou	Paddy Field	2.658	0.797
	Pakxan	Sanaxay	Mr Somdi	Dry Dipterocarp	0.339	0.087
	Pakxan	Sanaxay	Mr Somdi	Paddy Field	1.127	0.368
	Pakxan	Sanaxay	Mr Somdi	Dry Dipterocarp	0.064	-
	Pakxan	Sanaxay	Mr Tou Homh	Paddy field	0.703	0.216
	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	4.278	1.288
	Pakxan	Sanaxay	Mr Hanh	Eucaliptus	0.677	0.202
	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	7.859	2.212
	Pakxan	Sanaxay	Mr Poikeo	Paddy Field	0.229	0.066
	Pakxan	Sanaxay	Ms Vieng	Built Up	0.428	0.001

Distance	District	Village	Owner	Land use	Environmental Study (Ha)	Engineering Clearance(Ha)
Km 11 to Km 14	Pakxan	Sanaxay	Belong to Village	Dry Dipterocarp	0.716	0.37
	Pakxan	Sanaxay	Army Zone	Dry Dipterocarp	0.146	0.049
	Pakxan	Sanaxay	Ms Touy	Built Up	0.623	0.337
	Pakxan	Sanaxay	Mr Yai	Kedsana plantaion	0.597	0.147
	Pakxan	Sanaxay	Army Zone	Kedsana plantaion	0.341	0.102
	Pakxan	Anusonxay	Belong to Village	Unstocked Forest	2.66	0.812
	Pakxan	Anusonxay	Mr Khampha	Built Up	0.236	0.073
	Pakxan	Anusonxay	Cabinat office	Built Up	0.689	0.064
	Pakxan	Anusonxay	Belong to Village	Road	1.312	0.585
	Pakxan	Anusonxay	Mr Phongsavanh	Built Up	0.148	0.005
	Pakxan	Anusonxay	Mr kokeo	Built Up	0.045	-
	Pakxan	Anusonxay	Mrs Bang	Built Up	0.132	0.001
	Pakxan	Anusonxay	Mr Inpunh	Built Up	0.146	0.066
	Pakxan	Anusonxay	Mrs Jone	Built Up	0.168	0.083
	Pakxan	Anusonxay	Mr Phonxay	Built Up	0.119	-
	Pakxan	Anusonxay	Mr Khamponh	Built Up	0.141	0.07
	Pakxan	Anusonxay	Mr Soubanh	Built Up	0.101	0.008
	Pakxan	Anusonxay	Mr Khamphanh	Built Up	0.091	0.048
	Pakxan	Anusonxay	Mrs Tou Yan	Built Up	0.036	0.003
	Pakxan	Anusonxay	Mr Nalinh	Built Up	0.032	0.004
	Pakxan	Anusonxay	Mrs Saimany	Built Up	0.144	0.052
	Pakxan	Anusonxay	Belong to Village	Road	0.08	0.036
	Pakxan	Anusonxay	Road	Road	0.281	0.098
	Pakxan	Anusonxay	Mr Lit	Built Up (Garage)	0.005	-
	Pakxan	Anusonxay	Mr Chanthakhan	Built Up	0.017	-
	Pakxan	Anusonxay	Mrs Mi	Built Up	0.044	-
	Pakxan	Anusonxay	Mr Somphon	Built Up	0.104	0.02
	Pakxan	Anusonxay	Mr Inpeng	Built Up	0.198	0.081
	Pakxan	Anusonxay	Mr Pani	Built Up	0.178	0.058
	Pakxan	Anusonxay	Mrs Toukeo	Built Up	0.059	0.006
	Pakxan	Anusonxay	Mr Bounphai	Built Up	0.071	-
	Pakxan	Anusonxay	Road	Road	0.097	0.029
	Pakxan	Anusonxay	Mr Thongphoun	Unstocked Forest	1.847	0.554
	Pakxan	Anusonxay	Pakxan Sub ST	Pakxan Sub ST	0.722	0.167
Total Area					**105.51**	**31.617**

Figure 1 Significant Sites along the proposed of transmission line

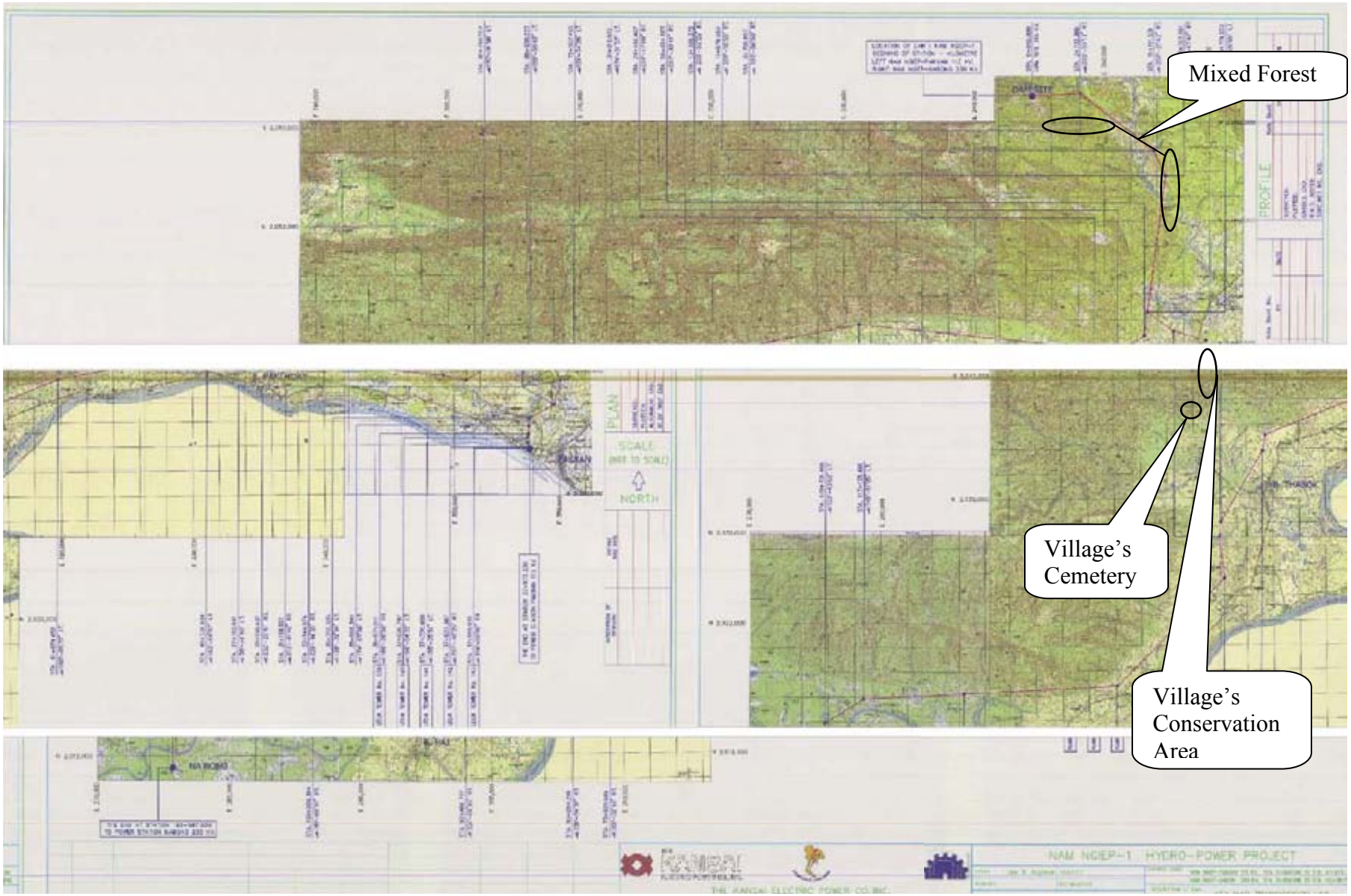


Table 1 Photos of land use and forest type along the proposed of transmission line from powerhouse to Nabong substation

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 00- Km 05	Pak Ngum	Ban Nabong	Belong to Village	Unstock Forest		17.240	30603	
	Pak Ngum	Ban Na bong	Mr Phet	Unstock Forest		0.675	40602	
	Pak Ngum	Ban Na bong	Belong to Village	Nam Ngum River		0.650	40601	
	Pak Ngum	Ban Thakokhai	Belong to Village	Nam Ngum River		0.661	40506	
	Pak Ngum	Ban Thakokhai	Mr Phet	Teak (237T)	001	1.160	40505	
	Pak Ngum	Ban Thakokhai	Mr Ti	Paddy Field	002	1.113	40503	
	Pak Ngum	Ban Thakokhai	Belong to Village	Unstock Forest		13.189	40504	
	Pak Ngum	Ban Thakokhai	Belong to Village	River		0.786	40501	
	Pak Ngum	Ban Nonh	Belong to Village	River		0.791	40408	
	Pak Ngum	Ban Nonh	Belong to Village	Unstock Forest		17.919	40407	
From Km 05- Km 10	Pak Ngum	Ban Nonh	Mr Khampien	Paddy Field	003	1.629	40406	
	Pak Ngum	Ban Nonh	Mr Bounta	Paddy Field	004	0.292	40405	

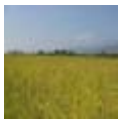
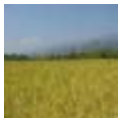
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 05-Km 10	Pak Ngum	Ban Nonh	Mr Chounmany	Paddy Field	005	1.529	40404	
	Pak Ngum	Ban Nonh	Mr Mi	Paddy Field	006	1.776	40403	
	Pak Ngum	Ban Nonh	Mr Kanha	Paddy Field	007	0.881	40402	
	Pak Ngum	Ban Nonh	Belong to Village	Unstock Forest		23.895	40401	
	Pak Ngum	Ban Xiengleatha	Mr Tou Xiengma	Paddy Field	008	0.307	40315	
	Pak Ngum	Ban Xiengleatha	Mr Air	Paddy Field	009	0.549	40314	
	Pak Ngum	Ban Xiengleatha	Belong to Village	Unstock Forest		6.336	40313	
	Pak Ngum	Ban Xiengleatha	Mr Phonh	Paddy Field	010	0.813	40312	
	Pak Ngum	Ban Xiengleatha	Mr Thidnoonh	Paddy Field	011	0.294	40311	
	Pak Ngum	Ban Xienglea tha	Mr Chine	Paddy Field	012	1.035	40310	
	Pak Ngum	Ban Xienglea tha	Mrs pat	Paddy Field	013	0.989	40309	
	Pak Ngum	Ban Xienglea tha	Mr Di	Paddy Field	014	1.243	40308	
	Pak Ngum	Ban Xienglea tha	Mr kham	Paddy Field	015	0.993	40307	

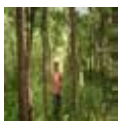
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 05-Km 10	Pak Ngum	Ban Xienglea tha	Mr Chandam	Paddy Field	016	0.965	40306	
	Pak Ngum	Ban Xienglea tha	Mr Luern	Paddy Field	017	1.286	40305	
	Pak Ngum	Ban Xienglea tha	Belong to Village	Dry Dipterocarp		11.450	40304	
	Pak Ngum	Ban Xienglea tha	Mr Nang Att	Paddy Field	018	1.291	40303	
	Pak Ngum	Ban Xienglea tha	Mr Lieng	Paddy Field	019	1.345	40302	
	Pak Ngum	Ban Xienglea tha	Belong to Village	Unstock Forest		34.282	40301	
From Km 15-Km 27	Pak Ngum	Ban Xienglea na	Belong to Village	Unstock Forest		68.130	40209	
	Pak Ngum	Ban Xienglea na	Mrs Sipha	Paddy Field	020	0.561	40208	
	Pak Ngum	Ban Xienglea na	Army Zone	Unstock Forest		5.106	40207	
From Km 27-Km 28	Pak Ngum	Ban Xienglea na	Mr Thanut B	Paddy Field	021	0.275	40206	
	Pak Ngum	Ban Xienglea na	Mr Thanut A	Unstock Forest		0.442	40205	
	Pak Ngum	Ban Xienglea na	Mr Thanut A	Paddy Field	022	0.535	40204	
	Pak Ngum	Ban Xienglea na	Army Home	Built Up		0.489	40203	

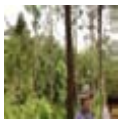
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 27-Km 28	Pak Ngum	Ban Xienglea na	Army Home	Built Up	023	0.909	40202	
	Pak Ngum	Ban Xienglea na	Belong to Village	Unstock Forest		3.518	40201	
From Km 28-Km 37	Pak Ngum	Ban Vuenkabao	Belong to Village	Unstock Forest		67.798	40101	
From Km 37-Km 42	Thaphabath	Ban Na	Belong to Village	Unstock Forest		6.051	30908	
	Thaphabath	Ban Na	Mr Kongphanh	Paddy Field	024	1.042	30907	
	Thaphabath	Ban Na	Mr Lai	Paddy Field	025	0.232	30906	
	Thaphabath	Ban Na	Mr Khammao	Paddy Field	026	0.378	30905	
	Thaphabath	Ban Na	Mr Somphon	Paddy Field	027	0.580	30904	
	Thaphabath	Ban Na	Belong to Village	Unstock Forest		8.055	30903	
	Thaphabath	Ban Na	Mr Somphone Hung	Paddy Field	028	0.324	30902	
	Thaphabath	Ban Na	Belong to Village	Dry Dipterocarp		5.793	30901	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		0.127	30817	
	Thaphabath	Ban Somsaat	Belong to Village	Dry Dipterocarp		4.828	30816	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 37-Km 42	Thaphabath	Ban Somsaath	Mr Onta	Paddy Field	029	0.509	30815	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		0.502	30814	
	Thaphabath	Ban Somsaath	Mr Mai	Paddy Field	030	0.490	30813	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		0.442	30812	
	Thaphabath	Ban Somsaath	Mr lieng	Paddy Field	031	0.226	30811	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		1.526	30810	
	Thaphabath	Ban Somsaath	Mr Khean	Paddy Field	032	0.310	30809	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		0.348	30808	
	Thaphabath	Ban Somsaath	Mr Somphone	Paddy Field	033	0.535	30807	
	Thaphabath	Ban Somsaath	Belong to Village	Unstock Forest		2.654	30806	
	Thaphabath	Ban Somsaath	Mr Chanh	Paddy Field	034	0.244	30805	
	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		1.899	30804	
From Km 42-Km 47	Thaphabath	Ban Somsaath	Mrs La	Paddy Field	035	0.321	30803	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 42- Km 47	Thaphabath	Ban Somsaath	Belong to Village	Dry Dipterocarp		5.003	30802	
	Thaphabath	Ban Somsaat	Belong to Village	Mix Forest		25.215	30801	
From Km 47- Km 52	Thaphabath	Ban palai	Belong to Village	Mix Forest		1.815	30714	
	Thaphabath	Ban Palai	Ms Khong	Paddy Field	036	0.733	30713	
	Thaphabath	Ban Palai	Mrs Pe	Paddy Field	037	0.393	30712	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		6.432	30711	
	Thaphabath	Ban palai	Mr Khanthong	Abandonment Paddy Field	038	0.627	30710	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		0.476	30709	
	Thaphabath	Ban palai	Mr vath	Kedsana	039	0.232	30708	
	Thaphabath	Ban palai	Mr Tou Tue	Paddy Field	040	0.939	30707	
	Thaphabath	Ban palai	Belong to Village	Mix Forest		14.371	30706	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		2.926	30705	
	Thaphabath	Ban palai	Tou Bounma	Rubber	041	1.926	30704	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		3.251	30703	
	Thaphabath	Ban palai	Mr Van	Paddy Field	042	0.293	30702	
	Thaphabath	Ban palai	Belong to Village	Unstock Forest		3.739	30701	
	Thaphabath	Ban Thabok	Mr Vanh	Paddy Field	043	1.296	30611	
	Thaphabath	Ban Thabok	Mr Xiengkong	Paddy Field	044	1.019	30610	
From Km 52- Km 56.5	Thaphabath	Ban Thabok	Mr Khambone	Paddy Field	045	0.905	30609	
	Thaphabath	Ban Thabok	Mr hand	Ray	046	3.621	30608	
	Thaphabath	Ban Thabok	Mr Xom	Ray	047	2.076	30607	
	Thaphabath	Ban Thabok	Mr Bounthanh	Paddy Field	048	0.978	30606	
	Thaphabath	Ban Thabok	Ms Thummi	Paddy Field	049	1.629	30605	
	Thaphabath	Ban Thabok	Mr Khammuan	Paddy Field	050	1.441	30604	
	Thaphabath	Ban Thabok	Mr Saly	Paddy Field	051	1.137	30603	
	Thaphabath	Ban Thabok	Tou Xiengthong	Paddy Field	052	1.365	30602	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 52- Km 56.5	Thaphabath	Ban Thabok	Belong to Village	Dry Dipterocarp		22.420	30601	
From Km 56- Km 77	Thaphabath	Ban Sisomxay	Belong to Village	Dry Dipterocarp		162.624	30501	
From Km 77- Km 82	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		1.433	30415	
	Thaphabath	Ban Nong kuen	Mr Att	Unstock Forest (Farm)	053	0.994	30414	
	Thaphabath	Ban Nong Kuen	Mr Ong	Mix Forest	054	1.335	30413	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		1.194	30412	
	Thaphabath	Ban Nong kuen	Mr Ngu	Abandonment Paddy Field	055	0.207	30411	
	Thaphabath	Ban Nong kuen	Mr Xom	Unstock Forest	056	2.679	30410	
	Thaphabath	Ban Nong kuen	Mr Xom	Paddy Field	057	0.377	30509	
	Thaphabath	Ban Nong kuen	Mrs Tom	Paddy Field	058	0.977	30408	
	Thaphabath	Ban Nong kuen	Mr Xom	Unstock Forest	059	0.258	30407	
	Thaphabath	Ban Nong kuen	Belong to Village	Mix Forest		3.698	30506	
	Thaphabath	Ban Nong kuen	Mr Si	Paddy Field	060	1.549	30405	

Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
	Thaphabath	Ban Nong kuen	Belong to Village	Dry Dipterocarp		11.287	30404	
	Thaphabath	Ban Nong Kuen	Mr Souk	Unstock Forest	061	0.534	30403	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		0.435	30402	
	Thaphabath	Ban Nong Kuen	Belong to Village	Dry Dipterocarp		13.790	30401	
From Km 82- Km 87	Thaphabath	Ban Pakthouay Neu	Belong to Village	Unstock Forest		0.133	30312	
	Thaphabath	Ban Pakthouay Neu	Mr Tousuan	Paddy Field	062	0.648	30311	
	Thaphabath	Ban Pakthouay Neu	Belong to Village	Dry Dipterocarp		1.434	30310	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Chouang	Abandonment paddy	063	0.499	30309	
	Thaphabath	Ban Pakthouay Neu	Belong to Village	Dry Dipterocarp		3.821	30308	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Tonh	Unstock Forest	064	0.616	30307	
	Thaphabath	Ban Pakthouay Neu	Mrs Tou Pouk	Paddy Field	065	0.291	30306	
	Thaphabath	Ban Pakthouay Neu	Mr Tou Sak	Paddy Field	066	0.442	30305	
	Thaphabath	Ban Pakthouay Neu	Mr Luar	Unstock Forest	067	0.087	30304	

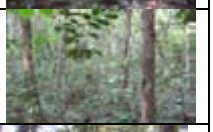
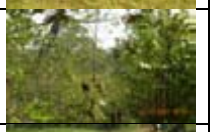
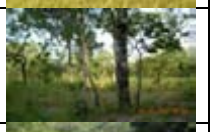
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 82-Km 87	Thaphabath	Ban Pakthouay Neu	Belong to Village	Unstock Forest		0.745	30303	
	Thaphabath	Ban Pakthouay Neu	Mr Tenh	Abandonment paddy	068	2.929	30302	
	Thaphabath	Ban Pakthouay Neu	Mr Buakham	Unstock Forest	069	0.407	30301	
	Thaphabath	Ban Pakthouay Tai	Mr Makham	Paddy Field	070	1.779	30201	
	Thaphabath	Ban Pakthouay Tai	Mrs Si	Paddy Field	071	1.265	30202	
	Thaphabath	Ban Pakthouay Tai	Belong to Village	Unstock Forest		2.472	30203	
	Thaphabath	Ban Pakthouay Tai	Mrs Tou Luer	Paddy Field	072	0.353	30204	
	Thaphabath	Ban Pakthouay Tai	Mrs Tou Suan	Abandonment Paddy Field	073	1.070	30205	
	Thaphabath	Ban Vuenthat	Mr Xiengli	Paddy Field	074	0.618	30118	
	Thaphabath	Ban Vuenthat	Mr Khong	Paddy Field	075	0.239	30117	
	Thaphabath	Ban Vuenthat	Mrs Sanh	Paddy Field	076	0.373	30116	
	Thaphabath	Ban Vuenthat	Mr Tou Auim	Paddy Field	077	1.239	30115	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		5.478	30114	

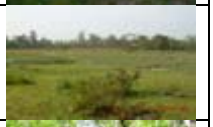
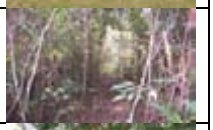
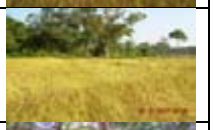
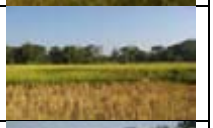
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 82-Km 87	Thaphabath	Ban Vuenthat	Mr Xieng Pong	AbandonmentPaddy Field	078	0.565	30113	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		7.744	30112	
	Thaphabath	Ban Vuenthat	Mr Theung	Paddy Field	079	0.694	30111	
	Thaphabath	Ban Vuenthat	Mr Ngai	Paddy Field	080	0.748	30110	
	Thaphabath	Ban Vuenthat	Mr Leun	Abandonment Paddy Field	081	0.578	30109	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		4.892	30108	
From Km 87-Km 97	Thaphabath	Ban Vuenthat	Mr Tou Phila	Paddy Field	082	1.460	30107	
	Thaphabath	Ban Vuenthat	Mr Manh	Paddy Field	083	1.743	30106	
	Thaphabath	Ban Vuenthat	Mr Vong Deun	Paddy Field	084	1.186	30105	
	Thaphabath	Ban Vuenthat	Belong to Village	Dry Dipterocarp		1.419	30104	
	Thaphabath	Ban Vuenthat	Mrs Khium	Dry Dipterocarp	085	0.997	30103	
	Thaphabath	Ban Vuenthat	Mr Tou Oum	Dry Dipterocarp	086	0.174	30102	
	Thaphabath	Ban Vuenthat	Mrs Tou Sand	Dry Dipterocarp	087	0.915	30101	

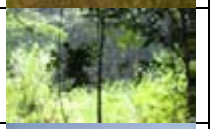
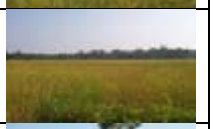
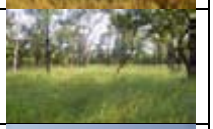
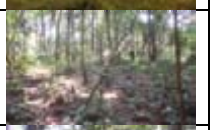
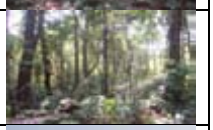
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 87- Km 97	Pakxan	Ban Saysavang	Belong to Village	Dry Dipterocarp		69.109	20601	
	Pakxan	Ban Namngiep	Belong to Village	Dry Dipterocarp		27.576	20501	
	Bolikhan	Ban Nampa	Belong to Village	Dry Dipterocarp		31.623	10201	
From Km 97- Km 119	Bolikhan	Ban Hat Gniun	Belong to Village	Unstock Forest		2.588	10106	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		63.342	10105	
	Bolikhan	Ban Hat Gniun	Belong to Village	Unstock Forest		1.083	10104	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		42.499	10103	
	Bolikhan	Ban Hat Gniun	Mr Keoun	Paddy Field	088	2.230	10102	
From Km 119- Km 125	Bolikhan	Ban Hat Gniun	Belong to Village	Mix Forest		62.741	10101	
	Bolikhan	Ban Hat Gniun	Belong to Village	Unstocked Forest		0.711	10104	
	Bolikhan	Ban Nampa	Belong to Village	Dry Dipterocarp forest		5.901	10201	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		10.997	10103	
	Bolikhan	Ban Hat Gniun	Belong to Village	Water body		0.165	10108	

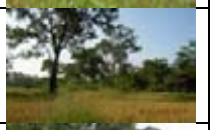
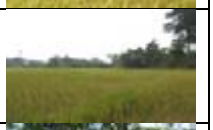
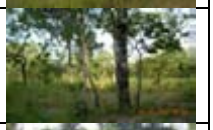
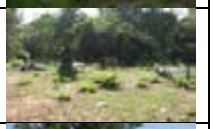
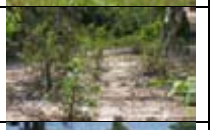
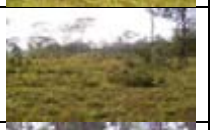
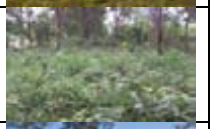
Distance	District	Village	Land Owner	Land Use	Map No.	Areas (ha)	Code	Picture
From Km 119-Km 125	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		15.495	10101	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		3.834	10105	
	Bolikhan	Ban Hat Gniun	Belong to Village	Water body		0.115	10109	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		11.986	10105	
	Bolikhan	Ban Hat Gniun	Mr Keoun	Paddy Field		0.257	10102	
	Bolikhan	Ban Hat Gniun	Belong to Village	Mixed deciduous forest		0.147	10107	

Table 1 Photos of land use and forest type along the proposed of transmission line from Ban Nampa to Pakxan substation

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Nampa	Belong to Village	Dry Dipterocarp	1.750	10202		
Ban Nampa	Belong to Village	Dry Dipterocarp	1.497	10203		
Ban Nampa	Belong to Village	Dry Dipterocarp	1.294	10204		
Ban Nampa	Mr Kham anh	Paddy Field	0.625	10205	001	
Ban Nampa	Belong to Village	Dry Dipterocarp	4.189	10206		
Ban Nampa	Mr La	Paddy Field	0.209	10207	002	
Ban Nampa	Mr Bounmi	Paddy Field	0.724	10208	003	
Ban Nampa	Belong to Village	Unstock Forest	1.895	10209		
Ban Nampa	Mr Touy	Paddy Field	0.209	10210	004	
Ban Nampa	Belong to Village	Dry Dipterocarp	0.667	10211		
Ban Nampa	Mr Sang	Paddy Field	0.136	10212	005	
Ban Nampa	Belong to Village	Dry Dipterocarp	1.981	10213		
Ban Nampa	Mr Xieng air	Abandonment Paddy Field	0.119	10214	006	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Nampa	Belong to Village	Dry Dipterocarp	1.059	10215		
Ban Huaykhoun	Mr Sing	Abandonment Paddy Field	0.393	10301	007	
Ban Huaykhoun	Belong to Village	Mix Forest	7.953	10302		
Ban Huaykhoun	Mr deng	Abandonment Paddy Field	0.058	10303	008	
Ban Huaykhoun	Mr Khamphone	Paddy Field	0.298	10304	009	
Ban Huaykhoun	Mr Thieng	Garden	1.529	10305	010	
Ban Huaykhoun	Mr Kham	Ray	0.321	10306	011	
Ban Huaykhoun	Belong to Village	Unstock Forest	6.182	10307		
Ban Thong Noi	Mr Tuen	Paddy Field	0.882	20101	012	
Ban Thong Noi	Mr Souni, Khanth	Paddy Field	3.693	20102	013	
Ban Thong Noi	Mr Phing	Paddy Field	1.223	20103	014	
Ban Thong Noi	Belong to Village	Evergreen Forest (Dong kampha)	1.505	20104		
Ban Thong Noi	Mr Sinuan	Paddy Field	1.085	20105	015	
Ban Thong Noi	Mrs Phong	Paddy Field	0.376	20106	016	
Ban Thong Noi	Mr Tid boun	Paddy Field	0.730	20107	017	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Thong Noi	Pakxan District	Evergreen Forest (Nong Bua)	6.995	20108		
Ban Thong Noi	Mrs Oh	Paddy Field	1.162	20109	018	
Ban Thong Noi	Mr Chieng	Paddy Field	0.853	20110	019	
Ban Thong Noi	Belong to Village	Evergreen Forest	0.784	20111		
Ban Thong Noi	Mrs Tuan chai	Paddy Field	0.792	20112	020	
Ban Thong Noi	Belong to Village	Evergreen Forest	0.933	20113		
Ban Thong Yai	Mr BounKhieng	Paddy Field	1.569	20201	021	
Ban Thong Yai	Mr Boun hin	Paddy Field	0.804	20202	022	
Ban Thong Yai	Mr Lumthong	Paddy Field	0.522	20203	023	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	1.260	20204		
Ban Thong Yai	Mr Somphone	Paddy Field	0.713	20205	024	
Ban Thong Yai	Mr Ki	Paddy Field	1.519	20206	025	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	0.179	20207		
Ban Thong Yai	Belong to Village	Dry Dipterocarp	0.125	20208		
Ban Thong Yai	Ms Manh	Paddy Field	0.137	20209	026	

Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Thong Yai	Mr Minoi	Paddy Field	3.195	20210	027	
Ban Thong Yai	Mrs Chanh	Paddy Field	0.874	20211	028	
Ban Thong Yai	Mr Somdi	Paddy Field	0.976	20212	029	
Ban Thong Yai	Mr Lamphone	Paddy Field	0.409	20213	030	
Ban Thong Yai	Belong to Village	Dry Dipterocarp	6.469	20214		
Ban Thong Yai	Belong to Village	Cemetery	1.873	20215		
Ban Sanaxay	Mr sisomphou	Paddy Field	2.658	20301	031	
Ban Sanaxay	Mr Somdi	Dry Dipterocarp	0.363	20302	032	
Ban Sanaxay	Mr Somdi	Paddy Field	1.103	20303	033	
Ban Sanaxay	Mr Somdi	Dry Dipterocarp	0.064	20304	034	
Ban Sanaxay	Mr Touhomh	Paddy Field	1.462	20305	035	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	3.522	20306		
Ban Sanaxay	Mr Hanh	Eucaliptus	0.677	20307	036	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	7.859	20308		
Ban Sanaxay	Mr Poikeo	Paddy Field	0.229	20309	037	

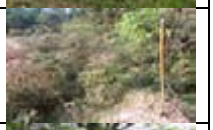
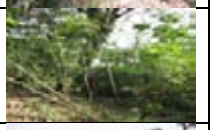
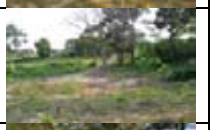
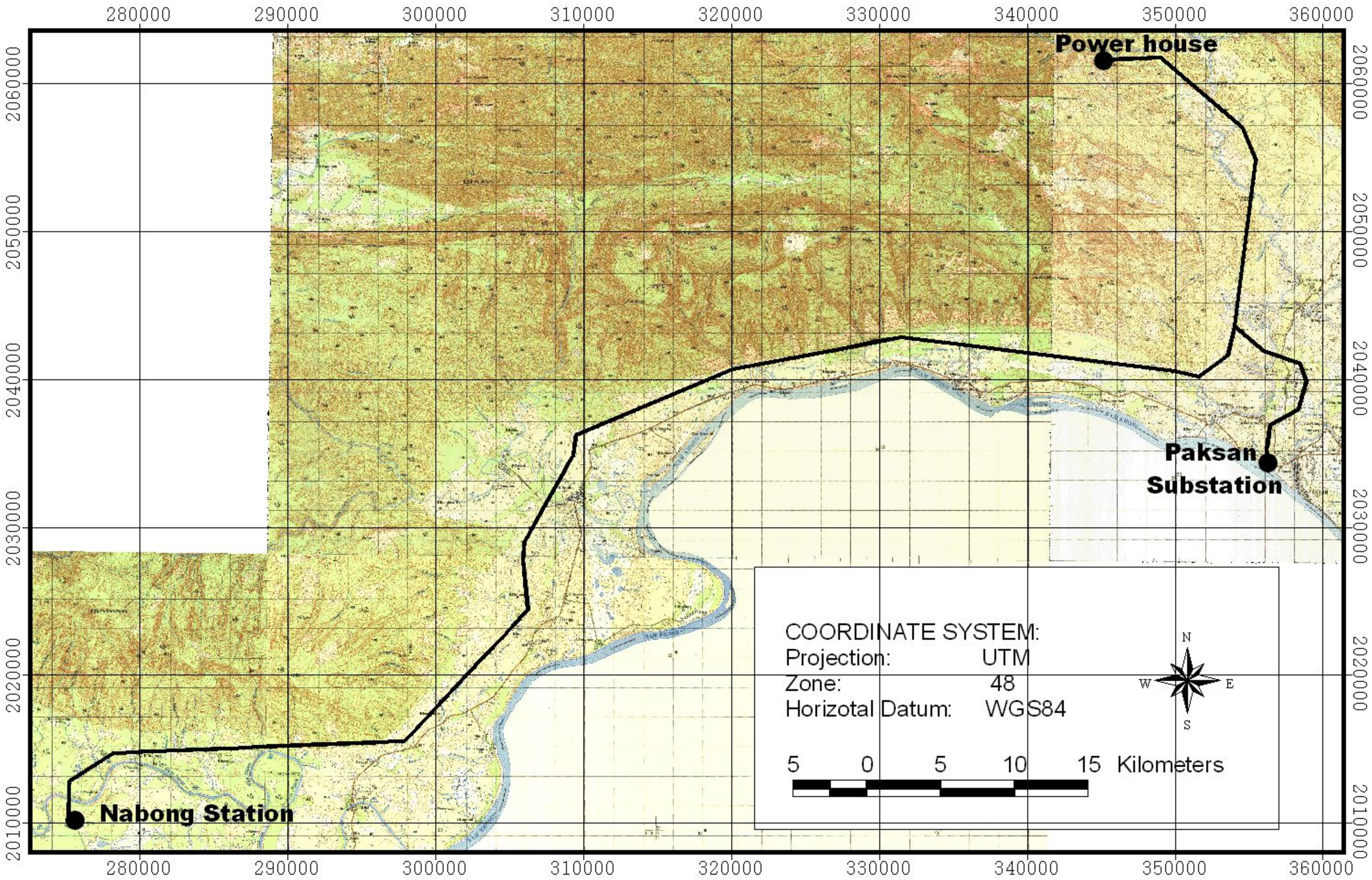
Village	Name of HH	Land Use	Area	Code of Land Use	Sketmap No.	Picture
Ban Sanaxay	Ms Vieng	Built Up	0.428	20310	038	
Ban Sanaxay	Belong to Village	Dry Dipterocarp	0.716	20311		
Ban Sanaxay	Army Zone	Dry Dipterocarp	0.146	20312	039	
Ban Sanaxay	Ms Touy	Built Up	0.623	20313	040	
Ban Sanaxay	Mr Yai	Kedsana plantaion	0.597	20314	041	
Ban Sanaxay	Army Zone	Kedsana plantaion	0.341	20315	042	

Table 1 The photos of Housing/Construction areas along the proposed of transmission line.

Village	Name of HH	Land Use	Area	Code of Land use	Sketmap	Picture
Ban Anusonxay	Belong to Village	Unstock Forest	2.660	20401		
Ban Anusonxay	Mr Khampha	Built Up	0.236	20402		
Ban Anusonxay	Cabinet office	Built Up	0.689	20403		
Ban Anusonxay	Belong to Village	Road	1.312	20404		
Ban Anusonxay	Mr Phongsavanh	Built Up	0.148	20405		
Ban Anusonxay	Mr kokeo	Built Up	0.045	20406		
Ban Anusonxay	Mrs Bang	Built Up	0.132	20407		
Ban Anusonxay	Mr Inpanh	Built Up	0.146	20408		
Ban Anusonxay	Mrs Jone	Built Up	0.168	20410		
Ban Anusonxay	Mr Phonxay	Built Up	0.119	20411		
Ban Anusonxay	Mr Khamponh	Built Up	0.141	20412		
Ban Anusonxay	Mr Soubanh	Built Up	0.101	20413		
Ban Anusonxay	Mr Khamphanh	Built Up	0.091	20414		

Village	Name of HH	Land Use	Area	Code of Land use	Sketmap	Picture
Ban Anusonxay	Mrs Tou Yan	Built Up	0.036	20415		
Ban Anusonxay	Mr Nalinh	Built Up	0.032	20416		
Ban Anusonxay	Mrs Saimany	Built Up	0.144	20417		
Ban Anusonxay	Belong to Village	Road	0.080	20418		
Ban Anusonxay	Road	Road	0.281	20419		
Ban Anusonxay	Mr Lit	Built Up (Garage)	0.005	20420		
Ban Anusonxay	Mr Chanthakhan	Built Up	0.017	20421		
Ban Anusonxay	Mrs Mi	Built Up	0.044	20422		
Ban Anusonxay	Mr Somphon	Built Up	0.104	20423		
Ban Anusonxay	Mr Inpeng	Built Up	0.198	20424		
Ban Anusonxay	Mr Pani	Built Up	0.178	20425		
Ban Anusonxay	Mrs Toukeo	Built Up	0.059	20426		
Ban Anusonxay	Mr Bounphai	Built Up	0.071	20427		
Ban Anusonxay	Road	Road	0.097	20428		
Ban Anusonxay	Mr Thongphoun	Unstock Forest	1.847	20429		
Ban Anusonxay	Pakxan Sub ST	Pakxan Sub ST	0.722	20430		

Alignment of Transmission line
Nam Ngiep 1 Hydropower Project



Map sheet No: 1

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

274900 275000 275100 275200 275300 275400 275500 275600 275700 275800 275900 276000 276100 276200

2010500 2010400 2010300 2010200 2010100 2010000 2009900 2009800

0.50km

40603

00.00 km

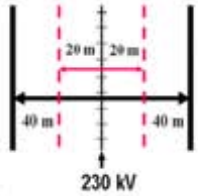
Ban Nabong
(0.00 km- 0.60 km)

Legend:

- Alignment of Transmission line
- Unstocked Forest

4 = Pakngum District
06 = Nabong Village
03 = Code of land owner
40603 = Belong to Nabong Village

= Engineering Clearance
= Environmental Study



COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

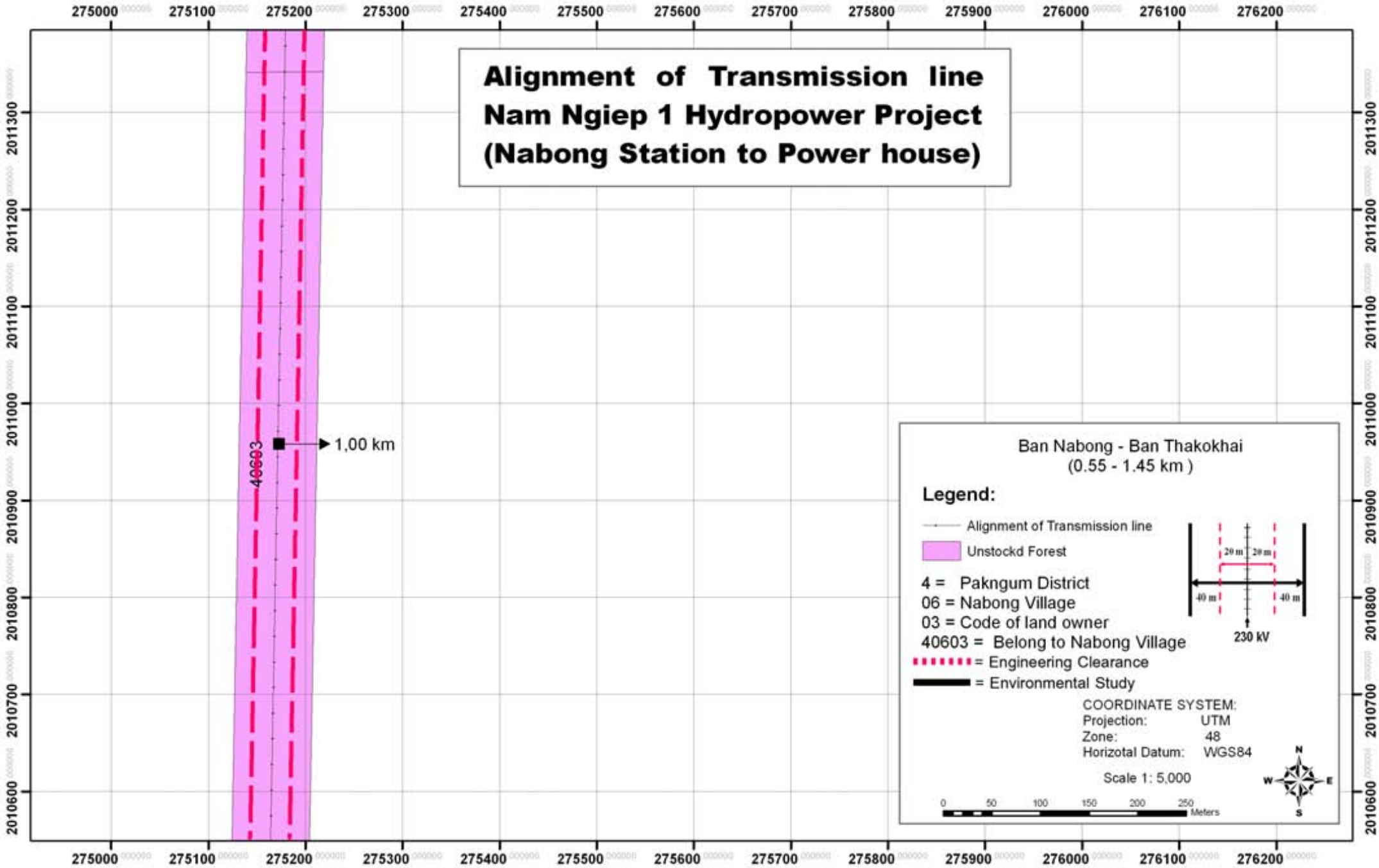
Scale 1;5,000

0 50 100 150 200 250 Meters

N W E S

Map sheet No: 2

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 3

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

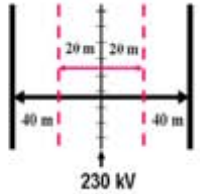
2.00 km

1.50 km

Ban Nabong - Ban Thakokhai
(1.40 - 2.20 km)

Legend:

- Alignment of Transmission line
- Plantation
- Unstocked Forest
- Paddy Field
- River (Nam ngum)



4 = Pakngum District
06 = Nabong Village
01-02 = Code of land owner
40601 = River (Nam ngum)
40602 = Belong to Mr. Phet
4 = Pakngum District
05 = Thakokhai Village
02- 06 = Code of land owner
40502 = Belong to Thakokhai Village
40503 = Belong to Mr. Ti
40504 = Belong to Thakokhai Village
40505 = Belong to Mr. Phet
40506 = River (Nam ngum)

= Engineering Clearance
= Environmental Study

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Scale 1: 5,000

0 50 100 150 200 250 Meters

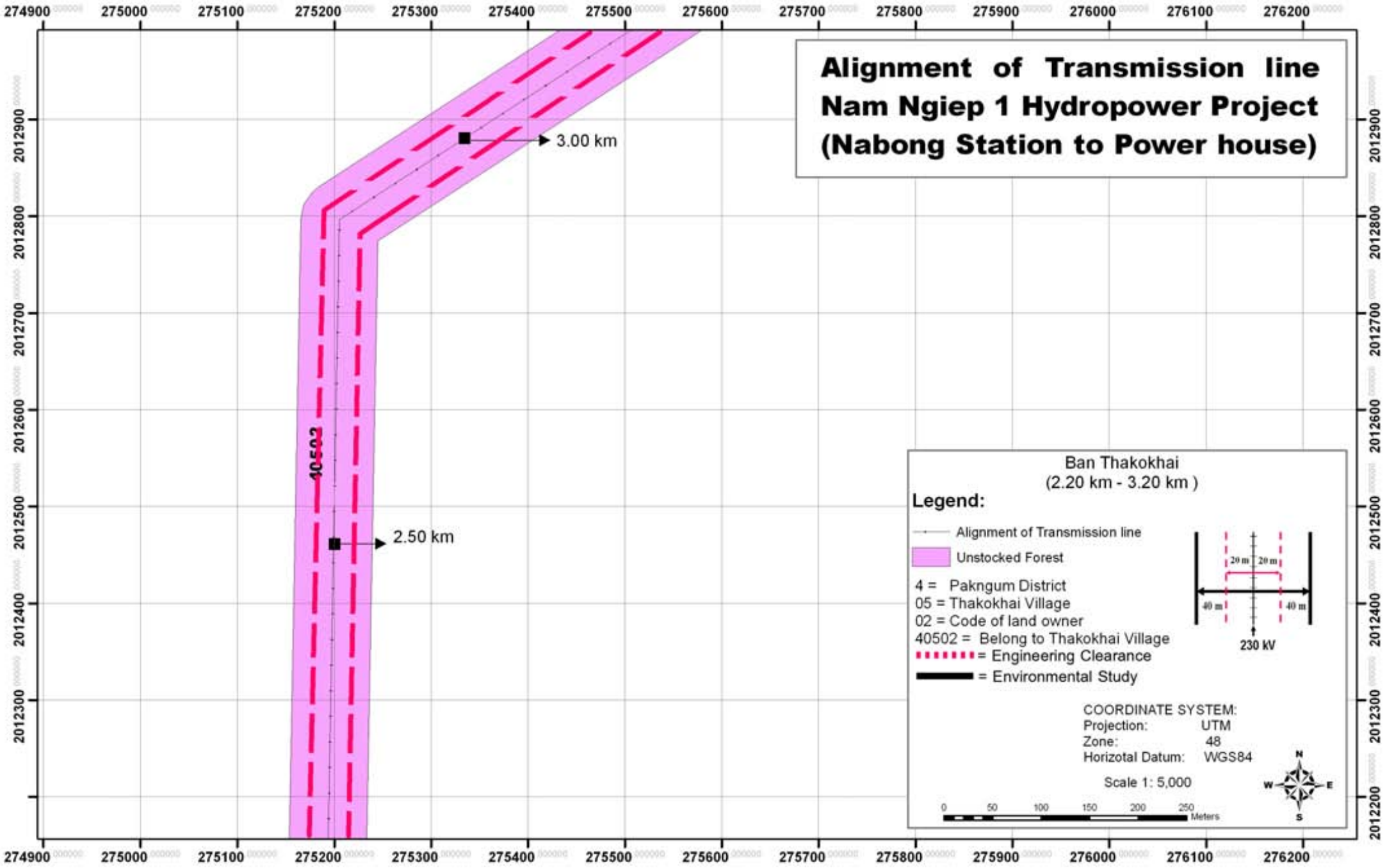
N W E S

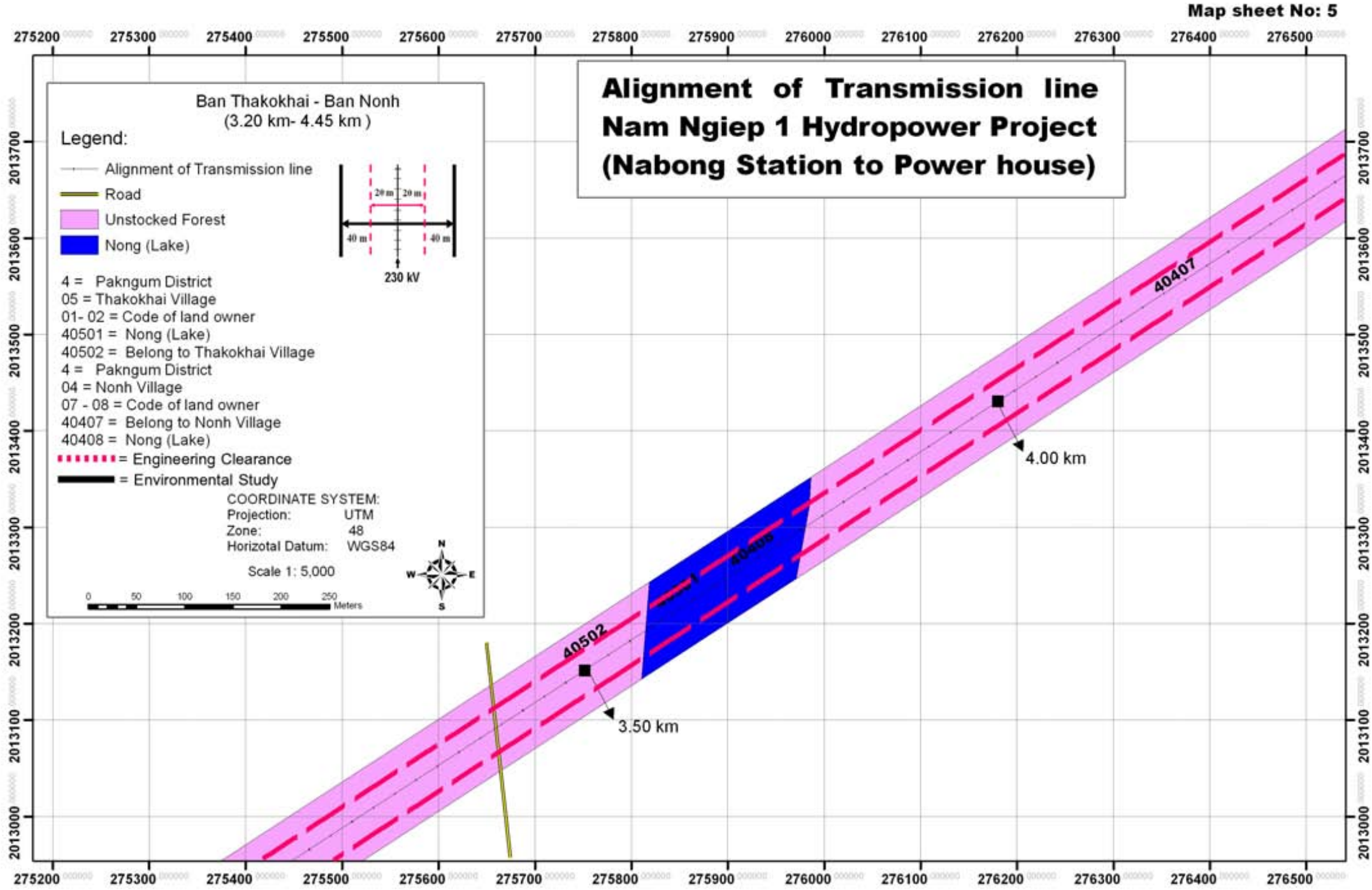
274900 275000 275100 275200 275300 275400 275500 275600 275700 275800 275900 276000 276100 276200

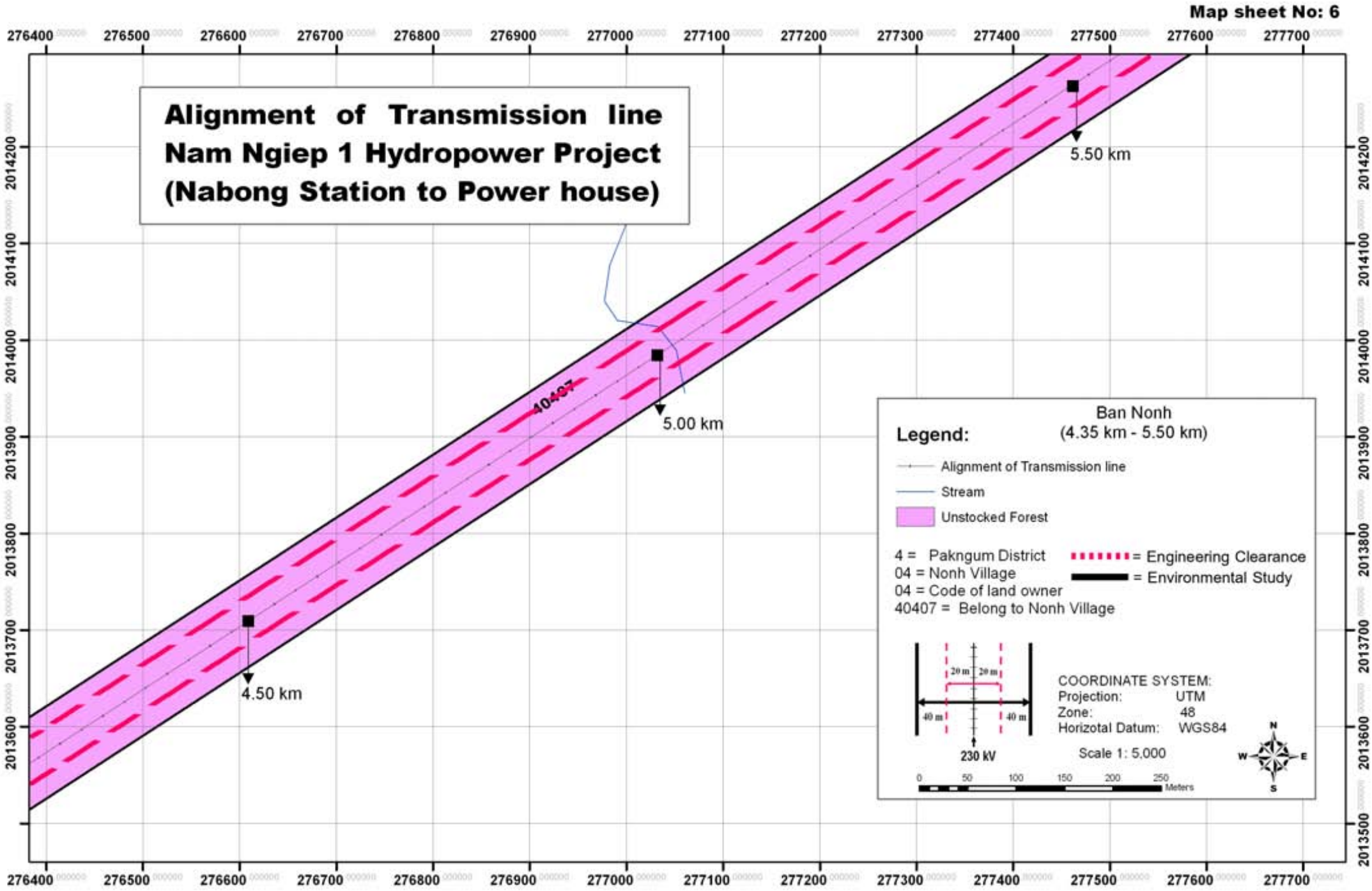
2012100 2012000 2011900 2011800 2011700 2011600 2011500 2011400

Map sheet No: 4

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)




Map sheet No: 5
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
Ban Thakokhai - Ban Nonh
(3.20 km- 4.45 km)
Legend:
Alignment of Transmission line
Road
Unstocked Forest
Nong (Lake)
20 m
20 m
40 m
40 m
230 kV
4 = Pakngum District
05 = Thakokhai Village
01- 02 = Code of land owner
40501 = Nong (Lake)
40502 = Belong to Thakokhai Village
4 = Pakngum District
04 = Nonh Village
07 - 08 = Code of land owner
40407 = Belong to Nonh Village
40408 = Nong (Lake)
= Engineering Clearance
= Environmental Study
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
Scale 1: 5,000
0 50 100 150 200 250 Meters
N
W
E
S
40407
40408
40502
4.00 km
3.50 km
275200 275300 275400 275500 275600 275700 275800 275900 276000 276100 276200 276300 276400 276500
2013700 2013600 2013500 2013400 2013300 2013200 2013100 2013000


Map sheet No: 6
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
276400
276500
276600
276700
276800
276900
277000
277100
277200
277300
277400
277500
277600
277700
2014200
2014100
2014000
2013900
2013800
2013700
2013600
2013500
4.50 km
5.00 km
5.50 km
40407
Ban Nonh
(4.35 km - 5.50 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
4 = Pakngum District
04 = Nonh Village
04 = Code of land owner
40407 = Belong to Nonh Village
= Engineering Clearance
= Environmental Study
20 m
20 m
40 m
40 m
230 kV
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
Scale 1: 5,000
0
50
100
150
200
250
Meters
N
W
E
S

Map sheet No: 7

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

277400 277500 277600 277700 277800 277900 278000 278100 278200 278300 278400 278500 278600 278700

2014900 2014800 2014700 2014600 2014500 2014400 2014300 2014200

40401 40402 40403 40404 40405 40406 40407

6.50 km

6.00 km

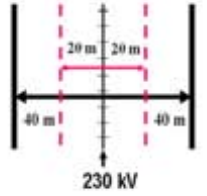
5.50 km

Ban Nonh
5.40 km-6.90km)

4 = Pakngum District
04 = Nonh Village
01-07 = Code of land owner
40401 = Belong to Nonh Village
40402 = Mr Kanha
40403 = Mr Mi
40404 = Mr Chounmany
40405 = Mr Bounta
40406 = Mr Khampien
40407 = Belong to Nonh Village

Legend:

- Alignment of Transmission line
- Unstocked Forest
- Paddy Field
- = Engineering Clearance
- = Environmental Study

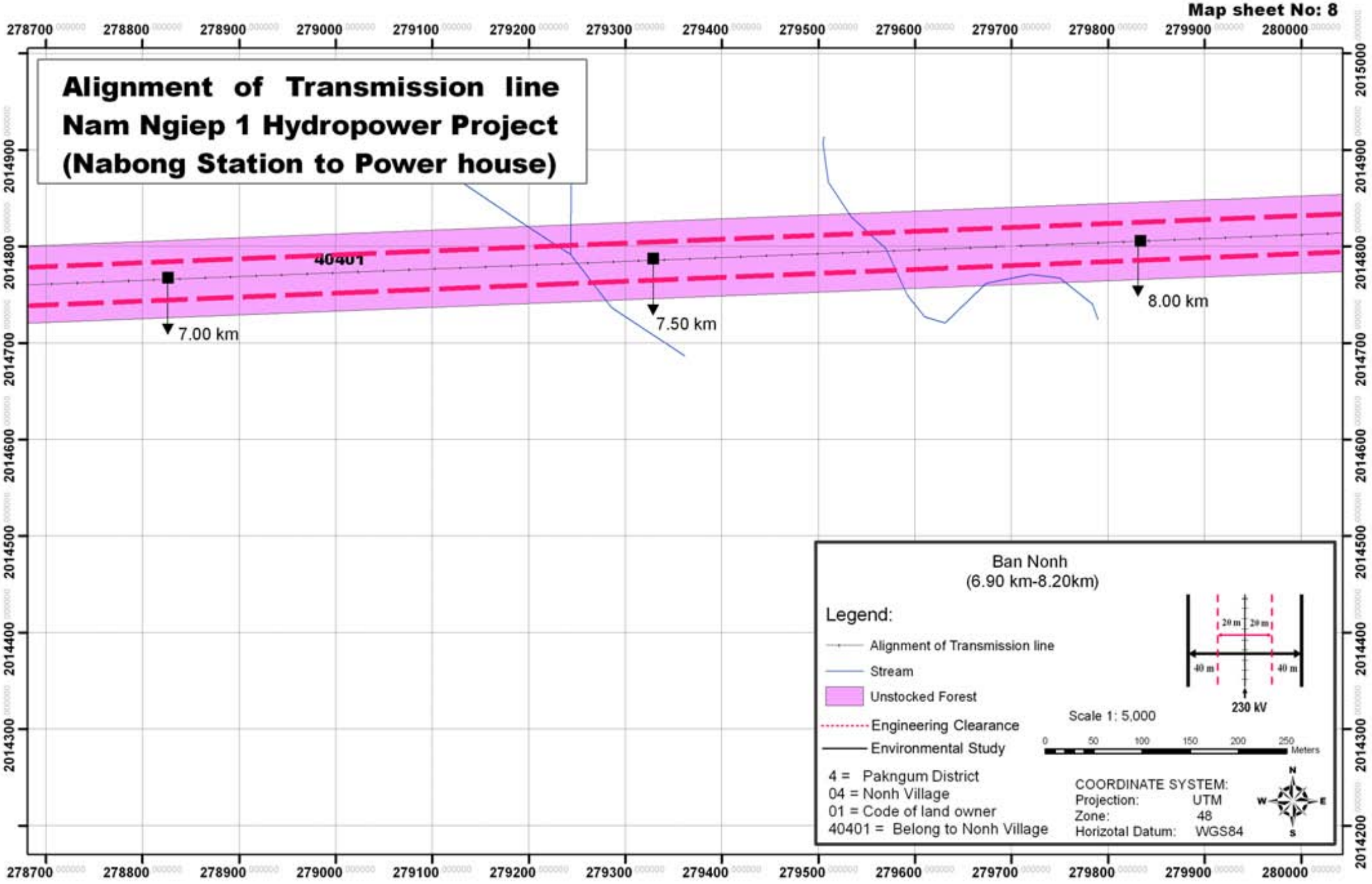


Scale 1: 5,000

0 50 100 150 200 250 Meters

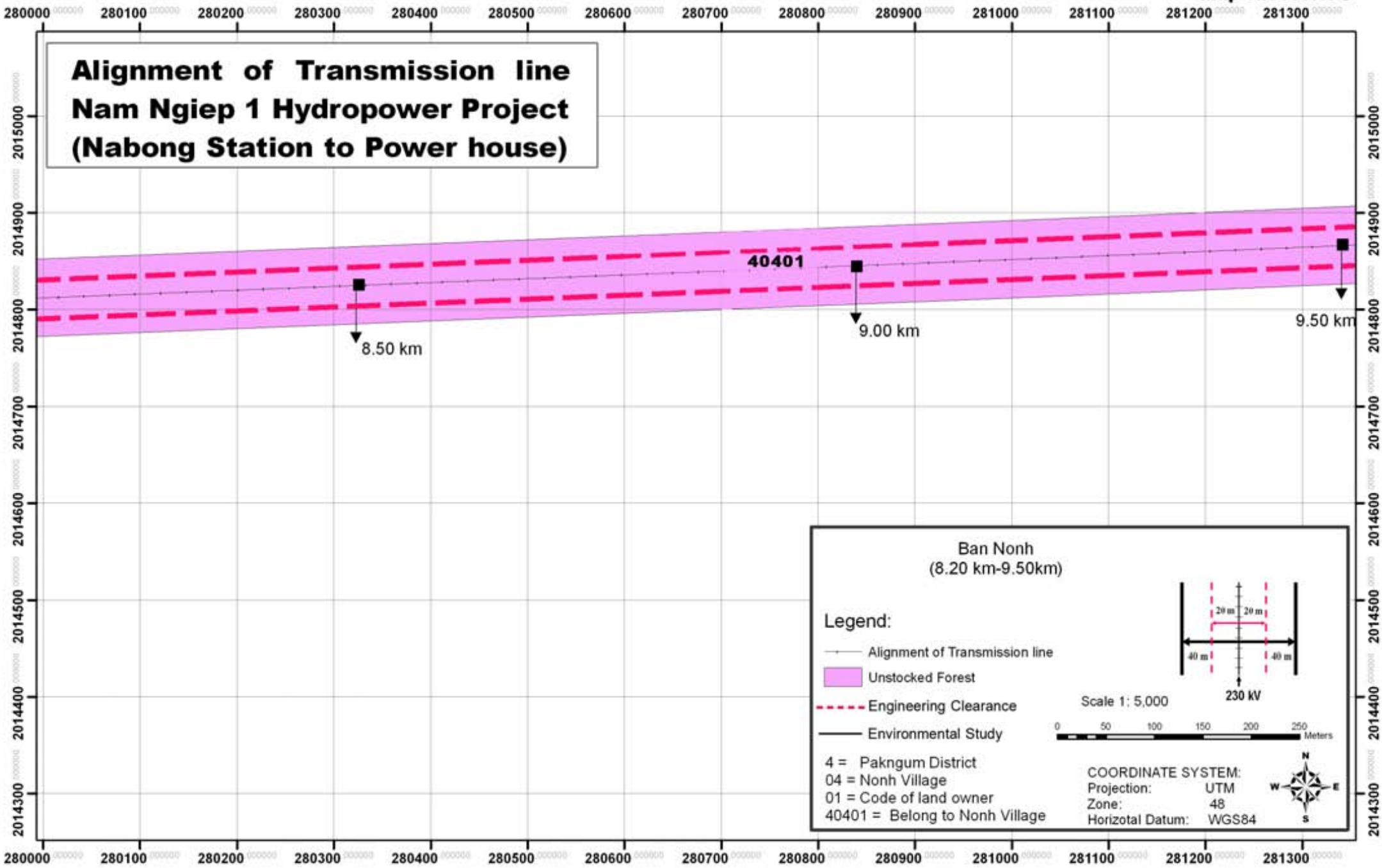
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S


Map sheet No: 8
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
278700
278800
278900
279000
279100
279200
279300
279400
279500
279600
279700
279800
279900
280000
2015000
2014900
2014800
2014700
2014600
2014500
2014400
2014300
2014200
40401
7.00 km
7.50 km
8.00 km
Ban Nonh
(6.90 km-8.20km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
Engineering Clearance
Environmental Study
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
4 = Pakngum District
04 = Nonh Village
01 = Code of land owner
40401 = Belong to Nonh Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 9

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 10

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

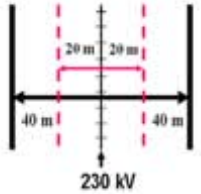
Ban Nonh - Ban Xienglea tha
(9.50 km-10.80km)

Legend:

- Alignment of Transmission line
- Stream
- Road
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

4 = Pakngum District
04 = Nonh Village
01 = Code of land owner
40401 = Belong to Nonh Village

4 = Pakngum District
03 = Xiengleatha
09 - 15 = Code of land owner
40310 = Belong to Mr Chine
40311 = Belong to Mr Tidnoonh
40312 = Belong to Mr Phonh
40313 = Belong to Xiengleatha Village
40314 = Belong to Mr Tou Xiengma
40315 = Belong to Mr Air



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 11

Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)

282600 282700 282800 282900 283000 283100 283200 283300 283400 283500 283600 283700 283800 283900

2015100 2015000 2014900 2014800 2014700 2014600 2014500 2014400

40313
40309 40308 40307 40306 40305 40304

11.00 km
11.50 km
12.00 km

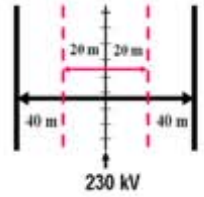
Ban Xienglea tha
(10.80 km-12.10km)

Legend:

- Alignment of Transmission line
- Road
- Stream
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field

4 = Pakngum District
03 = Xienglea tha
04 - 09, 13 = Code of land owner
40304 = Belong to Mr Chine
40305 = Belong to Mr Luern
40306 = Belong to Mr Chandm
40307 = Belong to Mr Kham
40308 = Belong to Mr Di
40309 = Belong to Mrs Pat
40313 = Belong to Xienglea tha Village

- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 12

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

283900 284000 284100 284200 284300 284400 284500 284600 284700 284800 284900 285000 285100 285200

2015200 2015100 2015000 2014900 2014800 2014700 2014600 2014500 2014400

40304

12.50 km

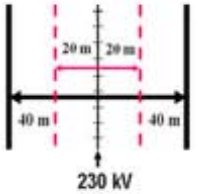
13.00 km

40303 40302 40301

Legend:

Ban Xienglea tha
(12.10 km-13.40km)

- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



4 = Pakngum District
03 = Xienglea tha
01 - 04 = Code of land owner
40301 = Belong to Xienglea tha Village
40302 = Belong to Mr Lieng
40303 = Belong to Mrs Nang Att
40304 = Belong to Xienglea tha Village

Scale 1: 5,000

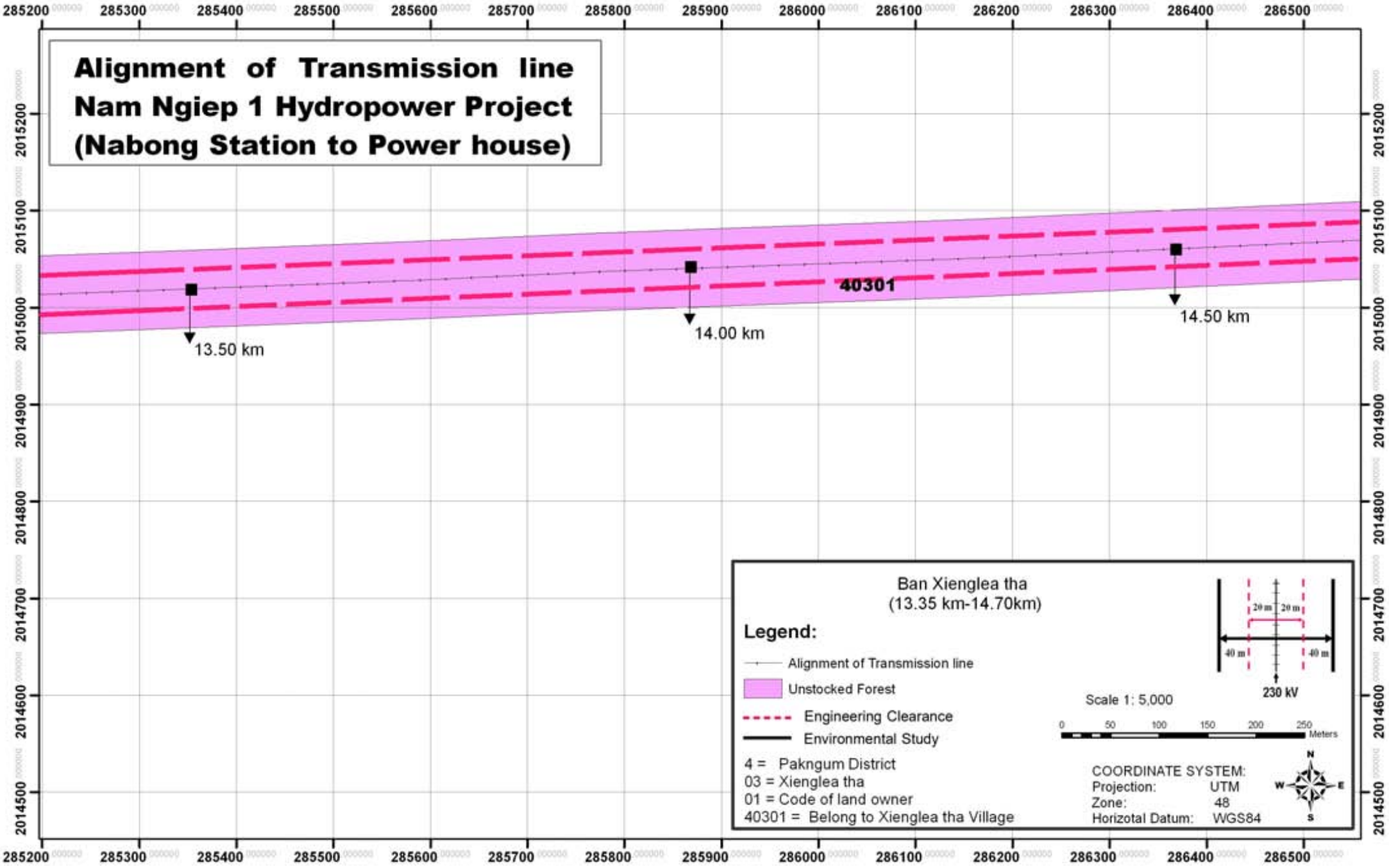
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

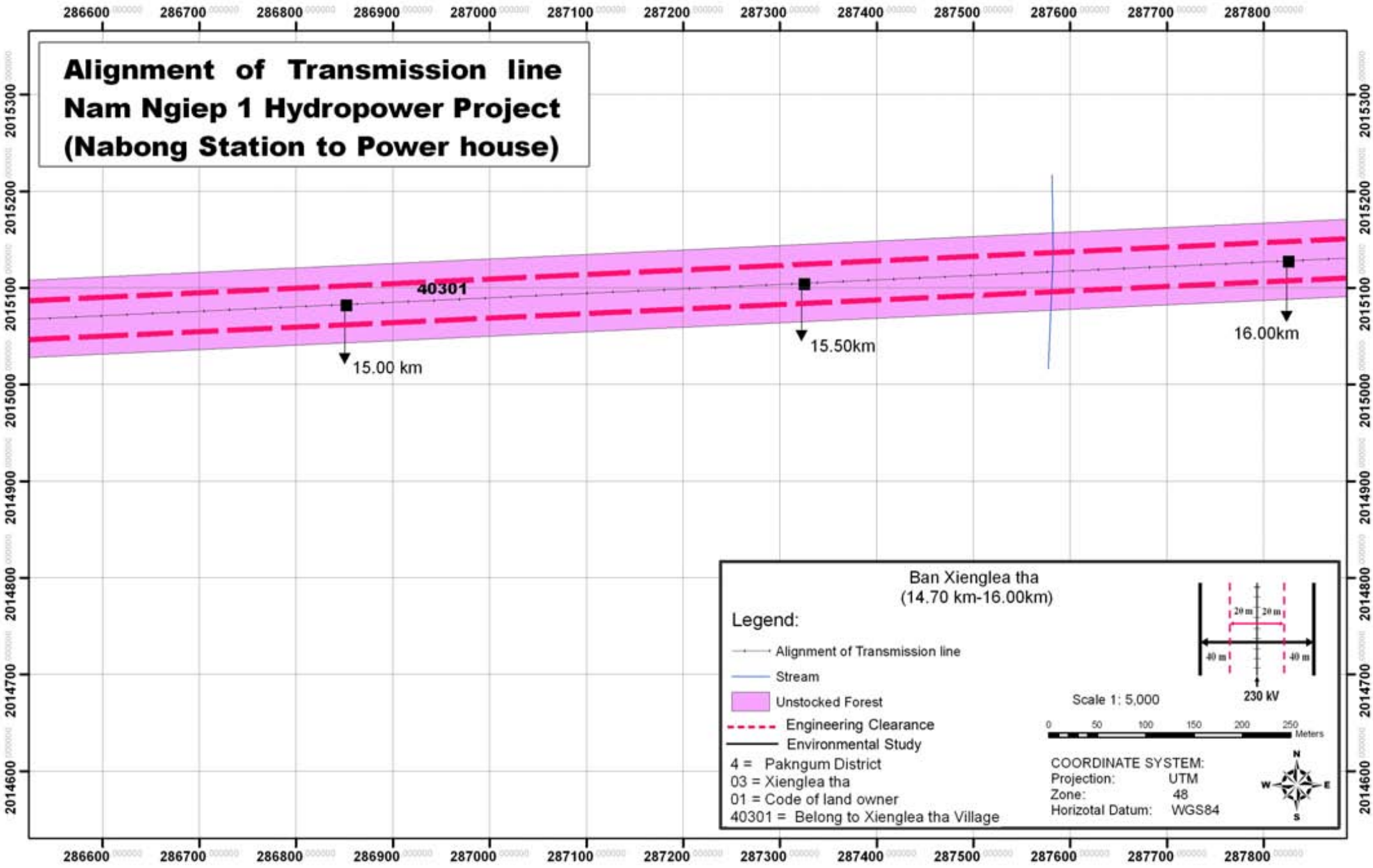
Map sheet No: 13

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



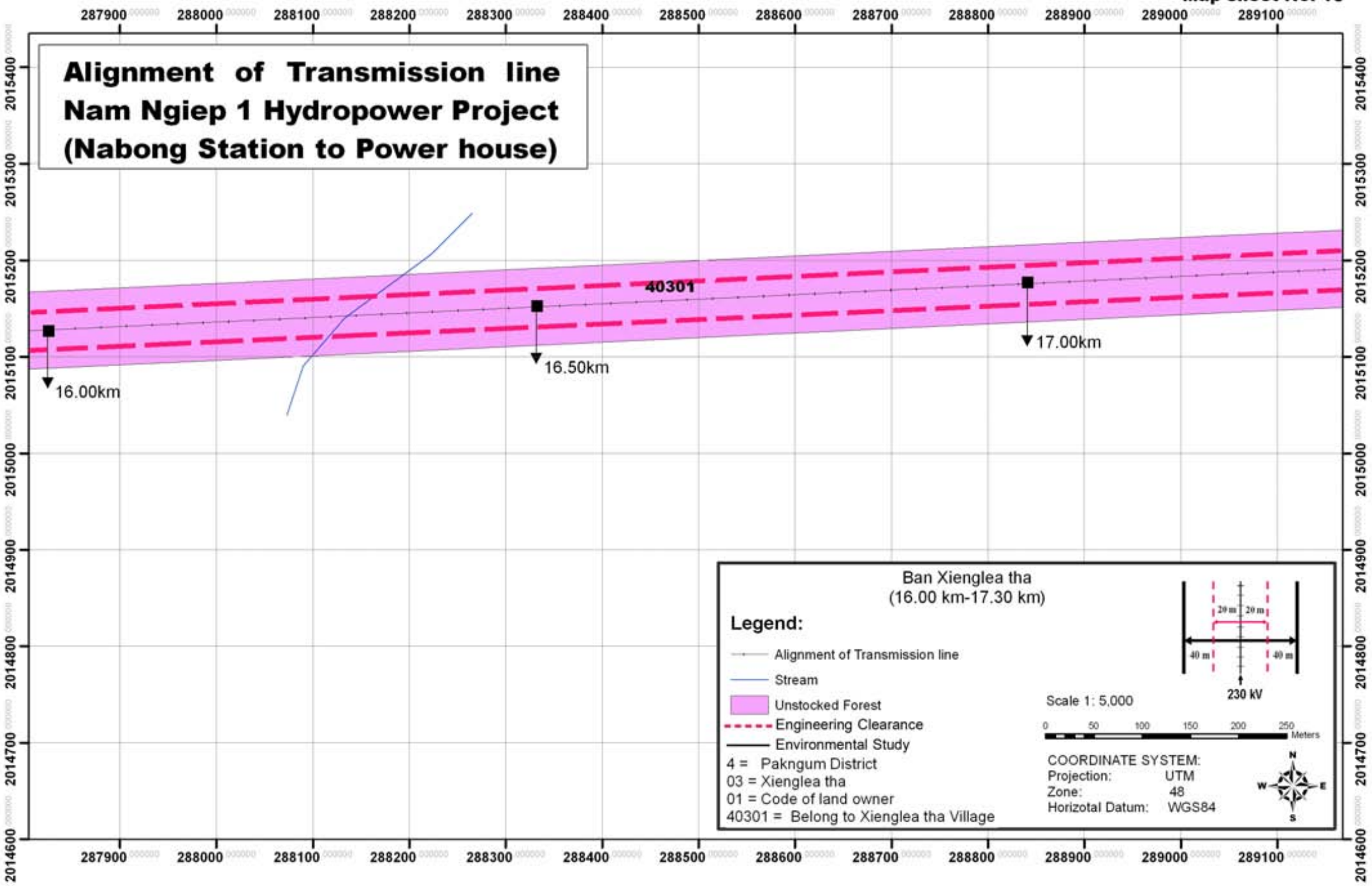
Map sheet No: 14

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 15

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Ban Xienglea tha
(16.00 km-17.30 km)

Legend:

- Alignment of Transmission line
- Stream
- Unstocked Forest
- Engineering Clearance
- Environmental Study

4 = Pakngum District
03 = Xienglea tha
01 = Code of land owner
40301 = Belong to Xienglea tha Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 16

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

289200 289300 289400 289500 289600 289700 289800 289900 290000 290100 290200 290300 290400 290500

2015400 2015300 2015200 2015100 2015000 2014900 2014800 2014700 2014600

40301

40209

17.50km

18.00km

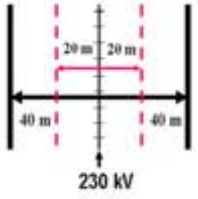
18.50km

Ban Xienglea tha - Ban Xienglea na
(17.30 km-18.60 km)

Legend:

- Alignment of Transmission line
- Unstock Forest
- Engineering Clearance
- Environmental Study

4 = Pakngum District
03 = Xienglea tha
01 = Code of land owner
40301 = Belong to Xienglea tha Village
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village

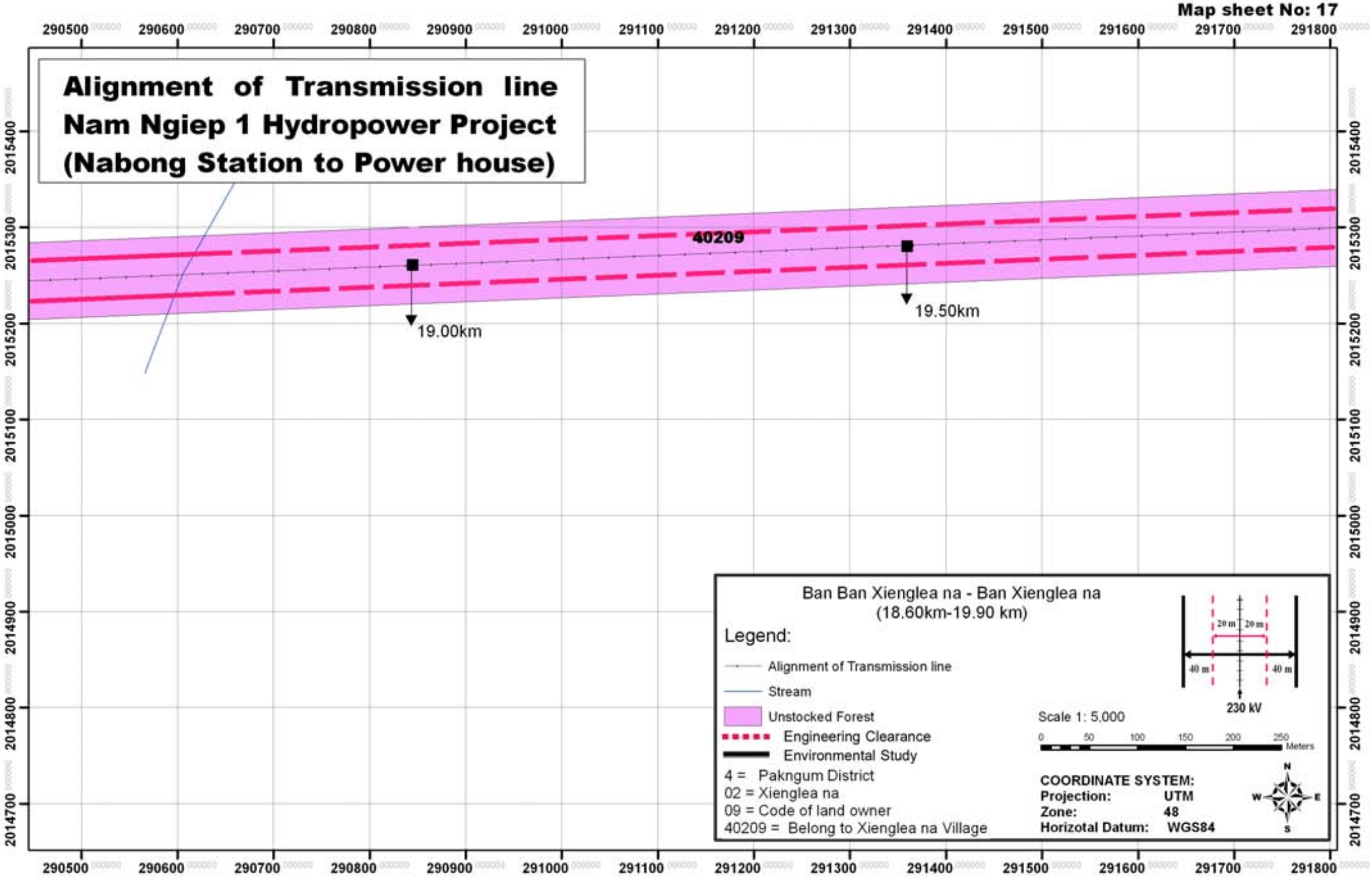


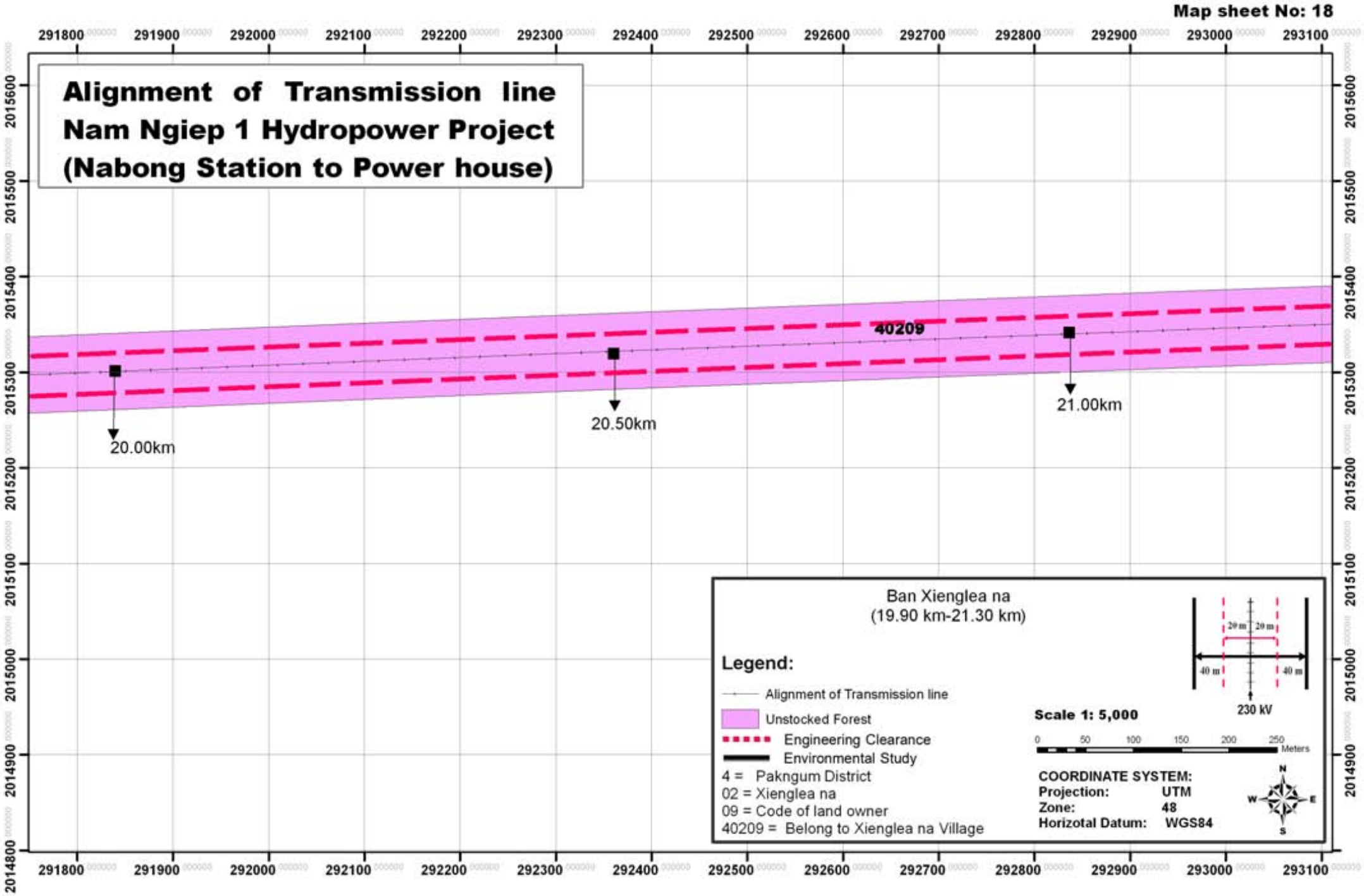
Scale 1: 5,000

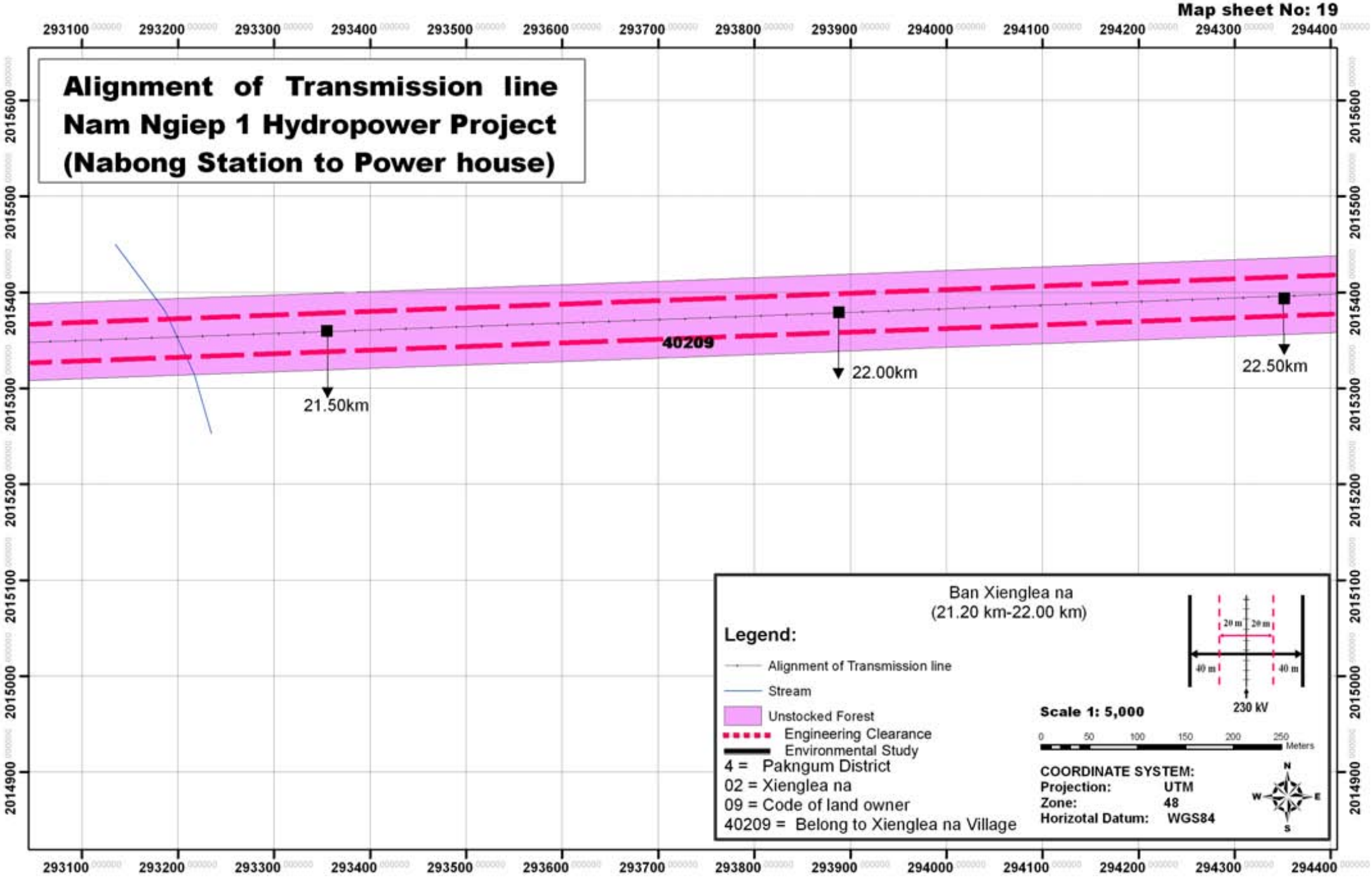
0 50 100 150 200 250 Meters

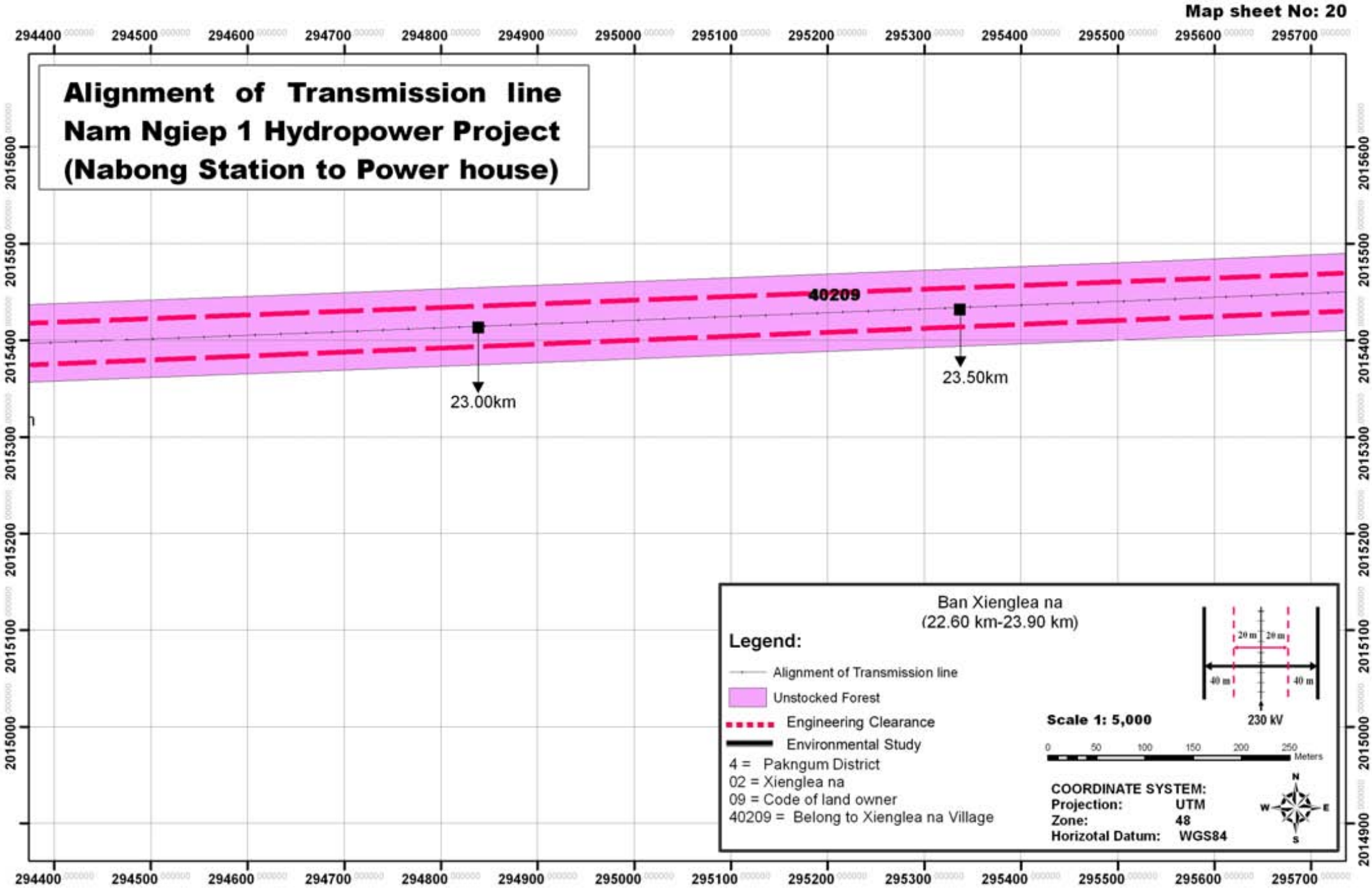
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

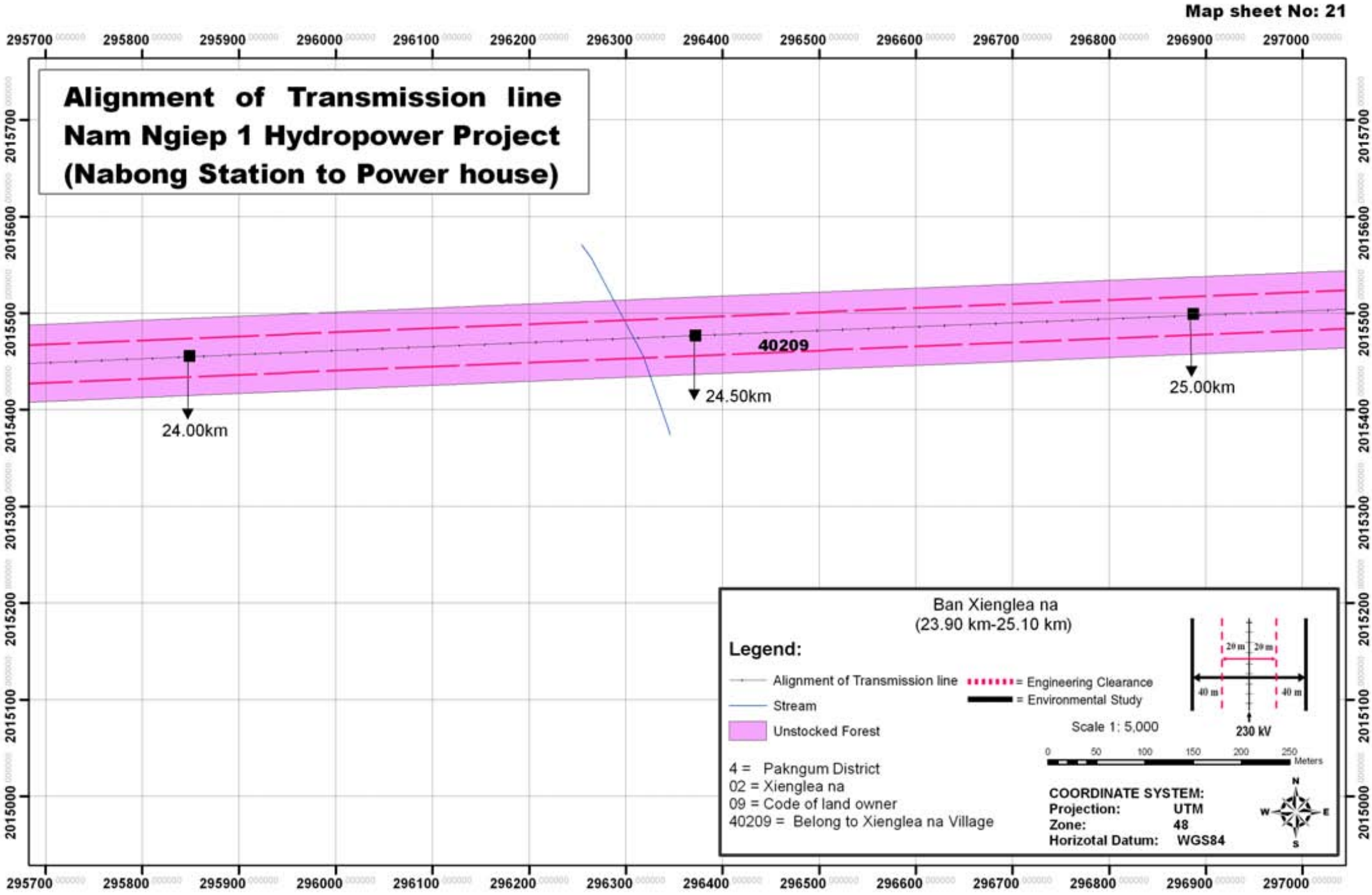
N W E S


Map sheet No: 17
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
290500
290600
290700
290800
290900
291000
291100
291200
291300
291400
291500
291600
291700
291800
2015400
2015300
2015200
2015100
2015000
2014900
2014800
2014700
40209
19.00km
19.50km
Ban Ban Xienglea na - Ban Xienglea na
(18.60km-19.90 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 18
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
291800
291900
292000
292100
292200
292300
292400
292500
292600
292700
292800
292900
293000
293100
2015600
2015500
2015400
2015300
2015200
2015100
2015000
2014900
2014800
40209
20.00km
20.50km
21.00km
Ban Xienglea na
(19.90 km-21.30 km)
Legend:
Alignment of Transmission line
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 19
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
293100
293200
293300
293400
293500
293600
293700
293800
293900
294000
294100
294200
294300
294400
2015600
2015500
2015400
2015300
2015200
2015100
2015000
2014900
40209
21.50km
22.00km
22.50km
Ban Xienglea na
(21.20 km-22.00 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 20
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
294400
294500
294600
294700
294800
294900
295000
295100
295200
295300
295400
295500
295600
295700
2015600
2015500
2015400
2015300
2015200
2015100
2015000
2014900
40209
23.00km
23.50km
Ban Xienglea na
(22.60 km-23.90 km)
Legend:
Alignment of Transmission line
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 21
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
295700
295800
295900
296000
296100
296200
296300
296400
296500
296600
296700
296800
296900
297000
2015700
2015600
2015500
2015400
2015300
2015200
2015100
2015000
40209
24.00km
24.50km
25.00km
Ban Xienglea na
(23.90 km-25.10 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
= Engineering Clearance
= Environmental Study
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
4 = Pakngum District
02 = Xienglea na
09 = Code of land owner
40209 = Belong to Xienglea na Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 22

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

297000 297100 297200 297300 297400 297500 297600 297700 297800 297900 298000 298100 298200 298300

2015900 2015800 2015700 2015600 2015500 2015400 2015300 2015200

40207

40208

40209

25.50km

26.00km

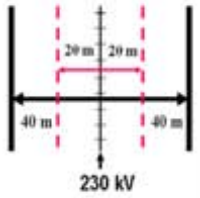
26.50km

Ban Xienglea na
(25.20 km - 26.50 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Unstocked Forest
- Environmental Study
- Ray
- Paddy Field

4 = Pakngum District
02 = Xienglea na
07 - 09 = Code of land owner
40207 = Belong to Army Zone
40208 = Belong to Mrs Sipha
40209 = Belong to Xienglea na Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 23

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

27.50km

27.00km

26.50km

40201

40202

40203

40204

40205

40206

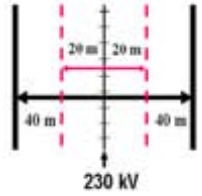
40207

Ban Xienglea na
(26.50 km - 27.50 km)

Legend:

- Alignment of Transmission line
- Stream
- Unstocked Forest
- Ray
- Paddy Field
- Buit Up
- Engineering Clearance
- Environmental Study

4 = Pakngum District
02 = Xienglea na
01 = Code of land owner
40201 = Belong to Xienglea na Village
40202 = Belong to Army Home
40203 = Belong to Army Home
40204 = Belong to Mr Thanut A
40205 = Belong to Mr Thanut A
40206 = Belong to Mr Thanut B
40207 = Belong to Army Zone



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

298100 298200 298300 298400 298500 298600 298700 298800 298900 299000 299100 299200 299300 299400

2016600 2016500 2016400 2016300 2016200 2016100 2016000 2015900

Map sheet No: 24

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

298700 298800 298900 299000 299100 299200 299300 299400 299500 299600 299700 299800 299900 300000

2017300 2017200 2017100 2017000 2016900 2016800 2016700 2016600

28.50km

28.00km

27.50km

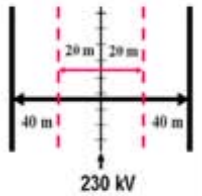
40101

40201

Ban Xienglea na - Ban Vuenkabao
(27.40 km - 28.50 km)

Legend:

- Alignment of Transmission line
- Unstocked Forest
- Engineering Clearance
- Environmental Study



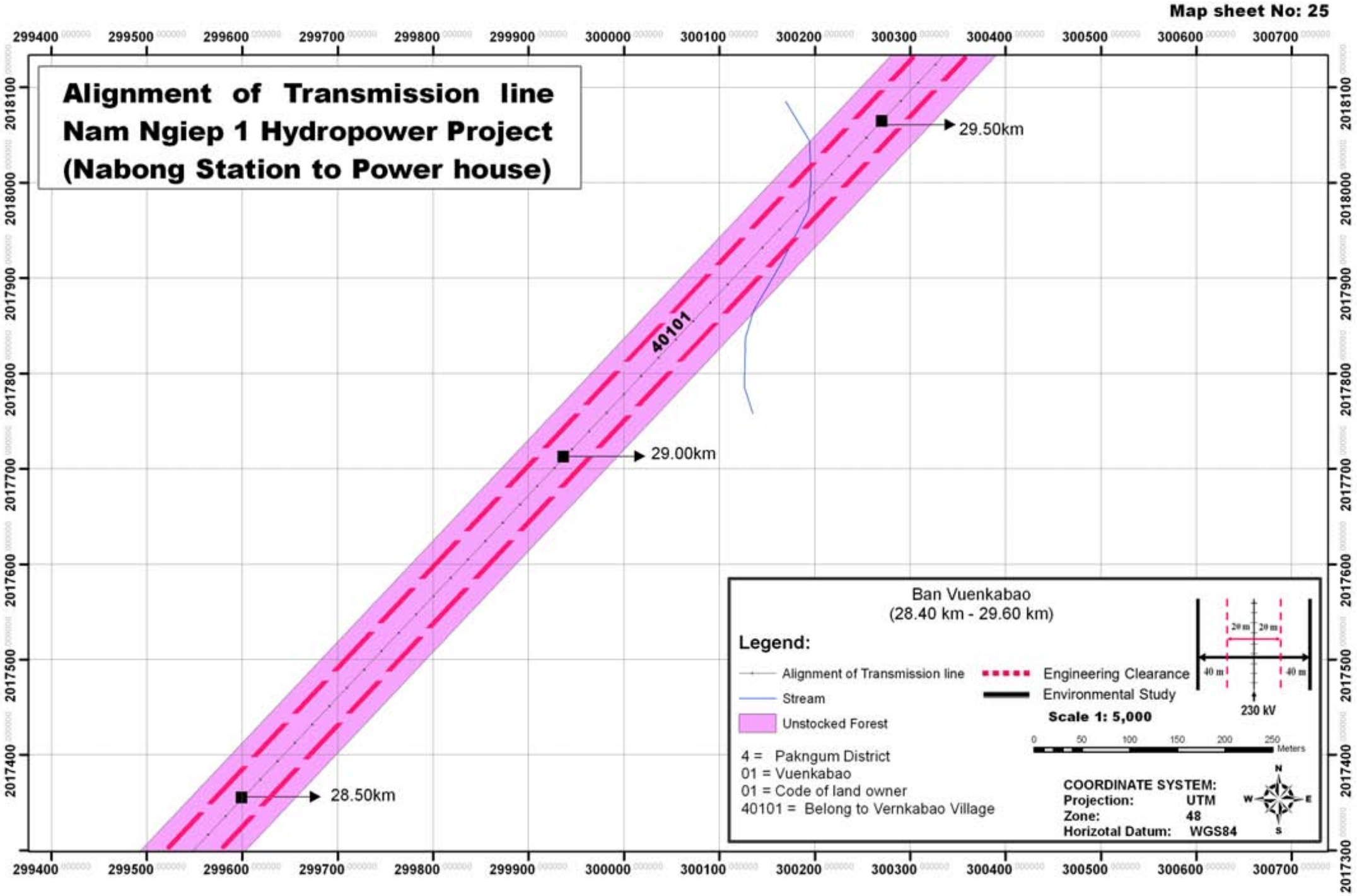
4 = Pakngum District
02 = Xienglea na
01 = Code of land owner
40201 = Belong to Xienglea na Village
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vuenkabao Village

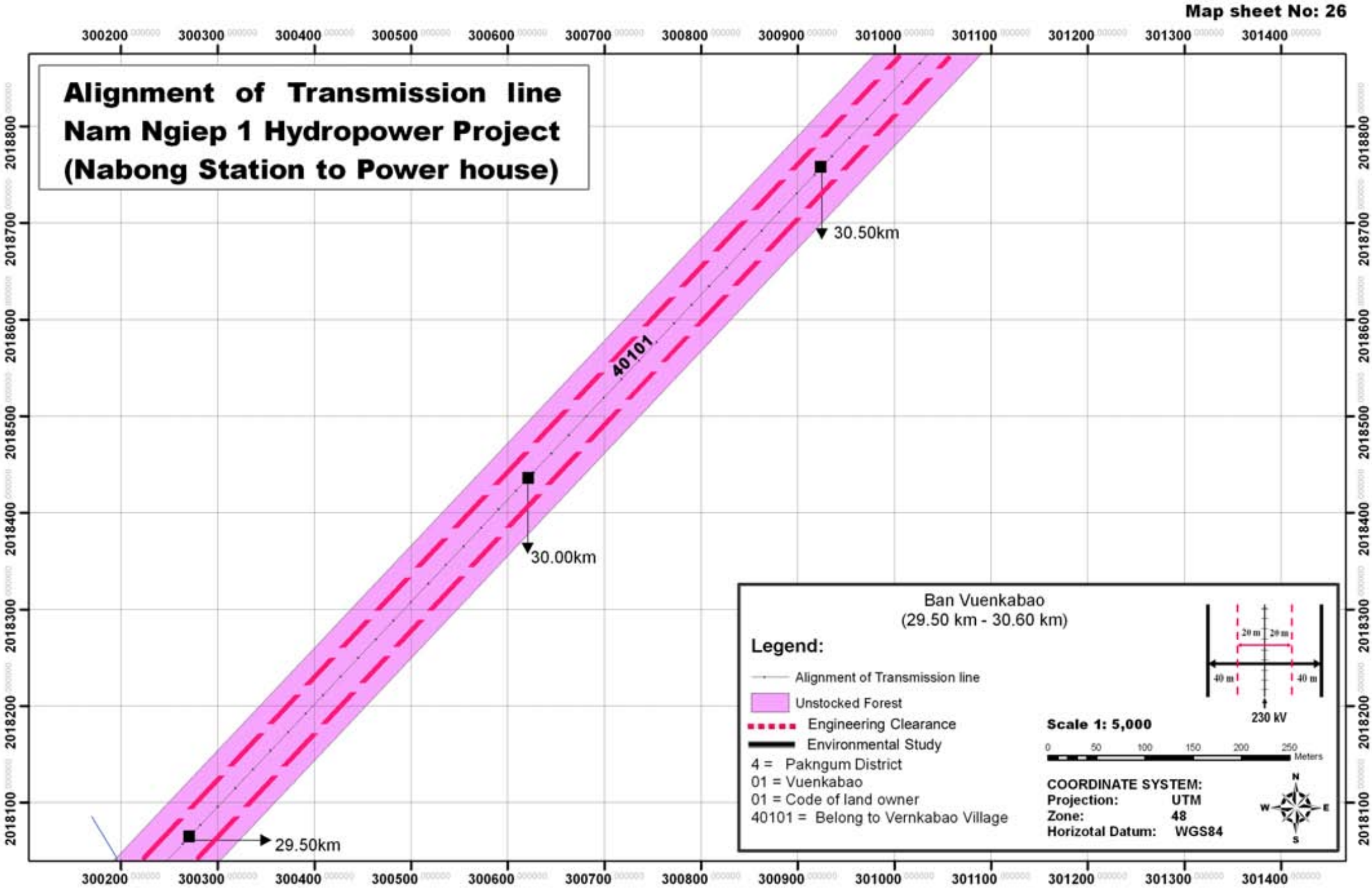
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

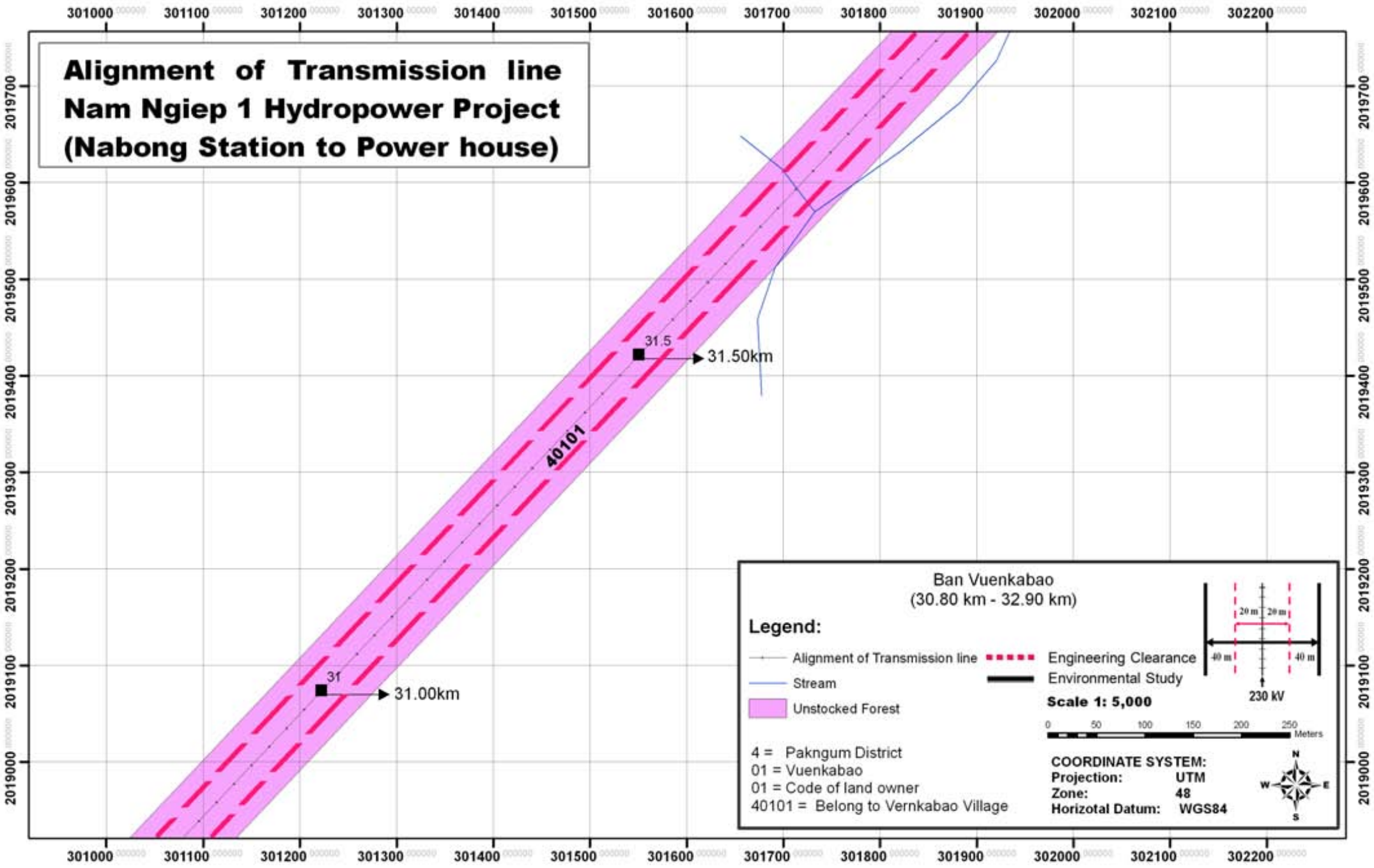
N W E S

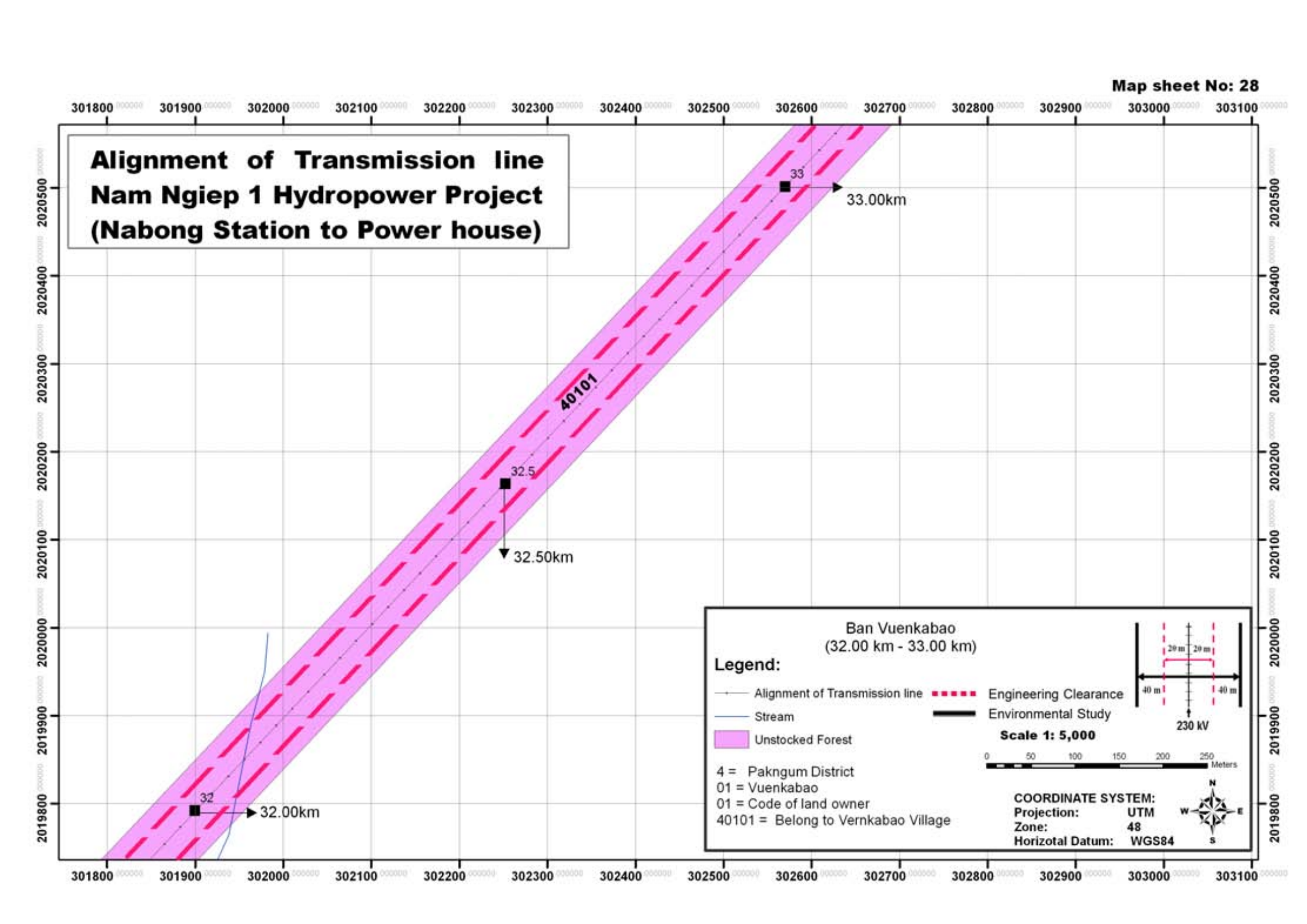

Map sheet No: 25
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
299400 299500 299600 299700 299800 299900 300000 300100 300200 300300 300400 300500 300600 300700
2018100 2018000 2017900 2017800 2017700 2017600 2017500 2017400 2017300
29.50km
29.00km
28.50km
40101
Ban Vuenkabao
(28.40 km - 29.60 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
Engineering Clearance
Environmental Study
Scale 1: 5,000
0 50 100 150 200 250 Meters
20 m 20 m
40 m 40 m
230 kV
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N W E S

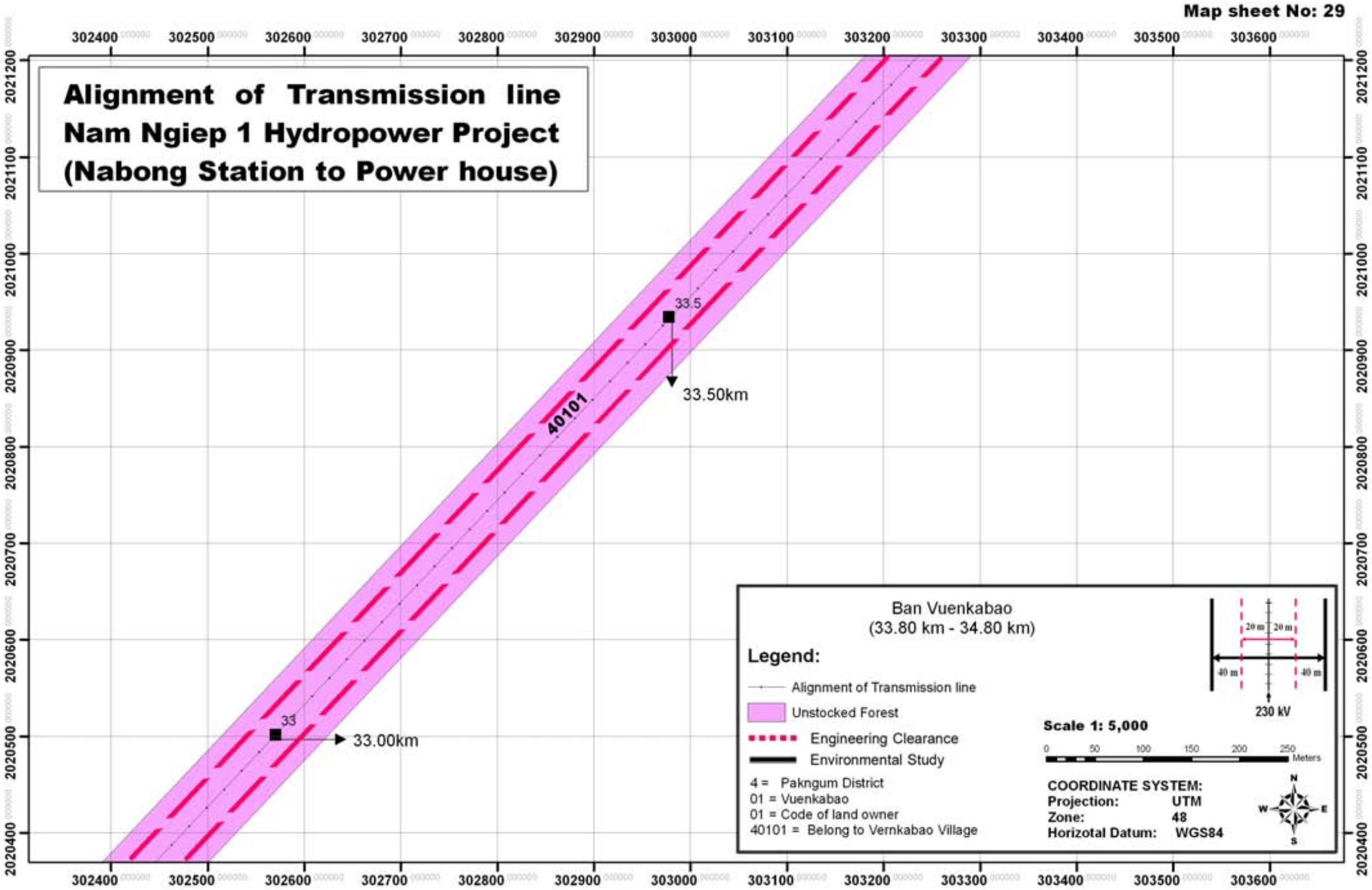

Map sheet No: 26
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
300200
300300
300400
300500
300600
300700
300800
300900
301000
301100
301200
301300
301400
2018800
2018700
2018600
2018500
2018400
2018300
2018200
2018100
40101
30.50km
30.00km
29.50km
Ban Vuenkabao
(29.50 km - 30.60 km)
Legend:
Alignment of Transmission line
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 27

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)




Map sheet No: 28
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
301800 301900 302000 302100 302200 302300 302400 302500 302600 302700 302800 302900 303000 303100
2020500 2020400 2020300 2020200 2020100 2020000 2019900 2019800
33
33.00km
32.5
32.50km
32
32.00km
40101
Ban Vuenkabao
(32.00 km - 33.00 km)
Legend:
Alignment of Transmission line
Stream
Unstocked Forest
Engineering Clearance
Environmental Study
Scale 1: 5,000
0 50 100 150 200 250 Meters
20 m 20 m
40 m 40 m
230 kV
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N W E S


Map sheet No: 29
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
302400
302500
302600
302700
302800
302900
303000
303100
303200
303300
303400
303500
303600
2021200
2021100
2021000
2020900
2020800
2020700
2020600
2020500
2020400
33.5
33.50km
40101
33
33.00km
Ban Vuenkabao
(33.80 km - 34.80 km)
Legend:
Alignment of Transmission line
Unstocked Forest
Engineering Clearance
Environmental Study
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 30

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

303300 303400 303500 303600 303700 303800 303900 304000 304100 304200 304300 304400 304500

2022100 2022000 2021900 2021800 2021700 2021600 2021500 2021400 2021300

34.50km

34.00km

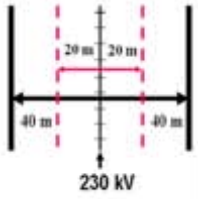
40101

Ban Vuenkabao
(33.80 km - 34.70 km)

Legend:

- Alignment of Transmission line
- Stream
- Unstocked Forest
- Engineering Clearance
- Environmental Study

Scale 1: 5,000



0 50 100 150 200 250 Meters

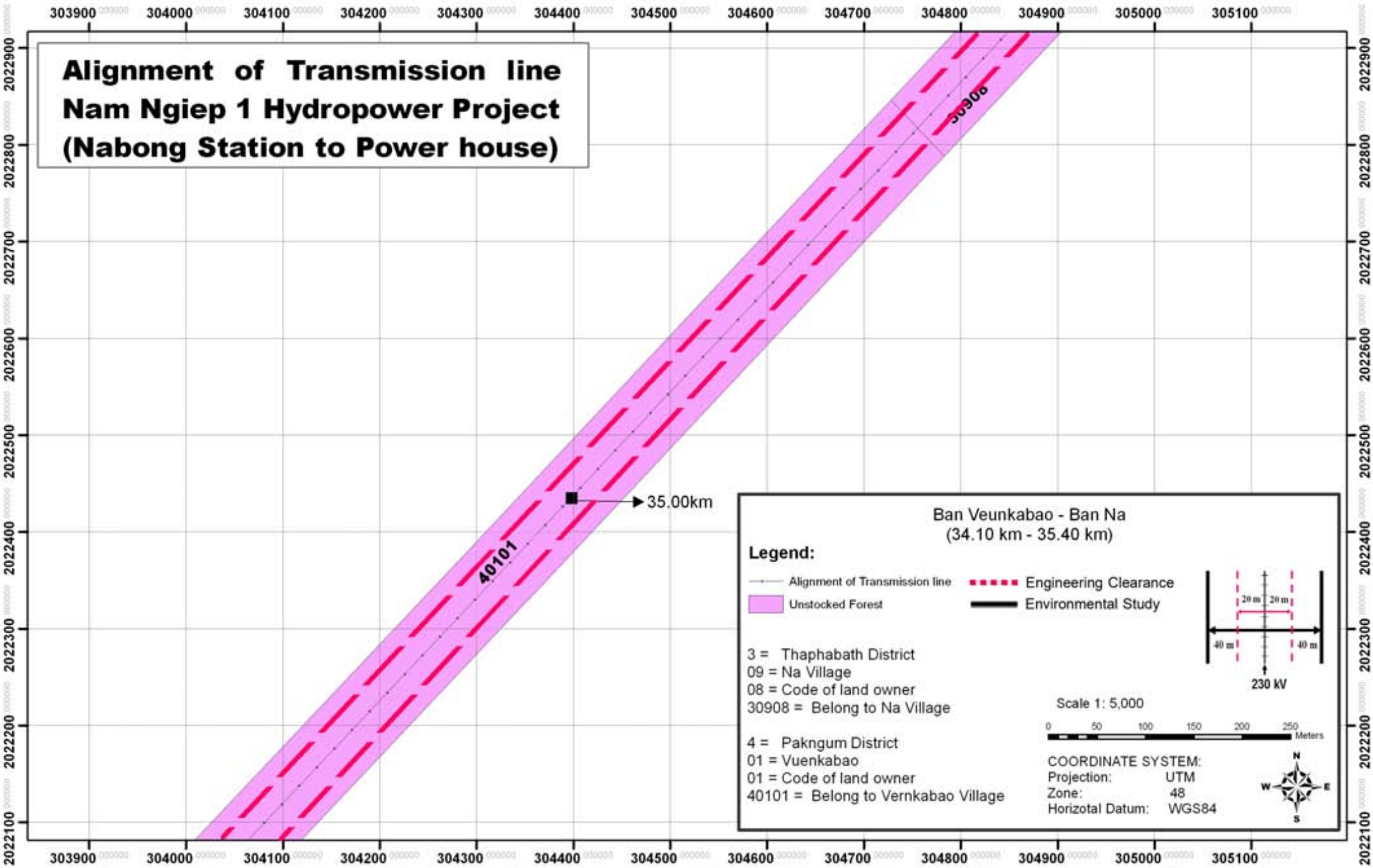
4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 31

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Ban Veunkabao - Ban Na
(34.10 km - 35.40 km)

Legend:

- Alignment of Transmission line
- Unstocked Forest
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
09 = Na Village
08 = Code of land owner
30908 = Belong to Na Village

4 = Pakngum District
01 = Vuenkabao
01 = Code of land owner
40101 = Belong to Vernkabao Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 32

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30903
30904
30905
30906
30907
30908

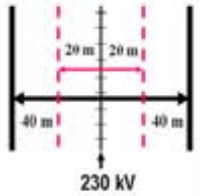
36.00km

35.50km

Legend:

Ban Na
(35.45 km - 36.30 km)

- Alignment of Transmission line
- Stream
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



3 = Thaphabath District
09 = Na
03 - 08 = Code of land owner
30903 = Belong to Na Village
30904 = Belong to Mr Somphon
30905 = Belong to Mr Khammao
30906 = Belong to Mr Lai
30907 = Belong to Mr Khamphanh
30908 = Belong to Na Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

304700 304800 304900 305000 305100 305200 305300 305400 305500 305600 305700 305800 305900 306000

2023700 2023600 2023500 2023400 2023300 2023200 2023100 2023000 2022900

Map sheet No: 33

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

37.00km

37.50km

36.50km

30901

30902

30903

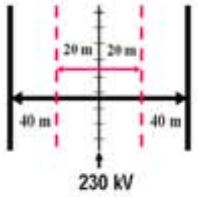
37

36.5

Ban Na
(36.30 km - 37.15 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

3 = Thaphabath District
09 = Na
01 - 03 = Code of land owner
30901 = Belong to Na Village
30902 = Belong to Mr Somphone Hung
30903 = Belong to Na Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

305500 305600 305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700

2024500 2024400 2024300 2024200 2024100 2024000 2023900 2023800 2023700

Map sheet No: 34

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30816

37.5

37.50km

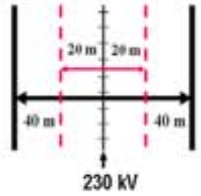
30901

Ban Na - Ban Somsaat
(37.15 km - 37.90 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
09 = Na
01 = Code of land owner
30901 = Belong to Na Village
3 = Thaphabath District
08 = Somsaat Village
16 = Code of land owner
30816 = Belong to Somsaat Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700 306800 306900 307000

2025300 2025200 2025100 2025000 2024900 2024800 2024700 2024600 2024500

Map sheet No: 35

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30809
30810
30811
30812
30813
30814
30815
30816
30817

38.50km

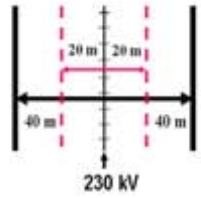
38.00km

Ban Somsaat
(37.95 km - 38.70 km)

Legend:

- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
08 = Somsaat Village
09 - 16 = Code of land owner
30809 = Belong to Khean
30810 = Belong to Somsaat Village
30811 = Belong to Mr Lieng
30812 = Belong to Somsaat Village
30813 = Belong to Mr Mai
30814 = Belong to Somsaat Village
30815 = Belong to Mr onta
30816 = Belong to Somsaat Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

305600 305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700 306800 306900

2026100 2026000 2025900 2025800 2025700 2025600 2025500 2025400 2025300

Map sheet No: 36

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

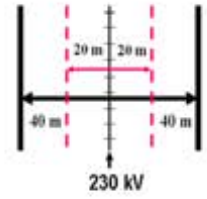
30802
30803
39.50km
30804
30805
30806
39.00km
30807
30808
30809
30810

Ban Somsaath
(38.75 km - 39.60 km)

Legend:

- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
08 = Somsaat Village
02 - 10 = Code of land owner
30802 = Belong to Somsaat Village
30803 = Belong to Mrs La
30804 = Belong to Somsaat Village
30805 = Belong to Mr Chanh
30806 = Belong to Somsaat Village
30807 = Belong to Mr Somphone
30808 = Belong to Somsaat Village
30809 = Belong to Khean
30810 = Belong to Somsaat Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700 306800 306900

2026900 2026800 2026700 2026600 2026500 2026400 2026300 2026200 2026100

Map sheet No: 37

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30801

30802

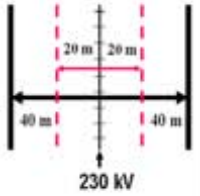
30803

40.00km

Ban Somsaath
(39.60 km - 40.35 km)

Legend:

- Alignment of Transmission line
- Stream
- Mixed deciduous
- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

3 = Thaphabath District
08 = Somsaat Village
01 - 03 = Code of land owner
30801 = Belong to Somsaat Village
30802 = Belong to Somsaat Village
30803 = Belong to Mrs La

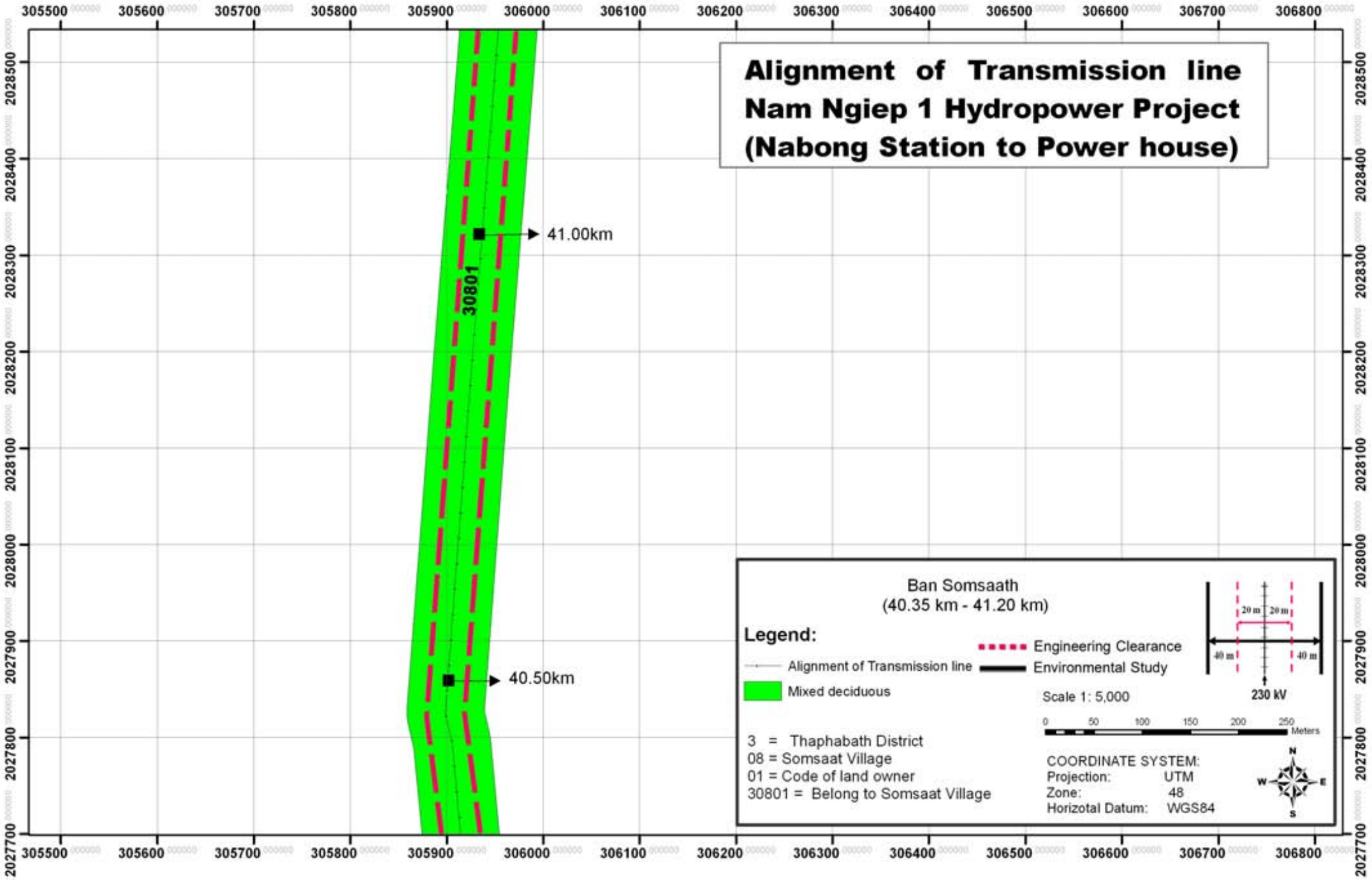
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

305500 305600 305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700 306800

2027700 2027600 2027500 2027400 2027300 2027200 2027100 2027000 2026900

Map sheet No: 38

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Ban Somsaath
(40.35 km - 41.20 km)

Legend:

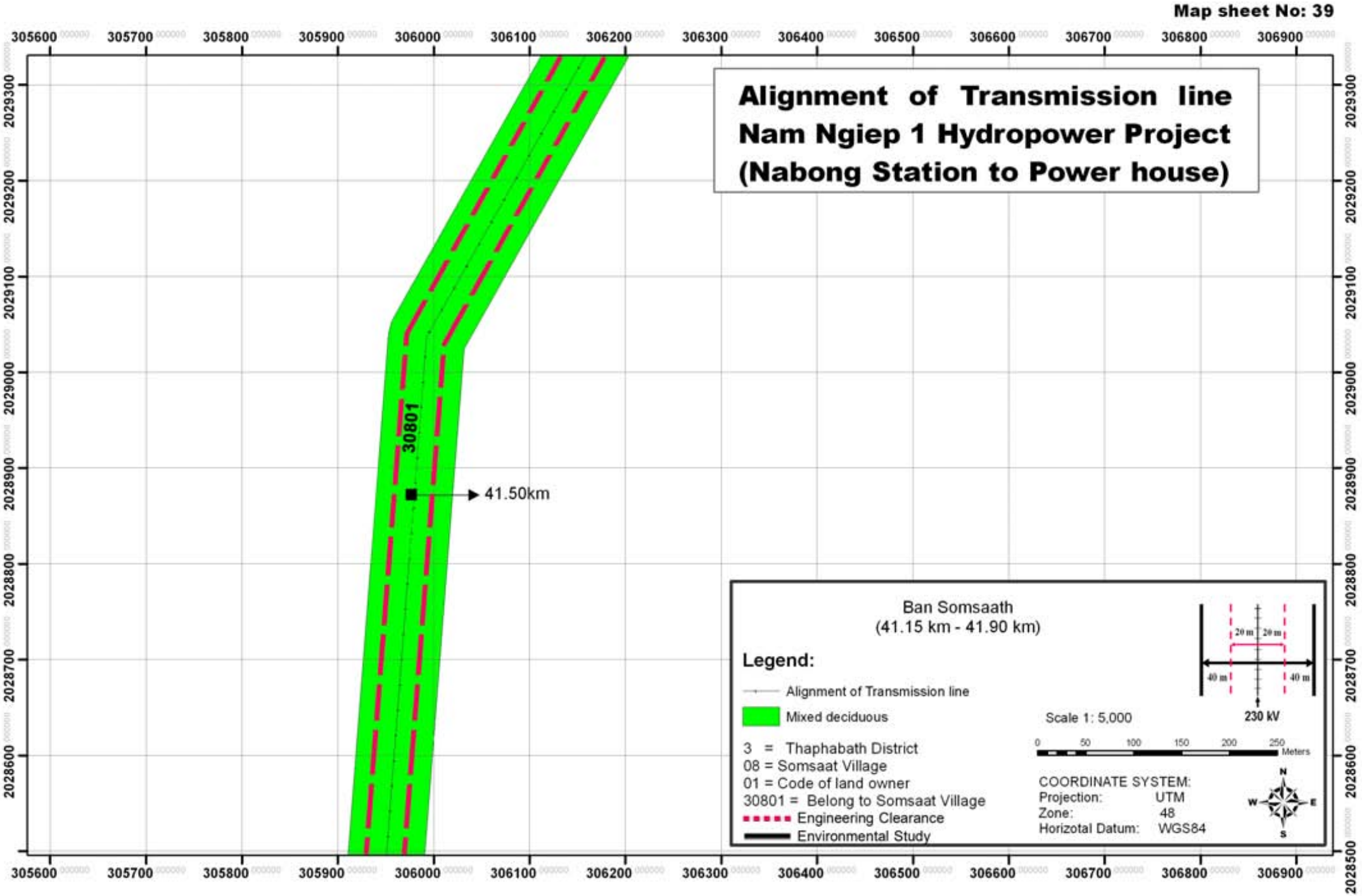
- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

Scale 1: 5,000

0 50 100 150 200 250 Meters

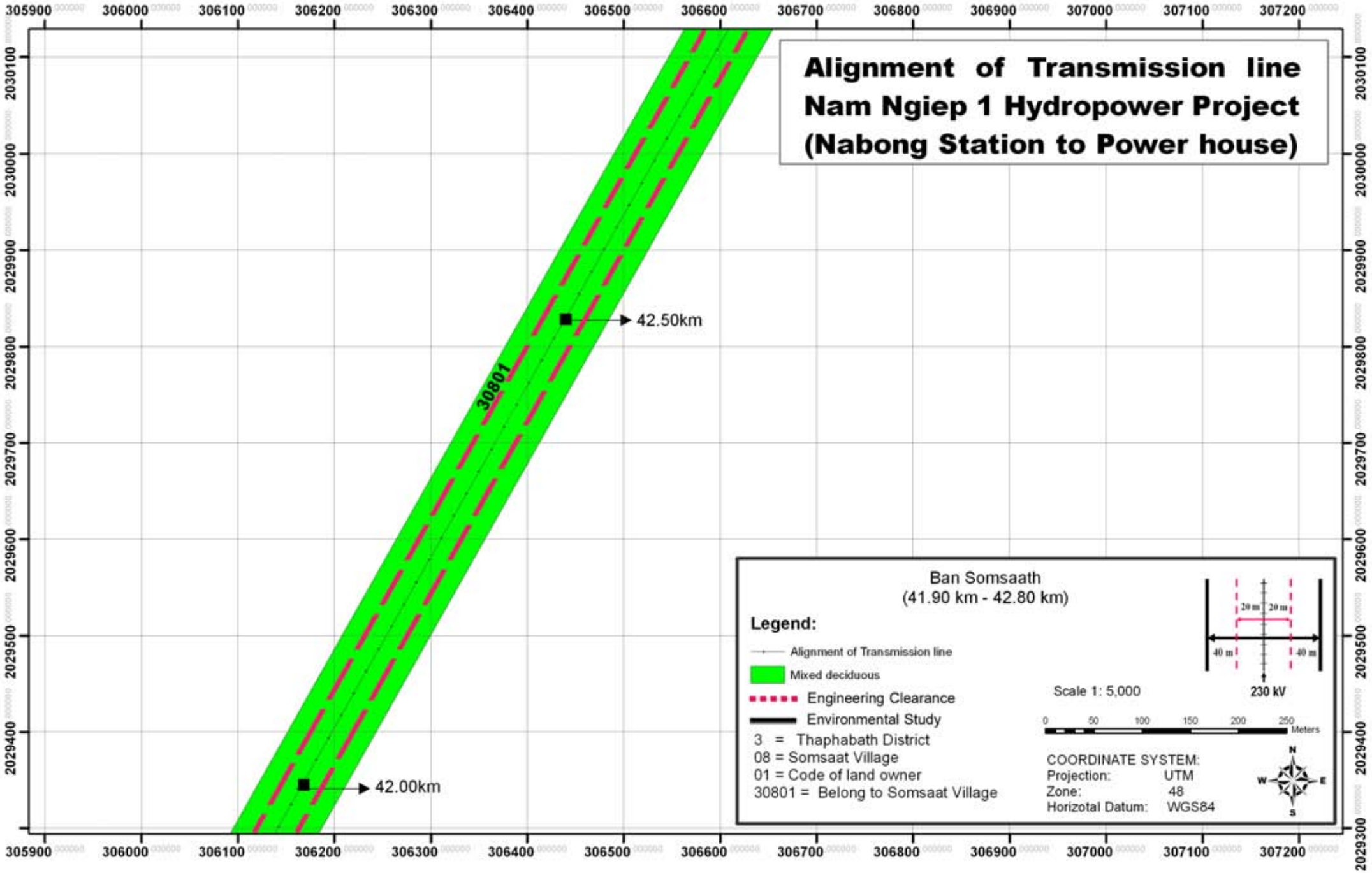
3 = Thaphabath District
08 = Somsaat Village
01 = Code of land owner
30801 = Belong to Somsaat Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84


Map sheet No: 39
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
305600 305700 305800 305900 306000 306100 306200 306300 306400 306500 306600 306700 306800 306900
2029300 2029200 2029100 2029000 2028900 2028800 2028700 2028600 2028500
30801
41.50km
Ban Somsaath
(41.15 km - 41.90 km)
Legend:
Alignment of Transmission line
Mixed deciduous
3 = Thaphabath District
08 = Somsaat Village
01 = Code of land owner
30801 = Belong to Somsaat Village
Engineering Clearance
Environmental Study
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0 50 100 150 200 250 Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 40

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 41

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30711
30712
30713
30714
30801

43.50km

43.00km

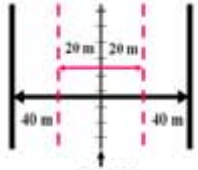
Ban Somsaath - Ban Palai
(42.80 km - 43.70 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Environmental Study
- Mixed deciduous
- Unstocked Forest
- Paddy Field

3 = Thaphabath District
08 = Somsaat Village
01 = Code of land owner
30801 = Belong to Somsaat Village

3 = Thaphabath District
07 = Palai Village
11- 14 = Code of land owner
30711 = Belong to Palai Village
30712 = Belong to Mrs Pe
30713 = Belong to Ms Kong
30714 = Belong to Palai Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N
W
E
S

306500 306600 306700 306800 306900 307000 307100 307200 307300 307400 307500 307600 307700 307800

2030900 2030800 2030700 2030600 2030500 2030400 2030300 2030200 2030100

Map sheet No: 42

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

306800 306900 307000 307100 307200 307300 307400 307500 307600 307700 307800 307900 308000

2031700 2031600 2031500 2031400 2031300 2031200 2031100 2031000 2030900

30706 30707 30708 30709 30710 30711

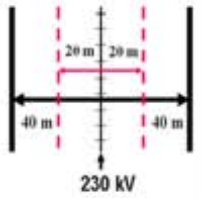
44.50km

44.00km

Legend:

Ban Palai
(43.70 km - 44.60 km)

- Alignment of Transmission line
- Road
- Mixed deciduous
- Plantation
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



3 = Thaphabath District
07 = Palai Village
06- 11 = Code of land owner
30706 = Belong to Palai Village
30707 = Belong to Mr Tou Tue
30708 = Belong to Mr Vath
30709 = Belong to Palai Village
30710 = Belong to Khanthong
30711 = Belong to Palai Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 43

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

45.50km

45.00km

30706

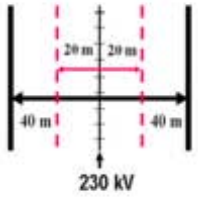
30715

30707

Ban Palai
(44.70 km - 45.60 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Environmental Study
- Mixed deciduous
- Paddy Field
- River (Nam Leuk)



3 = Thaphabath District
07 = Palai Village
06- 07 = Code of land owner
30706 = Belong to Palai Village
30707 = Belong to Mr Tou Tue
30715 = River (Nam Leuk)
Belong to Palai Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

307300 307400 307500 307600 307700 307800 307900 308000 308100 308200 308300 308400 308500 308600

2032500 2032400 2032300 2032200 2032100 2032000 2031900 2031800 2031700

Map sheet No: 44

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

307800 307900 308000 308100 308200 308300 308400 308500 308600 308700 308800 308900 309000 309100

2033300 2033200 2033100 2033000 2032900 2032800 2032700 2032600 2032500

46.5

46.50km

30705

30706

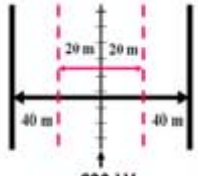
46

46.00km

Ban Palai
(45.60 km - 46.50 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Unstocked Forest
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

3 = Thaphabath District
07 = Palai Village
05- 06 = Code of land owner
30705 = Belong to Palai Village
30706 = Belong to Palai Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 45

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

30703

30704

30705

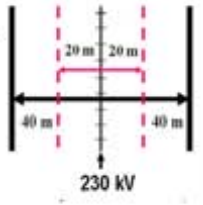
47.00km

46.50km

Ban Palai
(46.50 km - 47.40 km)

Legend:

- Alignment of Transmission line
- Road
- Plantation
- Unstocked Forest
- Engineering Clearance
- Environmental Study



3 = Thaphabath District
07 = Palai Village
05- 06 = Code of land owner
30703 = Belong to Palai Village
30704 = Belong to Tou Xiengkong
30705 = Belong to Palai Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

308200 308300 308400 308500 308600 308700 308800 308900 309000 309100 309200 309300 309400 309500

2034100 2034000 2033900 2033800 2033700 2033600 2033500 2033400

Map sheet No: 46

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

48.00km

47.50km

30609

30610

30611

30701

30702

30703

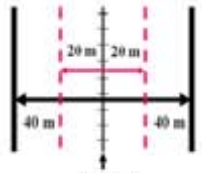
Legend:

Ban Palai - Ban Thabok
(47.40 km - 48.30 km)

- Alignment of Transmission line
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
06 = Thabok Village
09- 11 = Code of land owner
30609 = Belong to Mr Khambone
30610 = Belong to Mr Bounma
30611 = Belong to Mr Vanh

3 = Thaphabath District
07 = Palai Village
01- 03 = Code of land owner
30701 = Belong to Palai Village
30702 = Belong to Mr Van
30703 = Belong to Palai Village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

308800 308900 309000 309100 309200 309300 309400 309500 309600 309700 309800 309900 310000

2034900 2034800 2034700 2034600 2034500 2034400 2034300 2034200 2034100

Map sheet No: 47

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

49.00km

48.50km

30606

30607

30608

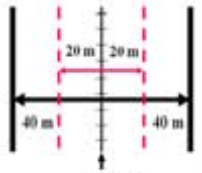
30609

Ban Thabok
(47.30 km - 49.10km)

Legend:

- Alignment of Transmission line
- Ray
- Paddy Field
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
06 = Thabok Village
06- 09 = Code of land owner
30606 = Belong to Mr Bounthanh
30607 = Belong to Mr Xom
30608 = Belong to Mr Hand
30609 = Belong to Mr Khambone



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

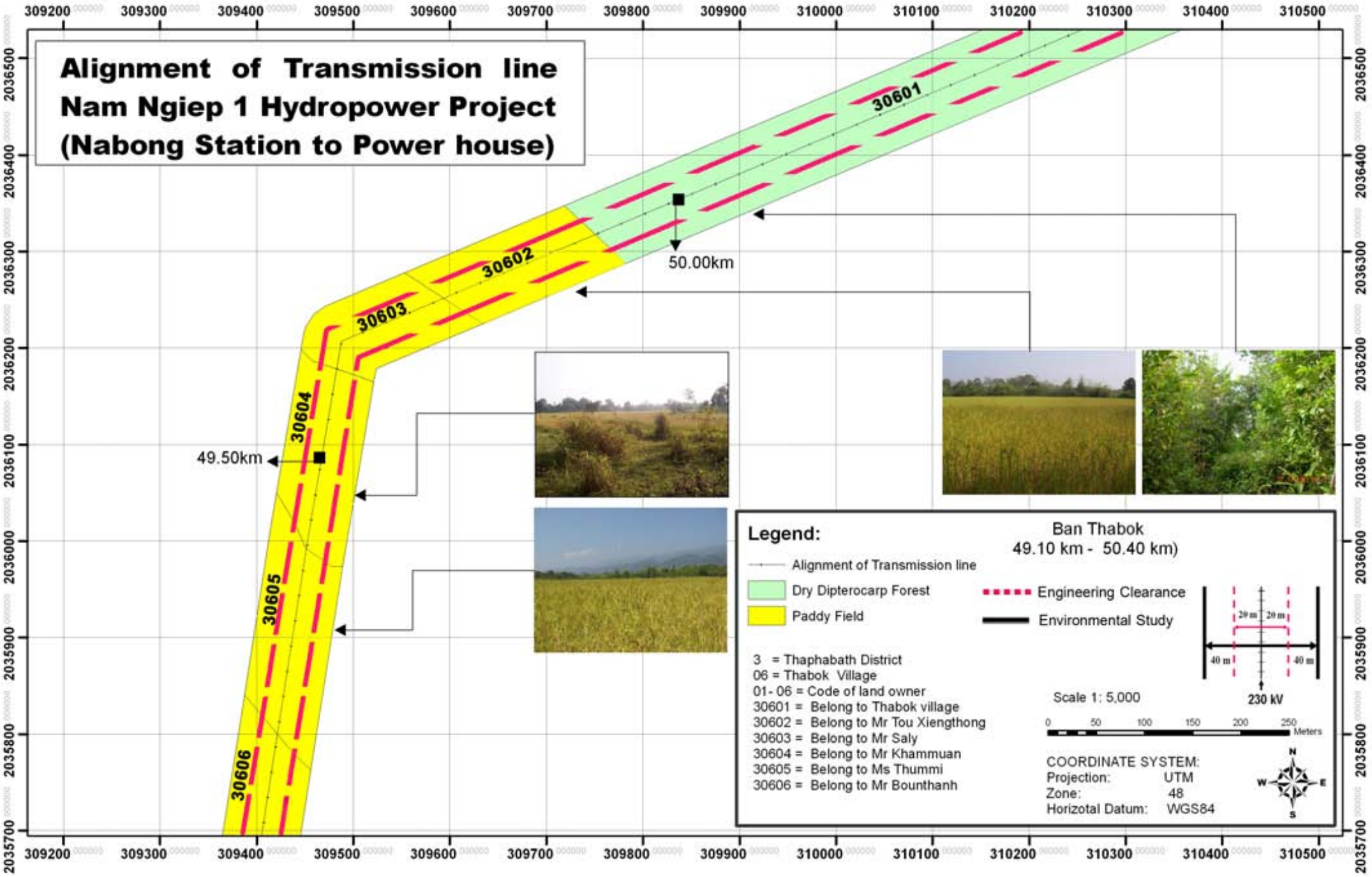
N
W
E
S

309000 309100 309200 309300 309400 309500 309600 309700 309800 309900 310000 310100 310200 310300

2035700 2035600 2035500 2035400 2035300 2035200 2035100 2035000 2034900

Map sheet No: 48

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Legend:

Ban Thabok
49.10 km - 50.40 km)

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
06 = Thabok Village
01- 06 = Code of land owner
30601 = Belong to Thabok village
30602 = Belong to Mr Tou Xiengthong
30603 = Belong to Mr Saly
30604 = Belong to Mr Khammuan
30605 = Belong to Ms Thummi
30606 = Belong to Mr Bounthanh

Scale 1: 5,000

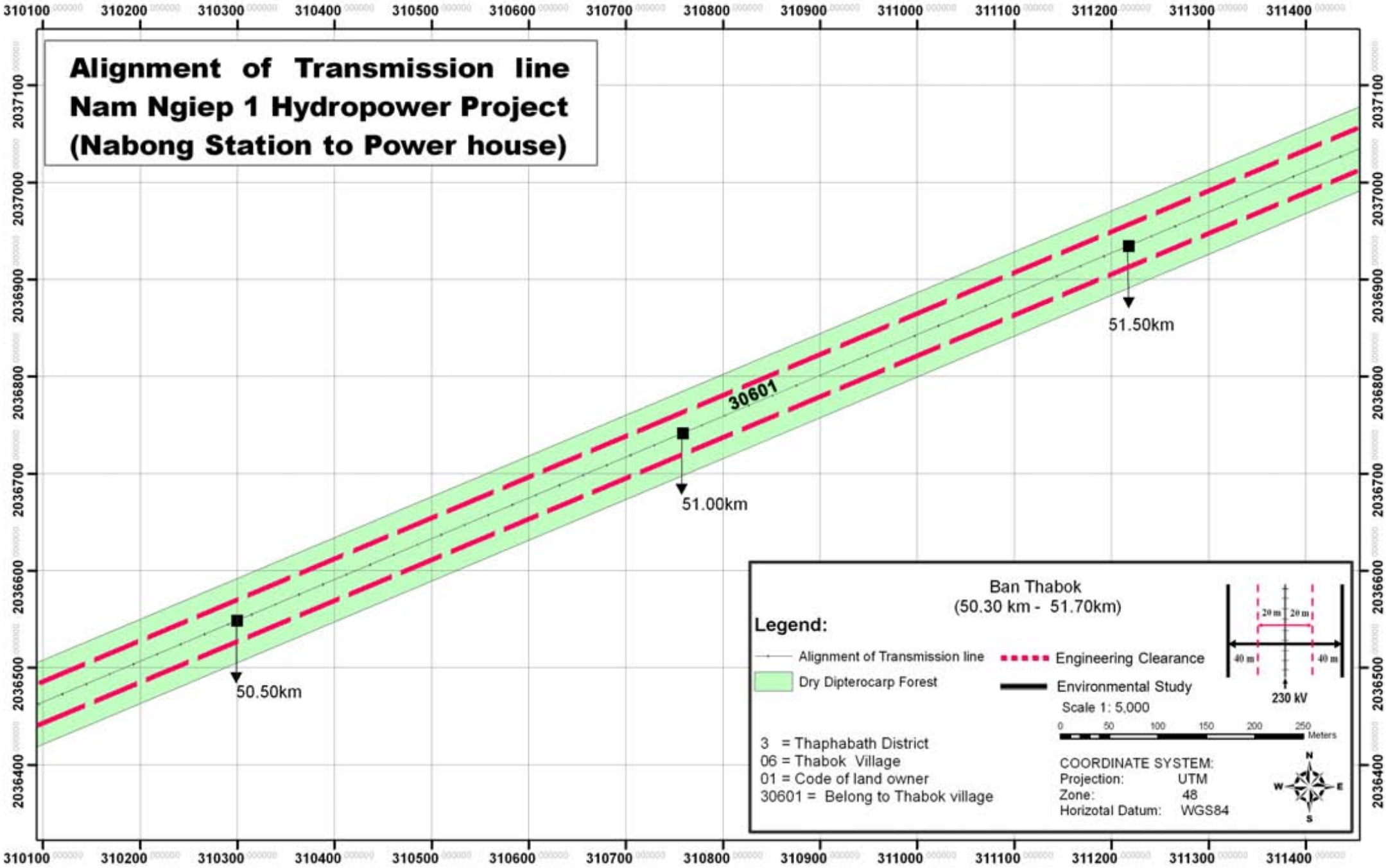
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N
W
E
S

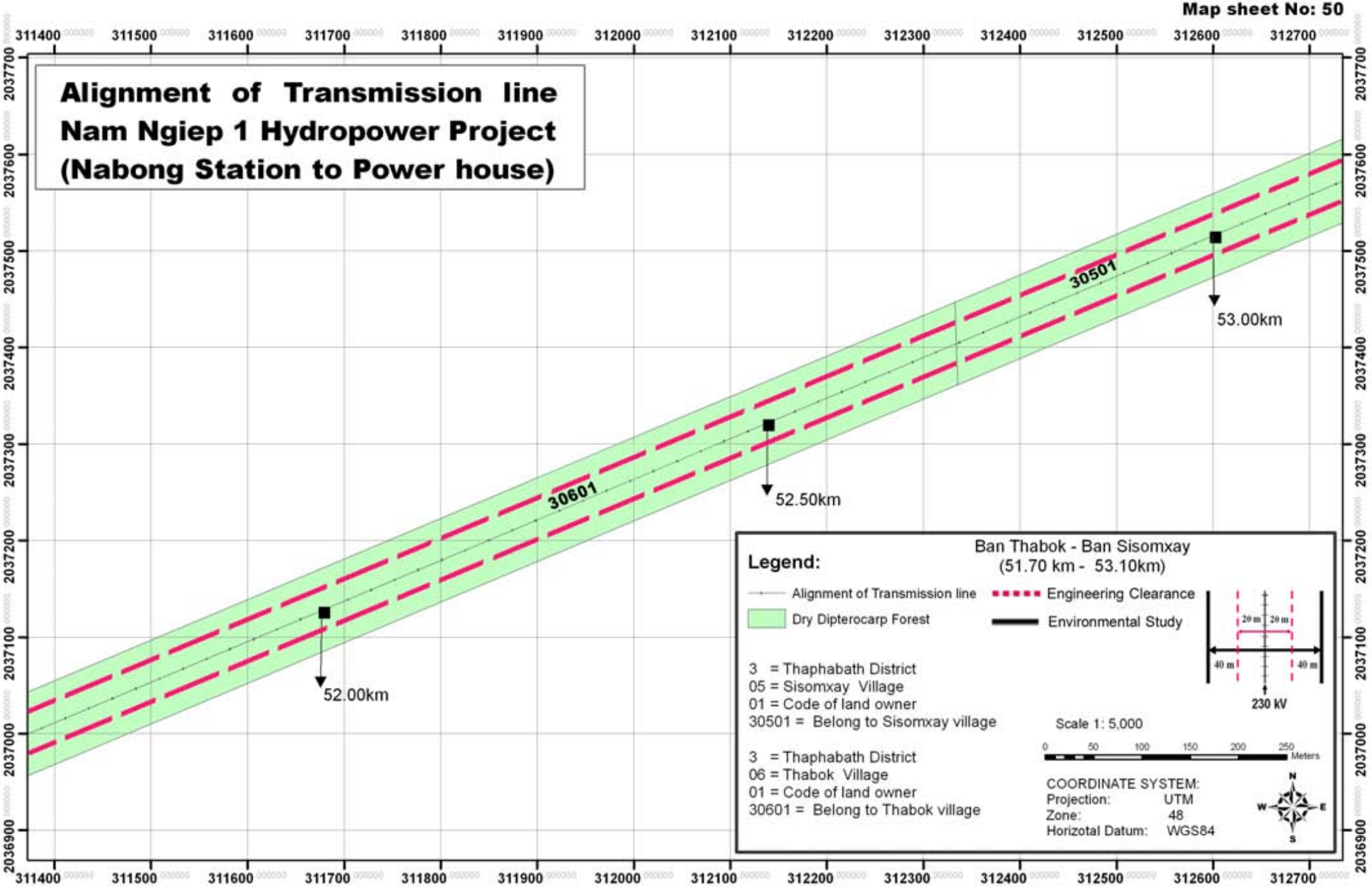
Map sheet No: 49

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 50

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Legend:

Ban Thabok - Ban Sisomxay
(51.70 km - 53.10km)

- Alignment of Transmission line
- Engineering Clearance
- Dry Dipterocarp Forest
- Environmental Study

3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village

3 = Thaphabath District
06 = Thabok Village
01 = Code of land owner
30601 = Belong to Thabok village

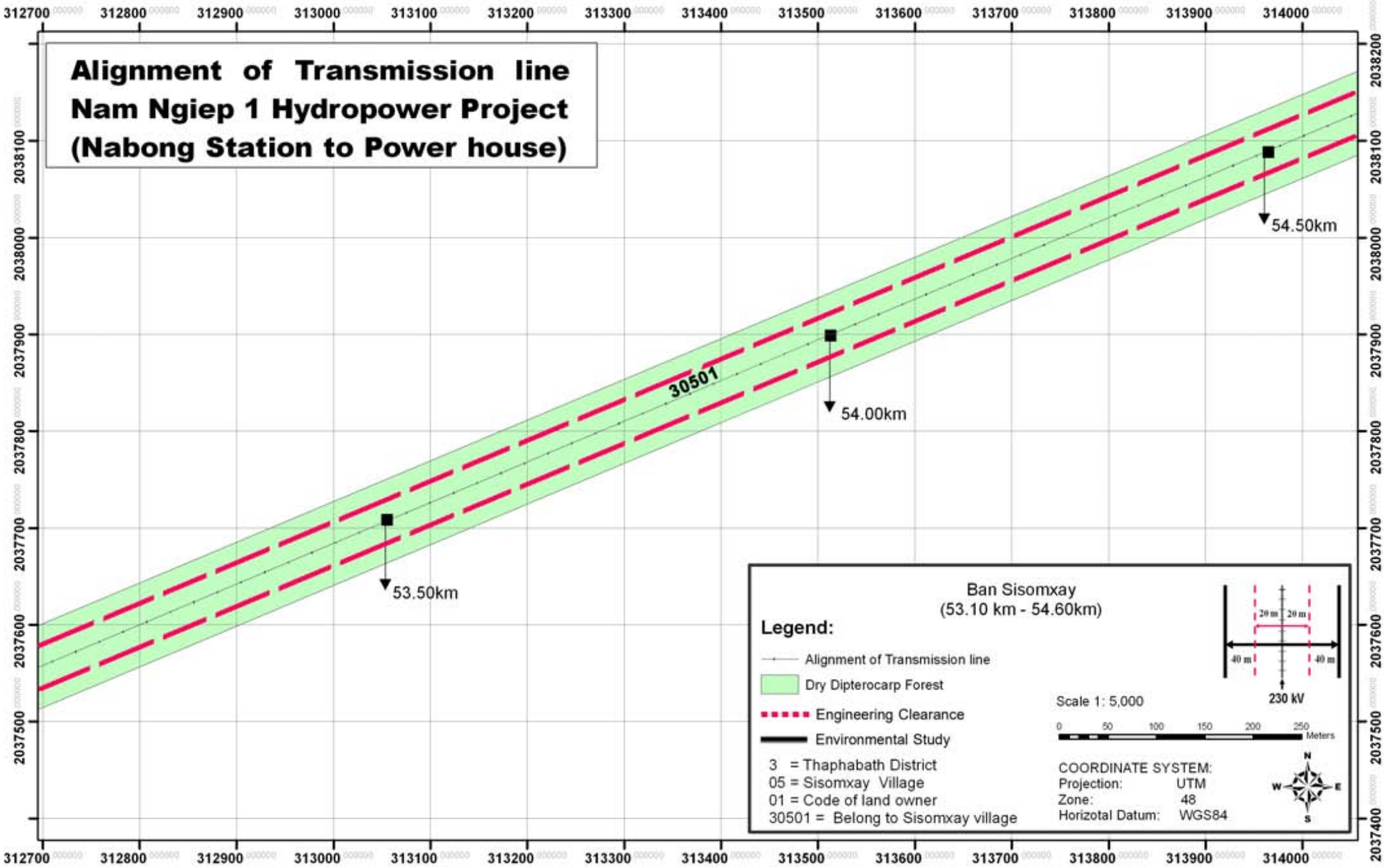
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

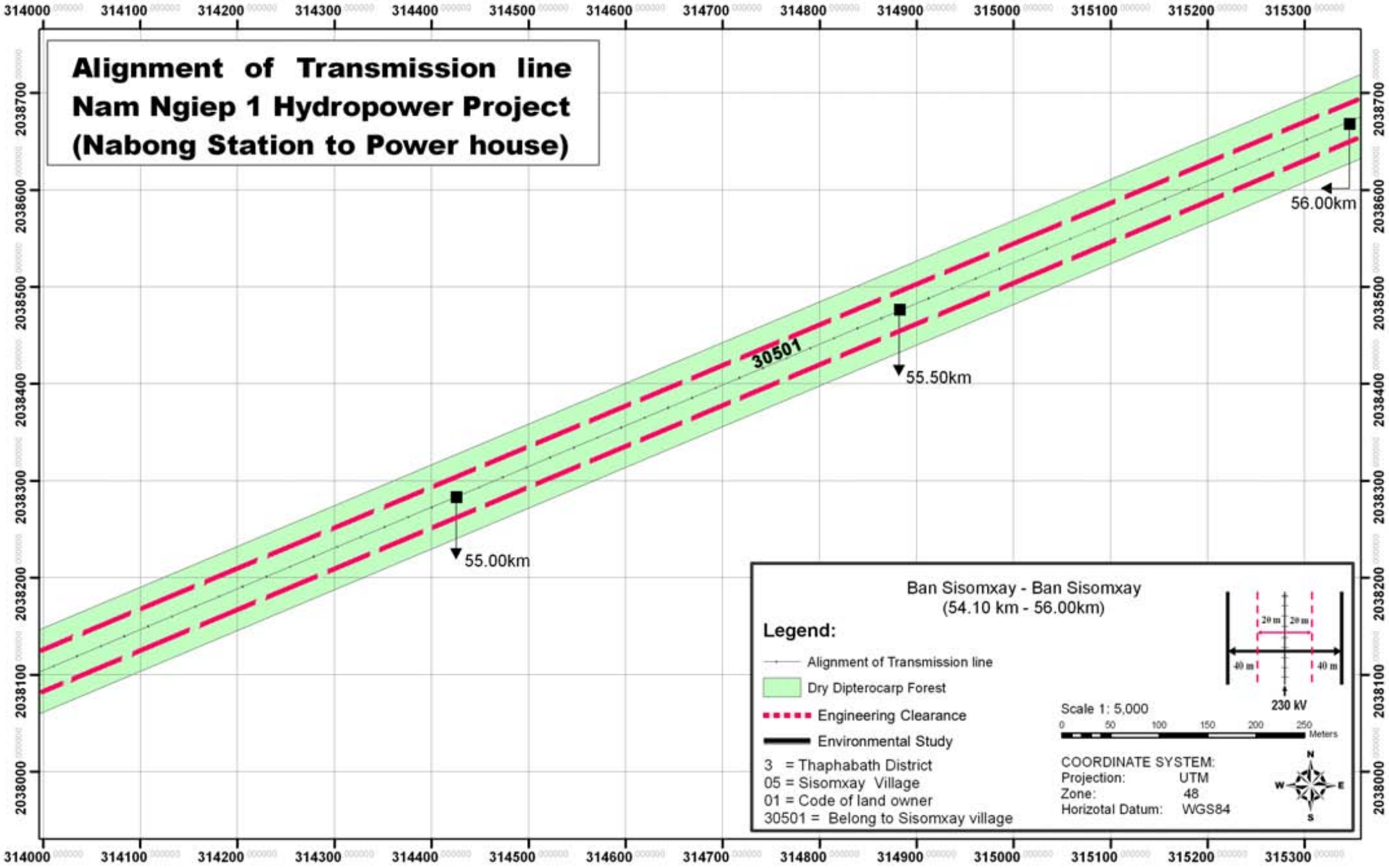
Map sheet No: 51

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 52

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Ban Sisomxay - Ban Sisomxay
(54.10 km - 56.00km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village

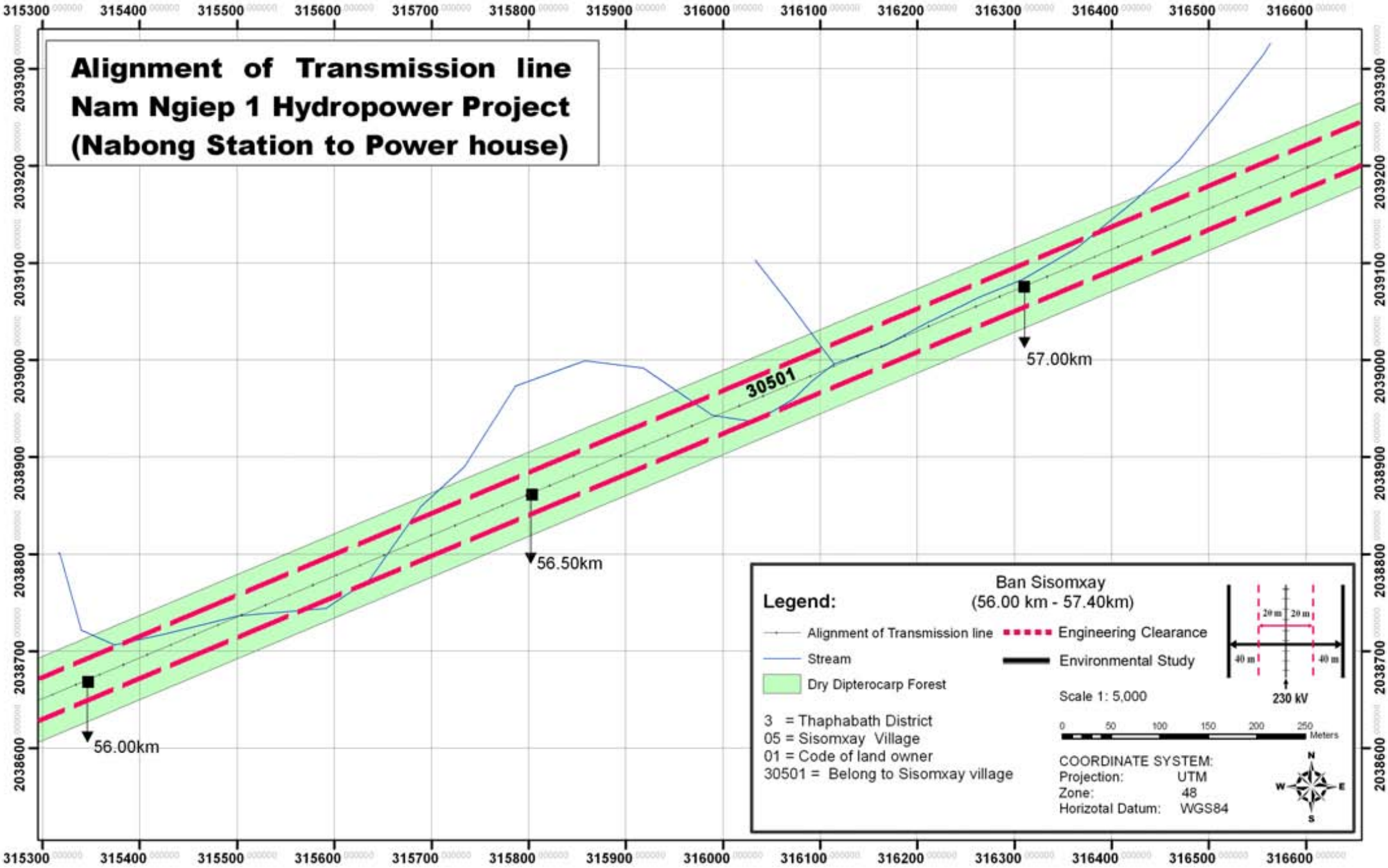
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

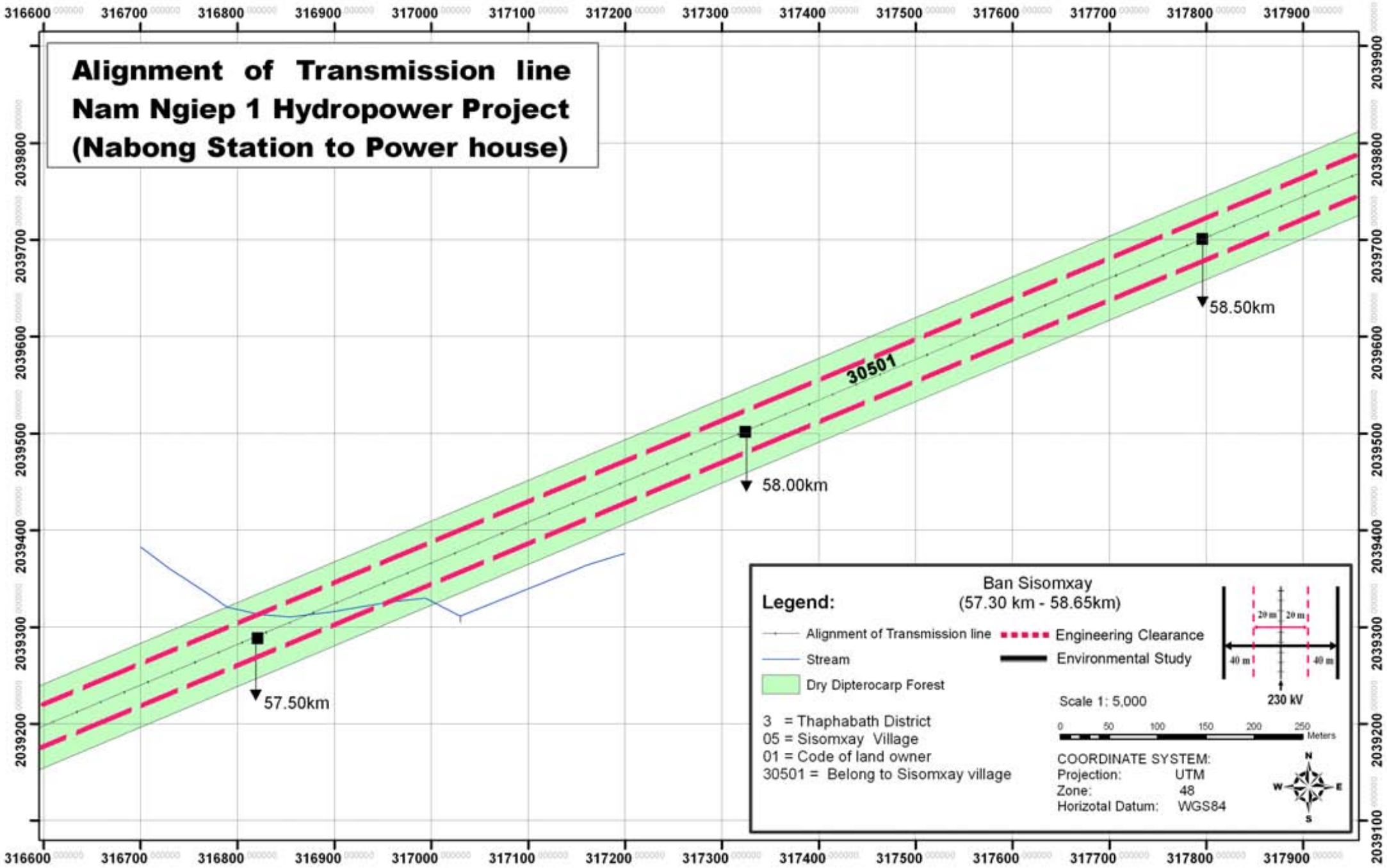
Map sheet No: 53

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



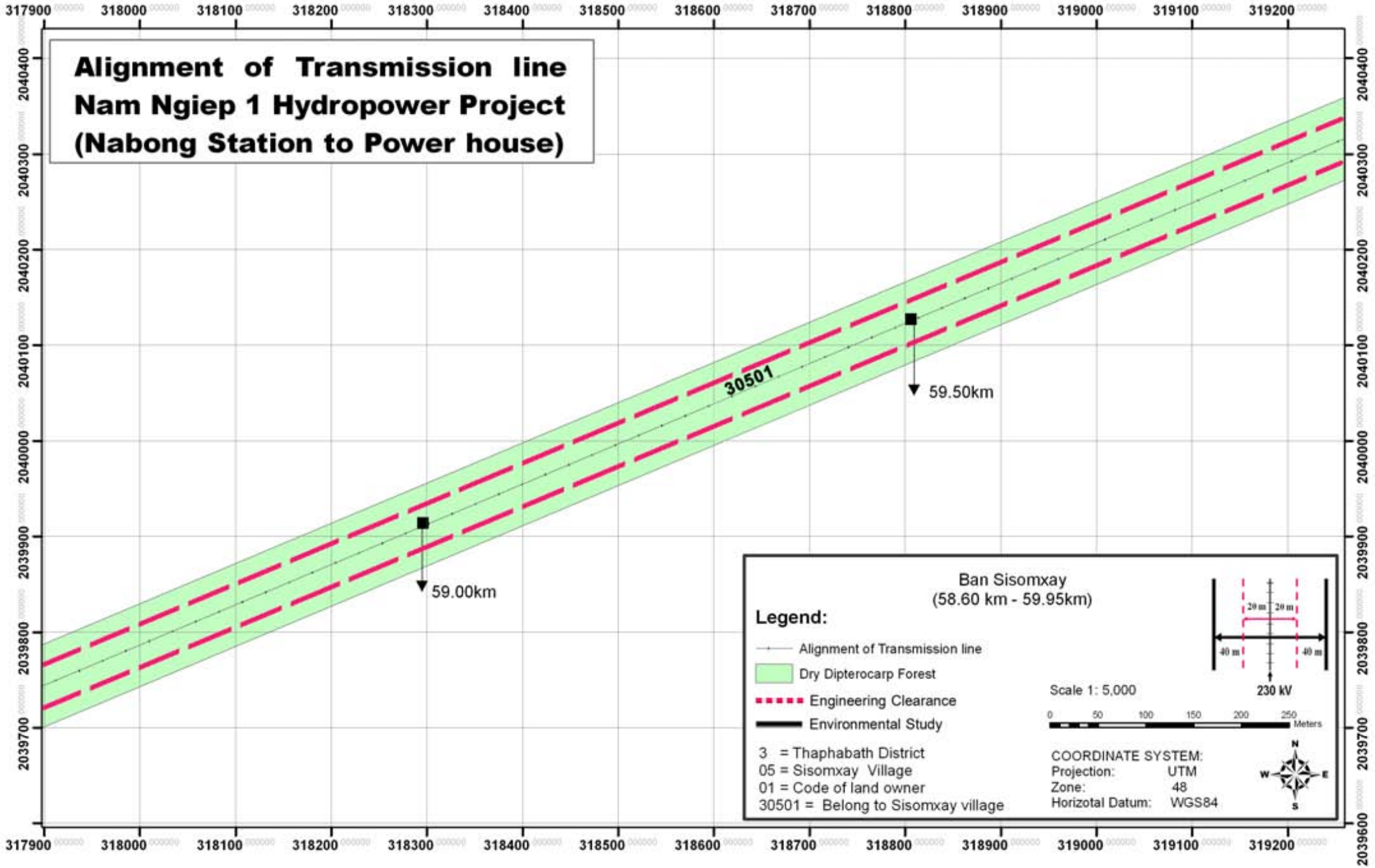
Map sheet No: 54

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



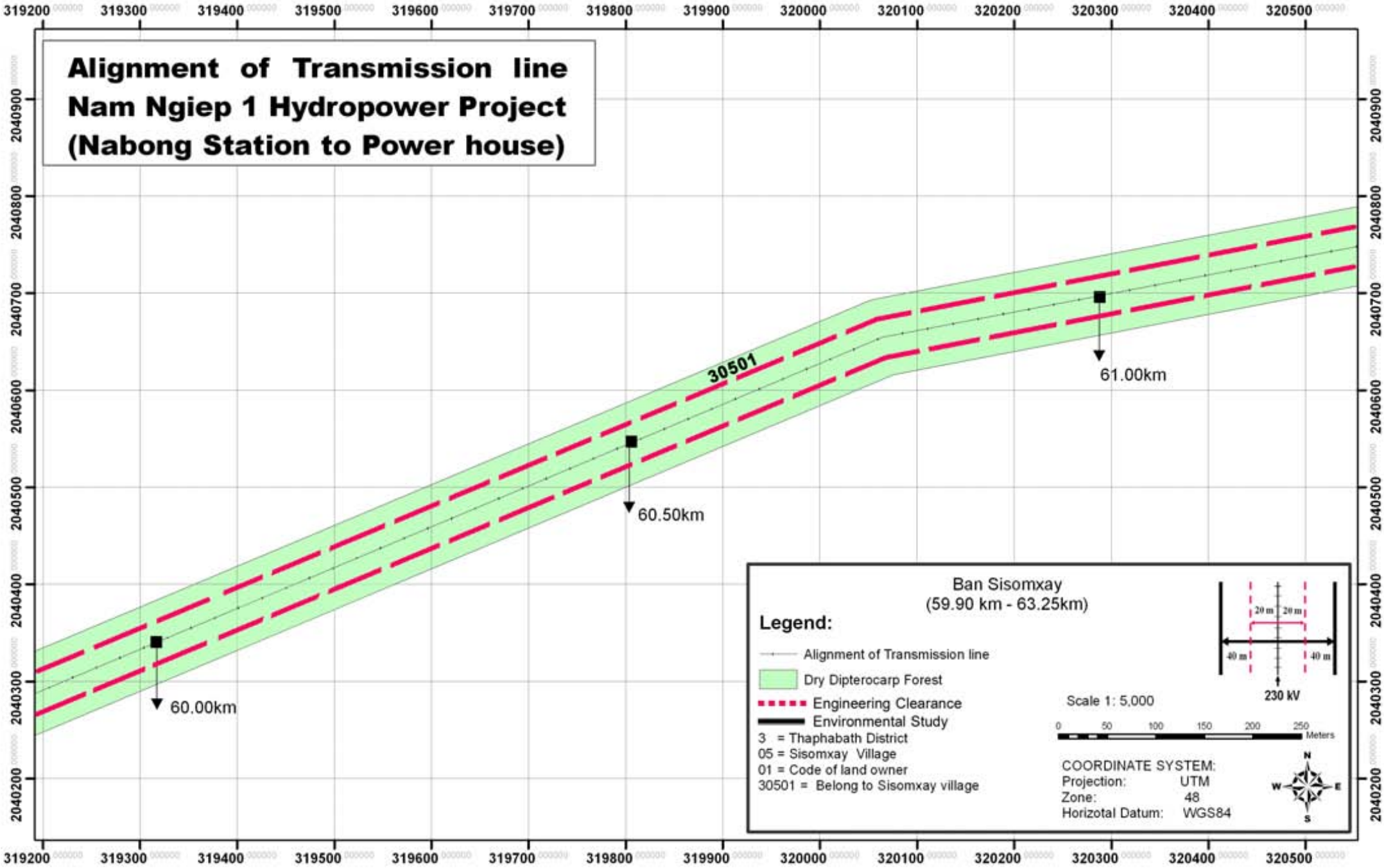
Map sheet No: 55

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



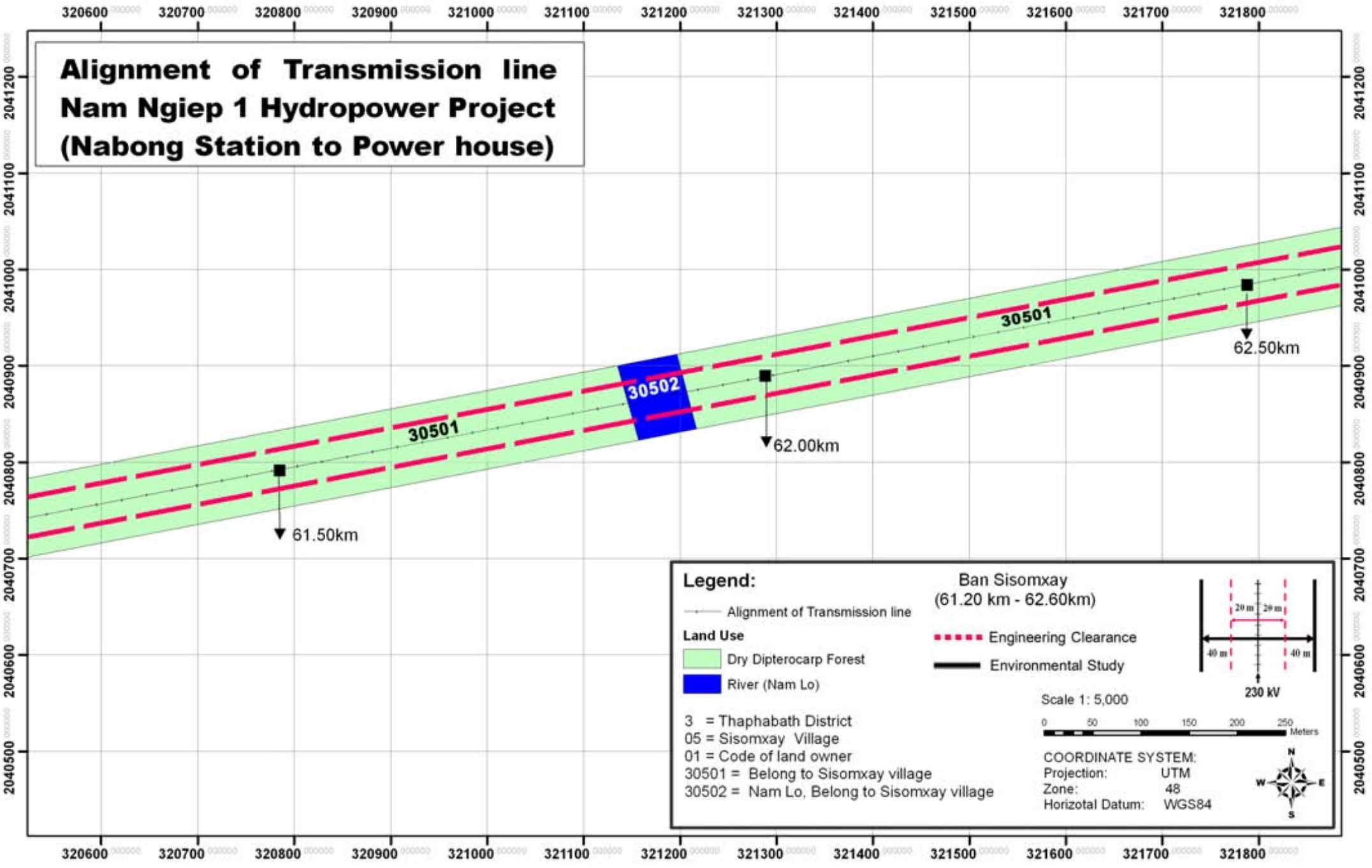
Map sheet No: 56

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 57

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Legend:

- Alignment of Transmission line

Land Use

- Dry Dipterocarp Forest
- River (Nam Lo)

Ban Sisomxay
(61.20 km - 62.60km)

- Engineering Clearance
- Environmental Study

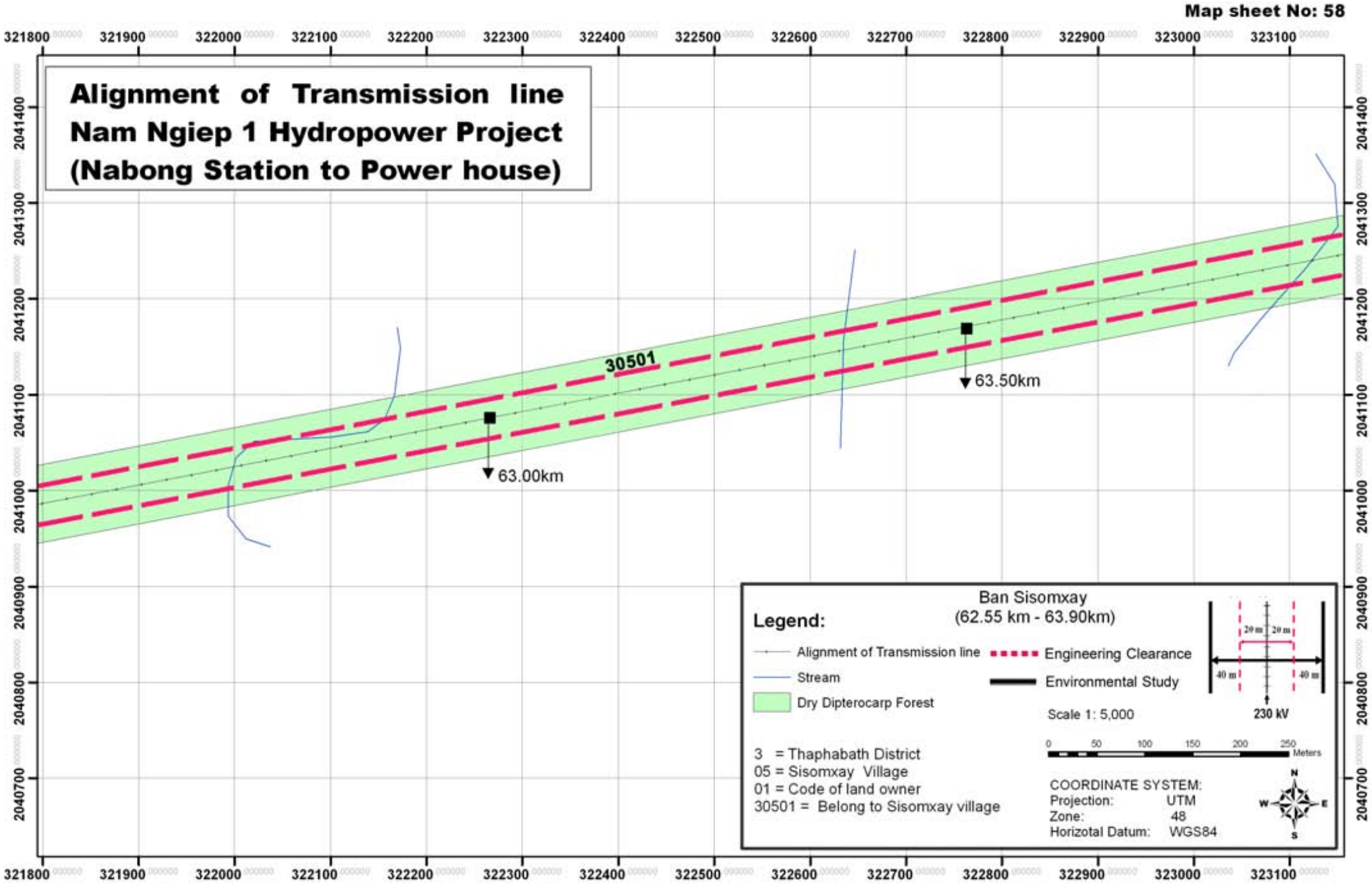
Scale 1: 5,000

0 50 100 150 200 250 Meters

3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
30502 = Nam Lo, Belong to Sisomxay village

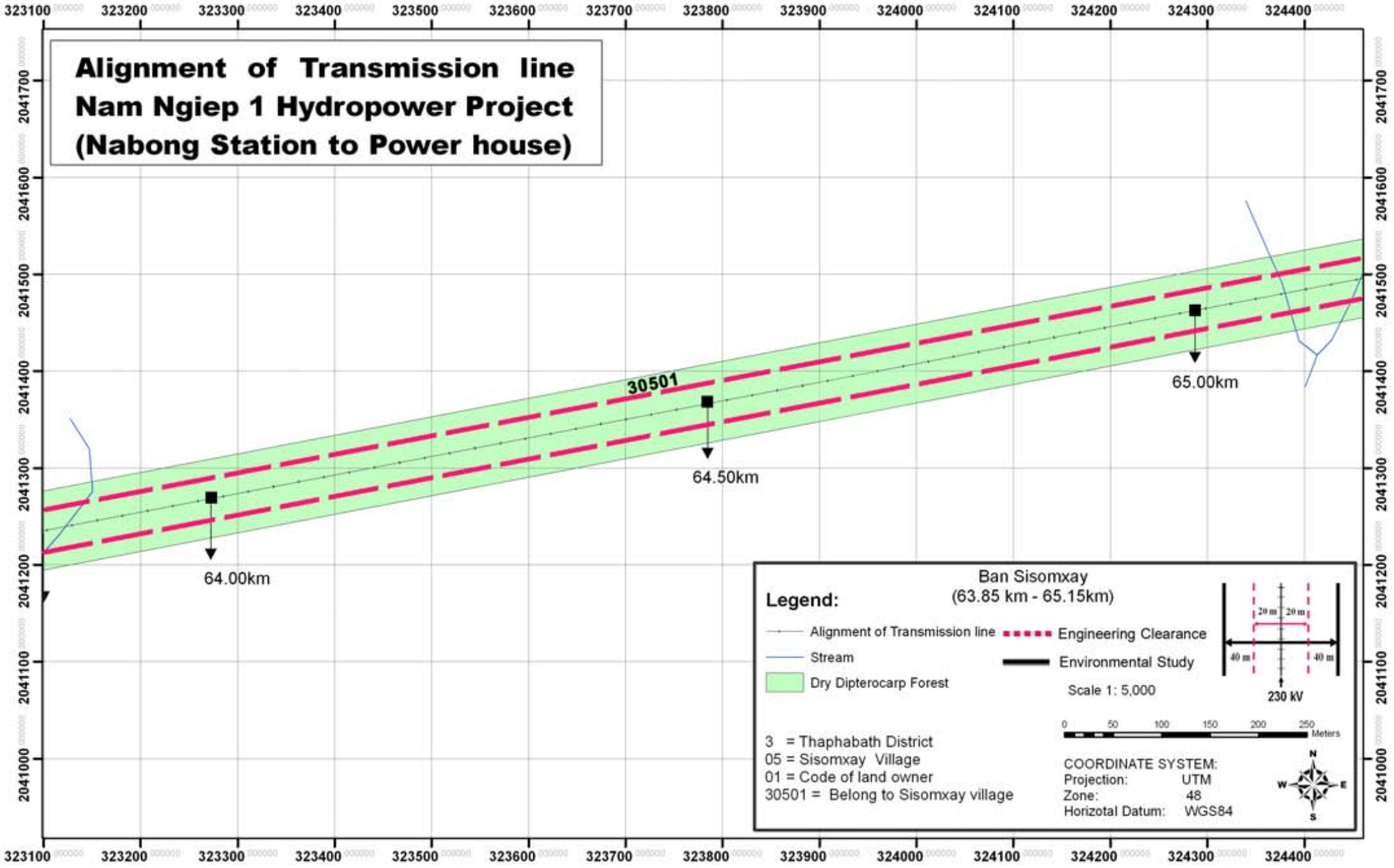
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N
W
E
S


Map sheet No: 58
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
321800
321900
322000
322100
322200
322300
322400
322500
322600
322700
322800
322900
323000
323100
2041400
2041300
2041200
2041100
2041000
2040900
2040800
2040700
30501
63.00km
63.50km
Ban Sisomxay
(62.55 km - 63.90km)
Legend:
Alignment of Transmission line
Stream
Dry Dipterocarp Forest
Engineering Clearance
Environmental Study
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

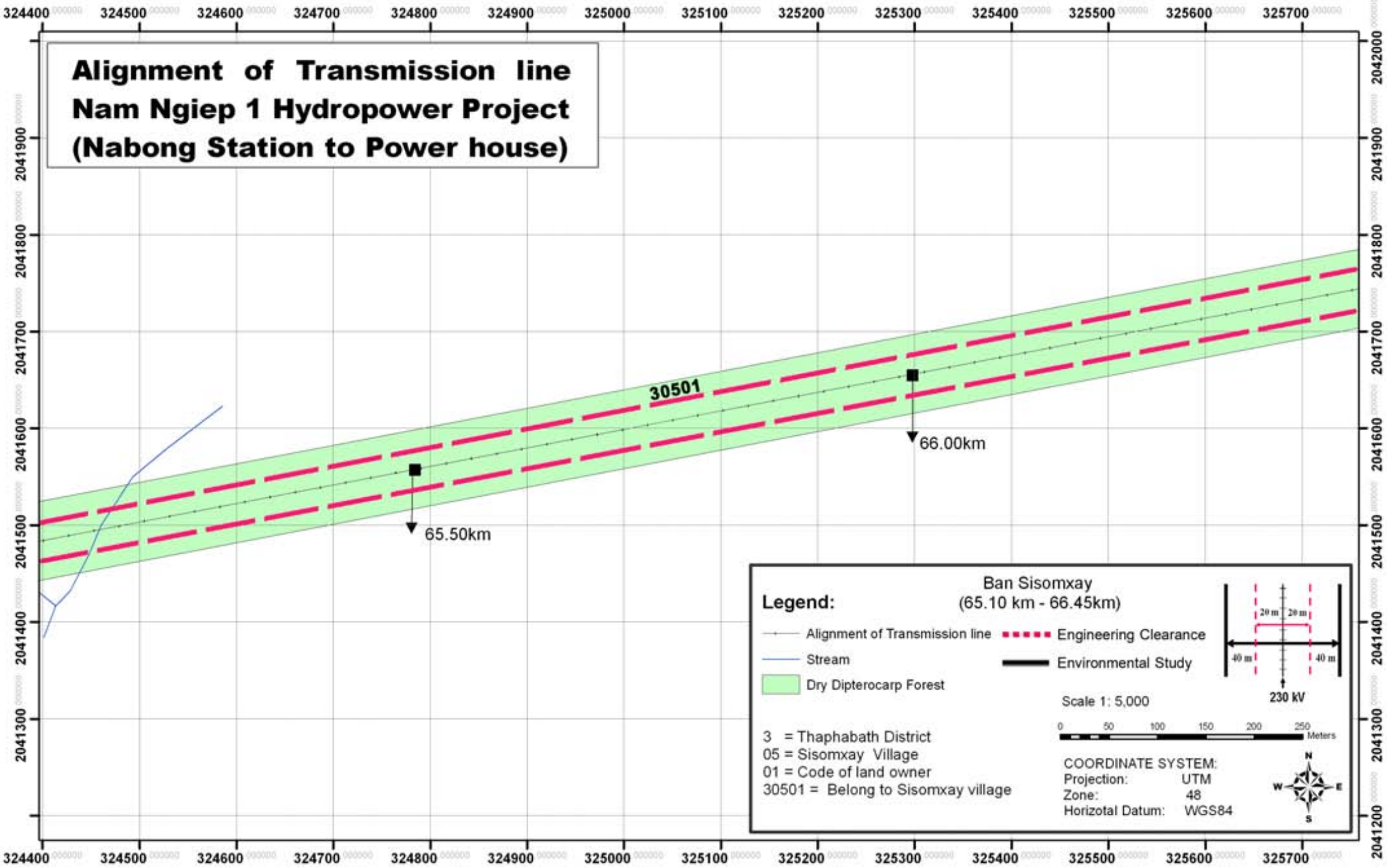
Map sheet No: 59

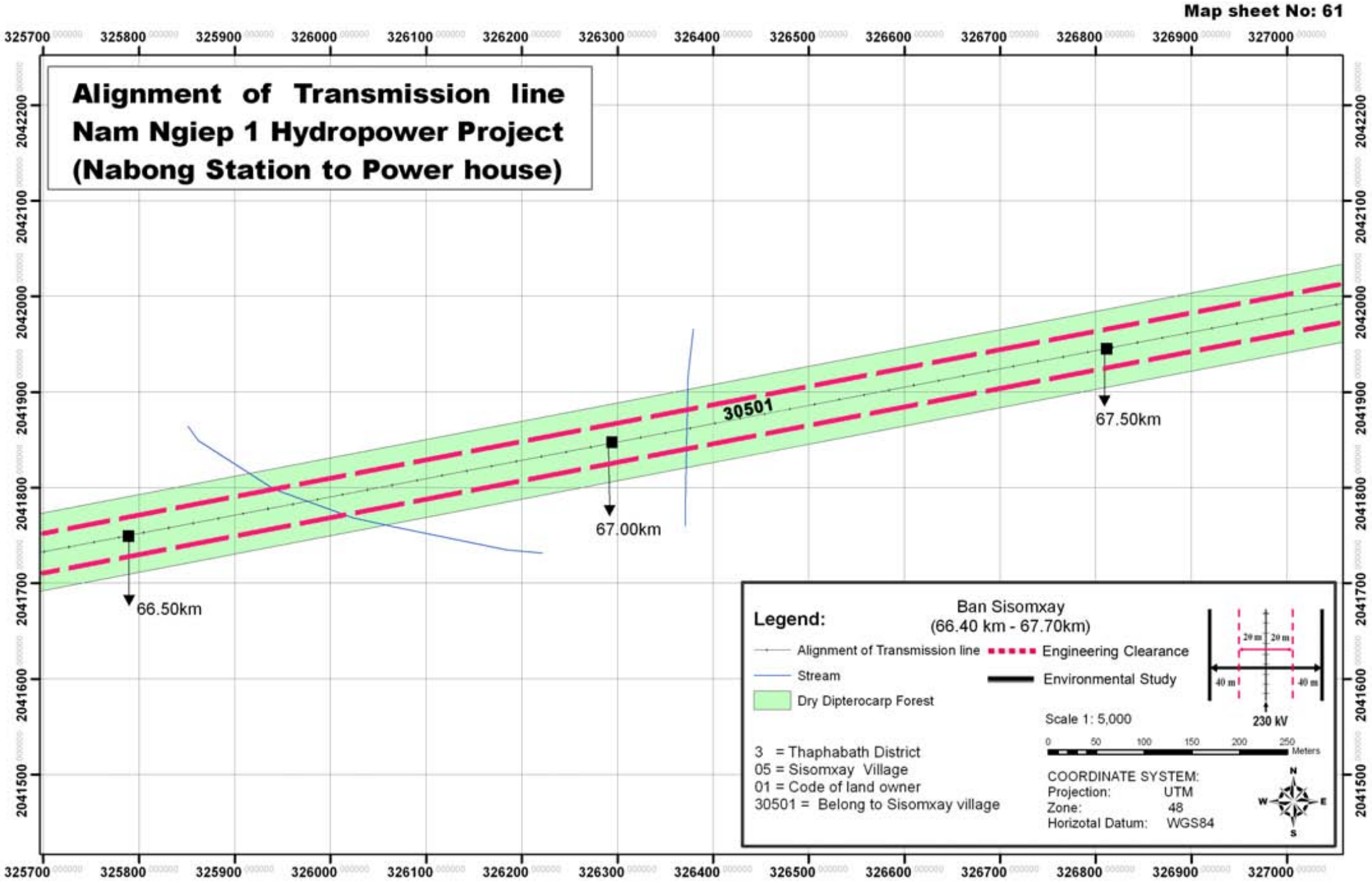
Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

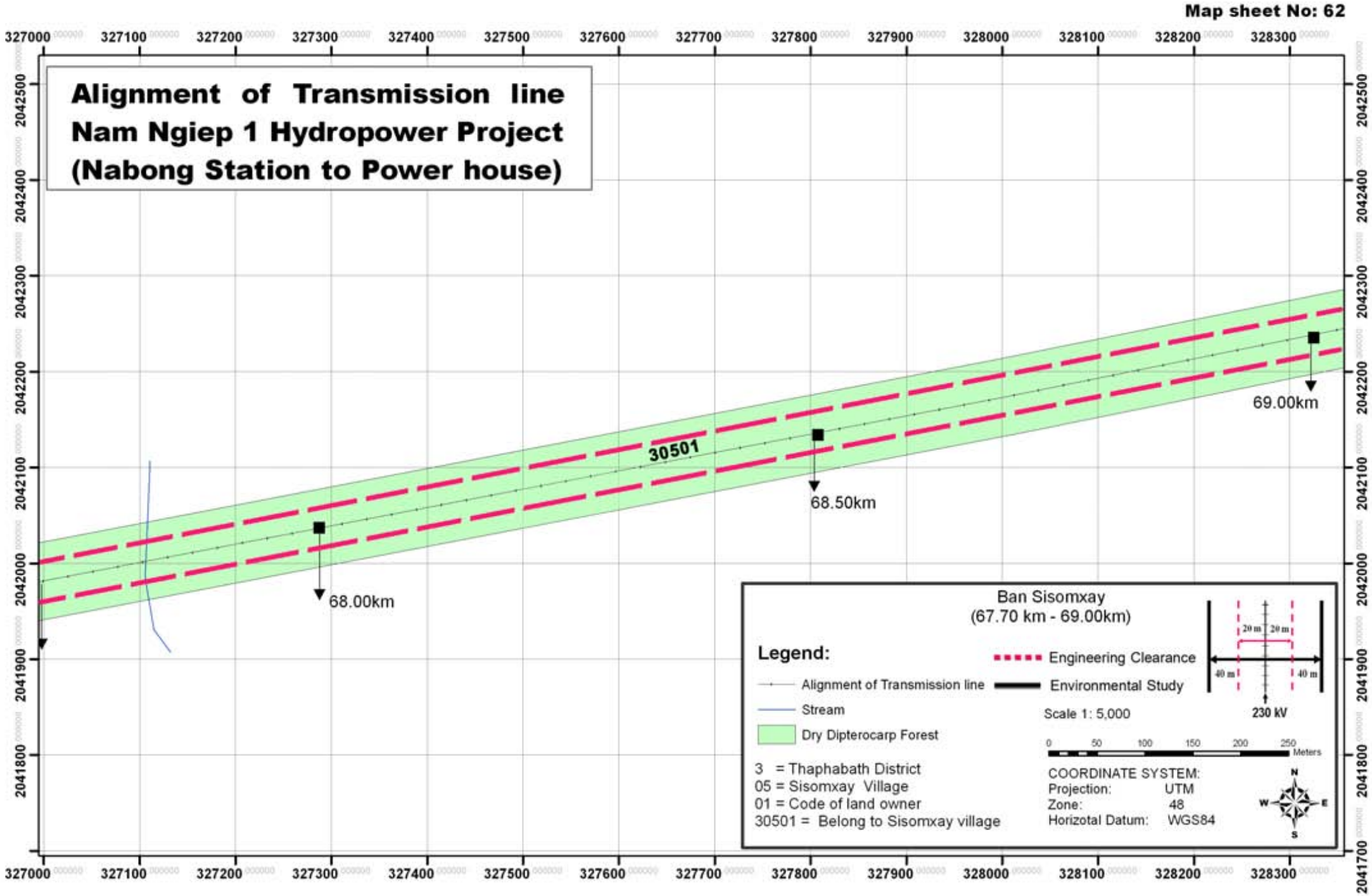


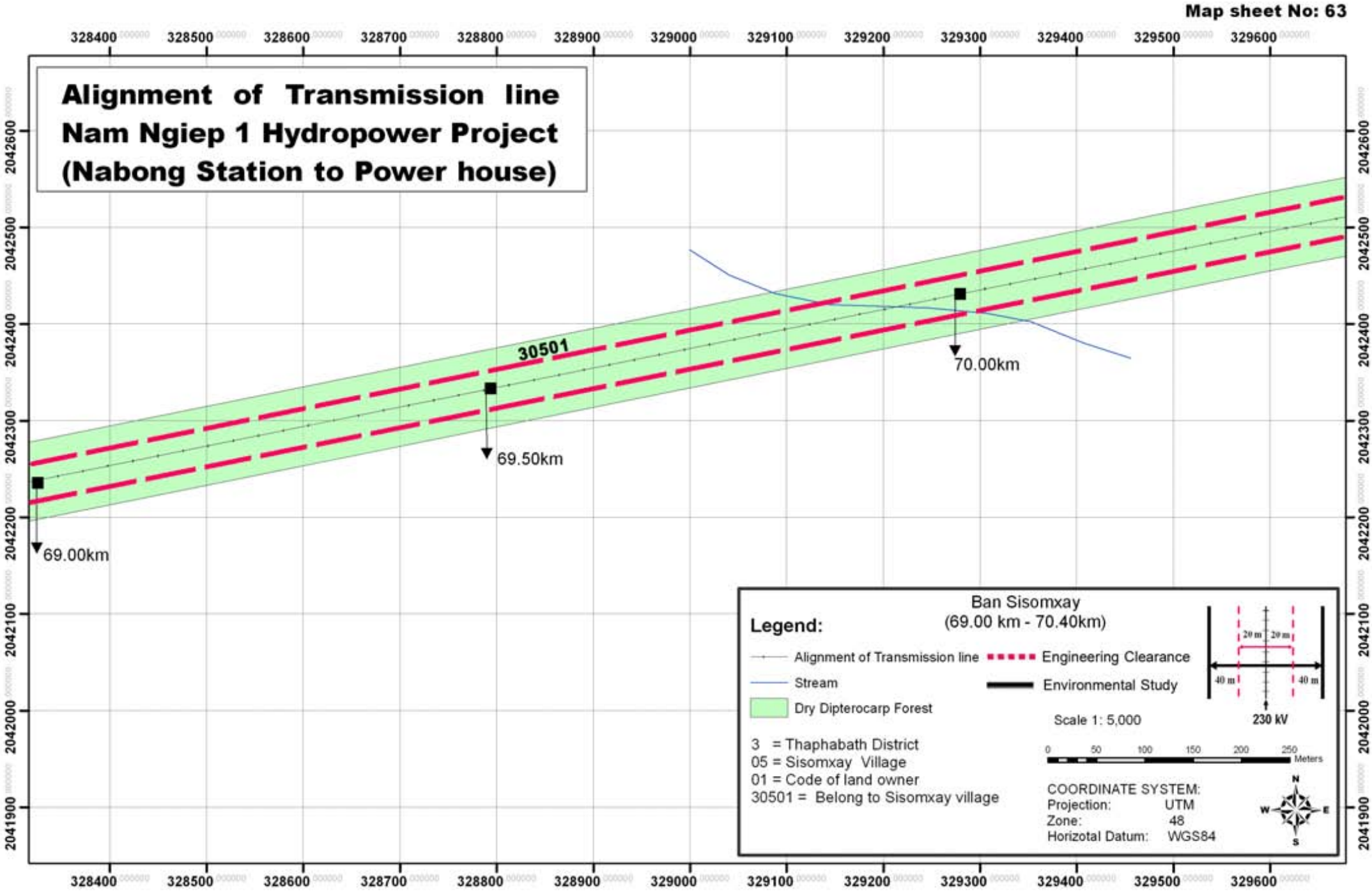
Map sheet No: 60

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



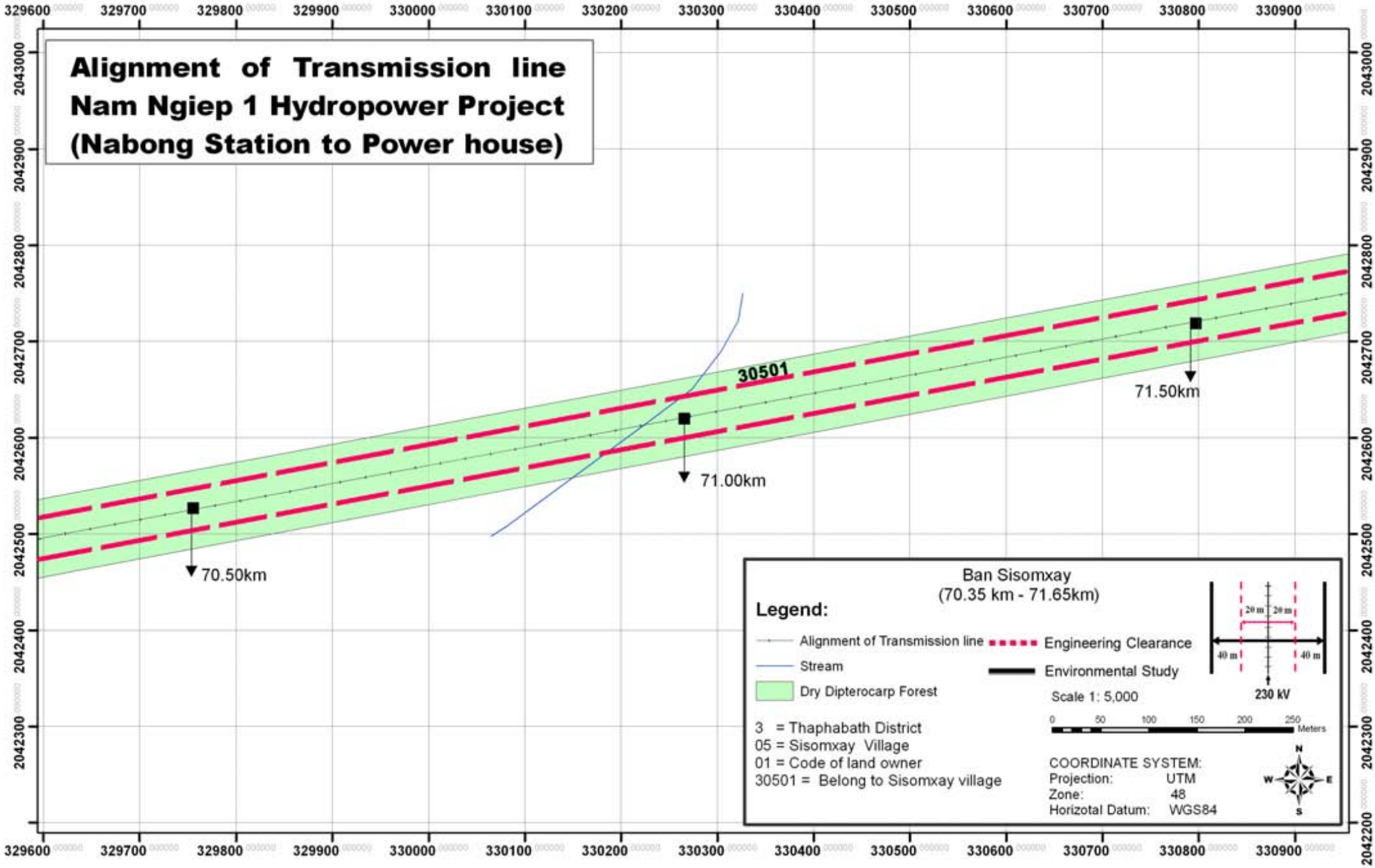

Map sheet No: 61
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
325700
325800
325900
326000
326100
326200
326300
326400
326500
326600
326700
326800
326900
327000
2042200
2042100
2042000
2041900
2041800
2041700
2041600
2041500
30501
66.50km
67.00km
67.50km
Legend:
Ban Sisomxay
(66.40 km - 67.70km)
Alignment of Transmission line
Engineering Clearance
Stream
Environmental Study
Dry Dipterocarp Forest
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 62
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
327000
327100
327200
327300
327400
327500
327600
327700
327800
327900
328000
328100
328200
328300
2042500
2042400
2042300
2042200
2042100
2042000
2041900
2041800
2041700
30501
68.00km
68.50km
69.00km
Ban Sisomxay
(67.70 km - 69.00km)
Legend:
Alignment of Transmission line
Stream
Dry Dipterocarp Forest
Engineering Clearance
Environmental Study
Scale 1: 5,000
0 50 100 150 200 250 Meters
20 m
20 m
40 m
40 m
230 kV
3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S


Map sheet No: 63
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
328400
328500
328600
328700
328800
328900
329000
329100
329200
329300
329400
329500
329600
2042600
2042500
2042400
2042300
2042200
2042100
2042000
2041900
30501
69.00km
69.50km
70.00km
Ban Sisomxay
(69.00 km - 70.40km)
Legend:
Alignment of Transmission line
Engineering Clearance
Stream
Environmental Study
Dry Dipterocarp Forest
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0 50 100 150 200 250 Meters
3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 64

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 65

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)




30501
30415
30414
30413
30412
72.00km
72.50km
73.00km

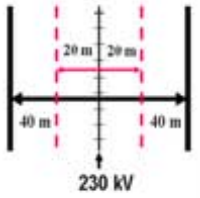
Ban Sisomxay - Ban Nong Kuen
(71.70 km - 73.00km)

3 = Thaphabath District
05 = Sisomxay Village
01 = Code of land owner
30501 = Belong to Sisomxay village
3 = Thaphabath District
04 = Nong Kuen Village
12-15 = Code of land owner
30412 = Belong to Nong Kuen Village
30413 = Belong to Mr Ong
30414 = Belong to Mr Att
30415 = Belong to Nong Kuen Village

Engineering Clearance
Environmental Study

Legend:

Alignment of Transmission line
Dry Dipterocarp Forest
Unstocked Forest



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

331000 331100 331200 331300 331400 331500 331600 331700 331800 331900 332000 332100 332200 332300

2043100 2043000 2042900 2042800 2042700 2042600 2042500 2042400 2042300

Map sheet No: 66

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

Engineering Clearance
Environmental Study

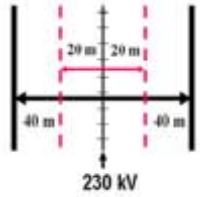
3 = Thaphabath District
04 = Nong Kuen Village
04 - 13 = Code of land owner
30404 = Belong to Nong kuen village
30405 = Belong to Mr Si
30406 = Belong to Nong Kuen village
30407 = Belong to Mr Xom
30408 = Belong to Mrs Tom
30409 = Belong to Mr Xom
30410 = Belong to Mr Xom
30411 = Belong to Mr Ngu
30412 = Belong to Nong Kuen village
30413 = Belong to Ong

Legend:

Ban Nong Kuen
(73.15 km - 74.45km)

Land Use

- Mixed deciduous
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 67

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

74.50km

75.00km

75.50km

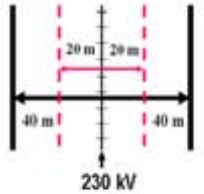
30404

Ban Nong Kuen
(74.40 km - 75.70km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

3 = Thaphabath District
04 = Nong Kuen Village
04 = Code of land owner
30404 = Belong to Nong Kuen village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

333600 333700 333800 333900 334000 334100 334200 334300 334400 334500 334600 334700 334800 334900

2042800 2042700 2042600 2042500 2042400 2042300 2042200 2042100

Map sheet No: 68

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

334900 335000 335100 335200 335300 335400 335500 335600 335700 335800 335900 336000 336100 336200

2042600 2042500 2042400 2042300 2042200 2042100 2042000 2041900

76.00km

76.50km

77.00km

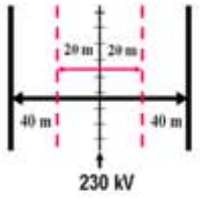
30404 30403 30402 30416 30401 30417 30401

Ban Nong Kuen
(75.650 km - 77.00km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Environmental Study
- Dry Dipterocarp Forest
- Unstocked Forest
- River (Nam Thouay)

3 = Thaphabath District
04 = Nong Kuen Village
01 - 04 = Code of land owner
30401 = Belong to Nong Kuen village
30402 = Belong to Nong Kuen village
30403 = Belong to Mr souk
30404 = Belong to Nong Kuen village
30416 = Belong to Nong Kuen village
30417 = Belong to Nong Kuen village



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 69

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

77.00km

77.50km

78.00km

30401

30308

30312

30311

30310

30309

30307

3 = Thaphabath District
04 = Nong Kuen Village
01 = Code of land owner
30401 = Belong to Nong Kuen village

3 = Thaphabath District
03 = Pakthouay Neu Village
08 = Code of land owner
30307 = Belong to Mr Tou Tonh
30308 = Belong to Pakthouay Neu Village
30309 = Belong to Mr Tou Chouang
30310 = Belong to Pakthouay Neu Village
30311 = Belong to Mr Tou Suan
30312 = Belong to Pakthouay Neu Village

Engineering Clearance
Environmental Study

Legend:

Ban Nong Kuen - Pakthouay Neu
(77.00 km - 78.30km)

Alignment of Transmission line
Dry Dipterocarp Forest
Unstocked Forest
Paddy Field

20 m 20 m
40 m 40 m
230 kV

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

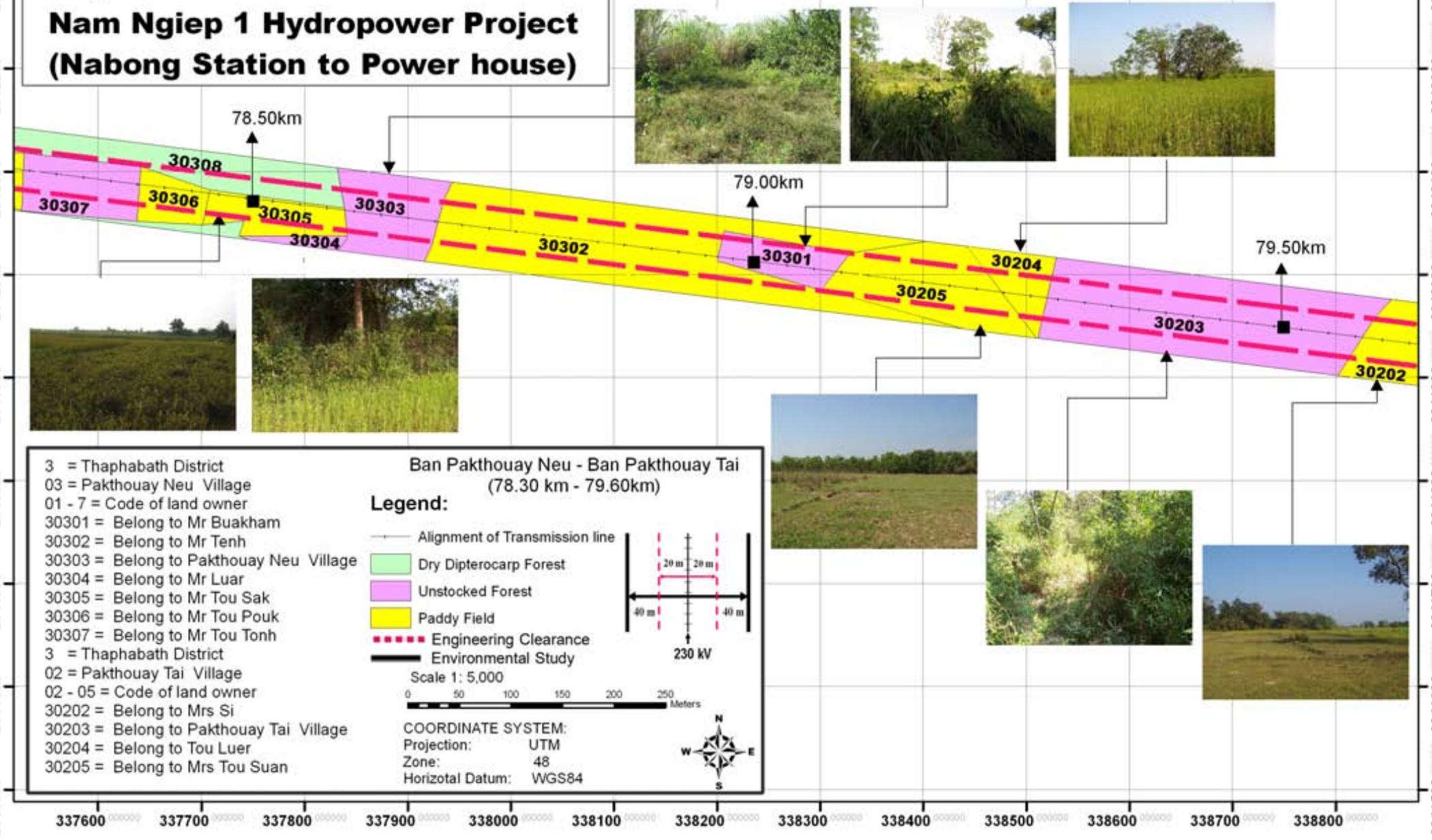
N W E S

336300 336400 336500 336600 336700 336800 336900 337000 337100 337200 337300 337400 337500

2042400 2042300 2042200 2042100 2042000 2041900 2041800 2041700

Map sheet No: 70

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



3 = Thaphabath District
03 = Pakthouay Neu Village
01 - 7 = Code of land owner
30301 = Belong to Mr Buakham
30302 = Belong to Mr Tenh
30303 = Belong to Pakthouay Neu Village
30304 = Belong to Mr Luar
30305 = Belong to Mr Tou Sak
30306 = Belong to Mr Tou Pouk
30307 = Belong to Mr Tou Tonh
3 = Thaphabath District
02 = Pakthouay Tai Village
02 - 05 = Code of land owner
30202 = Belong to Mrs Si
30203 = Belong to Pakthouay Tai Village
30204 = Belong to Tou Luer
30205 = Belong to Mrs Tou Suan

Ban Pakthouay Neu - Ban Pakthouay Tai
(78.30 km - 79.60km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

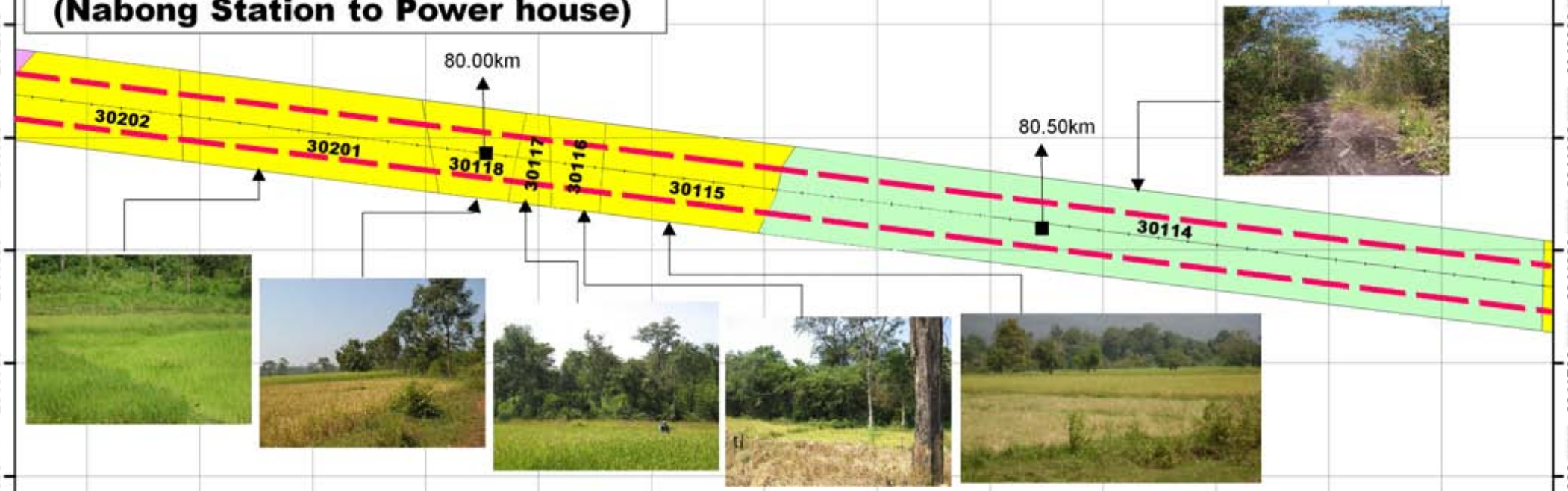
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 71

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Ban Pakthouay Neu - Ban Vuenthat (79.60 km - 80.90 km)

Legend:

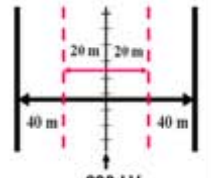
- Alignment of Transmission line
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field

3 = Thaphabath District
02 = Pakthouay Tai Village
1 - 2 = Code of land owner
30201 = Belong to Mr Makham
30202 = Belong to Mrs Si
Engineering Clearance
Environmental Study

3 = Thaphabath District
01 = Vuenthat Village
14 - 18 = Code of land owner
30114 = Belong to Vuenthat village
30115 = Belong to Mr Tou Auim
30116 = Belong to Mrs Sanh
30117 = Belong to Mr Khong
30118 = Belong to Mr Xiengli

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Scale 1: 5,000



338900 339000 339100 339200 339300 339400 339500 339600 339700 339800 339900 340000 340100

2042100 2042000 2041900 2041800 2041700 2041600 2041500 2041400 2041300

Map sheet No: 72

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

81.00km

81.50km

82.00km

30114

30113

30112

30111

30110

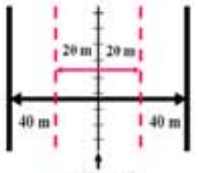
30109

Ban Vuenthat
(80.90 km - 82.30 km)

3 = Thaphabath District
01 = Vuenthat Village
09 - 12 = Code of land owner
30109 = Belong to Mr Leun
30110 = Belong to Mr Ngai
30111 = Belong to Mr Theung
30112 = Belong to Vuenthat Village
30113 = Belong to Mr Xieng pong
30114 = Belong to Vuenthat Village

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

340200 340300 340400 340500 340600 340700 340800 340900 341000 341100 341200 341300 341400 341500

2041900 2041800 2041700 2041600 2041500 2041400 2041300 2041200

Map sheet No: 73

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

341500 341600 341700 341800 341900 342000 342100 342200 342300 342400 342500 342600 342700 342800

2041700 2041600 2041500 2041400 2041300 2041200 2041100 2041000

82.50km

83.00km

83.50km

30108

30107

30106

30105

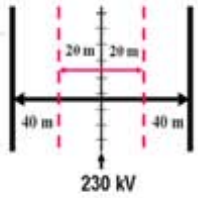
30104

3 = Thaphabath District
01 = Vuenthat Village
04 - 08 = Code of land owner
30104 = Belong to Vuenthat village
30105 = Belong to Mr Vong Deun
30106 = Belong to Mr Manh
30107 = Belong to Mr Tou phila
30108 = Belong to Vuenthat Village

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

Ban Vuenthat
(82.25 km - 83.60 km)



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 74

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

342800 342900 343000 343100 343200 343300 343400 343500 343600 343700 343800 343900 344000 344100

2041600 2041500 2041400 2041300 2041200 2041100 2041000 2040900

84.00km

84.50km

30103 30102 30101 20601



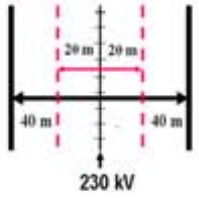

Ban Vuenthat - Saysavang Village, Paksan District
(83.10 km - 84.90km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study

2 = Paksan District
06 = Sayavang Village
01 = Code of land owner
20601 = Belong to Sayavang Village

3 = Thaphabath District
01 = Vuenthat Village
01 - 03 = Code of land owner
30101 = Belong to Mrs Tou Sand
30102 = Belong to Mr Tou Oum
30103 = Belong to Mrs Khium



Scale 1: 5,000

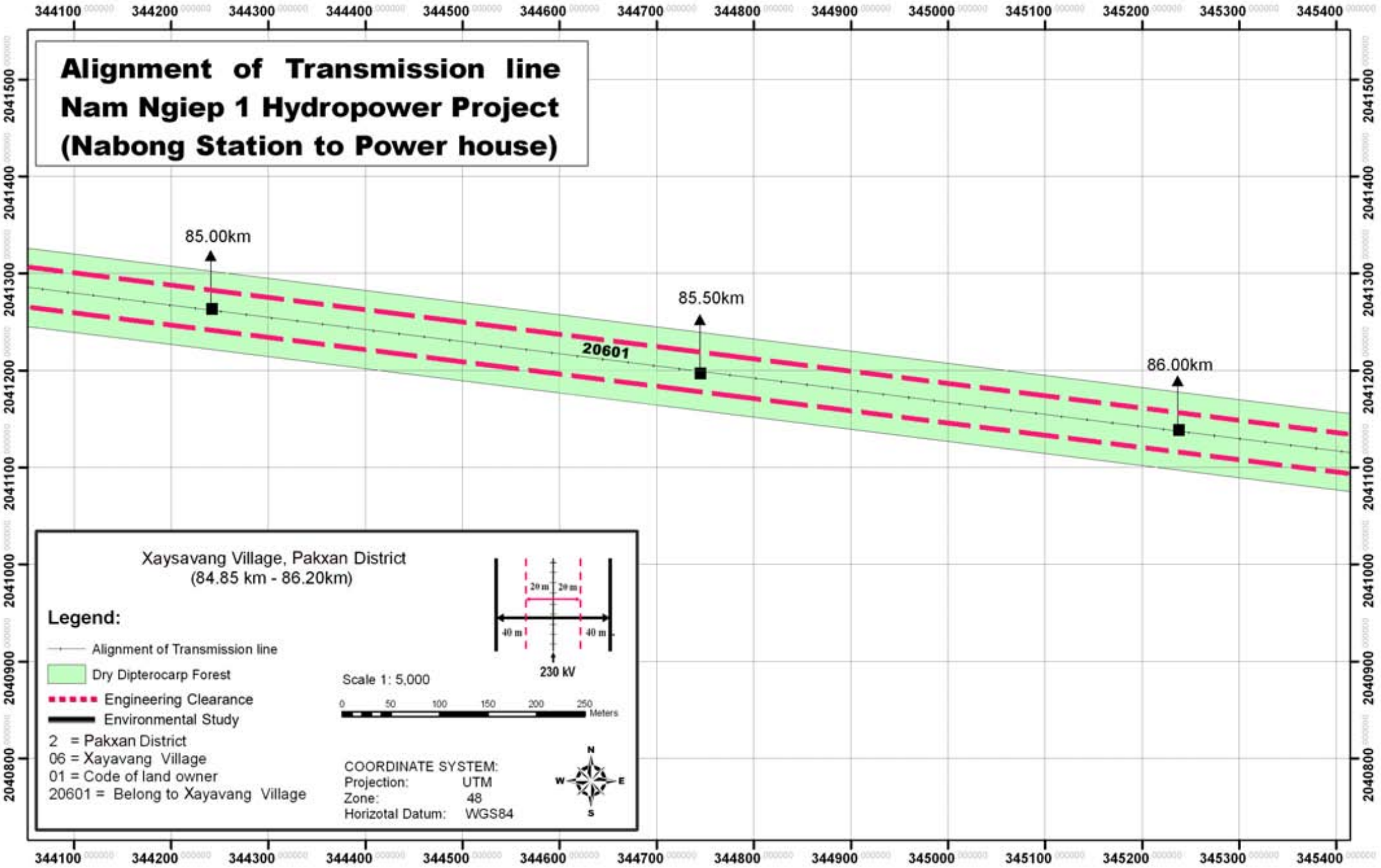
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 75

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Xaysavang Village, Pakxan District
(84.85 km - 86.20km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

2 = Pakxan District
06 = Xayavang Village
01 = Code of land owner
20601 = Belong to Xayavang Village

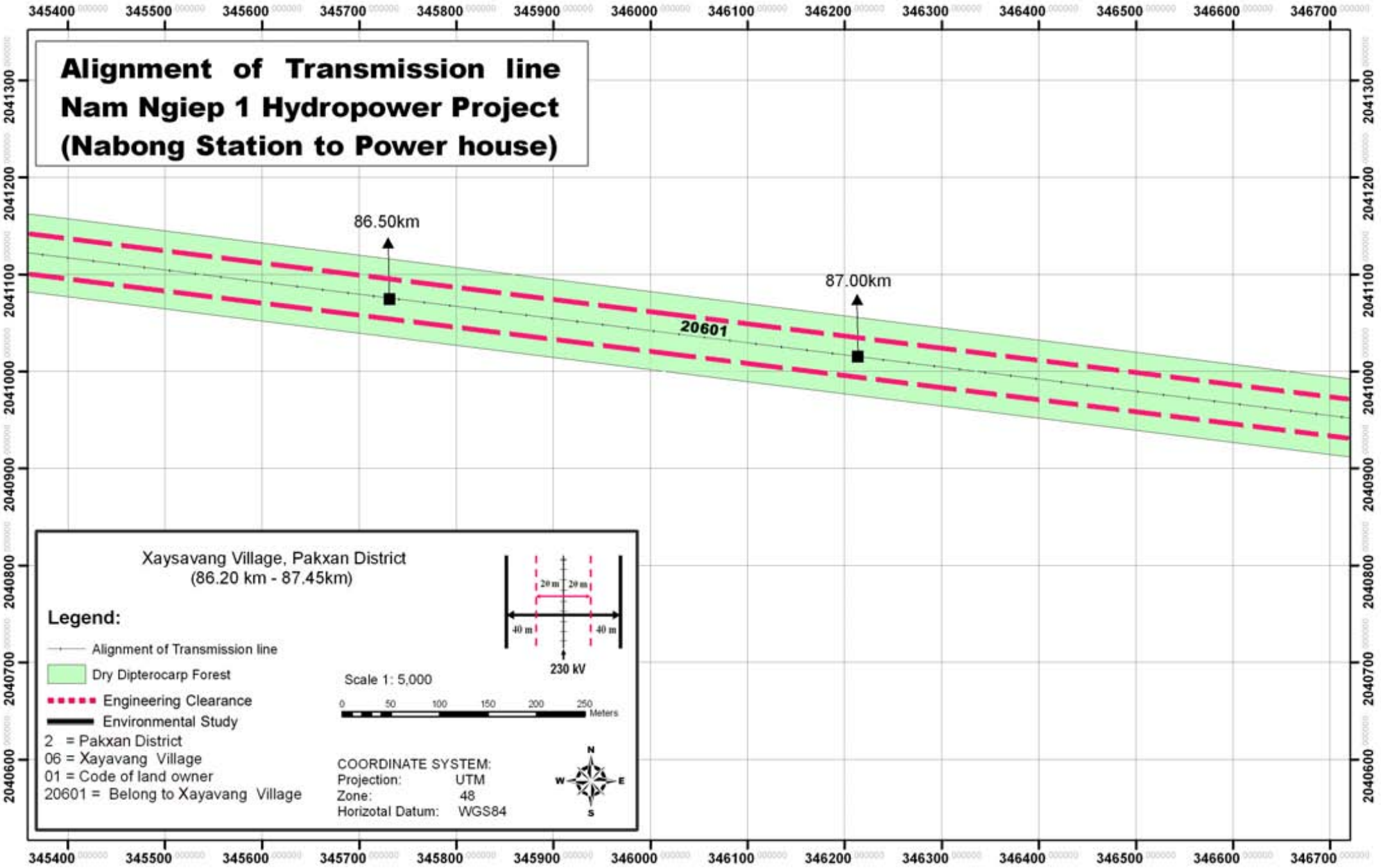
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 76

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Xaysavang Village, Pakxan District
(86.20 km - 87.45km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

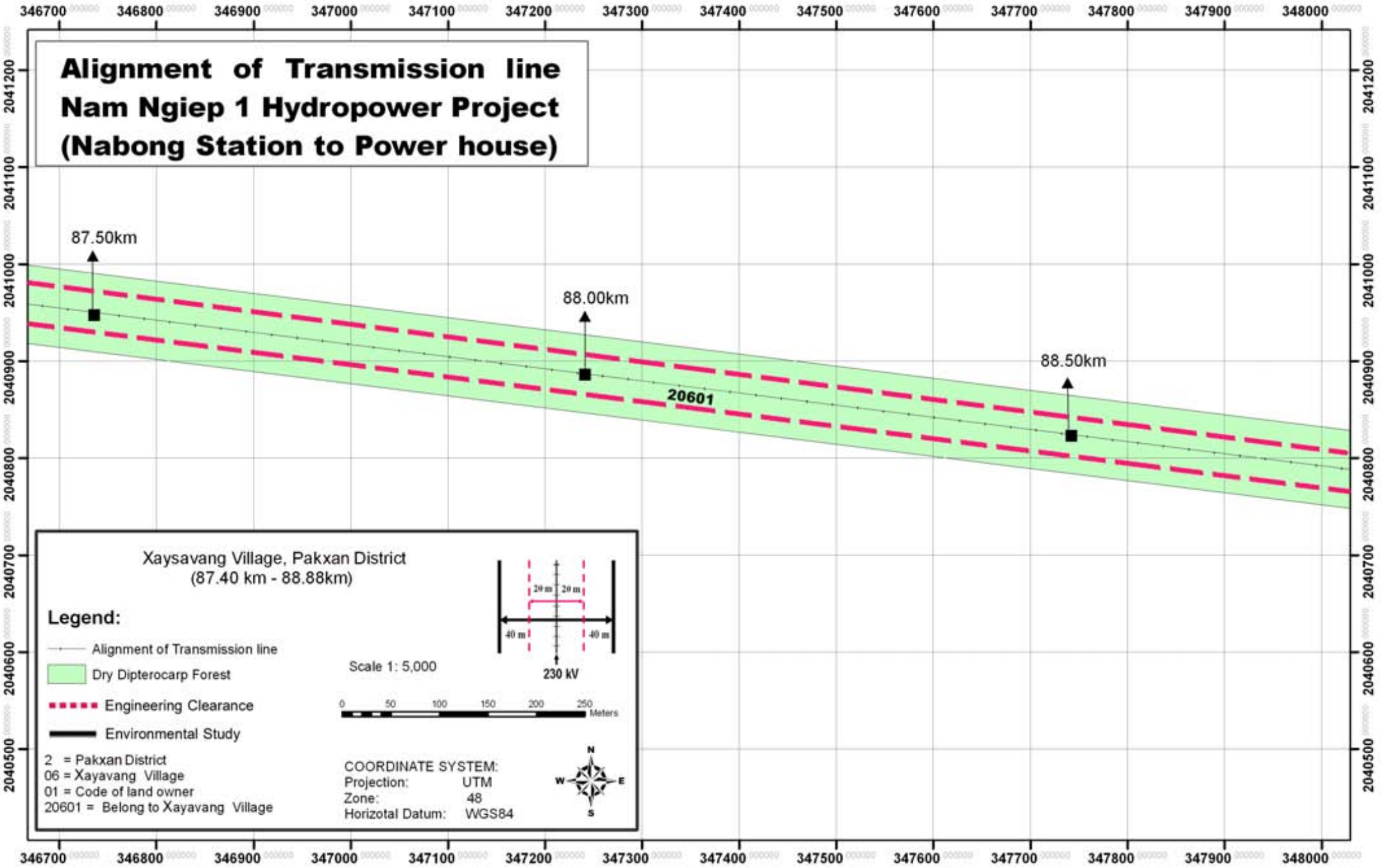
2 = Pakxan District
06 = Xayavang Village
01 = Code of land owner
20601 = Belong to Xayavang Village

Scale 1: 5,000

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

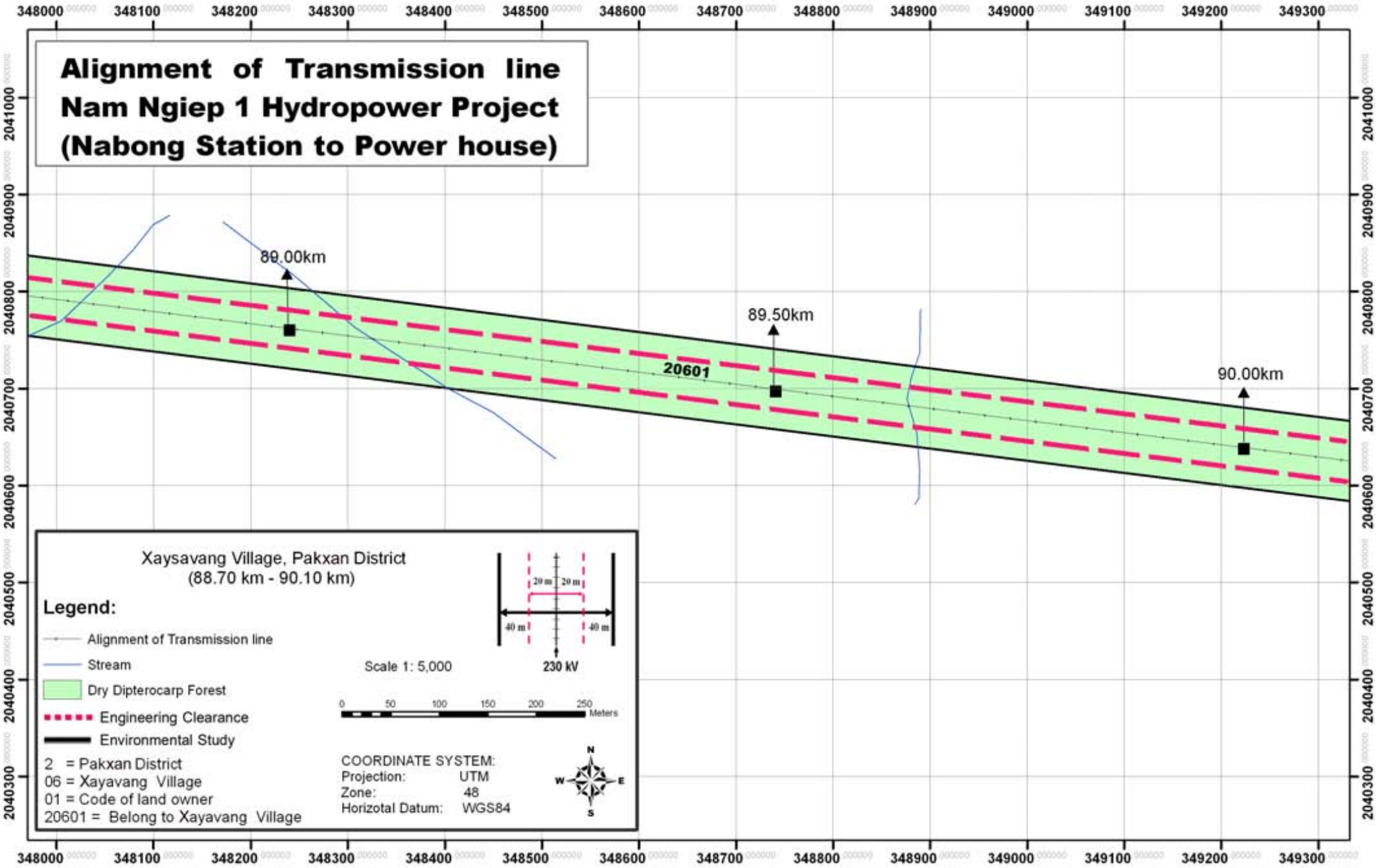
Map sheet No: 77

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 78

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Xaysavang Village, Pakxan District
(88.70 km - 90.10 km)

Legend:

- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

2 = Pakxan District
06 = Xayavang Village
01 = Code of land owner
20601 = Belong to Xayavang Village

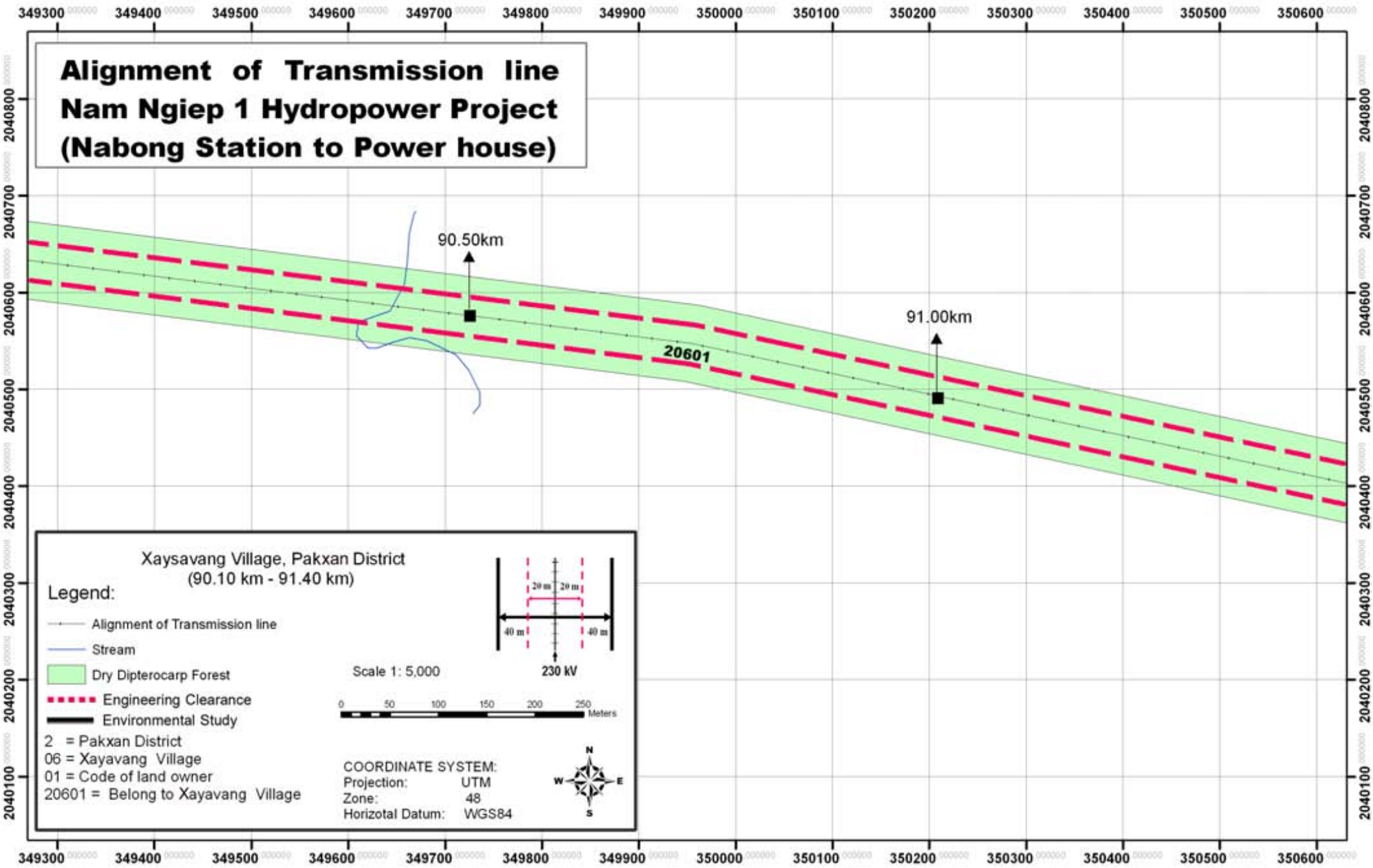
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 79

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Xaysavang Village, Pakxan District
(90.10 km - 91.40 km)

Legend:

- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

2 = Pakxan District
06 = Xayavang Village
01 = Code of land owner
20601 = Belong to Xayavang Village

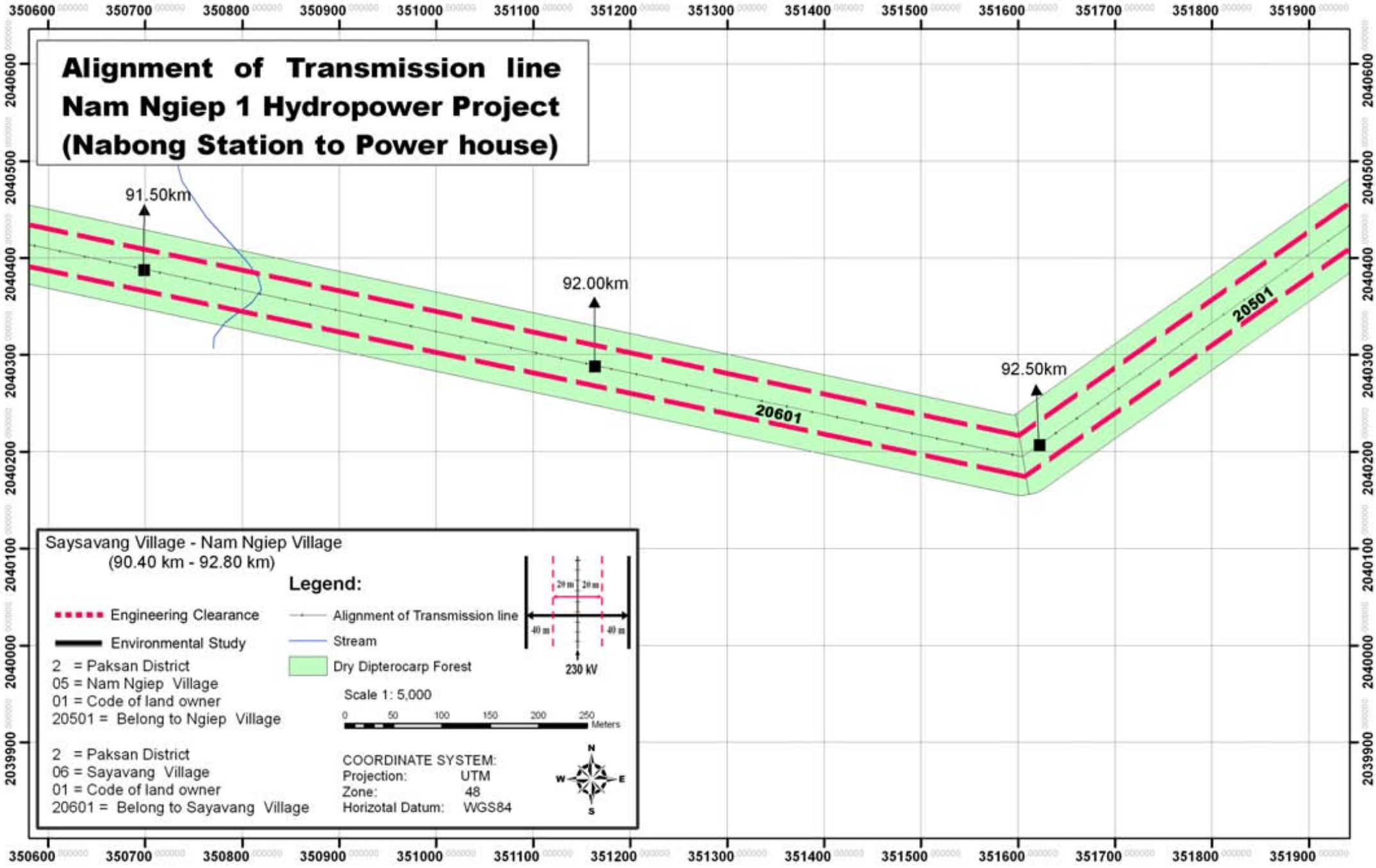
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 80

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Saysavang Village - Nam Ngiep Village
(90.40 km - 92.80 km)

Legend:

- Engineering Clearance
- Environmental Study
- Alignment of Transmission line
- Stream
- Dry Dipterocarp Forest

2 = Paksan District
05 = Nam Ngiep Village
01 = Code of land owner
20501 = Belong to Ngiep Village

2 = Paksan District
06 = Sayavang Village
01 = Code of land owner
20601 = Belong to Sayavang Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 81

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

351900 352000 352100 352200 352300 352400 352500 352600 352700 352800 352900 353000 353100 353200

2041000 2040900 2040800 2040700 2040600 2040500 2040400 2040300 2040200

93.50km

93.00km

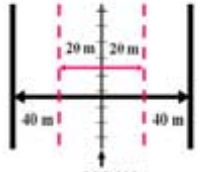
20501

Pak Ngiep Village
(92.90 km - 93.80 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

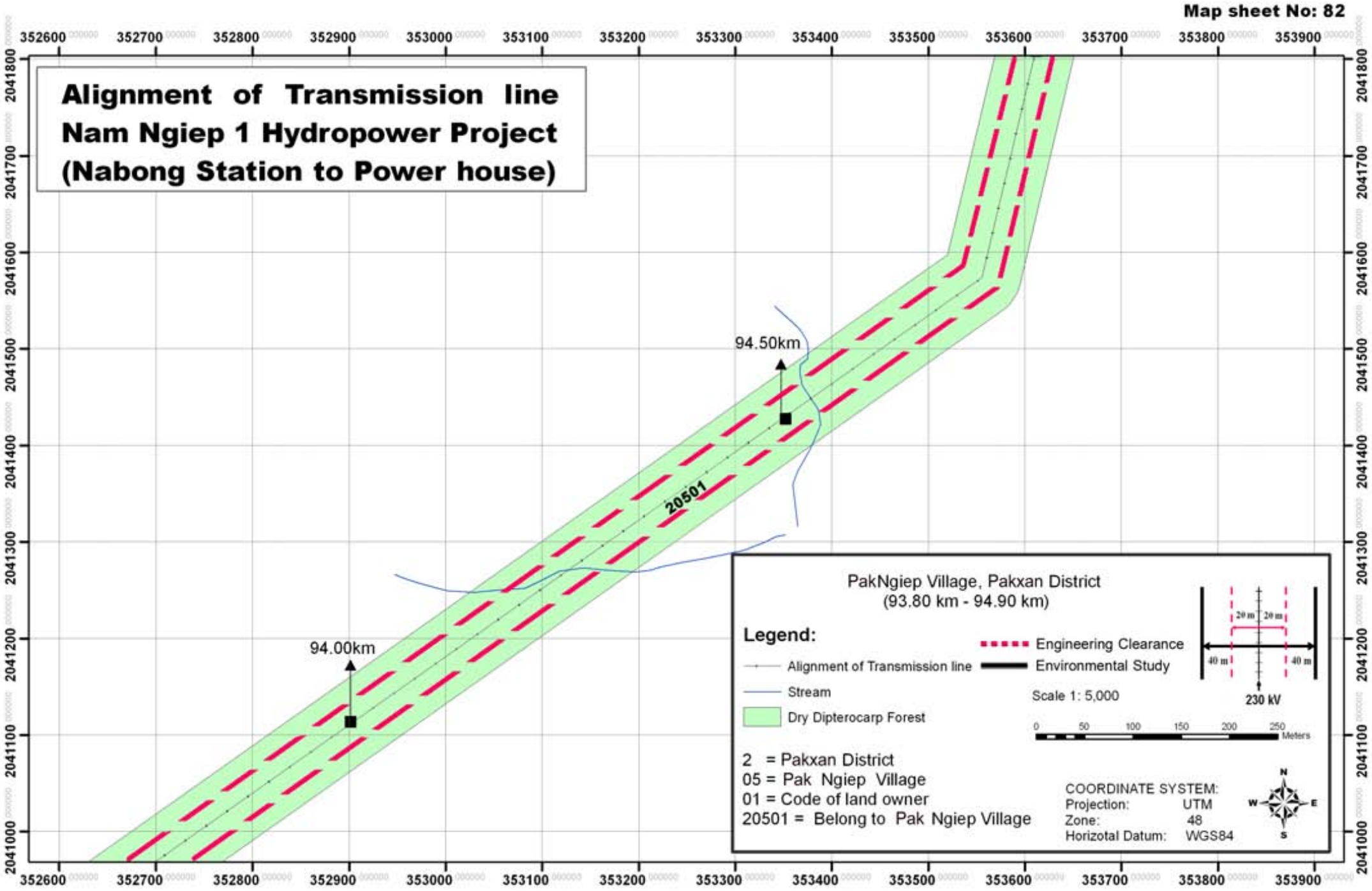
2 = Pakxan District
05 = Pak Ngiep Village
01 = Code of land owner
20501 = Belong to Pak Ngiep Village

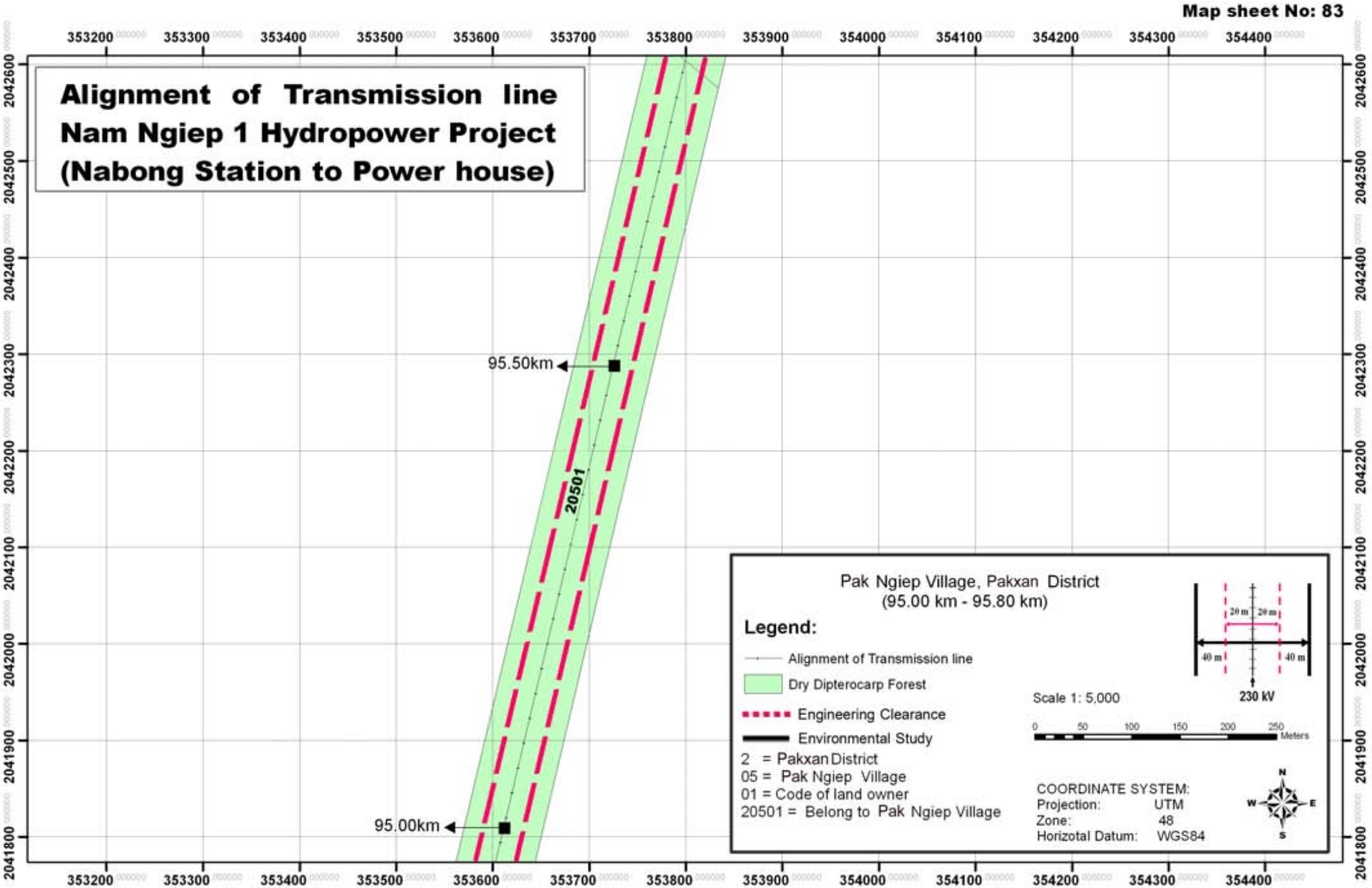


Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84


Map sheet No: 82
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
352600 352700 352800 352900 353000 353100 353200 353300 353400 353500 353600 353700 353800 353900
2041800 2041700 2041600 2041500 2041400 2041300 2041200 2041100 2041000
94.50km
94.00km
20501
PakNgiep Village, Pakxan District
(93.80 km - 94.90 km)
Legend:
Alignment of Transmission line
Stream
Dry Dipterocarp Forest
Engineering Clearance
Environmental Study
Scale 1: 5,000
0 50 100 150 200 250 Meters
20 m 20 m
40 m 40 m
230 kV
2 = Pakxan District
05 = Pak Ngiep Village
01 = Code of land owner
20501 = Belong to Pak Ngiep Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N W E S


Map sheet No: 83
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
353200
353300
353400
353500
353600
353700
353800
353900
354000
354100
354200
354300
354400
2042600
2042500
2042400
2042300
2042200
2042100
2042000
2041900
2041800
95.50km
95.00km
20501
Pak Ngiep Village, Pakxan District
(95.00 km - 95.80 km)
Legend:
Alignment of Transmission line
Dry Dipterocarp Forest
Engineering Clearance
Environmental Study
2 = Pakxan District
05 = Pak Ngiep Village
01 = Code of land owner
20501 = Belong to Pak Ngiep Village
20 m
20 m
40 m
40 m
230 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 84

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

352900 353000 353100 353200 353300 353400 353500 353600 353700 353800 353900 354000 354100 354200

2043400 2043300 2043200 2043100 2043000 2042900 2042800 2042700 2042600

96.50km

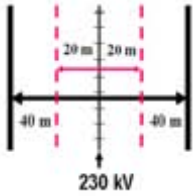
96.00km

10201

Nampa Village
(95.80 km - 96.60 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

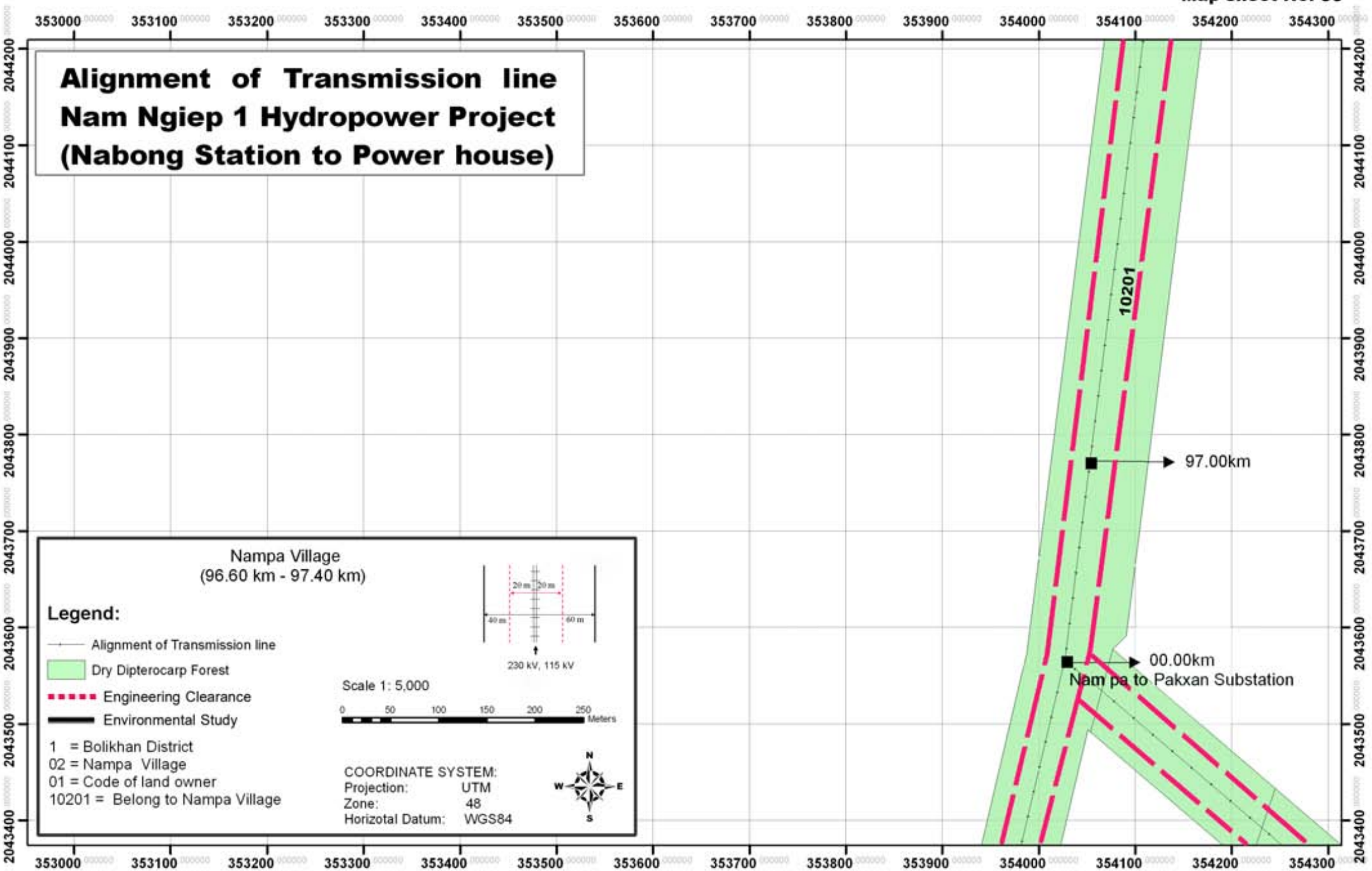
1 = Bolikhan District
02 = Nampa Village
01 = Code of land owner
10201 = Belong to Nampa Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 85

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Nampa Village
(96.60 km - 97.40 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
02 = Nampa Village
01 = Code of land owner
10201 = Belong to Nampa Village

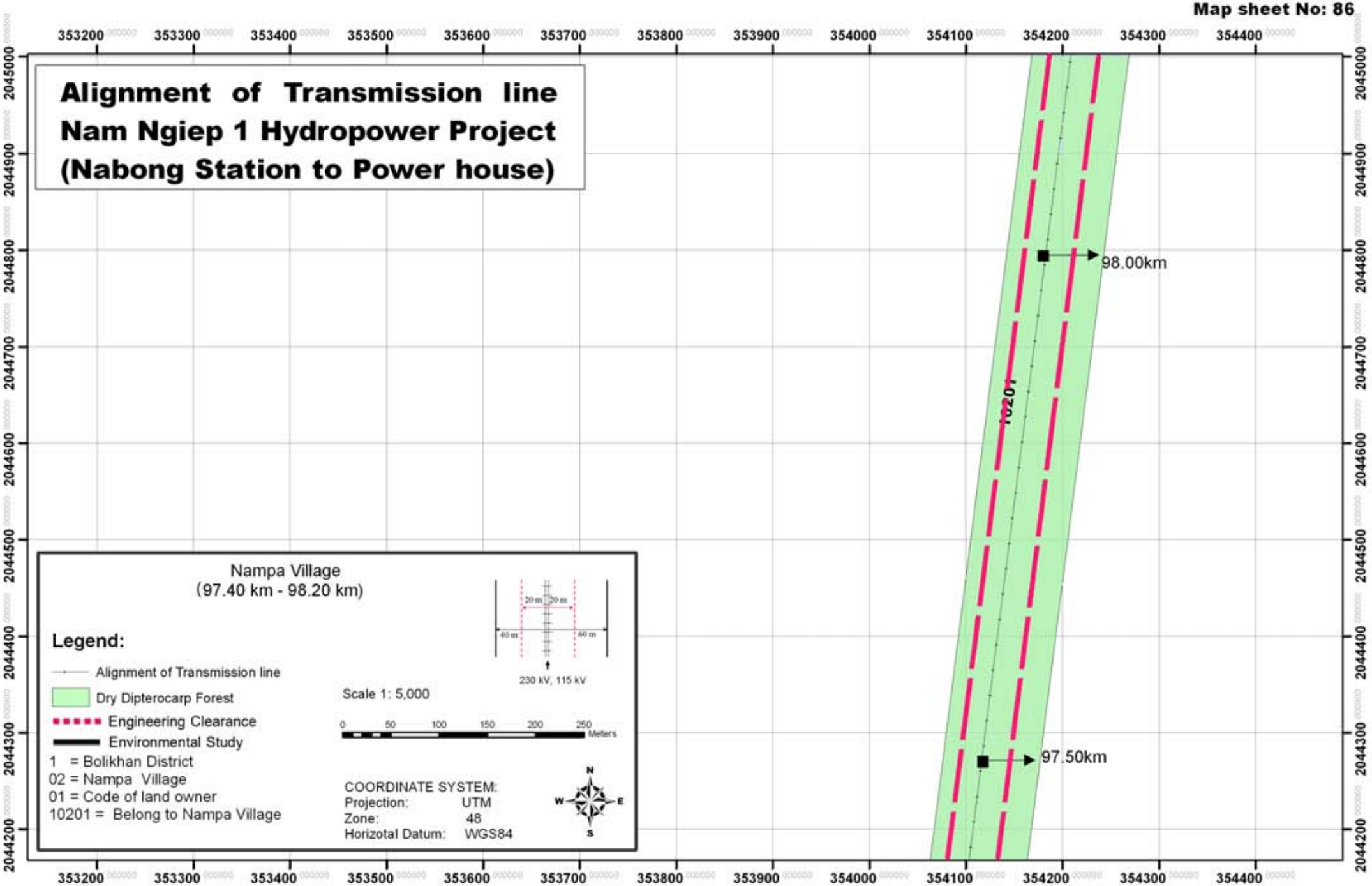
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 86

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Nampa Village
(97.40 km - 98.20 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

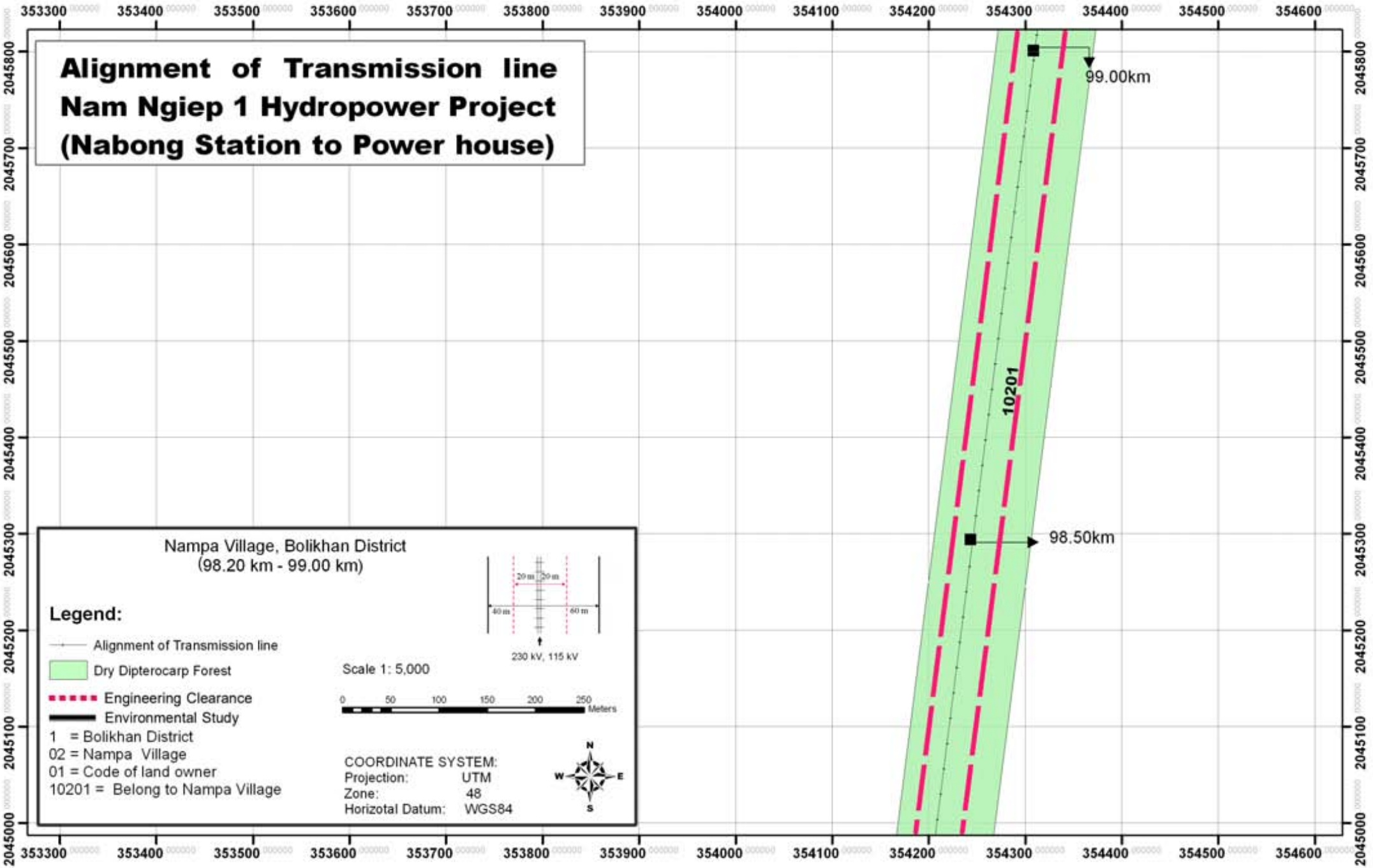
1 = Bolikhan District
02 = Nampa Village
01 = Code of land owner
10201 = Belong to Nampa Village

Scale 1: 5,000

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 87

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Nampa Village, Bolikhan District
(98.20 km - 99.00 km)

Legend:

- Alignment of Transmission line
- Dry Dipterocarp Forest
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
02 = Nampa Village
01 = Code of land owner
10201 = Belong to Nampa Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N
W
E
S

Map sheet No: 88

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

10103

10201

99.50km

99.00km

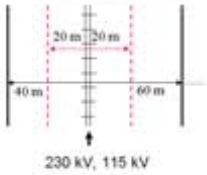
353400 353500 353600 353700 353800 353900 354000 354100 354200 354300 354400 354500 354600 354700

2046600 2046500 2046400 2046300 2046200 2046100 2046000 2045900 2045800

Nampa Village - Hat Gniun Village , Bolikhan District
(99.00 km - 99.80 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Mixed deciduous
- Environmental Study
- Dry Dipterocarp Forest



1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

1 = Bolikhan District
02 = Nampa Village
01 = Code of land owner
10201 = Belong to Nampa Village

Scale 1: 5,000

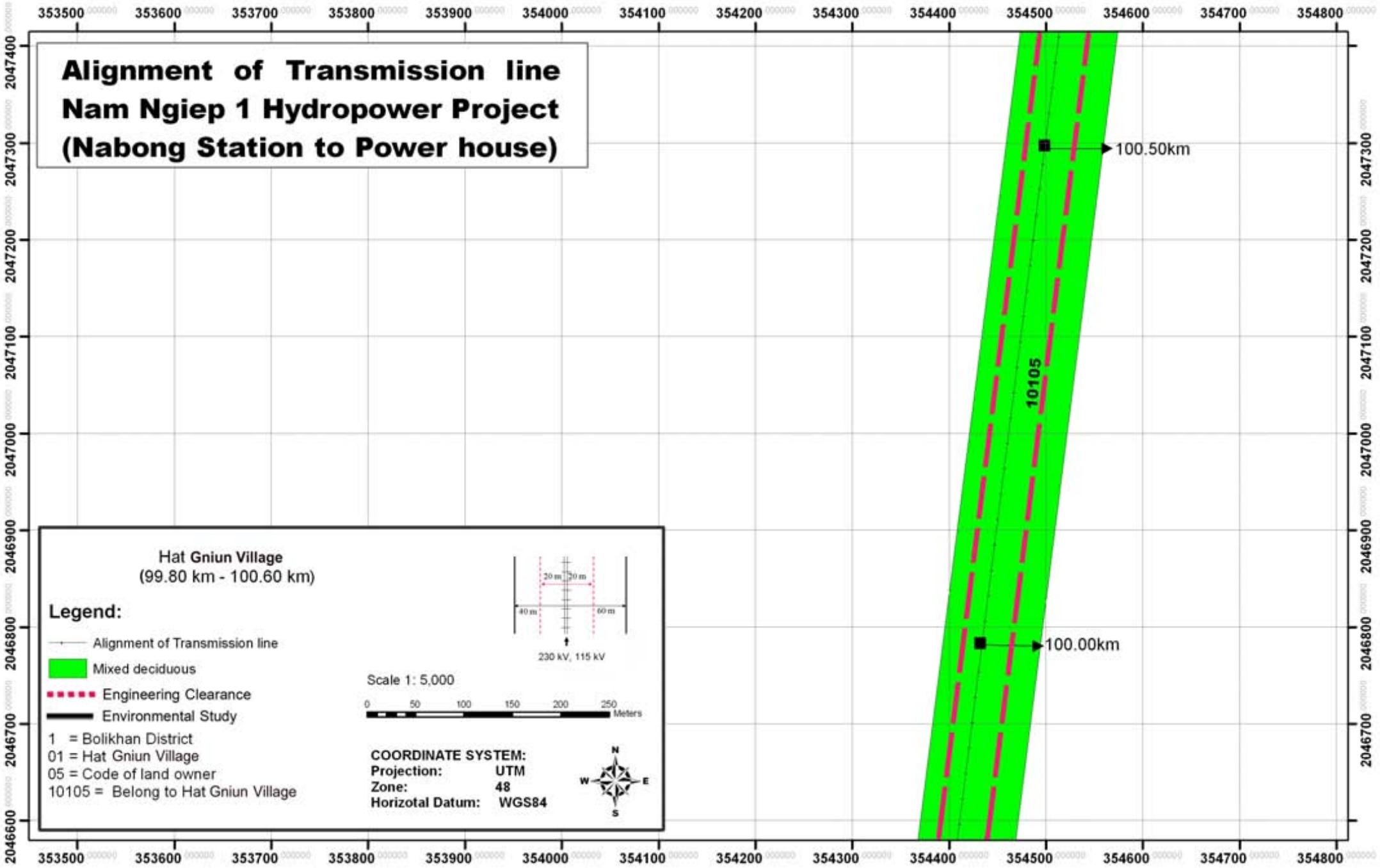
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 89

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(99.80 km - 100.60 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

230 kV, 115 kV

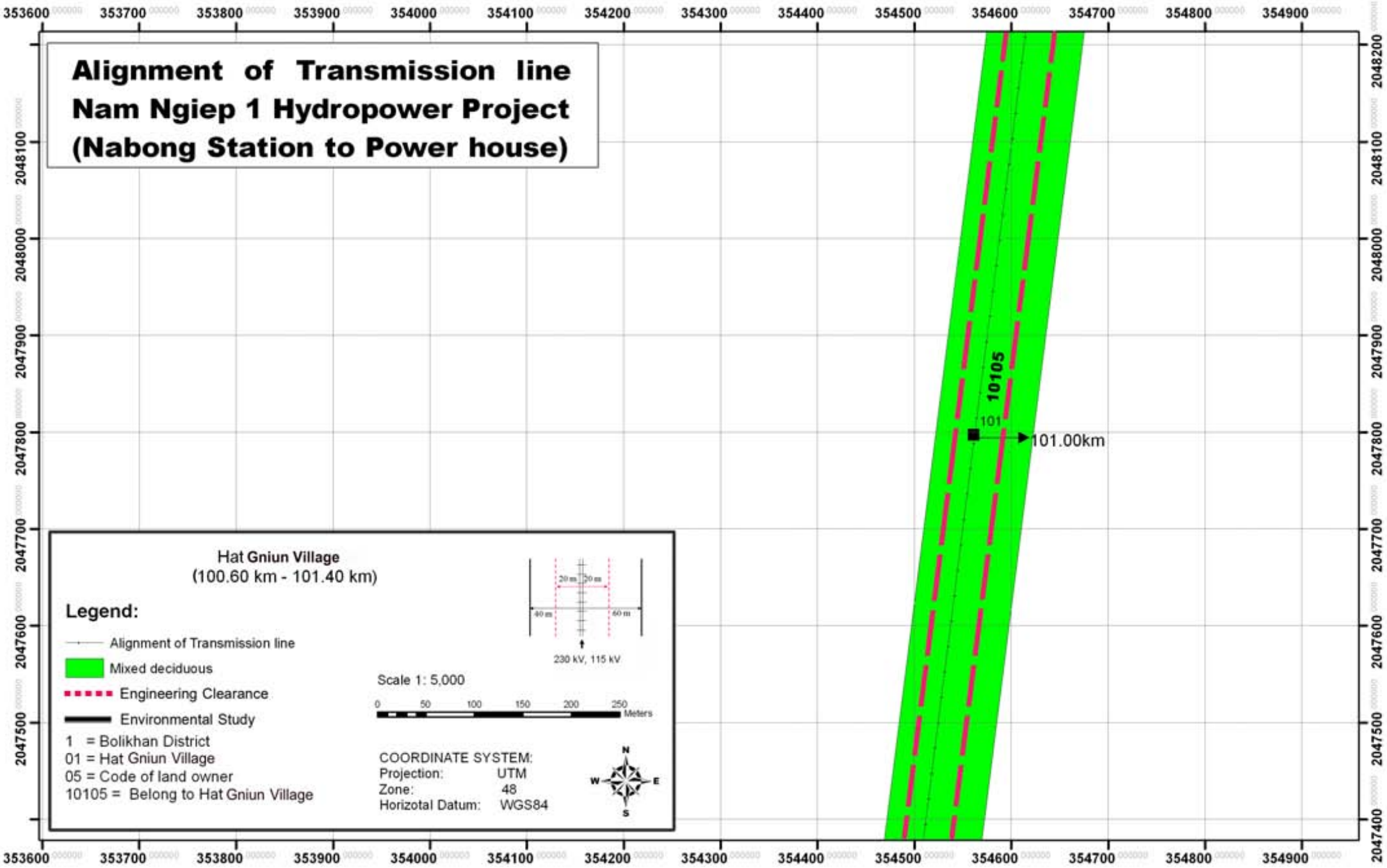
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 90

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(100.60 km - 101.40 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

230 kV, 115 kV

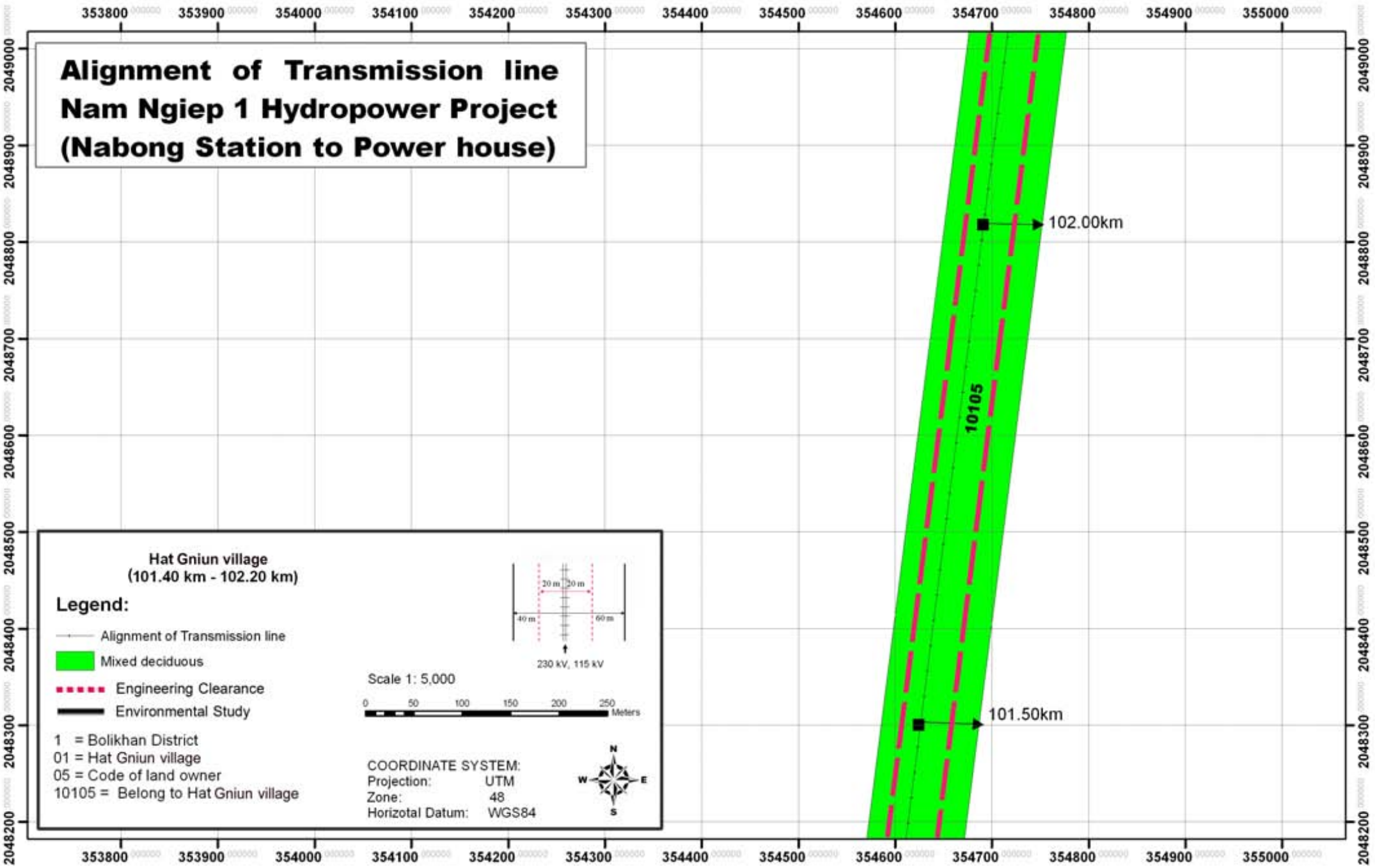
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 91

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun village
(101.40 km - 102.20 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun village
05 = Code of land owner
10105 = Belong to Hat Gniun village

230 kV, 115 kV

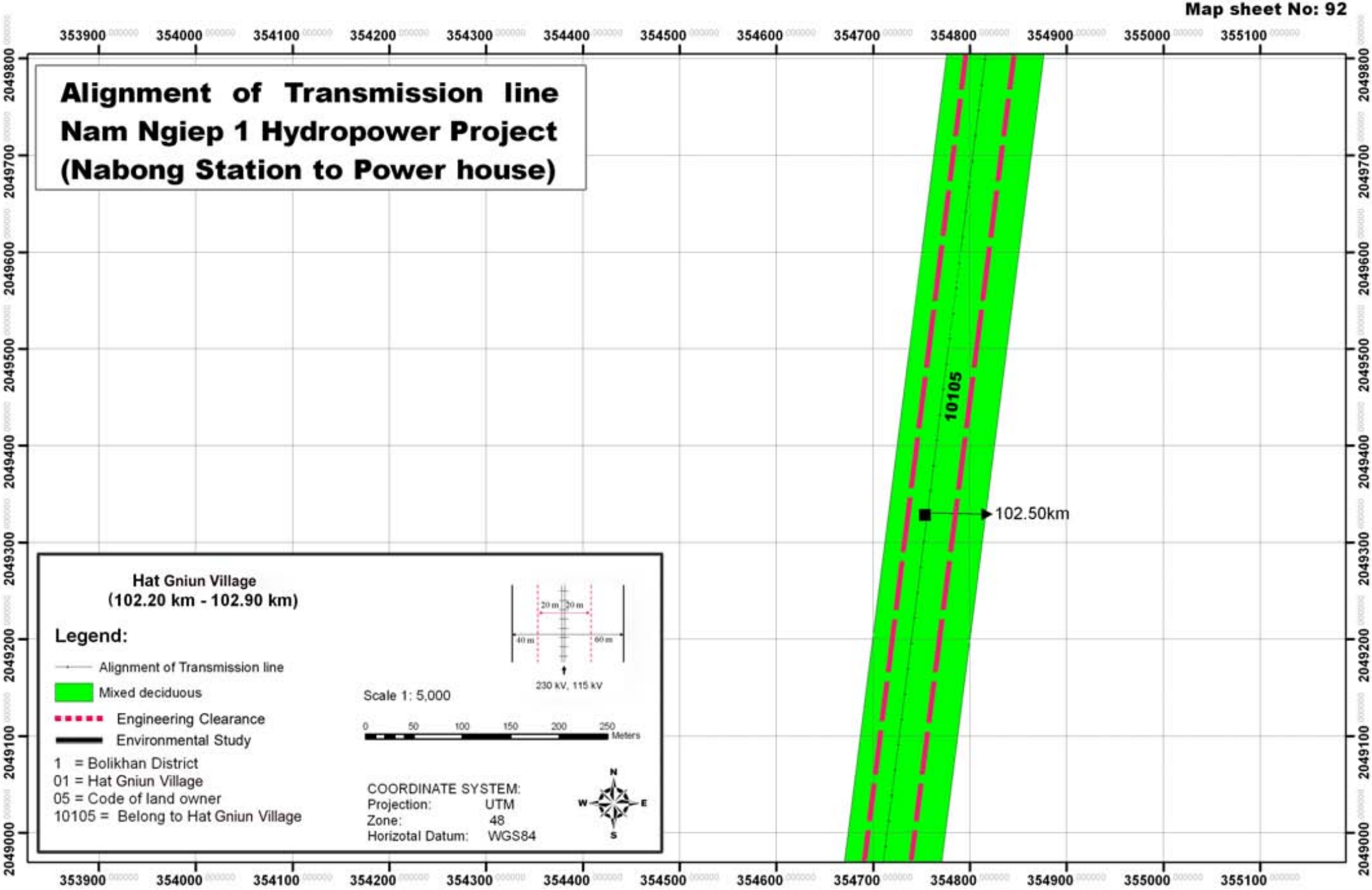
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 92

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(102.20 km - 102.90 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

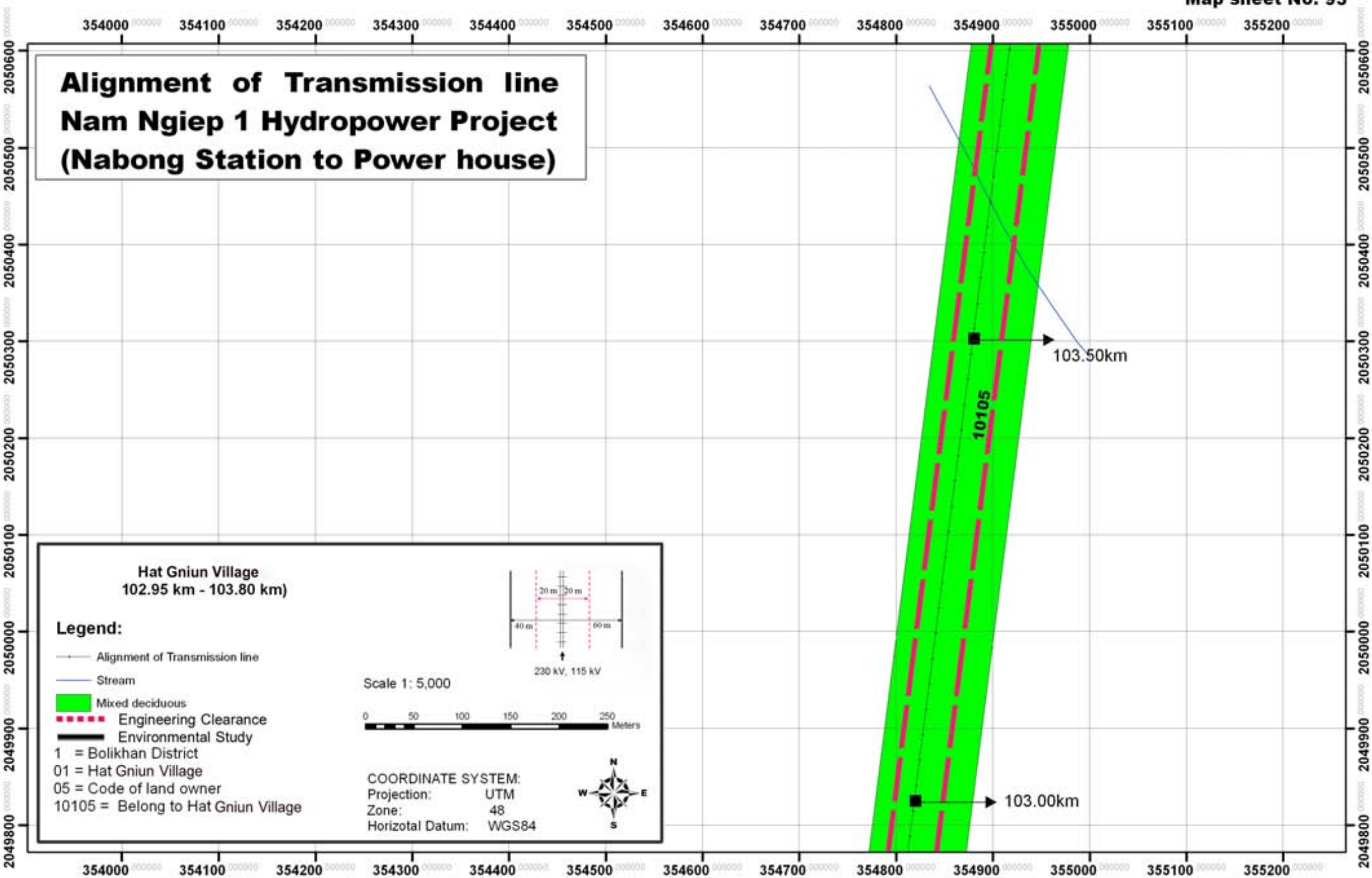
1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

Scale 1: 5,000

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 93

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
102.95 km - 103.80 km)

Legend:

- Alignment of Transmission line
- Stream
- Mixed deciduous
- Engineering Clearance
- Environmental Study

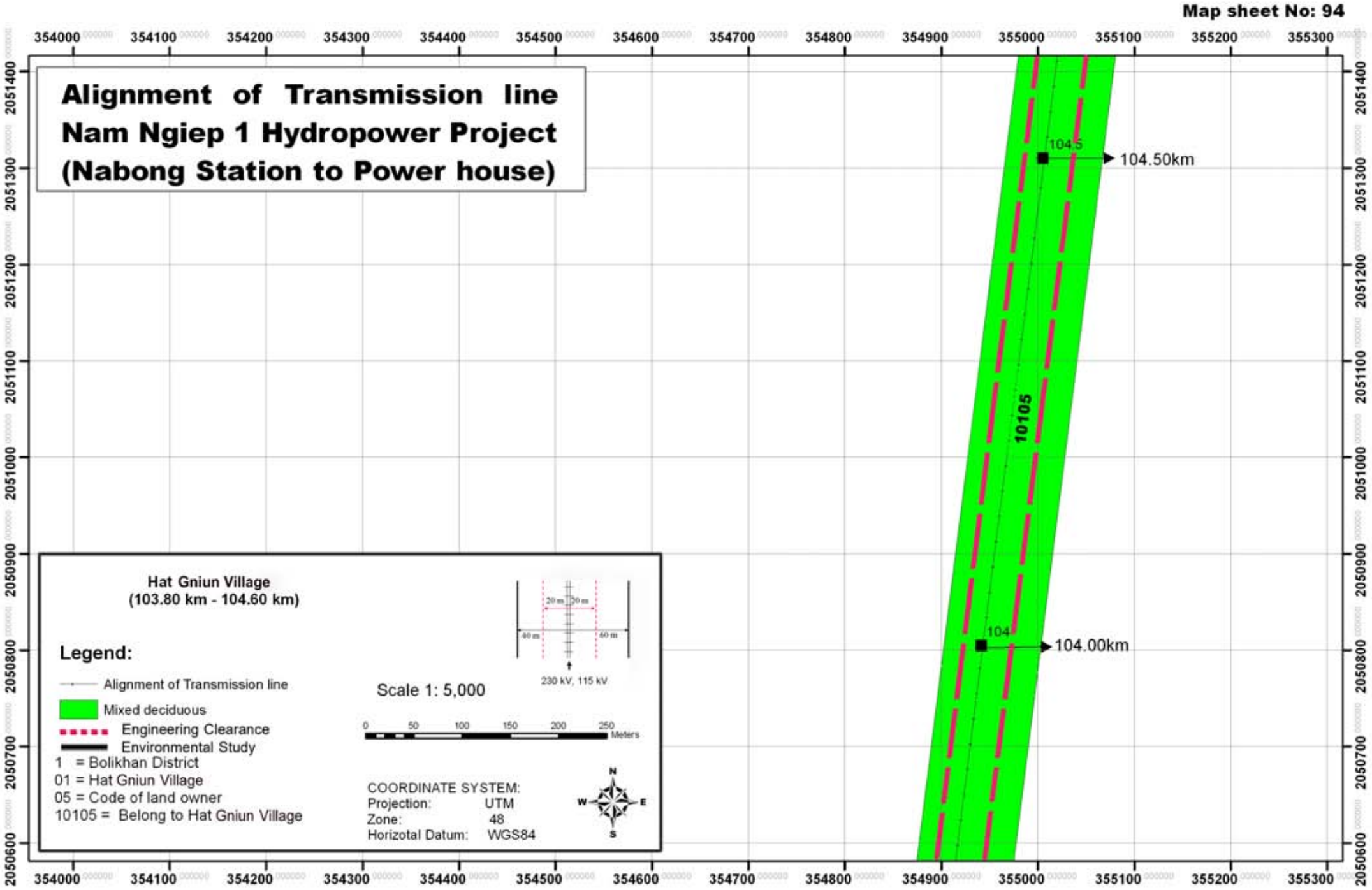
1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

230 kV, 115 kV

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84


Map sheet No: 94
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
354000
354100
354200
354300
354400
354500
354600
354700
354800
354900
355000
355100
355200
355300
2051400
2051300
2051200
2051100
2051000
2050900
2050800
2050700
2050600
104.5
104.50km
104
104.00km
10105
Hat Gniun Village
(103.80 km - 103.60 km)
Legend:
Alignment of Transmission line
Mixed deciduous
Engineering Clearance
Environmental Study
1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village
20 m
20 m
40 m
60 m
230 kV, 115 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 95

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

Hat Gniun Village
(104.52 km - 105.42 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

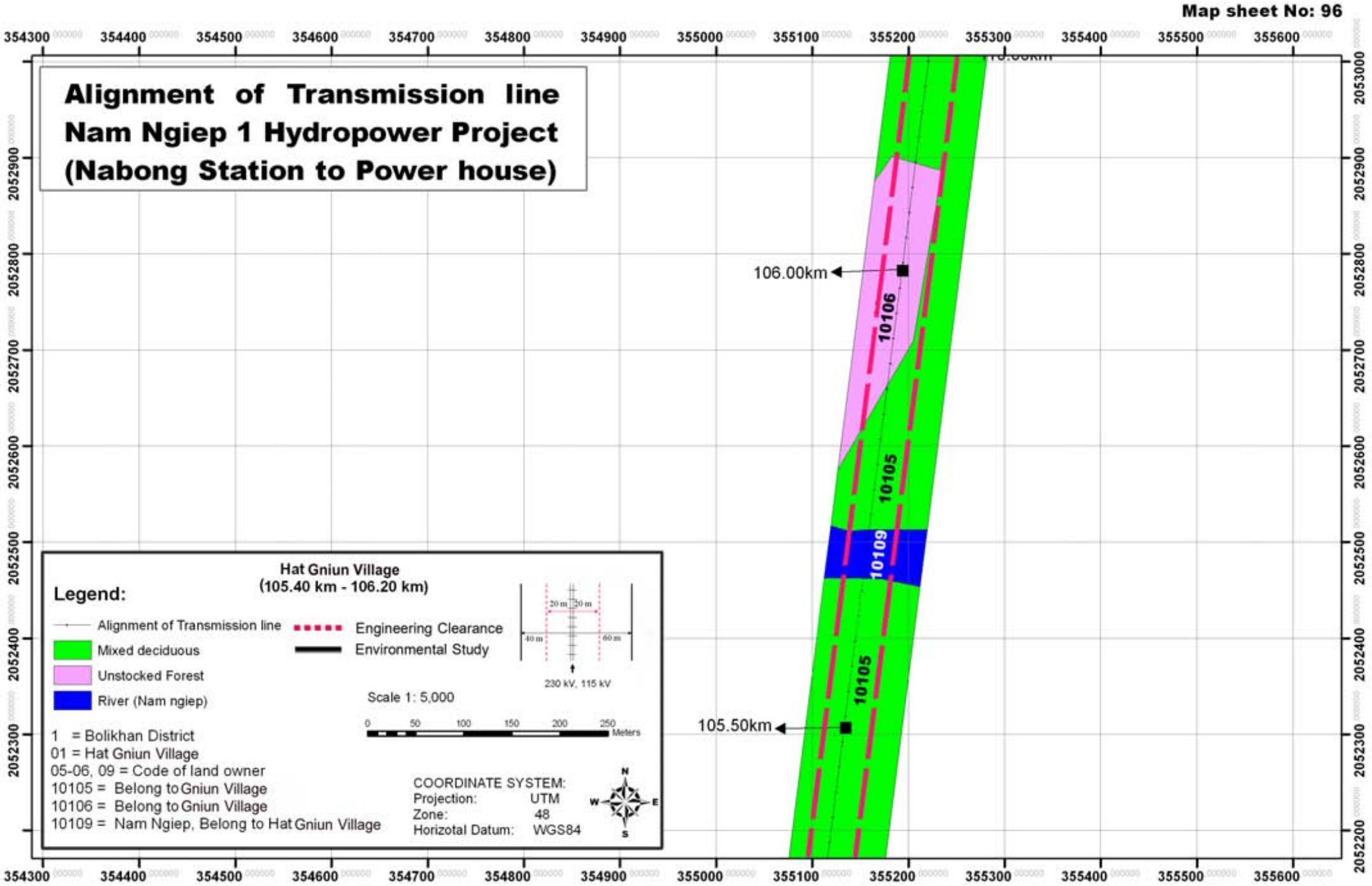
1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

230 kV, 115 kV

Scale 1: 5,000

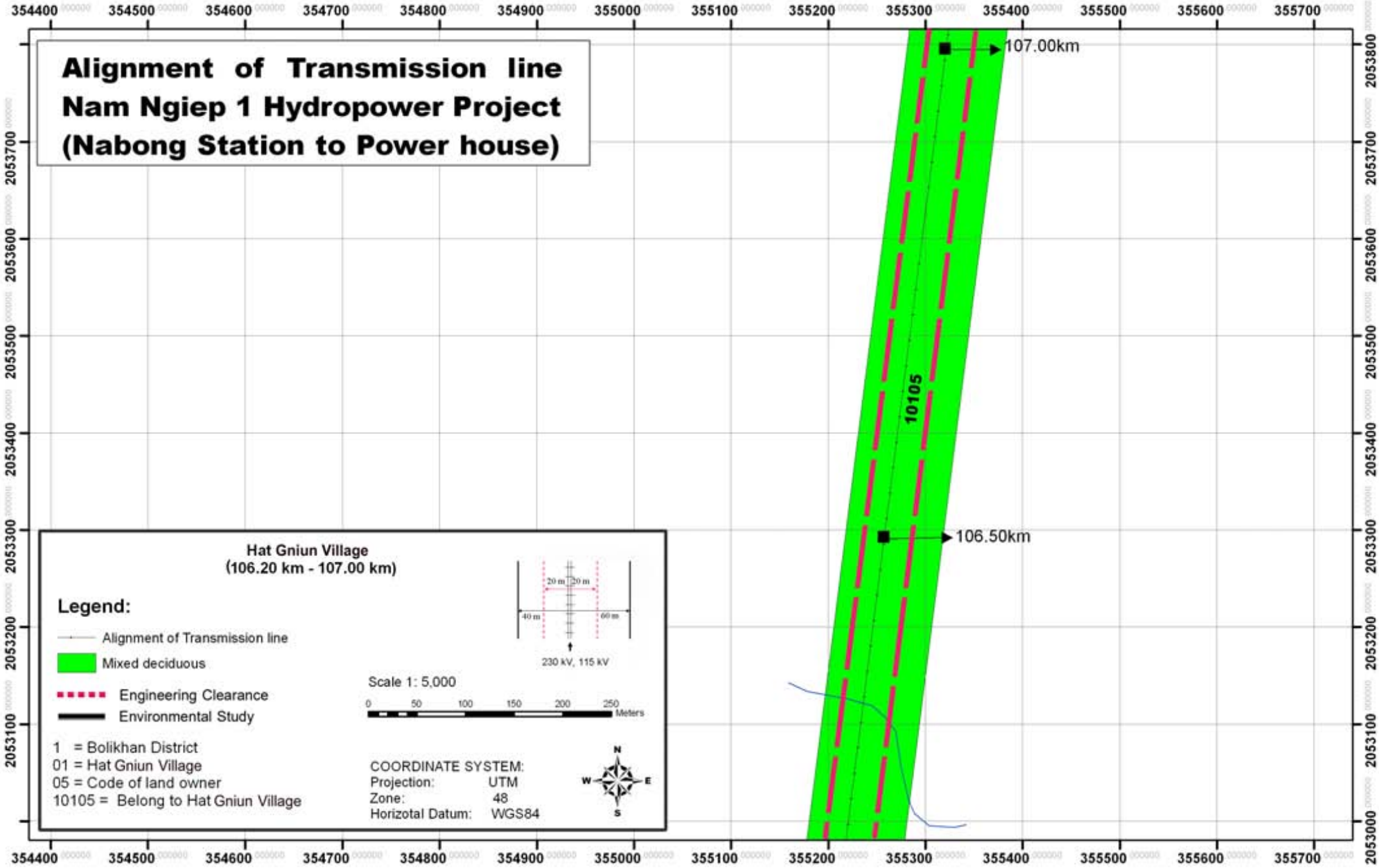
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84


Map sheet No: 96
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
354300
354400
354500
354600
354700
354800
354900
355000
355100
355200
355300
355400
355500
355600
2052900
2052800
2052700
2052600
2052500
2052400
2052300
2052200
2053000
106.00km
105.50km
10106
10105
10109
10105
Hat Gniun Village
(105.40 km - 106.20 km)
Legend:
Alignment of Transmission line
Mixed deciduous
Unstocked Forest
River (Nam ngiep)
Engineering Clearance
Environmental Study
20 m
20 m
40 m
60 m
230 kV, 115 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
1 = Bolikhan District
01 = Hat Gniun Village
05-06, 09 = Code of land owner
10105 = Belong to Gniun Village
10106 = Belong to Gniun Village
10109 = Nam Ngiep, Belong to Hat Gniun Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
S
E
W

Map sheet No: 97

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(106.20 km - 107.00 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun Village
05 = Code of land owner
10105 = Belong to Hat Gniun Village

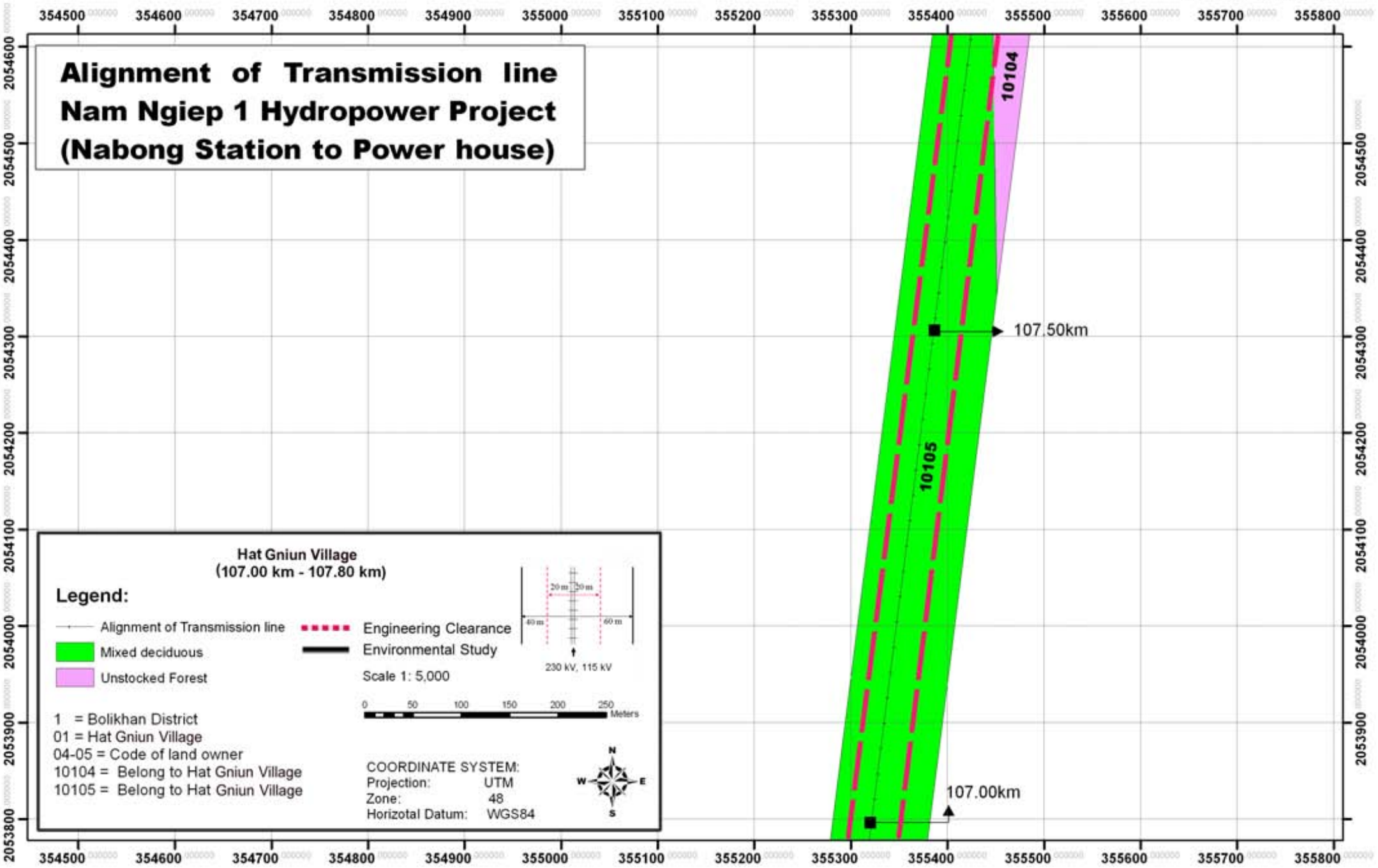
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 98

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(107.00 km - 107.80 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Unstocked Forest
- Engineering Clearance
- Environmental Study

Scale 1: 5,000

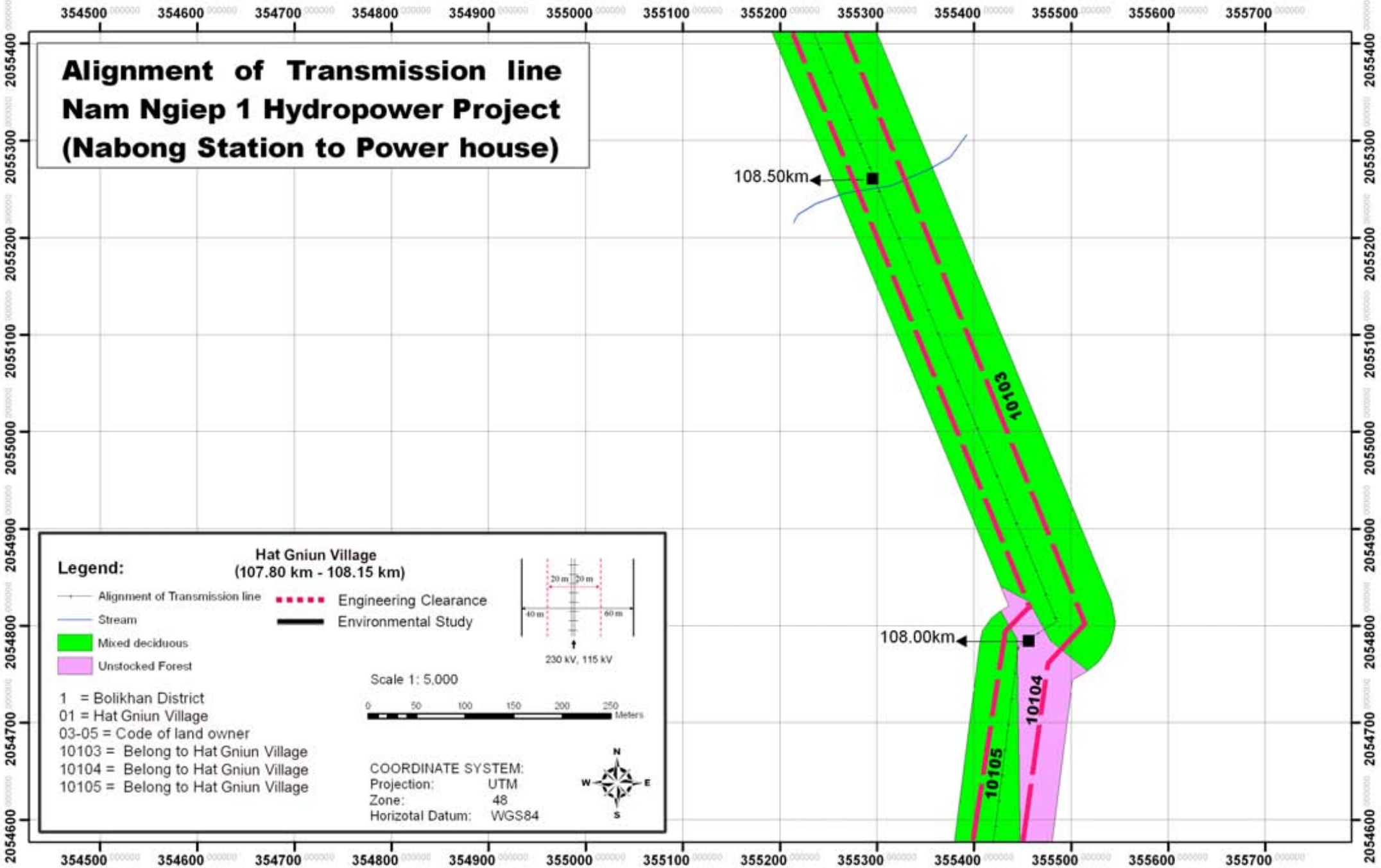
0 50 100 150 200 250 Meters

1 = Bolikhan District
01 = Hat Gniun Village
04-05 = Code of land owner
10104 = Belong to Hat Gniun Village
10105 = Belong to Hat Gniun Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 99

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Legend:

Hat Gniun Village
(107.80 km - 108.15 km)

- Alignment of Transmission line
- Stream
- Mixed deciduous
- Unstocked Forest
- Engineering Clearance
- Environmental Study

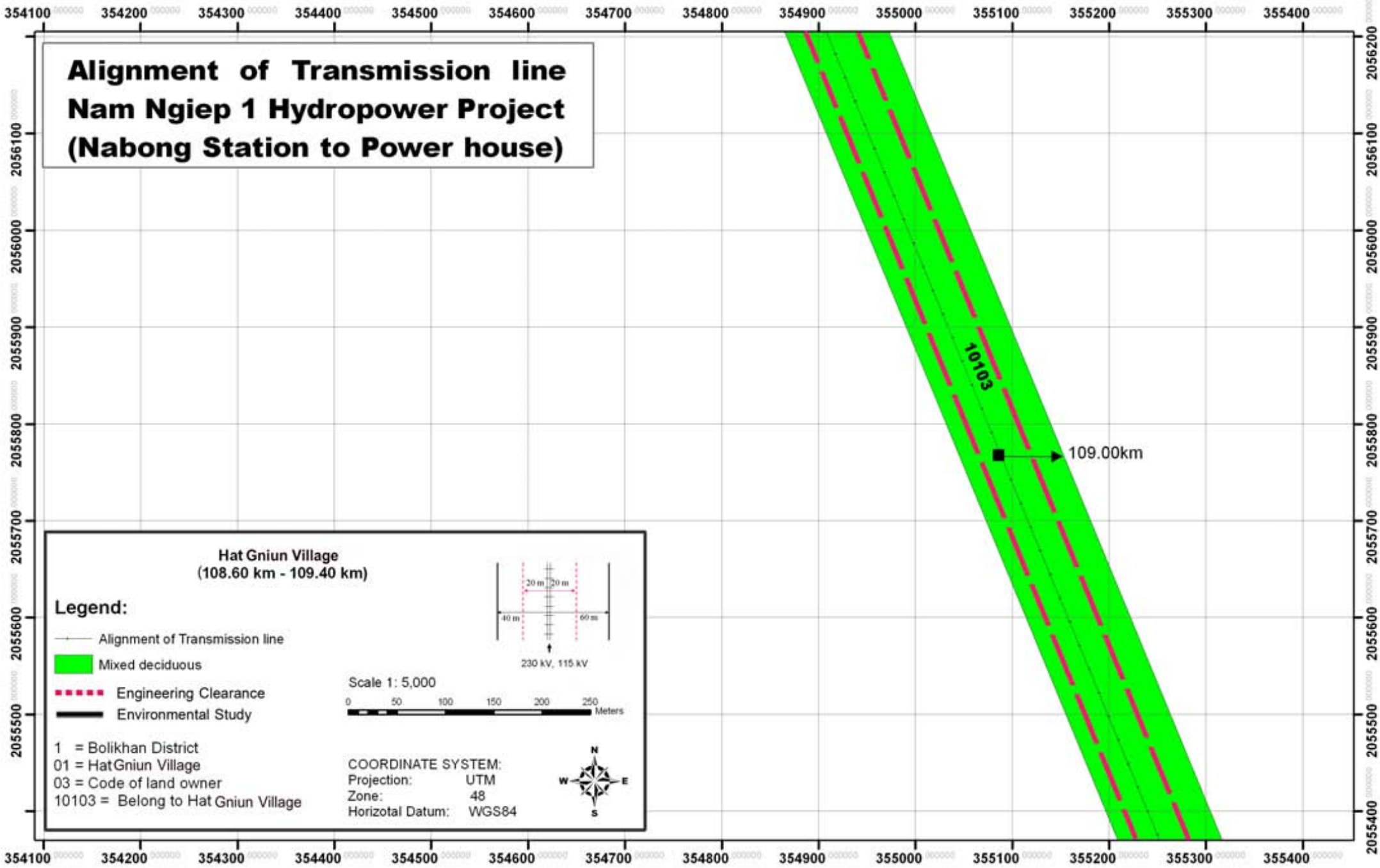
Scale 1: 5,000

1 = Bolikhan District
01 = Hat Gniun Village
03-05 = Code of land owner
10103 = Belong to Hat Gniun Village
10104 = Belong to Hat Gniun Village
10105 = Belong to Hat Gniun Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 100

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(108.60 km - 109.40 km)

Legend:

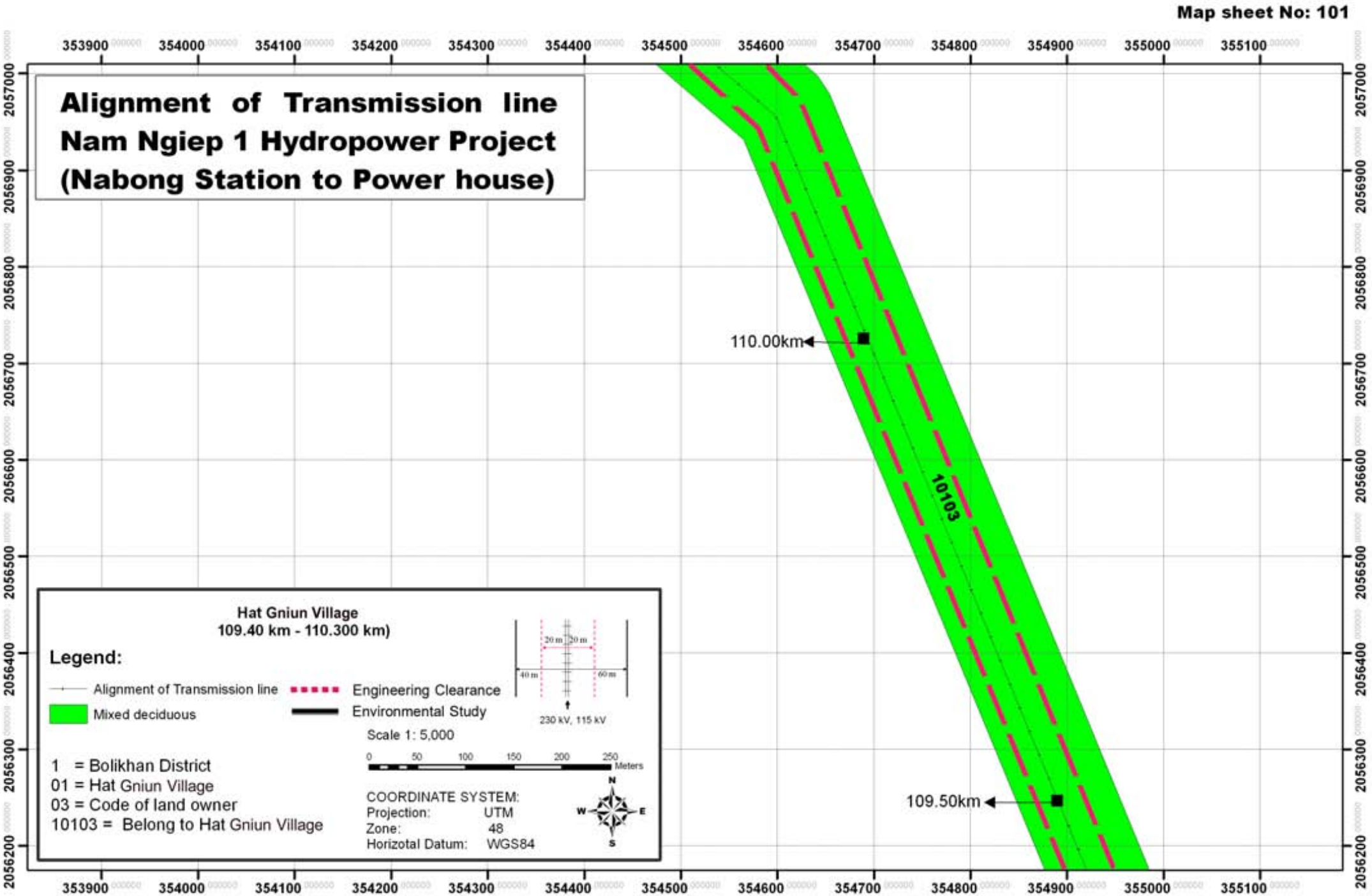
- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun Village
03 = Code of land owner
10103 = Belong to Hat Gniun Village

Scale 1: 5,000

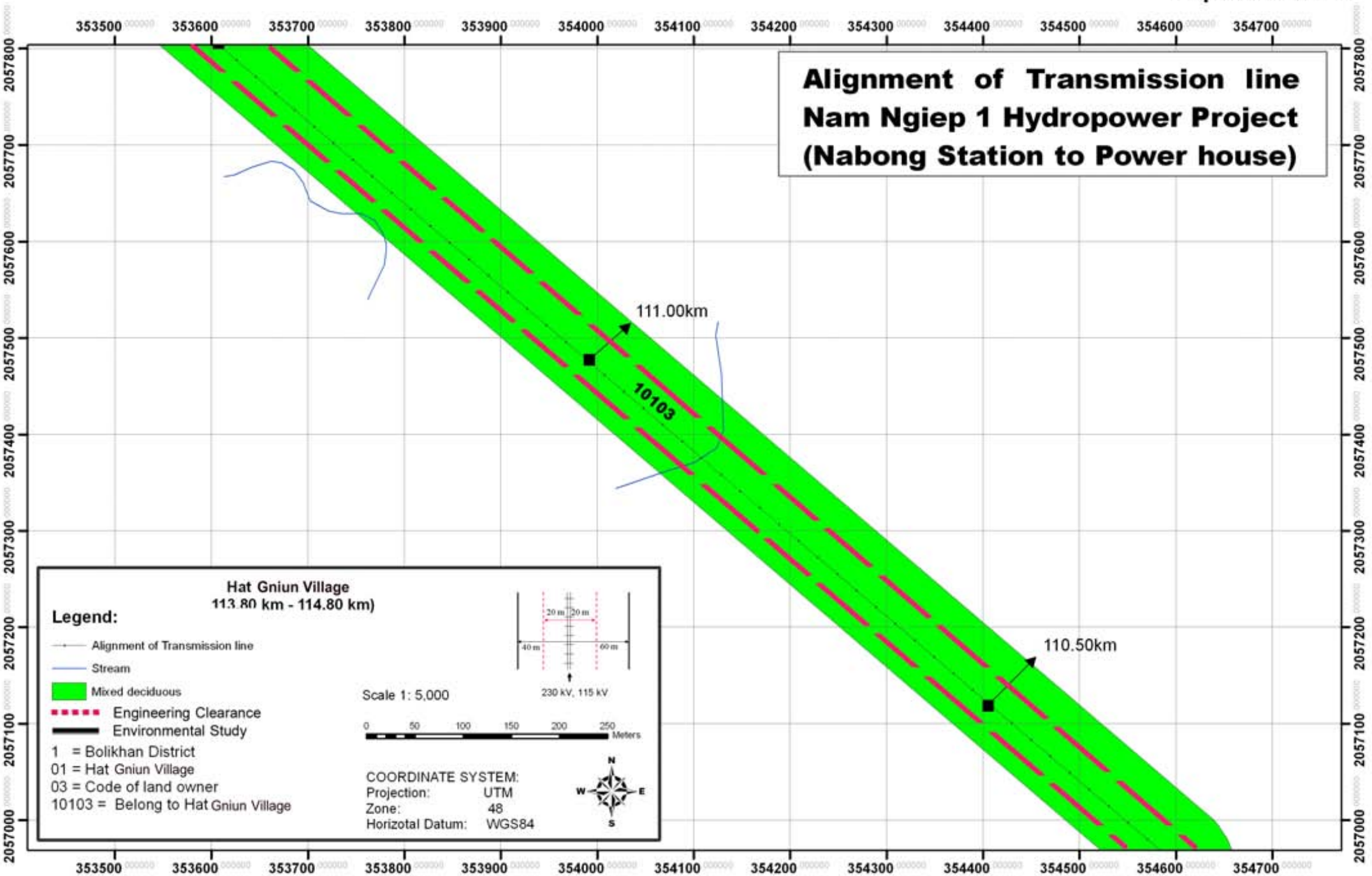
0 50 100 150 200 250 Meters

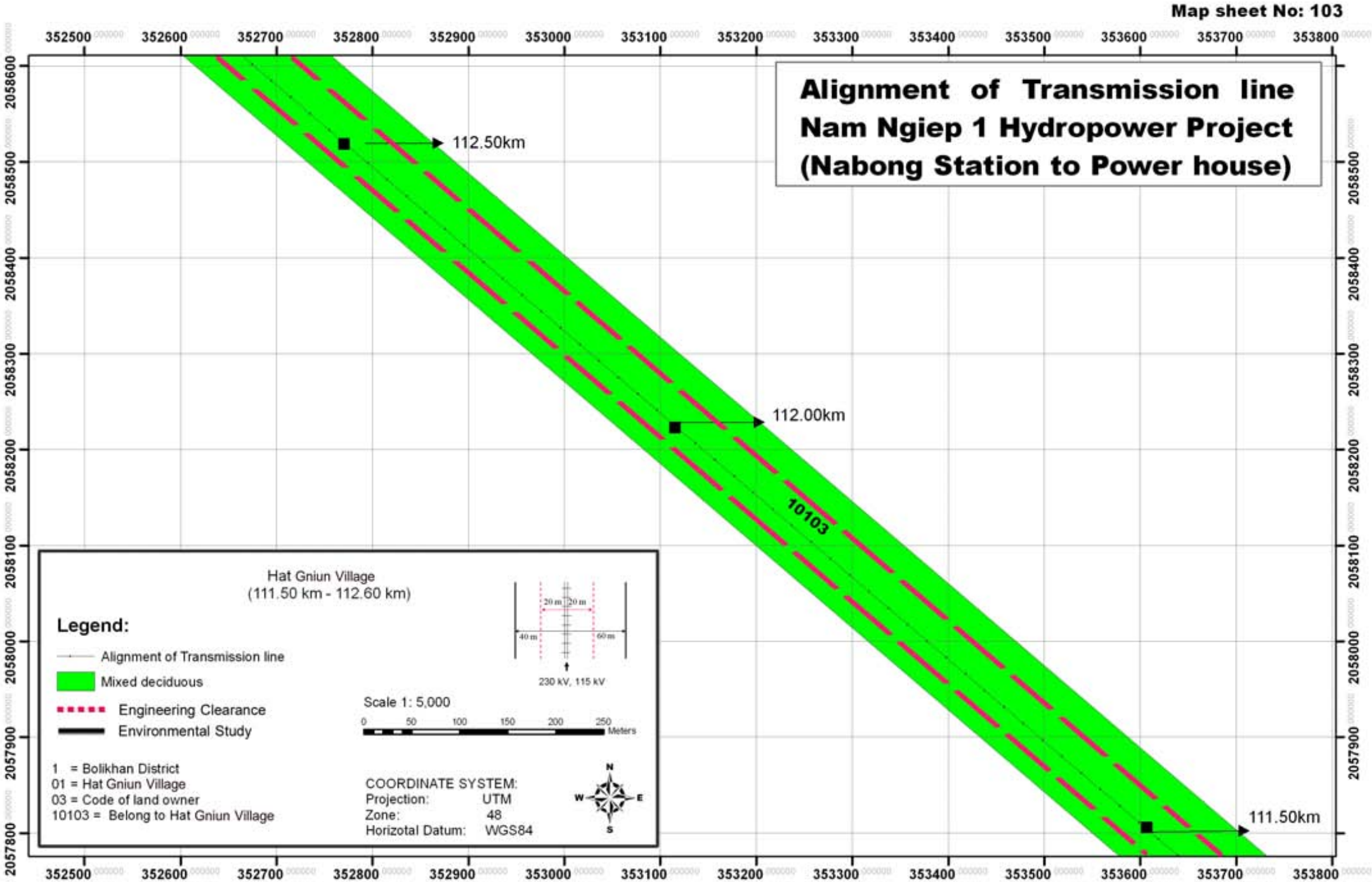
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84


Map sheet No: 101
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
353900
354000
354100
354200
354300
354400
354500
354600
354700
354800
354900
355000
355100
2057000
2056900
2056800
2056700
2056600
2056500
2056400
2056300
2056200
110.00km
109.50km
10103
Hat Gniun Village
109.40 km - 110.300 km)
Legend:
Alignment of Transmission line
Engineering Clearance
Mixed deciduous
Environmental Study
20 m
20 m
40 m
60 m
230 kV, 115 kV
Scale 1: 5,000
0
50
100
150
200
250
Meters
1 = Bolikhan District
01 = Hat Gniun Village
03 = Code of land owner
10103 = Belong to Hat Gniun Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S

Map sheet No: 102

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)




Map sheet No: 103
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
112.50km
112.00km
111.50km
10103
352500
352600
352700
352800
352900
353000
353100
353200
353300
353400
353500
353600
353700
353800
2058600
2058500
2058400
2058300
2058200
2058100
2058000
2057900
2057800
Hat Gniun Village
(111.50 km - 112.60 km)
Legend:
Alignment of Transmission line
Mixed deciduous
Engineering Clearance
Environmental Study
20 m
20 m
40 m
60 m
230 kV, 115 kV
Scale 1: 5,000
0 50 100 150 200 250 Meters
1 = Bolikhan District
01 = Hat Gniun Village
03 = Code of land owner
10103 = Belong to Hat Gniun Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
S
W
E

Map sheet No: 104

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)

10101

10102

10107

10108

10103

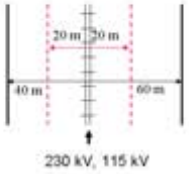
113.50km

113.00km

Hat Gniun Village
112.80 km - 113.98 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Paddy Field
- River (Nam Ngiep)
- Engineering Clearance
- Environmental Study



1 = Bolikhan District
01 = Hat Gniun Village
01 - 03,07,08 = Code of land owner
10101 = Belong to Hat Gniun Village
10102 = Belong to Mr Keoun
10103 = Belong to Hat Gniun Village
10107 = Belong to Hat Gniun Village
10108 = Nam ngiep, Belong to Hat Gniun Village

Scale 1: 5,000

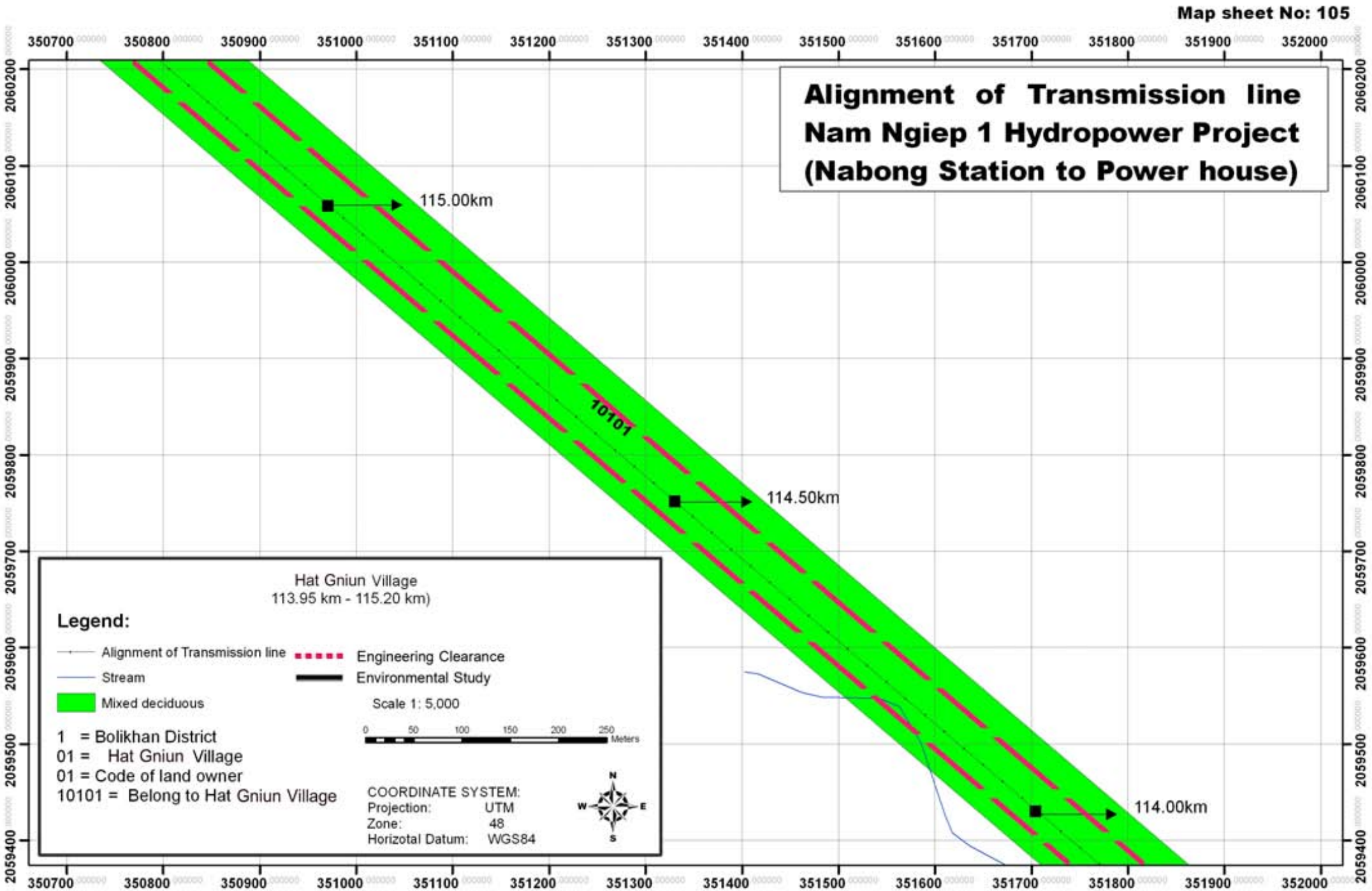
0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

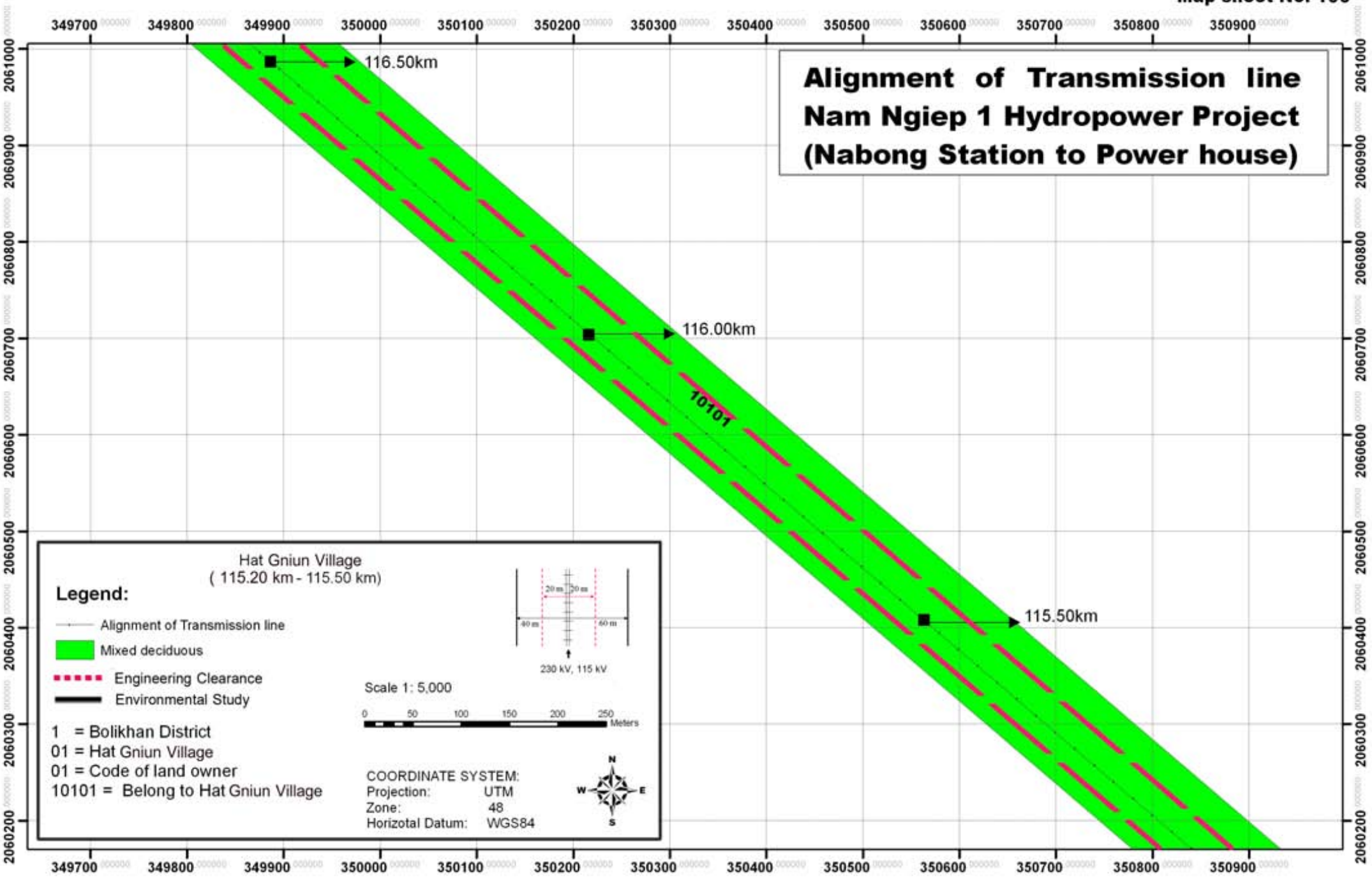
351500 351600 351700 351800 351900 352000 352100 352200 352300 352400 352500 352600 352700 352800

2059400 2059300 2059200 2059100 2059000 2058900 2058800 2058700 2058600


Map sheet No: 105
Alignment of Transmission line
Nam Ngiep 1 Hydropower Project
(Nabong Station to Power house)
115.00km
114.50km
114.00km
10101
Hat Gniun Village
113.95 km - 115.20 km)
Legend:
Alignment of Transmission line
Engineering Clearance
Stream
Environmental Study
Mixed deciduous
Scale 1: 5,000
0 50 100 150 200 250 Meters
1 = Bolikhan District
01 = Hat Gniun Village
01 = Code of land owner
10101 = Belong to Hat Gniun Village
COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84
N
W
E
S
350700 350800 350900 351000 351100 351200 351300 351400 351500 351600 351700 351800 351900 352000
2060200 2060100 2060000 2059900 2059800 2059700 2059600 2059500 2059400

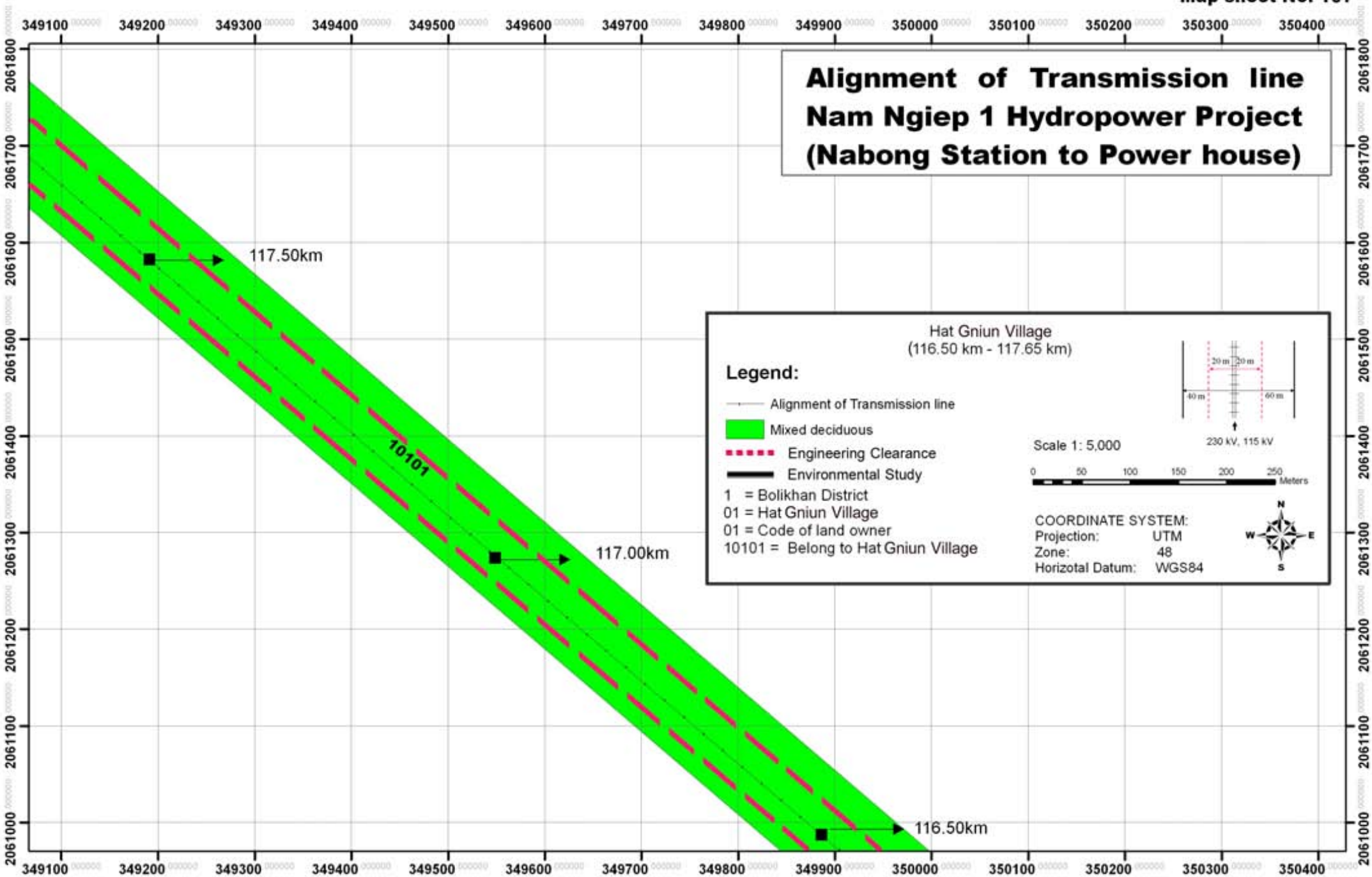
Map sheet No: 106

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 107

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gniun Village
(116.50 km - 117.65 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

1 = Bolikhan District
01 = Hat Gniun Village
01 = Code of land owner
10101 = Belong to Hat Gniun Village

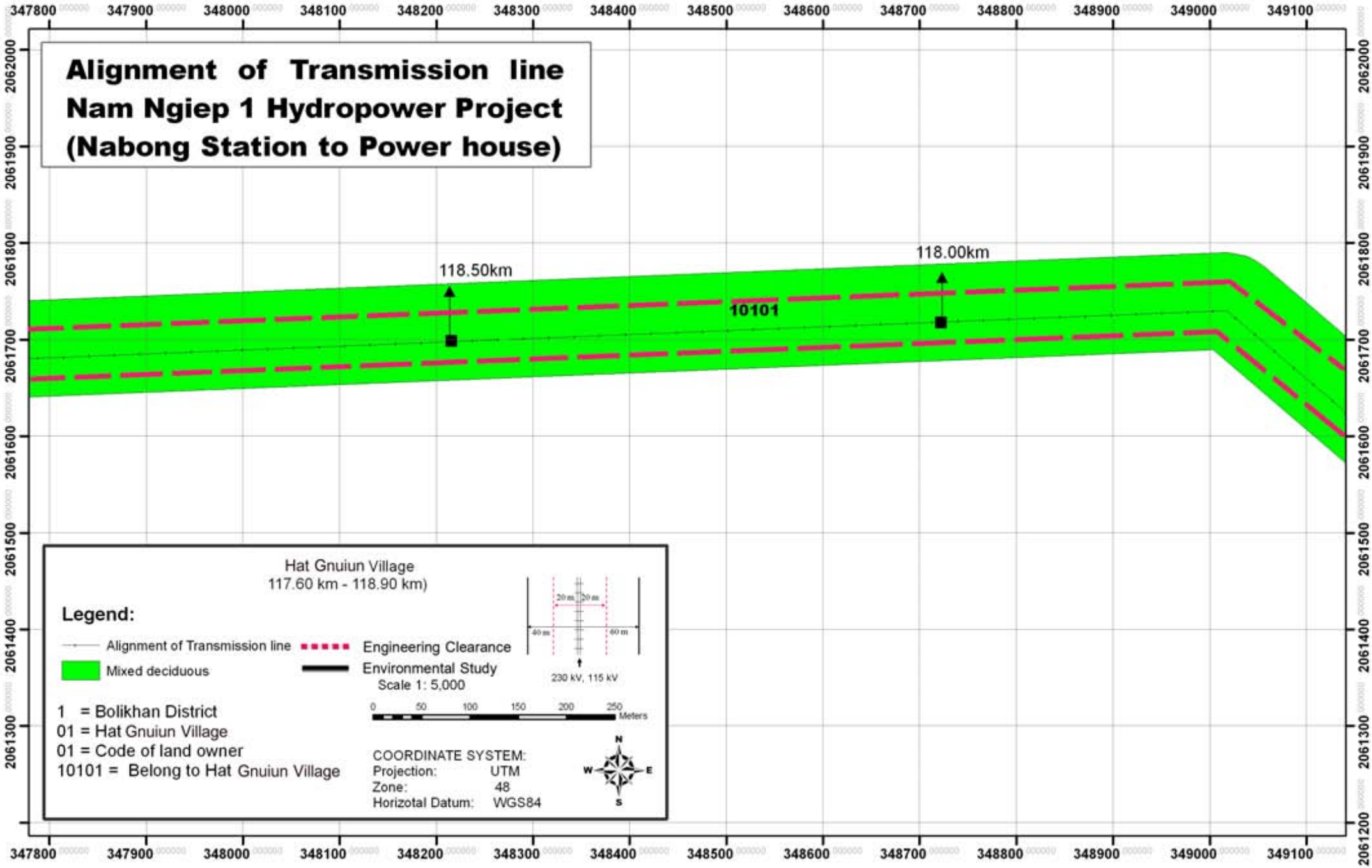
Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 108

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Hat Gnuiun Village
117.60 km - 118.90 km)

Legend:

- Alignment of Transmission line
- Mixed deciduous
- Engineering Clearance
- Environmental Study

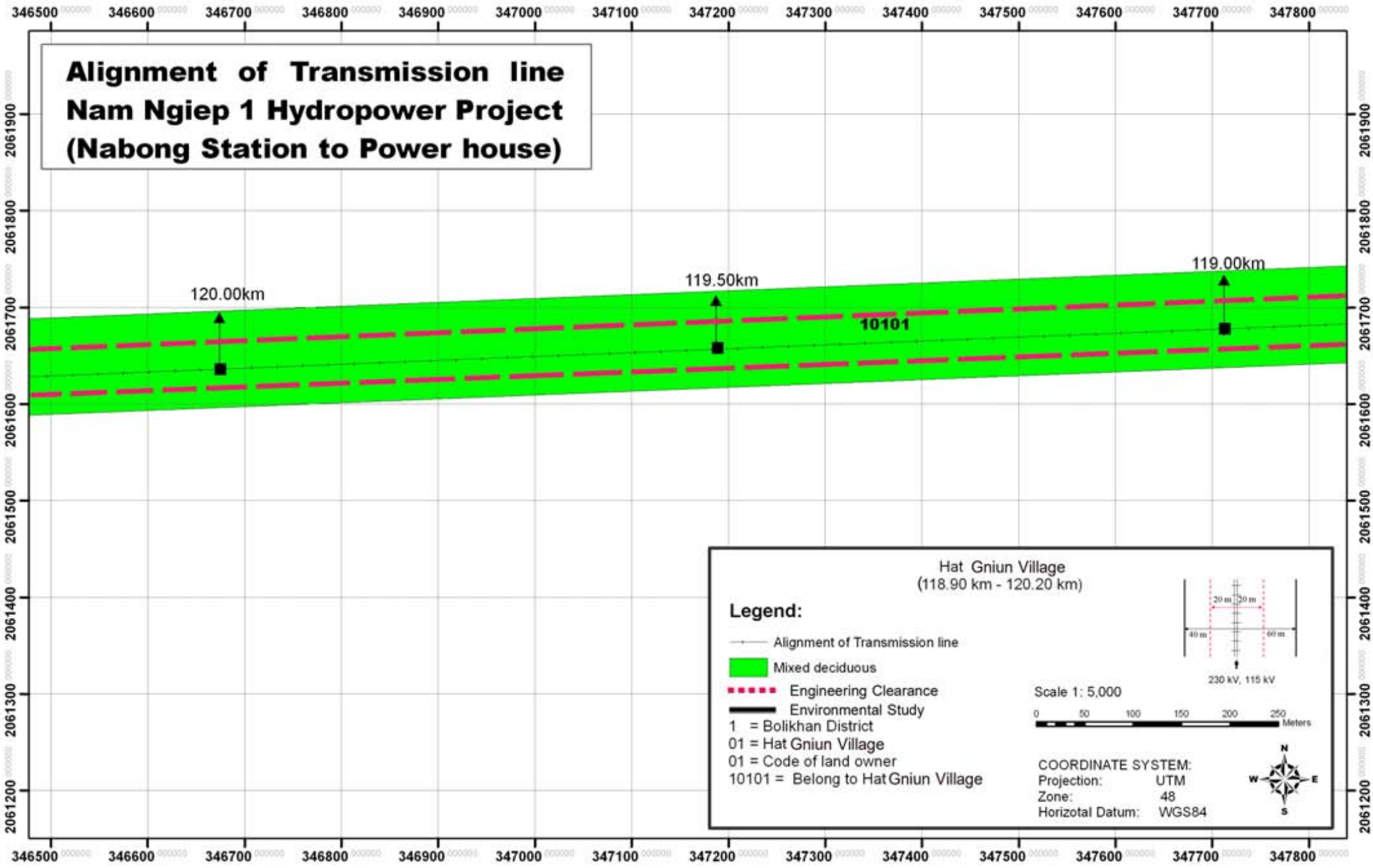
Scale 1: 5,000

1 = Bolikhan District
01 = Hat Gnuiun Village
01 = Code of land owner
10101 = Belong to Hat Gnuiun Village

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

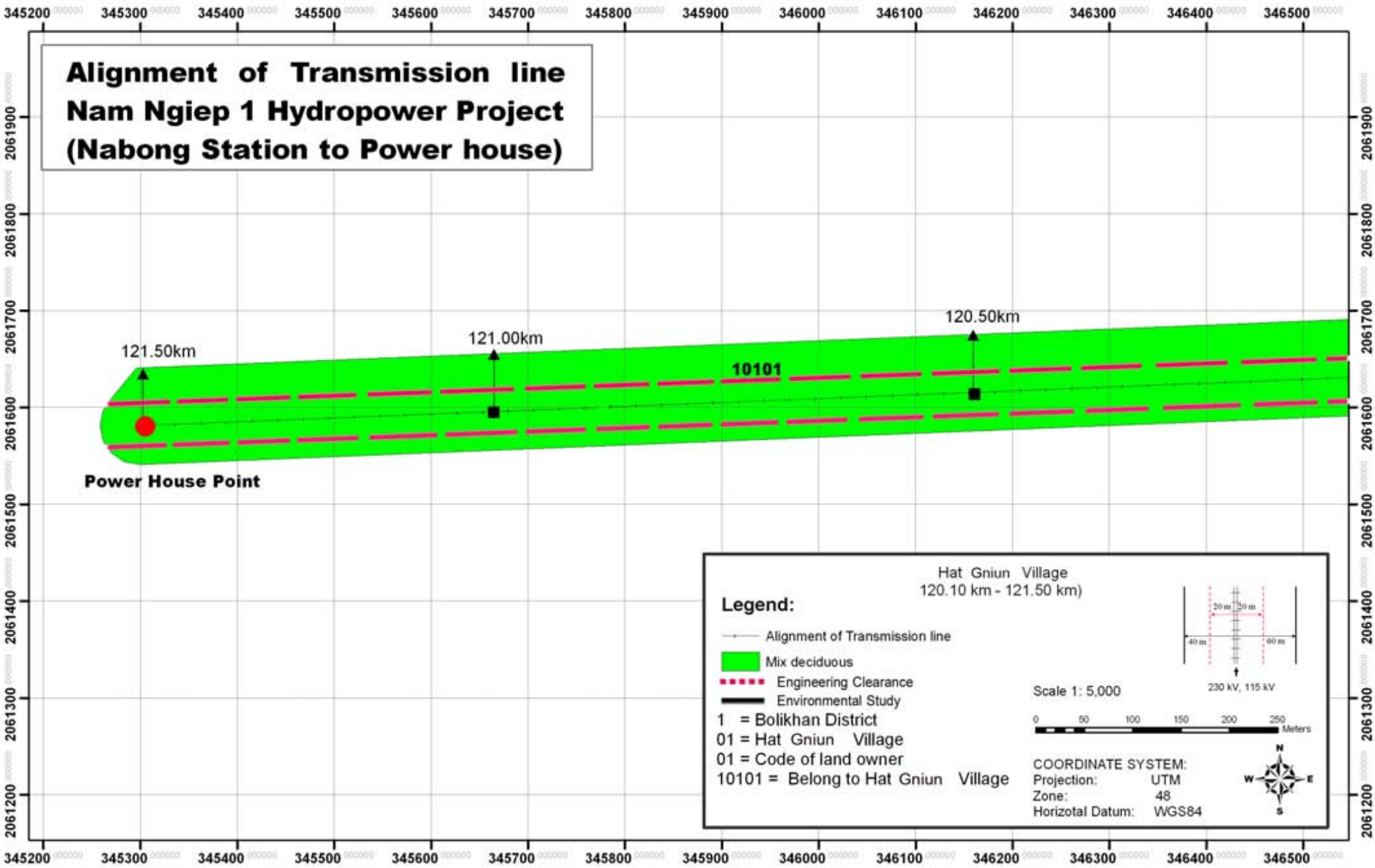
Map sheet No: 109

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 110

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nabong Station to Power house)



Map sheet No: 1

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Substation)

00.00km

Nam Pa to Pakxan Substation

10202

10203

10204

10205

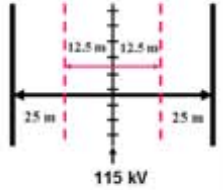
10206

0.5km

Nampa Village
(00 km - 0.80 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Dry Dipterocarp Forest
- Environmental Study
- Paddy Field



1 = Bolikhan District
02 = Nampa Village
02 - 06 = Code of land owner
10202 = Belong to Nampa Village
10203 = Belong to Nampa Village
10204 = Belong to Nampa Village
10205 = Belong to Mr Kham anh
10206 = Belong to Nampa Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

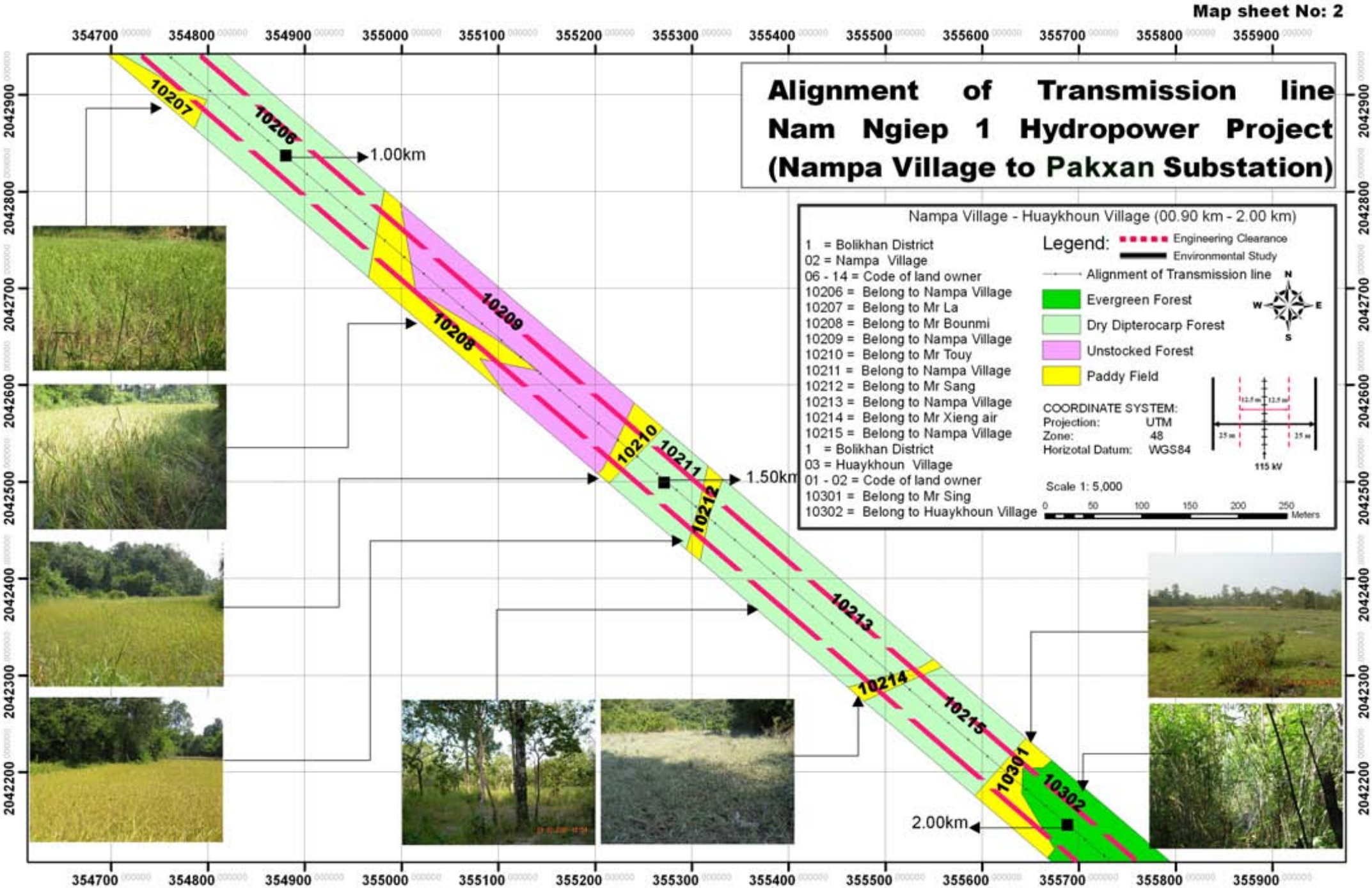
N W E S

354000 354100 354200 354300 354400 354500 354600 354700 354800 354900 355000 355100 355200 355300

2043700 2043600 2043500 2043400 2043300 2043200 2043100 2043000 2042900

Map sheet No: 2

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Substation)



Nampa Village - Huaykhoun Village (00.90 km - 2.00 km)

1 = Bolikhan District
02 = Nampa Village
06 - 14 = Code of land owner
10206 = Belong to Nampa Village
10207 = Belong to Mr La
10208 = Belong to Mr Bounmi
10209 = Belong to Nampa Village
10210 = Belong to Mr Touy
10211 = Belong to Nampa Village
10212 = Belong to Mr Sang
10213 = Belong to Nampa Village
10214 = Belong to Mr Xieng air
10215 = Belong to Nampa Village
1 = Bolikhan District
03 = Huaykhoun Village
01 - 02 = Code of land owner
10301 = Belong to Mr Sing
10302 = Belong to Huaykhoun Village

Legend:
- Engineering Clearance
- Environmental Study
- Alignment of Transmission line
- Evergreen Forest
- Dry Dipterocarp Forest
- Unstocked Forest
- Paddy Field

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Scale 1: 5,000

0 50 100 150 200 250 Meters

Map sheet No: 3

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

355600 355700 355800 355900 356000 356100 356200 356300 356400 356500 356600 356700 356800 356900

2041400 2041500 2041600 2041700 2041800 2041900 2042000 2042100

2.00km

2.50km

3.00km

10303

10302

10304

10306

10305

10309

10307

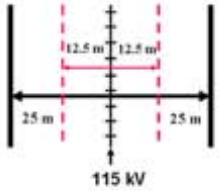
Houaykhoun Village
(2.00 km - 3.30 km)

1 = Bolikhan District
03 = Houaykhoun Village
01 - 07,09 = Code of land owner

10302 = Belong to Houaykhoun Village
10303 = Belong to Mr Deng
10304 = Belong to Mr Khamphone
10305 = Belong to Mr Thieng
10306 = Belong to Mr Kham
10307 = Belong to Houaykhoun Village
10309 = Nam ngiep, Belong to Houaykhoun Village

Legend:

- Alignment of Transmission line
- Stream
- Engineering Clearance
- Environmental Study
- Evergreen Forest
- Plantation
- Unstocked Forest
- Ray
- Paddy Field
- River (Nam Ngiep)



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

Map sheet No: 4

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

3.50km

10307

4.00km

20101

20102

20103

4.50km

20104

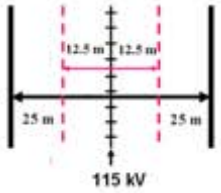
Houaykhoun Village - Thong Noi Village
(3.30 km - 4.70 km)

1 = Bolikhan District
03 = Houaykhoun Village
07 = Code of land owner
10307 = Belong to Houaykhoun Village

2 = Pakxan District
01 = Thong Noi Village
01 - 04 = Code of land owner
20101 = Belong to Mr Tuen
20102 = Belong to Mr Souni, Khanth
20103 = Belong to Mr Phing
20104 = Belong to Thong Noi Village

Legend:

- Alignment of Transmission line
- Stream
- Engineering Clearance
- Environmental Study
- Evergreen Forest
- Unstocked Forest
- Paddy Field



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

356900 357000 357100 357200 357300 357400 357500 357600 357700 357800 357900 358000 358100 358200

2041700 2041600 2041500 2041400 2041300 2041200 2041100 2041000 2040900

Map sheet No: 5

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

5.00km

5.50km

20104

20105

20106

20107

20108

Legend:

Alignment of Transmission line

Stream

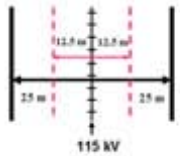
Evergreen Forest

Paddy Field

Thong Noi Village
(4.70 km - 5.65 km)

Engineering Clearance

Environmental Study



2 = Pakxan District
01 = Thong Noi Village
04 - 08 = Code of land owner

Scale 1: 5,000

0 50 100 150 200 250 Meters

20104 = Belong to Thong Noi Village
20105 = Belong to Mr Sinuan
20106 = Belong to Mrs Phong
20107 = Belong to Mr Thidboun
20108 = Belong to Pakxan District

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

358200 358300 358400 358500 358600 358700 358800 358900 359000 359100 359200 359300 359400 359500

2041300 2041200 2041100 2041000 2040900 2040800 2040700 2040600 2040500

Map sheet No: 6

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

20108

20109

20110

20111

6.00km

6.50km

Thong Noi Village
(5.65 km - 6.50 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Evergreen Forest
- Environmental Study
- Paddy Field

2 = Pakxan District
01 = Thong Noi Village
08 - 11 = Code of land owner
20108 = Belong to Paksan district
20109 = Belong to Mrs Oh
20110 = Belong to Chieng
20111 = Belong to Thong Noi Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

358400 358500 358600 358700 358800 358900 359000 359100 359200 359300 359400 359500 359600 359700

2040500 2040400 2040300 2040200 2040100 2040000 2039900 2039800 2039700

Map sheet No: 7

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

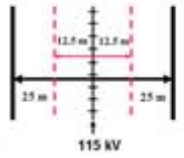
Thong Noi Village - Thong yai Village
(6.50 km - 7.30 km)

2 = Pakxan District
01 = Thong Noi Village
11 - 13 = Code of land owner
20111 = Belong to Thong Noi Village
20112 = Belong to Mrs Tuan chai
20113 = Belong to Thong Noi Village

2 = Pakxan District
02 = Thong yai Village
1 - 05 = Code of land owner
20201 = Belong to Mr Bounkhieng
20202 = Belong to Mr Bounhin
20203 = Belong to Mr Lumthong
20204 = Belong to Thong yai Village
20205 = Belong to Mr Somphone

Legend:

- Alignment of Transmission line
- Evergreen Forest
- Dry Dipterocarp
- Paddy Field
- Engineering Clearance
- Environmental Study



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Map sheet No: 8

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

20206
20207
20208
20209
20210
20211
20212

7.50km

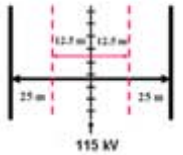
8.00km

Legend:

Thong yai Village
(7.35 km - 8.15 km)

Land Use

- Dry Dipterocarp Forest
- Paddy Field
- Engineering Clearance
- Environmental Study



2 = Pakxan District
02 = Thong yai Village
6 - 12 = Code of land owner

Scale 1: 5,000

0 50 100 150 200 250 Meters

20206 = Belong to Mr Ki
20207 = Belong to Thong
20208 = Belong to Thong
20209 = Belong to Mr Manh
20210 = Belong to Mr Minoi
20211 = Belong to Mr Chanh
20212 = Belong to Mr Somdi

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

358100 358200 358300 358400 358500 358600 358700 358800 358900 359000 359100 359200 359300 359400

2038900 2038800 2038700 2038600 2038500 2038400 2038300 2038200 2038100

Map sheet No: 9

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

20212
20213
20214
20215
20301

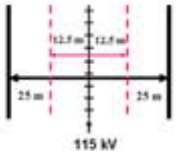
8.50km
9.00km
9.50km

Thong yai Village - Sanaxay Village
(8.20 km - 9.50 km)

Legend:

- Alignment of Transmission line
- Road
- Dry Dipterocarp Forest
- Paddy Field
- Cemetery
- Engineering Clearance
- Environmental Study

2 = Pakxan District
03 = Sanaxay Village
01 = Code of land owner
20301 = Belong to Mr Sisomphou



2 = Pakxan District
02 = Thong yai Village
12 - 15 = Code of land owner

20212 = Belong to Mr Somdi
20213 = Belong to Mrs Lamphone
20214 = Belong to Thong yai Village
20215 = Cemetery belong to Thong yai Village

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

357400 357500 357600 357700 357800 357900 358000 358100 358200 358300 358400 358500 358600

2038100 2038000 2037900 2037800 2037700 2037600 2037500 2037400 2037300

Map sheet No: 10

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

9.50km

10.00km

10.50km

20301

20302

20303

20304

20305

20306

20307

20308

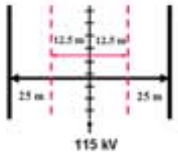
20309

Sanaxay Village
(9.50 km - 10.85 km)

2 = Pakxan District
03 = Sanaxay Village
01 - 09 = Code of land owner
20301 = Belong to Mr Sisomphou
20302 = Belong to Mr Somdi
20303 = Belong to Mr Somdi
20304 = Belong to Mr Somdi
20305 = Belong to Mr Touhomh
20306 = Belong to Sanaxay Village
20307 = Belong to Mr Tou Hanh
20308 = Belong to Sanaxay Village
20309 = Belong to Mr Poikeo

Legend:

- Engineering Clearance
- Environmental Study
- Alignment of Transmission line
- Road
- Dry Dipterocarp Forest
- Plantation
- Paddy Field



Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

356100 356200 356300 356400 356500 356600 356700 356800 356900 357000 357100 357200 357300

2037500 2037400 2037300 2037200 2037100 2037000 2036900 2036800 2036700

Map sheet No: 11

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Paxan Sub station)

20309

20308

20310

11.00km

20311

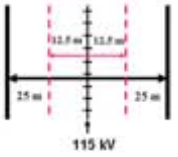
20312

11.50km

Sanaxay Village
(10.80 km - 11.65 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Environmental Study
- Dry Dipterocarp Forest
- Paddy Field
- Built Up



2 = Paxan District
03 = Sanaxay Village
08 - 12 = Code of land owner

20308 = Belong to Sanaxay Village
20309 = Belong to Poikeo
20310 = Belong to Mrs Vieng
20311 = Belong to Sanaxay Village
20312 = Belong to Army Zone

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

355900 356000 356100 356200 356300 356400 356500 356600 356700 356800 356900 357000 357100

2035900 2036000 2036100 2036200 2036300 2036400 2036500 2036600 2036700

Map sheet No: 12

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

12.00km

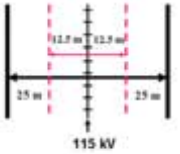
12.50km

20308
20310
20314
20315
20401
20402
20403
20404
20405

Sanaxay Village - Anusonxay Village
11.30 km - 12.00 km)

Legend:

- Alignment of Transmission line
- Engineering Clearance
- Environmental Study
- Dry Dipterocarp Forest
- Plantation
- Unstocked Forest
- Built Up



2 = Pakxan District
03 = Sanaxay Village
08,13,14,15 - 15 = Code of land owner
20308 = Belong to Sanaxay Village
20313 = Belong to Mr Touy
20314 = Belong to Mr Yai
20315 = Belong to Army Zone

2 = Pakxan District
04 = Anusonxay Village
01- 05 = Code of land owner
20401 = Belong to Anusonxay Village
20402 = Belong to Mr Khampha
20403 = Belong to District office
20404 = Belong to Anusonxay Village
20405 = Belong to Mr Phonsavanh

Scale 1: 5,000

0 50 100 150 200 250 Meters

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

N W E S

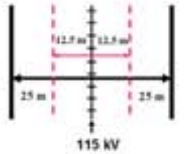
355900 356000 356100 356200 356300 356400 356500 356600 356700 356800 356900 357000 357100

2035900 2035800 2035700 2035600 2035500 2035400 2035300 2035200 2035100

Map sheet No: 13

Alignment of Transmission line Nam Ngiep 1 Hydropower Project (Nampa Village to Pakxan Sub station)

Anusonxay Village
12.55 km - 13.50 km)



2 = Pakxan District
04 = Anusonxay Village
05 - 29 = Code of land owner

20405 = Belong to Mr Phongsavanh
20406 = Belong to Mr Kokeo
20407 = Belong to Mrs Bang
20408 = Belong to Mr Inpunh
20409 = Belong to Mrs Jone
20410 = Belong to Mr Phonxay
20411 = Belong to Mr Khamphonh
20412 = Belong to Mr Sounanh
20413 = Belong to Mr Khamphanh
20414 = Belong to Mrs Tou Yan
20415 = Belong to Mr Nalinh
20416 = Belong to Mrs Saimany
20417 = Belong to Anusonxay Village
20418 = Road, Belong to Anusonxay Village
20419 = Belong to Mr Lit
20420 = Belong to Mr Chanthakhan
20421 = Belong to Mrs Mi
20422 = Belong to Mr Somphon
20423 = Belong to Mr Inpeng
20424 = Belong to Mr Pani
20425 = Belong to Mrs Toukeo
20426 = Belong to Mr Bouphai
20427 = Road, Belong to Mr Bouphai
20428 = Belong to Mr Thongphoun
20429 = Pakxan Substation Area

Legend:

- Alignment of Transmission line
- Unstocked Forest
- Built Up
- Road
- Pakxan Substation
- Engineering Clearance
- Environmental Study

COORDINATE SYSTEM:
Projection: UTM
Zone: 48
Horizotal Datum: WGS84

Scale 1: 5,000

0 50 100 150 200 250 Meters

20405
20406
20404
20407
20410
20408
20409
20411
20412
20413
20414
20416
20415
20417
20418
20419
20420
20424
20421
20425
20422
20426
20423
20427
13.00km
20428
13.50km
20429

Asian Development Bank

Accountability Mechanism

www.adb.org/Accountability-Mechanism/default.asp

Listening to Communities Affected by ADB–Assisted Projects and Enhancing Development Effectiveness

About the Asian Development Bank

The Asian Development Bank (ADB) is a multilateral development finance institution owned by its 67 members. Its vision is an Asia and Pacific region free of poverty. By providing loans, technical assistance, grants, equity investments, and guarantees to governments and private enterprises in its developing member countries, ADB helps improve the quality of people's lives through a broad range of development activities.

What is the ADB accountability mechanism?

In May 2003, ADB approved a new accountability mechanism to replace the previous Inspection Function. The mechanism was established to provide better access for people adversely affected by ADB-assisted projects to voice and seek solutions to their problems and also report alleged violations of ADB's operational policies and procedures.

Establishment of the mechanism is also an effort to enhance ADB's development effectiveness, project quality, and transparency in operations.

The key feature of the mechanism is its two related functions: consultation and compliance review. The first is consultation among stakeholders focusing on problem solving. If a satisfactory solution cannot be reached, a filing of complaint for consultation is found ineligible, or the consultation process has reached an advanced stage and there are concerns on compliance issues, it is possible to request a compliance review.

What is the consultation phase?

- The consultation phase aims to assist people who are adversely affected by ADB-assisted projects to find solutions to their problems. It is led by ADB's Special Project Facilitator.

- The consultation phase starts with consideration of the eligibility of the complaint. If accepted, the focus will be on seeking agreement among all the parties involved such as the complainant, project implementer, developing member country government or private sector sponsor, and ADB. The Special Project Facilitator will, however, not interfere in the internal matters of a developing member country.

- The Special Project Facilitator offers an additional avenue for problem solving but does not supplant the role of project administration carried out by ADB's operations departments. He/she reports directly to the President of ADB and recommends actions to deal with the complaint. He/she will also monitor implementation of agreements resulting from the consultation process.

"I am confident that with support from all stakeholders, the Accountability Mechanism will satisfy their demand that ADB address the complaints of project-affected people on the ground and establish a transparent process that will increase ADB's accountability."

Tadao Chino
ADB President
Statement on ADB Accountability Mechanism becoming effective
December 2003

What is the compliance review phase?

- The compliance review is focused on the direct and material harm suffered by project-affected people, and whether this is caused by ADB's violations of its operational policies and procedures in formulating, processing, or implementing the project. The compliance review is done by an independent Compliance Review Panel.

- The compliance review starts with the Panel making a recommendation to the ADB Board of Directors on the eligibility of the request for compliance review. If approved, the Panel conducts an independent investigation and makes recommendations to the Board of Directors to ensure project compliance, including remedial changes in the scope or implementation of the project.

- The Panel is supported by a secretariat, the Office of the Compliance Review Panel. The Panel will also monitor implementation of any remedial actions approved by the Board of Directors.

Who can file a complaint/ request?

- Any group of two or more people in the country where the ADB-assisted project is located or in an adjacent member country. This can be an organization, association, society, or other group of individuals.

- A local representative appointed by people adversely affected by the project.

- A nonlocal representative, in exceptional cases where local representation cannot be found and the Special Project Facilitator agrees; and in the case of a request, the Compliance Review Panel agrees.

- Any Board member can in special cases file a request relating to ongoing projects.

How to file a complaint/request

Claimants need to first file a complaint with the Special Project Facilitator. They can file a request with the Compliance Review Panel if their complaint is found ineligible, if they are not satisfied with the consultation process, or if the consultation process is at an advanced stage and there are concerns on compliance issues.

Complaints/requests must be made in writing and sent to the Special Project Facilitator/Secretary, Compliance Review Panel by mail, facsimile, or electronic mail, or be hand delivered to ADB headquarters or to any ADB resident mission or representative office. Complaints/requests may be submitted in English or in any of the official or national languages of ADB's developing member country, if the complainant/requester is unable to provide an English translation. The identity of claimants will be kept confidential if requested, but anonymous complaints will not be accepted.

What matters are not eligible for complaints/requests?

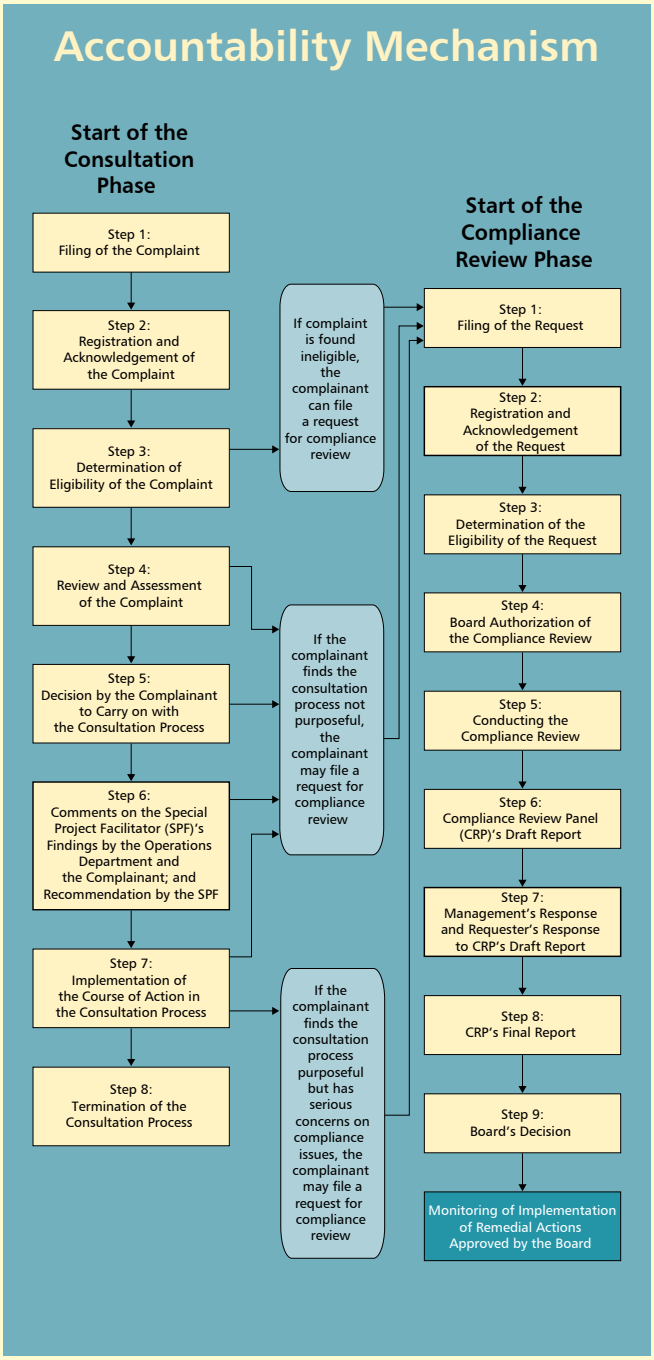
- Decisions made by ADB or the project implementer regarding procurement of goods, services, and consulting services. These matters should be addressed to ADB's Central Operations Services Office, which can be contacted through www.adb.org/COSO.

- Allegations of fraud and corruption in projects and by ADB staff. These matters should be addressed to ADB's Integrity Division, Office of the Auditor General, which can be contacted through www.adb.org/Integrity/unit.asp.

- The project completion report for the project has been issued, normally within two years after physical completion of the project.

- Matters already considered under the previous Inspection Function or by the Compliance Review Panel.

- Private sector projects with concept clearance before 29 May 2003.



For more information on the ADB accountability mechanism, go to **www.adb.org/Accountability-Mechanism/default.asp**

Contents of a complaint

The complaint must specify the following:

- The complainant is, or is likely to be, directly affected materially and adversely by an ADB-assisted project
- The direct and material harm claimed is, or will be, the result of an act or omission of ADB in the course of the formulation, processing, or implementation of the ADB-assisted project
- A description of the rights and interests that have been, or are likely to be, directly affected materially and adversely by the ADB-assisted project
- Identification of the complainant (and any representatives) and contact information, and if there is a request that the complainant's identity be kept confidential, the reasons for such a request
- If there is any representative, identification of the people affected by the project and evidence of authority to represent them
- A brief description of the ADB-assisted project, including the name and location if available
- The desired outcome or remedies that people affected by the project believe ADB should provide or help obtain through the Special Project Facilitator
- A description of the complainant's good faith efforts to address the problems first to the operations department concerned
- An explanation of why any of the above information cannot be provided
- Any other relevant matters or facts with supporting documents

The Special Project Facilitator can be reached at

Special Project Facilitator
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines

Tel +63 2 632 4825
Fax +63 2 636 2490
spf@adb.org
www.adb.org/spf

Contents of a request for compliance review

The request must specify the following:

- The requester is, or is likely to be, directly affected materially and adversely by the ADB-assisted project
- The direct and material harm claimed is, or will be, the result of an act or omission of ADB's alleged failure to follow its operational policies and procedures in the course of the formulation, processing, or implementation of the ADB-assisted project
- A description of the rights and interests that have been, or are likely to be, directly affected materially and adversely by the ADB-assisted project
- Identification of the requester and contact information, along with the reasons for any request for confidentiality
- If there is any representative, identification of the people affected by the project and evidence of authority to represent them
- A brief description of the ADB-assisted project, including the name and location
- The desired outcome or remedies that people affected by the project believe ADB should provide
- An explanation of the results of the requester's efforts to address the complaint first to the Special Project Facilitator (or if the Special Project Facilitator has rejected the complaint as ineligible an explanation of why the request is nonetheless eligible for compliance review)
- An explanation of why any of the above information cannot be provided
- Any other directly relevant matters or facts with supporting documents

The Compliance Review Panel can be reached at

Secretary, Compliance Review Panel
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines

Tel +63 2 632 4149
Fax +63 2 636 2088
crp@adb.org
www.compliance.adb.org

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ADB

www.compliance.adb.org

ທະນາຄານ ພັດທະນາ ອາຊີ

ກົນໄກການລາຍງານ ຜົນກະທົບຈາກໂຄງການ

[illegible]

ກ່ຽວກັບ ທະນາຄານພັດທະນາອາຊີ

[illegible]

ກົນໄກການລາຍງານ ຜົນກະທົບຈາກໂຄງການ ຂອງທະນາຄານພັດທະນາອາຊີ ແມ່ນຫຍັງ?

ໃນເດືອນພຶດສະພາ ປີ 2003, [illegible] (Inspection Function). [illegible]

[illegible]

[illegible]

ຂະບວນການປຶກສາຫາລື ແມ່ນຫຍັງ ?

- [illegible] (Special Project Facilitator/SPF)
- [illegible] (SPF) [illegible]
- [illegible] (SPF) [illegible]

" ຂ້າພະເຈົ້າໝັ້ນໃຈວ່າ ດ້ວຍການສະໜັບສະໜູນ ຈາກຜູ້ມີສ່ວນຮ່ວມທຸກພາກສ່ວນ, ກົນໄກການລາຍງານຜົນກະທົບຈາກໂຄງການນີ້ ຈະຕອບສະໜອງ ຄວາມຕ້ອງການຂອງເຂົາເຈົ້າ ທີ່ຢາກໃຫ້ ທະນາຄານພັດທະນາອາຊີ ແກ້ໄຂ ການຮ້ອງທຸກຂອງປະຊາຊົນ ທີ່ໄດ້ຮັບຜົນກະທົບຈາກໂຄງການ ຢູ່ໃນພາກສະໜາມ ແລະ ສ້າງຕັ້ງຂັ້ນຕອນ ທີ່ໂປ່ງໃສ ທີ່ຈະເພີ່ມທະວີຄວາມເຊື່ອໝັ້ນ ຕໍ່ຂອງ ທະນາຄານພັດທະນາອາຊີ ຕໍ່ຜົນກະທົບຈາກໂຄງການ."

ທາດາໂອ ຈີໂນ
ປະທານ ທະນາຄານພັດທະນາອາຊີ
ຄຳປາໄສ ກ່ຽວກັບການປະກາດໃຊ້ ກົນໄກຄວາມຮັບຜິດຊອບຂອງ ທະນາຄານພັດທະນາອາຊີ
ສິງຫາ 2003.

ຂັ້ນຕອນ ການກວດກາຄືນການປະຕິບັດຕາມ ແມ່ນຫຍັງ?

- ຂັ້ນຕອນ ການກວດກາຄືນ ແມ່ນສຸມໃສ່ບັນຫາຕ່າງໆໂດຍກົງ ແລະ ບັນຫາດ້ານວັດຖຸທີ່ເກີດຂຶ້ນກັບປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບຈາກໂຄງການ ແລະ ກວດກາເບິ່ງວ່າເປັນມີສາຍເຫດມາຈາກທະນາຄານພັດທະນາອາຊີລະເມີດນະໂຍບາຍ ແລະ ຂະບວນການດຳເນີນງານຂອງຕົນ ໃນການອອກແບບ, ພິຈາລະນາ ຫຼື ປະຕິບັດໂຄງການ. ຈະມີ ຄະນະກຳມະການເອກະລາດ ເພື່ອການກວດກາຄືນ ການປະຕິບັດຕາມນະໂຍບາຍ ແລະ ຂັ້ນຕອນ (Compliance Review Panel/ CRP) ເປັນຜູ້ຮັບຜິດຊອບ ກວດກາຄືນການປະຕິບັດຕາມ.

- ການກວດກາຄືນ ຈະເລີ່ມຂຶ້ນດ້ວຍຄະນະກຳມະການ (CRP) ເມື່ອທີ່ສະເໜີເບື້ອງສະພາບໍລິຫານຂອງທະນາຄານພັດທະນາອາຊີ ກ່ຽວກັບຄວາມເໝາະສົມຂອງການຮ້ອງຂໍໃຫ້ມີການກວດກາຄືນ. ຖ້າຫາກໄດ້ຮັບອະນຸມັດ, ຄະນະກຳມະການ (CRP) ຈະປະຕິບັດການສືບສວນຢ່າງເປັນເອກະລາດ ແລະ ມີຂໍ້ສະເໜີໃຫ້ສະພາບໍລິຫານ ເພື່ອໃຫ້ຮັບປະກັນການປະຕິບັດຕາມໂດຍໂຄງການ, ລວມທັງຂໍ້ສະເໜີ ການປ່ຽນແປງເພື່ອແກ້ໄຂຂອບເຂດໂຄງການ ຫຼື ການປະຕິບັດໂຄງການ.

- ຄະນະກຳມະການ (CRP) ນີ້ ຈະໄດ້ຮັບການສະໜັບສະໜູນ ຈາກກອງເລຂາ ຊຶ່ງແມ່ນຫ້ອງການຂອງ ຄະນະກຳມະການເອກະລາດ ເພື່ອການກວດກາຄືນ ການປະຕິບັດຕາມນະໂຍບາຍ ແລະ ຂັ້ນຕອນ (CRP). ຄະນະກຳມະການນີ້ ຍັງຈະຕິດຕາມການປະຕິບັດມາດຕະການແກ້ໄຂຕ່າງໆ ທີ່ໄດ້ຮັບການອະນຸມັດ ຈາກສະພາບໍລິຫານ.

ແມ່ນໃຜສາມາດຍື່ນຄຳຮ້ອງທຸກ / ຮ້ອງຂໍ ?

- ກຸ່ມຄົນທີ່ປະກອບດ້ວຍ ສອງຄົນ ຫຼື ຫຼາຍກວ່ານັ້ນ ໃນປະເທດທີ່ເປັນທີ່ຕັ້ງຂອງໂຄງການ ທີ່ໄດ້ຮັບ ການຊ່ວຍເຫຼືອຈາກທະນາຄານພັດທະນາອາຊີ ຫຼື ໃນປະເທດສະມາຊິກທີ່ຢູ່ຕິດກັບເຂດແດນຂອງເປັນ ອົງການຈັດຕັ້ງ, ສະມາຄົມ, ສິ່ງອື່ນໃດໜຶ່ງ ຫຼື ກຸ່ມຄົນອື່ນໆ

- ຕົວແທນຈາກທ້ອງຖິ່ນ ທີ່ໄດ້ຮັບການແຕ່ງຕັ້ງ ໂດຍປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບທາງລົບ ຈາກໂຄງການ.

- ຕົວແທນທີ່ບໍ່ແມ່ນຈາກທ້ອງຖິ່ນ, ໃນກໍລະນີພິເສດທີ່ບໍ່ສາມາດຫາຕົວແທນຈາກທ້ອງຖິ່ນໄດ້ ແລະ ໄດ້ຮັບການເຫັນດີຈາກຜູ້ອຳນວຍຄວາມສະດວກພິເສດສຳລັບໂຄງການ (SPF) ແລະ ໃນກໍລະນີຂອງການຮ້ອງຂໍ, ໄດ້ຮັບການເຫັນດີຈາກຄະນະກຳມະການເອກະລາດ ເພື່ອການກວດກາຄືນການປະຕິບັດຕາມນະໂຍບາຍ ແລະ ຂັ້ນຕອນ (CRP).

- ສະມາຊິກສະພາບໍລິຫານຄົນໃດຄົນໜຶ່ງ ສາມາດເລືອກການຮ້ອງຂໍເປັນກໍລະນີພິເສດໃຫ້ກວດກາຄືນໂຄງການທີ່ ກຳລັງດຳເນີນຢູ່.

ຈະຍື່ນສະເໜີຄຳຮ້ອງທຸກ / ຮ້ອງຂໍແນວໃດ ?

ກ່ອນອື່ນໝົດ ຜູ້ຮ້ອງທຸກຕ້ອງຍື່ນຄຳຮ້ອງຂໍໃຫ້ແກ່ ຜູ້ຄົ້ນຄວ້າຄວາມສະດວກພິເສດສຳລັບໂຄງການ (SPF). ຜູ້ຮ້ອງທຸກຈະສາມາດຍື່ນຄຳຮ້ອງໃຫ້ມີການກວດກາຄືນ ແກ່ຄະນະກຳມະການກວດກາຄືນການປະຕິບັດຕາມ(CRP) ກໍ່ຕໍ່ເມື່ອພວກເຂົາ ຄຳຮ້ອງທຸກຂອງເຂົາເຈົ້າບໍ່ສາມາດແກ້ໄຂໄດ້ໃນຂັ້ນຕອນການປຶກສາຫາລື ແລະ ຖ້າ ຫາກພວກເຂົາເຈົ້າ ບໍ່ພໍໃຈຕໍ່ຂັ້ນຕອນການປຶກສາຫາລື, ຫຼື ຖ້າສາມາດຂັ້ນຕອນການປຶກສາຫາລືແມ່ນໄດ້ດຳເນີນໄປແລ້ວໃນ ປະເທດທາງການເຂົາແລ້ວ ແລະ ເຫັນມີຄວາມເປັນຫ່ວງ ຕໍ່ບັນຫາ ການປະຕິບັດຕາມແນວໂນບາຍ ແລະ ຂັ້ນຕອນຕ່າງໆ.

ຕ້ອງມີຄຳຮ້ອງທຸກ/ຮ້ອງຂໍ ເປັນລາຍລັກອັກສອນ ແລະ ສົ່ງໄປໃຫ້ ຜູ້ຄົ້ນຄວ້າຄວາມສະດວກພິເສດສຳລັບໂຄງການ (SPF) /ກອງ ເລຂາ, ຄະນະກຳມະການກວດກາຄືນໂດຍທາງໄປສະນີ, ແຟັກ ຫຼື ອີເມລ໌ ຫຼື ຍື່ນເອົາໃຫ້ທີ່ສຳນັກງານໃຫຍ່ ທະນາຄານພັດທະນາ ອາຊີ ຫຼື ຫ້ອງການຜູ້ຕາງໜ້າ ຫຼື ຫ້ອງການຕົວແທນຂອງ ທະນາຄານພັດທະນາອາຊີ. ອາດຈະຍື່ນຄຳຮ້ອງທຸກ/ຮ້ອງຂໍເປັນ ພາສາອັງກິດ ຫຼື ເປັນພາສາທາງລັດຖະການ ຫຼື ພາສາປະຈຳຊາດ ຂອງປະເທດສະມາຊິກຂອງທະນາຄານພັດທະນາອາຊີ, ຖ້າຫາກ ຜູ້ຮ້ອງທຸກ/ຮ້ອງຂໍ ບໍ່ສາມາດແປເປັນພາສາອັງກິດໄດ້. ຖ້າມີ ການຮ້ອງຂໍ, ຈະມີການຮັກສາຊື່ຂອງຜູ້ຮ້ອງທຸກ ໄວ້ເປັນຄວາມລັບ, ແຕ່ການຮ້ອງທຸກທີ່ບໍ່ມີການບອກຊື່ຜູ້ເຮັດຄຳຮ້ອງເລີຍ ຈະບໍ່ຮັບຮັບ ເອົາ.

ບັນຫາໃດທີ່ບໍ່ຖືກຕ້ອງສຳລັບການຮ້ອງທຸກ / ຮ້ອງຂໍ?

- ການເຮັດສັນໃຈ ໂດຍທະນາຄານພັດທະນາອາຊີ ຫຼື ໂດຍຜູ້ ປະຕິບັດໂຄງການ ກ່ຽວກັບການຈັດຊື້ຈັດຈ້າງ ສິນຄ້າ, ການ ບໍລິການ ແລະ ການບໍລິການທີ່ປຶກສາ. ບັນຫາເຫຼົ່ານີ້ ຕ້ອງໄດ້ ຍື່ນໄປໃຫ້ ຫ້ອງການບໍລິການ ການດຳເນີນງານສູນກາງຂອງ ທະນາຄານພັດທະນາອາຊີ (ADB's Central Operations Services Office) ຊຶ່ງສາມາດຕິດຕໍ່ໄດ້ທີ່ www.adb.org/COSO
- ການກ່າວຫາ ວ່າມີການສໍ້ໂກງ ແລະ ສໍ້ລາດບັງຫຼວງ ໃນ ໂຄງການຕ່າງໆ ແລະ ເຫັດໂດຍພະນັກງານທະນາຄານ ພັດທະນາອາຊີ. ບັນຫາເຫຼົ່ານີ້ຕ້ອງໄດ້ຍື່ນໄປໃຫ້ ໜ່ວຍງານ ຕໍ່ຕ້ານການສໍ້ລາດບັງຫຼວງຂອງທະນາຄານພັດທະນາອາຊີ (ADB's Anticorruption Unit, Office of the Auditor General) ຊຶ່ງສາມາດຕິດຕໍ່ໄດ້ທີ່ www.adb.org/Anticor ruption/unit.asp
- ໄດ້ມີການເຊັນແລ້ວ ບົດລາຍງານການສຳເລັດໂຄງການແລ້ວ, ຫຼືພະຍາຍາມໃນສອງປີ ສິ້ງຈາກການສຳເລັດໂຄງການ
- ບັນຫາທີ່ໄດ້ມີການພິຈາລະນາແລ້ວ ພາຍໃຕ້ໜ້າທີ່ການກວດ ສອບ (Inspection Function)ໃນເມື່ອກ່ອນ ຫຼື ພິຈາລະນາ ແລ້ວ ໂດຍຄະນະກຳມະການກວດກາຄືນ ການປະຕິບັດຕາມ (CRP).
- ໂຄງການສາກສ່ວນເອກະຊົນທີ່ມີການເຫັນຊອບຄວາມເຄີດ ຂອງໂຄງການ ກ່ອນວັນທີ 29 ມິຖຸນາ 2003.

ຖ້າຕ້ອງການຂໍ້ມູນເພີ່ມເຕີມກ່ຽວກັບກົນໄກ ການລາຍງານຜົນກະທົບຈາກໂຄງການ ຂອງ ທະນາຄານພັດທະນາອາຊີ, ໃຫ້ເບິ່ງໃນ **www.compliance.adb.org**

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