Nepal Electricity Authority

Social Impact Assessment of

Khimti- Dhalkebar 220 kV Transmission Line Project

Final Report

Submitted to:

Khimti- Dhalkebar 220 kV Transmission Line Project
Darbar Marga, Kathmandu

Submitted by:

Environment and Social Studies Department
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Acronyms

SIA	:	Social Impact Assessment
EIA	:	Environmental Impact Assessment
EPA	:	Environment Protection Act (1997)
EPR	:	Environment Protection Rule (1997)
		Including the first Amendment (1999)
HMG/N	:	His Majesty's Government of Nepal
NEA	:	Nepal Electricity Authority
ESSD	:	Environmental and Social Studies Department
EMU	:	Environment Management Unit
ToR	:	Terms of Reference
NGO	:	Non Governmental Organizations
EMP	:	Environment Management Plan
PRA	:	Participatory Rural Appraisal
RRA	:	Rapid Rural Appraisal
FGD	:	Focussed Group Discussion
VDC	:	Village Development Committee
DDC	:	District Development Committee
CBOs	:	Community Based Organizations
KDTL	:	Khimti-Dhalkebar 220 kV Transmission Line Project
TL	:	Transmission Line
RoW	:	Right of Way
IPP	:	Independent Power Producers
MW	:	Mega watt
KW/h	:	Kilowatt-hours
kV	:	Kilo volt
CBS	:	Central Bureau of Statistics
FGD	:	Focused group discussion
S/S	:	Substation
^{0}C	:	Degree centigrade
%	:	Percentage
HHs	:	Households
SLC	:	School leaving certificate

PAFs	:	Project affected families
SPAFs	:	Seriously project affected families
Ha	:	Hectare
Kg	:	Kilogram
NRs	:	Neapli rupees
O_3	:	Ozone
No	:	Nitric oxide
No_2	:	Nitrogen dioxide
AN	:	Corona audible noise
dB	:	Decibel
AM	:	Amplitude modulated
FM	:	Frequency modulated
m^3	:	Cubic meter
EMF	:	Electromagnetic field
V/m	:	Volts per meter
A/m	:	Ampere per meter
RHDP	:	Rural Health Development Program
CDS	:	Community Development Society
INPS	:	Integrated Nepal Power System
LP	:	Liquid petroleum
EAC	:	Environmental awareness for conservation
STD	:	Sexually transmitted disease
AIDS	:	Acquired immune deficiency syndrome
NTFP	:	Non timber forest products
CDO	:	Chief District Officer
AAPA	:	Aquatic animal protection act

Executive Summary

1.0 Introduction

The total installed capacity of the Integrated Nepal Power System (INPS) is approximately 585 MW. To meet present increasing demand of power generation the existing capacity of the transmission needs to be upgraded or new transmission line should be constructed. The Power Development Projects, of which Khimti-Dhalkebar 220 kV project is a component, financed by World Bank aims to meet the objectives of HMG/N in extending access to electricity supply to a larger percentage of the population by supporting the development of Nepal's power sector.

In view of future system development plan Nepal Electricity Authority (NEA) proposed Khimti – Dhalkebar 220 kV Transmission Line Project to evacuate the power generated from Tamakoshi and other hydropower projects in the region. This transmission line will also be connected with two existing Independent Power Producer (IPP) plants, Khimti and Bhotekoshi, with a view to exporting power to India as well as to serve the eastern region of the country.

Since the proposed project will be funded under Power Development fund provided by the World Bank the study has to satisfy requirement of "Policy Framework for Environmental Impact Assessment for projects under the Power Development Fund"2002. Considering aforementioned requirement a separate Social Impact Assessment (SIA) report is prepared focusing on social baseline, impacts, mitigation measures and social monitoring of Khimti - Dalkebar 220 kV transmission line project.

This report is prepared by the Environmental and Social Studies Department (ESSD) of NEA as per the contract signed between Transmission Line/Substation Construction Department and ESSD.

Public hearing program for this study is planned to be conducted at Manthali of Ramechap district and Dhalkebar of Dhanusha district in order to provide opportunity for the maximum participation of local people and to discuss the findings of the EIA & SIA study and to collect the issues/ concerns of local people. The relevant issues raised by local people and representatives of the VDCs and line agencies will be incorporated in final EIA & SIA report.

2.0 Study Methodology

Desk study, field study and impact identification through impact assessment matrix was the main methodology applied for this study. The desk study includes the review of technical reports of the project, topo maps of 1:25,000 scale, district profiles and VDC profiles. Questionnaire & checklist survey focused group discussion and interview of local leaders, VDC representatives and other intellectuals were the other method utilized for SIA study.

The field investigation was carried out by a multi-disciplinary team, which comprised of Sociologist Economist, ACRP expert and Surveyor. The fieldwork was conducted in February-March and April-May and lasted for about 40 days. Team traversed in project area to collect information on existing socio-economic & cultural environment of the area.

3.0 Project Description

The Khimti Dhalkebar 220 kV transmission line starts from Kirnetar village of Dolakha district

and will cross Ramechap, Sindhuli and Mahottari districts and finally reaches the Dhalkebar substation of Dhanusha district. For the purpose of the SIA study, the study area is defined as the project area consisting of the right of way, substation area as well as the area that will be impacted due to the construction and operation of the project. The proposed project will cover 16 VDCs and one Municipality of the five districts.

The right of way of the proposed project will be 15 meter each side from the centerline and approximately 12.5m x 12.5-m area will be required for tower foundation. In most of the areas span of the tower will be 350 meter and in total 230 towers will be constructed in 73- km alignment. The number of angle points is 53 and tower is steel lattice structure, self supported type. The project component also includes extension of two 132 kV line bays, one each at Khimti and Dhalkebar existing substations. The estimated cost for the proposed project is 22 million US$ which will be jointly funded by World Bank, HMG/N and NEA.

In order to carry out the project works the entire stretch of the line route will be segmented into two work sections and will be controlled from two ends. The working group of each section will be more or less mobile; hence small size temporary camp will be constructed for the implementation of project. Altogether 225 people will be employed in the project which includes 50 skilled, 65 semi skilled and 110 unskilled.

4.0 Existing Social Condition of the Project Area

The total population of the project area is 114516 and number of households is 21668. The male and female populations are 56414 (49.26%) and 58102 (50.74%) respectively. Average household size varies in between 4.39 and 6.21 and total average constitutes 5.28 persons per household. Annual population growth rate in the project area is about 2%. Brahmin, Chettri, Tamang, Newar and Magar are the major ethnic groups found in the project area. 56.85 % population of the project area is literate. The literacy rate is high (68.28%) in Gauribas VDC of Mahottari district and lowest (43.40%) in Kathjore of Ramechhap district.

Krishna temple, Kalika Devi, Ram temple, Bhimeshwor temple, Dhanaugi temple and Ganesh temples are the religious places found in the project affected VDCs. Health facilities in project area are inadequate and main diseases prevalent are stomachache, diarrhea, fever, tuberculosis, hysteria, skin diseases etc. Firewood, kerosene and electricity are the main source of energy for lighting and cooking. Due to accessibility and low cost most of the households in the project area use firewood for cooking.

The project area includes predominantly rural economy with agriculture as a main source of livelihood and income. The other occupations include business, service, labor work and domestication of livestock. A variety of skills including mason, carpenter, tailor, blacksmith, shoemaker, weaving and driver are found in the project area.

Irrigated, un-irrigated and grassland are the main land type occupied by the local people. Distribution of PAF by size of land holding reveals that most of the families cultivate less than 1 ha of land. Estimated annual income per household in project area is Rs. 72400 in which agriculture and labor/ wages contributes about 36% and 28.5 % respectively. Expenditure pattern of PAF residing along the RoW indicates that the share of expenditure on food is about 69%, which is relatively in higher side. Expenses on energy constitute 9% followed by clothing, education and medicine. About 350 –400 m stretch of the proposed alignment passes in the vicinity of the Manthali airport at a distance about 740 m from the airport. No objection letter from the airport authority was received during the study.

5.0 Potential Social Impact

The social impacts likely to occur in construction phase are loss of 1.6 ha private land, relocation of 17 houses (7 double story and 10 single story), relocation of one block and toilet of Tamakoshi Higher Secondary School at Khimti besi, loss of standing crops, occupational safety impacts, likely impact on gender & vulnerable group and life style.

The other impacts include changes in social and cultural practices, health and sanitation and infrastructures (access trail at AP-16). The operation phase impacts include devaluation of land in RoW, electric hazardous and electromagnetic impact, loss of agricultural production, withdrawal of economic opportunity, farming hindrance and loss of aesthetic value.

Employment to 225 people and increase in local economy is the positive impact during construction phase. The operation phase impacts include increase in local skill and national economy.

6.0 Mitigation Measures

Mitigation measures suggested during construction phase include compensation for the loss of private land and houses, school block, provision of land registration fee (7% of the compensation amount or actual amount spend in land purchase whichever is low), rental allowances for 4 months, appropriate rent for leased land, temporary camp with adequate facilities for the workers, provision of first aid kits and vaccines against infectious and communicable diseases.

Other mitigation programs include awareness program, availability of safety equipment's and device, strong code of conduct for the outside construction workers; no discrimination to the local people on the basis of gender, cast color or place of origin in Nepal; appropriate coordination with local and district level administration such as local VDCs, NGOs CBOs and construction of access trail to the cultural site at AP-16.

The operation phase mitigation programs include 10% compensation for the deduction of land value and occupational safety measures.

The enhancement measures during construction phase include priority to the local employment, and community support program. The operation phase mitigation program includes local employment and continuation of community support program for 2 years. Due priority shall be given in rural electrification since this is prime expectation of local people from the project. The total social estimated mitigation cost is NRs. 12.36 million NRs.

Nepal Electricity Authority will have prime responsibility for the implementation of recommended mitigation measures. The mitigation program will be implemented in coordination with district level line agencies to the extent possible.

7.0 Social Monitoring

Baseline, impact & compliance monitoring will be conducted in different phases of the project. Changes in settlement, public health, infrastructure and compliance of the tender clauses are the major areas of monitoring. The schedule of monitoring will be daily, quarterly, half yearly and yearly depending on the parameters and type of monitoring.

NEA will have prime responsibility for the implementation of environmental monitoring. Besides NEA line agencies, will also have responsibility for environmental monitoring of the proposed project

The Environmental and Social Studies Department on behalf of the project will conduct the pre-construction monitoring. Khimti-Dhalkebar Environmental Management Unit comprising of staff from ESSD, among others will be the institution responsible for construction phase monitoring. Grid Operation Department, NEA will conduct the operation phase monitoring of the project and ESSD will conduct some of the monitoring works on behalf of the department. The estimated total monitoring cost including social monitoring is 3.92 million NRs. /- for both construction phase and two years operation of the project.

8.0 Conclusion and Recommendations

The study indicates that proposed project would have low to moderate impact on socioeconomic environmental condition of the area. The study concludes that construction of the proposed Khimti-Dhalkebar 220 kV/TL Project is socially feasible if recommended mitigation measures and monitoring plan is implemented.

CHAPTER-1
INTRODUCTION

1.1 Background

Transmission lines are linear facilities. About 40% of Nepal's population is served by electricity and the per capita consumption of electricity in Nepal is 64 kW/h (NEA 2003). The total installed capacity of the Integrated Nepal Power System (INPS) is approximately 585 MW. To meet present increasing demand of power generation the existing capacity of the transmission needs to be upgraded or new transmission line should be constructed.

The Khimti region (Watershed of Tamakoshi and Khimti Khola) has the hydropower potential of about 1041 MW. This potential is mainly from the development of Tamakoshi (Rolwalling), Likhu-4, Khimti -II Hydroelectric Projects. Thus in view of future system development plan Nepal Electricity Authority (NEA) proposed Khimti –Dhalkebar 220 kV Transmission Line Project. The Power Development Projects, of which Khimti-Dhalkebar 220 kV project is a component, financed by World Bank aims to meet the objectives of HMG/N in extending access to electricity supply to a larger percentage of the population by supporting the development of Nepal's power sector. As a component of this project the Khimti –Dhalkebar 220 kV line is proposed to evacuate the power generated from Rolwaling Hydroelectric Project. This transmission line will also be connected with two existing Independent Power Producer (IPP) plants, Khimti and Bhotekoshi, with a view to exporting power to India as well as to serve the eastern region of the country. It will also provide an attractive route to evacuate the power from the IPP plants since they are already connected to the grid system through the Bhaktapur substation.

Since the proposed project will be funded under Power Development fund provided by the World Bank the study has to satisfy requirement of "Policy Framework for Environmental Impact Assessment for projects under the Power Development Fund"2002. This Policy Framework was agreed by Ministry of Water Resources and World Bank for financing Projects under Power Development fund in Nepal.

The policy framework is more specific on socio-economic and cultural aspects of the development projects. It identifies certain criteria, which are salient in Environment Protection Rules 1997(EPR) and Environment Protection Act (EPA) 1997 and needs to be addressed during Project Preparation. Considering aforementioned requirement a separate Social Impact Assessment (SIA) report is prepared focusing on social baseline, impacts, mitigation measures and social monitoring of Khimti - Dalkebar 220 kV transmission line project.

This report is prepared by the Environmental and Social Studies Department (ESSD) of NEA as per the contract signed between Transmission Line/Substation Construction Department and ESSD.

1.2 Objectives of the Study

The main objective of this study is to identify social baseline conditions of project area, assessment of potential impacts and to propose mitigation measures and monitoring plan on social aspects.

CHAPTER-2

STUDY METHODOLOGY

2.0 General

Literature review, field survey by the team of experts (observation, checklist and questionnaire survey), meeting and discussion with line agencies, group meetings and impact assessment matrix were the main methodology applied for the SIA study. The details of methodology applied to conduct SIA study of the proposed project is presented below. District Mahottari includes only forest area and Dolakha District is nominally connected by the route alignment. Therefore the social study focused mostly on Ramechhap, Sindhuli and Dhanusha districts out of 5 affected districts by the project.

2.1 Literature Review

Relevant information from various sources (Central Bureau of statistics (CBS), District Profiles-, VDC Profiles and Publications of local NGOs have also been collected and reviewed for baseline information. Review of topographical maps and district map has also been done. The feasibility study report (2003) and scoping document of Khimti –Dhalkebar 220 kV Project has been reviewed. The World Bank guideline for transmission line project and SIA guideline prepared for the Nepal Power Development Fund were reviewed to determine frame of reference for SIA study.

2.2 Field Study

The field investigation was carried out by a group of social scientist comprising Socio-economist, Sociologist, ACRP expert and Senior Surveyor. The fieldwork was conducted in February- March and May –June 2004 and lasted for about 40 days. Team traversed throughout the alignment from Sahare of Dolkha to Dhalkebar of Dhanusha district to collect information on socio-economic and cultural aspects of the project area. The following methodology was applied to collect baseline information and impact prediction in Socio-economic and cultural environment.

Inventory of Landowners from Cadestral Map

Maps interpretation was an integral part of field survey. Topographic maps of the area were consulted and relevant information was collected. Khimti- Dalkebar 220 kV transmission line alignment drawn in topographic maps was transferred to cadastral maps of 1: 2500 scales by on the spot verification by junior surveyor (Amines). A 30m corridor was fixed on cadastral maps. By using parcel numbers within 30m-corridor landowner names were compiled which were further verified by the records of Land Revenue Office. The present list is outcome of aforementioned activities. The team faced the difficulty due to absent of uniform coordinates in topographic and cadastral maps. The area not covered by cadastral maps is covered by topographic map of route alignment. Thus total area is surveyed. Junior surveyor and staff of District Survey Office were mobilized to collect the list of landowners affected by the project. This list was further verified by Land Revenue Office to cross check and update the information.

Questionnaire Survey

Appropriate questionnaire was developed in Nepali language and administered in the project-affected area (Annex-1). The questionnaire was pre tested before administration to the local community at site. Cadestral maps and list of landholders along right of way of transmission line provided by District Revenue Office were considered for questionnaire interview. A random stratified questionnaire (sample) survey with equal probability of selection, proportionate to number of landowners was selected out of 16 VDCs and one municipality. Local enumerators were hired for questionnaire survey and 210 (29% of the total affected HH) were interviewed. A census was carried out for affected houses and land falling within Angle Towers. Separate data sheets for prices prevailing in the area were administered. The sample size is appropriate and represents the project area to draw conclusions and recommendations. The responses of the questionnaires were edited for consistency. The list of persons interviewed during the field survey is given in Annex-2.

Checklist Survey/In depth Interview

Former VDC Chairman, secretary and schoolteachers were interviewed to document information about local conditions expected impacts and mitigation measures. Thirty-two checklists were filled from above mentioned different persons, which include two from each VDC/Municipality affected by the project.

Focused Group Discussion

Group meeting was conducted at Kamlamai Municipality –10, Bhiman, Dhungarebas, Bijaya Chap, Rajabash, Tilpung, Kathjore, and Tulasi Bahunmara to discuss various issues likely to arise due to implementation of the project, existing socio-economic condition of the areas and views/ concerns of former representatives of VDCs, intellectuals and local people. Similarly, a meeting was also conducted with local NGOs such as Community Development Society, Tamakoshi Sewa Sammittee and Rural Health Development Project (Annex-3).

The size of group ranges from 5-8 people. Local employment, rural electrification, compensation for the private assets and implementation of income generation program are the major concerns raised in-group meetings. The list of presentees and issues raised by them were noted down and are summarized in various sections of this report.

2.3 Data Analysis

Data analysis was carried out by access computer program and as per formats of output tables provided by the expert. The main output data are presented in various chapters of this report. The collected data seems reliable because these data closely correlate with other available maps and publications. The impacts both positive and negative were identified and their severity was predicted. The appropriate mitigation measures are suggested as per the severity (i.e. magnitude, extent and duration) of the corresponding impacts.

2.4 Public Hearing Program

The notice regarding the program was published in Gorkhapatra daily on 2061/5/25. The copy of the notice along with request letter for participation in the program was sent to concern ministries and departments, DDC office, local VDCs and district level line agencies. Audio record was made for the entire program and written concerns of the participants were collected.

Public hearing was conducted at Manthali of Ramechhap district and Dhalkebar of Dhanusha district in order to provide opportunity for the maximum participation of local people and to discuss the findings of the EIA and SIA study and to collect the issues/ concerns of local people. The public hearing was focus on awareness about the project plan and program, building of mutual consensus about the implementation of the project, identification of the key impacts/issues and consideration of these issues/impacts during the preparation of final report.

2.5 Impact Assessment

Matrix method was used to assess impact of the project on socio- economic and cultural environment. The magnitude, extent and duration of the impacts were categorized according to the National Environmental Impact Assessment Guidelines, 1993. The impacts were further categorized as high, medium and low in terms of magnitude, short term, medium term and long term in terms of duration and local, site specific and regional in terms of extent. The families who loose land or any assets are classified project-affected families (PAFs) and those who lost their houses are classified as Seriously Project Affected Families (SPAFs).

2.5.1 Magnitude of Impacts

Low Impact (L): If the impact is significant but limited to small magnitude
Medium Impact (M): If the impact is of considerable magnitude

High Impact (H): If the impact is of severe nature

2.5.2 Extent of Impacts

Site Specific (S): If the impact is limited to the site itself then it is a site specific one.

Local (L): If the impact of the work extends to the adjoining wards and or VDCs then it is termed as local

Regional (R): If the impact of the work extends to the entire district or further then it is termed as regional.

2.5.3 Duration of Impacts

Short Term (ST): If the duration of the impact is limited to the particular construction site then it is termed as a short-term impact.

Medium Term (MT): If the impact of the work extends throughout construction period then it is termed as medium-term Impact.

Long Term (LT): If the span of the impact expands beyond the construction phase of the project then it is termed as a long-term impact.

2.6 Study Team

A multidisciplinary team of experts conducted the SIA study. The following professionals were deployed for the SIA study of Khimti -Dhalkebar 220 kV Transmission Line Project.

- Mr. S.C. Jha- Director ESSD
- Dr. Mohan Deo Joshi- Team Leader/ Socioeconomist
- Mr. Rabindra Chaudhary- Team Co-ordinator
- Mr. D.S. Shrestha ACRP Expert
- Mr. Rajan Rishi Kandel -Sociologist
- Mr. Laxman Jha- Senior Surveyor
- Mr. Mahesh Acharya- Data Analyst
- Mr. Umesh Bista- Computer Operator

CHAPTER - 4.0

EXISTING SOCIOECONOMIC CONDITION OF THE AREA

4.1 Socioeconomic Condition of the Project Affected Districts

Details of relative indicators of development of the affected districts Dhanusha, Mahottari. Sindhuli, Ramechhap and Dolakha are provided in Annex-4, which indicates that these districts show mixed tendencies and are underdeveloped area in comparison with other districts of Nepal. They require central budget to develop basic infrastructure and their development potential.

4.1.1 Demography

Altogether five districts are affected by 73-km long transmission line, which is located in Terai, Mid hills and Chure area of Nepal. Accordingly topography, climate and agricultural practices differ according to agro-climatical zones. Main demographical indicators are tabulated in Table 4.1.1, which indicate that Dhanusha is most populated followed by Mahottari, Sindhuli, Ramechhap and Dolakha. Male and female ratio has mixed tendency. Female outnumbers males in Dolkha and Ramechhap. Annual population growth rate is lowest in Dhanusha and highest in Sindhuli and Mahottari, which is approximately 2% per annum.

Table- 4.1.1 Population Distribution of Project Affected Districts

S.No	District	Male	Female	Total	Annual Growth Rate Percent
1	Dolkha	98832	103010	201842	1.54
2	Ramechhap	105594	113308	218902	1.53
3	Sindhuli	136857	135541	272398	1.98
4	Mohottari	276932	258552	535484	1.98
5	Dhanusha	353028	328124	681152	0.54
	Total	971243	938535	1909778	

Source: Nepal District Profile 2002, National Development Institute

4.1.2 Education

In terms of educational establishments Sindhuli had 705 schools and colleges. The number of educational establishments in Dolkha, Ramechhap, Mahottari and Dhanusha constitute 479, 523,347 and 504 respectively. Teacher student ratio is highest in Dhanusha followed by Mahottari. It is lowest for Ramechhap. The published data reveal that literacy rates are 44, 34, 38, 32, and 38 percent in Dolakha, Ramechhap, Sindhuli, Mahottari and Dhanusha respectively. The detail of educational status is presented in Table 4.1.2.

Table -4.1.2 Education Status of Project Affected Districts

S.No	District	Number of School / College	Number of Student	Number of Teacher	Literacy Rate
1	Dolakha	479	54610	1486	44%
2	Ramechhap	523	55235	1355	34%
3	Sindhuli	705	62027	1247	38%
4	Mahottari	347	74088	1279	32%
5	Dhanusha	504	115642	2517	38%
	Total	2558	361602	7884	

Source: Nepal District Profile 2002, National Development Institute

4.1.3 Agriculture

Paddy, wheat, maize and other cereal and cash crops are produced in the affected districts but the productivity is low due to traditional techniques and marginal use of modern agricultural inputs. Total estimated cereal production is 21653, 64988, 79648, 161485 and 198797 Mt. for Dolakha, Ramechhap, Sindhuli, Mahottari and Dhanusha districts respectively. Details regarding agriculture production in these districts are provided in Table 4.1.3.

Table - 4.1.3 Agriculture Production of Project Affected Districts

S.No	District	Paddy Production	Maize	Wheat	Other	Total
1	Dolakha	6625	9095	1617	4316	21653
2	Ramechhap	16420	36333	4020	8215	64988
3	Sindhuli	26225	30172	10400	12851	79648
4	Mohottari	123935	2300	34240	1010	161485
5	Dhanusha	149816	2351	46000	630	198797
	Total	323021	80251	96277	27022	526571

Source: Nepal District Profile 2002, National Development Institute

4.1.4 Food Balance

Food balance as estimated by Agricultural Department indicates that only Ramechhap and Sindhuli have food surplus estimated to be for 15 and 3 days per capita. Deficit ranges in between 19.3 and 4 days/ capita (Table -4.1.4).

Table -4.1.4 Food Balance Status of Affected Districts

S.No	District	Year	Population	Requirement	Surplus	Per Capital Food Deficit / Surplus
1	Dolakha	1999/2000	210906	40283	-21355	-19.3
2	Ramechhap	1999/2000	227816	45791	1822	15
3	Sindhuli	1999/2000	276863	55649	478	3
4	Mohottari	1999/2000	543574	98387	-1005	-4
5	Dhanusha	1999/2000	680311	123136	-1427	-4
	Total		1939470	363246		

Source: Nepal District Profile 2002, National Development Institute

4.2 Socioeconomic Condition of the Project Affected VDCs

This sub chapter is basically focused on socio-economic and cultural aspects of VDCs and Wards through which the proposed transmission line passes. This area is also refereed as project area in this report. For this purpose the transmission line corridor and project site is analyzed in more detail.

4.2.1 Demography of Project Area

The project area is spread over 16 VDCs and one Municipality of five districts. The total population of the project area is 1,14,516 and number of households is 21668 (district profile). The male and female populations are 56414 (49.26%) and 58102 (50.74%), respectively. Among the projected affected VDCs Beghadawar is highly populated (10638) whereas population is low in Jalkanya VDC (1915). The ward wise population of the project area is given in Annex-5.

Average household size varies in between 4.39 and 6.21 and total average constitutes 5.28 persons per household (Table 4.2.1). Annual population growth rate in the project area is about 2%.

Table- 4.2.1 Population of the Project Area

S.N.	District	VDCs/Municipality	Male Population	Female population	Total Population	Households	Ave.HH size
1	**Dolakha**	Sahare	1293	1453	2746	554	4.96
2	**Ramechhap**	Gelu	2812	3335	6147	1192	5.16
		Khimti	2032	2390	4422	910	4.86
		Tilpung	1993	2325	4318	792	5.45
		Kathjor	2174	2605	4779	921	5.19
		Manthali	2609	2444	5053	1150	4.39
		Bhaluajor	1686	1870	3556	631	5.63
3	**Sindhuli**	Bhimeshor	961	1063	2024	380	5.33
		Ratanchura	1275	1375	2650	488	5.43
		Ranichauri	4591	4580	9171	1477	6.21
		Bhadrakali	2241	2350	4591	744	6.17
		Jalakanya	908	1007	1915	351	5.46
		Kamalamai Municipality	16388	16450	32838	6447	5.09
4	**Mahottari**	Gauribas	2872	2860	5732	1094	5.24
5	**Dhanusa**	Tulasi Bahunmara	1934	2090	4024	800	5.03
		Begadawar	5513	5125	10638	1965	5.41
		Dhalkebar	5132	4780	9912	1772	5.59
	Total		**56414**	**58102**	**114516**	**21668**	**5.28**

Source: Nepal District Profile 1997

4.2.2 Ethnicity

Being a less developed multiethnic society Nepal has caste system. The ethnic composition differs in different part of the alignment. Altogether sixty-three castes are found in the project area. Chettri (25.56%), Tamang (15.40%), Newar (11.35%), Magar (9.93% and Brahmin (9.79%) are major ethnic group found in the project area (Annex-6). Other includes Kami, Sarki, Damai, Majhi and Yadav.

4.2.3 Language

Social integration of the society is in process and population distribution by mother tongue for affected VDCs indicates that dominant language is Nepali followed by Tamang and Maithili. Besides this some dialects are also spoken in the area. Normally Nepali is spoken and understood by all residents.

4.2.4 Religion and Religious Sites

Hinduism is the predominate (82.50%) religion followed by Buddha (15.72%) in the project area (Table- 4.2.2). Some households are the followers of Islam (0.14%) and Christian (0.24%).

Table- 4.2.2 Religious Population in Project Area

S.NO	VDC/ Municipality	Religion									
		Hindu	Buddha	Islam	Kirat	Jain	Chirstian	Sikha	Bahai	Not stated	Total
1	Sahare	2638	108	0	0	0	0	0	0	0	2746
2	Khimti	3905	517	0	0	0	0	0	0	0	4422
3	Gelu	5671	471	1	0	0	4	0	0	0	6147
4	Tilpung	3313	1004	0	1	0	0	0	0	0	4318
5	Kathjor	4639	138	0	0	0	0	0	0	2	4779
6	Manthali	4391	307	0	8	0	0	1	0	346	5053
7	Bhaluwajar	2723	772	0	0	0	0	0	0	61	3556
8	Bhimeshwar	2022	2	0	0	0	0	0	0	0	2024
9	Jalkanya	1753	162	0	0	0	0	0	0	0	1915
10	Ratanchura	2561	89	0	0	0	0	0	0	0	2650
11	Bhadrakali	2594	1979	0	18	0	0	0	0	0	4591
12	Kamalamai Municipality	25723	6324	29	291	1	99	13	1	357	32838
13	Ranichuri	6582	2551	0	0	0	38	0	0	0	9171
14	Gauribas	5096	400	1	9	0	27	0	0	199	5732
15	Tulsi Bahunmara	3421	549	0	3	1	13	0	0	37	4024
16	Begadabar	8513	1752	42	0	0	89	13	0	229	10638
17	Dhalkebar	8932	877	87	0	0	15	0	0	1	9912
	%	**82.50**	**15.72**	**0.14**	**0.28**	**0.002**	**0.249**	**0.024**	**0.001**	**1.07**	**100**

Source: Nepal District Profile 2002, National Development Institute

Krishna temple, Kalika Devi, Ram temple, Bhimeshwor temple, Dhanaugi temple and Ganesh temples are the religious places found in the project affected VDCs. The detail of religious places found in the project area is presented in Table 4.2.3.

Table- 4.2.3 Major Religious Places

District	Religious Places
Dolkha	Shiva temple
	Deviyan Chanuate
	Pashupati Mandir
	Nardevishwori Mandir
	Krishna Mandir
	Dhungeshwor Mahadev
	Guru Ko Chautari
	Mahadev Mandir
	Kalika Devi
	Lisanpani Devi
	Devi Mandir
	Ram Mandir
	Kaidalee Devi
	Rdha Krishna Mandir
	Jalpa Devistan
	Urgeni Chhoyoling Gumba

Ramechhap	Nil Kanteshwor
	Boudha Mandir
	Ram Mandir
	Thanpati Mahadev
	Mahadevsthan
	Shiva Mandir
	Pashupatinath Mandir
	Radha Krishna
	Indrabati Temple
	Ram Sita Mandir
	Kusheshwor
	Shiva Mandir
	Rupkali Mandir
	Bhagwati
	Bhagwati Mandir
Sindhuli	Krishna Mandir
	Ganesh Mandir
	Bhimsen Mandir
	Viajaychhap
Mahottari	Nava durga temple
Dhanusha	Durga Mandir
	Dhanaugi
	Mahadevsthan
	Bahunmara
	Chure Shiva Mandir
	Bhimeshwor
	Aakhidi Mandir
	Bisara Mandir
	Ram Mandir

Source: Checklist Field Survey, 2004

4.2.5 Education and Educational Institution

56.85 % population of the project area is literate. The literacy rate varies in different VDCs. The literacy rate is high (68.28%) in Gauribas VDC of Mahottari district and lowest (43.40%) in Kathjore of Ramechhap district. The detail of literacy status in project area is given in Annex-7.
Altogether 102 educational institutions of different levels are found in the project area. Out of the total educational institutions primary level constitutes 70.59% and plus 2 is only 2.94 %. The number of educational institutions is more in Ramechhap part of the project area in compare to other district (Table 4.2.4).

Table -4.2.4 Educational Institutions in the Project Area

Types of Institutions	Project Area					Total	%
	Dolkha	Ramechhap	Sindhuli	Mahottari	Dhanusha		
Primary School	5	34	10	3	20	72	70.59
Lower Secondary School	0	8	0	2	5	15	14.71
Secondary School	0	6	2	1	3	12	11.76
Plus 2	0	2	1	0	0	3	2.94
Total	**5**	**50**	**13**	**6**	**28**	**102**	**100**

Source: Field Survey, 2004

The number of educational establishments by levels, number of teachers and students in the project area are tabulated in following tables-4.2.5. Preliminary data indicate that in primary level students/teacher ratio in Ramechhap is 29. Similar indicators for Dhanusha and Sindhuli are 30 and 29. In lower secondary level student/ teacher ratio for Ramechap and Dhanusha is 39 and 46. In secondary level the ratio is almost same except for Sindhuli and Dhanusha where it is more than 50.

Table- 4.2.5 Number of Schools in Project Area

	Primary School						
		Teacher			Students		
District	Number	Male	Female	Total	Male	Female	Total
Ramechhap	34	90	23	**113**	1840	1419	**3259**
Sindhuli	10	14	6	**20**	275	300	**575**
Dhanusha	20	69	17	**86**	1438	1140	**2578**

Source: Checklist Field Survey, 2004

	Lower Secondary School						
		Teacher			Students		
District	Number	Male	Female	Total	Male	Female	Total
Ramechhap	8	47	15	**62**	1230	1170	**2400**
Sindhuli	0	0	0	**0**	0	0	**0**
Dhanusha	5	29	7	**36**	865	785	**1650**

Source: Checklist Field Survey, 2004

	Secondary School						
		Teacher			Students		
District	Number	Male	Female	Total	Male	Female	Total
Ramechhap	6	77	5	**82**	1225	1025	**2250**
Sindhuli	2	18	8	**26**	800	600	**1400**
Dhanusha	3	30	9	**39**	1102	898	**2000**

Source: Checklist Field Survey, 2004

	Plus 2						
		Teacher			Students		
District	Number	Male	Female	Total	Male	Female	Total
Ramechhap	2	18	3	**21**	530	585	**1115**
Sindhuli	1	10	3	**13**	250	200	**450**
Dhanusha	0	0	0	**0**	0	0	**0**

Source: Checklist Field Survey, 2004

4.2.6 Occupation

Agriculture is predominant occupation in project area flowed by livestock farming, poultry, trade and business, manufacturing industries, transport and business.

According to available data 17.63% population of the project area is economically active. Out of that 10.7% are involved in manufacturing sector and 33.3% in trade and business. The other

areas are 3.6%, 29% and 21.6% for transport, service and others respectively. The detail of economic active and non active population in the project area is presented in Annex- 8.

4.2.7 Land Holding Size and Land Transaction

Checklist survey provides average landholding by types of land in the project area, which shows that Terai households have more land than hilly families. Land distribution is uneven. Most of lands are concentrated on few landholders. Average household in Dolakha, Ramechhap, Sindhuli, Mahottari and Dhanusha, sector of the project area corresponds to 0.66 ha, 0.60 ha, 0.35 ha, 0.67 and 0.91 ha per households respectively (Table- 4.2.6). It shows that subsistent farming system prevails in project area and per capita land availability is low.

Table - 4.2.6 Land Holding Size in Project Area

Project Area	Land Area Ropani				Total	
	Irrigated Land	Unirrigated Land	Khar Bari	Pakha / Bari	Ropani	Ha.
Dolkha	3	2	3	5	13	0.66
Ramechhap	1.70	1.72	2.61	5.77	11.8	0.60
Sindhuli	1.00	0.50	1.00	4.50	7	0.35
Mahottari	6	5	0	2.16	13.16	0.67
Dhanusha	6.50	0.00	0.00	11.50	18	0.91

Source: Checklist Field Survey, 2004

Land transaction in terms of land purchase and sale is limited in the project area. Therefore, land holdings appear to be stable. However, the price of land depends upon the location, quality of land and varies from VDC to VDC (Table- 4.2.7).

Table - 4.2.7 Land Price in Project Area

District	VDC	Irrigated Land (NRs.)				Unirrigated Land (NRs.)				Kharbari	Unit
		Abbal	Doyam	Sim	Chahar	Abbal	Doyam	Sim	Chahar		
Sindhuli	Kamalamai	80000	70000	60000	50000	60000	50000	40000	30000	30000	Per Kattha
Sindhuli	Ratanchura	200000	150000	100000		200000	150000	100000		10000	"
Sindhuli	Bhimeshwor	500000	400000	200000	200000	250000	200000	150000	100000		"
Dhanusha	Tulasi Bahunmara	35000	22000	20000	18000	20000	16000	10000	9000		per Kattha
Dhanusha	Bengadawar	40000	35000	20000	15000	20000	15000	7000	5000		"
Dhanusha	Dhalkebar	20000	18000	16000	14000	15000	14000	13000	12000		"
Ramechhap	Manthali	200000	150000	100000	90000	20000	15000	10000	8000	10000	Per Ropani
Ramechhap	Katahare	125000	100000	90000	75000	90000	75000	70000	65000	40000	

Source: Field Survey, 2004

4.2.8 Agriculture Practice and Production

Average productivity of crops shows that Sindhuli is more productive for paddy and maize. Per Ropani wheat and millet production is highest in Ramechhap. Details are provided in the Table 4.2.8.

Table -4.2.8 Productivity of Different Crops in Project Area

District	Unit	Paddy	Maize	Wheat	Millet	Potato	Others
Dolkha	Muri/Ropani	3.14	1.34	2.00	2.00	5.00	2.00
Ramechhap	Muri/Ropani	3.14	1.34	2.00	2.00	5.00	2.00
Sindhuli	Muri/Ropani	4.50	2.50	1.75	1.75	4.50	2.25
Mahottari	Muri/Ropani	2.00	1.50	1.50	-	5.00	2.45
Dhanusha	Muri/Ropani	2.00	1.50	1.50	-	5.00	2.50

Note: 1 Muri= 50 Kg
Source: Checklist Field Survey, 2004

4.2.9 Income Levels

From the interview with knowledgeable persons income levels of families were estimated and results are shown in following table which indicates that most of families have average annual income in between Rs 12000 and 50000. Significant numbers of rural families are living on below Rs. 12000 annual income. It appears that normally income data are under reported in rural context but the tabulated data indicate disparity of income distribution among the families in and around transmission line alignment.

Table-4.2.9 Number of Households by Annual Income in Project Area

Affected District	Number of Families		
	< 12000	12000 - 50000	>50000
Ramechhap	2435	3100	1845
Sindhuli	558	638	399
Dhanusha	2600	2925	975

Source: Checklist Field Survey, 2004

4.2.10 Electrification

The field survey shows that 12 VDCs and one municipality of the project area are partly electrified (Table 4.2.10).

Table -4.2.10 Electrified Area

District	VDC	Ward No	Village
Dolkha	Sahare	3, 4, 5 & 6	Pauwa, Kirne, Rithabote and Sahare
Mahottari	Gauribash	8	Rajbash
Dhanusha	Begadawar	8	Bal Tole
		4	Jamunibas
		9	Lalgadh
	Dhalkebar	2	Dhalkebar, Ghattole
		4	Dhalkebar
Ramechhap	Gelu	1	Batase
	Kathajore	8	Bandre, Pakhakhet
	Khimti	1	Khimti Digi, Thapatole, Khimti Besi
		5	Khimti Besi
		6	Khimti Besi

	Manthali	1	Lisanpani
		2	Machhedanda
		6	Nalamitol, Dahalgaun
		7	Dahalgaun
		8	Tekanpur
	Tilpung	2	Mange
Sindhuli	Bhadrakali	1	Dhungre Bhanjyang
		2	Dhungre Bhanjyang
		3	Lamishwara, Mudekharka
	Bhimeshwor	2	Tari, Baghbazar, Raj Dei
		3	Rato Tar, Khurkot Ratotar
		4	Pokhrelthok, Dhungeni Danda, Kushgaun, Khurkot
		9	Mathillo Besi
	Kamalamai	6	Aandheri, Ratamate
		7	Bhadautar, Dandatole, Majhitar, Panitanki, Thulitar
		9	Kattike
	Ratanchura	1	Khanigaun, Thapatole
		2	Vijaychhap, Ghhata Mathi
		11	Khanigaun

Source: Field Survey, 2004

Electricity consumption is primarily domestic in nature and large industries consuming considerable energy is absent in project area. Between the periods the number of consumers was slightly increased. Per consumer revenue may be taken as proxy of consumer's willingness to pay. In domestic sector willingness to pay varies in between Rs.163 and 168. Overall revenue per consumer during winter is Rs. 352 and during the summer it decreases to Rs. 289. Household consumption is more or less stable and constitutes 29.5 units per month.

Table -4.2.11 Energy consumption in Project Area during winter

S.N.	Consumer	Number of Consumer	Units	Revenue Rs.	Revenue per Consumer Rs.
1	Domestic	2122	62531	346954	163.5
2	Commercial	13	4496	45709	3516
3	Noncommercial	71	9722	92526	1303
4	Industrial	26	8425	58178	2238
5	Others	8	29056	254564	31820
6	Total	2240	124231	787933	352

Source: NEA, Sindhuli Branch - Monthly Statement for 060, Paush

Table-4.2.12 Energy Consumption in Project Area during summer

S.N.	Consumer Category	Number of Consumers	Units	Revenue Rs.	Revenue per Consumer Rs.
1	Domestic	2017	60093	338956	168
2	Commercial	12	3158	33124	2760
3	Non -commercial	67	13268	120501	1303
4	Industrial	23	8205	55629	1798

5	Others	8	13978	67329	8416
6	Total	2127	98702	615540	289

Source: NEA, Sindhuli Branch - Monthly Statement for 060, Jestha

4.2.11 Land use Pattern

Map interpretation of the project area reveals that altogether 68.44 ha of cultivated area along ROW with 68 tower pads will be required for the construction of the Project. The land use pattern of the alignment by affected districts is provided in this table-4.2.13 which shows area under forests is 106.6 ha. River crossing, road crossing and barren lands constitute 53.6 ha. Cultivated area is not affected in Dolakha and Mahottari districts and social issues, if any, may be only related to use of forests in these districts.

Table- 4.2.13 Land use Pattern in Transmission Line ROW

S.No	District	Cultivated Land (ha)	Forest Land (ha)	River Crossing (ha)	Road Crossing (ha)	Barren Land (ha)
1	Dolakha	-	-	1.8	0.059	1.1187
2	Ramechhap	28.318	25.905	7.6	1.185	17.241
3	Siindhuli	30.355	59.488	6.4	1.778	-
4	Mahottari	-	7.946	1.7	0.059	-
5	Dhanusha	9.7671	13.261	4.9	10.119	-
Total		68.4401	106.6	22.4	13.2	18.3597

Source: Field Survey, 2004

4.2.12 Development Activities

Hydropower, drinking water, health, road, suspension bridge and rural electrification are the major development project implemented in the project area. The field survey shows that number of development program are more in Ramechhap part of the project area compare to other areas (Annex-9).

4.2.13 Institutional Analysis and Infrastructure

NGOs

More than 20 NGOs are working in the project area. Rural Health Development Project (RHDP), Community Development Society (CDS), Tamakoshi Sewa Samiti, Dhruba Tara Yuva Club and Dhanusha Sewa Samiti are the main NGOs actively working in environment, drinking water, health, social service & public awareness and income generation areas. The list of NGOs, objectives/work area and people employed are presented in Annex-10.

Infrastructure

The main local markets are Khimti Besi, Gogane, Kubinde, Khurkot, Panitanky, Sindhure Bagmara and Hardia. The infrastructures for people services are 11kV transmission line in Manthali area and 33KV T/L in Ratanchaur and Bhadrakali area, airport in Manthali, irrigation canal in Khurkot. Sindhuli – Banepa Road and Bardibas – Sindhuli Road is the other features encounter in the transmission line corridor.

The other infrastructure found in the area are hospital, police office, forest office, irrigation,

agriculture service center, veterinary, water supply office and banks (Annex-11).

4.2.14 Manthali Airport

About 350 –400 m stretch of the proposed alignment extent in the vicinity of the Manthali airport. This stretch lies at a distance about 730 m from the airport. This airport is located in Manthali of Manthali Village Development Committee and occupies 0.04 ha of land. There are three flights (Sunday, Tuesday & Thursday) of Royal Nepal Airlines from Kathmandu to Mathali in a week. This airport also serves as transit point for the landing of aircraft if the whether of Lukla and other mountainous flight are not clear. The airport has landing facilities from north and south direction depending on wind direction.

4.2.15 Information Decimation in Project Area

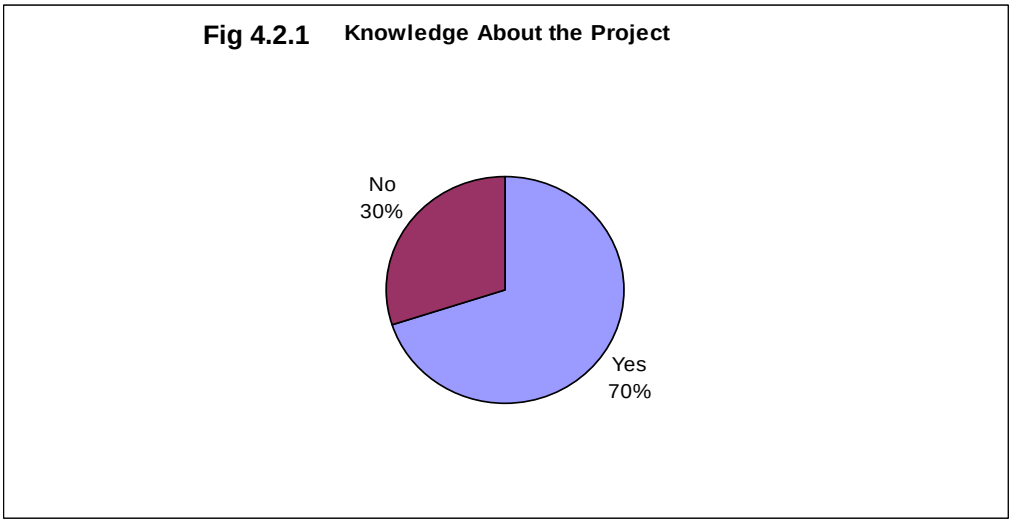
The field survey compiled the data regarding knowledge about the project, which reveals that 70 % of households had knowledge about the project. 30 % of respondents said that they have no information regarding the project. Information on the project is to be provided before and during the project construction so that people will be aware of activities in the route alignment. Public consultation and activities regarding information disclosure will enable the local people to know more about the project (Table 4.2.14).

Table 4.2.14 Knowledge About the Project

Knowledge About the Project	No. of HHs	% of HHs
Yes	147	70.00
No	63	30.00
Total	**210**	**100.00**

Source: Field Survey, 2004

Fig 4.2.1 Knowledge About the Project



4.2.16 Expectation

The survey team records various expectations of affected households. Most of people (42.19 %) expect that project will provide better compensation followed by employment. As a result of

project construction local area will be developed and electrification in rural area will be intensified. The details of people's expectations are provided in following table-4.2.15.

Table 4.2.15 Expectation from Project

Expectations	No. of HHs	% of HHs
Better Compensation	127	42.19
Employment	69	22.92
Electricity Facilities	45	14.95
Development of Local Area	60	19.93
Others	0	0.00
Total	**301**	**100.00**

Source: Field Survey, 2004

4.2. 17 Public Hearing

Public hearing was conducted at Manthali Bazar of Ramechhap district on 2061/5/28 and Dhalkebar of Dhanusha district on 2061/6/8 in order to provide opportunity for the maximum participation of local people and to discuss the findings of the EIA study and to collect the issues/ concerns of local people. 215 peoples were participated in the program, which includes former chairman of the affected VDCs, Secretary of VDCs, affected people, representative of community forest users group and local people. Chief District Officer, representative of district forest offices, representative of district development committee, representative of Ministry of Population and Environment and Ministry of Forest and Soil Conservation were also participated in the program.

The finding of the EIA/SIA study and objectives of the program was presented by the NEA staff. The representative of ministries requested participants to raise their relevant concerns in the program. Among the participants 43 people raised different types of questions, which was replied by the project manager and team leader of EIA study team. The detail of the public hearing report is given in Annex-12.

4.3 Socioeconomic Condition of the Project Affected Families

4.3.1 Demography

The population distribution pattern of the project affected families (PAFs) reveals that population density is high in affected families with average household size is 6.2. The study shows that male population is more than females (Table-4.3.1).

Table -4.3.1 Total Population and Households of PAF

Items	Total
Total Population	**1307**
Male	705
Female	602
Number of Households	**210**
Household Size	**6.22**

Source: Field Survey, 2004

Joint family system is common in PAFs. The field study shows that among the project affected families 63.33 % are joint families and 36.67 % are nuclear families (Fig 4.3.1). The existence of considerable joint families shows that farming activities require considerable labor inputs and joint family is a economically viable option. However process of formation of nuclear family is underway and is likely to increase number of households. Tables 4.3.2 provide the family status of the PAFs.

Table 4.3.2 Family Type of PAFs

Type of Family	No. of HHs	% of HHs
Joint Family	133	63.33
Nuclear Family	77	36.67
Total	**210**	**100.00**

Source: Field Survey, 2004

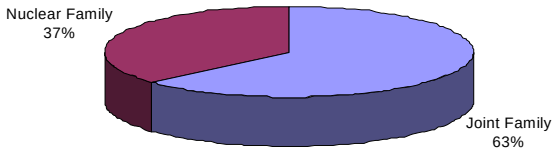


Fig: 4.3.1 Family Type of PAFs

4.3.2 Age Structure

Age structure of the affected population indicates that economically active population constitutes 63% and dependent are less, i.e. 37%. It indicates that students are also included in economically active population. 28% of the population needs schooling facilities and about 10% may need frequent medical services. The numbers of females is greater in below 10 years age group (Table 4.3.3). It is assumed that this age structure will not change significantly during Project construction and the need of services will remain the same.

Table- 4.3.3 Population Distribution of PAF by Age Group and Sex

n=210

Age Group	Male	Female	Total	Percentage
Below 10 Years	105	112	**217**	16.60
10 - 15 Years	80	64	**144**	11.02
15 - 60 Years	450	369	**819**	62.66
Above 60 Years	70	57	**127**	9.72
Total	**705**	**602**	**1307**	**100.00**

Source: Field Survey, 2004

4.3.3 Religion

The religion pattern of the project affected families are similar to non affected families. The field survey shows that 92.38 % population is Hindu followed by 7.62 % Buddha (Table 4.3.4)

Table 4.3.4 Religion of the Project Affected Families

S.No	Religion	Project Area		%
		Total Population	No. of HHs.	
1	Hindu	1195	194	92.38
2	Buddha	112	16	7.62
3	Muslim	0	0	0.00
4	Christian	0	0	0.00
5	Others	0	0	0.00
	Total	1307	210	100.00

Source: Field Survey, 2004

4.3.4 Literacy

The questionnaire survey indicates that literacy status of the project affected families is 64.65%, which is higher than the average of the project area. According to the findings 35.35% of population is illiterate. Among the literate 14.54% are able to read and write. People with primary, lower secondary, secondary and SLC level of education are 16.68%, 8.8%, 9.79% and 9.79 % respectively. Only 5% of affected population have more than SLC level of education. Overall literacy of PAF is 64.65% which is considered a good indicator of social status. The detail of literacy status of the project affected families is given below.

Table-4.3.5 Literacy Status of PAF

Population	Illiterate	Literate							Total of All
		Able to Read and Write	Primary	Lower Secondary	Secondary	SLC	Intermediate and Above	Total	
Male	178	108	127	72	78	88	54	527	**705**
Female	284	82	91	43	50	40	12	318	**602**
Total	**462**	**190**	**218**	**115**	**128**	**128**	**66**	**845**	**1307**
Percentage	**35.35**	**14.54**	**16.68**	**8.8**	**9.79**	**9.79**	**5.05**	**64.65**	**100.00**

Source: Field Survey, 2004

4.3.5 Migration Pattern

The field survey shows that most of the households (83.33%) are local resident but some people migrated into the area due to various reasons. One family migrated recently. Three families came to the area within five years. Thirty- one households are migrant for more than five years (Table 4.3.6).
It appears that a few families may immigrate to the project area until the construction of the project starts. The Project Affected Families are comparatively stable and present data reflects socio- cultural issues during construction when seasonal in migration may occur. Out migration was not considered which has primarily seasonal character.

Table 4.3.6 Migration Pattern of PAFs

Types	No. of HHs	% of HHs
Local Resident	175	83.33
Migrated Within 1 Year	1	0.48
Migrated Within 5 Years	3	1.43
Migrated More Than 5 Years	31	14.76
Total	**210**	**100.00**

Source: Field Survey, 2004

4.3.6 Occupation

Among the project-affected families 49% of population responded that their primary occupation is agriculture. 8.8% reported that service is their main occupation. Study is also taken as an occupation and 17% of the respondents reported their occupation as a student. Share of business, labor and wages are almost equal and constitute 2.68 and 2.37 percent respectively (Table-4.3.7). It appears that labor and wages will be required during project construction and operation and local skills will be utilized as far as practicable. Existing occupational distribution reflects rural nature of sampled population where agriculture is dominant characteristics. Some diversification of occupation is expected during construction.

Table- 4.3.7 Occupation Distribution of PAF by Sex

Occupation	Male	Female	Total	Percentage
Agriculture	285	356	**641**	**49.04**
Business	28	7	**35**	**2.68**
Service	102	13	**115**	**8.80**
Labour and Wages	29	2	**31**	**2.37**
Students	148	106	**254**	**19.43**
Unable to Work	107	116	**223**	**17.06**
Others	6	2	**8**	**0.61**
Total	**705**	**602**	**1307**	**100.00**

Source: Field Survey 2004

4.3.7 Skills

During the field survey an inquiry was made about skills of affected population and only 10% of population have some skills. A variety of skills including mason (7.52%) carpenter (3.01%), tailor (1.50%), blacksmith (3.01%), shoemaker (3.01%), weaving (10.53%) and driver (4.51%) are found in the project area. These and other skills of affected population may be utilized during transmission line construction. The details are shown in table 4.3.8.

Table 4.3.8 Distribution of Skilled Population in Project Affected Families

n=210

Skill Type	Number of Person	Percentage
Mason	10	7.52
Carpenter	4	3.01
Tailor	2	1.50
Blacksmith	4	3.01
Shoemaker	4	3.01
Weaving	14	10.53
Driver	6	4.51
Construction	1	0.75
Nursery Works	4	3.01
Others	84	63.16
Total	**133**	**100.00**

Source: Field Survey, 2004

4.3.8 Land Holding Size and Land Transaction

The project affected families located along the RoW use irrigated, unirrigated and grassland. Distribution of PAF by size of land holding reveals that most of the families cultivate less than 1 ha of land. 21.43 % of PAF reported that they have no irrigated land and 13.3 % of PAF do not own unirrigated land. Similarly 67% of them are deprived of grassland. On the average total landholding of a PAF is 1.05ha which includes 0.4 ha irrigated land, 0.58 ha unirrigated land and 0.07 ha grassland. Area distribution according to size of landholding is presented in Table 4.3.9.

Table- 4.3.9 Distribution of PAFs by Land Holding Size

n=210

Size of Land Holding	Irrigated Land (Khet)			Unirrigated Land (Bari)			Grassland (Kharbari)			Total Land	
	No.	Percent	Area (ha)	No.	Percent	Area (ha)	No.	Percent	Area (ha)	Area (ha)	Percent
Holding without land	45	21.43	0.00	28	13.33	0.00	141	67.14	0.00	**0.00**	**0.00**
Less Than 0.1 ha	20	9.52	0.98	21	10.00	4.67	10	4.76	0.53	**6.18**	**2.79**
0.1 - 0.2 ha	33	15.71	4.54	35	16.67	17.78	30	14.29	3.90	**26.21**	**11.83**
0.2 - 0.5 ha	63	30.00	19.55	61	29.05	17.78	19	9.05	4.91	**42.24**	**19.07**
0.5 - 1.0 ha	25	11.90	17.32	38	18.10	26.51	6	2.86	3.31	**47.14**	**21.28**
Greater Than 1 ha	24	11.43	40.78	27	12.86	54.31	4	1.90	4.63	**99.72**	**45.02**
Total	**210**	**100.00**	**83.17**	**210**	**100.00**	**121.04**	**210**	**100.00**	**17.28**	**221.49**	**100.00**

Source: Field Survey, 2004

4.3.9 Area Allocation and Productivity

The project area includes predominantly rural economy with agriculture as a main source of livelihood and income. Agricultural practices with age old equipment result in low productivity of major crops. The primary crops cultivated in the project area are paddy, wheat, maize, millet and pulses and their productivity is estimated at 1.48, 0.56, 0.78, 0.94 and 2.77 t/ha respectively. Area allocation indicates that area under maize is highest followed by wheat, paddy and pulses. Annual average production per household is estimated to be 3514 Kg. or 567 kg per capita or 47.23 Kg per capita per month. The details are provided in following table 4.3.10.

Table -4.3.10 Agricultural Practice and Production

n=210

Types of Product	Paddy	Wheat	Maize	Millet	Pulses	Others	Potatoes	Mustard
Total Area (sqm)	443037.24	450312.03	1147935.3	327008.21	440772.71	19712.45	259873.86	78676.31
Khet (sqm)	236351.3	240378.32	265674.99	40658.65	112237.49	2371.64	125554.27	37354.82
Bari (sqm)	206685.94	209933.71	882260.31	286349.56	328535.22	17340.81	134319.59	41321.49
Production (kg)	298150	25125	89200	30825	122250	375	136800	35275
Yield (Ton/ha)	1.48	0.56	0.78	0.94	2.77	0.19	5.26	4.48

Source: Field Survey, 2004

4.3.10 Livestock with PAFs

Livestock development is one of the major sources of income besides their own consumption of livestock and their products. Cattle, buffaloes, goats, pigs and birds are the major livestock domesticated in the project area. The number of these animals differs from house to house. On the average each household possesses 2.18 cattle, 8.5 buffaloes, 3 goats and sheep and 6.2 hen and duck (Table 4.3.11).

Table -4.3.11 Livestock Population with PAFs by Type

S. No.	Type of Livestocks	Numbers	% of S. No. 1 and 2	% of Total	Milk/Month (Liter)	Average Milk/Month (Liter)
1	**Cattle**	**459**	**100.00**			
	Male	260	56.64	6.20		
	Female	168	36.60	4.01		
	Milking	31	6.75	0.74	968.57	4.61
2	**Buffalo**	**1786**	**100.00**			
	Male	1539	86.17	36.71		
	Female	175	9.80	4.17		
	Milking	72	4.03	1.72	3488.57	16.61
3	**Goats and Sheep**	**621**		14.81		
4	**Pigs**	**24**		0.57		
5	**Hen and Duck**	**1302**		31.06		
	Total	**4192**		**100.00**	**4457.14**	**21.22**

Source: Field Survey, 2004

4.3.11 Fruit Trees

Fruit trees are the sources of additional income. Inventory conducted during the field survey concludes that fruits like orange, lemon, mango, guava, junar and banana are prevalent in

project area. Total number of trees estimated as 4769 owned by 210 households. Share of banana, guava and mango is highest followed by lemon and orange. Species wise distribution of the fruits and number of trees per household are tabulated in following table.

Table - 4.3.12 Fruit Trees in the Project Affected Area

Types of Tree	Total Number	Percentage	Average / HH
Orange	213	4.47	1.01
Lemon	111	2.33	0.53
Mango	503	10.55	2.40
Guava	509	10.67	2.42
Banana	2699	56.59	12.85
Others	734	15.39	3.50
Total	**4769**	**100.00**	**22.71**

Source: Field Survey, 2004

4.3.12 Health Facilities and Diseases

Health facilities in project area are inadequate and main diseases prevalent are stomachache, diarrhea, fever, tuberculosis, hysteria, skin diseases and others. The percentage wise distribution of main diseases is provided in following table. It appears that communicable diseases exist in the project area (Table 4.3.13). As a supplement to the survey findings annual records of Manthali Health Post are annexed which are typical of project area (Annex-15).

Table - 4.3.13 Number of PAF Affected by Diseases

Types of Diseases	Number of Households	Percentage
Tuberculosis	6	2.51
Stomachache	61	25.52
Diarrhea	56	23.43
Hysteria	3	1.26
Fever	63	26.36
Skin Diseases	2	0.84
Others	48	20.08
Total	**239**	**100.00**

Source: Field Survey, 2004

Methods of treatment indicate that in most cases patients consult health post, private clinics and pharmacy. Local baidya and dhami/jhakri also contribute to patient's treatment. There are the cases when patient was not treated at all. Following table provides the information about common methods of treatment in project area (Table 4.3.14). The present data suggest that health facilities are not developed in project area.

Table- 4.3.14 Methods of Treatment

Methods of Treatment	Number of Households	Percentage
Private Clinic	28	11.72
Local Baidhya	8	3.35
Dhami / Jhakri	11	4.60
Health Post	166	69.46
Pharmacy	21	8.79
Others	4	1.67
Not Treated	1	0.42
Total	**239**	**100.00**

Source: Field Survey, 2004

4.3.13 Energy

Firewood, kerosene and electricity are the main source of energy for lighting and cooking. Due to accessibility and low cost almost all houses use the firewood for cooking. For lighting purposes electricity is used by 52.4% households where as kerosene is used by 46.2% households (Table 4.3.15). Animal dung and agricultural residue are not being used for lighting and cooking.

Table - 4.3.15 Energy Use and Source for Lighting and Cooking

Source of Energy	Use of Energy			
	Lighting		Cooking	
	No. of HHs	Percentage	No. of HHs	Percentage
Firewood	3	1.43	206	98.10
Kerosene	97	46.19	2	0.95
Electricity	110	52.38	0	0.00
Animal Dung	0	0.00	0	0.00
Agricultural Residue	0	0.00	0	0.00
Others	0	0.00	2	0.95
Total	**210**	**100.00**	**210**	**100.00**

Source: Field Survey, 2004

Willingness to Pay for Electricity

The field survey indicates that most of the households (85%) are willing to pay Rs. 80 per month Some 11% of households may connect their houses by paying 300 Rs. per month. 3.7% afford more (Table 4.3.16). The following table reveals that rural households are unable to pay substantial amount for commercial energy due to lack of cash income. In most cases electricity is used only for lighting purpose which gives low electricity consumption pattern.

Table -4.3.16 Willingness to Pay for Electricity

Willingness to Pay (NRs.)	No. of HHs	% of HHs
80	69	85.19
300	9	11.11
650	3	3.70
Above 650	0	0.00
Total	**81**	**100.00**

Source: Field Survey, 2004

4.3.14 Food Sufficiency

Reported information about food sufficiency indicates that 34.76% of households in core project area have sufficient food for twelve months. Similarly 17.62 % and 38.10% of households have deficit of food for 3 and 6 months respectively (Table 4.3.17). Food reserve of 2.86 per cent of households does not cover even 3 month. These data show that malnutrition and deficit in calorie intake of the households are prevalent in project area. The details are tabulated in following table.

Table- 4.3.17 Food Sufficiency of PAFs

Sufficient for Months	No. of HHs	% of HHs
12	73	34.76
9 - 12	37	17.62
6 – 9	80	38.10
3 – 6	14	6.67
Less than 3	6	2.86
Total	**210**	**100.00**

Source: Field Survey, 2004

4.3.15 Income and Expenditure

Income sources as reported by rural households of core project area indicate that agriculture is main source of income and contributes about 36.25% of annual average income. Labor and wages and service contribute 28.05 and 21.90 % respectively. Trading is also a contributing factor with 4.47 % contribution. Among other sources of income cottage industries, pension, services and fishing are prominent one. Estimated annual income per household in project area is Rs. 72396.

Table- 4.3.18 Annual Average Income of PAFs

Income Source	Average Amount (NRs.)	Percentage of Average Annual
Agriculture and Animal Husbandry	26246.6	36.25
Service	15854.29	21.90
Trade	3233.333	4.47
Cottage Industries	1371.429	1.89
Pension	1423.81	1.97
Labour and Wages	20304.76	28.05
Professional Services	742.8571	1.03
Fishing	95.2381	0.13
Others	3123.81	4.31
Total	**72396.12**	100.00

Source: Field Survey, 2004

Expenditure pattern of PAF residing along the RoW indicates that the share of expenditure on food is 68.91%, which is relatively in higher side. Expenses on energy constitute 9.01% followed by clothing, education and medicine. Average household expenditure constitute Rs. 76498 which is higher than the average annual income by Rs. 4102 (Table 4.3.19). This is explained by the fact that the respondents over estimated the expenses on food items.

Table - 4.3.19 Annual Average Expenditure of PAFs

Expenditure Items	Average Amount (NRs.)	Percent of Average Amount
Food	52713.94	68.91
Energy	6891.09	9.01
Medicine	4345.24	5.68
Education	5072.52	6.63
Clothing	5444.59	7.12
Others	2030.95	2.65
Total	**76498.33**	**100.00**

Source: Field Survey, 2004

4.3.16 Sanitation and Drinking Water

The field survey with regards to sources of drinking water reveals that 68.10 % of households have piped water supply and 30% use water from wells for drinking (Table -4.3.20). Some households replied that they are using river and spring water for daily consumption. The water supply scenario seems to be good that majority of population have piped water supply and have less probability of infection by water related diseases.

Table -4.3.20 Sources of Drinking Water and Percentage of Users

Source	No. of HHs	Percent
River / Spring	3	1.43
Well	63	30.00
Pipe	143	68.10
Others	1	0.48
Total	**210**	**100.00**

Source: Field Survey, 2004

4.3.17 Use of Forest Resources

Field data regarding firewood collection reveals that majority of households (61.06 %) collect firewood from community forest where as 20% of households use the government forest (Table-4.3.21). The source of firewood for 14.90 % of families residing along the RoW is private forest to meet their requirement. Some households 3.37 % used to by firewood for their domestic use. It appears that pressure on forest resources does exist but is not so severe.

Table- 4.3.21 Sources of Firewood Collected by PAFs

Source	No. of HHs	% of HHs
Government Forest	42	20.19
Private Forest	31	14.90
Community Forest	127	61.06
Purchase	7	3.37
Others	1	0.48
Total	**208**	**100.00**

Source: Field Survey, 2004

4.3.18 Gender

Males and females of the project area not equally participate in decision making. Decision on child care and health and cleanliness are primary responsibility of women where as issues related to give and take, education, shopping and community development are decided by males (Table 4.3.22). In certain areas both men and women take the decision. Relative weightage of the roles is presented in following table.

Table -4.3.22 Gender Issues in the Decision Making of Various Activities n-210

Activities	Decision Making By							
	Male	%	Female	%	Both	%	No Response	%
Agriculture	34	6.50	17	4.71	159	15.96	0	0.00
Education	71	13.58	14	3.88	121	12.15	4	40.00
Shopping	82	15.68	23	6.37	105	10.54	0	0.00
Child Care	7	1.34	142	39.34	58	5.82	3	30.00
Community Development	73	13.96	24	6.65	112	11.24	1	10.00
Income Generating Activities	65	12.43	17	4.71	128	12.85	0	0.00
Health and Cleanliness	19	3.63	96	26.59	95	9.54	0	0.00
Give and Take	109	20.84	13	3.60	88	8.84	0	0.00
Social Work	63	12.05	15	4.16	130	13.05	2	20.00
Total	**523**	**100.00**	**361**	**100.00**	**996**	**100.00**	**10**	**100.00**

Source: Field Survey, 2004

4.4 Socioeconomic Condition of the Seriously Project Affected Families (SPAFs)

4.4.1 Demography

Project Affected families whose houses are located under the RoW are considered as Seriously Project Affected Families (SPAFs). The Power Development fund Guidelines places relatively more emphasis on Project Affected Families loosing principal residence and these are specified as SPAFs.

Altogether 17 houses of three districts fall under RoW in 73-km alignment. Out of that 3 from Ramechhap, 9 from Sindhuli and 5 from Dhanusha districts are within the RoW (Table 4.4.1). All houses are kachchi with tiled and thatched roofing. Types of houses are more or less similar and reflect construction and roofing materials used by the households.

Table 4.4.1 Location of Houses found in RoW

S.No.	Type of Houses	No. of Houses	%
1	Ramechhap	3	17.64
2	Sindhuli	9	52.94
3	Dhanusha	5	29.42
	Total	**17**	**100.00**

Source: Field Survey, 2004

The total population of SPAF is 100 with average household size 5.88, which is low in comparison of PAFs. The male female ratio is 52% and 48% respectively (Table 4.4.2).

Table -4.4.2 Total Population and Households of SPAF

Indicators	Total
Total Population	100
Male	52
Female	48
Number of Households	17
Household Size	5.88

Source: Field Survey, 2004

4.4.2 Migration Pattern

Migration pattern of SPAFs does not differ from PAFs and immigration in to the area is nominal. Most (52.94%) of the households are either local residents or migrated in to the area more than five years (41.18%) ago. One family migrated within one year (Table 4.4.3).

Table 4-4.3 Migration Pattern of SPAFs

	No. of HHs	% of HHs
Local Resident	9	52.94
Migrated Within 1 Year	1	5.88
Migrated Within 5 Years	0	0.00
Migrated More Than 5 Years	7	41.18
Total	17	100.00

Source: Field Survey, 2004

4.4.3 Age Structure

SPAFs age structure reveals that 77 % are of economically active group. Schooling age children constitutes 15% of total population and aged population is reported as 8 % (Table 4.4.4). It appears that females are less than males.

Table -4.4.4 Population Distribution of SPAF by Age Group and Sex

n=17

Age Group	Male	Female	Total	Percentage
Below 10 Years	5	4	9	9.0
10 - 15 Years	3	3	6	6.0
15 - 60 Years	38	39	77	77.0
Above 60 Years	6	2	8	8.0
Total	52	48	100	100.0

Source: Field Survey, 2004

4.4.4 Occupation

Occupation distribution of SPAFs indicates that most of them are engaged in agriculture and can be employed only during agricultural off-season. 6% are service holders and 18% are unable to work. A very few of them reported that their main occupation is business and labor and wages. Occupation pattern shows typical rural characteristics. Details are presented in table 4.4.5

Table- 4.4.5 Occupation Distribution of SPAF by Sex

Occupation	Male	Female	Total	Percentage
Agriculture	27	38	65	65.00
Business	1	0	1	1.00
Service	4	2	6	6.00
Labour and Wages	2	0	2	2.00
Students	5	3	8	8.00
Unable to Work	13	5	18	18.00
Others	0	0	0	0.00
Total	52	48	100	100.00

Source: Field Survey, 2004

4.4.5 Educational Status

Educational status of Seriously Project Affected Families indicates that 36 % are illiterate and 64 % are under SLC. None of them have received higher education. It shows their poor economical status also. Low level of education may prevent them to perform skilled construction activities. The following table shows disparity regarding educational status among males and females (Table 4.4.6).

Table -4.4.6 Literacy Status of SPAF

n=17

Population	Illiterate	Literate							Total of All
		Able to Read and Write	Primary	Lower Secondary	Secondary	SLC	Intermediate and Above	Total	
Male	13	9	14	7	5	4	0	39	52
Female	23	9	7	8	1	0	0	25	48
Total	36	18	21	15	6	4	0	64	100
Percentage	36.00	18.00	21.00	15.00	6.00	4.00	0.00	64.00	100.00

Source: Field Survey, 2004

4.4.6 Landholding

Analysis of landholding size reveals that most of the holdings are small i.e. less than one hectare consisting of irrigated and unirrigated land. Population pressure on cultivated land has resulted in fragmentation of land holding which may not be sufficient for supporting minimum needs of the households. The table 4.4.7 provides more information on distribution of landholding by SPAFs.

Table -4.4.7 Distribution of SPAFs by Land Holding Size

n=17

Size of Land Holding	Irrigated Land (Khet)			Unirrigated Land (Bari)			Grassland (Kharbari)			Total Land	
	No.	Percent	Area (ha)	No.	Percent	Area (ha)	No.	Percent	Area (ha)	Area (ha)	Percent
Holding without land	9	52.94	0.00	2	11.76	0.00	14	82.35	0.00	0.00	0.00
Less Than 0.1 ha	2	11.76	0.03	3	17.65	0.17	0	0.00	0.00	0.20	2.15
0.1 – 0.2 ha	1	5.88	0.15	3	17.65	0.40	3	17.65	0.31	0.86	9.14
0.2 – 0.5 ha	3	17.65	1.02	5	29.41	1.51	0	0.00	0.00	2.53	27.04
0.5 – 1.0 ha	0	0.00	0.00	4	23.53	3.30	0	0.00	0.00	3.30	35.25
Greater Than 1 ha	2	11.76	2.47	0	0.00	0.00	0	0.00	0.00	2.47	26.43
Total	17	100.00	3.68	17	100.00	5.38	17	100.00	0.31	9.36	100.00

Source: Field Survey, 2004

4.4.7 Agriculture

Area allocation for different major crops and their productivity is presented in following table (Table 4.4.8). The main crops are paddy, wheat, maize, millet and pulses. Areas covered by the crops include irrigated and unirrigated lands and productivity differs according to the type of land. Average productivity of major crops is as follows;

Table -4. 4.8 Agricultural Practices and Production by SPAFs

n=17

Types of Product	Paddy	Wheat	Maize	Millet	Pulses	Potatoes	Mustard
Total Area (sqm)	43718.48	23974.63	67883.22	32514.66	22887.53	9215.72	16707.33
Khet (sqm)	36769.01	20307.63	20667.11	2422.46	0	243.76	13891.01
Bari (sqm)	6949.47	3667	47216.11	30092.2	22887.53	8971.96	2816.32
Production (kg)	13150	2450	4750	2775	19	300	600
Yield (ton/ha)	3.01	1.02	0.70	0.85	0.01	0.33	0.36

Source: Field Survey, 2004

4.4.8 Livestock

Livestock rearing is an important aspect of rural economy and SPAFs activities, which provides cash income and products for home consumption. The field survey provides data regarding number of livestock unit and average milk production by buffaloes. The average number of cattle, buffalo, goats and sheep per household are 2.1, 1.1 and 3.6 respectively. The details are presented in following table 4.4.9.

Table -4.4.9 Livestock Hold by SPAFs by Type

S. No.	Type of Livestocks	Numbers	% of S. No. 1 and 2	% of Total	Milk/Month (Liter)	Average Milk/Month (Liter)
1	Cattle	36	100.00			
	Male	24	66.67	13.48		
	Female	12	33.33	6.74		
	Milking	0	0.00	0.00	0.00	0.00
2	Buffalo	19	100.00			
	Male	3	15.79	1.69		
	Female	8	42.11	4.49		
	Milking	8	42.11	4.49	360.00	5.07
3	Goats and Sheep	61		34.27		
4	Pigs	3		1.69		
5	Hen and Duck	59		33.15		
	Total	**178**		**100.00**	**360.00**	**5.07**

Source: Field Survey, 2004

4.4.9 Food Sufficiency

Reported information about food sufficiency among SPAFs of project area reveals chronic malnutrition and deficit in calorie intake. Agricultural production of the families does not satisfy the needs for whole year. Families with sufficient food for 9-12 months account 35.29 % and for 6-9 month constitute 41.18%. About 17.65% of households survive with food sufficiency of less than three months. The food deficit is normally covered by purchases or by earning from labor and wages. The details are tabulated (Table 4.4.10).

Table- 4.4.10 Food Sufficiency of SPAFs

Sufficient for Months	No. of HHs	% of HHs
12	0	0.00
9 – 12	6	35.29
6 – 9	7	41.18
3 – 6	1	5.88
Less than 3	3	17.65
Total	**17**	**100.00**

Source: Field Survey, 2004

4.4.10 Energy

Field data regarding energy sources for lighting and cooking reveal that firewood, kerosene and electricity are the primary energy contributors. All of the households use firewood for cooking and some use firewood for lighting also. Most of them (82.35%) %) uses kerosene for lighting purposes. Only 11.76 % of households use electricity for lighting. It appears that traditional energy sources are being replaced by commercial energy for lighting purpose and this trend will continue in future.

Table -4.4.11 Energy Use and Source for Lighting and Cooking by SPAFs

Source of Energy	Use of Energy			
	Lighting		Cooking	
	No. of HHs	Percentage	No. of HHs	Percentage
Firewood	1	5.88	17	100.00
Kerosene	14	82.35	0	0.00
Electricity	2	11.76	0	0.00
Others	0	0.00	0	0.00
Total	17	100.00	17	100.00

Source: Field Survey, 2004

4.4.11 Affordability

Affordability of households for electricity is influenced by low cash income levels in rural area. As a result most of the SPAFs (91.67 %) are willing to pay minimum charges. Only one family reported that upto 650 Rs. may be spent for electricity charges which is an exception and 5 households did not replied at all. The data show that energy consumption in project area is expected to be low and will be primarily used for lighting.

Table -4.4.12 Willingness to Pay for Electricity by SPAF

Willingness to Pay (NRs)	No. of HHs	% of HHs
80	11	91.67
650	1	8.33
Above 650	0	0.00
Total	12	100.00

Source: Field Survey, 2004

4.4.12 Sources of Drinking Water

Sources of drinking water identified by the survey suggest that most of the households (64.71%) use piped water supply where as 35.29% households use water from well. Water from river/spring was not being used. Possibility of infection by water borne/related diseases still exists in the area and water supply for construction crew may be an issue. Pressure on local water supply should be minimized.

Table -4.4.13 Sources of Drinking Water and Percentage of Users of SPAF

Source	No. of HHs	Percent
River / Spring	0	0.00
Well	6	35.29
Pipe	11	64.71
Total	**17**	**100.00**

Source: Field Survey, 2004

4.4.13 Sources of Firewood collection

Inquiry regarding sources of firewood collection (Table 4.4.14) revealed that most of the households (70.59 %) collect firewood from community forest, which is managed in sustainable principle. Government forest is a source of firewood for 17.65 % of families. Only 11.76% of households use the private forests for the sources of firewood. Firewood collection for cooking may be problematic in the absence of government forest.

Table -4.4.14 Sources of Firewood Collected by SPAFs

Source	No. of HHs	% of HHs
Government Forest	3	17.65
Private Forest	2	11.76
Community Forest	12	70.59
Purchase	0	0.00
Others	0	0.00
Total	**17**	**100.00**

Source: Field Survey, 2004

4.4.14 Health and Sanitation

Identification of common diseases for SPAFs was conducted during the field survey and results shows that fever is most common followed by stomachache (Fig 4.4.1). Some of the common diseases likely to be found in the area were not reported (Table 4.4.15). Anyway health and sanitation situation in the project area is far from satisfactory.

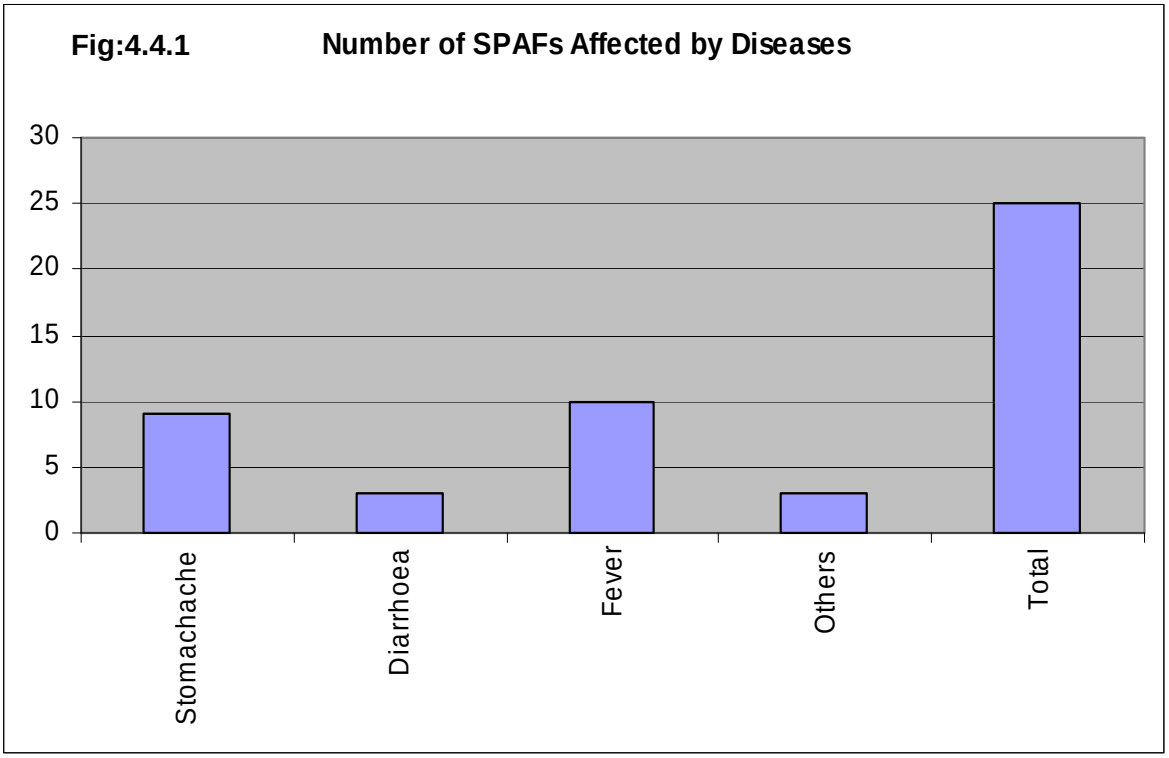
Table -4.4.15 Number of SPAFs Affected by Diseases

n=17

Types of Diseases	Number of Households	Percentage
Tuberculosis	0	0.00
Stomachache	9	36.00
Diarrhoea	3	12.00
Fever	10	40.00
Skin Diseases	0	0.00
Others	3	12.00
Total	**25**	**100.00**

Source: Field Survey, 2004

Fig:4.4.1 Number of SPAFs Affected by Diseases



Methods of treatment adopted by SPAFs indicate that health post and private clinics are being used for treatment. The locals are using modern method of treatment. Traditional methods were not reported but interviews with local residents during the site visit shows that traditional methods are still being used in the project area (Table 4.4.16).

Table -4.4.16 Methods of Treatment Adopted by SPAF

n=17

Methods of Treatment	Number of Households	Percentage
Private Clinic	6	24.00
Local Baidhya	0	0.00
Dhami / Jhakri	0	0.00
Health Post	18	72.00
Pharmacy	1	4.00
Not Treated	0	0.00
Total	25	100.00

Source: Field Survey, 2004

4.4.15 Income and Expenditure

Average annual income of SPAFs consists of agriculture and animal husbandry, service, trade, cottage industries, labor and wages and professional services. The share of agriculture in household income is about 35%, which is under reported. Labor and wages contribute 37.09 % of annual average income. Agriculture and animal husbandry placed second and contributes 35.1 percent. The share of services in annual average income is 16.27% followed by cottage industries (6.92%). Trade has the lowest contribution consisting of 2.31%. The table-4.4.17 shows that annual average income per household is Rs.67351 and per capita constitutes Rs.10774.

Table -4.4.17 Annual Average Income of SPAFs

Income Source	Average Amount (NRs)	Percentage of Average Annual
Agriculture and Animal Husbandry	23640	35.10
Service	10958	16.27
Trade	1556	2.31
Cottage Industries	4661	6.92
Labour and Wages	24980	37.09
Professional Services	1556	2.31
Others	0.00	0.00
Total	67351	100.00

Source: Field Survey, 2004

Expenditure pattern of SPAFs presented in following table (Table 4.4.18) shows that 72.5% of total expenses are made for food, which demonstrates consumer behavior of households. Share of energy and clothing is 9.95% and 6,7 % respectively. Contribution of education and medicine is almost equal and constitutes 4.69% and 4.4 % of annual expenditure. Annual average household expenditure is estimated to be Rs. 60774. In per capita terms it is equal to Rs. 10336.

Table -4.4.18 Annual Average Expenditure of SPAFs

Expenditure Items	Average Amount (NRs)	Percent of Average Amount
Food	44067	72.51
Energy	6047	9.95
Medicine	2676	4.4
Education	2853	4.69
Clothing	4070	6.7
Others	1059	1.74
Total	**60774**	**100.00**

Source: Field Survey, 2004

CHAPTER - 5
IMPACT ASSESSMENT

5.0 General

This chapter addresses the likely adverse and positive impacts of the construction and operation of Khimti-Dhalkebar 220 kV Transmission Line Project, which will result in changes to the existing baseline conditions. The details of adverse impacts and positive impacts on socio-economic and cultural environment of the area are presented below in sub chapter 5.1 and 5.2 respectively. The impact assessment and mitigation measures matrix is presented in Table 5.1.4.

5.1 Adverse Impact

5.1.1 Construction Phase

5.1.1.1 Land Acquisition

About 68 tower pads are located in cultivated area, which will affect 1.06 ha land permanently. Altogether 68 households will be affected by the land take. The field survey shows that land loss is negligible in compare to the total land occupied by the landowners.

The field survey shows that approximately 12 % households falls in the RoW have land holding size of 0.25 ha or less than this. The impact of land acquisition is significant for the tenants and farmers whose land holding is less than 0.25 ha. It is not clear at this stage that such type of households will be affected by land acquisition or not. Besides permanent acquisition land will be taken on lease for temporary facilities. Approximately 0.5 ha land will be temporarily affected by the project. The project will affect Sitalpatti Pani Guthi land at Khrkote of Bhimeshwor VDC. Approximately 0.446 ha Guthi land falls in the RoW. The over all magnitude of impact is considered to be low, extent is local and duration is long term.

The field survey identified 714 land parcels affected by the transmission alignment. Out, of which 365 (51%) parcels are located in Ramechhap district, followed by 283 land parcels in Sindhuli. and 66 parcels are affected in Dhanusha district (Table 5.1.1). According to cadastral map interpretation private lands are not affected in Dolakha and Mahottari districts.

Table-5.1.1 Affected Parcels Distribution by Districts

S.N.	District	Number of Affected Parcels	Percent
1.	Dhanusha	66	9.3
2.	Ramechhap	365	51.1
3.	Sindhuli	283	39.6
	Total	**714**	**100**

Source: Field Survey, 2004

VDC wise distribution of affected land parcels reveals that affected land parcels in Sidheshwori constitute 16.80 % followed by Tilpung and Khimti. Bhimeswor and Bhaluajore are also impacted considerably. Table -5.1.2 provides distribution of affected land parcels by VDCs.

Table-5.1.2 VDC wise Affected Land Parcels

S.NO.	VDC	No of Parcels	Percent
1.	Begadwar	29	4.06
2.	Dhalkebar	37	5.18
3.	Bhaluwajor	67	9.38
4.	Bhangeri(Manthali)	9	1.30
5.	Gelu	10	1.40
6.	Katahare(Tilpung)	110	15.40
7.	Kathajore	32	4.48
8.	Nagthali (Khimti)	107	14.98
9.	Sunarpani(Manthali)	30	4.20
10.	Bhadrakali	29	4.06
11.	Bhimeshwor	85	11.90
12.	Ranibas	11	1.54
13.	Ranichura	11	1.54
14	Ratanchura	27	3.78
15.	Sidheshwori	120	16.80
	Total	**714**	**100**

Out of total land parcel affected by the project 631 will be affected from private land and 83 from government land (Table 5.1.3).

Table -5.1.3 Parcels of Government Land affected by Transmission Line

S.No.	Type of Parcel	Numbers of Parcel
1.	Road	8
2.	Butane	7
3.	jungle	2
4.	Kalno	4
5.	Kulo	4
6.	Kholsa	4
7.	Khola	3
8.	Bhir	5
9.	Bagar	2
10.	Ailani	2
11.	HMG	7
12.	Guthi	8
13.	Unidentified	25
14.	School	2
	Total	**83**

Details of parcel number with landowners' name address area of land parcels and affected area by 30-meter corridor is provided in Annex 16.

Table 5.1.5 Entitlement Matrix

S. N	Type of Loss / Impacts	Definition of Entitlement	Definition of entitled Unit	Applicable Guidelines	Responsible Organization
1.	Loss of land	Replacement value in cash	Land owner, a person with landowner certificate	Owners will be compensated in cash	HMG/N
2.	Land falling under ROW	Hardship allowance 10% of land value	Owners with certificate	Amount will be paid in cash	The Project
3.	Land occupied by residential house	Replacement value in cash	House owner	Will be paid in cash	The Project
4.	Tenants	50% of the cash compensation	A person cultivating land under lease	The amount is deducted from total compensation	The Project
5.	Loss of Community land (Guthi)	33% of total compensation	Person who pays rent to Guthi	67 % goes to Guthi and 33% to the cultivator	The Project
6.	Loss of houses	Replacement cost without depreciation	House owner	Will be paid in cash allowing to use previous construction materials	The Project
7.	Cultivated Area by non titleholders	Value of one year crop production	Household should be cultivating the land for more than one year	If the cultivator provides documentation of more than one year use cash will be provided.	The Project
8.	Loss of standing Crops	Value of Crops	Cultivator	Damage assessment Committee will determine extent of losses and amount to be paid	The Project
9.	Loss of tree in Private Land	Cost of trees Five years production of fruit and fodder trees	Tree owner	Damage assessment Committee considering wood volume	The Project
10.	Common Property resources	Continued assess to resources	All users	Alternative arrangements are to be made	The Project
11.	Loss of Community forestry Land	Replacement of affected land	User group	Equivalent land will be provided	The Project Ministry of Forest

5.1.1.2 Relocation of Houses

Seventeen houses are likely to be affected due to implementation of the project, which include 9 in Sindhuli 3 in Ramechhap and 5 in Dhanusha districts (Table 5.1.6). Out of the total affected

houses 9 houses have tiled shaded and 8 with thatched roof. 7 houses are double story and 10 are single story. Eight VDC and one municipality will be affected by the house relocation.

About 100 people will be affected by house relocation. The age structure indicates that the stress caused by relocation may not be crucial for economically active group, which is supposed to be active participant of project construction.

Table- 5.1.6 Houses Affected in Different part of the Project Area

			Type	Story	Roof type
District	**VDC**	**Ward No/Settlement**	**Kachhi**		
Ramechhap	Khimti	Khatri tole -6	1	2	Thatch
	Manthali	Dahal Guan-6	1	2	do
	Bhaluwajore	Lisanpani-1	1	2	do
Sindhuli	Bhadrakali	Mudekhrka	1	1	Thatch
	Ratanchura	Ward-2	1	1	do
	Ratanchura	Ward-2	1	2	do
	Kamalamai Municpality	Sano Karkare	1	1	Thatch
	Kamalamai Municipality	Karkare	1	2	Tyal
	Kamalamai Municipality	Thukitar	1	1	Thatch
	Ranichuri	Bhuttaya-Khatyar	3	2	Tyal
Dhanusha	Tulasichauda	Ram chandra tole -2	3	2	Tyal
	Beghadabar	Ward-4	1	1	Tyal
	Beghadabar	Ward-4	1	2	Tyal
	Total		**17**		

The transmission line crosses the school building (one block) and toilet of Tamakoshi Higher Secondary School at Khimti besi of Khimti VDC. The magnitude of impact is considered to be high, extent is local and duration is long term.

5.1.1.3 Loss of Standing Crops

Preferably construction of transmission line is to be carried out during lean season so that standing crops are not damaged or minimum damaged due to construction related activities. However it is not completely ignored during construction and area close to tower pads and RoW may disturb due to movement of contractor machines, labor force and for line pulling. Normally the winter crop will be affected as construction will be curtailed or even closed down completely during the monsoon. This impact is considered more at Khimti besi, near Sindhuli bazar area and at Lalghadh area. It is not possible to calculate the exact loss at this stage. The magnitude of impact is considered to be low, extent is local and duration is long term.

5.1.1.4 Occupational and Safety Hazards

Construction related accidents are common in Nepal, primarily because of unsafe construction practices. The erection of towers and stringing of line in steep slopes are difficult and risky job and any negligence on the part of personal protective guidelines may cause accident. Work-related injuries and vehicle accidents are the likely impact expected due to implementation of the proposed project. The magnitude of impact is moderate, extent is local and duration is long term.

5.1.1.5 Historical and Cultural Sites

Devithan of Gelu VDC falls between AP-1 to AP-2 and Mahadevthan of Bhaluwajor VDC is located close to AP-16. The clearance height of the Devithan is more than 50 meter whereas Mahadeothan is located about 12 meter from the Angle Tower. The access trail to the religious site at AP-16 will be disturbed which may pose difficulty to worshipers. Since movement of people is not restricted in the RoW the likely impact on cultural site is considered to be low, extent is local and duration is long term.

5.1.1.6 Conflict of Interest and Law and Order Situation

During the construction of the transmission line labor force from different places with different religion and faiths will be employed by the contractor and possibilities of conflict of interest exists and law and order situation may be detoriated. Since the labore force is limited and mobile the magnitude of impact is considered to be low, extent is local and duration is medium term.

5.1.1.7 Gender and Vulnerable Group

Normally female has greater workload than male and role of women in decision making is limited. During project construction daily wages labor will be deployed for excavation, transportation of construction materials and other construction related works. The contractor especially the sub contractors may discriminate the women and vulnerable group while hiring the workers. Field study shows that there are some vulnerable groups, such as minors, aged and handicapped but project impact on such groups is minimum. It is assumed that most of the labor force required for the construction of the transmission line will be farmers and land less people from the vicinity of the actual work place moving around the alignment as the construction proceeds.

In general the employment opportunity will be more to men in comparison to women in development projects implemented so far in Nepal and this trend may continue in this project also. This will not only change the daily workload patterns within families, but will alter the relation between men and women and between the generations too. While men gain access to the cash economy women remain in the weakened subsistence sector.

Although the number of the local labours in the project shall be limited, the possibility of employing child labour cannot be ruled out for lesser wage rates. Considering the number of labors to be employed, the significance of impact will be low. On the other hand in practice rural minors can support their family by performing light works. In the absence of which the family is deprived of financial help earned by respective minors. It appears that by forbidding the child labor we are depriving them an opportunity of financial assistance. The overall magnitude of impact is considered low, extent is local and duration is medium term considering the nature of construction work and manpower deployed.

5.1.1.8 Life Style

The interaction among different people and ethnic group may attract the rural people towards more advanced society. Experience with other project indicates that sudden cash flow in project area and cash earning of workers is spend unproductively. The availability of cash and alcohol may divert workers towards gambling and more alcohol consumption. The concentration of a

labor force of some hundreds may encourage prostitution, which could encourage the spread of Acquired Immune Deficiency Syndrome (AIDS) and other sexually transmitted diseases. A particular risk group is long distance Truk drivers who are often responsible for disease transmission.

The migration of large workers from out side may affect the local social and cultural norms and other local facilities of the area. However local labors may be exposed to the new lifestyle with its minuses and pluses and some may try to adopt new values. In this sense a new culture may be developed within the project area. This impact is considered significant in low population area especially in hills. The magnitude of impact is low, extent is local and duration is medium term.

5.1.1.9 Health and Sanitation

The project area has relatively poor health and sanitation facilities. Health care facilities are located far. The likely increase in population of the area during construction may add further stress on local health posts. The lack of proper sanitary measures in temporary camps affects the health condition of the workers. The most vulnerable will be women and children. Since the proposed project requires small labor and local labor force will be used mostly the magnitude of likely impact is considered to be low, extent is local and duration is medium term.

5.1.1.10 Social and Cultural Practices

Construction of proposed project requires 225 number of workers and their dependents having different cultural traditions, norms and values, which may interact with, established local sociological and cultural aspects. Due to short stay of new comers most of their sociological and cultural ways of life hardly could be observed by local society. But certain values may be exchanged among the workers such as inter caste marriages, demonstration impact of lifestyle, health and sanitation, skill transfer, opportunity of new jobs, working discipline etc. This impact is comparatively high in hills with respect to the Terai area because Terai is already facing rapid changes in social patterns due to migration from the hills and from India. The magnitude of impact is considered to be low, extent is local and duration is medium term.

5.1.1.11 Impact on Infrastructure and Communal Resources

The influx of labor increases population density in project area and infrastructures (school health post, banks, road and drinking water facilities) established for permanent population. In this respect influx of construction crew may pose some additional pressure on existing facilities. Since the number of construction crew is limited the likely pressure on local infrastructure facilities may not be considerable and the project construction may not require additional capacities of these facilities. The project will disturb access trail near AP-16. The magnitude of impact is considered to be moderate, extent is local and duration is medium term.

5.1.1.12 Expectations

The proposed project is not designed for rural electrification. Despite this local people interviewed during the field survey and in-group meetings expressed their belief that rural electrification will follow line construction. The other demands are local employment; appropriate compensation based on the value loss and assistance in local development works such as gabian wire, fencing wire etc. It is unwise to ignore these expectations but difficult to fulfill the requirements since some are not directly related with project. The experience at other projects

is that when peoples expectations of benefits are not fulfilled the consequences are disappointment and frustration which may affect during the construction of this project as well as other development project in the region.

5.1.2 Operation Phase

5.1.2.1 Interference to the Airport

The transmission line passes near the Manthali airport at a distance of approximately 740m from the existing airport. Discussion with the Civil Aviation Authority and representative of Mathali airport reveals that technically the alignment is not interfering the existing airport and no impact is anticipated for aviation traffic. No objection letter for the proposed transmission line is provided for the final selected route by the Civil Aviation Authority.

5.1.2.2 Loss of Agricultural Production

1.06 ha of cultivated land for 68 tower pads will be permanently acquired. Assuming 150 % cropping intensity and existing cropping pattern there will be annual loss 4.2 tons food grain. Paddy, wheat, maize, millet, potato and pulses are the crops likely to be affected by the land acquisition. This loss is divided among 68 landowners and every cultivator will loose about 62Kg of grain. The production loss is spread over 23.33 Km length of transmission line, which reduces intensity of impact in one place. The magnitude of impact is low, extent is local and duration is long term.

5.1.2.3 Reduction of Land Value

Land transaction in hilly districts (Ramechhap and Sindhuli) are rare but in Dhanusha selling and buying the land are common. As per electricity regulation houses are not allowed to build along right of way due to safety reason. The value of land especially at Khimti besi, Manthali Bazar, Sindhuli Bazar and Dhalkebar areas the market value of adjoining parcels is reduced since the land will not be applicable for construction of house. This phenomenon exists but it is difficult to quantify and other factors also contribute to price fixation mechanism. The overall magnitude of impact is moderate, extent is local and duration is long term.

5.1.2.4 Farming Hindrance

The placement of one tower will occupy 0.015 ha (12.5mx12.5m) of land. The towers constructed in cultivated area, especially those erected in the middle of land parcels pose hindrance while ploughing the agro- field. The field may be cultivated by using human labor that will increase the cost of agriculture production. This impact is considered more significant at Khimti besi, Sindhuli Bazar area and Dhalkebar. The overall magnitude of impact is considered to be low, extent is local and duration is long term.

5.1.2.5 Withdrawal of Economic opportunity

During the project construction induced economic opportunities benefit the local peoples, local economy and project area as a whole. At the end of project construction these opportunities ceased to exist. Worker will lose the job and salary. Demand for local agricultural production by

construction crew will be minimized. Community and local commodity transactions will be reduced.

The withdrawal or decrease in economic activity during operation and maintenance may affect the life style of the local people. Local people are habitual of more earning and expenses are rises as increase in economic condition of the people. People will face difficulty to mange the lifestyle once the economic activities will reduce and earning will drastically decline. However the magnitude of impact is considered to be low because the economic activities are limited and some might be continued during operation phase also. The extent is local and duration is long term.

5.1.2.6 Occupational Health and Safety

The new lines will be larger and carry a much higher current than any previously operated in Nepal. During operation phase, the flow of 220kV current and the operation of substation- makes the people, in the immediate vicinity of the line, vulnerable to electrical hazards such as fire, electrical shocks or even electrocution. Furthermore lack of training, operation and maintenance skill and unavailability of the necessary safety equipment may add further risk with safety regards.

The public can be affected principally through their own acts, such as children climbing towers, high vehicles attempting to pass beneath the lines, surveyors using metal leveling staffs under the conductors and attempt at power theft. These risks have a low probability of occurrences, but a very high (terminal) significance to the individuals involved. The overall magnitude of impact is considered to be low, extent is local and duration is long term.

5.1.2.7 Visual Aesthetic Value

Approximately 73-Km transmission line along Tamakoshi valley, Middle Hills and Terai creates some short of visual barrier. More over 230 towers erected along the corridor affect the visual aesthetic value. Sometimes the route passes near the settlement and may create visual barrier but ridge to ridge alignment does not reduce the aesthetic value. The Gadhi palace is located approximately 700-meter distance from the proposed line hence no direct impact is expected. The overall magnitude of impact is considered to be low, extent is local and duration is long term.

5.1.2.8 Electric and Magnetic Field Effects

Electric power transmission lines create electric and magnetic field together known as electromagnetic field or EMF. Electric fields are created by the presence voltage and are expressed in volts per meter (V/m). Magnetic field is produced by the presence of current in the line and is expressed in terms of ampere per meter (A/m). Power line EMFs are strongest beneath the lines and diminish rapidly with distance. For high voltage lines, they merge into normal background levels at a distance of 200 – 300 meters. EMFs are also created at substation. EMFs may pose a hazard to human health. The scientific community has not reached consequences on specific biological response to EMFs but it is expected some impacts are likely to occur due to long term exposure. The magnitude of overall impact is considered to be low, extent is local and duration is long term.

5.2 Positive Impacts

5.2.1 Construction Phase

5.2.1.1 Local Employment

One of the major positive impacts of the project during the construction stage is the creation of employment opportunity. Altogether 225 people will be deployed during the construction of the project, which include 110 unskilled, 65 semi skilled and 50 skilled manpower. 48% of labor force is estimated to be unskilled. Normally high cast people are reluctant to low grade physical labor and lower caste people may take advantages of the situation. Cash income is needed in rural household to pay for debts, manufactured goods, education and cloths. To some extent such employment opportunities may check out migration of the area and promote in migration. In this sense the employment opportunities contribute to poverty alleviation in rural area. The possible increase in local employment opportunity will be positive impact to the area as people are currently facing acute unemployment. The magnitude of impact is considered to be moderate, extent is local and duration is medium term.

5.2.1.2 Local Economy

The employment opportunity, income from shops, house rental, increases demand for fresh vegetable, meat and rental/lease of land are the areas of income during construction period. Furthermore local contractor will also be used for some construction work which is considered positive impacts for the local economy. The likely impacts due to increased economic activities during construction phase and contribution of project to enhance rural economy is considered positive impact for the area. As a result of increased trade and business, significant amount of cash will be channeled in to local economy. This short term economic boom will contribute to diversify and development of local economy. The increase in trade and business will enhance the economic status of local people. The magnitude of impact is considered to be moderate, extent is local and duration is medium term.

5.2.2 Operation Phase

5.2.2.1 Increase in Local Skills

Experience shows that local employed people gain experience in tower pad assembling, erection of towers, stringing of line, driving and transportation of equipment. The work enhances traditional skills and some marketable new skills will emerge in the area. With the skill learned during the construction of the project, local people will be able to get employment in similar projects elsewhere in Nepal. The magnitude of impact is considered to be moderate, extent is national and duration is long term.

5.2.2.2 National Economy

The transmission line project will evacuate the energy produced in Khimti area and provide reliable power supply in load centers in eastern region. It will also reduce transmission losses and generates revenue by exporting power to India. This will be the first 220 kV voltage line in Nepal and will contribute to value added of the national economy.

5.2.2.3 Employment Opportunity

For the smooth operation the project will require manpower which will provide employment opportunity to the people. Similarly, regular maintenance such as vegetation clearance in RoW and other maintenance work is vital for the smooth operation of power line. This will also provide short-term employment opportunity to the local people. The employment opportunity will provide income source to some of the local people.

CHAPTER - 6
MITIGATION MEASURES

6.0 General

The following mitigation measures are proposed to ameliorate the possible adverse impacts of the project during construction and operation phases. NEA being the proponent of the project has prime responsibility in carrying out the indicated mitigation measures. Contractors will implement some of the mitigation measures mentioned below on behalf of NEA.

6.1 Construction Phase

6.1.1 Compensation for the Land Loss

Legal Procedure of Compensation

The legal basis of land acquisition and compensation is the Land acquisition Act, 2034 and specific regulations to be pursuant to the Act. According to Article -3 of the Act His Majesties Government can acquire any land, anywhere and in any amount for the public works by paying compensation. Article -9 outlines the procedures to be followed regarding notification of land acquisition (i.e. publishing lists of landowners and parcel numbers in the newspapers). The article states that to notify certain individuals the local officer may send a notice personally to such persons.

Article -13 and 16 of the Act relates to creation of a Compensation Fixation Committee. The committee will be formed under the chairmanship of Chief District Officer of the concerned district and includes chairman of affected VDCs, representative of affected people, representative of the District Development Committee, representative of land revenue office and representative of Khimti-Dhalkebar 220 kV Transmission Line Project. The primary duty of the Committee is to fix compensation rates.

Article -14 of the Act relates to land for land compensation. As per Article 27 the required land can be acquired through negotiation process between HMG/N and concerned residents in order to device a just and fair method and rate of compensation. According to Article -34 the land not required by the project should be returned to the concerned landowner.

The Project will follow Policy Framework for Environmental Impact Assessment for Projects Under the power development Fund, 2002 underlines the need for Grievance Redress Committee and Compensation Fixation Committee which will be formed to undertake the respective responsibilities. The "Policy Framework for Project under the Power Development Fund" provides guidelines for acquisition and compensation of this Project. A Grievance Redress Committee will be established to address complains and grievances of projects acquisition and compensation process.

Compensation

The private land affected by the project will be compensated as per the rate fixed by the Compensation Fixation Committee. Affected people were asked (210 H.H) about the mode of compensation. Most the households affected by the land acquisition requested for cash compensation. The payment will be made on cash and all the procedures will be completed prior to implementation of the project.

Reported land cost figures from the local people is in higher side and land revenue office accepts lower rates for the purpose of revenue collection than market price of land. The market value is still more for housing plots, land near the roads and market centers. Hence the rates provided by Land Revenue Office are considered as inapplicable in the case of Khimti- Delkebar 220 kV Transmission line. The rates are to be differentiated for municipalities and District headquarters. Both government's rate and market rates in the area will be taken in to account by Compensation Fixation Committee while determining compensation rates. The land price varies from place to place, parcel to parcel and according to proximity of road and market centers. The average land price in the area is considered for the estimate of compensation (Table 6.1.1).

Land less (tenants), Guthi holders etc affected by the project will also be compensation as per the recommendation of the Compensation Fixation Committee and the decision of the project. Persons who do not have formal legal rights but have a claim to such rights (continued possession of public lands) provided that such claims becomes recognized through an appropriate process are eligible for compensation. The affected Guthi land of Shitalpatti Pani Gughi will be compensated as per Guthi Act 2033.

Besides compensation, land registration fee upto 7 % of the compensation amount or the actual amount spent in land purchase by the project affected families whichever is low will also be provided (if any affected family purchases land of similar type of equal area to replace land taken by the project within six months). The affected families must submit proper documentation to the project to receive such facilities. The estimated compensation amount for the land to be acquired by the project is as follows.

Table- 6.1.1 Land Compensation Cost

S.N.	Items	Area(ha)	Rate NRs.(ha)	Amount/NRs.
1	Land acquisition	1.06	491250	5,20,725
2	Land Registration Fee	1.06	7% of the compensation amount	36,450.75
	Total			**5,57,175.75**

Source: Field Survey 2004

Preference of Compensation

Regarding types of compensation the household survey indicated that 87.62 % of affected households prefer cash compensation. Land for land compensation was reported by 10.48 % of households but small piece of land located in distant place can hardly be economically cultivated.1.43 % of household prefer house to house compensation for house loss (Table 6.1.2). Following table and Fig 6.1.1 provide the details of preference for compensation.

Table 6.1.2 Preference of Compensation for Affected Lands

Types of Compensation	No. of HHs	% of HHs
Cash	184	87.62
Land for Land	22	10.48
House for House	3	1.43

Others	1	0.48
Total	**210**	**100.00**

Source: Field Survey, 2004

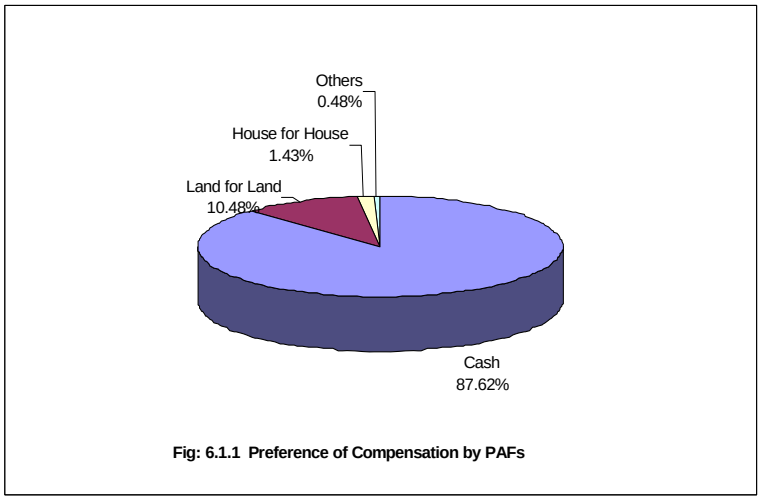


Fig: 6.1.1 Preference of Compensation by PAFs

Preferable Use of Compensation Money

The field survey results (Fig 6.1.2) regarding preferable use of compensation amount indicate that most of households (72.05%) are thinking to spend on buying land followed by construction of house (21.26%). Some of the households are planning to invest in business (5.12%) and some may pay the outstanding debt (Table 6.1.3).

Table 6.1.3 Preferable Use of Compensation Money by Percent of Users

Use of Compensation	No. of HHs	% of HHs
Buy Land	183	72.05
Construction of House	54	21.26
Business	13	5.12
Pay Debt	4	1.57
Others	0	0.00
Total	**254**	**100.00**

Source: Field Survey, 2004

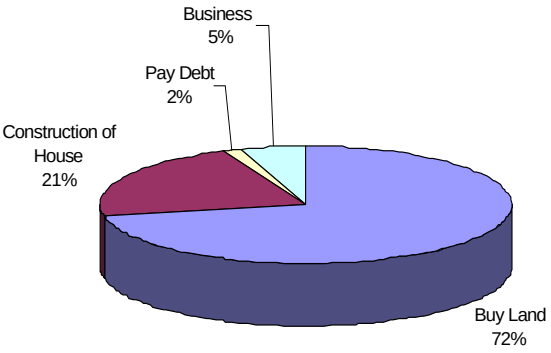


Fig: 6.1.2 Use of Compensation by PAFs

6.1.2 Compensation for Relocation of Houses

The project will provide appropriate compensation for the houses and land area occupied by the house likely to be affected by the project. Houses will be compensated at replacement cost. The affected households will be allowed to use the construction material from their own dismantled houses. Besides, compensation rental allowances for the 4 months will be paid to each household. It is expected that new houses will be constructed within that period.

Discussion with the affected people reveals that people are not ready to resettle out side the area and able to manage in nearby areas or land. Resettlement is not applicable for this project because the number of houses to be affected by the project is low and scattered in 9 VDCs of 3 districts. The project will also compensate for the construction of one block of school building and toilet of Tamakoshi Higher Secondary School since the alignment passes through them. Due care has to be given to school going and aged population while relocation of houses. The detail of compensation rate and amount for the house loss is presented in Table 6.1.4.

Table-6.1.4 Compensation for the Relocation of Houses

S.No	Compensation	Unit Rate (NRs.)	No of affected house	Amount
1	**Types of Houses**			
	Kachi house with tiled roof	200000	9	1800000
	Kachi house with thatched roof	150000	8	1200000
	School block having Paki house with tin shade	1200000	1	1200000
	Construction of School Toilet	LS	1	50000
	Sub- Total			**42,50,000**
2	**Land Replacement Cost**			
	Land replacement cost for houses	491250/ha	0.27 ha	132637.5
	Land replacement cost for school	600000/ha	0.050ha	30000
3	**House Rental allowance for 4 months**	500/month	68 months	34000
	Total			**44,46,637.5**

SPAFs preference for compensation indicates that 76.5 % of households prefer cash compensation and 11.7 % prefer replacement houses. Some households raised the question of house plots also. As a whole most of households are satisfied by cash compensation considering easy handling of cash for different purposes.

Table 6.1.5 Preference of Compensation of SPAFs

Types of Compensation	No. of HHs	% of HHs
Cash	13	76.47
Land for Land	1	5.88
House for House	2	11.76
Others	1	5.88
Total	**17**	**100.00**

Source: Field Survey, 2004

6.1.3 Compensation for Crop Loss

Construction work shall be scheduled at best to avoid cropping season. People of the concerned land shall be informed in advance so these disturbances shall be minimized. Compensation shall be paid for any unavoidable crop damage or area depending on the crop production. Damage of any standing crop shall be paid based on the present value. Compensation shall also be paid for the loss of fruit trees. The implication of food deficit in project area indicates that the project contractor has to manage food requirement for construction crew independently without relying on local food supply.

6.1.4 Occupational Safety Measures

The construction area shall be declared as hard hat area and all the necessary precaution and warning sign must be placed at work site. This area shall be restricted for the entry of un-authorized people. Hard hat, eyeglass, safety boot, fire fighting accessories, caution signals and other safety equipment as required at particular site and work area must be provided. The contractor shall conduct safety awareness program and any loss of life or injury shall be compensated at prevailing rules. The likely increase in injuries and accidents shall be minimized and contractual requirements should be strict.

6.1.5 Infrastructure

The access trail to the cultural site at AP-16 shall be reconstructed to facilitate the access for worshipper.

6.1.6 Coordination

The project shall develop a good coordination mechanism with local and district level administration of HMG/N. Cordial relation shall also be established with local VDCs, NGOs, CBOs and project workers working in the area. The project shall establish good information system to coordinate the work between the different project partners such as contractor,

consultant and client.

6.1.7 Gender and Vulnerable Group

The project shall not discriminate to the local people based on gender, cast, color or place of origin in Nepal and vulnerable group. The project shall completely ban the use of child labor. Consultant, contractor and sub contractor shall be instructed that use of child labor is not allowed in project works. Due priority shall be given to project related employment and other benefits to vulnerable group and poor people.

6.1.8 Awareness Program

Awareness program will be implemented by the project for the proper use of compensation amount, areas of employment and likely effect on people due to withdrawal of economic opportunity. The awareness program will also include about the problem associated with social and cultural disintegrate and awareness against girls trafficking and sexually transmitted disease (STD) such as AIDS.

6.1.9 Health and Sanitation

Temporary camp shall be provided for the project workers. The temporary camp established by sub contractor must have toilet facilities and the drinking water sources shall be tested prior to mobilization. The contractor shall maintain at least first aid kits and vaccines against infectious and communicable diseases, which will decrease pressure on local health and sanitation facilities. Health check-up of workers and documentation of health status shall be made periodically.

6.1.10 Cultural Aspects

To minimize the impact on cultural practice of local communities, a strong code of conduct need to be enforced to the outside construction workers. The workers shall be instructed to act in a responsible manner during and after the working hours, respecting the rights, property and practice of local people.

6.2 Operation Phase

6.2.1 Manthali Airport

Since the alignment is shifted from the previously proposed location in consultation with Civil Aviation Department no mitigation measure is proposed.

6.2.2 Agricultural Production

The impact on agriculture production is in small scale and scattered in nature it is not possible to implement agriculture intensification program. The community support program elaborated in 6.3.1.2 especially for the poor and deprived people will minimize the likely impact.

6.2.3 Land Devaluation

Private land (68.44 ha) within the RoW will be compensated at current market price as per standard practice of HMG/N. Such amount will be paid 10% of the total amount of land value. The land within RoW will be utilized as usual by the respective landholders. There is not such

standard practice for commercial and housing plots, where the value depends on a number of highly subjective factors. It is recommended that such areas shall be considered while determining devaluation cost.

6.2.4 Farming Hindrance

This is unavoidable impact. However it is recommended that placement of tower pad at the center of field shall be avoided.

6.2.5 Awareness Program

The awareness program mentioned in 6.1.8 will minimize the likely impacts due to withdrawal of economic activities.

6.2.6 Occupational Health and Safety

Safety equipment required for the operation of the transmission line should be provided. During the maintenance major area shall be restricted for entry of unauthorized person to avoid disturbances and risk. Hard hat, eye glass, safety boot, ear plugs, good electric light system, power-cutting devices fire fighting accessories, caution signals and other safety equipment as required at particular site and work area must be provided. The aforementioned awareness program will also minimize the risk of accidents.

6.3 Enhancement Measures

6.3.1 Construction Phase

6.3.1.1 Priority to the Local Employment

The project shall emphasize to hire the local people to the extent possible for the construction work. Due priority shall be given to project affected families, disadvantage people and women.

6.3.1.2 Community Support Program

In order to minimize the project impact on affected families disadvantageous and vulnerable people and to develop cordial relation and safe operation of the project community support program is suggested. The survey identified about 40 poor and disadvantageous households in the transmission line alignment.
The community support program should be implemented to support the disadvantageous people and lower caste people in addressing their pressing needs. The scope of the program should be further designed and refined in consultation with local NGOs, stakeholders and residents of route alignment. The basic principle of the program implementation is the local participation, contribution and support to the economically disadvantageous group and benefit sharing. At least the following aspects shall be covered under this scheme.

- Cash crop training especially vegetable and Junar
- Livestock raising training
- Poultry farming training

After completion of the training users groups will be formed in the leadership of the trained person and such group will be assisted for the farming of goat, pig and poultry where most of disadvantageous group are employed. This program is mostly designed for the poor and vulnerable people affected by the project. The training program and implementation of community support program will be revised and implemented in coordination with local NGOs.

6.3.1.3 Rural Electrification

Main demand of the local people is to electrify the affected area. Although this project is not directly related for rural electrification it is recommended that project should facilitate rural electrification in the area through NEA regular scheme since NEA is responsible for the rural electrification in different part of the country. Some of the project areas in Sindhuli and Ramechhap districts are already proposed for rural electrification under the Rural Electrification and Distribution System Reinforcement Project.

6.3.2 Operation Phase

6.3.2.1 Priority to the Local Employment

The project shall emphasize to hire the local people to the extent possible for the operation and maintenance work. Due priority shall be given to project affected families, disadvantage people and women.

6.3.2.2 Community Support Program

The community support program implemented during the construction phase shall be continued for at least two years of project operation.

6.4 Social Mitigation Cost

The proposed social mitigation cost includes only the items described above, which are not included in project design and tender documents. The Total estimated mitigation cost for the proposed Khimti-Dhalkebar 220 kV Transmission Line Project is 36.47 Million NRs. out of which social mitigation cost include 12.36 million NRs. (Table-6.4.1).

Table 6.4.1 Social Mitigation Cost

S.N.	Items	Units	Costs/NRs.
1	Compensation of land	Ref. Table 4.2	557175.75
2	House relocation	Ref. Table 4.3	4446637.5
3	Crop damage	LS	300000
4	Compensation for the loss of private trees	LS	500000
5	Awareness program	LS	200000
6	Land compensation for ROW (10%)	491250/ha	3362115
7	Community support program	LS	2500000
8	Miscellaneous	LS	500000
	Total		***1,23,65,928.25***

Besides the above-mentioned cost some social mitigation costs are included in project design and can not be separated. The item in built in project design and included in tender documents

is not included in this estimated mitigation cost. Those costs are tie up with other activities and included in total project cost. The following social mitigation programs are included in technical part of the project.

- Camp with adequate facilities
- Safeguarding of the construction sites and safety equipment's
- Safety awareness program and associated mitigation measures
- Provision of first aid kits, health checkup of the workers and vaccines against infectious disease

CHAPTER - 7
SOCIAL MONITORING

7.0 General

Monitoring is an essential aspect of social management. It consists collection of data to measure social changes associated with construction and operation of the project. Depending on the location or the month of the year certain construction activities may have greater or lesser impacts. NEA will have prime responsibility for implementation of monitoring program. Khimti-Dhalkebar Environmental Management Unit, Consultant, Project Manager, Contractor and Line Agencies are responsible for monitoring of different components as specified below.

7. 1. Types of Monitoring

Based on the study, type and size of the project and monitoring experience of other projects daily to quarterly monitoring depending on the parameter is recommended throughout construction period. The monitoring will be conducted in construction and operation phases of the project.

7.1.1 Baseline Monitoring

Baseline monitoring is conducted to update the baseline condition of the project area prior to implementation of the project.

7.1.2 Impact Monitoring

Impact monitoring is to be carried out to assess actual level of impact. The impact monitoring will be conducted during construction as well as operation phases of the project. The impact monitoring includes:

- Monitoring of the impacts of the project on socioeconomic environment of the area
- Monitoring of the accuracy of the predicted impacts
- Monitoring of the effectiveness of social mitigation measures and community support program

7.1.3 Compliance Monitoring

The compliance monitoring will be conducted to monitor the compliance of the recommended mitigation measures and monitoring activities. The compliance monitoring will mainly focus on;

- Mitigation and monitoring requirements associated with the contractor shall be dually incorporated in tender document and contract agreement.
- Compliance of the tender clause
- Compliance of the mitigation measures
- Monitoring of the allocation of adequate budget for the implementation of the mitigation measures and monitoring works

7.2 Monitoring Parameters, Schedule and Agencies to be Consulted

Settlement, public health, infrastructure and compliance of the tender clauses are the few areas of monitoring. The schedule of monitoring will be daily, quarterly, half yearly and yearly depending on the parameters and type of monitoring. The details of monitoring parameters,

schedule, method and agencies to be consulted during construction and operation phase is presented in Table- 7.2.1.

7.3 Manpower

Socio-economist along with supervisors and support staff will be mobilized for social monitoring of the project.

7.4 Monitoring Cost

The estimated total monitoring cost is 3.92 million NRs. including manpower, report production, transportation and others for pre construction, 18 months construction and 2 years operation phases (Table-10.2). This cost also includes monitoring of social sector (Ref. EIA report fur further details).

7.5 Organizational Setup

Environmental and Social Studies Department of NEA will be the organization responsible for pre construction monitoring. Khimti-Dhalkebar Environment Management Unit (KDTL-EMU) comprising of staff from ESSD, among others will be established for the construction phase monitoring of the project. This unit will work on behalf of Khimti-Dhalkebar 220 kV Transmission Line Project. The KDTL-EMU will be responsible for compliance and impact monitoring works as specified in Table 7.2.1.

Grid Operation Department, NEA will conduct the operation phase monitoring up to first 2 years of the project and ESSD will conduct some of the monitoring works on behalf of the department. (Ref. EIA report fur further details).

CHAPTER -8

CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

Nepal Electricity Authority proposed Khimti –Dhalkebar 220 kV Transmission Line Project to evacuate the power generated from Tamakoshi and other hydropower project in the region. This SIA report is an outcome of the study conducted as per the World Bank Guidelines for the projects funded under the power development fund. The Social Impact Assessment study is based on field survey and review of secondary information. On the basis of the above analysis it may be summarized that social baseline has been determined and impacts are predicted. Social mitigation measures are proposed to support the construction & post acquisition scenario that Project Affected Families are at least as well off as before the project construction. The major social impacts likely to occur due to implementation of proposed project are summarized below.

8.1.1 Adverse Impact

Construction Phase

- Loss of 1.06 ha private land for the placement of towers
- Likely impact on 68 households due to land acquisition for tower pads
- Relocation of one block and toilet of Tamakoshi Higher Secondary School at Khimti besi
- Relocation of 17 houses
- Likely impact on standing crop
- Occupational safety impacts
- Likely disturbance in cultural worship
- Likely detoriation in law and order situation
- Likely impact on gender and vulnerable group
- Changes in life style
- Impact on local health and sanitation situation
- Likely impact on social and cultural practices
- Likely impact on community services and institutions
- Expectations of local people

Operation Phase

- Loss of approximately 4.2 Mt. food grain annually
- Withdrawal of economic opportunity
- Reduction of land value in Khimti besi, Manthali, Sindhuli and Dhalkebar market areas
- Farming hindrance
- Likely impact on aesthetic value
- Occupational and safety impacts
- Electromagnetic impact

8.1.2 Positive Impact

Construction Phase

- Employment to 225 people
- Likely improvement in local economy

Operation Phase

- Enhancement in technical skill and know- how
- Improvement in national economy
- Local employment opportunity

8.2 Recommendations

Social impacts can be mitigated by paying appropriate compensation, preferential hiring rehabilitation grant based on entitlement policy and other mitigation measures which will contribute to enhance the quality of life of Project Affected Families and rural society. The following mitigation measures are proposed to minimize the likely impacts of the proposed project on socioeconomic and cultural environment of the area.

Construction Phase

- Compensation for the loss of private land and provision of land registration fee up to 7 % of the compensation amount or the amount spend for land purchase (within 6 months) whichever is low.
- Appropriate rent for leased land
- Compensation for Relocation of Houses
- Compensation for the relocation of one block of school building and toilet
- Appropriate compensation for the loss of crop
- Implementation of occupational safety measures and regular checkup of the project workers
- Construction of access trail at AP-16
- Coordination with local administration, VDCs, DDCs local people etc
- Due priority shall be given to project related employment and other benefits to vulnerable group and poor people
- The contractor shall maintain at least first aid kits and vaccines against infectious and communicable diseases
- Awareness program
- Strict rule and regulation for the workers
- Land prices are subject to change and are to be updated prior to meeting of compensation fixation committee meeting.
- Landowners name, types of land, and other essential information has to be confirmed before the project implementation due to time lag between this study and time of project implementation.
- Modalities and scope of work of Community Support Program are to be further refined in consultation with Project Affected Families.

Operation Phase

- Private land falls within the RoW will be compensated. Such amount will be paid 10% of

the total amount of land value

- Tower shall not be placed at the center of field to the extent possible
- Safety equipment required for the operation of the transmission line shall be provided and safety measures must be applied

Enhancement Measures

Construction Phase

- Priority for local employment
- Implementation of community support program

Operation Phase

- Due priority shall be given to local employment
- Continuation of community support program for 2 years
- Due priority shall be given for rural electrification to the affected area

In summary the project is socio-economically feasible and appropriate arrangements are to be made to compensate and rehabilitate project affected families. Any omission and/ or discrepancy regarding entitlement, list of landowners etc will be sorted out during project implementation. The study concludes that construction of the proposed Khimti-Dhalkebar 220 kV Transmission Line Project is feasible if recommended social mitigation measures and monitoring plan is implemented.

REFERENCES

CBS, Statistical year Book of Nepal 2003

CBS, Population of Nepal: Caste/ Ethnicity, Mother tongue and Religion (CDR) 2001

DDCO, 2060. *District Level Monitoring and Evaluation Report*. District Development Committee Office, Information and Collection Center, Ramechhap

DDCO, 2059. *Ramechhap Development Overview for the improvement of the communication and transparency in development*. District Development Committee Office, Information Collection Center, Ramechhap.

DDCO. 2058. *Ramechhap Development Overview*. District Development Committee, Information and Collection Center, Ramechhap.

DDCO. 2059. *Ramechhap in Maps*. District Development Committee Office, Human Resources Development Center, Ramechhap.

DDCO. 2060. *Ramechhap Development Overview for the Improvement of the Communication and Transparency in Development*. District Development Committee, Information and Collection center, Ramechhap.

HMG/N Electricity Regulation 2050, Nepal Rajpatra

KM. 2059. *An Overview of Kamalamai*. Second Edition. Kamalamai Municipality, Sindhuli

NEA, 2003, Detail Route Alignment Survey of Khimti Dhalkebar 220 kV Transmission Line Project. Project Development Department, NEA.

NEA (2002). A Year in Review, Nepal Electricity Authority, Fiscal year 2001/02, Durbar Marg, Kathmandu

NEA 2003. A Year in Review, Nepal Electricity Authority Fiscal year 2002/03

NPC. Tenth Five-year Plan 2059-2064

NRA National Research Associates Nepal District Profile 2002

NDP National District Profile (1997) Kathmandu.