

# STUDY OF THE IMPACT OF ASIATIC WILD ELEPHANT (*ELEPHAS MAXIMUS*) IN HETAUDA- DHALKEBAR- DUHABI 400 KV TL PROJECT

## FINAL REPORT



**Submitted to:**

**Hetauda- Dhalkebar- Duhabi 400 kV Transmission Line Project**

**Darbar Marga, Kathmandu**

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## ***List of abbreviations and acronyms***

AP	Angle Point
AWE	Asiatic Wild Eléphant
BZ	Buffer Zone
BZR	Buffer Zone Régulation
DoF	Department of Forest
DNPWC	Department of National Parks & Wildlife Conservation
EDR	Eastern Development Region
GPS	Global Positioning System
HC	Human Casualty
km	Kilo meter
kV	Kilo Volt
KTWR	Koshi Tappu Wildlife Reserve
CDR	Central Development Region
NEA	Nepal Electricity Authority
NPWCA	National Parks and Wildlife Conservation Act
RoW	Right of Way
TLP	Transmission Line Project
TOR	Terms of Reference
UC	User Committee
WR	Wildlife Reserve

## Executive Summary

The study of the impact of Asiatic wild elephant (*Elephas maximus*) in Hetauda-Dhalkebar-Duhabi 400 kV TL Project was started in July 2012. The study was conducted based on the Terms of Reference provided by ESSD and Inception report cleared by World Bank. The study mainly focus on three affected sites namely Nijgadh (AP 15-16) of Bara district, Ghoghanpur (AP 38-41) of Saptari and Tapeshowari (AP48-51) of Udayapur district. The main objectives of the study were to find out the physical occurrences of Asiatic elephants in above mentioned sites, the impact of transmission line project on Asiatic wild elephant and vice versa and proposed suitable measures to minimize the impacts. The final report is prepared based on one year field data collected on the above mentioned three sites along with other areas of the transmission line alignment.

The study team was headed by elephant expert includes, Park rangers of Parsa and Koshi Tappu wildlife reserves and environment specialist from ESSD. In addition three local people consisting one at each site were hired for data collection. Brief orientation training to the recruited persons was also conducted about the data collection procedure, community consultation, data recording system in the given format and reporting mechanism. The team collected site specific data and documented the evidences found in the field. A thousands meter transects line delineated in all three sites with the help of GPS and used for data collection such as foot prints and dungs. Focus group and semi-structured interviews were carried out to collect data through rapid assessment in three sites. Discussion has been made with former ward chair persons, school teachers and intellectual persons. The team had also interacted with CFUG members, reserve and forest officials regarding the elephant's movement and human elephants conflicts.

The total population of Asiatic elephants in Nepal is 147-171 (Yadav 2012) in Terai low land. There are four sub-population of Asiatic elephants found in four Development Regions. These are the Eastern development region (EDR) 10-15 nos, Central development region (CDR) 40-50 nos, Mid-western region 75-90 nos and Far western region 12-18 nos. Out of 10 project district the presence of elephant is reported from 9 districts covering 50 VDCs. The estimated forest cover is 3984.80km<sup>2</sup>.

The team observed three traditional / ancestral routes of the Asiatic wild elephants also called *Hatti Dandi* in local language in Janjyoti CF of Nijgadh (AP 15-16). Elephants used the same

route every year, so the path became deeper and make traditional route. Twenty cemented fencing poles in the CF were found dismantled. The barbed fencing wires at different places on the Hatti Dandi were also found broken in the Janjyoti CF. Altogether 20 old foot prints of both male and female wild elephants were recorded by the study team. The foot prints were found near the fence posts and inside the forest. We also observed the foot prints in the cultivated areas located close to forest.

The old and dried elephants dung piles were also recorded inside community forest in AP (15-16). So these evidences proved that the elephant's occurrence in Nijgadh area is permanent during the cropping season.

The Asiatic wild elephants visited these areas in July to November each year. About 10-15 wild elephants occurred in community forests of Nijgadh area (AP 15-16) annually.

Local people reported the elephants visits to the *Ghoghanpur* area, mostly in the cropping season each year. Elephant mostly visited the Gorja and Debikhola CF area and nearby settlements of Kamalpur VDC ward 8. Elephant visited the area for their additional foods and foraging especially in November to February. The number of elephant's visited the area were female 7-8, male 2-3 and 3-4 calves.

In Tapeshowari area the transmission line is proposed through dense sal (*Shorea robusta*) forest. This site is the biological corridor of Asiatic wild elephants. The biological corridors and connectivity join the KTWR and Trijuga forest. According to local people Amar Jyoti CF (AP47), Aadarsh CF (AP 48) and Saptkoshi CF (AP 49) are the crucial biological corridors for wild elephants. The number of elephants visited the site is 1-5 and 5-10 (Per comm.). Raiding crops by wild elephants were maize, rice, millets, wheat and pumpkins.

There are two types of herds of wild elephants found in EDR. The big herd consisting more than 100 elephants in a group visited mostly the Bahundangi VDC of Jhapa district. The small herd consisting less than 15 elephants were roaming around in the five districts namely Jhapa, Morang, Sunsari, Udayapur and Saptari of eastern Nepal. There is one residential herd of wild elephants in CDR. The herd consist less than 50 elephant roaming around in the five districts namely Mahotari, Sarlahi, Rautahat, Bara, Parsa and Chitwan.

The present study mainly focuses the impact of proposed 400 kV line on small herd. Experience with existing 132 kV line in above mentioned district/areas shows that no physical damage has been caused by elephant to the towers as well as by transmission line tower and cables to the elephant. Furthermore the transmission line cables are about 8m from the ground, so the elephant cannot reach to touch/harm the TL cables.

The implementation of the project will clear 390.92 ha forest area from 10 project districts. Altogether 158000 trees will be felled from the 390.92 ha forest area covering 113 km forest stretch. The implementation of the project will affect 6 community forests at three localities where the movement of wild elephant is documented during the present study. Altogether 7182 trees will be felled from 22.67 ha forest area. The clearance of forest will create scarcity of feeding and hiding of the Asiatic wild elephants in Nijgadh, Tapeswori and Ghoghanpur area along the transmission line alignment.

Traditional / ancestral routes of the Asiatic wild elephants called *Hatti Dandi* in local language are identified in Janjyoti CF of Nijgadh area. Likewise biological corridor is identified in Tapeswori area connecting Trijuga forest and KTWR. Although towers are not found in the above mentioned traditional route and biological corridor, the construction of the proposed project may disturb the existing traditional route due to movement of labor force, construction equipment and other associated activities.

Project workers working in the above mentioned 6 community forest area may have risk by the elephant especially during the elephant visit season. The movement of worker will also create disturbances for the wild elephant roaming around. The area excavated for the tower legs are generally open for 7 to 10 days which is also considered risk for the elephant roaming around.

During construction phase of TL the workers should be careful during the occurrence of wild elephants in the respective forest and sites. The workers should be in groups during the work. The workers should be aware about not to making noise and disturbances by throwing stones to the elephants groups. The construction work in six community forest of above mentioned three localities shall be avoided during elephants visit season.

The study proposed the continuation of the mitigation measures mentioned for wildlife including Asiatic wild elephant. Due emphasis for the plantation of medium size forage/fodder/grasses under compensatory plantation scheme, assistance to the land owner for the plantation of the banana and sugarcane under the TL in cleared private forest areas, assist for the rescue and rehabilitation of the wounded and helpless wild animals including Asiatic wild elephant, avoid the fencing on the Asiatic wild elephant paths and excavated area for the tower pads shall be fenced properly and backfilled as soon as possible are the additional mitigation measures proposed to minimize the impacts on Asiatic wild elephant.

# 1 Background

Nepal India Electricity Transmission and Trade Project of NEA intend to construct Hetauda-Dhalkebar- Duhabi 400 kV TL in 10 districts of Central and Eastern Nepal. The Initial Environmental Examination (IEE) of the proposed project was conducted by Environment and Social Studies Department (ESSD) as per the Environment Protection Rule (EPR) 1997 and World Bank Guideline. The IEE documents the presence of Asiatic elephants and their migration route at some of the localities in TL. Since TL passes about 40% forest area in its total length the impacts on Asiatic elephants has been envisaged in IEE report but more specific and detail study on the Asiatic elephants found in the area has been done to fulfill the donor requirement.

This report has been prepared as per the requirements stipulated by the MOU between the Project and Environment and Social Studies Department (ESSD) of Nepal Electricity Authority (NEA) for conducting Study of Asiatic wild elephants (*Elephas maximums indicus*) in Hetauda – Dhalkebar – Duhabi 400 kV Transmission Line (TL) Project to fulfill the requirement of World Bank for Project funding. GOEC Nepal Private Limited is the Consultant involved in the study. The final report has been prepared based on the data collected from July 2012 –June 2013.

## 1.1 Scope of Study

The scope of the work is to conduct specific study on the mega herbivore Indian or Asiatic wild elephant ( *Elephas maximus indicus*) at key localities along the TL route. The IEE study conducted for the project documented the presence of Asiatic elephant in Tapeshwori (AP 48-51) Ghoghanpur ( AP 39-40) and Nijgad (AP 15-16) area. The presence of Asiatic elephant was reported in TL alignment between Hetauda- Nijgad Section. The hot spot study will include:

- Confirm the occurrence of Asiatic elephants in TL alignment;
- Identification of the suitable habitat in the area if any;
- Identification of the migration time, key movement area, depredation to the crops in nearby settlement etc;
- Identification of the migration territory and possibilities of frequent interaction with project workers during construction and operation.
- Collection of information regarding the touch/contact/harm to the existing 132 kV towers



- Review available literature and studies on the impact of TLs, towers and cables on Asiatic elephants and compile relevant information on mitigation measures used to minimize the adverse impacts identified;
- Identification of the impacts of the proposed project on Asiatic wild elephants during construction and operation phases; and
- Develop appropriate mitigation measures to minimize the adverse impacts.

## 2 Project Description

The TL passes through 4 zones (Narayani, Janakpur, Sagarmatha and Koshi), 10 districts, 77 Village Development Committees (VDCs) and two municipalities. It covers the area of Makwanpur, Bara, Rautahat, Sarlahi, Mahottari, Dhanusha, Saptari, Siraha, Sunsari and Morang districts. The proposed 400 kV TL is 285.2 km in length, commencing at the under construction Hetauda substation (for Hetauda-Bardghat 220 kV Project) located at Hetauda Municipality Ward No 1 of Makwanpur district and terminating at the new Duhabi substation located at Ward no 7 Bhokraha tole (Hanif tole) of Bhokraha VDC in Sunsari district. The TL passes through 112.66 km of forest area which consists of 95.7 km of forest area, 8.2 km of shrub land and 8.76 km of grass land. The total forest land along the alignment **ROW** is 518.24 ha. The TL passes close to buffer zone of Koshi Tappu Wildlife Reserve. The minimum distance of the alignment from the Koshi Tappu Wildlife Reserve is 1.8 km.

The initial 18.6 km stretch of TL passes through hill section (Hetauda- Hurnamadi) and after that 23.4 km section is hill to Terai (Hurnamadi- Nijgadh). The remaining 243.2 km (Nijgadh- New Duhabi) passes through flat plain of Terai almost parallel to north of East-West Highway. The TL is aligned parallel to existing 132 kV line to the extent possible. In this regard out of 285.2 km total length 96.6 km is aligned close to existing 132 kV line. This includes 29km from Nijgadh to Bagmati, 20km from Bagmati to Dhalkebar and 47.6 km from Dhalkbear to Kanchanpur section.

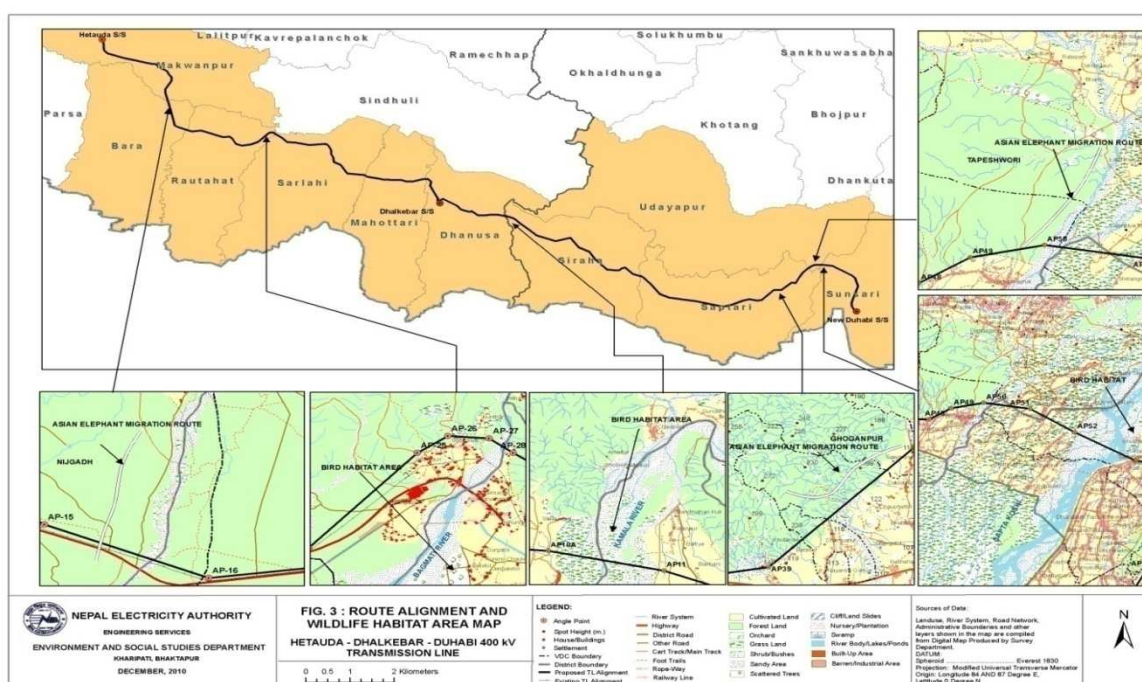


Table -1: Project features

Features	Description	
<b>General</b>		
Project	Hetauda – Dhalkebar- Duhabi 400 kV TL Project	
Development region	Central and Eastern Development Region	
Districts	10 districts ( 6 from Central Development Region 4 from Eastern Development Region)	
Development Region	Districts	VDCs/municipalities
<b>Central Development Region</b>	Makwanpur (6)	Hetauda Municipality and Churiyamai, Hatiya, Hurnamadi, Shreepur Chativan and Dhiyal VDCs
	Bara (2)	Nijgadh and Bharatgang VDCs
	Rautahat (5)	Chandranigahapur, Kakanpur, Rangapur, Judibela and Paurai VDCs
	Sarlahi (10)	Karmaiya, Dhungrekhola, Hariaon, Atrouli, Pattharkot, Lalbandi, Kalinjor, Ranigunj, Bhaktipur and Gourishankar VDCs
	Mahottari (3)	Khayarmara, Gauribas and Maistan VDCs
	Dhanusha (10)	Tulsichauda, Begadawar, Dhalkebar, Naktajhijh, Hariharpur, Puspapur, Umapremur, Yagyabhumi,

<b>Eastern Region</b>	<b>Development</b>	Siraha (17)	Bharatpur and Godar VDCs Ramnagar Mircharya, Fulbariya, Badharamal, Karjanha, Rampurbirta, Chandrodayapur, Chandralalpur, Jamdaha Lalpur, Ayodhyanagar, Asanpur, Dhangadhi, Bstipur, Padariya Tharotole, Govindpur Taregana & Bhadayia VDCs and Lahan Municipality
	"	Saptari (20)	Madhupatti, Daulatpur, Kushaha, Khojpur, Pansera, Kalyanpur, Bhangaha, Khoksar Parbaha, Rayapur, Terahota, Sitapur, Prasabani, Jandaul, Bakdhauwa, Theliya, Dharampur, Rupnagar, Dhodhanpur, Kamalpur and Fatepur VDCs
	"	Udayapur (2)	Thoksila and Tapeswari VDCs
	"	Sunsari (4)	Mahendranagar, Singiya, Dumraha, and Bhokraha VDCs
Initial point		New Hetauda Substation , Hetauda Municipality Makwanpur	
Terminal point		New Duhabi Substation, Bhokraha VDC, Sunsari district	
Number of major road crossing		3	
Number of major river crossings		4	
Number of 33 kV line crossings		1	
Number of 66 kV line crossings		1	
Number of 132 kV line crossings		1	
<b>Clearances</b>			
Highways		9.5 m	
Normal ground for pedestrians only		8.6	
Power lines		6.5 m for 11 & 33 kV and 6.1 for 66 & 132 kV	
Telecommunication lines		36m	
Roads and streets		9.5m	
Residential areas		9.2m	

Water surface at maximum flood	7.5 m
To metal clad or roofed sheds or structures upon which a man may stand	6m
Vertical clearance for forest	7.5m
Horizontal clearance for forest and settlement	46m
<b>Substation</b>	
<i>New Substation</i>	400/220/132 kV at Hanif tole of Bhokraha VDC
<i>Upgrading</i>	Construction of 400,220,132 and 33 kV voltage level buses at Dhalkebar substation and 220 kV bus and transformers at new Hetauda substation.
<b>Finance</b>	
<i>Project Cost</i>	USD 144 million for both TL and substation
<i>Funding Agency</i>	GoN / World Bank

*Note: For other objects not listed above the requirements for minimum clearances shall comply also with NESCA (NATIONAL ELECTRIC SAFETY CODE).*

Source: IEE 2011


### 3 Study approach and methodology

#### 3.1 Study Approach

A team of experts with several years' professional experience in their respective areas carried out the study of Asiatic wild elephants on Hetauda – Dhalkebar – Duhabi 400 kV TL areas. The study was conducted as per the Terms of Reference (TOR) and Inception report cleared by the World Bank/Project. The names of the personnel that carried out the field survey are given in Table 1. Research Assistants were hired locally to assist the elephant expert in field survey and for the data collection in the designated sites. Brief orientation training to the recruited persons was also conducted about the data collection procedure, community consultation, data recording system in the given format and reporting mechanism. The team collected site specific data and documented the evidences found in the field.

**Table- 2: Study Team**

SN	Name	Expertise/position
1	Mr. Rabindra Chaudhary	Coordinator

2	Mr. Babu Ram Yadav	Asiatic elephant Expert
3	Raju Geywali	Environment Specialist
4	Promod Yadav	Park ranger
5	Chandrashekhar Chuadhary	Park ranger
6	BhoteChaudhary	Field Assistant Tapeswari site
7	Ganesh BahadurKarki	Field Assistant Nijgadh site
	Mishri Lal Chaudhary	Field Assistant Ghoganpur site
		
		<b>Study Team</b>

The following general approaches were followed during the study period:

- Mobilization of technical experts as envisaged in the TOR and approved Inception Report.
- Selection of tested and proven methods and technologies.
- Effective communication with the client and all the concerned agencies.
- Optimum utilization of the available study reports, maps, drawings, standards etc.

Considering the project site location, ease of access, and seasonality, field studies were planned carefully and were conducted systematically. Emphasis was given on:

- Frequent and effective co-ordination and communication with the client
- Effective coordination and interaction with the team members
- Good and reliable management of the field logistics, equipment and other support facilities
- Careful management of study team movement to and from the field site
- Use of standard formats and checklists for collecting uniform and quality field data.
- Establishment of a database of the baseline data for analyses and future reference for monitoring.

## **3.2 Methods and Materials**

### **3.2.1 Field Visit and Surveys**

Four field visits were conducted to record Asiatic elephants occurrence in Nijgad of Bara district (AP 15-16) near Parsa wildlife reserve, Tapesowari of Udayapur district (AP 48-51) and Ghoghanpur of Saptari (38-42) close to Koshi Tappu wildlife reserve from July 2012-June 2013. Quarterly direct observation on above sites was conducted by elephant expert along with park rangers, CFUG chair person and local people recruited for the study. The environment specialist Mr. Raju Geywali from NEA facilitate the study and assist the team to get the Angles Points on above mentioned three sites. 1000 meters of established transect lines in each quarter on the three sites were investigated and recorded the evidences. The data regarding elephants internal migration and human elephants conflicts (HEC) in above mentioned three sites were collected. In addition general observation was made in the entire transmission line stretch to document the occurrence of wild elephant in other stretch of transmission line also.

### **Focus group discussion**

Focus group and semi-structured interviews were carried out to collect data through rapid assessment in three sites. Discussion has been made with former ward chair persons, school teachers and intellectual persons. The team had also interacted with CFUG members, reserve and forest officials regarding the elephant's movement and human elephants conflicts in the designated three sited including remaining TL stretch of EDR and CDR.

### **3.2.2 Materials**

Global Positioning System (GPS), camera, pairs of binoculars together with measuring tapes and stationary materials were taken during the field survey. Formats were used to collect the evidence encountered in the field. Jeep and motor cycles were hired to facilitate the study.

## **4. Review of Relevant Policies, Legislation, Guidelines and Conventions**

The relevant policies, acts, rules, guidelines and convention signed by the government of Nepal has been reviewed and discussed below. The proponent must comply the legal requirement of Government of Nepal (GoN) and will be responsible for fulfilling provisions of all relevant acts while implementing the project.

### **4.1 National Parks and Wildlife Conservation Act (NPWCA) 2029 ( A.D 1973)**

To protect, conserve and manage the biological diversity, this Act has made following rules and guidelines. Article 5: of the act prohibit Poaching /Hunting of wildlife, acquiring land without permission, grazing domesticated cattle's, clearing of seedlings, trees , digging out sand, stones, soil and mine and harm to the forest products.

**Article 10** of the act deals with protected wildlife species. The protected wildlife is listed in Appendix-1 of this act and their hunting is strictly prohibited. There are 39 protected wildlife species consisting 27 mammals species , 9 birds and 3 reptiles. Wild elephants is one of the endangered flagship species among top 7 prioritized endangered mammals (Tiger, Rhino, Elephant, Clouded leopard, Snow leopard, Musk deer, Bison, Red panda). Government of Nepal has made very strict provision to protect wild elephants out of 7 prioritized above mentioned mammals. If any person killed , sale the parts, sale meat and put body parts , the ACT 1973 charge a fine of NRs. 50,000 – NRs. 100,000 and sent to jail for 5 years to 15 years or both.

To protect, conserve and manage the biological diversity, this Act has made following rules and guidelines. Some relevant articles are only mentioned in this report. Article 5: Prohibition of Wildlife Poaching /Hunting, capturing land, grazing domesticated cattle's, clearing of seedlings, trees , digging out sand, stones, soil and mine , harm to the forest product or wildlife, birds and land. Damming the running water river and put poison and use crackers.

#### **Article 10: Protected Wildlife**

Wildlife listed in Appendix-1 in this Act is protected wildlife and their hunting is strictly prohibited. There are 39 protected wildlife of different species have been enlisted an endangered species, these are mammals 27, birds 9 and reptiles 3. Wild elephant is one of the endangered flagship species among top 7 prioritized endangered mammals (Tiger, Rhino, Elephant, Clauded leopard, Snow leopard, Musk deer, Bison, Red panda). Nepal Government has made very strict provision to protect wild elephants out of 7 prioritized above mentioned mammals. If any person killed , sale the parts, sale meat and put body parts , the ACT 1973 charge a fine of NRs. 50,000 – NRs. 100,000 and sent to jail for 5 years to 15 years or both.

#### **4.2 Wildlife Reserve Regulation 2034 ( A.D 1978)**

**Article 6:** of the regulation prohibited the following activities in Wildlife Reserve area without written approval of the designated authority of government of Nepal.



- a) Make any type of hut/houses , shelters and use it
- b) Acquiring illegally any land, cleaning/clearing vegetation, growing crops or harvests any vegetation in the reserve.
- c) Illegally graze the domestic cattle's or use water to drink for domesticated animals
- d) Digging out sand, stones, soil and mines
- e) Taken away parts of wildlife, dried meat and flesh
- f) Damming the river/streams, blocking sources of water, put poisons and crackers in river/streams

**Article 18:** Prohibits the movement of any person inside Wildlife Reserve area written permission of Wildlife warden/assistant warden or designated authority of government of Nepal.

### **4.3 Buffer Zone Areas Management Regulation 2052( A.D 1996)**

#### **Article 7:** Conservation in Buffer Zone Areas

Conservation of following things is the responsibilities of wildlife warden

- a) Wildlife
- b) Natural environment and natural resources
- c) Biological diversities
- d) Forests
- e) Development constructions

**Article 17:** Prohibited the following activities in Buffer Zone Area without written permission of Wildlife warden.

- a) Acquiring illegally the land , tree/seedling cutting, forest clearing and cultivate
- b) Forest product destruction and making fire in the forest
- c) Create adverse effect through digging out stone , sand , soil and mines
- d) Poisoning in the river/streams
- e) Illegal hunting and harm to the wildlife

**Article 18:** deals the authority of warden to amend and stop the activities implemented in BZA. As per this act any types of works conducting inside the BZA , if the activities make adverse effect the natural environment or natural resources , land use of BZA, general health of people or animals then the warden can amend /stop the works on prior suggestion of



Users Committee. If the client is unsatisfied, they can complain and that can be decided by DNPWC and it will be the final decision.

**According to Article 19** any persons or institutions cannot destruct public routes, public bridges, walls/barbed wires, signage inside the Buffer Zone areas.

**Article 20:** deals with issue consent letter. According to this article except cottage industries, other industries to be registered or get permit issue, from Department of National Park and Wildlife Conservation (DNPWC). After the approval of consent letter by DNPWC then warden can issue letter to proponents/institution to register the industry to the respective institutions.

#### **4.4 CITES**

##### **4.4.1 Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora, 1973**

Nepal is a party to the CITES that aims to control the trade of certain wildlife species to prevent further endangering of their survival. CITES classifies species according to the following criteria: I – species threatened with extinction, II – species which could become endangered, III – species that are protected (CITES 1983). As Nepal is party to the Conventions related to species conservation attention should be given to evaluate the impacts of the project activities on meeting their obligations. This convention is relevant for study as well as project implementation since elephant is listed under CITES I category.

##### **4.5 Domesticated Elephant Management Policy 2060 (2004)**

There are 214 domesticated elephants in five development regions. About 50% are F2 generation and these are under the CITES Appendix II. An elephant breeding centre has been established under the Chitwan National Park with aim to contribute for the sustainability management of wild elephant population in Nepal. As the elephants found in national park area belong to different owners (Private, Hotels, NGO and GON) the health status and other condition of elephants are not well. Most of the private owners have not any legal status to rear the elephant listed under CITES. Considering the fact Domesticated Elephant Management Policy was promulgated by GON in 2004 for the conservation and management of this flagship species.

## 5. Results and Discussion

### **5.1 Scientific classification, Distribution and habitat of Asiatic Wild elephants**

The scientific classification of the Asiatic elephants are ; Kingdom : Animalia , Phylum : Chordata, Class : Mammalia , Order : Proboscidea, Family : *Elephantidae*, Genus : *Elephas*, Species : *Elephas maximus*. Asiatic elephants inhabit grasslands, tropical evergreen forests, semi-evergreen forests, moist deciduous forests, dry deciduous forests and dry thorn forests, in addition to cultivated and secondary forests and scrublands. Over this range of habitat types elephants are seen from sea level to over 3,000 m (9,800 ft). In the Eastern Himalaya in northeast India, they regularly move up above 3,000 m (9,800 ft) in summer at a few sites.

Three subspecies are recognized: the Sri Lankan elephant lives in Sri Lanka;

- the Indian elephant lives in mainland Asia: India, Nepal, Bangladesh, Bhutan, Myanmar, Thailand, Malay Peninsular, Vietnam, Cambodia, Laos, and China;
- the Sumatran elephant lives in Sumatra and Borneo.

In China, Asiatic elephants survive only in the prefectures of Xishuangbanna, Simao, and Lincang of southern Yunnan. In Bangladesh, only isolated populations survive in the Chittagong.

### **5.2 Wild elephant's population status in world**

The total world wild population of Asiatic wild elephants is 38534-52566 animals survive in 13 range country. About 50 percent of total population is in India. Elephant total range habitat is 486800 sq.km in 13 rang countries (Sukumar 2005).

### **5.3 Wild elephant's population status in Nepal**

The total population of Asiatic elephants in Nepal is 147-171 (Yadav 2012) in Terai low land. There are four sub-population of Asiatic elephants found in four Development Regions. These are the Eastern development region (EDR) 10-15 nos, Central development region (CDR) 40-50 nos, Mid-western region 75-90 nos and Far western region 12-18 nos (Pradhan 2007, Yadav 2012, Petra 1999).

**Habitat:** Total potential habitat of wild elephants in four development regions (EDR, CDR, MWDR, FWDR) in Nepal is 10982.04 Sq. km (ECAP 2009), individually the potential habitat of Asiatic elephants in EDR-1942 sq.km, CDR-3513 Sq.km, MWDR-2944 sq.km and FWR-2583sq.km.

### **Wild elephant's and people conflict status in Nepal**

Altogether 18 districts, 135 Village Development Committees and about 900000 people living in flat land of Terai are affected by human elephant conflicts (HEC). Human casualty (HC) by wild elephants differs from one region to another. A total of 102 people have been killed by Asiatic wild elephant during 2002-2012. Out of this 30 persons were in EDR, 35 in CDR, 28 in MWDR and 9 in FWDR.

### ***Mortality of Asiatic Wild elephant***

Due to human and elephants conflicts, elephant mean annual mortality is: 1.4 individual during A.D 1980-2000, 3.4 individuals 2000-2005 and 6.8 individuals during 2005-2012 including both wild and domesticated elephants.

Altogether 68 elephants were killed in 10 years period (2002-2012) which consist 17 retaliatory killing, 10 due to disease, 34 natural death, 3 poisoning and 4 due to unknown reason. Out of this 38 were male, 25 female and sex of three elephants were unknown. This includes 40 wild elephants and 28 domesticated elephants.

### **5.4 Wild Elephant Status in Project Districts**

Out of 10 project district the presence of elephant is reported from 9 district covering 50 VDCs. The estimated forest cover is 3984.80km<sup>2</sup>.

**Table- 3: Movement of elephants in Project districts**

<b>Elephants</b>	<b>District</b>	<b>Affected number of VDCs</b>	<b>Estimated forest cover ( km<sup>2</sup>)</b>
Eastern population	Sunsari	11	160.3
	Saptari	6	304
	Udayapur	7	1065
	Siraha	1	233.1
	<b>Sub-total</b>	<b>25</b>	<b>1762.4</b>
Central population	Dhanusa	2	286.3
	Mahotari	1	238.3

	Sarlahi	6	289.5
	Rautahat	3	304.5
	Bara	3	403.8
	<b>Sub-total</b>	<b>25</b>	<b>2222.4</b>
	<b>Total</b>	<b>50</b>	<b>3984.80</b>

## 5.5 Wild Elephant Status in Transmission Line Alignment

The findings of the study conducted at three localities namely Nijgadh area (AP 15-16), Ghoganpur (AP 39-42 ) and Tapeshowari area (AP 48-51) of Bara, Saptari and Udayapur districts respectively is presented below.

### 5.5.1 NIJGADH (AP 15-16) OF BARA DISTRICT (CDR)

The team observed three traditional / ancestral routes of the Asiatic wild elephants also called *Hatti Dandi* in local language in Janjyoti CF of Nijgadh (AP 15-16). Elephants used the same route every year, so the path became deeper and make traditional route. The elephants have been used *Hatti Dandi* from their ancestral time. Elephants when move one destination to another destination walk in a straight line and the routes will be constructed automatically.

Twenty cemented fencing poles in the CF were found dismantled. The barbed fencing wires at different places on the Hatti Dandi were also found broken in the Janjyoti CF. The representative of CFUG has made barbed wire fencing in their community forest in order to minimize the encroachment. Since these fencings also blocked the traditional route, so the elephants have broken the barbed wire fencing. The elephant coming in this area during cropping season (maize and rice crops) used to raid the crop during night and stay in the forest during the day. Due to presence of wild elephants in the CF, the human entrance into the forest during the period is almost stopped. We found that the chair person of CFUG do not send watcher (guard) during elephants movement time in to their forest since human encroachment is almost negligible during those days.

The AP 14-15 of the proposed 400 kV transmission line is located about 75 meters far from the existing 132 kV line and then aligned parallel to the existing line. Cutting of trees were found adjacent to 132 kV transmission line. This area is heavily used by the wild elephants said by Ganesh Karki the chair person of Janjyoti CF and field assistant of the Nijgadh area

too. No sign of any touch/harm by Asiatic elephants to the existing 132 kV transmission line was observed during the field survey.

Altogether 20 old foot prints of both male and female wild elephants were recorded by the study team. The foot prints were found near the fence posts and inside the forest. We also observed the foot prints in the cultivated areas located close to forest.

The old and dried elephants dung piles were also recorded inside community forest in AP (15-16). So these evidences proved that the elephant's occurrence in Nijgadh area is permanent during the cropping season.

The Asiatic wild elephants visited these areas in July to November each year. According to local people raiding of crops by wild elephants especially the rice and maize is common every year. The elephants also stole the stored grain from nearby villages. Sometime they drink local wine made by villagers for their own use. After drinking local liquors they become destructive and injured some peoples in Nijgadh area. About 10-15 wild elephants occurred in community forests of Nijgadh area (AP 15-16) annually.

Local farmers are aggressive due to raiding the crops by elephants every year. Poor people who have little land are seriously victimized by the raiding of elephants. Raiding of crops of poor people create scarcity of foods among them. No compensation has been paid by the Government of Nepal to the victims so far. The victimized people are not in favor of the CFUG, because the density of forest is increasing and becoming the good habitat of wild elephants and other animals.

The dominant tree species found in this stretch is Saj (*Terminalia alata*) where as the seedlings, saplings and pole class trees of sal (*Shorea robusta*) are found higher than other species. The major associated tree species are ; Barro, (*Terminalia bellirica*), Karma (*Adina cardifolia*), Boddhangero (*Lagerstroemia parviflora*), Sindure (*Mallotus philippensis*), Khair (*Acacia catechu*) etc. The shrub species found during our survey are : *Eupatorium odoratum*, *Murryako nigii*, *Osbeckia stelata*, *Actinidia callosa*, *Psidium gaujava*, *Lantana camara*. The major herbs are found in this RoW are; *Dioscorea deltoidea*, *Biden spilosa*, *Oxalis corniculata*, *Thyanolaema maxim* etc,

#### **5.5.2 GHOGHANPUR (AP39-42) OF SAPTARI DISTRICT (EDR)**

Local people reported the elephants visits to the *Ghoghanpur* area, mostly in the cropping season each year. KTWR is about 2-3 km far from this site and the elephant group visits the areas for 4-5 hours and return to the reserve. However sometimes elephant stay in forest area for 2-4 days ( Per comm., *Mishri Lal Chaudhary*, *Kamalpur VDC-9* and *Chhedi Chaudhary*, *Kamalpur -8*). KTWR is considered good habitat of wild elephants. Elephant mostly visited the

Gorja and Debikhola CF area and nearby settlements of Kamalpur VDC ward 8. Elephant visited the area for their additional foods and foraging especially in November to February. The number of elephant's visited the area were female 7-8, male 2-3 and 3-4 calves. The casualty of human and elephants have been not recorded so far. The damages reported by local people consist 130 ha cropped area mostly rice and 10-15 thatch houses ( Per comm., *Mishri Lal Chaudhary , Kamalpur VDC-9 and Chhedi Chaudhary , Kamalpur -8*). Most of the people of Kamalpur VDC's are not sleeps at night due to elephants presence in those areas over night.

### **5.5.3 TAPESHOWARI (AP48-51) OF UDAYAPUR DISTRICT (EDR)**

In Tapeshowari area the transmission line is proposed through dense sal (*Shorea robusta*) forest. This site is the biological corridor of Asiatic wild elephants. The biological corridors and connectivity join the KTWR and Trijuga forest.

A group meeting was conducted with Mr. Basrupan Chaudhary chair person of Aadarsh CFUG. They told that Amar Jyoti CF (AP47), Aadarsh CF (AP 48) and Saptkoshi (AP 49) are the crucial biological corridors for wild elephants. The construction of transmission line will remove 4421 trees from 12.03 ha area of above mentioned three community forests. The removal of trees will affect the existing biological corridor of the wild elephant.

The major forest types are ; *Shorea robusta* (Sal) , mixed sal and Reverine. The dominant species is Saj (*Terminalia alatais*) whereas the seedling, saplings and pole class trees of shorea robusta is found higher than other species. The major associated tree species are ; *Haldu (Lannea coromandica)*, *Bodhangero (Lagerstroemia parviflora)* and *Bhalayo (Semecarpus anacardium)* . The major shrub species found during our survey are: *Clebrookea oppositifolia*, *Eupatorium odoratum*, *Woodfordia fruticosa* *Murryako nigii*, and *Lantana camara*. The major herbs are found in this RoW are; *Polygonum barbatum*, *Cassia tora*, *Smilax ovalifolia*, *Ageratum conyzoides*, *Diocorea bulbifera*, *Dioscorea deltoidea*, *Phyllanthus urinaria*, *Urena lobata* and *Cyanodon dactylon*.

### **Elephant / human casualty and crop damage**

A wild bull elephant was killed in Feb 2012at *Junga khola Muhan* (Per comm. Bhote Chaudhary 2012). One man was killed by elephant in 1989 and an old man was killed in 1996 in this area. Three year ago Kokila Shrestha was killed by elephants. Wild elephant visit in November – February and July –October. The number of elephants visited the site is 1-5 and 5-10 (Per comm.). Raiding crops by wild elephants were maize, rice, millets, wheat and pumpkins.

### 5.6 MAJOR PLANT SPECIES USED FOR ELEPHANT FOOD

Hardwood forest, Sal Forest, Reverine Forest and Mixed Sal forest are used by elephant for food and shelter. Altogether 21 plants having timber, fodder and medicinal value are preferred by the elephant for their food.

**Table 2 : Preferred plant species by elephant**

S.N.	Common name	Scientific name	Region
1	Sal climber	<i>Spathollus roxburghii</i>	Terai
2	Harro	<i>Terminalia chebula</i>	"
3	Khayar	<i>Acacia catechu</i>	"
4	Amala	<i>Phyllanthus emblica</i>	
5	Banimali	<i>Bauhinia malabarica</i>	
6	Bel	<i>Agle marmelos</i>	
7	Datrung	<i>Ehretia leavis</i>	
8	Dudhe khirroo	<i>Holarrhena antidysentrica</i>	
9	Dumari	<i>Fycus racemosa</i>	
10	Gajahar	<i>Fycus affinior</i>	
11	Jamun	<i>Syzygium cumini</i>	
12	Jhingad	<i>Lannea grandis</i>	
13	Khanayo	<i>Ficus semicordata</i>	
14	Kumbhi	<i>Careya arborea</i>	
15	Mauwa	<i>Madhuka indica</i>	
16	Pandan	<i>Desmodium oojeinense</i>	

17	Rukhforsa	<i>Grewia spp</i>	
18	Simal	<i>Bombax ceiba</i>	
19	Sindure	<i>Mallotus phillippinensis</i>	
20	Sissoo	<i>Dalbergia sisoo</i>	
21	Tantari	<i>Dillenia pentagyna</i>	

Source: Pradhan 2007 and field work 2013

### 5.7 FOREST STATUS AND VEGETATION TYPE IN ROW

Vegetation types in the RoW in Terai are Sal Forest, Reverine Forest and Mixed Sal Forest. The community and collaborative forest falls under the habitat of Asiatic wild elephants are given in the table 3.

**Table - 3 : Community and Collaborative Forest found in RoW**

Sn	Name of the CF	VDCs/Wards	District	Area (ha)	Household
1	Janjyoti CFUG	Nijgadh	Bara		
2	Janahit CFUG	"	"		
3	Janjagriti Sundar CFUG	Nijgadh2	"		334
4	Bagbhairaw CFUG	Nijgadh3	"	519	346
5	Jana Shrijanshil CFUG	Nijgadah 5	"	200	652
6	Bagini CFUG	Kamalpur	Saptari		
7	Gorraja CFUG	Ghoghanpur 1,2,3,4	"	127.7	444
8	Sundari CFUG	Dharampur 8	"	443.1	336
9	Adarsabelka CFUG	Tapeswory 1	Udayapur	107.10	86



10	Belka Namuna CFUG	Tapeshwory 9	"	95.4	101
<b>S.N</b>	<b>Name of collaborative forest</b>	<b>Area (ha)</b>	<b>VDCs</b>	<b>District</b>	<b>Remark</b>
1	Phuljorbaba	2300	22	Rautaha t	
2	Tuteshwarnath	1334.2	20	Mahotar i	
3	Banke-Maraha	2006.85	35	Mahotar i	
4	Gadhanta- Bardibas	1160.70	22	Mahotar i	

## 6. Impacts

About one million people are affected from Asiatic wild elephants in four development regions (EDR, CDR, MWDR and FWDR) of Nepal. Similarly 147-171 Asiatic wild elephants are also affected due to human activities in above mentioned development regions. In addition raiding of crops and damages to the houses of the villagers is also common since past few years.

There are two types of herds of wild elephants found in EDR. The big herd consisting more than 100 elephants in a group visited mostly the Bahundngi VDC of Jhapa district. The small herd consisting less than 15 elephants were roaming around in the five districts namely Jhapa, Morang, Sunsari, Udayapur and Sapatari of eastern Nepal. There is one residential herd of wild elephants in CDR. The herd consist less than 50 elephant roaming around in the five districts namely Mahotari, Sarlahi, Rautahat, Bara, Parsa and Chitwan.

The present study mainly focuses the impact of proposed 400 kV line on small herd. Experience with existing 132 kV line in above mentioned district/areas shows that no physical damage has been caused by elephant to the towers as well as by transmission line tower and

cables to the elephant. Furthermore the transmission line cables are about 8m from the ground, so the elephant cannot reach to touch/harm the TL cables.

The local people use electric wire to kill the elephants to protect their crops so the elephants fear from electricity poles due to current flow through it. This is might be the reason that no harm is noted to the existing 132 kV system by elephant.

The implementation of the project will clear 390.92 ha forest area from 10 project districts. Altogether 158000 trees will be felled from the 390.92 ha forest area covering 113 km forest stretch. The implementation of the project will affect 6 community forests at three localities where the movement of wild elephant is documented during the present study. Altogether 7182 trees will be felled from 22.67 ha forest area. The clearance of forest will create scarcity of feeding and hiding of the Asiatic wild elephants in Nijgadh, Tapeswori and Ghoghanpur area along the transmission line alignment. Encroachment of the forest due to different activities reduced the available forest habitat affecting food, elephant corridor and shelter of the wild elephant which compel the elephants to stay in PWR and KTWR. Since these reserves are providing good habitat to wild elephants in terms of food and shelter the elephant taking shelter in reserves are affecting crops and houses of the local people of nearby villages. In addition human casualties due to elephant movement were also reported at different time of the year.

Traditional / ancestral routes of the Asiatic wild elephants called *Hatti Dandi* in local language are identified in Janjyoti CF of Nijgadh area. Likewise biological corridor is identified in Tapeswori area connecting Trijuga forest and KTWR. Although towers are not found in the above mentioned traditional route and biological corridor, the construction of the proposed project may disturb the existing traditional route due to movement of labor force, construction equipment and other associated activities.

Project workers working in the above mentioned 6 community forest area may have risk by the elephant especially during the elephant visit season. The movement of worker will also create disturbances for the wild elephant roaming around. The area excavated for the tower legs are generally open for 7 to 10 days which is also considered risk for the elephant roaming around.

## **7.0 Mitigation Measures**

### **7.1 Mitigation Measures Proposed in IEE Report**

Compensatory plantation for the loss of vegetation in 1:2 ratio (as per recent decision of GON for hydropower and transmission line projects), plantation for the leased forest land @ 1600 saplings/ha with due emphasis of plantation in elephant corridor, minimization of

construction disturbances, restrict hunting and poaching and awareness for wildlife conservation were proposed in IEE report prepared for the project. The IEE report proposed RoW sharing with existing 132 kV line from AP 14 located at Nijgadh to AP 18 at Chandranigahapur, AP 21 to AP 25 and AP 38 at Lalbandi to AP 49 at Mahottari. The RoW sharing will save 96.6 km forest length having an area of 43.53 ha. This will reduce 18429 numbers of poles and trees to be felled.

Likewise IEE report also proposed the coordination of the construction work with District Forest Office, collaborative forest management and Community Forest User Groups and placement of informative and warning sign in the concerned area.

## **7.2 Additional Mitigation Measures**

During construction phase of TL the workers should be careful during the occurrence of wild elephants in the respective forest and sites. The workers should be in groups during the work. The workers should be aware about not to making noise and disturbances by throwing stones to the elephants groups. The construction work in five community forest of above mentioned three localities shall be avoided during elephants visit season. The following are the additional/supplementary mitigation measures proposed to minimize the impacts.

- Plantation of medium size forage/fodder/grasses for Asiatic wild elephants under the cleared transmission line stretch.
- Provide assistance to the land owner for the plantation of the banana and sugarcane under the TL in cleared private forest areas
- The awareness program shall also cover the awareness regarding biological diversity conservation and human-elephant conflicts
- Illegal firing in the forest is strictly prohibited so the workers must be aware and avoid firing inside the forest
- Assist for the rescue and rehabilitation of the wounded and helpless wild animals including Asiatic wild elephant if found nearby construction sites in coordination of DFO/Warden.
- Avoid the fencing/ towers on the Asiatic wild elephant paths (*Hatti Dandi*) to minimize the disturbances
- The excavated area for the tower pads shall be fenced properly and backfilled as soon as possible to avoid the likely accidents
- The field survey shows that angle towers are not found in elephant traditional route. The placement of suspension tower (if any) shall be avoided.

## 8. CONCLUSION AND RECOMMENDATION

The study of the impact of Asiatic wild elephant (*Elephas maximus*) in Hetauda-Dhalkebar-Duhabi 400 kV TL Project was started in July 2012. The study was conducted based on the Terms of Reference provided by ESSD and Inception report cleared by World Bank. The study mainly focus on three affected sites namely Nijgadh (AP 15-16) of Bara district, Ghoghanpur (AP 38-41) of Saptari and Tapeshowari (AP48-51) of Udayapur district.

Field observation by the expert, observation of the dung, foot prints, line transect survey, and consultation with reserve authority, community forest users group & local people were the main method used for the study.

The findings of the study shows that there is a seasonal presence of elephants in groups at the above mentioned community forest and nearby areas. The study team did not find any types of disturbance/damages to the existing 132 kV TL located parallel to the proposed Hetauda-Dhalkebar-Duhabi TL. The implementation of the proposed transmission line will removed 7182 trees from 22.67 ha forest area at three different stretch of transmission line. The clearance of forest will create scarcity of feeding and hiding of the Asiatic wild elephants in Nijgadh, Tapeshwori and Ghoghanpur area along the transmission line alignment.

The study recommended the continuation of the mitigation measures mentioned for wildlife including Asiatic wild elephant in IEE report prepared for the project plus additional mitigation measures proposed above.

## SOME SIGNIFICANT PHOTOS TAKEN AT AFFECTED SITES 2012



Elephant dung



Foot prints



Foot prints



Meeting with CFUG



Cemented pillars



Elephant old dung

Cement fencing pillar

Elephant path

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## Appendix

### Questionnaires Survey Jan 2013

#### *Impact of Hetauda-Dhalkebar-Duhabi 400Kv Transmission Line Project on Asiatic Wild Elephants ( *Elephas maximus indicus* )*

##### PROBLEM ASSOCIATED WITH TRANSMISSION LINE CONSTRUCTION

##### Questionnaire with Local people and CFUG

Name \_\_\_\_\_ Age: \_\_\_\_\_ Sex: Male / Female

District ..... VDC : -----Ward :-----

1. Do you know about the construction of Hetauda-Dhalkebar-Duhabi 400 kV Transmission Line? तपाईंलाई थाहा छ हेटौडा-ढलेकेबर-दुहबी विजुलीको ४०० के.भी. ट्रांसमिसन लाईनको बारेमा ?  
 Yes \_\_\_\_\_ No \_\_\_\_\_
2. Do the elephants visit around the proposed transmission line towers Nijgad (AP 48-51, ), Tapeshwory ( AP 48-51), Ghoghanpur (AP 15-16) ? जंगली हत्तिहरू यस क्षेत्रमा आउने जाने गर्दछन्? ।  
 Yes \_\_\_\_\_ No \_\_\_\_\_
3. Do the elephants harm/touch the proposed transmission line towers Nijgad (AP 48-51, ), Tapeshwory ( AP 48-51), Ghoghanpur (AP 15-16) जंगली हत्तिहरूले प्रस्तावित ढलेकेबर-दुहबी विजुलीको ४०० के.भी. ट्रांसमिसन लाईनलाई छुन वा बिर्गान सक्दछन्? ।  
 Yes \_\_\_\_\_ No \_\_\_\_\_
4. Do the elephants harm/touch/destroyed the proposed transmission line cables Nijgad (AP 48-51, ), Tapeshwory ( AP 48-51), Ghoghanpur (AP 15-16) जंगली हत्तिहरूले प्रस्तावित ढलेकेबर-दुहबी विजुलीको ४०० के.भी. ट्रांसमिसन लाईनको केबल छुन वा बिर्गान सक्दछन्?  
 Yes \_\_\_\_\_ No \_\_\_\_\_
5. Do the elephants harm/disturb the labourers during the construction phase of proposed transmission line towers Nijgad (AP 48-51, ), Tapeshwory ( AP 48-51), Ghoghanpur (AP 15-16) जंगली हत्तिहरूले प्रस्तावित ढलेकेबर-दुहबी विजुलीको ४०० के.भी. ट्रांसमिसन लाईनमा काम गर्ने कामदारहरूलाई नेक्सान तथा अफ्टयारो पार्न सक्दछन्?  
 Yes \_\_\_\_\_ No \_\_\_\_\_
6. Do the construction of proposed transmission line project 400 Kv disturbed the elephants movements ? जंगली हत्तिहरूलाई प्रस्तावित ढलेकेबर-दुहबी विजुलीको ४०० के.भी. ट्रांसमिसन लाईनले जंगली हात्तिहरूको आवतजावतमा बाधा पार्न सक्दछन् ? ।  
 Yes \_\_\_\_\_ No \_\_\_\_\_



7. Do you hear any evidence to harm/touched/destroyed the 132 Kv transmission line? तपाईंलाई थाहा छ पुरानो १३२ के.भी. ट्रान्समिसन लाईनलाई बाधा पारेको बारेमा ?
- Yes No
8. Do you know that the cutting of forest reduce the habitat which affect the foraging of elephants? तपाईंलाई थाहा छ प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको बासस्थानमा कमि भई तिनहरूको चरनमा प्रभाव पर्दछ ?
- Yes No
9. Do you know that the cutting of forest also affect the movement of elephants? तपाईंलाई थाहा छ प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको विचरनमा प्रभाव पर्दछ ?
- Yes No
10. Do you know that the cutting of forest due to transmission line construction reduce the foods of elephants in their habitat which compel the elephant to visit the cultivation and raiding crops , property damage and human casualty? तपाईंलाई थाहा छ प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको खाना तथा चरनमा कमि भई जसको कारण हात्तिहरू कृषिवाली / सम्पति नोक्सान तथा मानव छति पनि गर्न सक्दछन् ?
- Yes No
11. Reduction of foods and foraging of elephants in their habitats they are harmful to the local people living surrounding the transmission line, then how we mitigate this problems? प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको खाना तथा चरनमा कमि भई जसको कारण हात्तिहरू कृषिवाली / सम्पति नोक्सान तथा मानव छति पनि गर्न सक्दछन् तर प्रोजेक्टबाट पनि धेरै नेपाली जनताहरूलाई फाईदाहुने हनाले यस समस्या समाधानको लागि के के गर्न सकिन्छ त ?
- a) Managing additional Plantation of edible plants in the remaining forest प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको बासस्थानमा कमिलाई परिपूर्ति गर्न थप हात्तिले रुचाउने खालको विरुवाहरू रोपी समस्या समाधान गर्न सकिन्छ होला ?
- b) Fodders/grasses/climbers plant inside the remaining habitat प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको बासस्थानमा कमिलाई परिपूर्ति गर्न थप हात्तिले रुचाउने खालको डालेघाँस/भुईँघाँस/लहराको विरुवाहरूको व्यवस्थापन गरी समस्या समाधान गर्न सकिन्छ होला ?
- c) Management of grassland under the transmission line stretch प्रोजेक्टको लागि वन कटानी हुँदा हात्तिको बासस्थानमा कमिलाई परिपूर्ति गर्न ट्रान्समिसनलाईन मुनि घाँसे मैदानको व्यवस्थापन गरी समस्या समाधान गर्न सकिन्छ होला ?
12. If the elephant touch/harm/destroyed proposed transmission line 400 Kv, how can we protect the towers and cable of transmission line?
- a) Chasing of elephants b) Fencing the towers c) Increasing the height of cable d) Change the current places

#### PROBLEM ASSOCIATED WITH CROP DAMAGE

Name (नाम) Age: (उमेर) Sex: Male -(महिला) / Female (पुरुष)

District जिल्ला..... VDC : -गा.वि.स ----- Ward वार्ड नं. -----

1. What kind of crops do you grow in your field? कुन किसिमको बालीनाली खेतबारीमा लगाउनु हुन्छ ?

a) Paddy धान b) Maize मकै c) Wheat गहुँ c) Millets कोदो d) Sugar cane उँखु e) Casava तरुल f) Mustard तोरी G) Lentils मसुरो

2. Do you have any problem from wild elephants? तपाईंलाई हत्तिबाट कुनै किसिमको समस्या छ ?

Yes छ No छैन

If yes, what kind of problems do you have? कुन किसिमको समस्या छ ?

a) Crop damage बालीनाली b) Property damage सम्पतिको नोक्सानी c) Human injury/casualty मानवक्षति/घाइते d) Livestock's damage बस्तुभाउको नोक्सानी

3. Which animal mostly damage your crop? तपाईंलाई कुन जनावरबाट बढी समस्या छ ?

a) Elephants हात्ति b) Deer's: समस्या c) Wild boars समस्या d) Others समस्या

4. How often do they enter the field?

a) Every night in the crop season b) 1-2 times per week c) 1-2 times per month d) Occasionally

5. During which months are elephants causing problems and which month is worse?

a) November-February मंसिर-पौष , माघ-फाल्गुन b) March-June चैत्र-वैशाख , जेष्ठ-अषाढ July-October श्रावण-भदौ, असोज-कार्तिक

6. Which crop elephants prefer most? (List in order of preference)

i Rice ii Maize iii Wheat iv Sugar cane v Banana vi Millets v Lentil vi Others

7. Do elephants damage equally in all growing periods?

Yes No

If yes, at what stage do they damage most ?

Paddy i. Juvenile stag ii. Flowering stage iii Teaselling stage iv. Mature stage

Maize i. juvenile stage ii. Flowering stage iii Teaselling stage iv Mature stage

Wheat i. Juvenile stage ii. Teasling iii. Mature stage

Milletts i. Juvenile stage ii. Teasling iii. Mature stage

Sugarcane i. Juvenile stage ii. Teasling iii. Mature stage

Banana i. Juvenile stage ii. Teasling iii. Mature stage

Mustard i. Juvenile stage ii. Flowering stage. iii. Mature stage

8. Do you have damage problem this year?

Yes: No

If yes, how much land was damaged from elephants?

- a.) Paddy: Bigaha----- , Katha --- Dhur --- Maize : Bigaha----- , Katha --- Dhur ---  
 . Wheat : Bigaha----- , Katha --- Dhur --- Sugarcane : Bigaha----- , Katha ---  
 Dhur ---  
 Millets : Bigaha----- , Katha --- Dhur --- Banana : Bigaha----- , Katha --- Dhur ---  
 Mustard : Bigaha----- , Katha --- Dhur ---

### Elephants Chasing and controlling

9. How many wild elephants visit this areas every year

- a) 1-5 b) 5-10 c) 10-15 d) 15-20 e) 20-30 f) 30-40 g) above 40

10. How many tuskers visit with the groups

- a) 2-3 b) 3-5 c) 5-7 d) above 7

11. How many baby elephants visit with the groups?

- a) 2-3 b) 3-5 c) 5-7 d) 7-10 e) above 10

12. Which group is destructive to the crops and human

- a) Single male b) Male with female c) Baby with mothers d) Male with female

13. What kind of techniques do you apply to chase the elephants?

- a) Shouting and following b) Following with fire. c) Hitting with stones d. Scaring by hitting tins boxes e)  
 Watch Tower guarding f) All of above techniques g) Use mussel loaded guns

14. Which institutions involve chasing elephants from field and settlements?

- a) DFO b) PAO c) Local Administration d) Police

15. How many people are Injury/killed in this areas within 5 years

Injury : 1-2 , 2-3 , 3-5 5-7 , 7-10

Killed : 1-2 , 2-3 , 3-5 5-7 , 7-10

16. How many elephants are Injury/killed in this areas within 5 years

Injury : 1-2 , 2-3 , 3-5 5-7 , 7-10

Killed : 1-2 , 2-3 , 3-5 5-7 , 7-10