"BIO DIVERSITY ASSESMENT & WILDLIFE MITIGATION PLAN"

FOR

132 KV RILOH-SEIJOSA TRANSMISSION LINE PASSING THROUGH BUFFER ZONE OF PAKKE TIGER RESERVE

(UNDER COMPREHENSIVE SCHEME FOR STRENGTHENING OF TRANSMISSION & DISTRIBUTION SYSTEM IN ARUNACHAL PRADESH)

CONTENTS

SECTION –I: INTRODUCTION

1.0 PROJECT BACKGROUND:-

The North Eastern Region (NER) in India is endowed with rich energy resources but faces significant bottlenecks in electricity access and availability levels. The per capita power consumption in NER is one-third of the national average. No significant generation capacity has been added between 2004 and 2011 as a result of which inadequate power supply remains a critical constraint to sustainable growth and speeding up of private investment and economic competitiveness in the NER.

The road-map for development of power sector specifying the need for strengthening of overall Transmission, Sub-transmission and Distribution system of NER and Sikkim was brought out in the "Pasighat proclamation on power" released during the first Sectoral Summit of North Eastern Council at Pasighat in Arunachal Pradesh in January 2007.

Pursuant to recommendations of Pasighat summit, a Sub-Group was constituted under the Chairmanship of Member (Power System), Central Electricity Authority (CEA) on Transmission, Sub-transmission and Distribution related issues in North Eastern Region. Accordingly, a comprehensive scheme for strengthening of transmission, sub-transmission and distribution system was evolved by CEA in consultation with POWERGRID and States of North Eastern Region and Sikkim.

Under the subject project, implementation of the scheme in 6 states of NER viz. Assam, Meghalaya, Tripura, Mizoram, Manipur and Nagaland was envisaged through funding from World Bank / Govt. of India. Further, implementation in Sikkim & Arunachal Pradesh was envisaged under a separate project funded by Govt. of India.

Accordingly, sanction for "*Comprehensive Scheme for strengthening of Transmission & Distribution in Arunachal Pradesh and Sikkim*" was accorded by Government of India vide Office Memorandum dated 10th October 2014 at an estimated cost of Rs. 4754.42 crore (Apr, 2013 Price level) with the completion schedule of 48 months from the date of release of first installment (post-investment approval). The total sanctioned cost of the scheme Rs. 4754.42 crore comprises of Project Cost of Rs. 4208.96 Crore and consultancy fee of Rs.545.46 Crore calculated @ 12 % of the estimated executed cost as per following breakup:

1. For Arunachal Pradesh: Rs. 3199.45 crore including consultancy fee of Rs. 373.64 crore.
2. For Sikkim: Rs. 1554.97 crore including consultancy fee of Rs. 171.82 crore.

The entire cost of the project will be borne by the Government of India through the Plan Scheme of Ministry of Power.

For execution of the Comprehensive Scheme in Arunachal Pradesh, Ministry of Power (MoP), Govt. of India has appointed POWERGRID as Implementing Agency (IA) on behalf of the Department of Power, AP. In this regard, a Memorandum of Understanding (MoU) has been signed between Power Grid Corporation of India Ltd. (POWERGRID) and DoP, AP, wherein POWERGRID will execute the projects and hand over the assets to DoP, upon progressive commissioning for taking care of operation and maintenance of the assets.

1.1 JUSTIFICATION & BENEFIT OF THE PROJECT:-

In order to visualize the infrastructure requirements of the state, it would be appropriate to know about the geo-climatic peculiarity of the state of Arunachal Pradesh. Being thinnest in its population density of 13 persons per square KM, the area is covered with dense forest and hilly terrain. About 90% of area of Arunachal Pradesh is mountainous being criss- crossed by rivers & river systems making the logistic of the state so difficult that providing infrastructure of this state is the single most challenge to the state. The villages, towns and human concentration of the area are scattered over 84000 square KM making the distance between the villages and the towns longest in the country. The yardstick followed elsewhere in the country, therefore, does not fit into the state of Arunachal Pradesh, because of these peculiarities.

After conceiving the idea of strengthening the Transmission and Sub-Transmission systems in the region in the Pasighat Proclamation in 2007, new developments have taken place. Under RGGVY scheme, extensive and intensive electrification has been carried out electrifying about 1800 virgin villages extending the distribution systems to every nook and corner of the state. Moreover, some sub-transmissions projects also were taken up by the state in the last 5 — 6 years. Therefore, implementation of this project will create a reliable state power grid and improve its connectivity to the upcoming load centers, and thus extend the benefits of the grid connected power to all the consumers. The project would also provide the required grid connectivity to such villages and towns of the States, where development of distribution system at the downstream level has been taking place under Govt. of India sponsored RGGVY/APDRP/R-APDRP schemes. This project is a major step towards meeting the national objective of affordable 24X7 "Power to All" through enhancement in access of consumers to grid connected power supply through improving its availability and reliability, thereby facilitating inclusive growth. This shall also increase the per capita power consumption of these States, which is lagging behind the average national consumption and shall contribute to the economic development of the North-Eastern Region.

The project will give impetus to the inclusive growth by enhancing the consumers' access to reliable and affordable grid connected power supply. It will lead to reduction in operation of Diesel Generating Plants in Arunachal Pradesh thus bringing socio-economic and

environmental benefits to the people of Arunachal Pradesh. The project will also facilitate in development of small scale/cottage industries/tourism in the region and boost economic growth by enabling supply of quality power.

Further, this project will give impetus to integration of upcoming Hydro Power Generating Plants in Arunachal Pradesh with the National Grid and will facilitate lying of optical fiber (33 kV) to help extending communication facility to the small towns/villages. It shall boost local economy of the entire state with infusion of about Rs. 6501 crore and also by creating opportunities for long-term support of the new infrastructure.

1.2 DETAILS OF THE PROPOSED TRANSMISSION SUB-PROJECT:-

The proposed 132 kV S/C (on D/C tower) Rilo (Pakke Kesang) to Seijosa Transmission line is a sub-project conceived under the banner of "Comprehensive Scheme for Strengthening of Transmission & Distribution System in Arunachal Pradesh" located in East Kameng district of the State. *A route map showing the proposed transmission Line in SOI Topo sheet is enclosed as Annexure-I*

The proposed transmission line will connect two (2) Sub-stations namely 132 kV Pakke Kesang *(U/construction*) and 132 kV Seijosa *(yet to construct).* The Seijosa area, bordering Assam is a commercially important area and therefore load demand may increase in near future. Presently Seijosa is fed through 11 kV feeder line from 33 kV S/s at Jamuguri (Assam) and all adjoining villages are being connected by 11 kV feeder line under RGGVY. Therefore upon construction of the proposed line, major power flow will be from 132 kV Pakke Kessang S/s instead of Assam. Moreover, from the proposed 132 kV Seojosa S/s, separate 33 kV express line for Dissing Passo Circle, Tarasso and Balijan area are proposed to be drawn in future. Tea processing unit, Rubber processing unit & Paper Mill Industries are presently under construction and therefore the proposed transmission sub-project will cater the power demand in Seijosa area in near future.

1.3 PRESENT STUDY:-

The present Biodiversity Impact Assessment and Wildlife Management Plan forms an integral part of wildlife clearance proposal in case the project involves use of more than 50 ha area in NP/WS. However, in the instant case of diversion of 63.13 ha of forest land by POWERGRID on behalf of DOP, Arunachal Pradesh, the project area falls in the buffer zone of Pakke Tiger Reserve involving only reserved forest (Papum Reserve Forest) land since both the connecting 132 kV Sub-stations are located on either side of the buffer zone. The avoidance of the buffer

zone is entirely not possible due to the physical & complex terrain of the area However, the proposed project area (i.e. Transmissin Line) is approximately 4 km away from the core area of Pakke Tiger Reserve and involves Papum Tiger Reserve and comes under Khellong Forest Division.

Since, development projects in Tiger reserve area attract provisions of Wildlife Conservation Act, 1972 and require prior wildlife clearance, therefore, it is mooted to apply for wildlife clearance for the proposed 132 kV Riloh-Seijosa Transmission Line as per the provision of the Act.

SECTION–II: DETAILS OF PROTECTED AREA

2.0 PAKKE TIGER RESERVE AND BUFFER ZONE

Pakke Tiger Reserve is located in the East Kameng district of Arunachal Pradesh. It is surrounded by the Tenga Reserve Forest to the North, Doimara Reserve Forest on the West, Nameri National Park and Tiger Reserve (Assam) on the South and some agricultural land as well as Papum Reserve Forest on the East. The landscape has high species diversity and endemicity as it forms the transition zone between the Indian and Malayan eco-regions. The two important parts of the North-East Indian tiger landscape are the Brahmaputra flood plains and the North-East Indian hills. Pakke and Nameri Tiger Reserves are situated North of the river Brahmaputra in the transition zone between the Assam plains and the hilly forests of Arunachal Pradesh. Together, they form one of the largest blocks of semi-evergreen and evergreen forests in the North-East. They are extremely important in maintaining contiguity within the North-East Indian forests and are centrally located within the Western Assam and Arunachal forests. On the west, they are connected with Sonai-Rupai Wildlife Sanctuary through Sessa Orchid Wildlife Sanctuary and Eagle nest Wildlife sanctuary, on the South with Kaziranga Tiger Reserve and Karbi-Anglong hills, and towards the North, they are contiguous with Tale valley and Lower Subansiri forests, which are contiguous with East – Siang and further into Namdapha Tiger Reserve in Changlang district in eastern Arunachal Pradesh. The details of Pakke Tiger Reserve is as below:

Date of notification as Pakke Tiger Reserve : 23rd April 2002

Date of notification of buffer zone : 06th Aug, 2012.

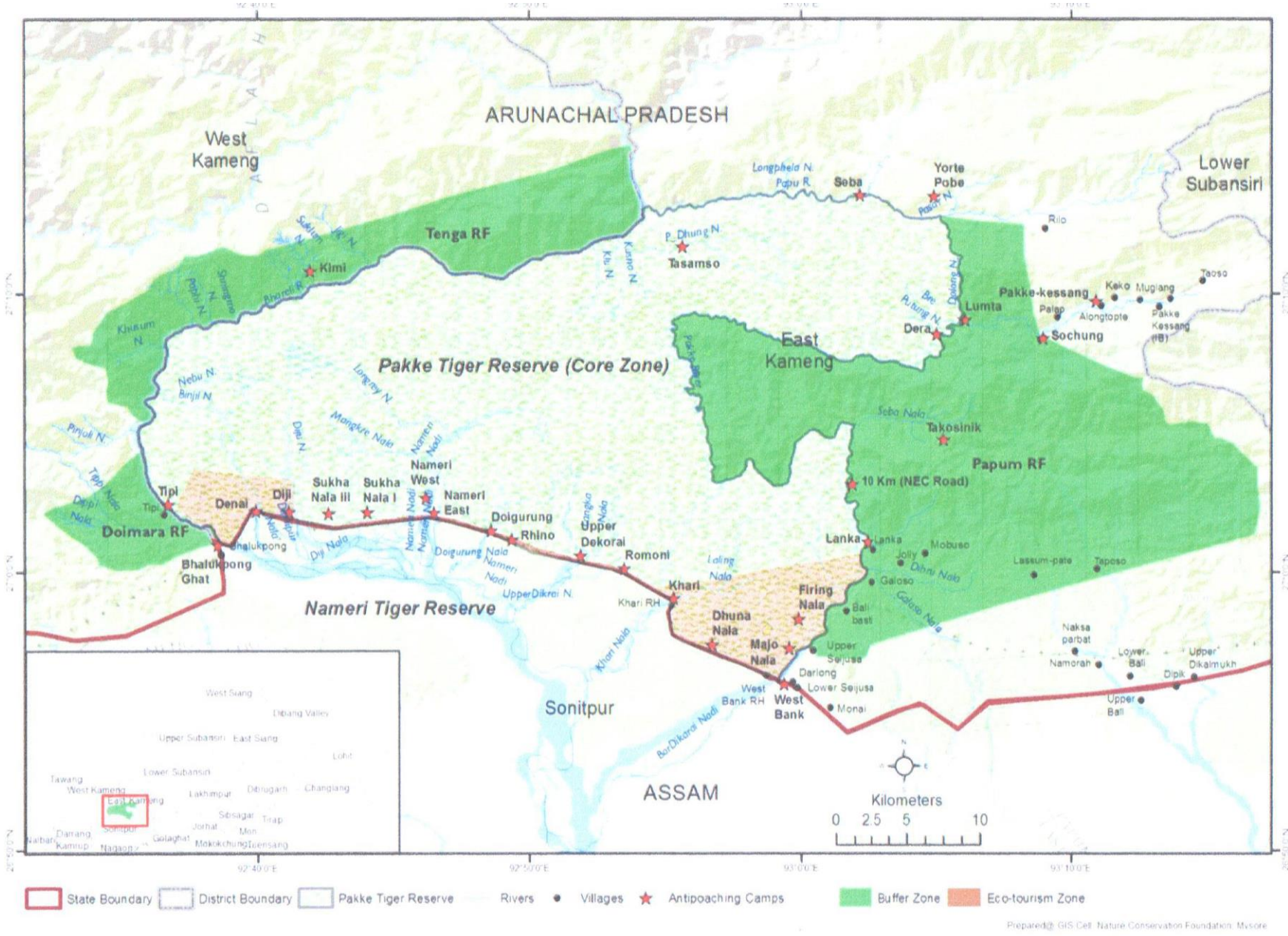
Area of the tiger reserve

Core/critical tiger habitat	: 861.95 Sq. Km
Buffer/Peripheral area	: 515.00 Sq. Km.
Total	: 1276.95 Sq. Km

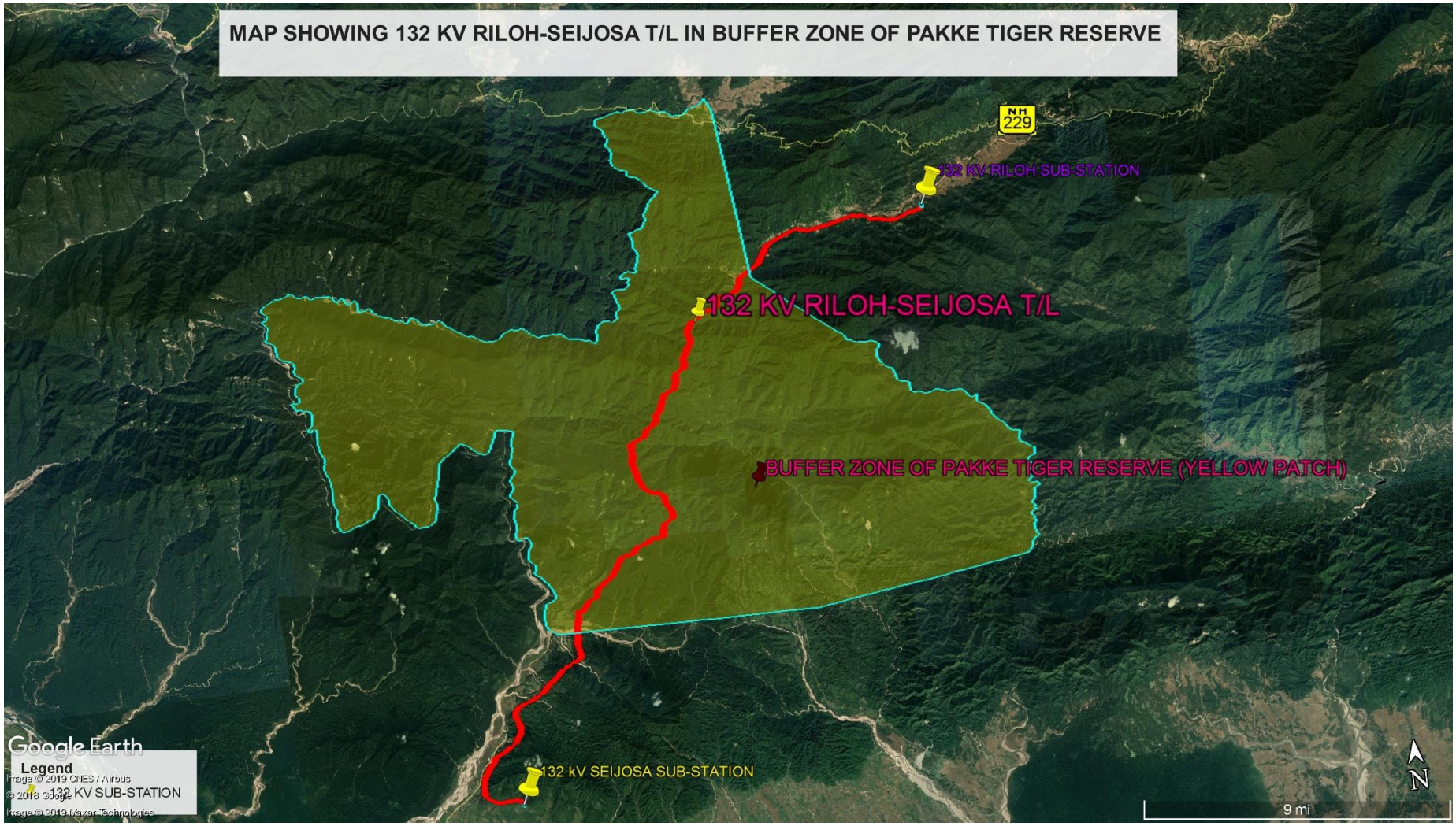
Location

Latitudes	: 27^0 01′ 05′′ N to 27^0 11′ 05′′ N
Longitudes	: 92^0 39′ 05′′ E to 92^0 44′ 20′′ E 2

A map showing the area of Pakke Tiger Reserve is placed below. Map showing the proposed 132 kV Riloh-Seijosa Transmission line passing through the buffer zone of Pakke Tiger Reserve is also enclosed as Annexure-II



Map of Pakke Tiger Reserve showing core zone and buffer zones


MAP SHOWING 132 KV RILOH-SEIJOSA T/L IN BUFFER ZONE OF PAKKE TIGER RESERVE
NH 229
132 KV RILOH SUB-STATION
132 KV RILOH-SEIJOSA T/L
BUFFER ZONE OF PAKKE TIGER RESERVE (YELLOW PATCH)
132 kV SEIJOSA SUB-STATION
Google Earth
Legend
132 KV SUB-STATION
Image © 2019 CNES / Airbus
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2.1 MAJOR HABITAT, FLORA AND FAUNA:-

Flora:

The main vegetation type of the entire tract is Assam Valley tropical semi-evergreen forest. At places, evergreen and semi-evergreen vegetation types merge. The forests are multi-storied and rich in epiphytic flora and woody lianas. The vegetation is dense, with a high diversity and density of woody lianas and climbers. The forest has a typical layered structure and the major emergent species are *Tetrameles nudiflora, Ailanthus grandis* and *Altingia excelsa*. The forest types include tropical semi-evergreen forests along the lower plains and foothills dominated by *Polyalthia simiarum, Pterospermum acerifolium, Sterculia alata, Stereospermum chelonioides*, *Ailanthus grandis* and *Duabanga grandiflor*. The tropical semi-evergreen forests are scattered along the lower plains and foothills, dominated by *Altingia excelsa*, *Mesua ferrea*, *Dysoxylum binectariferum*, *Beilschmiedia* sp. and other middle story trees belonging to the Lauraceae and Myrtaceae. Sub-tropical broad leaved forests of the Fagaceae and Lauraceae dominate the hilltops and higher reaches. Hill slopes here are dominated by *Mesua ferrea* and *Castanopsis* spp. Moist areas near streams have a profuse growth of bamboo, cane and palms. About eight species of bamboo occur in the area. Seven commercially important cane species grow in moist areas, along with *Livistona jenkinsiana*. Along the larger perennial streams, there are shingle beds with patches of tall grassland, which give way to lowland moist forests with *Dillenia indica* and *Talauma hodgsonii*. Along the larger rivers, isolated trees of *Bombax ceiba* and two species of *Albizzia* are common.

Fauna

The faunal diversity is immense and around 59 mammal species have been recorded so far out of which 16 threatened species (6 endangered and 10 vulnerable). Tiger and Elephant are the charismatic mammals, besides a large array of co-predators like Leopard, Clouded leopard, Wild dog, Himalayan Black bear and many more small carnivores, ungulates like Gaur, Sambar, barking deer, wild boar and other species. 296 birds species have been documented, 31 species of amphibians and 30 species of fishes have been recorded. Three large cats - the Bengal tiger, Indian leopard and clouded leopard share space with two canids – the wild dog and Asiatic jackal. Among the herbivore species, elephant, barking deer, gaur, and sambarare most commonly encountered. The commonest monkeys are the Rhesus macaque, Assamese macaque and the capped langur. In addition, PTR is home to as many as sixteen species of viverrids, weasels and mongooses. Commonly seen in pairs is the yellow-throated marten.

Notable mammals in the Tiger Reserve are: tiger, leopard, clouded leopard, jungle cat, wild dog, jackal, Himalayan black bear, binturong, elephant, gaur, sambar, hog deer, barking deer, wild boar, yellow-throated marten, Malayan giant squirrel, flying squirrel, squirrel, capped langur, rhesus macaque, Assamese macaque, gaur. The presence of stamp tailed macaques has been reported by one researcher.

Pakke Wildlife Sanctuary (i.e. the core area of Pakke Tiger reserve) is also recognized as one of the Important Bird areas (IBA) in India. At least 296 bird species have been recorded from Pakke Tiger Reserve including the globally endangered white-winged wood duck, the unique Ibisbill, and the rare Oriental bay owl. PTR is a good place to see hornbills. Roost sites of wreathed hornbills and great hornbill can be observed on the river banks. Birds seen in Pakke Tiger Reserve include: Jerdon's baza, pied falconet, white-cheeked hill-partridge, grey peacock-pheasant, elwe's crake, ibisbill, Asian emerald cuckoo, red-headed trogon, green pigeon spp., forest eagle owl, wreathed hornbill, great hornbill, collared broadbill and long-tailed broadbill, blue-naped pitta, lesser shortwing, white-browed shortwing, Daurian redstart, Leschenault's forktail, lesser necklaced laughing-thrush, silver-eared leiothrix, white-bellied yuhina, yellow-bellied flycatcher warbler, sultan tit, ruby-cheeked sunbird, maroon oriole, and crow-billed drongo.[9]

Of the over 1500 butterfly species found in India, it is estimated that Pakke Tiger Reserve could be home to at least 500 species.

A total of 36 reptile species and 30 amphibian species have been reported in Pakke Tiger Reserve. The Assam roofed turtle, a highly endangered species, is commonly sighted. The king cobra is sometimes seen on the fringes of villages and is not uncommon within the park. The pied warty frog, resembling bird droppings, is also found here.

Tiger Status

A report on the status of tigers, co-predators and prey in India done in 2010 by the Wildlife Institute of India shows that there are 9 tigers shared by Pakke and Nameri.

Core area

In the core area, wildlife protection and management are given priority. The Forest Department provides livelihood alternatives and eco-development activities in the buffer in order to wean people away from depending on resources in the core.

Buffer area

The buffer area has been classified into two (2) zones:

1. Eco Development Zone which consists of human settlement areas, agriculture land, horticulture, fisheries and jhum land. The eco-development activities are implemented through participatory village level micro plans for reducing resource dependency of people living around the park. The local community ensures reciprocal commitment through respective eco-development committee. Rural development activities shall be integrated with wildlife conservation concerns.

2. The Forested zone consists of the Reserve Forests (part of Papum RF & Tenga RF) and other unclassified state forests away from the human settlement. This zone is protected with the participation of local people. Collection of timber and NTFP are regulated. Human-wildlife conflict is mitigated by ensuring timely payment of ex-gratia for loss of life, livestock and crop depredation.

Corridor

The Seijosa nala and Dibru nala corridors in the Eastern part of Pakke Tiger Reserve connecting with Papum RF have been partially disturbed due to human settlement and agriculture land development. There is serious human-animal conflict due to crop depredation and damage of dwelling houses over the area. This corridor can be restored by voluntary relocation of the 2 villages (Langka and Jolly) and providing them with alternate suitable land. The Tipi and Elephant Flat corridors in the Western part of PTR connecting Doimara RF, Eagle Nest Wildlife Sanctuary and Sessa Orchid Sanctuary has been almost lost due to human settlements and the construction of 24 km Pinjuli-Kimi road by NEEPCO Ltd. which is beyond restoration. The proposed additional buffer at Doimara RF seeks to maintain the Dezeling corridor. In case of the corridors mentioned above, if the resident community is not agreeable to voluntary relocation, the agricultural practices and sale of agricultural land resulting in a change of land use patterns will be monitored so that the corridor values are not affected.

2.2 MAJOR ACTIVITIES INVOLVED IN THE TRANSMISSION PROJECT:-

The major construction activity envisages in the proposed transmission project are as follows:-

- Construction of Tower Foundation (An average of 7 M x 7 M tower base and activities involves excavation of soil and concreting)
- Erection of transmission towers (involves joining of tower members/lattice structure)
- Stringing of electrical conductor wires between adjacent towers.

The above activities will be carried out by engaging suitable Contractor. For tower foundation works, local gangs/manpower are usually engaged as petty Contractor and temporary makeshift camps are set nearby the construction site till completion of work. For hill areas construction of new approach road generally not encouraged & the existing village tract or jungle tract are used for head loading of tower materials. Tower erection and stringing of conductor is generally carried out by specialized gangs and temporary construction camps are also required to be set up for this purpose.

TOWER FOUNDATION:

Foundation of a transmission tower is the basic structure to support the tower in its position. It plays an important role in safety and satisfactory performance of the structure as it transmits mechanical loads of the electrical transmission system to earth. The foundations in various types of soils have to be designed to suit the soil conditions of particular type. In addition to foundations of normal towers, there are situations where considering techno-economical aspect for special towers required or river crossing which may be located either on the bank of the river or in the mind stream or both, pile foundation may be provided. The various activities involved in the foundation work are illustrated below:-

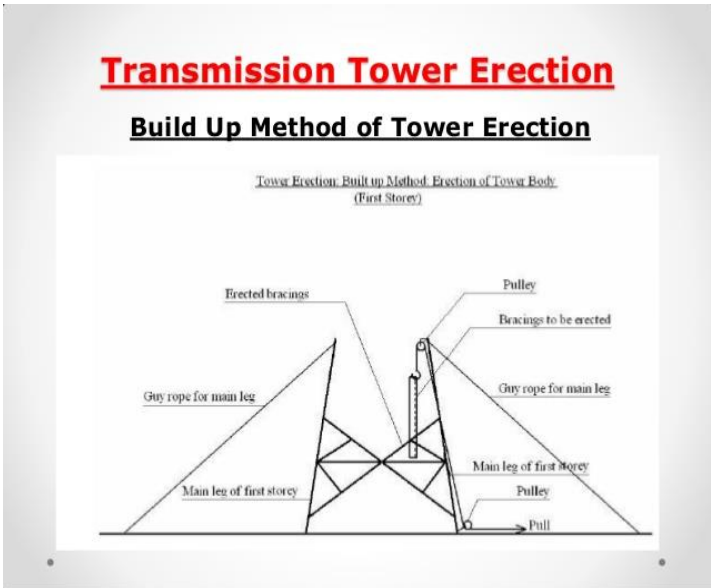
TOWER ERECTION:

There are four main methods of erection of steel transmission towers which are as below:

- Build-up method or Piecemeal method
- Section method
- Ground assembly method.
- Helicopter method.

Build Up Method of Tower Erection

- This method is most commonly used in India for the erection of 66 kV, 220 kV and 400 kV transmission line towers. This method consists of erecting the towers, member by member. The tower members are kept ground serially according to erection sequence to avoid search or time loss.
- The erection progresses from the bottom upwards. The four main corner leg members of the first section of the tower are first erected and bolted with the stub.



TOWER STRINGING**:**

- Stringing of Transmission line a process of joining and fixing of the electrical conductor wires from tower to tower and various other assemblies for transmission of electricity.

- Stringing overhead conductors in transmission is a very specialized type of construction requiring years of experience as well as equipment and tools that have been designed, tried and proven to do the work.

Steps of stringing

- Proper guying
- Insulator Hoisting
- Paying out of pilot wire & conductor
- Rough sagging of conductor
- Clipping & spacering
- Finishing activities
- Jumpering
- Final checking

2.3 LIKELY IMPACT OF THE PROJECT ON BUFFER ZONE OF PAKKE TIGER RESERVE:-

The impact on the forest and wildlife associated with power transmission project with specific reference to the proposed 132 kV Transmission Line from Riloh to Seijosa on the buffer zone of Pakke Tiger reserve is summarized as below:

- HABITAT LOSS AND FRAGMENTATION:-
  Powerlines or specially powerline corridors, are known to affect many different animal groups, predominantly birds. These impacts are largely associated with fragmentation & degradation of wildlife habitats along the powerline corridor i.e. Right of Way. In case of 132 kV Riloh-Seijosa Transmission line the RoW is considered as 27 meter, wherein the standing trees are required to be either felled, looped/pruned as necessary for casting of tower foundation, tower erection & electrical conductor stringing. The large scale felling of trees along the line corridor might impact the nesting sites of birds as well as habitat and movement of other arboreal species like monkeys, primates etc. available in that areas.

- ELECTROCUTION & ACCIDENTAL COLLISSION OF BIRDS.

  Electrocution of birds and their collision with powerlines, is not only a topic of conservation concern but also an issue of serious economic and financial costs. Powerlines cause large scale mortality of birds around the world due to electrocution and collision. Powerlines located close to Important Bird areas (especially water bodies having large congregation of birds, or carcass or garbage dumps) or bisecting critical flight paths pose a significant risk of electrocution or collision in birds. Transmission lines (typically >66 kV) are placed on tall metal lattice towers holding multiple conductor wires on cross arms. The phase to phase and phase to ground separation in transmission lines is usually sufficient to prevent electrocution of birds. However, electrocution of birds can occur when a bird, perched on a live wire, power pole or on a metal cross arm comes in contact with another live or earth wire, power pole or cross arm. Apart from structural aspects of the powerlines, biological characteristics of birds including body size, age class and behaviors affect electrocution risk. Birds with large wing spans that show preference for using power lines during hunting or for perching and roosting, particularly raptors are known to be more susceptible to electrocution. Raptors and strokes are to be most at risk of electrocution since they use power poles extensively as nesting platforms. With regard to the aspect of bird collision with powerlines, it is found that birds frequently collide with the earth wires installed at the top of transmission lines, as it is less visible and smaller in diameter. *A recent survey of 675 power poles in western Rajasthan recorded 162 birds which had been electrocuted, including five species of raptors. In the past ten years, six great indian bustards died as a consequence of collision or electrocution by powerlines.*

  Since Pakke Wildlife Sanctuary (i.e. the core area of Pakke Tiger Reserve) is recognized as one of the Important Bird areas (IBA) in India, a having a significant population of birds including the globally endangered white-winged wood duck, the unique Ibisbill, and the rare oriental bay owl, hornbills (wreathed hornbills and great hornbill) therefore, accidental electrocution and collision of birds *(specially the large winged species)* cannot be completely denied in case of the proposed 132 kV Riloh-Seijosa Transmission line which is passing through the buffer zone of the Pakke Tiger Reserve.

- ELECTROCUTION OF MAMMALS LIKE ELEPHANTS/MONKEYS ETC.
  Electrocution from powerlines is not only limited to birds, but other animal species like elephants, bats, monkeys, primates and other arboreal species are also vulnerable to electrocution. The Pakke Tiger reserve area is a suitable habitat of Indian wild elephants and other monkey species also and accidental electrocution of these species cannot be completely ruled out from the proposed power transmission line.

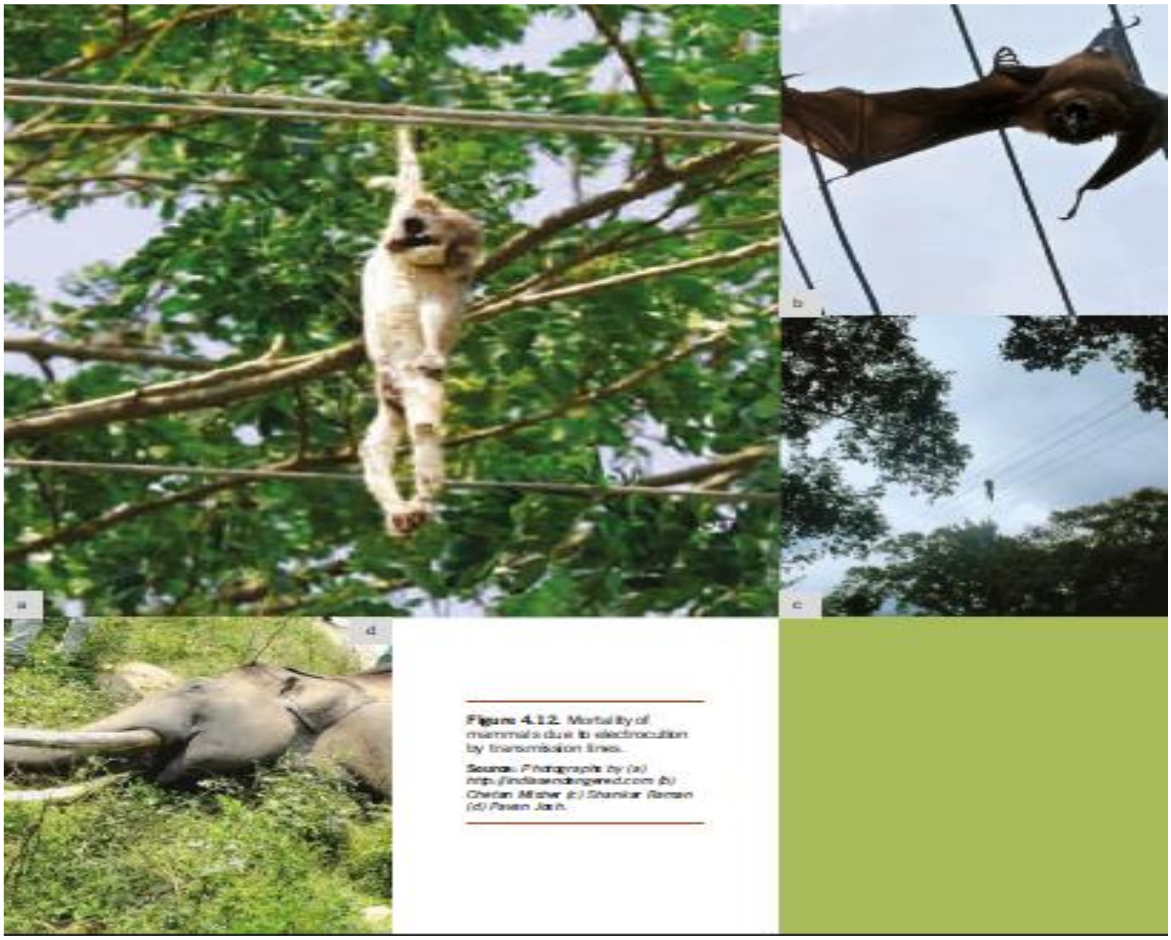


Figure 4.12. Mortality of mammals due to electrocution by transmission lines.

Source: *Photographs by (a) http://indiaendangered.com (b) Cheran Mother (c) Shankar Raman (d) Pawan Joshi.*

- ACCIDENTAL FALLINGS OF ANIMALS IN EXCAVATED PITS FOR TOWER FOUNDATION. The average pit dimension of 132 kV Tower is (3 m x 3 m x 3 m), which are required to be excavated for placing the tower foundation. For each 132 kV tower foundation, four (4) nos of such pits are required to be excavated and a total of .....no of towers are required to be erected in the buffer zone of Pakke Tiger Reserve. If such excavated pits are left unattended or left without backfilling, the accidental falling of wild animals like baby elephants and other species cannot be ruled out during the project construction period.

- INDUCED IMPACT ON WILDLIFE FROM CONSTRUCTION WORKERS.
  Construction manpower will be required for execution of the project and makeshift construction camps and will be set up at the tower foundation/erection sites as per site requirement. Generally for tower foundation works, local manpower/workers will be engaged. However, for specialized works like tower erection and stringing, migrant lablours are usually engaged. The induced impact on the wildlife of Pakke Tiger Reserve from such construction workers is the likelihood of involvement in hunting/trafficking of wild animals and other unlawful activity during the execution of the project.

SECTION–III: PROPOSED MITIGATION MEASURES

3.0 SAFEGUARD OF ELEPHANTS FROM ELECTROCUTION:-

As per the report of DFO, Pakke WLS & Tiger Reserve, it is intimated that section of the transmission line from AP-80 (Sibang) to AP-170 (up to 132 kV Seijosa S/s) is the prime habitat of Indian wild elephant and require special protection for which the following mitigation measures are proposed to be adopted by POWERGRID during execution of the project.

- As per Indian Electricity rule, the minimum ground clearance for 132 kV Transmission line is 6.1 meter i.e. the lower most electrical conductor wire between two adjacent towers will be stringed in such a way that the minimum height from actual ground level is always more than 6.1 meter which is sufficient for accidental touching of elephant trunk *(considering the average height of Indian wild elephant up to trunk is maximum 5 meter).* In addition to the above, it is proposed to maintain additional clearance 6 meter over and above minimum clearance (as stipulated under central electricity authority (measure relating to safety & electricity supply) regulations, 2010) above ground from the lowest conductor of transmission line as stipulated vide MoEF Letter dtd. 19th Nov, 2014 *(copy enclosed).*

- The towers falling within the elephant movement zone as above will be fenced/protected with barbed wire to dissuade wild elephant from coming in contact with the towers. *A figure showing the arrangement for protection/movement of elephants is shown in Annexure-I.*

3.1 SAFEGUARD OF BIRDS FROM ELECTROCUTION AND ACCIDENTAL COLLISSION:-

Since Pakke Wildlife Sanctuary (i.e. the core area of Pakke Tiger Reserve) is recognized as one of the Important Bird areas (IBA) in India, a having a significant population of birds including the globally endangered white-winged wood duck, the unique Lbisbill, and the rare oriental bay owl, hornbills (wreathed hornbills and great hornbill). Also As per the report of DFO, the area from AP-20 to AP-176, the prime habitat of Hornbil. Therefore, the following mitigation measures are proposed for safeguard of birds:-

- The Stringing of conductor for the transmission line shall be carried out maintaining a separation between energized conductors as follows:

  Vertical distance between two conductors : 4 m (appx.)
  Horizontal distance between two conductors : 9 m (appx.)

The above arrangement, will nullify the likelihood of electrocution of large winged birds like hornbill, because the distance between energized conductors will be always more than the maximum wing span of the bird. *A figure showing the above arrangement is shown in Annexure-II*

- To prevent accidental collision of birds with the conductor bird diverter/colored/contrast marker devices will be installed on the earth wire to make it visible to birds from long distance as shown in the photographs as below.

- Bird Guard will be provided on towers as per requirement to prevent birds from sitting in the insulator strings which may result in puncture of insulator due to defecation by birds.

6. Line markers should be as large as possible. The spacing between them should not be more than 5 to 10 m. Marker devices should be chosen to contrast as much as possible with the background colours (Figure 12.8), and, importantly, should be visible at night: most bird collisions are said to occur at night.

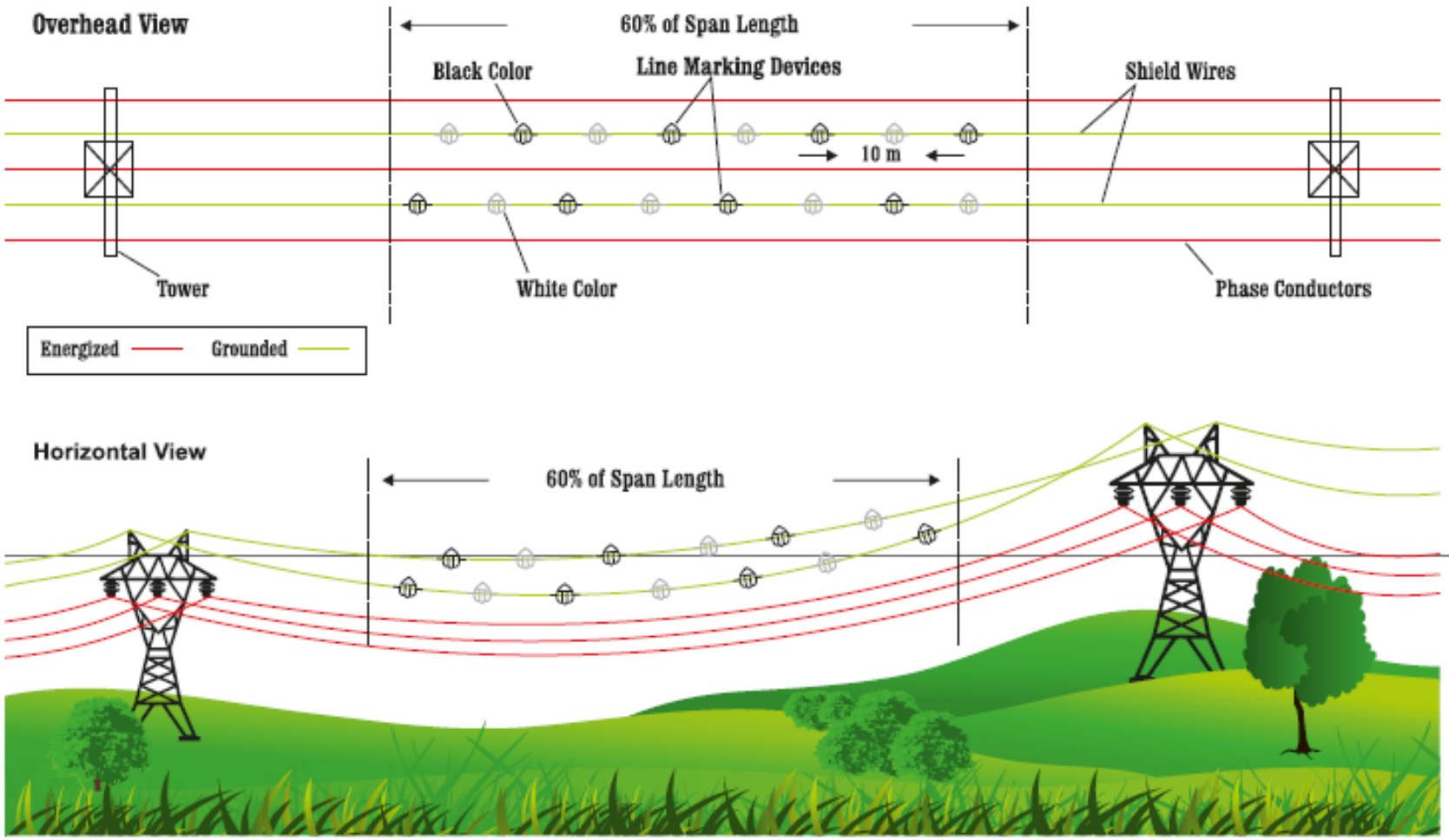


Figure 12.8. Design and configuration of markers to reduce bird collisions (after Eskom Transmission [South Africa] 2009).
Source: *APLIC 2012.*

3.3 GENERAL MITIGATION MEASURES FOR PROTECTION OF FOREST AND WILDLIFE :-

In addition to the above specific measures for elephants and birds, the following mitigation measures will be adopted by POWERGRID during execution of the project for protection of forest and wildlife of Pakke tiger reserve.

- Before start of work in the Pakke Tiger reserve (Buffer zone) awareness campaign will be taken up by POWERGRID in association with Forest Deptt to create maximum awareness among the construction workers regarding safeguard of forest and wildlife.

- No work shall be allowed at nights (i.e. between sunset & sunrise) in the forest area.

- No permanent labour camps will be set up inside the forest area.

- Tree felling will be minimized along the line corridor and only those trees which are unavoidable for tower foundation & erection will be felled under the supervision of Forest department. The guideline of MoEF dtd. 5th May, 2014 *(copy enclosed)* with regard to *"construction of transmission line in forest area"* will be strictly adhered to during execution of project.

- The trees on the remaining part of the transmission line corridor will be mostly looped and pruned which are required for stringing of conductor. In case of towers falling in hill top locations where enough ground clearance is available, tree will not be felled. This will minimize the impact on nesting sites of birds as well as habitat of arboreal species. *The tree felling pattern that will be adopted in forest area is shown in Figure -3*

- The specific and important tree species as identified by the Forest department will be marked separately and protected during the construction of the transmission line.

- To minimize the disturbance to wildlife, no new approach road will be constructed in the forest area. The existing village tracts/paths will be utilized for carrying of tower materials and also manual excavation of tower foundation will be done.

- Ecofriendly engineering practices in the construction works and due care be taken properly so as to avoid injury to wildlife.

- The excavated pits shall be properly barricaded and fenced so as to prevent accidental falling of mammals like baby elephants in the vicinity of the construction sites.

- Al pollution related aspects and waste management will be duly taken care during the implementation of the project.

- In addition to above, any other measures as envisaged by the State Board of Wildlife/national Board of Wildlife and as as per provisions of wildlife (Protection) Act, 1972 will be strictly adhered to during execution of the project by POWERGRID.

SECTION –IV: CONCLUSION

The proposed 132 kV S/C (on D/C tower) Rilo (Pakke Kesang) to Seijosa Transmission line is a very important sub-project which is conceived by Govt. of India under the ambitious *"Comprehensive Scheme for Strengthening of Transmission & Distribution System in Arunachal Pradesh"* located in East Kameng district of the State. This project is a major step towards meeting the national objective of affordable 24x7 "Power to All" through enhancement in access of consumers to grid connected power supply through improving its availability and reliability, thereby facilitating inclusive growth of power sector of the State.

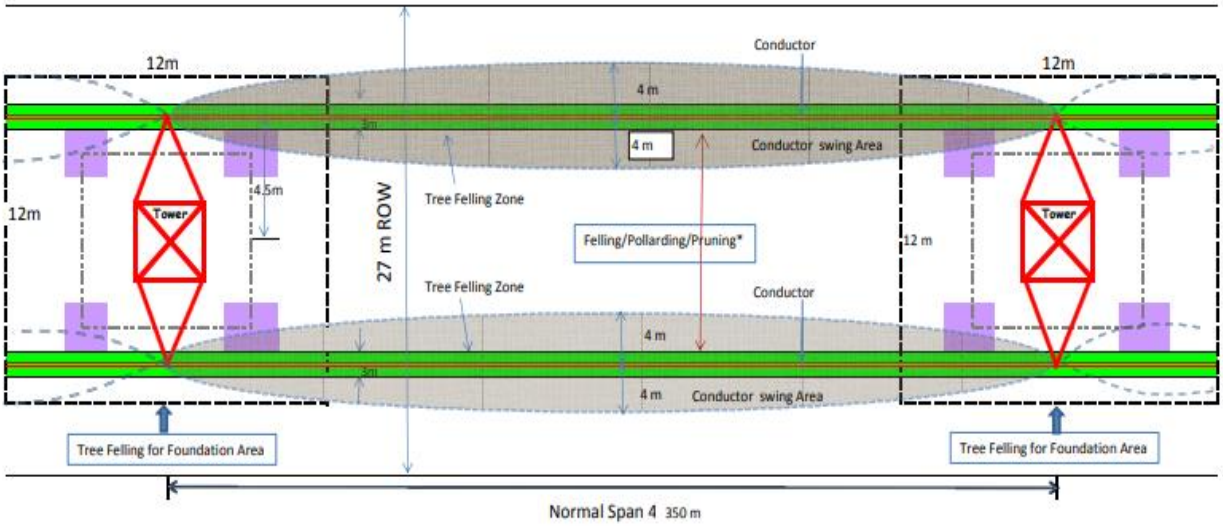
The construction of the above transmission line requires wildlife clearance since, a section of the proposed transmission line has to pass through the Buffer zone of Pakke Tiger Reserve *(i.e. part of Papum RF)* since the avoidance of the buffer zone is entirely not possible due to location of the Sub-stations and due to physical & complex terrain of the area. The EIA and environmental clearance is not required for this project since power transmission lines are kept outside the purview of EIA as per MoEF notification and considered as green project due to its pollution free nature.

Considering the importance of conservation of biodiversity and the rich wildlife habitat, flora and fauna of Pakke Tiger reserve, it is found that there will be some temporary and permanent impact from the aforesaid transmission project on the buffer zone area. However, the User Agency and POWERGRID has made a holistic approach towards protection of the buffer zone through the principle of avoidance, minimization and mitigation in their project activity and committed for implementation of various mitigation measures for elephants, birds, monkeys etc. including general measures for overall protection of the forest and wildlife in the buffer zone of Pakke Tiger Reserve.

Therefore, it is summarized that the overall impact on biodiversity on Pakke Tiger Reserve (buffer zone) due to the proposed transmission project is assessed as low which can be minimized through proper mitigation measures as per guidelines.

FIGURE-3 : TREE FELLING ARRANGEMENT IN THE PROJECT

AS PER GUIDELINE OF MOEF



TOWER SPOTTING IN BUFFER ZONE OF PAKKE TIGER RESERVE FOR SAFAGUARD OF ELEPHANT