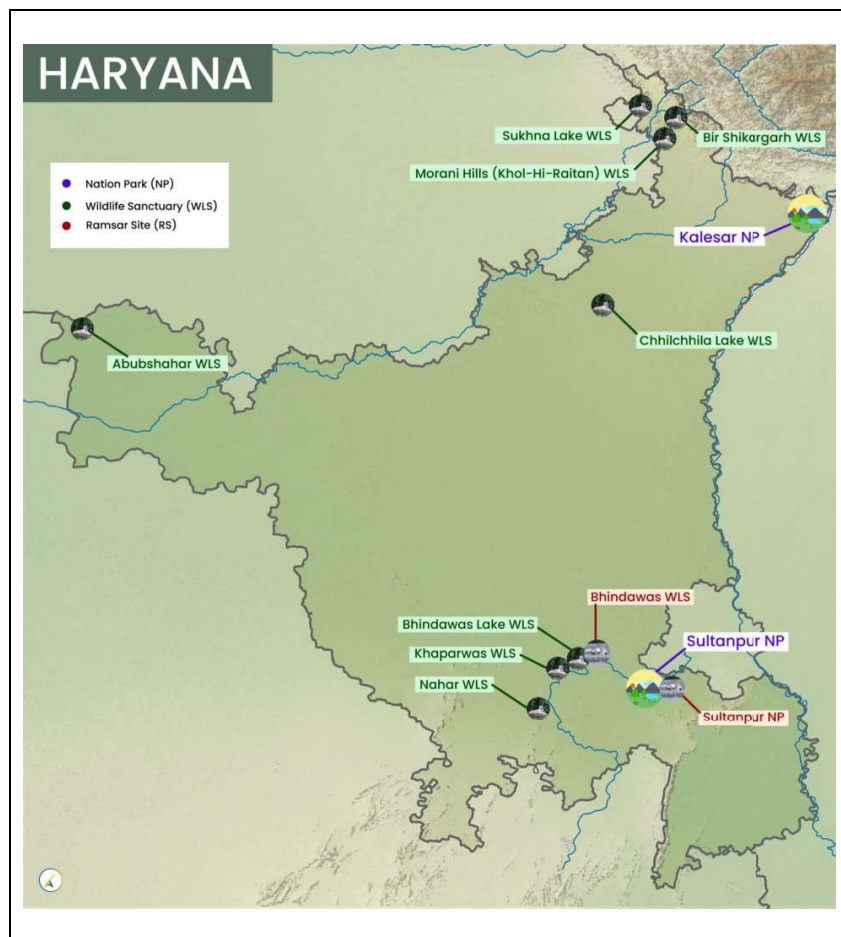


Wildlife Mitigation Plan for Diversion of 16.0591 Ha (Mahendergarh 4.8914 Ha, Rewari-2.2428 Ha & Jhajjar-8.9249 Ha) for construction of 765 kV DC Khetri-Narela Transmission Line in Haryana State passing nearby Bhindawas Wildlife Sanctuary & Khaparwas Wildlife Sanctuary (Online Proposal No. FP/HR/TRANS/416694/2023).



POWERGRID NARELA TRANSMISSION LIMITED

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1. PROJECT INTRODUCTION:

1.1 Transmission System Associated with Solar Energy Zone, Phase-II, Part-G in Rajasthan State:

The Government of India has set a target for establishing 175 GW renewable capacity by 2022, which includes 100 GW from Solar and 60 GW from Wind. This includes solar generation potential of about 20 GW in Rajasthan. Transmission system for evacuation of 8.9 GW under phase-I has already been taken up for implementation. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (11.1 GW – 3 GW through intra state) under Phase II, inter-alia includes evacuation of 1.05GW in Bhadla complex, 2.2GW in Fatehgarh complex, 1.9GW in Ramgarh and 2.95 GW in Bikaner. For integration and evacuation of power from generation projects in the above areas, a high capacity 765 kV and 400 kV transmission system interconnecting Bhadla-II, Fatehgarh-II, Sikar & Khetri along with establishment of 765/400 kV new substation at Sikar-II & Narela and 400/220 kV new substation at Bikaner-II & Ramgarh-II have been planned.

The transmission scheme involves establishment of 765/400 kV Narela S/s & implementation of Khetri – Narela 765 kV D/c Line & LILO of 765 kV S/C Meerut – Bhiwani line at Narela.

1.2 Details of the Proposed Transmission Project: -

The proposed 765 kV DC Khetri-Narela Transmission line transverse through the States of Rajasthan, Haryana & Delhi, which connects two sub-stations namely Khetri at Rajasthan State and Narela at Delhi. *A route map showing the proposed transmission Line in SOI Topo sheet is enclosed as **Annexure-I***

1.3 Requirement of Forest Clearance:

The construction of 765 kV DC Khetri-Narela Transmission line has been examined for Environmental, Social, Technical and Economical consideration and all possible efforts were made to avoid the forest area in Haryana State.

The proposed route is the shortest and the most feasible route from all aspects which has been selected among all the alternatives routes explored during detail survey. As we have no other approach for passing of transmission from the non-forest area, therefore, it is necessary for us to use minimum forest land. The total forest land proposed for 765 kV DC Khetri-Narela Transmission line in Haryana State is **16.0591 Ha**, which attracts Forest Conversion Act,

1980 and accordingly online proposal for diversion of **16.0591 Ha** Forest area has been submitted and online proposal no. FP/HR/TRANS/416694/2023 and Stage-I /In-Principal approval accorded on 31.01.2024 from O/o Regional Office, MoEF&CC, Chandigarh.

The proposed transmission line route is passing away from Bhindawas Wildlife Sanctuary & Khaparwas Wildlife Sanctuary.

1.4 Bhindawas Wildlife Sanctuary: The Bhindawas Wildlife Sanctuary is situated in the state of Haryana which is about 412 hectares, (approximate 80 km from West of Delhi) attracts a large number and variety of migratory birds, around 35,000 belonging to over 250 species in winter months and with water problem at Bharatpur National Park of Rajasthan, this sanctuary provides an alternate wintering site to the migratory water fowls; hence it's enhanced importance.

Bhindawas Wildlife Sanctuary is important and known for its Avi-fauna i.e. Oriental honey buzzard, Black kite, Red headed vulture, Shikra, Greater spotted eagle, Booted warbler, crested lark, Graylag goose, Ruddy Shelduck, Spot-billed Duck, Ferruginous Pochard, Great egret, yellow billed, Red-wattled lapwing, Painted stork, Woolly necked stork, Grey breasted Prinia, Laughing dove, Yellow-footed green pigeon, Red-necked falcon, Small pratincole, Yellow legged gull, White wagtail, Blue throat, Pied buschat, Sind sparrow, Black Francolin, Red vented bulbul, Black winged stilt, Dunlin, Barn owl, Oriental white eye.

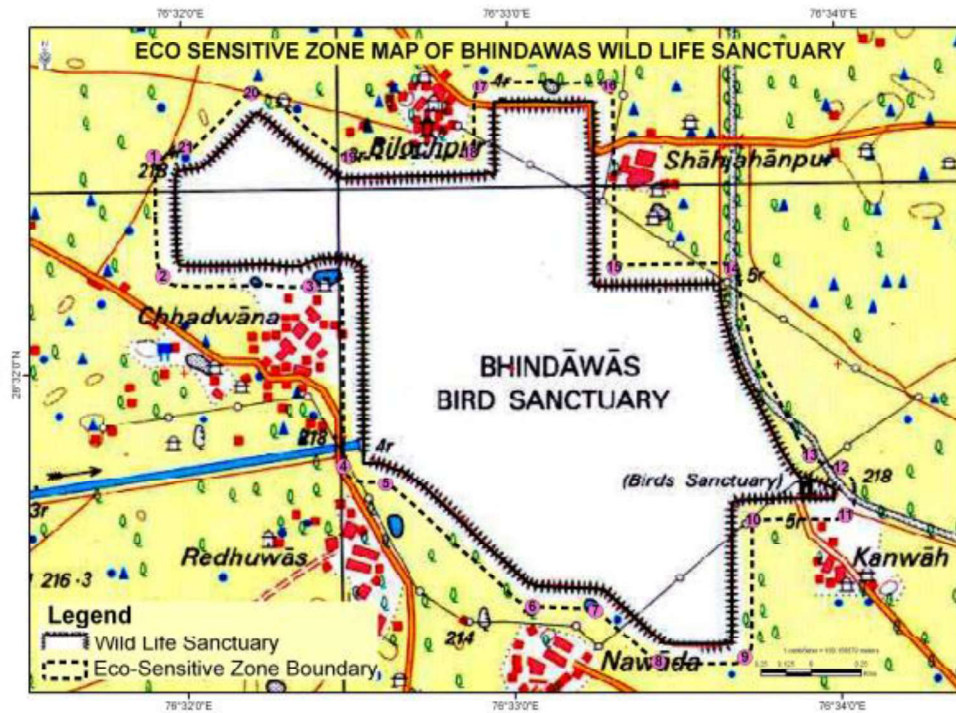
Bhindawas Wildlife Sanctuary is an important for its flora i.e. Acorus calamus, Allium cepa, Carum copticum, Nerium odorum, Reauwolfia serpentina, Amorphophallus Campanulatus, Eclipta alba, Oroxyllum indicum, Cannabis sativa, Diospyros melanoxylon, Cassia fistula, Dalbergia sissoo, Mentha spicata, Strychnos nuxvomica, Martynia annua, Ficus glomerata, Pinus roxburghii, Cymbopogon martini, Citrus medica, Aloe barbadensis, Ginger officinale, Tribulus terrestris etc.

As per the Gazette of India notification dated 28th September, 2016, Ministry of Environment, Forest and Climate Change, New Delhi has notified the Bhindawas Wildlife Sanctuary Eco-sensitive Zone from ecological and environmental point of view and to prohibit industries or class of industries and their operations and processes in the said Eco-sensitive Zone. The Extent of Eco-Sensitive Zone is up to 100 meters all around the boundary of the protected area of Bhindawas Wildlife Sanctuary comprising an area of 119 hectares approximately (copy enclosed).

Further, as per the above said notification it is to mention that the construction of transmission lines is regulated activity. The subject transmission line is passing away from Eco-Sensitive Zone of Bhindawas Wildlife Sanctuary (Annexure-II)

उपाबंध ।

भिन्दावास वन्यजीव अभयारण्य, हरियाणा के पारिस्थितिक संवेदी ज़ोन की सीमा का मानचित्र



1.5 Khaparwas Wildlife Sanctuary: The Khaparwas Wildlife Sanctuary is of about 83 hectares situated in the State of Haryana, a wetland (about 80 kilometers from West of Delhi) attracts a large number and variety of migratory birds, and at a distance of about 1.5 km from the Bhindawas Wildlife Sanctuary.

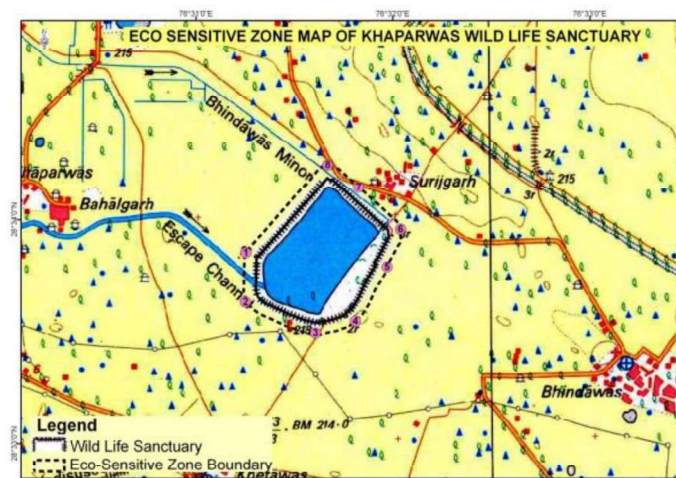
Khaparwas Wildlife Sanctuary is important and known for its Avi-fauna i.e. Oriental honey buzzard, Black kite, Red headed vulture, Shikra, Greater spotted eagle, Booted warbler, crested lark, Graylag goose, Ruddy Shelduck, Spot-billed Duck, Ferruginous Pochard, Great egret, yellow billed, Red-wattled lapwing, Painted stork, Woolly necked stork, Grey breasted Prinia, Laughing dove, Yellow-footed green pigeon, Red-necked falcon, Small pratincole, Yellow legged gull, White wagtail, Blue throat, Pied buschat, Sind sparrow, Black Francolin, Red vented bulbul, Black winged stilt, Dunlin, Barn owl, Oriental white eye

Khaparwas Wildlife Sanctuary is an important for its flora i.e. *Acorus calamus*, *Allium cepa*, *Carum copticum*, *Nerium odorum*, *Reauwolfia serpentine*, *Amarphophallus Campanulatus*, *Eclipta alba*, *Oroxylum indicum*, *Cannabis sativa*, *Diospyros melanoxylon*, *Cassia fistula*, *Dalbergia sissoo*, *Mentha spicata*, *Strychnos muxeomica*, *Martynia annua*, *Ficus glomerata*, *Pinus roxburghii*, *Cymbopogon martini*, *Citrus medica*, *Aloe barbadensis*, *Ginger officinale*, *Tribulus terrestris* etc.

As per the Gazette of India notification dated 9th January, 2017, Ministry of Environment, Forest and Climate Change, New Delhi has notified the Khaparwas Wildlife Sanctuary Eco-sensitive Zone from ecological and environmental point of view and to prohibit industries or class of industries and their operations and processes in the said Eco-sensitive Zone. The Extent of Eco-Sensitive Zone is up to 100 meters all around the boundary of the protected area of Khaparwas Wildlife Sanctuary comprising an area of 38 hectares approximately (copy enclosed).

Further, as per the above said notification it is to mention that the construction of transmission lines is regulated activity. The subject transmission line is passing away from Eco-Sensitive Zone of Khaparwas Wildlife Sanctuary (Annexure-III).

**MAP OF ECO-SENSITIVE ZONE OF KHAPARWAS WILDLIFE
SANCTUARY, HARYANA**



2. MAJOR ACTIVITIES INVOLVED IN THE CONSTRUCTION OF TRANSMISSION LINES: -

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

- Construction of Tower Foundation (An average of 25 M x 25 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. No new approach road is 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.

2.1 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:

Transmission Tower Foundation

Raft Concrete



Transmission Tower Foundation

Stub Footing concrete



Stub Concrete



Transmission Tower Foundation

Stub setting & Template Assembly



2.2 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 400 kV and 765 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.

Transmission Tower Erection

Tower Erection in progress



Transmission Tower Erection

Cross Arms Erected

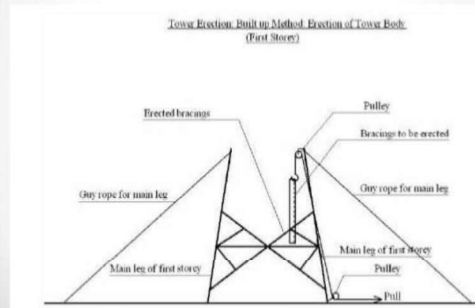


Transmission Tower Erection



Transmission Tower Erection

Build Up Method of Tower Erection



2.3 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 & splicing
- Finishing activities
- Jumpering & Final checking

Conductor Rough Sag in progress



Conductor Payout through Suspension Towers



Conductor Payout for each Phase



Conductor Stringing Completed



3. LIKELY IMPACT OF THE PROJECT ON ECO-SENSITIVE AREAS OF BHINDAWAS & KHAPARWAS WILDLIFE SANCTUARIES:

The impact on the forest and wildlife associated with power transmission project with specific reference to the proposed 765 kV DC Kheri-Narela Transmission Line in Haryana State on Eco-Sensitive Areas of Bhindawas & Khaparwas Wildlife Sanctuaries is summarized as below:

3.1 Habitat Loss and Fragmentation: -

Powerlines or specially powerline corridors, are known to minimal affect for different animal groups, including birds as no significant loss of habitat or fragmentation involving isolating or creating barriers for wildlife movement is envisaged. However, the impacts are largely associated loss of vegetation that too limited to Right of Way (RoW) only. In case of 765 kV DC Kheri-Narela Transmission Line in Haryana State, the RoW is considered as 67 meters. Moreover, the forest area involved in the line route are primarily road and canal crossing declared as protected forest and these forest stretches are not contiguous rather in small strips ranging from 3-10 meter which are constantly subjected to disturbance not conducive for any type of habitat for wildlife or bird nesting/habitat.

3.2 Electrocution & accidental collision of birds:

Bird mortality due to collision and electrocution with overhead power lines is a worldwide conservation issue. The risk of collision of birds with power transmission line are mostly reported during landing and take-off in areas close to water bodies, designated bird areas/ sanctuary having large congregation of birds or along identified bird fly or migratory paths.

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 live wire, power pole or on a metal cross arm comes on 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 behaviours affect electrocution risk. As per available data risk of electrocution of birds are mostly related to distribution/transmission lines up to 110 kV due to dimensions and spacing between two conductors, electrocution of Bird/Raptor by EHV lines of 132 kV & above is

quite rare. In the instant 765 kV line the minimum vertical and horizontal spacing between two conductor is around 15 m and 30 m respectively and hence there is possibility of electrocution of bird.

However, high voltage transmission power lines pose a collision risk to flying birds particularly the earth wires installed at the top, as it is less visible and smaller in diameter. The collision risks of birds are mostly reported during landing and take-off in area close to water bodies, designated bird areas/ sanctuary having large congregation of birds or line intersecting identified bird fly or migratory paths. Hence bird diverter, if placed on EHV line in the less visible earth wire can effectively reduce collision risk to a significant extent.

3.3 Induced impact on wildlife from construction workers:

Construction manpower will be required for execution of the project. Generally, for tower foundation works, local manpower/workers will be engaged. However, for specialized works like tower erection and stringing, migrant labourers are usually engaged. The induced impact on the wildlife from construction workers is the likelihood of involvement in hunting/trafficking of wild animals and other unlawful activity during the execution of the project.

4. PROPOSED MITIGATION MEASURES:

4.1 Safeguard of Birds from Electrocution and Accidental Collision: -

There are many bird species found in Bhindawas & Khaparwas Wildlife Sanctuaries namely, Oriental honey buzzard, Black kite, Red headed vulture, Shikra, Greater spotted eagle, Booted warbler, crested lark, Graylag goose, Ruddy Shelduck, Spot-billed Duck, Ferruginous Pochard, Great egret, yellow billed, Red-wattled lapwing, Painted stork, Woolly necked stork, Grey breasted Prinia, Laughing dove, Yellow-footed green pigeon, Red-necked falcon, Small pratincole, Yellow legged gull, White wagtail, Blue throat, Pied buschat, Sind sparrow, Black Francolin, Red vented bulbul, Black winged stilt, Dunlin, Barn owl, Oriental white eye etc. Therefore, following specific and general mitigation measures are proposed for safeguard of birds-

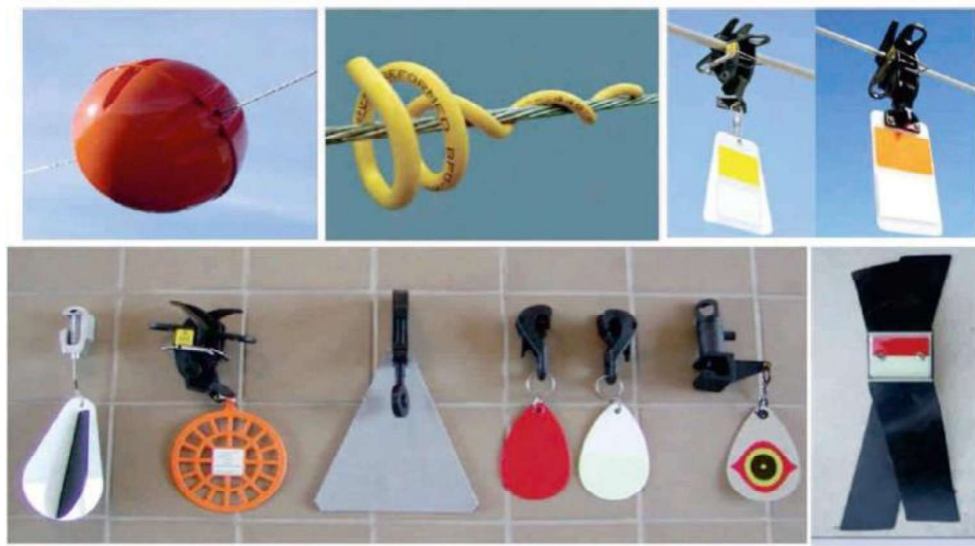
A) Specific Mitigation Measures

- I. The conductors for the transmission line shall be placed maintaining a wide separation between energized conductors as follows:

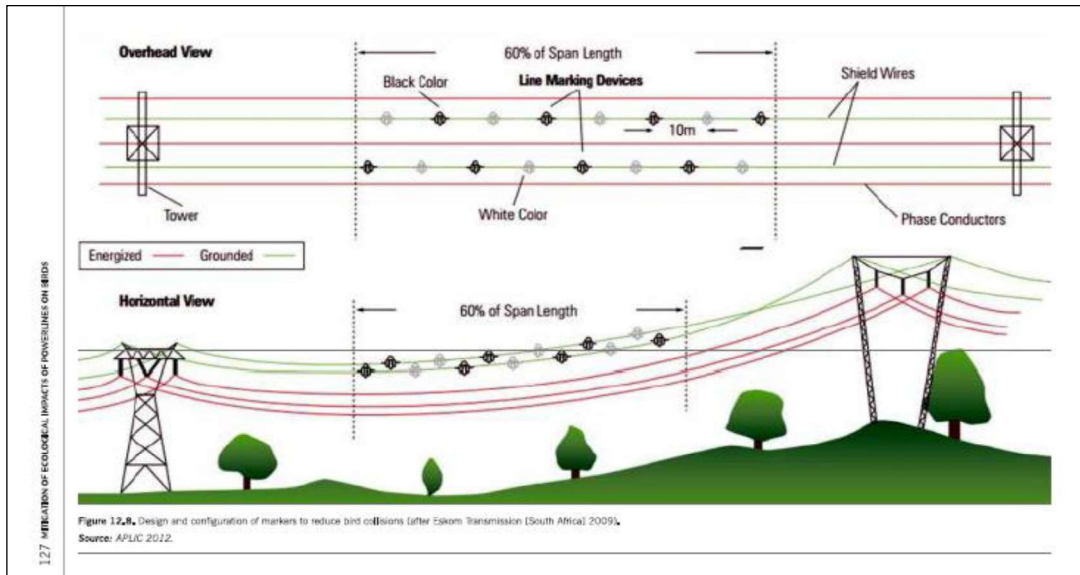
- a) Vertical distance between two conductors : **15 m (appx.)**
- b) Horizontal distance between two conductors : **30 m (appx.)**

The above arrangement will nullify the likelihood of electrocution even for large winged birds like hornbill, as the distance between energized conductors will be always more than the maximum wing span of the bird.

- II. To prevent accidental collision of birds with the conductor, bird diverter / colored / contrast marker devices shall be installed on the earth wire/OPGW to make it visible to birds from long distance which will help the flying/ migratory birds to manoeuvre safely avoiding any obstruction caused by transmission line.



However, for installation/ positioning of bird diverters on transmission line, MoEFCC guidelines “*Eco-friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife*” shall be followed. A schematic showing position of bird diverter is placed below:



- III. **Bird Guard/anti perching device** will be provided on towers to prevent birds from sitting/ nesting on towers which will not only avoid any possibility of electrocution during but also help in maintaining healthiness of insulator strings for continuous supply of power.

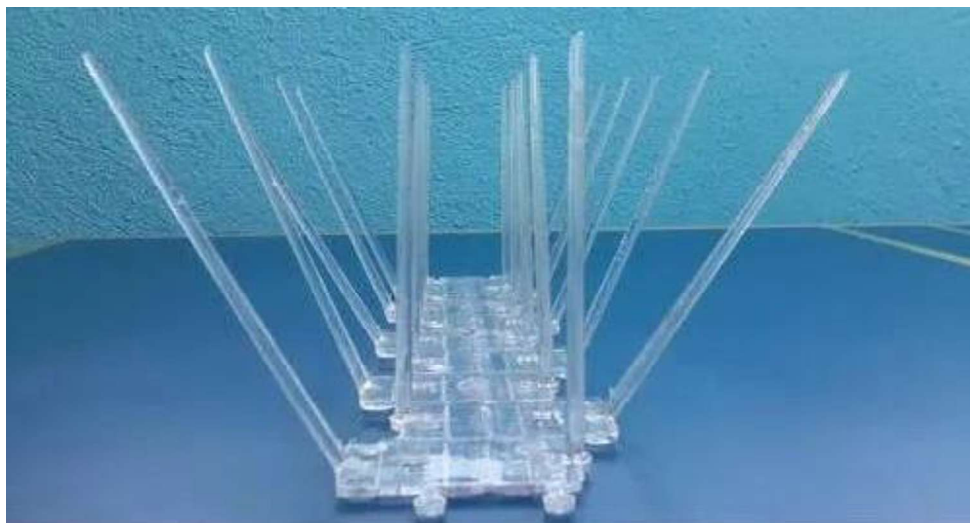


Photo of Bird Guard to be installed on Towers

Budget for providing Bird Diverters and Bird Guards comes to Rs. 25 Lakhs.
(Tentatively, actual cost may vary based on award).

B. General Mitigation Measures for Protection of Forest and Wildlife: -

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

- Before start of work in the Bhindawas & Khaparwas Wildlife Sanctuaries awareness campaign will be taken up by POWERGRID in association with Forest Dept. 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 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 loped and pruned which are required for stringing of conductor. In case of towers falling in hilltop 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 -A***
- 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.
- 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/bird.
- All pollution related aspects and waste management will be duly taken care during the implementation of the project.
- In addition to above, any other measures suggested by forest/wildlife authority shall be strictly adhered to during execution of the project by POWERGRID.

4.2 Conclusion:

The **proposed 765 kV Khetri-Narela Transmission Line** is a very important project which is conceived by Govt. of India under the ambitious “*Transmission Scheme for evacuation of power from Solar Energy Zones in Rajasthan (8.1 GW) under phase II-Part G in Rajasthan State*”. This project is a major step towards meeting power supply to Northern Region & National Grid and also encouraging renewable energy to provide affordable 24x7 “**Power to All**” through enhancement in access of consumers to grid connected power supply through improving its availability

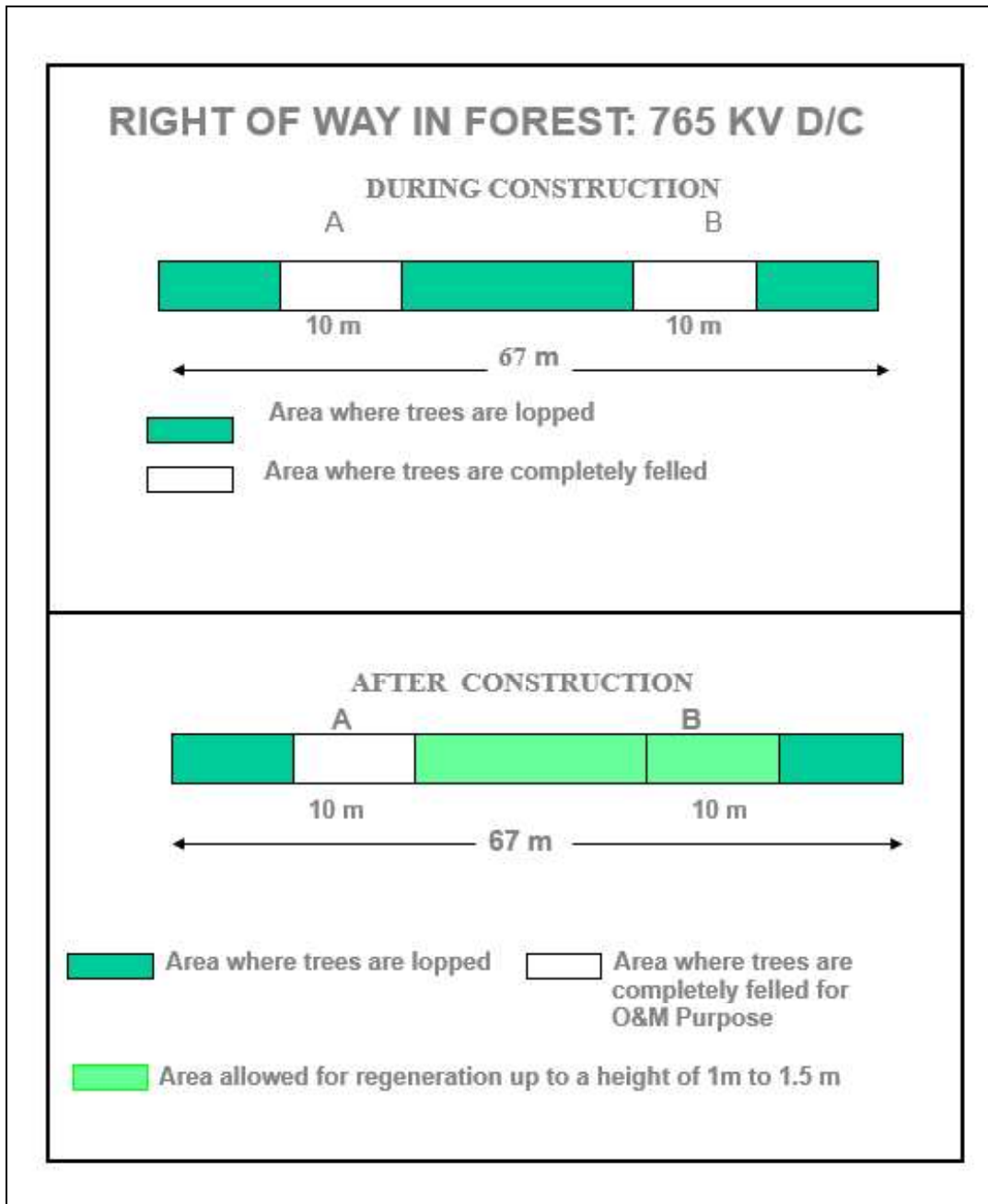
and reliability, thereby facilitating inclusive growth of power sector in India.

The construction of the above transmission line requires forest clearance since, a section of the proposed transmission line has to pass through the **forest area** as avoidance of the forest area is entirely not possible due to location of the sub-stations and geographical 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 2006 as per MoEF notification and considered as green project due to its pollution free nature.

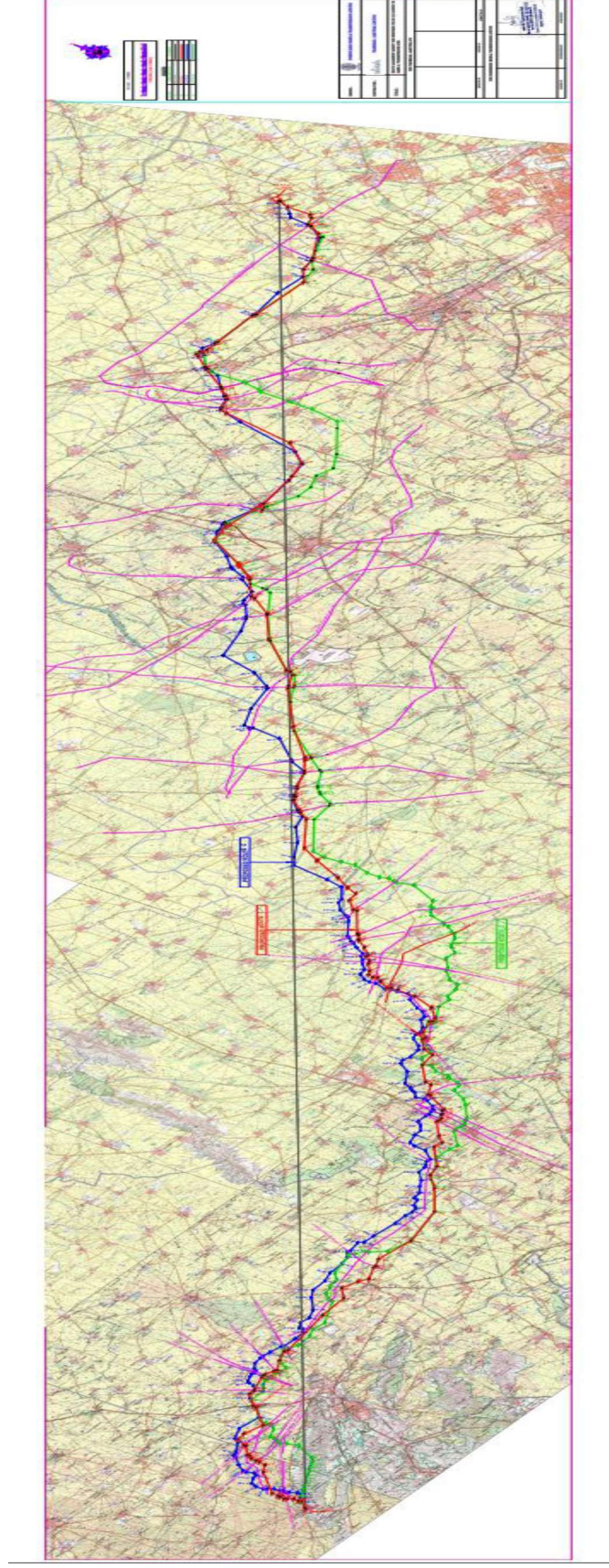
Considering the importance of conservation of biodiversity and the rich wildlife habitat, flora and fauna of Bhindawas & Khaparwas Wildlife Sanctuaries, it is found that there will be some temporary impacts from the aforesaid transmission project on the Eco-sensitive zone areas particularly for avifauna/birds. However, following its cardinal principles of avoidance, minimization, and mitigation POWERGRID has not only avoided Bhindawas & Khaparwas Wildlife Sanctuaries including Eco sensitive zone completely while finalizing the route but also committed for implementation of various specific mitigation measures for birds & others etc apart from general measures for overall protection of the forest and wildlife in the Eco-sensitive zone areas of Bhindawas & Khaparwas Wildlife Sanctuaries.

Therefore, it is summarized that the overall impact on biodiversity on the Eco-sensitive zone areas of Bhindawas & Khaparwas Wildlife Sanctuaries due to the proposed transmission project is assessed as low which can be minimized through proper mitigation measures as outlined in preceding section.

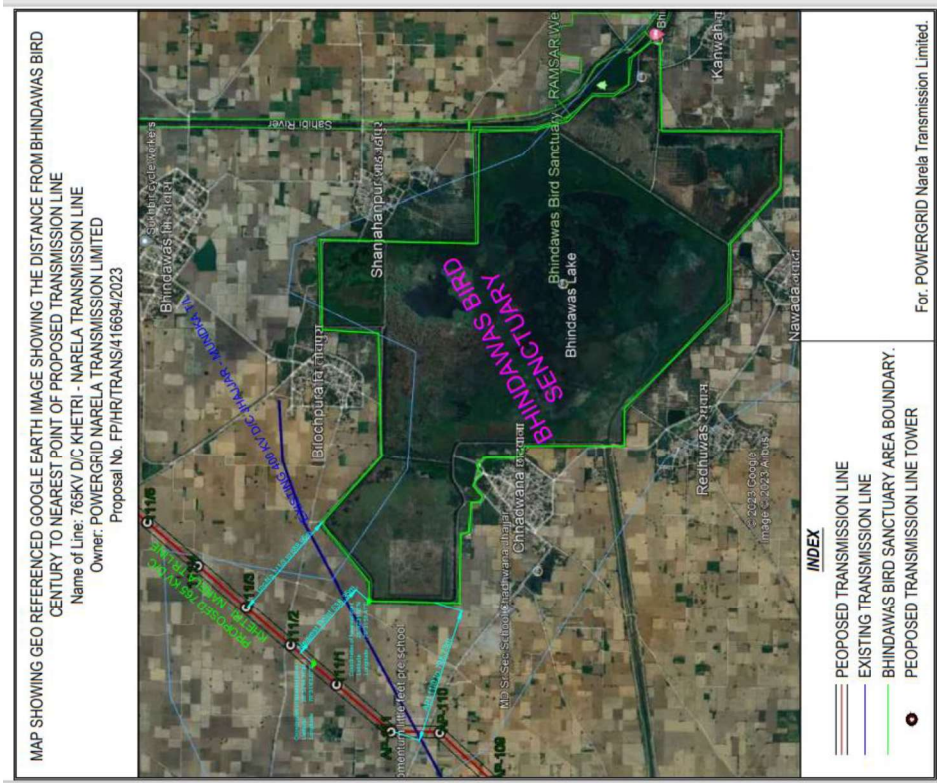
Tree Felling Arrangement in the 765 kV D/C Transmission Line (Figure-A)



TOPO MAP SHOWING THREE ALTERNATIVE ROUTE ALIGNMENT-ANNEXURE-I



MAP SHOWING TRANSMISSION LINE PASSING AWAY FROM BHINDAWAS WILDLIFE SANCTUARY-ANNEXURE-II



MAP SHOWING TRANSMISSION LINE PASSING AWAY FROM KHAPAR WAS WILDLIFE SANCTUARY-ANNEXURE-III

