DGPS REPORT



# North Karanpura Transco Ltd

## GEOREFERENCED DGPS MAPPING FOR 400 KV D/C KARANPURA–GAYA TRANSMISSION LINE



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Geotech Infra
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**CERTIFICATE** **Date-03/07/2019**

This is certify that the D.G.P.S. Survey of Govt. forest land proposed to be diverted in the Chatra South, Chatra North & Latehar forest Division of Chatra & Latehar District. Forest land under these Division **surveyed area is =191 hector (approx.)** done by us as per the guidelines of the forest conservation Act 1980 for North Karanpura-Gaya Transmission line ( Jharkhand Portion) of M/S North karanpura Transco Limited and the co-ordinate of boundary points are corrected on our knowledge.

The work done is as follow:

1. Create one Base point with fixation of two ground control points on static mode.
2. Survey of boundary pillars by using DGPS and fixed up its Ground position and preparation of Geo reference Cadastral plan/forest map.
3. The Geo reference Cadastral plan/forest map prepared using DGPS and superimposed vectorised SOI toposheet map.
4. Prepared DGPS survey report and soft copy of all above maps in standard format and Digitised maps in shape file and KML for imported in any GIS database.
5. Above work done by using D.G.P.S.(MODEL_SOUTH 586951117129458 GEM,SOKKIA:1144-11210)

FOR,GEOTECH INFRA
Reg no-192110866898
PAN no-BFMPD14868

GEOTECH INFRAA ★ Pursurah, Hooghly, W.B.-712401 ★ 2/7/19

Thanking You

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## 1.0 PROJECT DETAILS

### 1.1 Introduction

With the introduction of Electricity act 2003, competition was brought into power sector and its sub sectors. Power generation business was delicensed which led to huge capacity addition by the private sector and this warranted transmission network to be reinforced so that all the power generated could be supplied to the end users. The provision for independent transmission licenses were created for private sector to get in to the business.

The Government of India, Ministry of Power, vide Gazette Notification dated July 08, 2014 has notified REC Transmission Project Company Ltd. to be the Bid Process Coordinator (BPC) for the purpose of selection of Bidder as Transmission Service Provider (TSP) to establish Transmission System for "Immediate Evacuation for North Karanpura (3X660MW) generation project of NTPC along with creation of 400/220kV Substation at Dhanbad (ERSS-XIX)" through tariff based competitive bidding process.

The BPC invited Bids for selection of Transmission Service Provider to establish the Transmission System for "Immediate Evacuation for North Karanpura (3X660MW) generation project of NTPC along with creation of 400/220kV Substation at Dhanbad (ERSS-XIX)" (hereinafter referred to as 'Project') on Build, Own, Operate and Maintain basis, and to provide transmission service on a long term basis to the Long Term Transmission Customers. As part of said project the Special Purpose Vehicle (SPV) is formed "North Karanpura Transco Ltd." to develop the proposed project.

#### a) Project Scope

Project scope will include:

| Sr. No. | Scheme/ Transmission Works | |
|---|---|---|
| **Immediate Evacuation for North Karanpura (3X660MW) generation project of NTPC** | | |
| 1 | North Karanpura – Gaya 400kV D/C line with quad moose conductor | 23 Months |
| 2 | North Karanpura – Chandwa (Jharkhand) Pooling Station 400kV D/c line with quad moose conductor | 14 Months |
| **Creation of 400/220kV Substation at Dhanbad (ERSS-XIX)** | | |
| 3 | Establishment of 400/220 kV, 2x500 MVA sub-station at Dhanbad<br>**400 kV**<br>• ICTs: 400/220 kV, 2x500 MVA<br>• ICTs bays: 2 no.<br>• Line bays: 4 no.<br>• 400 kV bus reactor bays: 2 no.<br>• Bus reactor: 2x125 MVAR | 18 Months |

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| Sr. No. | Scheme/ Transmission Works | |
|---|---|---|
| | • Space for future bays: 4 no<br>• Space for future 400/220 kV, 500 MVA ICT along with associated bay<br>**220 kV**<br>• ICTs bays: 2 no.<br>• Line bays: 4 no.<br>• Space for future bays: 4 no | |
| 4 | LILO of both circuits of Ranchi – Maithon-RB 400kV D/c line at Dhanbad (Twin Moose) | 18 Months |

**Note**:

1. NTPC would provide 2 no. 400kV line bays for North Karanpura – Gaya 400 kV D/c line at their North Karanpura generation switchyard.
2. NTPC would provide 2 no. 400kV line bays for North Karanpura – Chandwa (Jharkhand) Pooling Station 400kV D/c line at their North Karanpura generation switchyard
3. CTU (POWERGRID) would provide 2 no. 400kV line bays at Gaya (PG) for termination of North Karanpura – Gaya 400 kV D/c line.
4. CTU (POWERGRID)would provide 2 no. 400kV line bays at under construction Chandwa (Jharkhand) Pooling Station (PG) for termination of North Karanpura – Chandwa 400 kV D/C line

**b) Technical Specification**

The technical requirements of this project has been brought out under the section ''Technical specification'' in the Request for Proposal (RFP) by BPC which has been evolved from the CEA technical standards and CTU practices. NKTL is mandated to adhere to these requirements during design, engineering and execution.

5. **Location of the Project:** The project is in Jharkhand (72%) & Bihar (28%) state. The North Karanpura – Gaya 400 kV D/C line hereafter referred as "Project" in completely in Jharkhand state.

**c) Topology of the Transmission system**

| Sr. No. | Description | Tentative Line Length (km) |
|---|---|---|
| 1. | 400 kV D/C (Quad Moose) North Karanpura – Gaya Transmission Line | Jharkhand Portion= 69.74<br>Bihar Portion=29.1<br>Total=98.8 |



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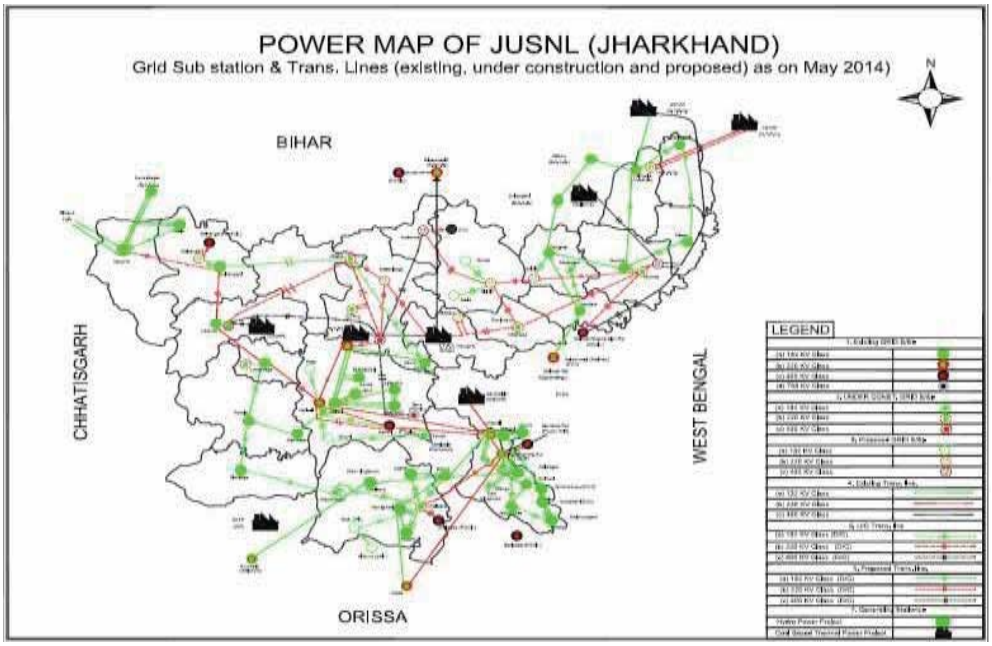
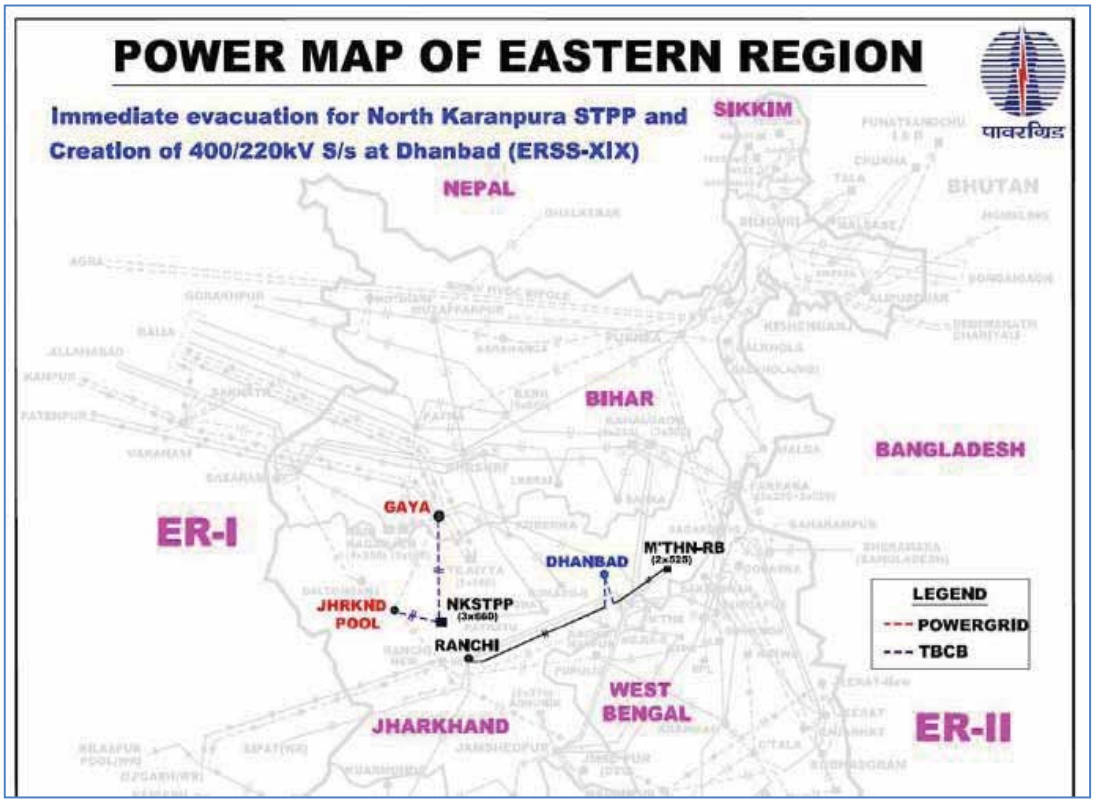
### d) Power Map

- **Jharkhand**




### e) SLD of Transmission Line

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## 1.2 Geographical Information

### 1.2.1 Climate

Jharkhand experiences a moderate type of climate. The State witnesses cold weather from November to February. March to mid-June is hot with May being the hottest month. Hot winds blow during the day time. Mid-June to October is the time when the state experiences heavy rainfall. The rainfall ranges from 1,000 mm (in the west central part) to around 1,500 mm in the southwest regions. Maximum rainfall is during the months of July and August. The temperature in Jharkhand, during winters, ranges from 10 degree Celsius to 22 degree Celsius. During summer months, the temperature here varies from 20 degree Celsius to 37 degree Celsius.

### 1.2.2 Area

Jharkhand is encircled by the Indian states of West Bengal (east), Uttar Pradesh (west), Chhattisgarh (west), Bihar (north) and Odisha (south). Jharkhand is 'the land of forests' - endowed with rich flora and fauna. The state is spread out across 30,778 square Kilometres. Ranchi is the state's prime capital. Tropic of Cancer passes through Kanke, few kilometres away from Ranchi, the capital of Jharkhand, making it the only state in India touched by Tropic of Cancer.

### 1.2.3 Topography

The topography of Jharkhand is rich in minerals. The abundance in minerals also enhances the prospects of the industries in Jharkhand. It is noteworthy that although being an industrial belt, Jharkhand also provides enough scope for cultivation of crops, such as wheat, paddy, pulses, maize, etc. within the territory. Agriculture and industries flourish side by side within the territory of Jharkhand.

Soil and land resources help to plan for sustainable management of these natural resources. Red soil, black soil, sandy soil, micaceous soil, laterite soils are found in Jharkhand. The soil has been formed from disintegration of stones and rocks. Agro forestry and horticulture, plantation of trees, measures like terracing, bunding, trenching etc. have been resorted to for soil and water conservation. The fertility status of soil depends on nature of vegetation, topography, texture of soil, climate and decomposition rate of organic matter.

## 1.3 Transport

### 1.3.1 Roads

The JTDC (Jharkhand Tourism Development Corporation), which is a state-owned



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organization, offers regular bus services to different parts of the state. Privately owned operators also run bus services.

The total length of State Highways is about 4,662 km. A two-lane road project between Govindpur (near Dhanbad) and Sahebganj is nearing completion. There are 12 National Highways in the state. The total length of National Highways in Jharkhand is 1,805 km. The National Highways running through the state are: NH-2,NH-6,NH-23,NH-31,NH-32,NH-33,NH-75,NH-78,NH-80,NH-98,NH-99,NH-100.NH-33 and NH-23 pass through Ranchi.
Buses ply regularly from Ranchi to other cities of Jharkhand. Three flyovers are coming up for smooth movement of traffic in the city. Most of the National Highways and other roads are being widened to 6 lanes or 8 lanes.

### 1.3.2 Rail network

The state of Jharkhand is situated in the eastern part of the country. The entire railway-route length in Jharkhand is 1,955 km. Ranchi is one of the most profitable stations in South-Eastern Railways. Goods-handling facilities are available in Ranchi, Dhanbad, Bokaro and Jamshedpur stations. There are various trains to reach the cities in Jharkhand from all over the country. Jharkhand has an extensive line of railway network including 97 main railway stations and many railway junctions. Some of the important railway stations in the state of Jharkhand include Barharwa Junction, Chandil Junction, Katrasgarh, Bokaro Steel City, Dhanbad Junction, Ranchi, Madhupur Junction, Tatanagar Junction, etc.

### 1.3.3 Air Ports

Jharkhand has two operational airports at Ranchi & Jamshedpur and One private airport at Bokaro. Birsa Munda Airport is a public domestic airport serving the city of Ranchi and is managed by Airports Authority of India. It is located in Hinoo locality, approximately 7 km (4.3 mi) from the centre of the city. It is the 37th busiest airport in India. Sonari Airport is a public airport located in Jamshedpur. Bokaro Airport is a private airport located in Bokaro Steel City. It is situated on National Highway-23 (Also known as the Bokaro-Chas road). There are no scheduled flights into this airport. Further, Tata Steel has proposed a new airport for city of Jamshedpur on 600 acres in the Adityapur - Seraikela area. The airport is to have a 7,000 feet long runway and will be able to handle Airbus A320 flights.

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## 1.4 Methodology/ Philosophy of Route Selection

In order to execute such transmission system, precise planning, costing, scheduling etc. were required. Optimum deployment of resources also was of prime target in implementing this transmission system. It is essential that at the planning stage itself various alternative routes and technical solutions for transmission lines be examined in detail.

For undertaking such studies, one of the major requirements is obtaining adequate information regarding physical constrains, environmental factors etc. along the route so that optimum solutions are identified. Subsequently, during implementation of the project, it is required to obtain elaborate details about terrain, soil conditions, constraints etc. of the route for proper resource planning, costing etc. as well as reduction in implementation time.

Presently, conventional methods of survey like walk over survey, preliminary survey and detailed survey are carried out at various stages from conceptualization of the project to implementation, which are time consuming tasks. There are new means available which is used to conduct route survey using Google, DGPS based survey etc.
Following are the major factors taken into account while deciding the line route of the project as per the provisions of the acts and rules –

- Major habitation & settlement area avoided.
- Wild Life Sanctuary's, Biosphere's, dense forest avoided.
- Minimum vegetation / tree cutting in the line route
- Minimum no of River Crossings, Railway Crossings, Highway Crossings, and Power Line Crossings are considered.
- Lowest minimum forest area demand in the proposed route
- Archaeological structures, defense sites, airport area, etc. are avoided.
- Accessibility of approach road to the project site.
- Rich gardens, plantations, notified industrial area, etc. to be avoided.
- Economic viability of the route

### 1.4.1 Preliminary & Route Alignment Survey

Preliminary Survey included the following steps:

- Map study
- Walkover survey

Route survey was carried out for following benefits:

- To select optimal route from the alternatives for ease of construction followed by O&M with economy.



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- Maintenance & additional construction cost can be brought to the minimum.
- Material Estimation and procurement can be done fairly on realistic basis.
- Limited Reserve/Protected/Private Forest Area.
- Proper planning can be done for networks keeping provision for future routes etc.
- Approvals from Railways, Civil Aviation, Forest authorities etc. can be obtained faster.
- Preparation of Master Network and fixing construction/erection targets can be done on realistic basis, which will help in the judicious planning of materials flow, cash flow and manpower requirements.
- Appreciable time can be saved during construction & maintenance of roads, if selection of Rivers, route along hill sections and power line etc., are properly made.

## 1.5 Map Study

- After drawing various routes of alignment network within the topo maps, a comparative study was made on the basis of the following data:
- Route length.
- Nos. and type of important road points in each indicating alignment of each road as measured on the map.
- Nature and number of major crossings.
- Mapping the industrial installations, structures, and important places for identification of Roads.
- Approach to the line in general for construction & maintenance.
- Reaches through protected or Reserved Forests
- Continuously long stretches in paddy fields.
- Close parallelism with Railway lines.
- Restricted areas such as civil and military airfield are avoided.
- Aircraft landing approaches are avoided.

Walkover Survey was carried out going over the area associated with the routes and collecting features observed other than those existing on the map. In addition the indications on following features are also checked.

- Communication lines
- Accessibility and smoother approach.
- Logistics of the route.
- Economic viability of the route.
- Existing and Present course of River



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- Power lines (existing)
- Expanding villages and towns
- Rich gardens and plantations

- Reserved forests and high tree areas
- National Parks & Wild life sanctuaries
- Archeological monuments
- Aerodromes, radar centers etc.
- Steep sloping terrain, Areas prone to landslides, soil instability etc.
- Prohibited areas declared under statutory regulations

## 1.6 Remote Sensing

Remote Sensing is modern technique in mapping sciences. It is now a major tool to map any area on earth's surface for transmission of power. The planning for installation of large transmission towers needs proper planning. For this, updated base maps are required. Remote sensing imageries can help in updating of the available topographic maps. The recently launched satellites like IKONOS, IRS-1C, 1D (PAN) having its very good spatial resolution of 1mt and 5.8mts through digital image processing techniques; it is able to identify even small features with the resolution as given above.

To select site for putting new transmission towers and lines especially in hilly terrains, the density of trees, elevation differences has to be carefully studied in detail. In such cases, remote sensing is the main technology, plays a vital role for the preparation of database on landforms, land use / land cover and related database. Integrating these information in GIS platform, it is able to generate three dimensional terrain model (DTMs) of the area, which can be further updated with the multi dated satellite images and aerial photographs also. Digital Photogrammetry is the potential technology to provide the information's on terrain elevation which has to be studied before locating site for transmission towers and lines. This has found great success in many European countries but yet to be implemented in the developing countries like India.

## 1.7 Satellite Image (Google Map)

Satellite Images were used as most authoritative document to record latest topographical changes along the surveyed routes. This involved the initiations of the following activities.

- Transferring of images to studios for processing and detailed measurements.



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- Ground Verification was undertaken to study the authenticity of the images.

Camera is supposed to see topographic details vividly, that is the only reason, why satellite images are used in detailed survey in comparison to the traditional field work. The ground profile in digital form could be obtained from satellite images, which in turn enable the user to estimate various types earthwork involved like benching, revetments etc. could be computed by using the relevant software.

Appropriate techniques for obtaining soil conditions, depth of ground water, terrain conditions etc. for correct estimation of civil works could be explored.

Due to "Shadow Effect", some errors crop up in the satellite imageries, which affect the preliminary surveys, and it becomes difficult to differentiate between the forests and other greenery, consequently it becomes difficult to mark the forest boundaries etc.

- Proper resolution plays an important role in interpreting satellite images; higher resolution improves the quality of visual Context and may differentiate the ground realities closely.
- Relief data and subsoil data cannot be assessed from Satellite imageries.
- Digitization of Complete Zonal maps, rather selected features would provide a complete replica in integrated environment.
- Satellite data of resolution 1 – 5.8m will be preferable. However, the overall cost economy shall have to be worked out, as this data will be more costly, but will avoid field assignment in many places.
- Symbols of physical features in satellite imageries are not easily recognized by transmission line engineers.

## 1.8 Updating of Base map using Satellite Imageries

Digital maps prepared are subjected to refinement by using imagery. Details of Topography which might have undergone changes between the period of topographic survey and input of satellite imagery, like the rivers and nala courses, forestry and vegetation, highways and rail routes are re-incorporated in the digitized drawings, by using satellite imageries. The regions where the topography does not match with the imageries, ground verification survey is undertaken. IRS 1D PAN & LISS III images were procured from NRSA. The satellite imagery rectifications include Geo-referencing, ortho-rectification, transformation and projections. The images are rectified using ERDAS Imagine Software. The digitization process involves on screen digitization of imagery using AutoCAD Map and Map Info Software.

### a) Satellite Data Selection

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For updating of base maps NRSA Pan (5.88 m) and LISS-III (23.5 m) merged imagery are used.

**b) Satellite Data Pre-Processing**

This phase includes the standard operations of geometric correction and registration of the satellite images into the required Co-ordinate System. Ground control points (GCP's) on the satellite images and on the topographic/paper maps are identified and the liner geometric correction functions available in the ERDAS Images 8.3.1 are applied.

**c) Satellite Data Classification**

For unsupervised classification, the ISODATA methods are applied, and for supervised classification, the Maximum Likelihood Classification (MLC) is preferred. To identify the sample areas for supervised classification, specific procedures and information from topographic/paper maps are used together with thematic maps and expert knowledge of the terrain after field checking.

**d) Satellite Data Interpretation and Vectorization of the Resulting Units**

Interpretation and vectorization on the screen, available in Arc View shape format are preferred because polygons created have vector format and can be directly transformed to a land base maps. In order to update line features (railroads, roads, streams) the ERDAS Imagine's Edge Enhancement filter is used.

**e) Classification**

A Comprehensive and standardized classification system would be created for mapping exercises. The classification of features would use a set of criteria that would allow correlation with existing classifications and legends for creation of land base map.

**f) Field Checking**

Field visits would be undertaken in all areas under study to collect terrain information and interpretation keys useful for image interpretation. Later, field checking would be carried out to test accuracy of image interpretation at selected sites and to clarify interpretation assumptions. GPS would be used to precisely locate the ground sites investigated.

**g) Composition of final Land Base Maps**

Vector shape files would be created manually, in Arc View using both the original image and the result of the supervised classification in the background to provide a basis for visual interpretation.

## 1.9 Seismic and Wind Zone Details

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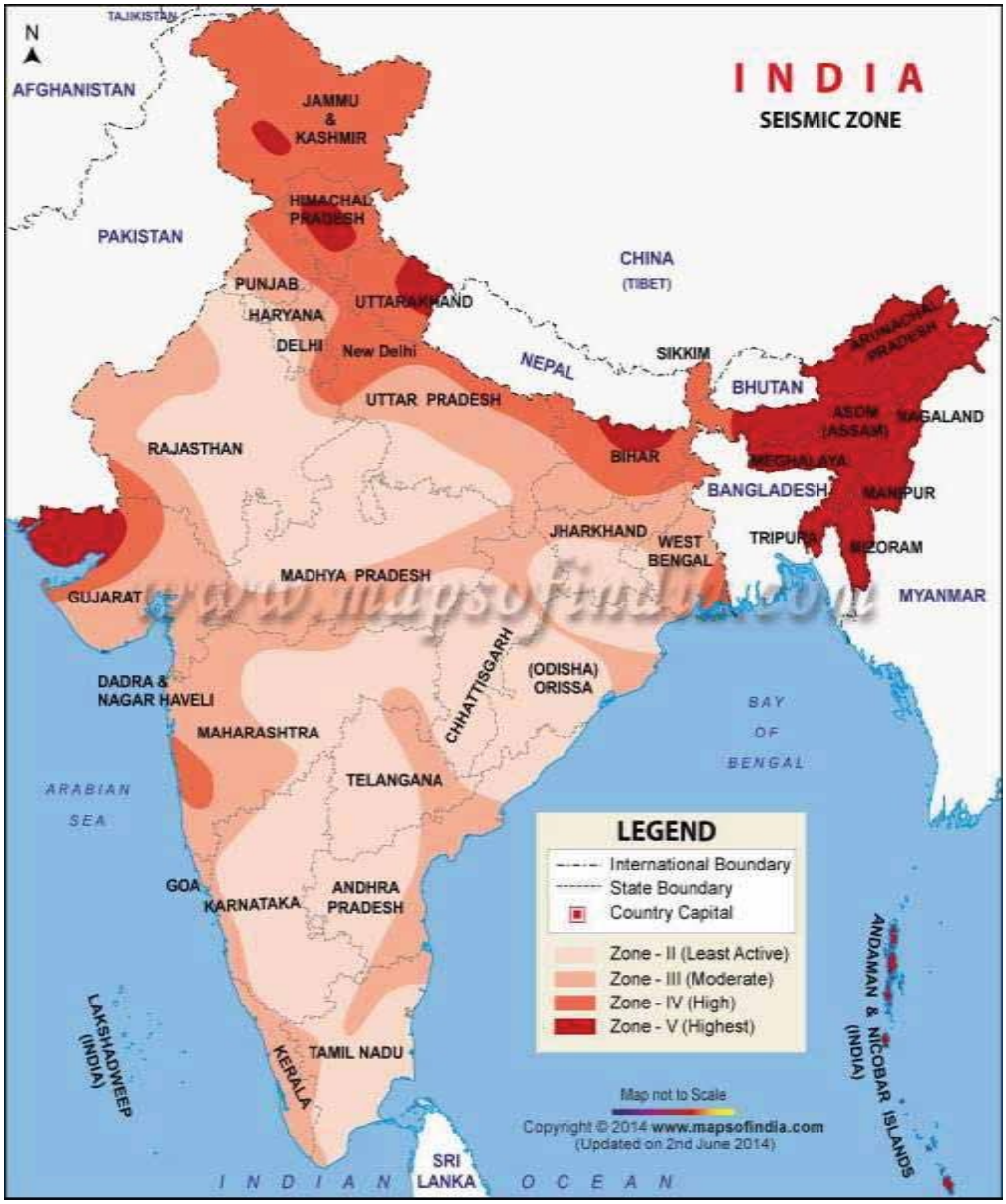
India has been divided into five seismic zones depending on the intensity of earthquake. Zone 1 represents the safest zone while the Zone 5 is the most vulnerable and prone to high intensity earthquakes.

Location showing the Seismic zones of India is attached below:




## 1.10 Wind Zone Details

The proposed line routes passing through the following:

Location showing the Wind zones of India is attached below.



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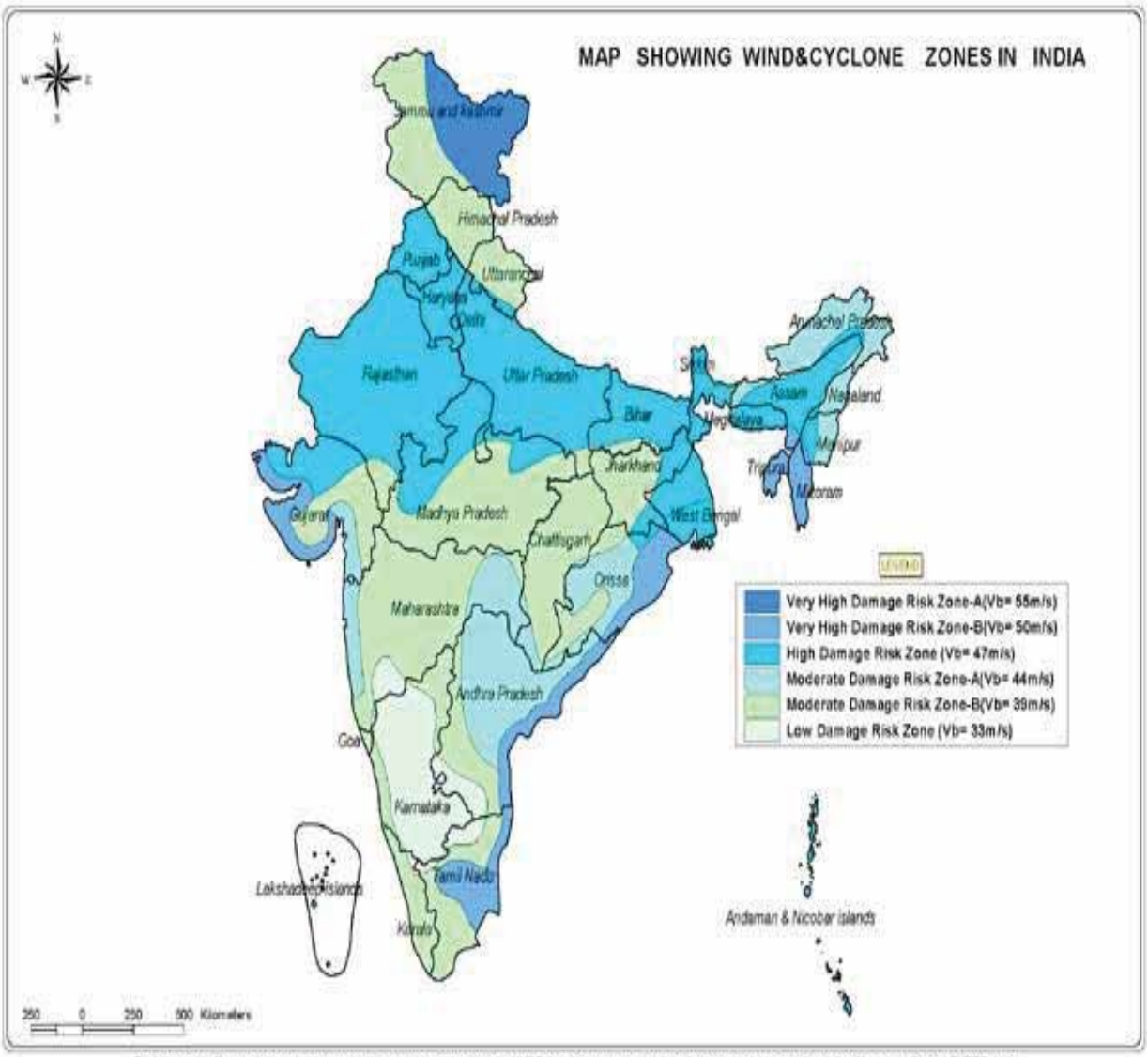


Disclaimer : All efforts have been made to make this image accurate. However UNDP do not own any responsibility for the correctness or authenticity of the same Source: BMTPC, India

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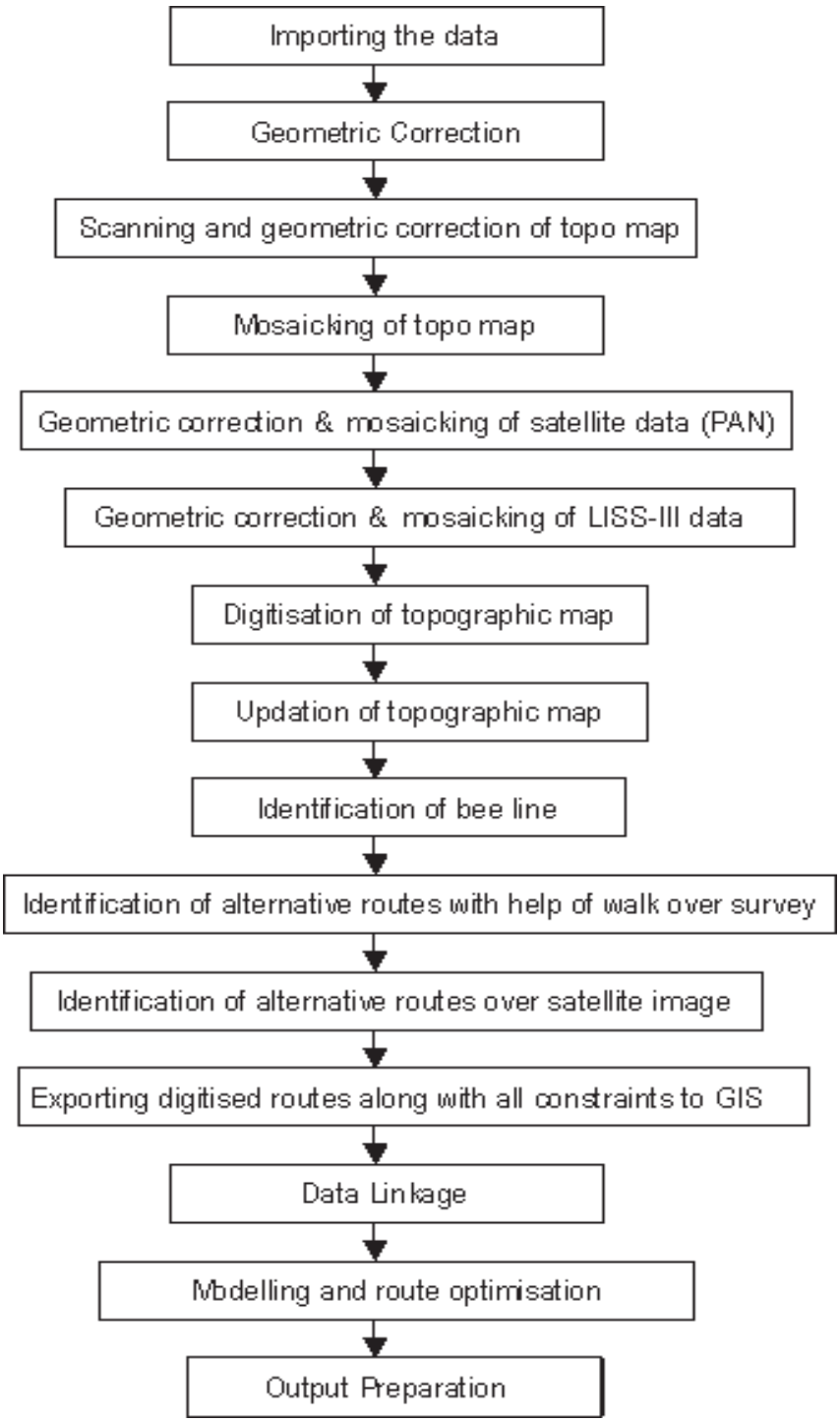
## 1.11 Methodology for Route Identification

**Fig 9.1 Flow Chart of the Methodology for Route Identification**




## 1.12 Route survey techniques

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Three (3) alternate route alignments were carried out by help of satellite images available in google map. Physical walk over survey was conducted on all the three routes and GPS coordinates were collected at every 100 meters along with soil strata. Based on the information so collected, the best route was selected after evaluation of factors like, minimum forest coverage, angle points, river crossing, power line crossing, habitation etc.

The Infrastructural Details along the Routes are as follows:

### 1.12.1 400 kV D/C (Quad Moose) North Karanpura–Gaya Transmission Line (Jharkhand Portion)

| | | | |
|---|---|---|---|
| Name of Proposed Transmission line between | : | 400 kV D/C (Quad Moose) North Karanpura– Gaya Transmission Line | |
| District | : | Latehar (Jharkhand), Chatra (Jharkhand), | |
| Total No. Angle Points | : | Jharkhand Portion 73 Nos (From common point AP/19 to AP/92) | |
| Total Route Length | : | Jharkhand Portion=69.74 km. (From common point AP/19 to AP/92) | |
| Terminal Points | | Common Point AP 19 of Multi Circuit North Karanpura Chandwa line :<br>E : 286605.51<br>N : 2639180.87<br>Gantry Gaya:<br>E : 292646<br>N : 2725070 | |
| Major Crossings along the route : | | | |
| Total H.T. Line | : | Total = 3 Nos<br>220 kV (1 Nos.) and 400 kV (2 nos.) | |
| Total Railway Line | : | 01 Nos. | |
| National Highway (NH) | : | 02 Nos | |
| State Highway (SH) | : | Nil | |
| | : | Major River : | NIL |



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| | | | |
|---|---|---|---|
| River Crossing | : | Minor River: | NIL |
| Forest /Sanctuary | : | 42.828 Kms (PF & Jungle Jhari) | |

| | | | |
|---|---|---|---|
| Towns, Cities & villages along the route | : | The route alignment is avoiding towns/ inhabitants | |
| Minerals in the route corridor | | Nil | |
| Type of Crops, Fruits, Forest Land, Hill are along the route | : | a) Crops | Rice, Arahar, Maize, Sugarcane and Wheat etc. |
| | | b) Soil | Normal Dry, Wet, Wet Paddy, Wet, PS, FS, DFR & Hard Rock. Soil Investigation report shall be furnished on later date |
| | | c) land | Plain (70%) |
| | | d) Hill | HILL (30%) |
| Land involvement | : | | Combination of Sparse Open Scrub, Govt. Land, Forest Land, barren and agriculture land |
| Climate | : | Seasons | Summer= March to June, Rain = July to September, Winter = October to February |
| | | a) Maximum Temperature | 46°C |
| | | b) Minimum Temperature | 19 C |
| Specific features | : | This alternative route-1 is more suitable for construction as well O&M prospective compared to route-2 & 3. Hence, Route-1 is recommended. | |

### 1.12.2 Legal Frame Work

It is proposed to execute the above entire transmission system as per provisions contained in the Indian Electricity Act 2003 and the rules made there under and the Electricity (Supply) Act 1910 and 1948, so far as these are applicable.

The following regulatory and Government approval will be taken. :-

1. Transmission License from CERC.
2. Approval of under section 68 of Indian Electricity Act 2003.

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3. Approval of under section 164 of Indian Electricity Act 2003.
4. Tariff Adoption from CERC.

## 2.0 ENVIRONMENTAL IMPACT ASSESSMENT

### 2.1 Forest involvement / Clearance

As per the practice, preliminary route selection is done based on such documents as the Forest Atlas and the survey of India maps using "bee" line method followed by field clarification through walk over survey. All possible steps are taken to avoid the route alignment through forest. In case where it becomes unavoidable due to the geography of terrain, the alignment is made in such a way that the route through the forest is the barest minimum.

### 2.1.1 For selection of optimum routes following points are taken into consideration

- The route of the transmission line does not involve any human rehabilitation.
- Any monument of culture or historical importance is not getting affected.
- The route does not create any threat to the survival of any community with special reference to tribal.
- It does not affect any Public Utility Services like Play Ground, School, other Establishment, etc.
- It does not pass through any sanctuaries, Nation Park etc. if any alternative route is feasible.
- It does not infringe with areas of natural resources.
- Away from major towns to account for future urban expansion

In case where it becomes unavoidable due to the geography of terrain, the alignment is made in such a way that the bare minimum line route through forest is selected.

| Name of Transmission line | Forest – Involvement (Approx. length in km) |
|---|---|
| 400 kV D/C Karanpura–Gaya Transmission Line Jharkhand Portion | 42.828 Kms |

## 3.0 PROJECT COST

The total project cost including taxes and duties for the said transmission line works out to INR **167** Crores.

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## 4.0 Features & Methodology of DGPS survey

Differential Global Positioning System (DGPS) is an enhancement to Global Positioning System that uses a network of fixed, ground-based reference stations to broadcast the difference between the positions indicated by the satellite systems and the known fixed positions. These stations broadcast the difference between the measured satellite pseudo ranges and actual (internally computed) pseudo ranges, and receiver stations may correct their pseudo ranges by the same amount.

Differential Positioning

- It is possible to determine the position of Rover 'B' in relation to Reference 'A' provided.
  – The coordinates of the Reference Station (A) are known
  – Satellites are tracked simultaneously

- Differential Positioning
  – eliminates errors in the sat. and receiver clocks
  – minimizes atmospheric delays
  – Accuracy 0.5 cm - 5 m A - B

The survey work has done with the help of Differential Global Positioning System survey. Starting DGPS Survey by making Two permanent reference point (Base Stations) by setting up, initialization of all the parameters of BASE Unit. One BASE point has been stablished. Than Initialization of the ROVER Unit in the same manner and each boundary pillars was established and fixed after 15 Minutes of reading on static mode and that's how 104 boundary points and two ground control points has been fixed. After the successful completion of the survey, All the RAW data collected from the field will be post process in the GNSS software, than Validation of the collected data by several methods &Geo-referencing of Cadastral map/Forest Compartment maps using software. Superimposition of output files on Geo-referenced Vectorized Cadastral map/Forest Compartment maps, SOI Toposheets.

## 5.0 APPROVALS AND CLEARANCES

Following approvals and clearances need to be obtained from the various authorities at the different stages of the project. Close follow up will be exercised for the timely approval of the below items.

Chandra Shekhar Singh
Assistant Manager
North Karanpura Transco Limited
Ranchi

| Sl. No. | Statutory Clearances | Concerned Authority | Remarks |
|---|---|---|---|
| **A** | **Required prior to construction** | | |
| 1 | Approval Under section 68 of E.A 2003 | MoP | Shall be handed over by Bid Process Coordinator at the time of SPV Takeover |
| 2 | Approval Under section 164 of E.A 2003 | CEA | |
| 3 | Transmission License | CERC | |
| 4 | Tariff Adoption | CERC | |
| **B** | **Required during/after construction** | | |
| 5 | Forest Approval | MoEF | During Construction. Required for particular stretch of line passing through forest. |
| 6 | Aviation | AAI | Before Charging of Line. |
| 7 | PTCC clearance | PTCC | Before Charging of line |
| 8 | Power Line Crossing | Concern Utility | During Construction. Required for particular crossing span. |
| 9 | Railway Crossing | Railway Authority | During Construction. Required for particular crossing span. |
| 10 | National Highway Crossing | NHAI | During Construction. Required for particular crossing span. |
| 11 | Final Charging Clearance approval | CEA | Before Charging of System |

## 6.0 DGPS SURVEY MAPS: Block wise Annexures details are as in table below.

| Sr. No. | District | Division | Block | Annexure Description |
|---|---|---|---|---|
| 1 | Latehar | Latehar | Bariyatu | Bariyatu DGPS Maps Annexure I |
| 2 | Chatra | Chatra South | Simaria | Simaria DGPS Maps Annexure II |
| 3 | Chatra | Chatra South | Lawalaung | Lawalaung DGPS Maps Annexure III |
| 4 | Chatra | Chatra South | Chatra | Chatra DGPS Maps Annexure IV |
| 5 | Chatra | Chatra North | Huntergunj | Huntergunj DGPS Maps Annexure V |

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