



Environment and Social Impact Assessment Report (Scheme D, Volume 2)

**Jharkhand Urja Sancharan
Nigam Limited**

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Jharkhand Urja Sancharan Nigam Limited

Environment and Social Impact Assessment Report (Scheme D, Volume 2)

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ABBREVIATIONS

BMTPC - Building Material and Technology Promotion Council of India
CEA - Central Electricity Authority
CFC - Chlorofluorocarbon
CGWB - Central Groundwater Authority Board
CPCB - Central Pollution Control Board
dB - Decibel
DG -Diesel Generator
DVC - Damodar Valley Corporation
EA - Environmental Assessment
EMP - Environmental Management Plan
ERM - Environmental Resources Management
ESIA - Environmental and Social Impact Assessment
ESIA- Environmental and Social Impact Assessment
ESMF- Environmental and Social Management Framework
ESZ - Eco-Sensitive Zone
GCC- General Conditions of Contract
GM - Gair Mazrui
GOI - Government of India
GPS - Global Positioning System
GSS - Grid Sub Station
IESE - Initial Environmental and Social Examination
IMD - India Meteorological Department
IS - Indian Standard
IUCN - International Union for Conservation of Nature
IWPA - Indian Wildlife Protection Act
JPSIP- Jharkhand Power System Improvement Project
JUSNL - Jharkhand Urja Sancharan Nigam Limited
KL- Kilo Litre
KLD - Kilo Litre per Day
Km - Kilometer
KVA - Kilo-Volts-Ampere
MVA - Mega-Volts-Ampere
NBWL - National Board of Wildlife
NH- National Highway
PCB - Pollution Control Board
PCB - Polychlorinated Biphenyls
PfA - Power for All
PPP - Public Private Partnership
PUCC - Pollution Under Control Certificate
SCC- Special Conditions of Contract
SF6 -Sulfur Hexafluoride
TCE - TATA Consulting Engineer
TL - Transmission Line
WPR- Work Participation Ratio

EXECUTIVE SUMMARY

The Jharkhand Urja Sancharan Nigam Limited (JUSNL) with financial assistance from the World Bank is implementing the transmission infrastructure development/upgradation under the Jharkhand Power System Improvement Project (JPSIP) and will include: (a) Creation of 25 new 132 kV substations, and (b) Development of associated 132 KV transmission lines of around 1800 kms. These 25 substations and associated transmission lines have been organised into 26 schemes. This ESIA covers the transmission lines a) 132 kV D/C Irba-Ramgarh Transmission Line; b) 132 kV D/C Irba- Ratu Transmission Line; and c) 132KV D/C Irba – Kanke Transmission Line, all of which are part of Scheme D and is to be covered under Phase I of the project. The ESIA has been undertaken based on the outcome of initial walk over survey which identified a preferred alignment based on analysis of three potential alternatives associated with the Bee-line between the two end-points. The level of detail captured in the ESIA is primarily based on the inputs of the walk-over survey; and attempt is being made to include some of the detail emerging from the detailed survey exercise, which is being conducted in parallel by the Design Consultant at this time. More detailed information about the accurate alignment of the transmission line, specific parcels of land which the RoW will intersect, and the exact footprint of the transmission towers would be available during the next phase of project planning, involving Check Surveys is not covered in this ESIA.

The three transmission lines, Irba-Ramgarh, Irba-Ratu and Irba-Kanke are planned to extend for distances of 23.59 Km, 42.677 Km and 23.59 Km respectively and would fall in the districts of Ranchi and Ramgarh. As per plan, the RoW of the alignment would be 27 m and transmission towers are expected to be setup every 300 m (approx. 2-3 towers per km depending on terrain and other technical, environmental and social considerations), each occupying a land footprint of about 22 m square. Overall, they will run cross country and cover a physical, environmental and social landscape which is typical to the state of Jharkhand – combination of plateau land exhibiting minor undulations and interspersed with flat terrain and hilly stretches. From the land use point of view, the line alignments would primarily cover agricultural, forest and barren/waste land use types. The ends of the transmission lines would originate from respective substations of Irba – Ramgarh, Irba- Ratu and Irba Kanke, which have access through road. At several other points along the route, crossings with roads (national or state highways) and railway lines are expected to occur. For access to other points of the proposed transmission lines, access would have to be obtained through existing village roads and open terrain.

The construction phase of the project would involve the following activities: (a) Site clearance –Ground vegetation and/or crops on field would be cleared and trees would be lopped or felled, to the extent required, for gaining access

to the corridor and to allow for tower construction and wire stringing activities; (b) For setting up towers within the 22 square m area, limited excavations would be undertaken for footings, concrete foundation developed, framework inserted, and the tower frame would be erected after hauling components to a nearby laydown area using existing roads and the transmission corridor RoW; (c) Mechanical stringing of conductors between towers would be done using a winching machine. The construction activities are anticipated to involve 15-20 people during construction of tower foundation and tower erection and 20-30 people would be involved in tower erection and stringing. Mostly the labour would be staying in fly camps while remaining workers would be staying in laydown areas (comprising of labour quarters and material storage areas). Typical vehicles on site at construction site would include 2 trucks, 2-3 excavators and 6 light duty vehicles (LDV), puller and tensioner.

After construction is over, there would be certain restrictions on future development and on height of trees along the width of the corridor (as per guidelines - IS 5613/MoEFCC, GoI Circular 7-25/2012-FC dated 5th May 2014) for the owners of the land parcels which get intersected. At the points where the transmission towers are to be set up, the right of the land for about 22 sq m of land would be obtained by JSUNL, though farmers can continue to pursue agricultural activities within the footprint, without causing any physical damage to the tower structure. Future access to the corridor can be sought by JSUNL for transmission line maintenance and subject to any damages to crops/property caused by such activity being compensated.

The baseline studies have profiled the environmental and social conditions along the 3 transmission line (TA) alignments (Irba –Ramgarh, Irba- Ratu and Irba - Kanke), covering in general a buffer distance of 500 m on either side of the RoW and up to 10 kms where any significant environmental sensitivity is identified. The studies were designed to collect information from secondary sources and to obtain primary information through site visits and consultations with local communities and other related stakeholders. Overall, the baseline is reflective of the environmental and social landscape of the districts through which the alignment would pass. Corridor specific environmental and social baseline for each of the transmission lines described below:

Irba-Ramgarh

- The Irba-Ramgarh TL alignment passes through Oramanjhi block, Patratu block and Ramgarh block. Major part of the TL alignment passes through rural area. Total 11 villages located within the study area of Irba-Ramgarh TL alignment. Among those Barkakhan (18475) has the highest population lived in 3563 household and the lowest populations were recorded in Uparnagru (161); The Ramgarh town is at approx. 3 km from the alignment but the Ramgarh cantonment is at a distance of approximately 1 km from the alignment.
- Two forest patches of approx. 370 meters (as demarcated in SoI toposheets) is found near the above mentioned TL alignment. However,

no Protected Area (PA)/ National Park or Wild life Sanctuary is located within 10 km of the TL alignment.

- River Damodar with width of 164.5 meter is intersected by the alignment.
- The TL alignment transverses through Ranchi district, which is Schedule V area as specified in the Indian Constitution.

Irba-Ratu

- The Irba-Ratu TL alignment passes through Oramanjhi and Kanke block. Major part of the TL alignment passes through rural area. Total 27 villages are located within the study area of Irba-Ratu TL alignment. Among those Ichapiri (4241) has the highest population lived in 696 household and the lowest populations were recorded in Jhiri (291). The Kanke town is approximately 5.6 km from the alignment.
- Two forest patches of approx. 450 meters (as demarcated in Sol toposheets) are found near the above TL alignment. However, no Protected Area (PA)/ National Park or Wild life Sanctuary is located within 10 km. of the TL alignment.
- River Damodar with width of 80 meters is intersected by the TL alignment.
- The TL alignment transverses through Ranchi district, which is a Schedule V area as specified in the Indian Constitution.

Irba-Kanke

- The Irba- Kanke TL alignment passes primarily through rural areas of Oramanjhi, Kanke and Burmu Block. Total 17 villages are located within the study area of Irba-Kanke TL alignment. Among these Kuchu (2371) has the highest population lived in 459 household and the lowest populations were recorded in Jhiri (291). The Kanke town is approximately 5.6 km from the alignment while the Ratu is approximately 9.6 km from the alignment.
- However, no Protected Area (PA)/ National Park or Wild life Sanctuary is located within 10 km. of the TL alignment.
- River Jhumur with width of 80 meters is passing through the TL alignment.
- The TL alignment transverses through Ranchi district, which is Schedule V area as specified in the Indian Constitution.

Community consultations were undertaken in villages (Ukhrid, Simatoli, Kuchu, Jidu, Khirabari, Gujrung Jamra) adjoining to the TL alignments to understand the perceptions of the local people with respect to the proposed project, problems faced by local people due to any existing transmission line (if any), livelihood pattern of the villagers etc. During community consultations following observations were recorded:

- Diminution of land value in the width of RoW;
- Damages to crop in case stringing of transmission line during harvesting period; and
- Expectation of employment opportunity arising from the project; and
- Electromagnetic induction below tower footings for which land owner are unable to cultivate;

The potential and associated impacts of the proposed TL alignment projects have been identified and evaluated using standard procedures. Source references including past project experience, professional judgment and knowledge of both the project activities as well as environmental and social setting of the site and surroundings were used in the assessment.

The uptake of land for TL alignment corridor, in sections which will pass through privately owned land, may lead to an adverse impact on the value of land parcels falling in the RoW in two ways: one, for parcels in which the towers are to be located, there is a physical obstruction to use of land falling under the tower footprint. The land owner is unable to use the land under the tower for alternative uses, other than agriculture, potentially leading to a reduction of land value, often for the entire parcel. Two, because of restrictions imposed with regard to undertaking any structural construction(s) above a stipulated safe height (depending on the height of the conductor), as per provisions of the Electricity Act 2003, for all land parcels falling within the RoW, the land value also diminishes. It must be noted however, that as per existing practice, only the rights to the use of land for the tower footprint is obtained from the land owners (typically by invoking the provisions of the Indian Telegraph Act, 1885) on whose lands the towers are to be constructed – no land purchase or acquisition leading to a transfer of ownership is involved in the process. At present, there has been no empirically estimated value or evidence as to the % reduction in land value for parcels falling within the RoW of TL alignments.

For stretches of the corridor which would pass through agricultural land, there is expected to be a loss of crops and consequent economic losses to farmers if the construction phase is timed to a pre-harvest time. Other than that, because of the limited use of heavy vehicles and equipment during construction, it is unlikely that there would be any long-term impact related to compaction of soil or loss of fertility in top soil. Efforts would be made to ensure that the TL alignments do not pass over any habitat or village dwellings.

For stretches of the corridor which will pass through forest land (approx. 2 forest patches for Irba-Ramgarh and approx. 2 forest patches for Irba-Ratu), the clearing of trees and vegetation along the corridor is anticipated to result in loss of biodiversity, though the adverse impact is expected to be limited to the corridor and with a scope for part of biodiversity to return back to normal conditions after the construction phase gets over with the exception for high trees (which would continue to be lopped during maintenance phase). Current experience with regard to existing TL alignments in Jharkhand confirms this assessment of impact to be minimal. No designated bird Areas of significance along the corridor and no local birds which having sufficiently wide wing spans that results in touching two conductors and resulting in electrocution, impacts to avian population is expected to be insignificant. Because of the narrow width of the corridor and taking into account the status of biodiversity

of forests and wildlife in Jharkhand, no long-term habitat fragmentation impacts are expected to occur.

With the construction phase at a particular location along the transmission corridor expected to last about 3-4 weeks, construction related activities are expected to cause local level impacts on environmental quality due to re-entrainment of dust in air from earth works and construction dumps, air and noise emissions from vehicles and construction equipment, discharge of domestic waste water from labour camps and generation of construction and domestic wastes. In the construction phase, there are expected to be health and safety related issues due to involvement of labour in construction activities. Influx of people (migrant workers, subcontractors and suppliers) may lead pressure on existing social infrastructure and their interactions with nearby rural communities or potentially lead to cultural conflicts, and result in additional vulnerability to women and population belonging to scheduled castes or tribes. At the same time, positive socioeconomic impacts are also expected with scope for business opportunities for local subcontractors, skill acquisition for local workforce and employment opportunities arising from recruitment of local construction labour and staff, improvement of roads and access.

In order to ensure that the mitigation measures developed for the significant impacts of the proposed project are implemented and maintained throughout the project duration, an Environmental and Social Management Plan (ESMP) has been developed. It needs to be highlighted here that the overall approach for transmission line planning already takes into account the scope for minimising the stretch falling under forest land through the exploration of alternate alignments where forest land is encountered during the initial walk over surveys. The ESMP outlines management strategies for managing all associated and potential impacts that could affect the environment and living conditions of people in the area. These mitigation measures and plans include:

- Arrange for appropriate compensation for loss of biodiversity/forest land caused because of diversion of forest land (approx. 2 forest patches for Irba-Ramgarh and approx. 2 forest patches for Irba-Ratu), as per regulatory provisions.
- Provide appropriate compensation for the loss of value of land falling within the tower footprint or along the corridor RoW. In addition, for any temporary loss to crops, vegetation, trees, potentially caused by construction activities, arrange for compensation to the affected land owners.
- Adopt appropriate engineering and associated mitigation measures and plans to minimise adverse impacts to local communities during construction activities.
- Adopt appropriate EHS safeguards and good practices to be adopted by construction contractors to ensure that occupational health and safety risks of labours are maintained at acceptable levels. The labour force should also undergo compulsory training on work related health and safety measures.

- Where possible, ensure local suppliers and contractors implement local employment and procurement policies to the benefit neighbouring communities along the alignment.

As part of the ESMP, it is proposed to arrange for necessary approvals for clearing of forests, cutting of trees, and obtaining consent from land owners through whose land the RoW would be passing. In order to ensure that the ESMP is implemented during construction phase, specific conditions of contract for Site Contractors to be engaged have been laid down which would be made part of the Bidding document. A ESMP monitoring plan would also be implemented to enable JSUNL to ensure that the planned mitigation measures are being implemented and adverse impacts are kept to the minimum possible level.

For the implementation of the JPSIP Project JSUNL has developed a Project Implementation Unit (JPSIP PIU) headed by the Chief Engineer (Transmission O&M). The JPSIP PIU would also be responsible for driving the implementation of the E&S safeguards in JPSIP. At the field level, the Chief Engineer cum GM of the Ranchi Zone of JSUNL would be responsible for implementing the technical aspects of the JPSIP with respect to the sub-projects and would be responsible for overseeing the implementation of the ESMP and the E&S safeguards adopted by the contractor. In addition, it is recommended that the Contractor implementing the subprojects would induct Environment and Social personnel to supervise implementation of the E&S safeguards on the ground.

Through the process of consultation and disclosures, JPSIP would ensure that the project information is communicated to the stakeholders and the feedback from the community is integrated into the execution phases of the project. A Consultation Framework has been prepared to ensure involvement of stakeholders' at each stage of project planning and implementation. In addition, a three-tier Grievance Mechanism has been proposed for handling any grievances of community related to the project i.e. Tier 1 -Circle level, Tier 2 -Zone level, Tier 3- Grievance Redresses Cell located centrally at the JPSIP PIU in Ranchi.

1.1

BACKGROUND

The Government of Jharkhand with active support of the Government of India has planned for implementing 24x7 Power for All (PfA) in Jharkhand. The program is aimed at achieving 24x7 reliable powers for all the households by FY 2019. The PfA roadmap includes interventions in generation, transmission, distribution, renewable energy and energy efficiency/ proposed to be implemented during FY16 to FY19. Government of Jharkhand through Jharkhand Urja Sancharan Nigam Limited (JUSNL) has planned to develop the transmission infrastructure in the State. This transmission infrastructure development is being funded from different sources e.g. domestic fund, Public Private Partnership (PPP) and multilateral funding. The Jharkhand Urja Sanchar Nigam Limited (the state run power transmission utility company) has approached the World Bank for assistance to fund a part of the transmission infrastructure under the Jharkhand Power System Improvement Project (JPSIP). The project would include creation of 25 new 132 kV substations and associated 132 KV transmission lines of around 2000 Kms.

JUSNL would like to develop the projects in a sustainable manner. Towards this objective, an Environmental and Social Management Framework (ESMF) has been developed to lay out a mechanism for integrating environmental and social concerns into the planning, designing and implementation phase of JPSIP. Based on the higher level guidance provided in the ESMF, each project component is undergoing a project specific Environmental and Social Impact Assessment (ESIA). Based on the outcome of the assessment, a project specific Environmental and Social Management Plan (ESMP) is laid down for all the sub-projects.

1.2

PROJECT OVERVIEW

As part of the JPSIP, JUSNL has planned for development of 25 new substations and associated transmission lines. These substations and transmission lines have further been consolidated into schemes. For the purpose of implementation these schemes are divided into 3 Phases. The subprojects in each of the schemes are presented as *Annexure 1*.

In Phase I there are 9 schemes. Three (3) nos of these schemes are located in Ranchi District while three (3) nos of scheme are located in Dumka district and three (3) nos in East Singhbhum district.

This Environment and Social Impact Assessment Report deal with the construction of:

- 132 kV D/C Irba-Ramgarh Transmission Line;
- 132 kV D/C Irba- Ratu Transmission Line.

- 132 KV D/C Irba – Kanke Transmission Line

These transmission lines are part of Scheme 1 of Phase I. The details of the other interlinked subprojects in the scheme are presented in *Table 1.1*.

Table 1.1 *Details of the substation and interlinked transmission lines (Scheme D)*

Sl. No	Details of Scheme D	Capacity (MVA)	Length (km)
1.	132/33 Kv GSS Irba (2x50 MVA)	100	
2.	132 kV D/C Irba-Ramgarh Transmission Line		23.59
3.	132 kV D/C Irba- Ratu Transmission Line		42.677
4	132 KV D/C Irba – Kanke Transmission Line		23.59

Source: JUSNL

Environmental and Social Assessment of the grid substation at Irba is presented as separate volume: **Scheme D Volume 1**.

1.3 *PURPOSE AND SCOPE OF THIS ESIA*

The ESIA process involves the identification of the potential environmental issues in the project and trying to address them through design interventions. The ESIA further carries out impact prediction and evaluation of residual environmental and social issues of a Project. It then goes on to outline the proposed mitigation measures for residual impacts and enhancement measures for positive impacts which the Project will implement. The objectives of this document are to:

- Identify all potentially significant adverse and positive environmental and social issues of the Project. Enumerate the design modification which has been influenced by the ESIA process and define the final alignment of the transmission lines;
- Gather baseline data to inform the assessment of impacts on the environment as a result of the Project;
- Suggest appropriate mitigation measures to effectively manage potential adverse impacts; and
- Developing an Environmental Management Plan (EMP) to implement suggested mitigation measures to minimize adverse impacts through effective management systems including formulation of monitoring and reporting requirements.

1.4 *STRUCTURE OF THE REPORT*

The report has been organized considering the following:

- Chapter 1 above contains a brief background of JPSIP. It also presents a broad context to the ESIA Study;
- Chapter 2 presents the regulations and policies applicable and actions which are required by JUSNL;

- Chapter 3 presents the description of the proposed transmission lines and interaction with the bio-physical and socio-economic environment;
- Chapter 4 provided methodology adopted for the ESIA study;
- Chapter 5 outlines the environmental and social setting of the proposed transmission lines which forms the basis for assessment of potential impacts;
- Chapter 6 presents the likely impacts from the proposed transmission lines over the lifecycle of the project along with its severity levels;
- Chapter 7 elaborates on the stakeholder identification process adopted and a brief of the public consultations under taken to capture the local residents / stakeholders perceptions;
- Chapter 8 presents the mechanism of the implementation of the proposed mitigation measures complete with responsibility and resources requirements; and
- Chapter 9 presents the Conclusions and Recommendations.

1.5 *LIMITATION*

Project planning for proposed transmission line has been undertaken by Tata Consulting Engineer (Hereinafter referred to as “Design Consultant”) based on desktop studies and a Detailed Project Report has been developed based on the same. Detailed field survey of the project components like tower footing and the RoW is currently being undertaken by Design Consultant. The present draft of the ESIA therefore considers the project configuration as has been outlined in Design Consultant’s Report and impacts for the same has been accordingly assessed.

1.6 *USES OF THIS REPORT*

The Client acknowledges that report provided by ERM in relation to the provision of Services is delivered to the Client solely for the Client’s benefit. ERM, its officers, employees, contractors, and agents shall owe no duties, obligations or liabilities to any persons in connection with any use of or reliance on the Project information provided by JUSNL. We make no warranties, express or implied, including without limitation, warranties as to merchantability or fitness for a particular purpose.

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ERM that the site and property described in the report are suitable collateral for any loan or that acquisition of such property by any lender through foreclosure proceedings or otherwise will not expose the lender to potential environmental or social liability.

The ESMF identifies all the national and state level legislation rules and guidelines which would be applicable to JPSIP. It has also identified all the World Bank Policies and guidelines which are applicable in JPSIP. This section highlights only the relevant environmental and social policies and regulations, World Bank guidelines which are applicable for this sub-project.

2.1 APPLICABLE LAWS AND STANDARDS

The applicable regulations and relevant policies in the context of the project are presented in below table.

Table 2.1 Regulations Triggered for the Project

Sl. No.	Regulation	Applicability & Action Required	Responsibility
A.	Electricity Related Regulation		
1.	Electricity Act 2003, Indian Telegraph Act 1885 and Department of Power, Government of Jharkhand notification dated 15th December 2017	<p>Under the provisions of Section 68(1):-Prior approval of the Govt. of Jharkhand (GoJ) is a mandatory requirement to undertake any new transmission project 11 kV upward in the State which authorizes JUSNL to plan and coordinate activities to commission a new Transmission project.</p> <p>Under Section 164:- GoJ, may by order in writing, authorize JUSNL for the placing of electric line for the transmission of electricity confer upon licensee (i.e. JUSNL) in the business of supplying electricity under this act subject to such conditions and restrictions, if any, as GoJ may think fit to impose and to the provisions of the Indian Telegraph Act, 1885, any of the power which the Telegraph authority possesses.</p> <p>The Electricity Act and Telegraph Act provide guidance on the compensation payable for damages to crops/ trees and structures for setting up of transmission line. As per the provision of the above mentioned Acts, JPSIP would require to pay compensation for any damage or loss due to its projects.</p> <p>Based on a Notification dated 15th</p>	JUSNL, JPSIP

Sl. No.	Regulation	Applicability & Action Required	Responsibility
		<p>of December, the Jharkhand Government has notified the following arrangement for compensation:</p> <ul style="list-style-type: none"> • Compensation at the rate of 85% of land value as determined by District Magistrate or any other authority based on Circle rate/ Guideline value/ Stamp Act rates for tower base area (between four legs) impacted due to installation of tower/pylon structure; • Compensation towards diminution of land value in the width of RoW Corridor (27m for 132 KVA transmission line) due to laying of transmission line and imposing certain restriction would be decided by the States as per categorization/type of land, at 15% of land value, as determined based on prevailing Circle rate /Stamp Act rate. 	
2.	Technical Standards for Construction of Electrical Plants and Electric Lines Regulations, 2010; Measures relating to Safety and Electric Supply Regulations, 2010	Both the Regulations are framed by Central Electricity Authority (CEA) of India under Indian Electricity Act, 2003. These regulations provide technical standard for construction of electrical lines and safety requirements for construction/ installation/ protection/operation/maintenance of electric lines and apparatus. JPSIP and its contractors would comply with the requirements of these regulations.	JPSIP, Contractor
B. Environment/Social Legislation			
1.	Environment Protection Rules, 1986 and applicable standards	The standards for discharge/ emission from different type of pollution source (e.g., DG sets) and industries have been laid down by CPCB under EP Rule, 1986. JPSIP would ensure that all these standards are adhered with during the planning, construction and operation of the project.	JPSIP, Contractor
2.	Forest Conservation Act, 1980	This Act mandates prior permission of the Forest Department for any activity which is to be undertaken on Forest Land. The provisions of conversion of forest land for non-forest purpose are specified under this Act. Some stretches of the transmission line have traversed through forest	JPSIP, Contractor

Sl. No.	Regulation	Applicability & Action Required	Responsibility
		area. Thus clearance has to be obtained from relevant authorities under the Forest (Conservation) Act, 1980.	
3.	Jharkhand Timber and Other Forest Produce (Transit and Regulation) Rules, 2004 as amended	For felling of trees in the forest land identified within the ROW of the transmission line, permission need to be obtained from DFO or authorized ACF.	JPSIP, Contractor
4.	Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006	The applicability of this Act has been linked with forest clearance process under Forest (Conservation) Act, 1980 w.e.f. August 2009 by MoEF. As part of the forest clearance process rights of the Scheduled Tribes and Other Traditional Forest Dwellers is required to be settled by District Collector.	JPSIP
5.	Ancient Monuments & Archaeological Sites and Remains Act, 1958; Indian Treasure Trove Act, 1878; Jharkhand Ancient Monuments and Archaeological Sites, Remains and Art Treasures Act, 2016.	Proposed transmission lines will not pass near or inside archaeological site. Thus National and State level Acts on Ancient Monuments and Archaeological Sites will not be triggered for this project. However, treasure, archaeological artefacts can be found during excavation work; for which procedure laid down in Indian Treasure Trove Act, 1878 would be followed.	JPSIP, Contractor
6.	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	Generation of waste oil and used transformer oil at site would attract the provisions of Hazardous Waste and other waste Rules, 2016. The hazardous wastes have to be disposed through CPCB/SPCB approved recyclers only. JPSIP would obtain authorization for hazardous waste under this Rule. JPSIP would also maintain record of hazardous waste and submit the desired return (Form 4) in prescribed form to JSPCB.	JPSIP
7.	E-Waste (Management) Rules, 2016	JPSIP, being the bulk consumer of electrical and electronic equipment will ensure that e-waste generated is channelized through collection center or dealer of authorized producer or dismantler or recycler or through the designated take back service provider of the producer to authorized dismantler or recycler.	JPSIP
8.	Central Ground Water Authority (CGWA) Public Notice dated 4 th January 2017	Permission need to be obtain from State Level Ground Water Resources Development Authority and Central Ground Water	JPSIP

Sl. No.	Regulation	Applicability & Action Required	Responsibility
		Authority for installation of bore well and abstraction of ground water resource.	
C. Labour related Legislation			
1.	The Child Labour (Prohibition and Regulation) Act, 1986	This Act prohibits engagement of children in certain employments and regulates the conditions of work of children in other certain employments. JPSIP and its contractors would comply with the requirements of these regulations.	JPSIP, Contractor
2.	Contract Labour (Regulation & Abolition) Act 1970	This Act regulates the employment of contract labours in certain establishments and prohibits for its abolition in certain circumstances. JPSIP and its contractors would comply with the requirements of these regulations.	
3.	Minimum Wage Act, 1948	Under this Act, Jharkhand State government has notified minimum wage rate for the workers. JPSIP's contractors would provide minimum wage to its workers as per the minimum wage rate provided in the said notification.	
4.	Bonded Labour System (Abolition) Act, 1976	This Act abolished bonded labour system to prevent the economic and physical exploitation of the weaker sections of the people. JPSIP and its contractors would comply with the requirements of these regulations.	
5.	Grievance Redressal Machinery under Industrial Disputes Amendment Act, 2010	This Act provides mechanism for setting up of grievance redressal committee in industrial establishment. JPSIP and its contractors would comply with the requirements of these regulations.	
6.	Employees' Provident Fund and Miscellaneous Provisions Act, 1952	This Act provides for the institution of provident funds, pension fund and deposit-linked insurance fund for employees in factories and other establishments. JPSIP and its contractors would comply with the requirements of these regulations.	
7.	The Payment of Wages Act, 1936, amended in 2005; Workmen's Compensation Act, 1923	This Act provides for timely disbursement of wages payable to employed persons covered by the Act. JPSIP and its contractors would comply with the requirements of these regulations.	
8.	Maternity Benefit Act, 1961	This Act regulate the employment of women in certain establishments for certain periods before and after child-birth and to provide for maternity benefit and certain other benefits. JPSIP and its contractors would comply with the requirements of these regulations.	
9.	Employees State Insurance Act, 1948	This Act provides certain benefits to employees in case of sickness, maternity and ' employment injury '. This Act is applicable to employees earning Rs 15,000 or less per month. JPSIP and its contractors would comply with the requirements of these	

Sl. No.	Regulation	Applicability & Action Required	Responsibility
		regulations.	
10.	Inter-state Migrant Workmen Act, 1979	This Act regulates the employment of inter-State migrant workmen and provides for their conditions of service. JPSIP and its contractors would comply with the requirements of these regulations.	
11.	Intimation of Accidents (Forms and Time of Service of Notice) Rules, 2004	This Rule comes in force for occurrence of accident in connection with the generation, transmission, supply or use of electricity and electric line. JPSIP would incorporate requirements of these regulations in contract document of procurement.	

2.2

WORLD BANK SAFEGUARD POLICY

The implementation of the World Bank Operational Policies seek to avoid, minimize or mitigate the adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the proposed project. Based on the information gathered during the study, following Policies are triggered and would require adequate measures to address the safeguard concerns.

Table 2.2 *World Bank Policies Triggered for the Project*

Sl. No.	World Bank Policies/Guidelines	Applicability	Responsibility
1.	OP 4.01 Environmental Assessment	The Bank requires environmental assessment (EA) of projects under Bank financing to help ensure that they are environmentally sound and sustainable. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. As per requirement of the OP 4.01, environmental assessment is being carried out for this project.	Environmental and Social Consultant of JPSIP
2.	BP 4.11 Physical Cultural Resources	This policy requires Bank financing projects to assess impacts on physical cultural resources at the earliest possible stage of the project planning cycle. Environmental assessment involves the preparation of a physical cultural resources management plan that includes (a) measures to avoid or mitigate any adverse impacts on physical cultural resources; (b) provisions for managing chance finds; (c) any necessary measures for strengthening institutional capacity for the management of physical cultural resources; and (d) a monitoring system to track the progress of these	Environmental and Social Consultant of JPSIP

Sl. No.	World Bank Policies/Guidelines	Applicability	Responsibility
		activities. Though presently there are no physical cultural resource found to be affected by the project, possibility of "chance finds" cannot be ruled out. If something is found at later stage of the project (construction phase), procedures laid down in "Indian Treasure Trove Act, 1878".	
3.	OP 4.36 Forests	This policy contributes to Bank's mission of poverty reduction and sustainable development through management, conservation and sustainable development of forest ecosystems and their associated resources. As the transmission line traverses through forest land, this Policy would be triggered. Specific measures would be made in the ESMP and the Bidding document to prohibit any activity which can be in contravention to the Bank policies on Forests.	Environmental and Social Consultant of JPSIP
4.	OP 4.10 Indigenous Peoples	This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For projects which are likely to have impact on the tribal community a Tribal Development Plan would be developed and implemented.	Environmental and Social Consultant of JPSIP/JPSIP
5.	IFC/WB General EHS Guidelines	Recommendations of these guidelines would be incorporated in ESMP and Bidding	Environmental and Social Consultant and
6.	IFC/WB Guidelines for Power Transmission and Distribution	document for this project.	Technical Consultant of JPSIP

3.1 PROJECT LOCATION

The Irba-Kanke, Irba- Ratu and Irba –Ramgarh transmission line (TL) alignments traverses through the districts of Ranchi and Ramgarh. The administrative districts through which each of the alignment passes are summarised in *Table 3.1* and presented in *Figure 3.1, Figure 3.2 and Figure 3.3*.

Table 3.1 *Administrative divisions of TL Alignments*

Sl. No	Line	District	Block	Approx. segment [Angle Point (AP) from -to]
1	Irba –Ramgarh	Ranchi	Ormanjhi	AP 1 –AP 17
		Ramgarh	Ramgarh	AP 17 – AP 55
2	Irba- Ratu	Ranchi	Ormanjhi	AP 1 – AP 23
			Kanke	AP 24 – AP 41
			Burmu	AP 42 – AP 63
3	Irba-Kanke	Ranchi	Ormanjhi	AP1 – AP 36
			Kanke	AP 36 – AP 44

Source: ERM Survey

3.2 ACCESSIBILITY

The National Highway 33 (connecting Ranchi- Hazaribagh) cuts across all the three TL alignments, i.e. Irba –Ramgarh, Irba- Ratu and Irba Kanke. In addition, all the three alignments are also accessible by State Highways at a number of places. The Bokaro Ramgarh Railway line crosses the Irba-Ramgarh alignment. However in the remaining two alignments there are no railway crossings. The details of the locations where the Highways cut the alignment are presented in *Table 3.2*.

Table 3.2 *Intersection of the Highways with the TL Alignments*

Sl. No	Line	Highway	Approx. segment [Angle Point(AP) from -to]
1	Irba –Ramgarh	NH 33	AP 23 – AP 24
		SH	AP 39 –AP 40
		Railway line	AP 43 – AP 44
2	Irba- Ratu	State Highway	AP 11- AP 12
		NH 33	AP 12- AP 13
1.	Irba-Kanke	NH 33	AP 17 AP 18
		State Highway	AP 12- AP 13

Source: ERM Survey

There are a number of other district roads which cut these alignments. Thus for the purpose of construction these existing roads would be used for approaching the tower footing. However in case at some of the tower location there are issues with regards to access the construction vehicle would ply over the agricultural field and no access road would be constructed. Accessibility

maps for three transmission line alignments are presented in *Figure 3.4, Figure 3.5 and Figure 3.6.*

Figure 3.1 *Administrative Setting of Irba- Kanke TL Alignment*

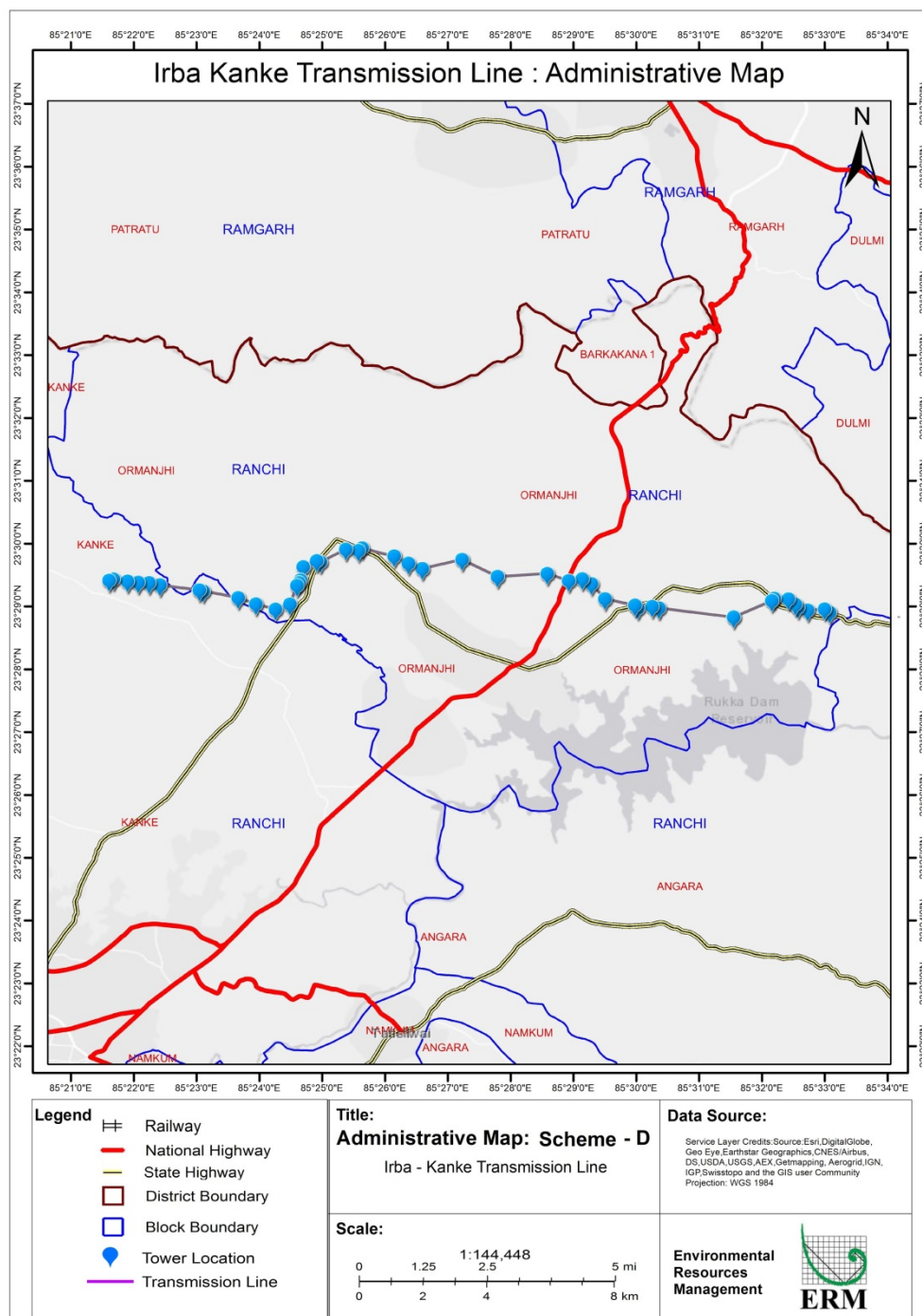


Figure 3.2 Administrative Setting of Irba -Ramgarh TL Alignment

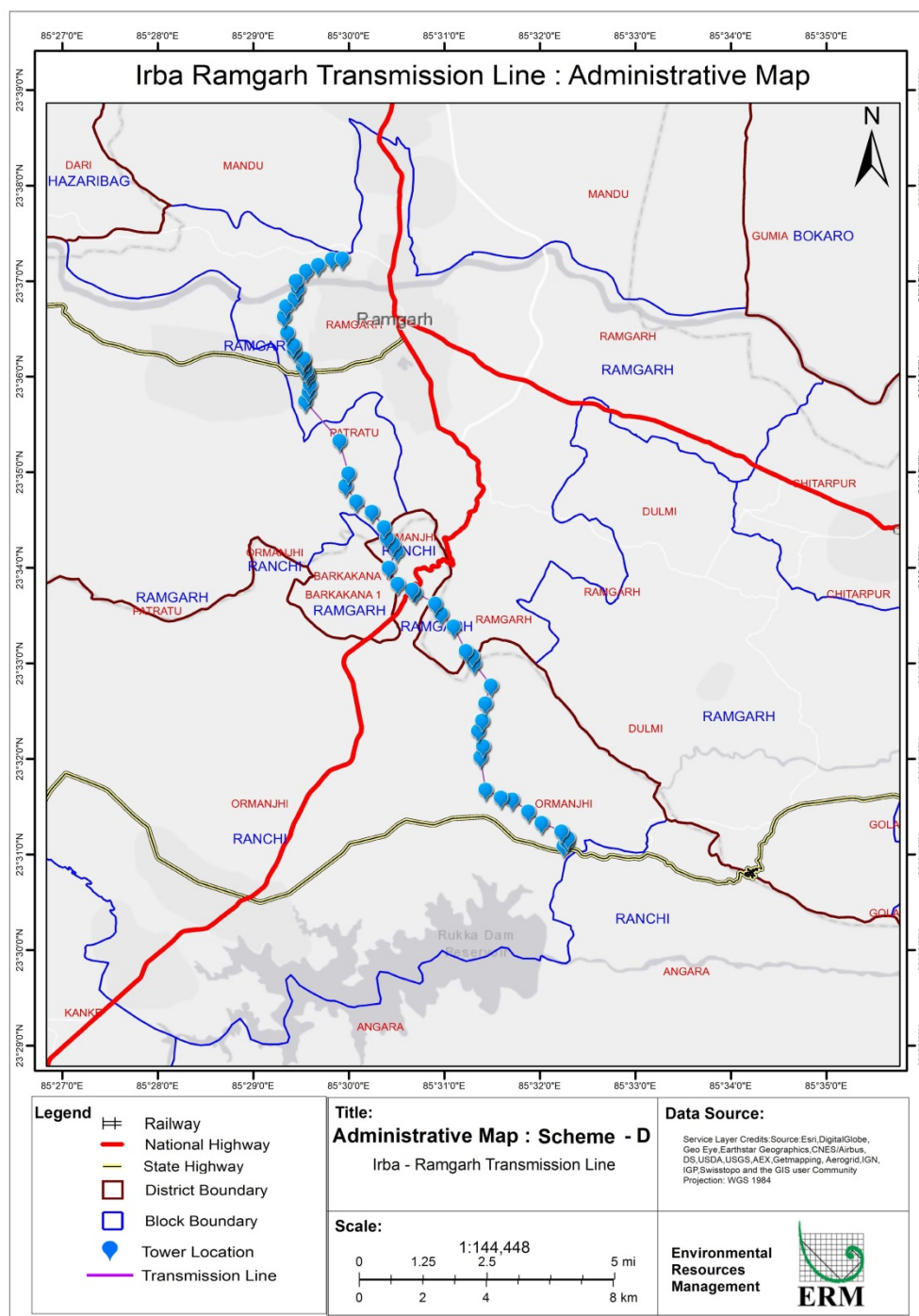


Figure 3.3 Administrative Setting of Irba -Ratu TL Alignment

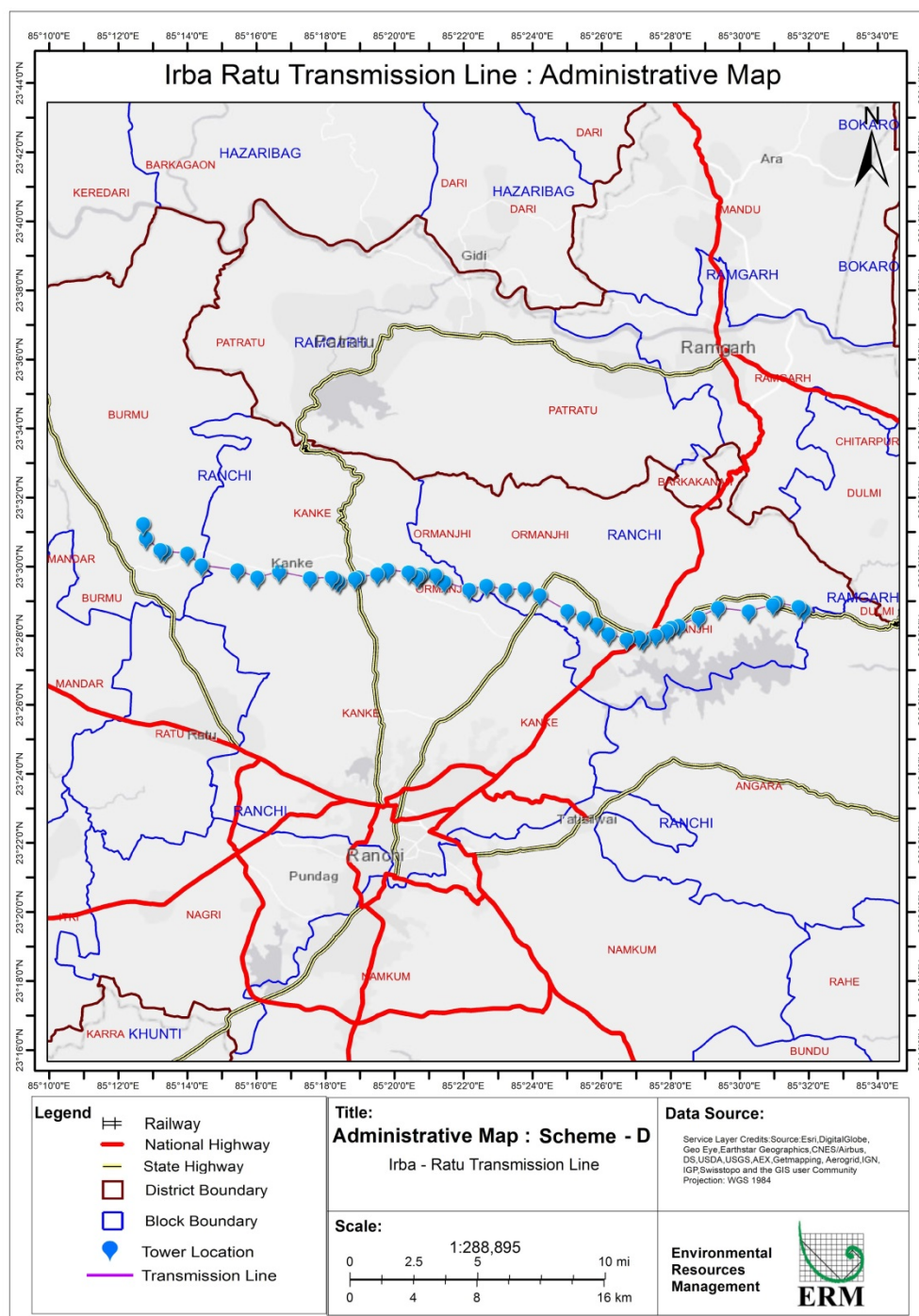


Figure 3.4 *Irba-Kanke TL Alignment on Satellite Imagery*

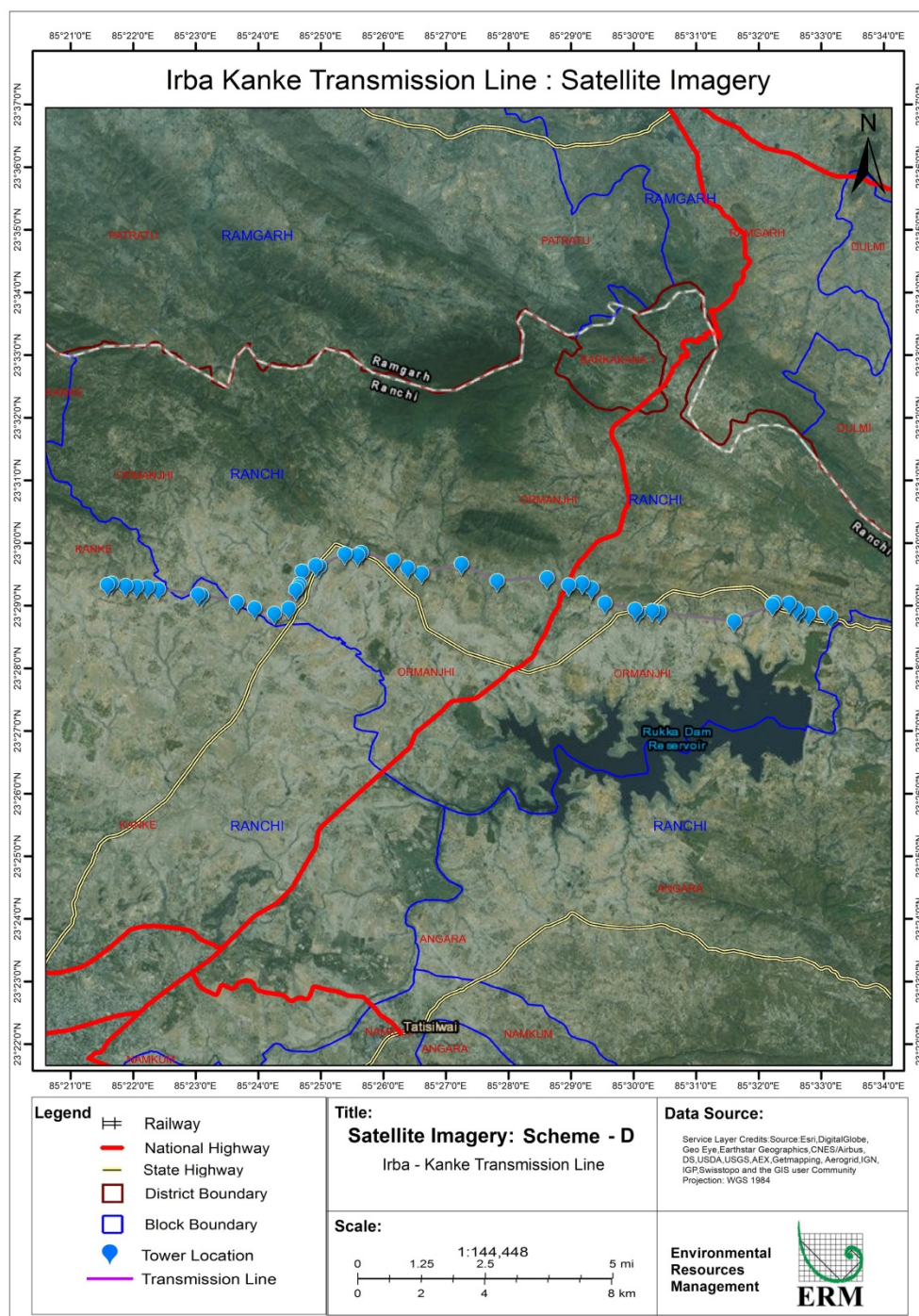


Figure 3.5 Irba-Ramgarh TL Alignment on Satellite Imagery

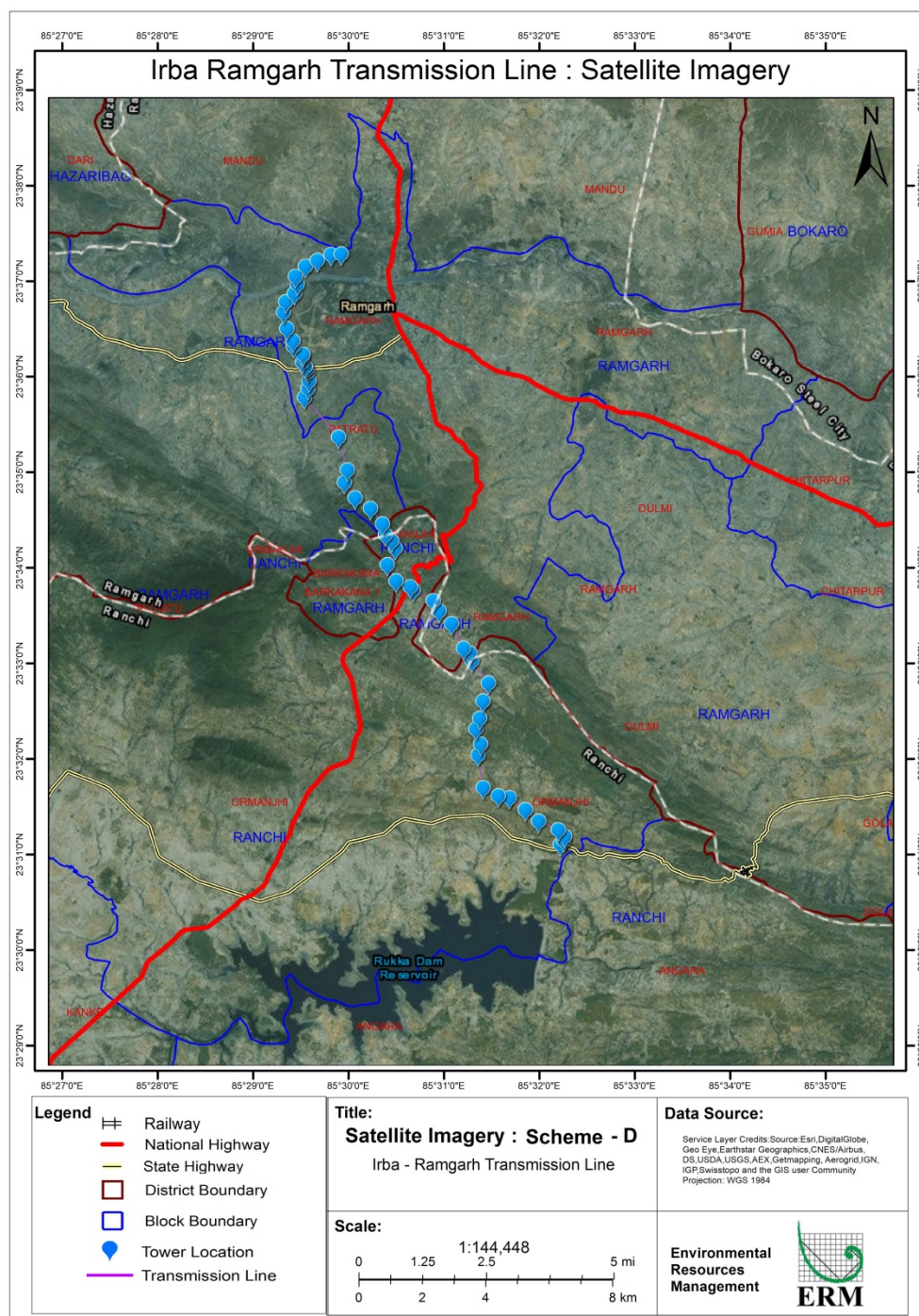
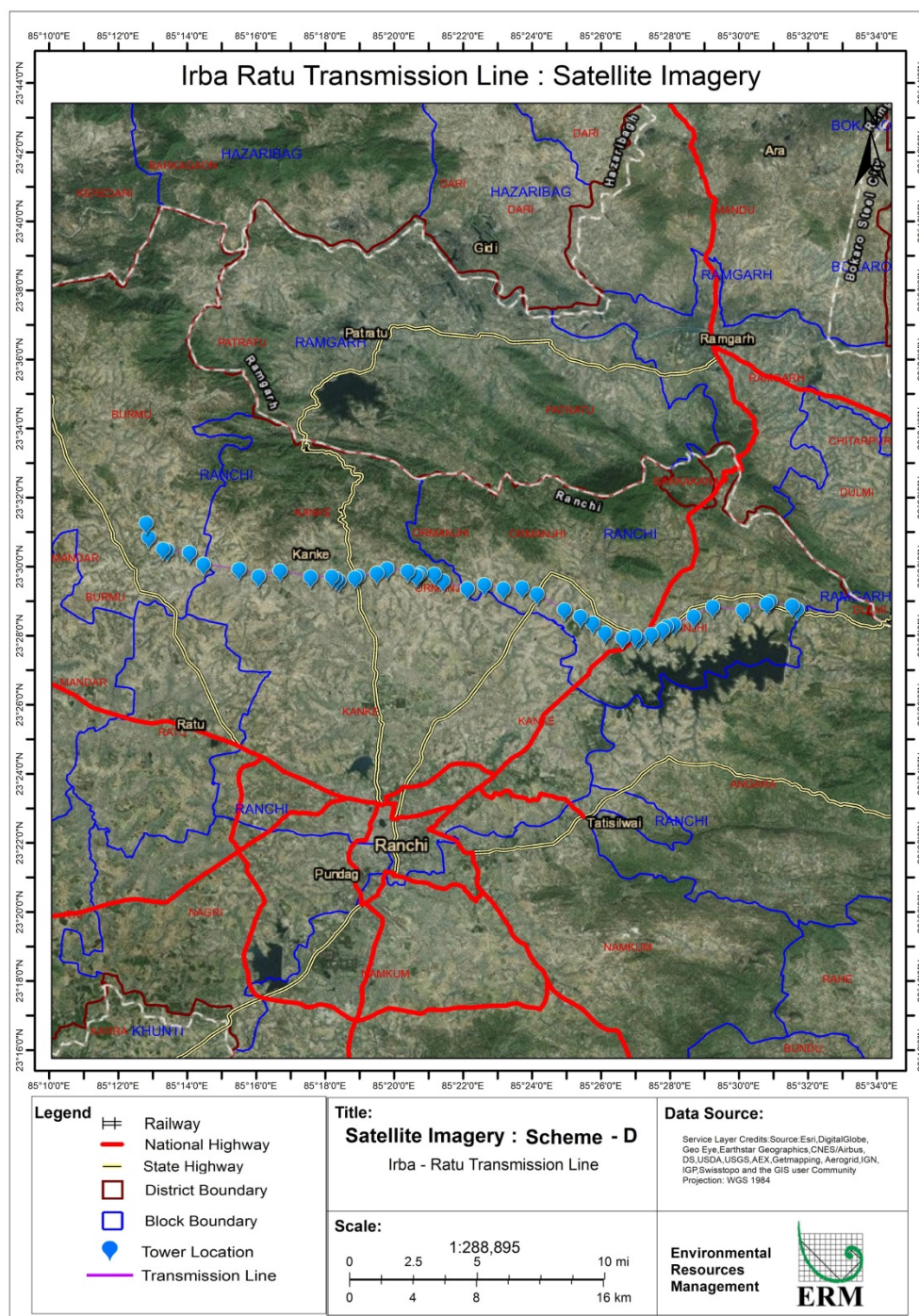


Figure 3.6 Irba-Ratu TL Alignment on Satellite Imagery



3.3 *TRANSMISSION LINES PROJECT PHASES AND ACTIVITIES*

Different phases of transmission line projects are described below.

3.3.1 *Project Planning*

During the stage the route planning for the transmission line takes place. At planning stage three alternative routes for each of the transmission line are identified avoiding sensitive areas such as the major settlements, forests etc. and based on other technical considerations. A preliminary level analysis is carried out to identify the best alternative. The typical activities which would be carried out during the project conceptualisation phases include:

- Walkover surveys of the alternative alignment;
- Techno-economic and Environmental and Social Analysis of the alternative alignment for deciding on the final ;
- Detailed survey of the final alignment; and
- Soil investigation of the tower locations at regular interval to ascertain the type of foundation.

3.3.2 *Project Construction Activities*

The construction of the transmission line route includes carrying out check surveys, site clearing, access road establishment, foundation construction, structure installation and finally energising. This phase is expected to take between 18 – 24 months to complete. The project construction activities would include a number of activities including:

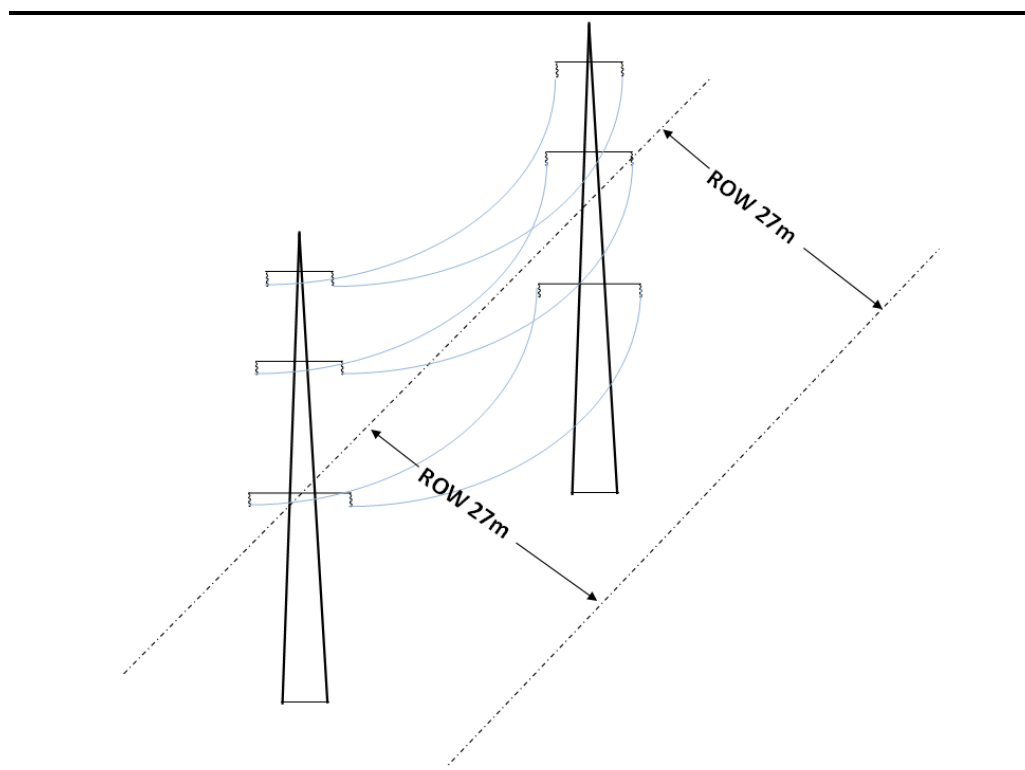
- Check Surveys;
- Site Clearing including vegetation removal and tree felling;
- Excavation for tower foundation, construction of the concrete bases for the transmission line pylons;
- Hauling in of the pylon components and other raw materials;
- Assembly and erection of the towers;
- Stringing of the transmission line; and
- Site rehabilitation.

Check Surveys

The check surveys are carried out by the contractor at the initiation for fixing the tower locations. At this point of time once the tower locations are known, the ownership of the land is identified by the Contractor with the help of the Revenue Department. Civil construction work would be initiated after the land owner has provided his/her consent and the compensations for damages have been paid.

All construction activities would be carried out within the Right of Way for the safe operation of the transmission lines. The right of way for the 132 KV D/C transmission line is 27 m as per IS 5613.

Figure 3.7 *Right of Way for 132 KV Transmission Line*



Clearing of Sites

At the tower footing site all vegetation in the footprint of the tower base and the working area of approximately 2 m on each side of the base are cleared of vegetation.

Excavations

The total depth of foundation, below ground level shall generally be 3.0 to 3.5 m ⁽¹⁾. However, depth of tower foundations will vary depending on the soil condition and tower type. Excavations would be carried out for the foundations of the towers using an excavator. Each excavation would be inspected and tested to confirm its suitability. The foundations would be filled up with concrete. As per Annexure 2.0 of the DPR a typical suspension tower ⁽²⁾ would require 4.7m X 4.7 m area.

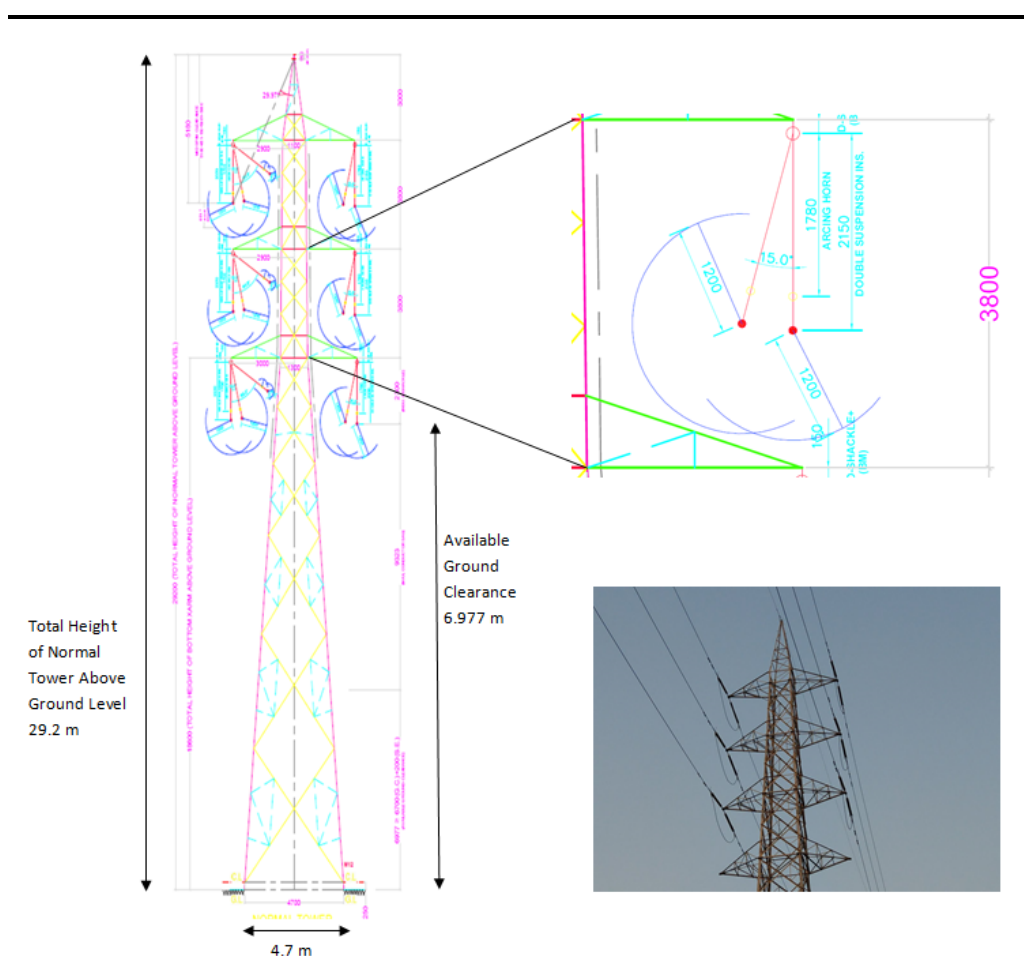
The framework, reinforcing bars, embedded of the tower and any earthing elements would be placed in the pits. A 50 mm thick pre-stressed concrete cement pad is laid at the base of the foundation. Concrete will be sourced from a 'ready-mix' truck which will access the site or concrete will be mixed on site using a portable concrete mixer.

(1) Section 5.6.2.6 of Detail Project Report (DPR)

(2) Annexure 2.0 of DPR considers Type 2 tower in Wind zone 2.0 Category 2 with single ASCR conductor as a typical conductor.

Approximately, 80-100 m³ of concrete is required per tower. The steel used for the tower foundation would conform to IS 456-2000. The casting of the foundation would take approximately 15- 30 days and would involve 15- 20 labours depending on the terrain and soil conditions. Approximately, 60 m³ of water is required daily for the purpose of construction and allied activities. Once the excavations have been filled, the concrete requires 28 days for curing. The excavated soil would be backfilled and compacted as per the good engineering practices.

Figure 3.8 *Typical Electrical Clearance Diagram for Tower Type – DD2 (Suspension Tower)*



Note- Information derived from Annexure 2.0 of Detail Project Report prepared by Design Consultant

Erection of Tower

The material for the construction of the tower would be delivered directly from the storage yard/lay down area directly to the tower construction site. The material would be brought to the site directly either by tractor trailer or manually depending on the accessibility. The tower construction would start after the setting of the concrete is complete. The setting time, as specified in the Indian Standards (usually 28 day) would be maintained before the construction of the tower can begin. About 50 litres of water would be required at each of the tower site for the purpose of curing. It is estimated that in Scheme D 309 towers would be constructed as presented in **Table 3.3**.

Table 3.3 *Estimated number of towers in Scheme D*

Sl. No	Name of Alignment	No of Towers (nos)
1.	Irba -Ramgarh 132KV D/C Transmission line	81
2.	Irba -Ratu 132 KV D/C Transmission line	147
3.	Irba _Kanke 132 KV D/C Transmission line	81
	Total Number of towers in Scheme D	309

Source: DPR

The erection of the tower is done manually by assembling the prefabricated component of the lattice structure. The components are also hoisted manually by using a pulley system. Approximately 10-15 people are involved in the erection of the tower.

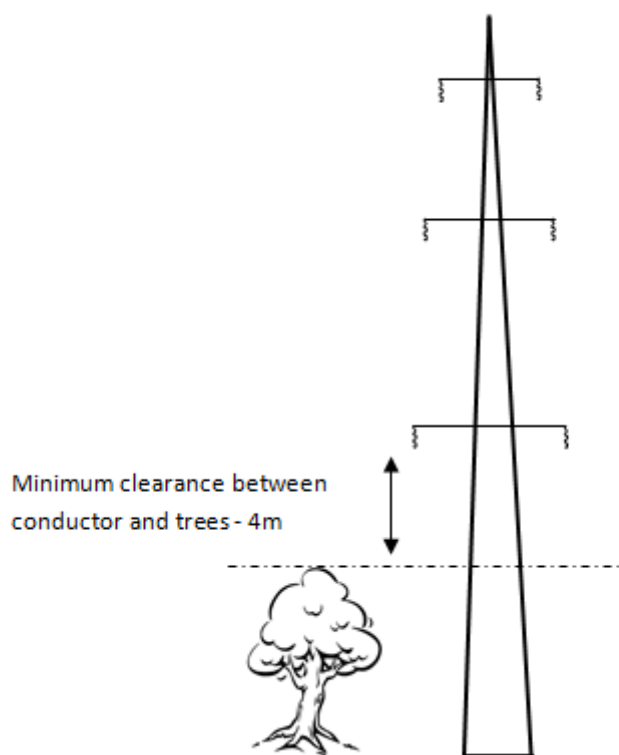
Stringing of Conductors

The stringing of the conductors can be done by either manual or tension method. Usually tension methods are used for stringing as this method keeps the conductor surface safe during stringing process. In this method, the conductor is kept under tension during the stringing process to keep the conductor clear of the ground. A pulling line is initially pulled into the travellers which are then used to pull the conductor from the reel stands using specially designed tensioners and pullers. There are basically two types of pulling machines used in the construction of transmission lines being strung under tension. These are defined as bull wheel and drum/reel-type. Pullers would be equipped with load-indicating and load-limiting devices. Tensioners would be equipped with tension indicating devices. The capacities of the puller and tensioner would be based on the conductor, span length, terrain, and clearances required above obstructions. Sag tensions can never exceed during stringing. Required capacity for both puller and tensioner can be calculated as mentioned in IEEE 524 ⁽¹⁾. Positive braking systems will be required for pullers and tensioners to maintain conductor tension when pulling is stopped.

Tree felling/lopping: Within the width of Right of Way (RoW), trees will be felled or lopped to the extent required, for preventing electrical hazard. As per Government of India Circular 7-25/2012-FC dated 5th May 2014, minimum clearance between conductor and trees would be 4m for 132 KV transmission line. The maximum sag and swing of the conductors are to be kept in view while working out the minimum clearance mentioned of 4m. In the case of transmission lines to be constructed in hilly areas, where adequate clearance is already available, trees will not be cut except those minimum required to be cut for stringing of conductors.

(1) Guide for the Installation of Overhead Transmission Line Conductors

Figure 3.9 *Minimum clearance between conductor and trees*



Note: Information derived from Government of India Circular 7-25/2012-FC dated 5th May 2014

3.4 *RESOURCE REQUIREMENT*

3.4.1 *Land Requirement*

Land will be required both for transmission line tower footing and 27 meter Right of Way for the 132 kV transmission line. As the detail survey of route alignment is not yet completed, exact land requirement is yet finalized. As stated earlier in Environmental and Social Management Framework for this project no land will be acquired for this project. However, there would be restriction on use of land falling within right of way and tower base. As per the regulation of Government of Jharkhand¹, due to restriction of land use, compensation at the rate of 85% of land value would be paid to land owners for tower base area. For RoW, compensation at the rate of 15% of land value would be paid to land owners towards diminution of land value in the width of RoW Corridor.

3.4.2 *Manpower*

The construction activity would be carried out by primarily three teams i) foundation ii) tower erection iii) stringing. The foundation construction team would have around 15-20 labours while the tower erection team which would

1) Department of Power, Government of Jharkhand notification dated 15th December 2017

follow would have 10-15 people. Finally the stringing team would also have around 20-30 people involved in the job.

Since these teams would be travelling along the transmission line they would preferably be staying on fly camps setup along the transmission corridor transmission line alignment. However for storage on the material a laydown area would be constructed. The area would also be used for housing of labours.

3.4.3 *Water Uses*

The water usage would include water for both construction and domestic activity. During tower foundation approximately 60 m³ of water (60 KL) will be required daily while in the tower erection phase approximately 50 L of water would be required daily. During stringing phase the water requirement would be primarily for domestic activity only and would be in the tune of 25 L per day.

3.4.4 *Vehicle usage*

Typical vehicles on site at all transmission lines include 2 trucks, 2-3 excavators and 6 light duty vehicles (LDV), puller and tensioner.

3.4.5 *Major material required During Construction*

Equipment and material necessary for the construction of the transmission line is presented in *Table 3.4*.

Table 3.4 *Equipment and Material required for transmission line*

Sl. No	Activity	Equipment Required
1	Foundation of Towers	Stub of Towers Stub Setting Templates Stub Setting jacks Form boxes for concreting Wooden planks for shuttering Concrete mixer machines , Vibrating Machines, Dewatering Pumps Back hoe Excavator Sand Cement Aggregate Metal Screens and other tools and tackles related for excavation , concreting and backfilling
2	Erection of Tower	Tower steel Members , nuts, bolts and rivets Derrick Poles for lifting of the tower members Poly propylene rope for Guying purpose
	Stringing of Conductor and earth wire	Pulleys tools and tackles Conductors and earth wire drums Insulator discs hardware filings and accessories Tensioner and puller machine for stringing purpose Pilot wires for paying off earth wire

Sl. No	Activity	Equipment Required
		Hydraulic compressor machine for making joints of conductors
		Pulley and sheaves , roller , clamps wires , ropes etc for stringing purpose

3.5 *WASTE GENERATION*

3.5.1 *Wastewater*

The wastewater generated at the construction phase would be primarily domestic wastewater from construction camp and laydown areas. These would be treated through septic tank and soak pit. In case of fly camp for the construction of the transmission bio-toilets would be provided.

3.5.2 *Solid Waste*

The solid waste generated from the construction activities would be primarily municipal solid waste.

3.6 *PROJECT TIMELINE AND PROJECT COST*

The estimated cost for Scheme D is INR 123.26 crore while that of the transmission lines is INR 53.17 crores. The time estimated for the construction period is envisaged to be 24 months. Most of the construction activity would be carried out during the non-monsoon.

A project level Environmental and Social Impact Assessment (ESIA) is method of systematic identification and evaluation of the potential impacts (effects) of the proposed transmission line project relative to the physical, biological and socioeconomic components of the environment. The ESIA study can be considered as an important project management tool that can assist in collecting and analyzing information on the environmental & social effects of a project and ultimately identify actions which can ensure that the projects benefits outweigh the impact on the bio-physical and social environment. The activities which have been undertaken in each of these steps/stages are presented in the subsection below.

4.1 SCREENING & SCOPING

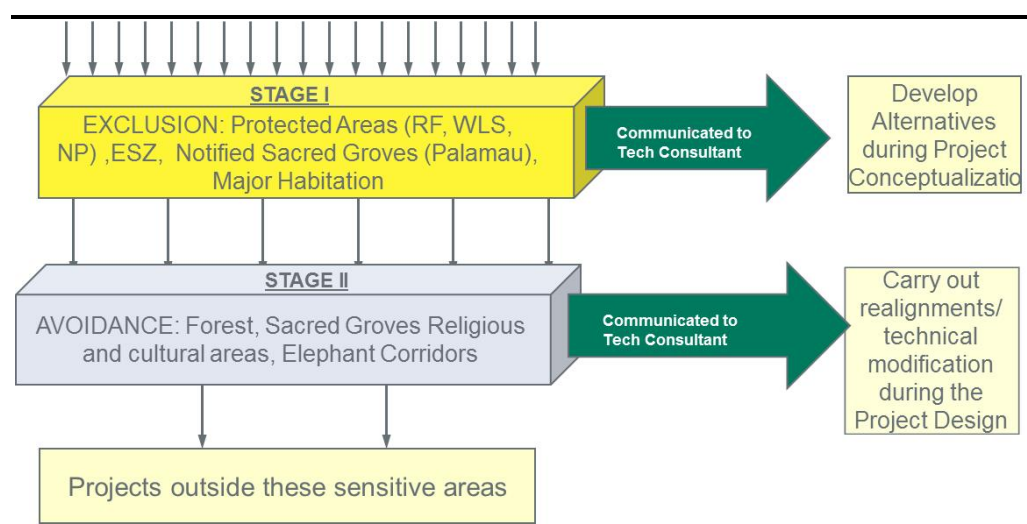
An initial reconnaissance was conducted along the three transmission lines to understand prevailing environment and social setting in its immediate vicinity and use it as a basis of screening and scoping exercise for the ESIA.

As defined in the ESMF, a two stage screening process was followed for transmission line project (refer *Annexure 2*). The first level of screening was carried out with the analysis of the alternative. While developing the alternatives JUSNL had taken into consideration the following criteria:

- Exclusion of protected areas such as Wildlife Sanctuary, National Park, Eco-Sensitive Zones etc.
- Forest land as identified on the Survey of India toposheet should be as less as possible;
- Settlement along the alignment should be as low as possible;
- Technical constraints such as crossing e.g. rivers, railways , roads should be as low as possible

The second stage of screening was carried out to identify and avoid forest land (wherever possible) on the best alternative. During this stage the best alignment was scanned for identifying any stretch of the alignment which has passed through any forest land. These were communicated to the Design Consultant for further consideration during the detailed survey stage. Moreover, during detail survey stage, it would be ensure by the Design Consultant that no houses are falling within the RoW of the transmission line. The results of the second stage screening are presented in *Annexure 2*.

Figure 4.1 *Two Stage Screening Process*



As per the ESMF, an initial environmental and social examination (IESE) was conducted to determine whether or not there would be key environmental and social impacts from the construction and operation of three transmission lines. The results of the IESE has been recorded in an Environmental and Social Impact Identification Matrix presented in the IA Section (**Chapter 6**) and was used as a tool for scoping the ESIA to potential environmental and social issues of concern. The IESE also helped in determining the requirement for other specialized studies e.g. Biodiversity Action Plan and Tribal People Plan.

4.2 *BASELINE STUDIES*

Establishing baseline helps in understanding the prevailing environmental and socio economic status of the study area. It provides the background environmental and social conditions for prediction of the future environmental and social characteristics of the area due to the operation of the proposed project during its life cycle.

Considering the project activity described in **Chapter 3** it is anticipated that scale and magnitude of project related impacts are likely to be perceived in an area within 500 m both side of the alignment and has been considered to be the study area for the ESIA. Site surveys were conducted in the study area understand the environmental setting of the alignments and the study area, understanding of the drainage patterns, presence of physiographic features e.g. hillocks, rocky outcrops, location of the habitations with respect to the alignment etc. Ecological surveys and community consultations were also conducted to collect the information related to the local community and biological environmental conditions of the study area. Secondary baseline data collection involved identifying and collecting available published material and documents on relevant environmental and social aspects (like soil quality, hydrogeology, hydrology, drainage pattern, ecology, meteorology

and socio-economic conditions) from veritable sources including Govt. Departments, Research papers, etc.

4.3

IMPACT ASSESSMENT

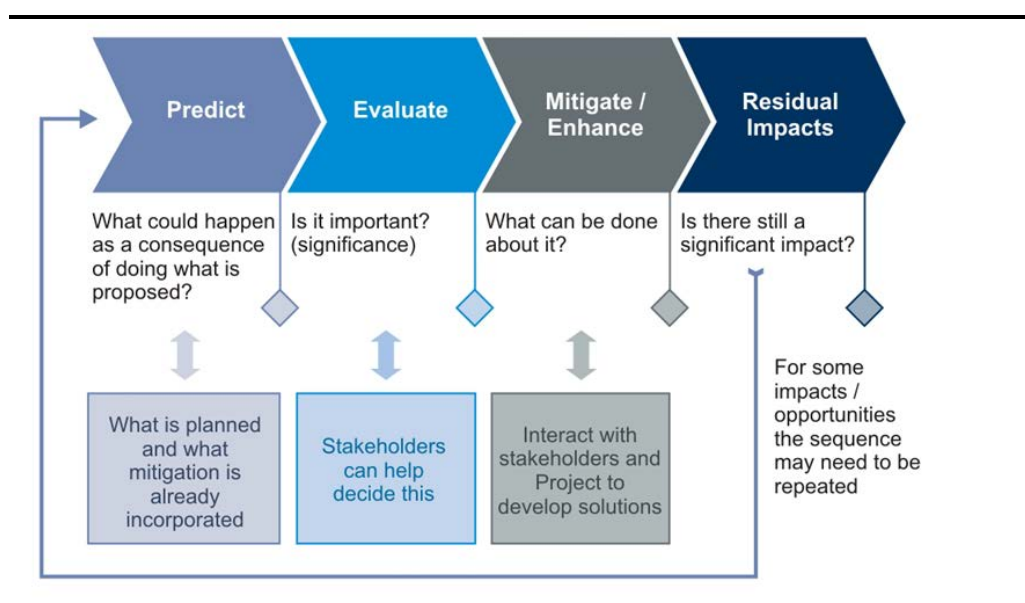
The key aim of the impact assessment process was to characterize and evaluate potential environmental and social impacts arising out of the project and prioritize them so that they can be effectively addressed through Environment & Social Management Plans (ESMPs). The potential impacts have been identified through a systematic process wherein the activities (both planned and unplanned) associated with the project, across the construction and operational phases have been considered with respect to their potential to interact with environmental and social resources or receptors. Thereafter, sequential impact assessment steps involving impact prediction, evaluation, mitigation and enhancement and evaluation of residual impacts have been followed in a phased manner.

Prediction of impacts was undertaken as an objective exercise to determine what could potentially happen to the environmental and social receptors as a consequence of the project and its associated activities and took into account baseline conditions at site, stakeholder's opinion and expert judgement. The evaluation of impacts was done using a semi-quantitative, based on the delineation of a set of criteria as follows:

- *Scale*: Degree of damage that may be caused to the environmental & social components concerned.
- *Extent*: The extent refers to spatial or geographical extent of impact due to proposed project and related activities.
- *Duration*: The temporal scale of the impact in terms of how long it is expected to last.
- *Magnitude*: Degree of change caused by a project activity is a function of Scale, Extent and Duration, as applicable.
- *Vulnerability of Receptor*: Represents the sensitivity of the receptor based on the relationship between the project and present baseline environment (the receptor).

Once magnitude of impact and sensitivity/ vulnerability/ importance of resource/ receptor have been characterized, the significance was assigned for each impact using an impact score for each criteria, following a systematic rating method, leading to the qualification of significance of impact as Negligible, Minor, Moderate and Major. The overall impact assessment methodology is presented in below figure.

Figure 4.2 *Impact Assessment Process*



4.4 *ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN PREPARATION*

The Environmental & Social Management Plan (ESMP) along with a Monitoring Plan has been prepared for the construction and operation of the transmission line. The ESMP would act as a guidance document for JPSIP to ensure that they can implement the project in an environmentally sound manner where project planners and design agencies, contractors, relevant government departments and stakeholders of concern understand the potential impacts arising out of the proposed project and take appropriate actions to properly manage them.

5.1 INTRODUCTION

This section establishes the baseline environmental and socio economic status of the study area to provide a context within which the impacts of the Project are to be assessed.

Establishing baseline helps in understanding the prevailing environmental and socio economic status of the study area. It provides the background environmental and social conditions for prediction of the future environmental characteristics of the area based on the operation of the new/ expansion activity of the project during its life cycle. It also helps in environmental and social management planning and strategy to minimise any potential impact due to the Project activities on surrounding environment.

5.2 TERRAIN

Ranchi district has even flat surface with isolated hillocks known as Tongri. Hills lying on west have elevation above 800 metres and those lying in east have elevation less than 75 metres. The average elevation of the district is 650 metres but western portion is relatively higher than eastern part.

In Ramgarh district has uneven land surfaces characterized by plateau and sharply sloping hills. Virtually its topography corresponds to Ranchi plateau being separated by Damodar valley as it has residual hills and inter-plateau valley.

A review of the relief ⁽¹⁾ of the areas along the TL alignments indicate that Irba-Kanke, Irba -Ratu and Irba-Ramgarh TL alignment passes primarily through the areas of nearly level, very gentle sloping, gently sloping, moderately sloping except for the areas. However, at some stretches of all the three TL alignments traverses through strongly sloping area.

Table 5.1 TL Alignment passing through strongly sloping area

Sl. No.	TL Alignment	Approx. segment [Angle Point (AP) from -to]
1	Irba-Kanke	AP 8-9
2	Irba Ramgarh	AP 24-23, AP 13-12, AP 9-8
3	Irba -Ratu	AP 4- AP 5, AP 24 - AP 30

(1) Nearly Level: 0-1% (Class A), Very Gentle Sloping : 1-3% (Class B); Gentle Sloping 3-5% (Class C); Moderately Sloping : 5-10% (Class D); Strongly Sloping : 10-15% (Class E); Moderately Steep Sloping : 15-20% (Class F), Steep Sloping: 25-33% (Class G); Very Steep Sloping: 33-50% (Class H), Very Very Steep: Over 50% (Class I); Soil Survey Manual 1960, All India Soil and Land Survey Organisation

The landuse land cover was assessed within a radius of 500 m each side from the proposed alignments. The Irba- Ratu and Irba Kanke TL alignment primarily traverse through the single cropped land (Kharif cropped) except for small patches of forest (AP 24 – AP 26 and AP 42 – AP 44) for Irba-Kanke TL alignment. The Irba-Ramgarh line however has a variety of the landuse and land cover. It was observed that at both ends (AP 12- AP 24 and AP 45-AP 54) the Irba-Ramgarh line passes through single crop agricultural land; however the mid segment of the line (AP 25- AP 44) traverses through the wasteland and forest land. Thus major landuse near TL alignment is primarily single crop agricultural land. Photograph of land cover near transmission alignment is presented in *Figure 5.1*.

Figure 5.1 *Photographs of Land cover near TL Alignment*



The soils in Ranchi district are mostly of the residual type. High temperature and high rainfall have led to the formation of lateritic type of soils from rocks of Archean metamorphic complex exposed in the greater part of the district. Texturally the soils of the district have been classified into four classes viz. i) stony and gravelly soils, ii) red and yellow soils, iii) lateritic soils and iv) alluvial soils.

In Ramgarh district mainly two type of soil found viz. i) red soil and ii) sandy loam. Three soil orders namely Entisols, Inceptisols and Alfisols were observed in the district.

The majority of all the three alignment in Ranchi district passes through fine loamy soil. In Ramgarh district majority of all the two alignment passes through fine loamy soil.

5.5 *CLIMATE AND METEOROLOGY*

Ranchi and Ramgarh experiences subtropical climate, which is characterized by hot summer from March to May and well distributed rainfall during southwest monsoon from June to October. Winter season in the area is marked by dry and cold weather during the month of November to February.

The normal annual rainfall data indicate that average rainfall is around 1300 mm. Maximum rainfall has been observed from June to October months. About 90% of the total annual rainfall is received in the monsoon period. As discussed above the soil type and fertility limits the agricultural activity, further rainfall occurs primarily during the monsoon and in absence of any irrigation network in the area agricultural activity is limited to the Kharif season (i.e. July – November).

5.6 *AIR ENVIRONMENT*

There is no industrial area set up in 2 km of the proposed Irba- Ramgarh, Irba –Kanke and Irba – Ratu site. The only industry in the study area is the SAIL – IFFCO Refractory Unit which is 1.87 km from the 132/33 KV Ramgarh substation. The source of generation of air pollutants is primarily from the transportation corridors i.e. NH 33 and the state highways and from burning of fossil fuels for domestic purpose. Therefore the ambient air quality is representative of rural set-up.

5.7 *NOISE ENVIRONMENT*

Since there are no industrial activities or major settlement along any of the three alignments the source of noise is primarily from the transportation vehicles. Therefore the ambient noise quality along the Irba- Ramgarh, Irba-Kanke and Irba-Ratu TL alignment is representative of residential areas.

5.8 *DRAINAGE*

As per the site reconnaissance and review of the Survey of India Toposheet and satellite imagery it was observed that the Irba- Ramgarh TL alignment is part of the Damodar River Basin. The Irba –Kanke and Irba –Ratu TL alignments are part of the Subarnarekha River Basin. The Jhumur Nadi, Sapali Nadi and the Doma Nadi intersect the Irba- Ratu alignment. Since the Irba-Kanke alignment is parallel to the Irba-Ratu alignment the three water channels i.e. Jhumur, Sapali and Doma Nadi also intersect this alignment. The

Irba- Ramgarh alignment crosses the River Damodar near Ramgarh Town. The major water body in the study area of these lines are the Getalsud Reservoir located approximately 1.5 km south-west of the proposed substation at Irba. In addition there are a number of second order and first order streams which cuts the alignments. The review of the DPR and superimposing the route alignment on the topo sheet the location of the river crossing is presented in *Table 5.2*.

Table 5.2 *Proposed river crossing and width of the crossing*

Sl. No	Transmission Line	Name of the River	River crossing	Width of the River
1.	Irba- Ramgarh	River Damodar	AP 50- AP 51	164.5 m
2.	Irba -Ratu		AP 19 – AP 20	80 m
3.	Irba- Kanke	River Jhumur	AP 28 -29	80 m

5.9 ECOLOGICAL ENVIRONMENT

The transmission line stretches are located in Ranchi and Ramgarh districts of Jharkhand. The proposed lines falls in 6B Deccan Peninsula – Chota-Nagpur plateau bio-geographic province.

Natural vegetation in the region can be broadly classified into **C3 Moist Mixed Deciduous Forest and 5B Northern Tropical Dry Deciduous Forests**. The dominant tree species in the region is Sal (*Shorea robusta*).

C3 Moist Mixed Deciduous Forest – This forest can be mainly found in some patches of narrow valley, where the crop tends to be moist. In undisturbed areas, this forest is mainly characterized by closed forest of medium to good height where sal (*Shorea robusta*) is the dominant species. Other species that are associated with sal, in this type of forest are *Terminalia tomentosa*, *Diospyros melanoxylon*, *Buchanania latifolia*, *Anogeissus latifolia*, *Haldina cordifolia*, *Lannea grandis*, *Boswellia serrata* etc.

5B Northern Tropical Dry Deciduous Forests – In this region dry deciduous forest are found in the drier parts, mostly in the upper ridges. Here also the dominant species is sal (*Shorea robusta*). Other species that are associated with sal are *Terminalia belerica*, *Terminalia chebula*, *Haldina cordifolia*, *Madhuca latifolia*, *Butea monosperma*, *Diospyros melanoxylon*, *Ailanthus excelsa*, *Cassia fistula* etc.

5.9.1 Vegetation within the Study area

Forest Vegetation

There is no forest patch within the Irba-Kanke transmission line corridor. However, the Irba-Ratu and Irba-Ramgarh corridors passed through lengths of 450m and 370 m protected forest patches respectively. Forest vegetation in the study area is primarily located on hilly terrain. Sal (*Shorea robusta*) is the most dominant tree of the forest areas. Other common tree species recorded are semal (*Bombax ceiba*), mohua (*Madhuca longifolia*), kadam (*Haldina*

cordifolia), babool (*Acacia nilotica*), sirish (*Albizia lebeck*), Palas (*Butea monosperma*), teak (*Tectona grandis*), neem (*Azadirachta indica*), amaltas (*Cassia Fistula*), etc. The location of the forest areas in the Irba- Kanke, Irba –Ramgarh and Irba Ratu alignment are provided in *Figure 5.2, Figure 5.3 and Figure 5.4* respectively.

Figure 5.2 Forest areas in the Irba-Kanke TL Alignment

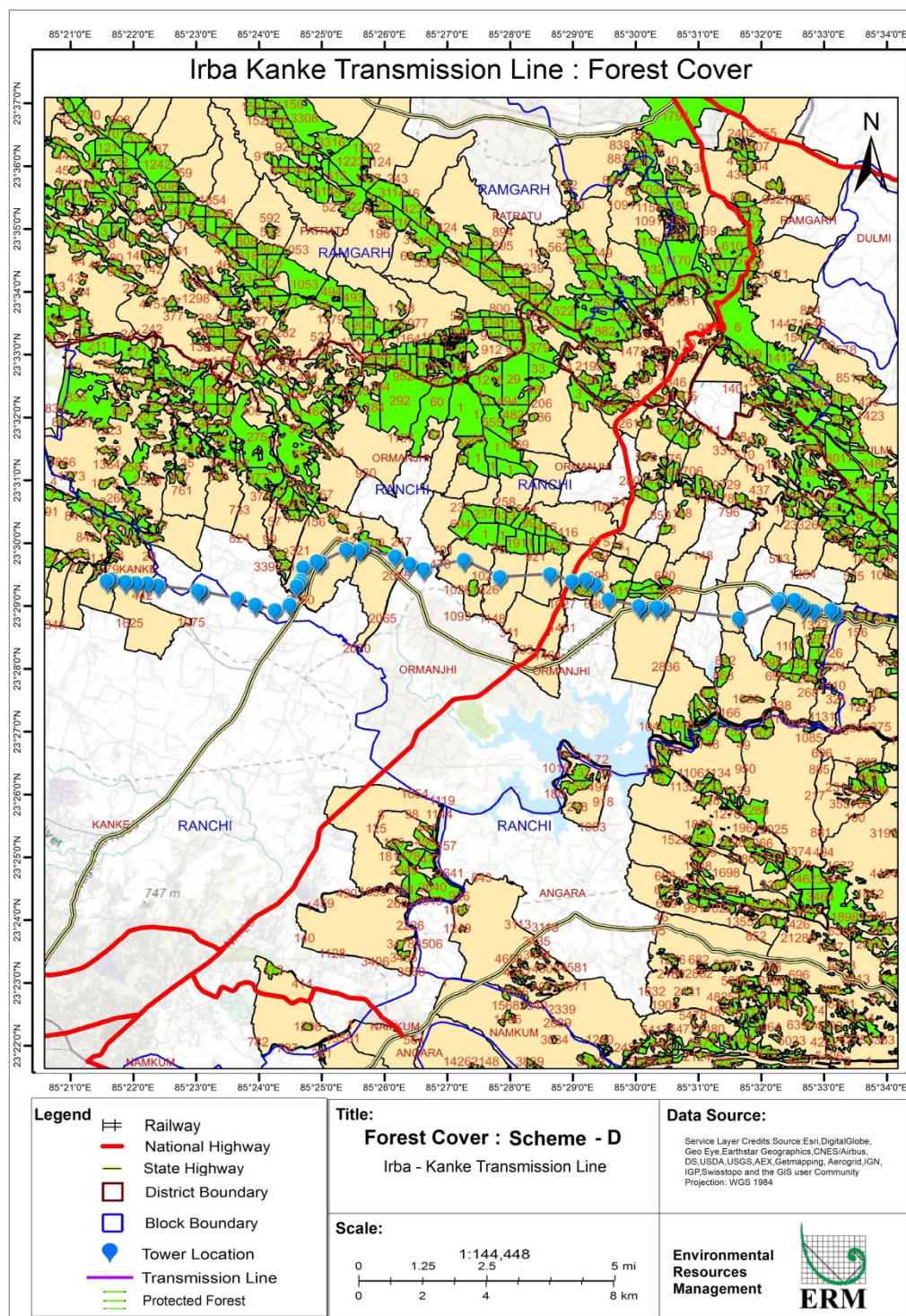


Figure 5.3 Forest areas in the Irba-Ramgarh TL Alignment

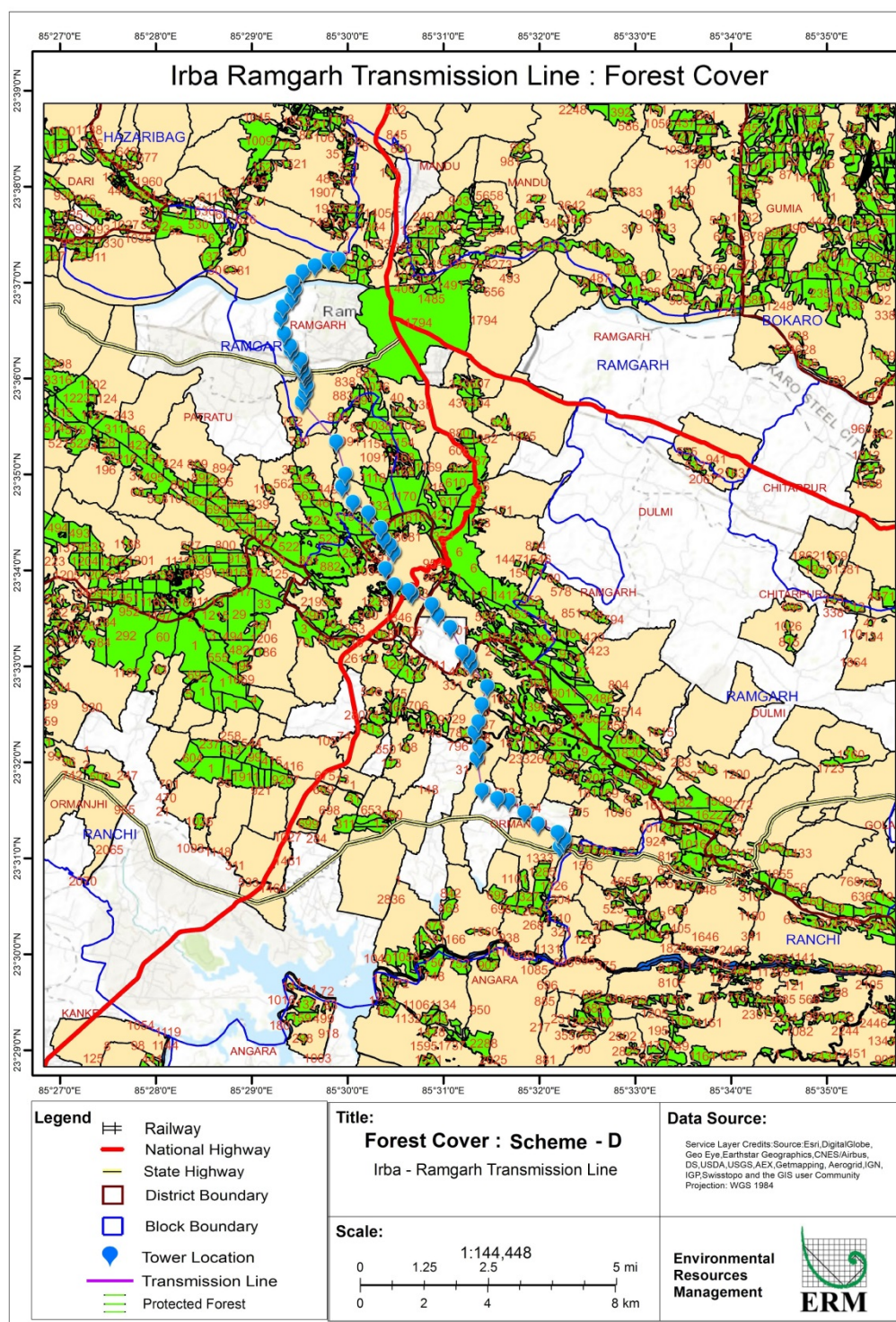
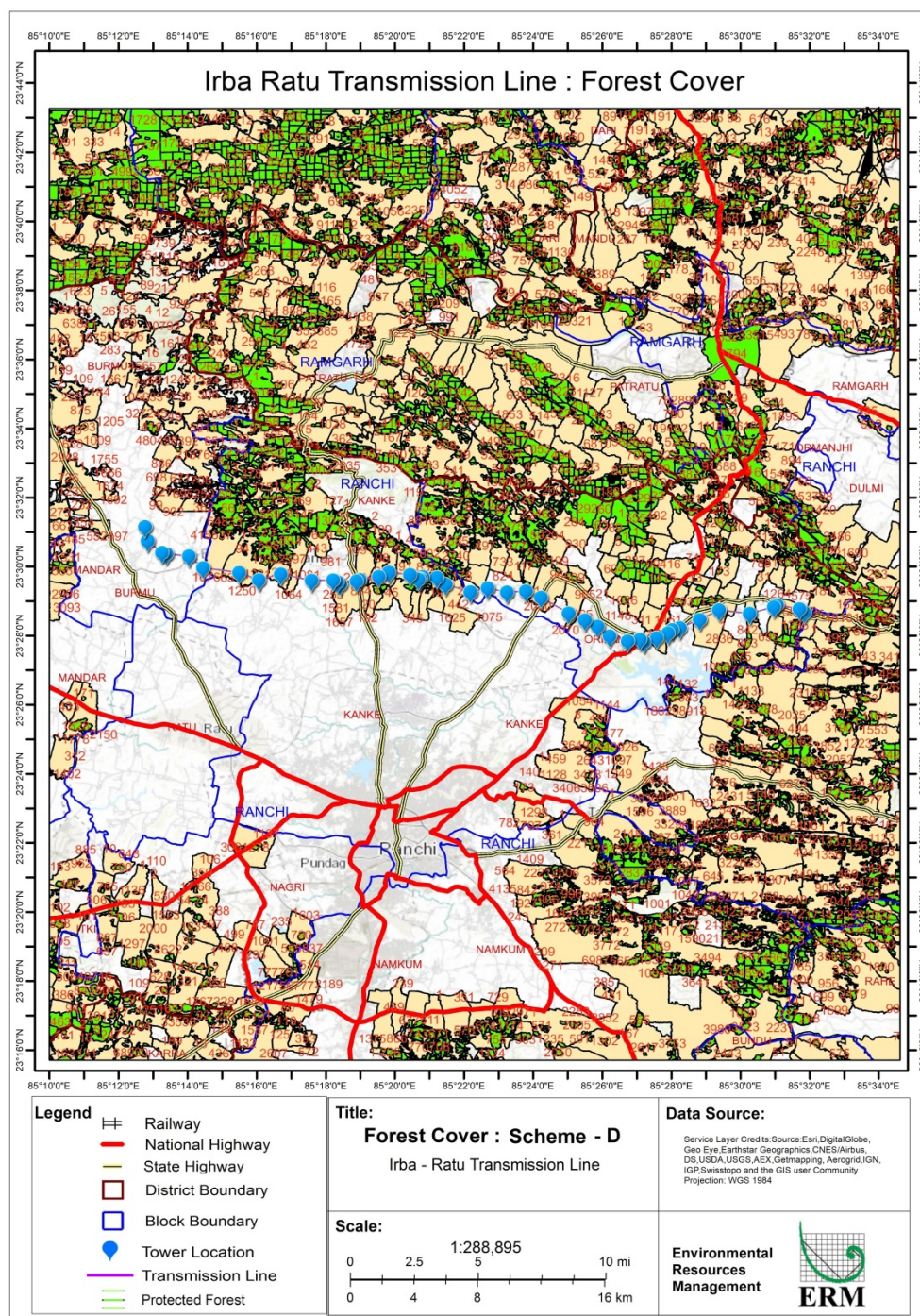


Figure 5.4 Forest areas in the Irba-Ratu TL Alignment



Homestead plantation

During the primary survey trees like aam (*Mangifera indica*), jack fruit (*Artocarpus heterophyllus*), imli (*Tamarindus indica*), jamun (*Syzygium cumini*), date palm (*Phoenix dactylifera*), sugar palm (*Borassus flabellifer*), neem (*Azadirachta indica*), semal (*Bombax ceiba*), palas (*Butea monosperma*) mohua (*Madhuca latifolia*), peepal (*Ficus religiosa*), wad (*Ficus benghalensis*), kadam (*Haldina cordifolia*) etc. were found to occur frequently in human settlement.

Roadside plantation

Along the roadside following trees were recorded gulmohor (*Delonix regia*), babool (*Acacia nilotica*), semal (*Bombax ceiba*), peepal (*Ficus religiosa*), wad (*Ficus benghalensis*), shisham (*Dalbergia sisso*), radhachura (*Peltophorum pterocarpum*), munga (*Moringa oleifera*), amaltas (*Cassia Fistula*), ashoka (*Saraca asoka*), imli (*Tamarindus indica*), rain tree (*Samanea saman*), chhatim (*Alstonia scholaris*)

Riparian Vegetation

Riparian vegetation is observed on the sides of rivers, and waterbodies. The Irba-Ramgarh line crosses the Ramgarh River. Major vegetation observed are semal (*Bombax ceiba*), peepal (*Ficus religiosa*), wad (*Ficus benghalensis*), shisham (*Dalbergia sisso*), jamun (*Syzygium cumini*) etc.

Trees within transmission line corridors

Tree species present with number of individuals within the transmission line corridors for Irba-Kanke, Irba-Ratu and Irba-Ramgarh is listed in Appendix.

Invasive Alien species

Invasive alien species are non-native species in a specific ecosystem whose introduction and subsequent establishment adversely impacted the economy, agriculture, biodiversity and human health. Major invasive species recorded during the study are: *Lantana camara*, *Parthenium hysterophorus* etc.

5.9.2 Wildlife Habitat

No sensitive ecological habitat like National Park, Wild Life Sanctuary, Tiger Reserve or Elephant Reserve is located within the study area of the transmission lines.

5.9.3 Faunal Diversity

Herpetofauna

Three species of amphibians viz. Indian Bull frog (*Duttaphrynus melanostictus*), Indian Bullfrog (*Hoplobatrachus tigerinus*) and Skittering Frog (*Euphlyctis cyanophlyctis*) etc. are observed from the study area. All the species are listed Least Concern as per IUCN Classification (IUCN Version 2017-3). 9 species of reptiles were observed/ reported from the study area. The list includes Russel's Viper (*Daboia russellii*), Indian Cobra (*Naja naja*), Common Krait (*Bungarus caeruleus*), Banded Krait (*Bungarus fasciatus*), Common Vine Snake (*Ahaetulla nasuta*), Indian Rat Snake (*Ptyas mucosus*), Checkered Keelback (*Xenochrophis piscator*), Oriental Garden Lizard (*Calotes versicolor*) and Indian monitor (*Varanus bengalensis*). The list includes one Schedule I species viz. Indian Monitor, four Schedule II species viz. Russel's Viper, Indian Cobra, Indian Rat Snake and Checkered Keelback.

Avifauna

A total of 46 species were recorded from the study area. The species list includes terrestrial and aquatic birds. Terrestrial and aquatic birds recorded are presented below.

Terrestrial birds- Shikra (*Accipiter badius*), Bank Myna (*Acridotheres ginginianus*), Common Myna (*Acridotheres tristis*), Paddyfield Pipit (*Anthus rufulus*), Little Swift (*Apus affinis*), House Swift (*Apus nipalensis*), Spotted Owllet (*Athene brama*), Greater Coucal (*Centropus sinensis*), Common Pigeon (*Columba livia*), Indian Roller (*Coracias benghalensis*), House Crow (*Corvus splendens*), Asian Palm Swift (*Cypsiurus balasiensis*), Black Drongo (*Dicrurus macrocercus*), Black Winged Kite (*Elanus caeruleus*), Asian Koel (*Eudynamis scolopaceus*), Indian Silverbill, Coppersmith Barbet (*Psilopogon haemacephalus*), Green bee-eater (*Merops orientalis*), Black Kite (*Milvus migrans*), Common Tailorbird (*Orthotomus sutorius*), House sparrow (*Passer domesticus*), Baya weaver (*Ploceus philippinus*), Plain Prinia (*Prinia inornata*), Rose-ringed Parakeet (*Psittacula krameri*), Red-vented Bulbul (*Pycnonotus cafer*), Indian Robin (*Copsychus fulicatus*), Laughing Dove (*Spilopelia senegalensis*), Eurasian Collared Dove (*Streptopelia decaocto*), Brahminy Starling (*Sturnia pagodarum*), Jungle babbler (*Turdoides striata*), Common Hoopee (*Upupa epops*) etc.

Aquatic birds- Common Kingfisher (*Alcedo atthis*), White-breasted Waterhen (*Amaurornis phoenicurus*), Asian Openbill (*Anastomus oscitans*), Grey Heron (*Ardea cinerea*), Indian Pond Heron (*Ardeola grayii*), Cattle Egret (*Bubulcus ibis*), Pied Kingfisher (*Ceryle rudis*), Little Egret (*Egretta garzetta*), Common Moorhen (*Gallinula chloropus*), White-throated Kingfisher (*Halcyon smyrnensis*), Intermediate Egret (*Ardea intermedia*), Little Cormorant (*Microcarbo niger*), Painted Stork (*Mycteria leucocephala*), Purple Swamphen (*Porphyrio porphyrio*), Red-wattled Lapwing (*Vanellus indicus*).

Shikra, Black Kite and Black Winged Kite are listed as Schedule I as per Wildlife Protection Act, 1972. Painted Stork is listed as Near Threatened as per IUCN Classification (IUCN version 2017-3).

Getalsud dam is located within 0.5 km of the Irba-Ratu transmission line and within 1 km of Irba-Kanke transmission line. Asian Waterbird Census (AWC), 2015 revealed 30 species of waterbirds at Getalsud dam with total count of 2737 individuals. No IUCN threatened waterbird species was recorded from Getalsud dam during the census. A flock of 1500 individuals of Northern Shoveller (*Anas clypeata*) with 1500 individual was the dominant avian species recorded during the census.

Mammals

Total 12 species of mammals are reported/recorded from the study area. The mammals observed/reported in the study area are Indian Elephant (*Elephas maximus*), Five-striped Palm Squirrel (*Funambulus pennantii*), Bengal Fox (*Vulpes bengalensis*), Golden Jackal (*Canis aureus*), Common Grey Mongoose

(*Herpestes edwardsii*), Indian Flying Fox (*Pteropus giganteus*), Northern Plains Langur (*Semnopithecus entellus*), Rhesus macaque (*Macaca mulatta*), House Mouse (*Mus musculus*), House Rat (*Rattus rattus*), Wild pig (*Sus scrofa*), Nilgai (*Boselaphus tragocamelus*) etc. Large mammals were reported to be absent in the study area. The list includes one Schedule I species viz. Indian Elephant and five Schedule II species Golden Jackal, Bengal Fox, Common Grey Mongoose, Northern Plains Langur and Rhesus macaque.

5.9.4 *Critical Habitat Assessment*

IFC Guidance Notes (GN57) for PS-6 defines that internationally and/or nationally recognized areas of high biodiversity value will likely qualify as Critical Habitat (CH), which includes Protected Areas, Important Bird Areas (IBA). The study area is not located in proximity to any protected areas and IBAs.

Critical Habitat Triggers

Critical habitat is defined under IFC PS6. Critical habitats are areas with: high biodiversity value, including;

- (i) habitat of significant importance to Critically Endangered and/or Endangered species;
- (ii) habitat of significant importance to endemic and/or restricted range species;
- (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- (iv) highly threatened and/or unique ecosystems; and/or
- (v) areas associated with key evolutionary processes “

Movement of IUCN Endangered species viz. Indian elephant (*Elephas maximus*) is reported in some sections of the transmission line corridors and also Irba-Ratu and Irba-Kanke transmission lines pass near Getalsud dam where several species of migratory birds are reported. Hence, assessment for Critical Habitat is undertaken as a screening process against the criteria defined within the IFC PS 6 Guidance Note. Criterion relevant for triggering the CHA as per IFC PS-6 is presented in *Annexure 9* and Candidate Critical Habitat Assessment is presented in *Annexure 10*.

5.10 *SOCIO ECONOMIC ENVIRONMENT*

Since the people constitute the essence and the focus of any socio-economic activity, it originates with reference to the underlying demographic features and trends.

This section deals with the baseline socio-economic environment of the associated proposed transmission line of proposed Irba Substation (Scheme D). The following section discusses the methodology used for the socio-economic assessment. The subsequent sections discuss the baseline profile of the villages within the study area. The information provided has been

primarily derived from the secondary sources (*Census of India*). In addition primary information was also collected during the discussions at the villages with the local community members. The village-wise secondary data (*obtained from Census, 2011*) has been taken into consideration for analyzing the socio-economic profile of the project area.

5.10.1 *Area of Influence*

The study area for the transmission line is defined as area within 500 meter of each side of proposed transmission line. Total 46 villages (*Total 54 villages but among this Bhusur village is common for all three transmission line and other 7 villages area common among Irba Kanke and Irba Ratu Trans Line*) are located within the 1 km (500 meter each side) buffer of three proposed transmission line. Line wise details of these villages are provided in **Table 5.3**.

Table 5.3 *Number of the Villages Located within 1 km (500 meter each side)*

Transmission Line	Number of Village	Block	District
Irba-Ramgarh Trans. Line	5 Villages	Ormanjhi Block	Ranchi
	5 Villages	Patratu Block	Ramgarh
	1 Village	Ramgarh Block	
Irba-Kanke Trans. Line	14 Villages	Ormanjhi Block	Ranchi
	3 Villages	Kanke Block	
Irba-Ratu Trans. Line	19 Villages	Ormanjchi Block	
	5 Villages	Kanke Block	
	3 Villages	Burmu Block	

The demographic profile in terms of total population, household size, sex-ratio of the selected villages in the block has been summarized in the sections below.

5.10.2 *General Socioeconomic Profile*

The demographic profile in terms of total population, household size and sex-ratio of the above mentioned selected villages has been summarized in the sections below.

Population and Household Size

As per the 2011 Census records, the study area, covering 46 villages, has a total of 15724 households and a population of 82207. Majority of the population in the study area falls in the rural category. The demographic details are provided in **Table 5.4**.

Irba-Ramgarh Trans Line

Among 11 villages located within the study area of Irba-Ramgarh transmission line, Barkakhan (18475) has the highest population lived in 3563 household and the lowest populations were recorded in Uparnagru (161) and total household no is 29. The household size of above mention 11 villages generally ranged within 4.80 to 5.55 with an average household size of 5.17.

Irba-Kanke Trans Line

Among 17 villages located within the study area of Irba-Kanke transmission line, Kuchu (2371) has the highest population lived in 459 household and the lowest populations were recorded in Jhiri (291) and total household no is 63. The household size of above mention 17 villages generally ranged within 4.52 to 6.22 with an average household size of 5.11.

Irba-Ratu Trans. Line

Among 27 villages located within the study area of Irba-Ratu transmission line, Ichapiri (4241) has the highest population lived in 696 household and the lowest populations were recorded in Jhiri (291) and total household no is 63. The household size of above mention 17 villages generally ranged within 4.62 to 6.22 with an average household size of 5.26.

Table 5.4 *Demographic Profile of the Study Area Villages*

Village	No. of House hold	Total Population	Household Size	% of Male Population	% of Female Population	Sex Ratio	% SC Population	% of ST Population	% Literate	% Male Literate	% Female Literate
Irba -Ramgarh Trans. Line											
Jaidiha	199	1027	5.16	49.95	50.05	1002	8.28	54.33	59.24	70.65	47.43
Ganeshpur	110	591	5.37	49.92	50.08	1003	0.00	85.11	53.82	65.20	42.34
Hethnagru	77	402	5.22	52.99	47.01	887	0.00	0.00	57.10	71.27	41.46
Uparnagru	29	161	5.55	51.55	48.45	940	0.00	6.21	61.19	69.57	52.31
Bhusur	148	745	5.03	50.47	49.53	981	3.09	13.69	64.32	78.21	50.48
Kander	216	1079	5.00	51.34	48.66	948	0.46	93.42	51.91	65.64	37.34
Siur	163	847	5.20	50.77	49.23	970	18.77	54.78	49.02	58.52	39.08
Kachudag	63	332	5.27	53.92	46.08	855	0.00	92.47	55.52	65.82	43.18
Hesla	928	4451	4.80	52.46	47.54	906	7.32	15.61	86.19	92.23	79.45
Barkakana	3563	18475	5.19	52.18	47.82	916	13.34	20.80	82.86	89.11	76.06
Dohakatu	368	1866	5.07	51.45	48.55	944	10.66	62.49	48.52	58.15	38.33
Irba-Kanke Trans Line											
Kalheyakanadu	152	885	5.82	51.53	48.47	941	0.00	9.265536723	64.47	74.73	53.49
Kumhariya	333	1785	5.36	50.87	49.13	966	7.17	63.08	58.69	66.79	50.07
Chardi	244	1298	5.32	48.61	51.39	1057	0.00	37.90	67.24	79.71	54.66
Jirabar	147	706	4.80	49.01	50.99	1040	0.14	52.12	62.73	72.22	53.77
Kulhi	400	2015	5.04	52.21	47.79	915	0.79	21.84	65.43	76.24	53.19
Kuchu	459	2371	5.17	51.83	48.17	929	2.53	7.80	73.63	83.67	62.92
Chapabar	153	762	4.98	49.74	50.26	1011	3.54	48.69	56.84	66.67	47.31
Gagari	230	1143	4.97	51.18	48.82	954	15.92	68.33	58.99	75.93	41.09
Khatanga	164	827	5.04	50.18	49.82	993	1.93	73.04	67.44	79.55	54.60
Ulatu	151	682	4.52	50.44	49.56	983	0.00	65.54	65.32	74.84	55.21
Ukrid	159	773	4.86	52.65	47.35	899	0.39	12.42	63.22	73.49	51.77
Jhiri	63	291	4.62	56.01	43.99	785	0.00	57.04	67.20	75.18	57.52
Guru	230	1186	5.16	49.49	50.51	1020	0.00	33.64	58.69	71.91	45.18
Bhusur	148	745	5.03	50.47	49.53	981	3.09	13.69	64.32	78.21	50.48
Sanri	133	668	5.02	52.84	47.16	892	1.20	39.37	71.25	89.31	51.85
Khudiya	104	519	4.99	51.83	48.17	929	0.00	5.97	69.27	80.26	57.21
Lotwa	60	373	6.22	48.79	51.21	1049	0.00	0.00	60.86	70.07	52.23
Irba-Ratu Trans Line											
Hisri	338	1596	4.72	50.06	49.94	997	0.00	20.11	68.73	78.17	59.29

Village	No. of House hold	Total Population	Household Size	% of Male Population	% of Female Population	Sex Ratio	% SC Population	% of ST Population	% Literate	% Male Literate	% Female Literate
Bhantboreya	114	573	5.03	50.44	49.56	983	0.00	12.74	66.39	78.39	54.88
Baraudi	294	1620	5.51	50.74	49.26	971	0.00	28.52	69.57	80.65	57.72
Madanpur	197	1037	5.26	51.59	48.41	938	0.00	40.79	65.59	75.85	54.85
Jidu	92	508	5.52	39.96	60.04	1502	0.00	100.00	56.25	70.27	46.39
Hethkonki	406	2183	5.38	50.34	49.66	986	6.46	44.57	66.11	76.76	55.27
Ichapiri	696	4241	6.09	52.09	47.91	920	0.00	26.22	75.10	85.55	63.83
Barhu	671	3529	5.26	51.01	48.99	961	0.06	43.64	67.43	79.06	55.50
Mayapur	302	1771	5.86	51.44	48.56	944	8.07	15.13	65.82	75.82	54.82
Bundu	86	439	5.10	54.67	45.33	829	0.00	100.00	52.85	62.19	41.67
Santi	222	1046	4.71	52.39	47.61	909	3.25	23.61	61.17	73.82	46.68
Hochai	140	722	5.16	52.35	47.65	910	0.00	69.11	57.74	68.50	45.73
Jirabar (Jirawar)	147	706	4.80	49.01	50.99	1040	0.14	52.12	62.73	72.22	53.77
Kamta	290	1669	5.76	52.01	47.99	923	0.00	7.67	74.73	82.82	66.22
Kulhi	400	2015	5.04	52.21	47.79	915	0.79	21.84	65.43	76.24	53.19
Barwe	472	2634	5.58	52.01	47.99	923	6.23	39.07	63.56	72.21	54.01
Dahu	332	1760	5.30	50.51	49.49	980	4.15	20.68	73.59	85.14	62.23
Dardag	333	1834	5.51	51.53	48.47	941	1.09	12.38	79.30	87.70	70.58
Harchanda	386	1894	4.91	51.74	48.26	933	2.16	34.16	81.98	90.38	72.74
Ormanjhi	740	3956	5.35	51.31	48.69	949	8.65	17.90	82.15	88.43	75.40
Anandi	567	2935	5.18	52.37	47.63	910	1.26	23.20	73.23	86.12	59.25
Jhiri	63	291	4.62	56.01	43.99	785	0.00	57.04	67.20	75.18	57.52
Guru	230	1186	5.16	49.49	50.51	1020	0.00	33.64	58.69	71.91	45.18
Bhusur	148	745	5.03	50.47	49.53	981	3.09	13.69	64.32	78.21	50.48
Sanri	133	668	5.02	52.84	47.16	892	1.20	39.37	71.25	89.31	51.85
Khudiya	104	519	4.99	51.83	48.17	929	0.00	5.97	69.27	80.26	57.21
Lotwa	60	373	6.22	48.79	51.21	1049	0.00	0.00	60.86	70.07	52.23

Average sex ratio of the study area villages was recorded 942 which is slightly higher than the State average (940)

Irba Ramgarh Trans Line

Among above mentioned 11 study area villages, Ganeshpur (1003) has the highest sex ratio and the lowest sex ratio was recorded in Hethnagru (887) and the average sex ratio is 941 which is almost at par with the state averages of Jharkhand (940).

Irba-Kanke Trans Line

Among above mentioned 17 study area villages, Chardi (1057) has the highest sex ratio and the lowest sex ratio was recorded in Sanri (892) and the average sex ratio is 961 which is higher than the state averages of Jharkhand (940).

Irba-Ratu Trans Line

Among above mentioned 27 study area villages, Jidu (1502) has the highest sex ratio and the lowest sex ratio was recorded in Mayapur (829) and the average sex ratio is 962 which is higher than the state averages of Jharkhand (940).

Scheduled Caste (SC) & Scheduled Tribes (ST)

The overall demographic data of all 46 selected villages shows that the ST and SC population in these villages is not very high. Average ST and SC population in the study area villages were 30.59% and 5.71% respectively.

Irba Ramgarh Trans Line

Among above mentioned 11 study area villages, highest SC and ST population were recorded in Siur (18.77%) and Kander (93.42%) respectively. Lowest SC and ST population recorded in Kander (0.46%) and Bhusur (13.69%) respectively. There are 4 villages where SC population is not present and only one village in the study area where ST population is not found. Average SC and ST population the above mention villages were recorded 5.63% and 45.36% respectively.

Irba-Kanke Trans Line

Among above mentioned 17 study area villages, highest SC and ST population were recorded in Gagari (15.92%) and Khatanga (73.04%) respectively. Lowest SC and ST population recorded in Ukrid (0.39%) and Khudiya (5.97%) respectively. There are 7 villages where SC population is not present and only one village in the study area where ST population is not found. Average SC and ST population the above mention villages were recorded 2.16% and 35.87% respectively.

Irba-Ratu Trans Line

Among above mentioned 27 study area villages, highest SC and ST population were recorded in Mayapur (8.07%) and Jidu and Bundu (100%) respectively. Lowest SC and ST population recorded in Barhu (0.06%) and Khudiya (5.97%) respectively. There are 13 villages where SC population is not present and only one village in the study area where ST population is not found. Average SC and ST population the above mention villages were recorded 1.73% and 33.45% respectively.

5.10.5

Education & Literacy

The study of the education and literacy profile in the region is relevant in order to have an understanding whether the proposed project can utilize skilled human resources available within the area.

According to 2011 census data, the average literacy rate in 46 study area villages was 72.10%. Average male and female literacy rate in the study area was recorded 81.42% and 62.17% respectively.

Irba Ramgarh Trans Line

Among above mentioned 11 study area villages, the average literacy rate was 60.88% and highest and lowest literacy rate was recorded in Hesla (86.19%) and Dohakatu (48.52%). Average male and female literacy rate in the study area was recorded 71.31% and 62.17% respectively.

Irba-Kanke Trans Line

Among above mentioned 17 study area villages, the average literacy rate was 64.45% and highest and lowest literacy rate was recorded in Kuchu (73.63%) and Chapabar (56.84%). Average male and female literacy rate in the study area was recorded 75.81% and 52.50% respectively.

Irba-Ratu Trans Line

Among above mentioned 27 study area villages, the average literacy rate was 67.45% and highest and lowest literacy rate was recorded in Ormanjhi (82.15%) and Bundu (52.85%). Average male and female literacy rate in the study area was recorded 78.19% and 56.24% respectively.

5.10.6

Economic Activity & Livelihood Pattern

The relevance of economic activity and livelihood pattern is important in the context of the study since depending on the existing situation one can predict the impact of the project activity on the economy of the region.

Average total working population in the study area villages is 35.89%. Of the total workforce, average main work force is 67.93% and marginal workforce is 32.06%. Summary of work force participation in different selected villages is mentioned in **Table 5.5** below.

Table 5.5 *Livelihood Profile in the Study Area*

Village	WPR	Main Worker	Marginal Worker	Cultivator	Agricultural Labour	HH worker	Other
Irba-Ramgarh Trans Line							
Jaidiha	46.15	53.79	46.20	15.61	70.25	1.69	12.45
Ganeshpur	46.53	92.73	7.27	74.18	0.36	0.00	25.45
Hethnagru	49.25	98.99	1.01	94.44	0.51	0.00	5.05
Uparnagru	58.39	40.43	59.57	36.17	32.98	0.00	30.85
Bhusur	60.00	83.00	17.00	57.05	12.30	1.12	29.53

Village	WPR	Main Worker	Marginal Worker	Cultivator	Agricultural Labour	HH worker	Other
Kander	54.77	98.48	1.52	76.31	6.43	0.00	17.26
Siur	34.83	96.95	3.05	70.85	16.95	0.00	12.20
Kachudag	27.11	94.44	5.56	35.56	60.00	0.00	4.44
Hesla	26.40	85.11	14.89	3.91	6.30	3.23	86.55
Barkakana	25.34	91.09	8.91	6.81	9.23	2.24	81.71
Dohakatu	42.98	73.32	26.68	26.81	14.84	16.96	41.40
Irba-Kanke Trans Line							
Kalheyakanadu	40.34	57.42	42.57	19.05	72.55	1.12	7.28
Kumhariya	34.96	78.85	21.15	33.01	22.44	1.76	42.79
Chardi	32.05	70.43	29.57	34.62	14.18	0.48	50.72
Jirabar (Jirawar)	43.91	30.65	69.35	55.81	10.97	1.61	31.61
Kulhi	35.04	38.10	61.90	18.98	32.01	9.07	39.94
Kuchu	47.83	61.82	38.18	39.77	34.04	1.50	24.69
Chapabar(Chapawar)	42.91	60.55	39.45	55.05	22.32	0.61	22.02
Gagari	43.22	65.38	34.62	53.24	14.98	0.20	31.58
Khatanga	38.33	52.37	47.63	21.14	14.83	1.58	62.46
Ulatu	50.73	72.25	27.75	6.36	64.74	1.73	27.17
Ukrid	40.75	63.17	36.83	25.40	21.90	4.13	48.57
Jhiri	29.90	98.85	1.15	26.44	1.15	0.00	72.41
Guru	48.40	99.13	0.87	30.31	1.92	0.35	67.42
Bhusur	60.00	83.00	17.00	57.05	12.30	1.12	29.53
Sanri	34.13	64.91	35.09	10.96	19.30	4.82	64.91
Khudiya	36.61	43.68	56.32	3.68	28.95	1.58	65.79
Lotwa	37.00	32.61	67.39	34.78	7.97	0.00	57.25
Irba-Ratu Trans Line							
Hisri	67.48	58.96	41.03	72.14	20.52	0.56	6.78
Bhantboreya	54.28	56.59	43.41	77.49	5.14	0.00	17.36
Baraudi	44.75	51.59	48.41	38.48	52.28	0.00	9.24
Madanpur	31.92	83.69	16.31	32.63	9.37	1.81	56.19
Jidu	52.17	2.64	97.36	61.89	33.96	1.89	2.26
Hethkonki	36.83	64.30	35.70	21.27	48.88	2.49	27.36
Ichapiri	45.01	16.45	83.55	45.94	34.05	0.89	19.12
Barhu	30.86	61.52	38.48	17.54	3.76	1.56	77.13
Mayapur	40.82	73.17	26.83	35.82	26.97	12.31	24.90
Bundu	29.16	92.97	7.03	39.84	23.44	0.00	36.72
Santi	42.83	44.20	55.80	31.92	19.87	16.29	31.92
Hochai	38.37	88.45	11.55	41.52	0.00	15.52	42.96
Jirabar (Jirawar)	43.91	30.65	69.35	55.81	10.97	1.61	31.61
Kamta	36.01	25.79	74.21	4.83	58.24	6.82	30.12
Kulhi	35.04	38.10	61.90	18.98	32.01	9.07	39.94
Barwe	32.27	66.35	33.65	13.76	15.53	2.24	68.47
Dahu	38.13	70.94	29.06	59.91	8.49	0.89	30.70
Dardag	36.64	73.21	26.79	35.42	9.38	1.34	53.87
Harchanda	34.21	79.01	20.99	12.35	15.59	2.16	69.91
Ormanjhi	35.82	70.57	29.43	33.66	4.23	8.19	53.92
Anandi	29.85	84.82	15.18	17.92	5.02	3.65	73.40
Jhiri	29.90	98.85	1.15	26.44	1.15	0.00	72.41
Guru	48.40	99.13	0.87	30.31	1.92	0.35	67.42
Bhusur	60.00	83.00	17.00	57.05	12.30	1.12	29.53
Sanri	34.13	64.91	35.09	10.96	19.30	4.82	64.91
Khudiya	36.61	43.68	56.32	3.68	28.95	1.58	65.79
Lotwa	37.00	32.61	67.39	34.78	7.97	0.00	57.25

Work Participation ratio (WPR) ⁽¹⁾, defined as percentage of total workers including main and marginal workers out of the total population of the study area, is 35.89% which suggests the study area villages have relatively higher unemployment rate as most of people are involved in agriculture.

It can be seen from the following figures, the study area is characterised by dominance of main worker who are involved in same work more than 6 month in a year. It can be also observed that farm base and non-farm based livelihoods, both as the primary and secondary sources of livelihood. In farm based livelihood people mostly involved as both cultivator and agricultural labour while in case of nonfarm based livelihood community are involved as labour and other activities.

Other noticeable aspects as evident in the above table is that proportion of Agriculture Labourer (AL) is relatively high in majority of the study area villages which indicates number of farmers having sufficient land holding for their livelihood is on lower side in study area and community consultation also reveals that most of the people of local community has marginal to small landholding which is not sufficient for earning their livelihood.

5.11 BASIC AMENITIES AND INFRASTRUCTURE

5.11.1 Drinking Water facilities

The social organization and settlement pattern in the study area is predominantly arranged around the available agricultural land and water resources in the area. Land based livelihood being the key feature of the community, proximity and availability of water is often linked to the economic status of the family/ household. Also typically in a village, water for drinking and other purposes defines the household hygiene/ sanitation and ultimately the standard of living of the community. For drinking purpose, availability of water is mostly in the form of:

- Ground water sourced through hand pump and well serve mostly to the needs of household drinking water consumption however no filtration facility is available for drinking water;
- Supply of water is not available in majority of the study area villages;

As per community consultation very few household in the village have access to individual sanitation facility and majority of the community reportedly resort to open defecation.

5.11.2 Medical Facilities

Medical facilities are one of the basic service indicators which need to be studied so as to know the quality of life in the area. In the most of the study area villages considered for the study, do not have health facility with in their village premises.

(1) Work Participation ratio (WPR) is defined as percentage of total workers including main and marginal workers out of the total population of the study area

They have to depend on health facility in the nearby urban center like Ranchi, Ramgarh, Ormanjhi etc.

5.11.3 *Educational Facilities*

The study area possesses necessary educational infrastructure to cater to the educational needs of the both rural and urban population. Among the study area villages, one Govt. primary school is present in majority of the villages and one secondary and higher secondary school present in panchayat level. For higher education student have to go to nearest town.

5.11.4 *Transport & Communication*

Majority of the study area villages is connected with major road and urban center with all-weather road. Auto is the main transport facility for the villages though some of the villages also have bus facility from nearest urban center.

5.11.5 *Power Supply*

Electricity is available in all study area villages through the frequent power cut are also reported by the community during consultation.

5.11.6 *Post and Telecommunication*

In this era of telecommunication, access to mobile phone is within every bodies reach. All villages from sample study area have the access to post- office and other private courier services.

This section identifies and assesses the potential impacts to the physical, biological and socioeconomic environment that can be expected from the proposed transmission lines i.e. 132 KV DC Irba –Ramgarh, 132 KV DC Irba Kanke and 132 KV DC Irba –Ratu. The impacts due to the project activities across different phases have been identified and assessed. The impacts due to the project activities across different phases have been identified and assessed. Impacts are identified and predicted based on the analysis of the information collected from the following:

- Project information (as outlined in *Section 3*);
- Baseline information (as outlined in *Section 5*).

6.1

POTENTIAL IMPACT

The identification of likely impacts during construction and operation phases has been carried out based on understanding of activities and their consequent impacts on various environmental and socio-economic resources or receptors. The impact identification matrix in *Table 6.1* captures the likely interactions between the activities on one axis and the resources / receptors on the other axis.

Table 6.1 *Scoping Matrix for transmission line*

Project Activity/ Hazards	Environmental Resources								Ecological Resource				Social-Economic Resources									
	Aesthetic & Visual Impact	Land Use	Soil Quality	Air Quality	Noise & Vibration	Surface water resource	Surface water quality	Ground water resource	Ground water quality	Traffic (Road)	Terrestrial Flora	Terrestrial Fauna	Aquatic Flora & Fauna	Protected /Migratory Species	Migratory Path/Corridor	Job & economic opportunity	Common Property Resources	Land Use (Economic Displacement)	Infrastructure & Services	Cultural Resources	Community Health & Safety	Occupational health & safety
Pre-Construction Phase/Planning Phase																						
Land Procurement for Tower Footing																						
Construction Phase																						
Clearance (Vegetation)																						
Construction of Site approach road																						
Excavation for tower foundation																						
Transportation of construction materials, equipment & machineries																						
Storage & handling of construction materials																						
Construction of the Tower Footing																						
Erection of Tower																						
Stringing of Transmission lines																						
Storage, handling and disposal of construction waste																						
Generation of sewage and discharge																						
Sourcing of construction water & domestic water																						
Surface Runoff from construction site																						
Operation Phase																						
Physical presence of transmission tower																						

Project Activity/ Hazards	Environmental Resources									Ecological Resource				Social-Economic Resources								
	Aesthetic & Visual Impact	Land Use	Soil Quality	Air Quality	Noise & Vibration	Surface water resource	Surface water quality	Ground water resource	Ground water quality	Traffic (Road)	Terrestrial Flora	Terrestrial Fauna	Aquatic Flora & Fauna	Protected /Migratory Species	Migratory Path/Corridor	Job & economic opportunity	Common Property Resources	Land Use (Economic Displacement)	Infrastructure & Services	Cultural Resources	Community Health & Safety	Occupational health & safety
Maintenance of transmission lines																						
Lopping of trees for maintaining safety distance																						
	= Represents “no” interactions is reasonably expected																					
	= Represents interactions reasonably possible but none of the outcomes will lead to significant impact																					
	= Represents interactions reasonably possible where any of the outcomes may lead to potential significant impact																					

The details of the activities and their impacts have been discussed in detail in the following sections.

6.1.1 *Impacts on Aesthetic and Visual Quality*

Potential impacts to aesthetics and visual quality because of the setting up and operation of the transmission lines (132 KV DC Irba –Ramgarh, 132 KV DC Irba Kanke and 132 KV DC Irba –Ratu TL Alignment) may arise primarily due to disruption and degradation of views in the surrounding landscape. Visual impacts from transmission lines are highly variable and depends on several factors like location of the project, lines of sight, scenic vistas and most importantly the perception of the people. Degradation of views from transmission lines may result from cutting of trees and vegetation clearance from setting up of physical infrastructure (transmission towers). With the study area, not being recognized as a place of natural scenic beauty or a touristic destination, these factors are unlikely to lead to any significant adverse visual and aesthetic impacts in the area and it can be rated as **negligible**.

6.1.2 *Air & Noise Quality*

This project is not planned to house any point or area source of air emissions (particulate matter, pollutant gases, etc.) and neither does the study area have any industrial air pollution sources – the SH/NH/ORD passing adjacent to the transmission line alignments, through which regular vehicular movement occurs is the only line source of air pollution, caused by vehicular emissions and because of re-entrained dust from the road surface. Based on visual observations, the quality of the air shed can be categorized as good and no indicators or existing sources of air pollutants were noted in the study area that could potentially result in air quality parameters to exceed National Ambient Air Quality Standards (NAAQS).

During site preparation and construction, the project is likely to generate dust (as particulates) in spite of best efforts to control it and there will be times during the construction phase when elevated dust concentrations may occur. Higher amounts of dust will be generated at places where earthwork, cutting and filling operations take place or in material handling and storage areas. A large percentage of such dust emissions from construction sites have been found to comprise of particles which are coarse in size (>10 microns) and has a tendency to settle down within a few hundred metres of the source of emissions. The smaller fractions (PM10) can however be carried over longer distances in a dust cloud, in the case wind velocity is higher and depending on prevailing wind direction maybe deposited in the adjoining settlements with a potential to cause soiling of residential premises, deposition on agricultural crops, etc. However, this will be a short-term impact lasting for a few months. Particulates, CO, SO_x, NO_x and unburnt hydrocarbons (VOCs) will be emitted by vehicles, batching plants (if used), heavy equipment and DG sets associated with site clearing and construction activities. Overall, the impact on air quality during the construction and operational phase of the project can be rated as **negligible to minor**.

Noise and vibration is expected to be primarily generated during the site preparation and construction phases of the project. Such noise may be generated from blasting (if required), operation of construction equipment and machineries, DG sets and the transportation of equipment and materials. During stringing of transmission line, principal source of noise would be from operation of winching machine. The winching machine produces noise level near 80 dB (A).

The study area has no major noise sources, except for vehicular noise on the adjacent SH/NH/ODR. The noise generated from the construction phase activities is likely to be attenuated to acceptable levels as per the ambient noise standards within 200 m of the site. Such noise may however, cause discomfort the construction workers at site and nearby receptors of village settlements adjacent to the transmission line alignment. The construction activities, especially those with a potential to generate high noise levels would be temporary in nature and are not expected to last more than 15-20 days at specific tower location. The spatial scale of impact will be limited to a few hundred meters. The overall significance of the noise related impacts is rated as **minor**.

6.1.3 *Impact on Land use*

Approx. 309 nos of tower would be constructed in Scheme D (Irba –Ramgarh, Irba-Kanke and Irba –Ratu TL Alignment). Cumulative length of the three transmission lines would be approx. 89 km. Land footprint of about 22 sq. m. would be required for each transmission tower, where right of way of the transmission line would be of 27 m (for 132 KV transmission line).

The present land use of the area through which all the transmission lines (in Scheme D) passes are primarily agricultural land. As discussed in Section 5.3, mainly single cropped is practiced in this area. Though there would be restrictions on development work (e.g., construction of building) on the land parcels falling within the right of way, knowing the fact that there would not be any restrictions on these land parcels for use of agricultural purpose, and further all the three transmission lines area passing through mainly rural areas where chance of development work being coming up is near future very meagre, significance of the land use related impacts is considered as minor. However, transmission lines (in Scheme D) traverse through forest land of approx. 820 m. In these areas, JSUNL will divert the land use of the area falling within RoW of the TL alignments after obtaining necessary Forest Clearance (as per Forest Conservation Act, 1980) and this would result in a permanent change of land use. Due to permanent changes in land use, overall significance of the land use related impacts is rated as **moderate**.

6.1.4 *Impact on Soil*

Cutting of vegetation (at tower foundation area), stripping of topsoil and digging of foundation pits for the tower are the three main activities, which are likely to affect the soil structure and quality. At the tower site (approx. 309 nos), all vegetation within 2 m beyond the tower base in all direction will be cleared to ground level. At four legs of the tower, topsoil will be stripped and foundations will be dug up to a depth of 3 m depending upon the tower type and soil characteristics. General

practice shows that upon construction of the transmission tower, land below the tower is used for cultivations. Therefore, if topsoil removed during tower base construction work is not properly reinstated, it may lead to loss of soil quality and thereby low agricultural productivity.

Considering good construction practices and planned embedded measures for mitigating these impacts, overall significance of the soil related impacts is considered as **minor**.

6.1.5 *Impact on Road & Traffic*

The traffic movement during construction phase (approx. 5-6 vehicle per day) will to some extent depend on which type and number of trips to and from the proposed site. The existing village roads would be used to the extent possible to approach the site. Since the vehicular traffic on the village roads are low there would be minimal increment in the existing traffic load. The overall significance of traffic related impacts is rated as **negligible to minor**.

6.1.6 *Impact on Biological Environment*

As discussed above transmission lines under Scheme D would traverse through forest land of approx. 820 m. There is no forest patch within the Irba-Kanke transmission line corridor. However, the Irba-Ratu and Irba-Ramgarh corridors passed through lengths of 450m and 370 m protected forest patches respectively. JUSNL would have to obtain Forest Clearance as per the provisions of the FCA, 1980, before any project related activity can commence through forest land. Site preparation will involve removal of trees, shrubs and herbs present along the transmission line corridor which will cause change in the modified habitat within the corridor leading to a loss of floral biodiversity at local level.

Trees within the transmission line corridors would be removed before construction. Moreover, there would also be removal of herbs and shrubs from the transmission line corridors. None of the floral or faunal species expected to be present within the site is threatened as per IUCN Classification (Version 2017-3).

Faunal species that have the most probability of occurrence within the transmission line corridors include amphibians (Common toad), reptiles (lizards and snakes), birds (Common crow, Common sparrow, Common myna, Drongo, Indian Roller, larks, doves, parakeets, kites etc.) and mammals (mongoose, squirrels, rats, fox, jackal, langur, elephant etc.). Vegetation clearance may affect the faunal species mentioned above, however, there are similar habitats in the vicinity and the species can easily relocate to those areas. Removal of vegetation at construction site (for tower footing) can adversely affect residential burrowing faunal species *viz.* reptiles (lizards and snakes), ground roosting birds (sparrows, pigeon, doves etc.) and mammals (rats, mongoose, mouse etc.). Removal of trees, herbs and shrubs from the transmission line corridors may cause loss of nesting habitats for bird species. In most cases however it has been observed that faunal and bird species to migrate to other local habitats which are adjacent, if the land affected is not very large. The study area has reports of movement of Indian Elephant which is an IUCN

Endangered species. However, the frequency of elephant movement is not regular and some straying elephant movement is reported at the forest areas by the forest department and local villagers therefore the sensitivity of the site has been considered as medium. The scale of impact will be medium as it causes irreversible damage to a modified habitat. Duration of the impact will be long term as vegetation clearance would create a permanent impact within the site area. Extent of the impact would be only within the project site and immediate vicinity.

Construction activities will include excavation, movement of machineries, increased anthropogenic movement (men and transport) and may lead to minor disturbances to floral and faunal habitats in the vicinity of the tower footing site because of deposition of dust, noise and light generated during construction activities may affect feeding, breeding and movement of animals. There is a chance of elephants and other mammalian species falling in the excavated areas for transmission towers and get injured. However, these disturbances will be for a temporary period and expected to be of low magnitude and local in scale.

During the operation phase, several species of birds identified during the ecological study which can perch or make nests within transmission line area and can get electrocuted. Collision with the transmission line canal also result in bird mortality. The Irba-Kanke and Irba-Ratu lines pass in between two large reservoirs viz. Getalsud reservoir and Patratu reservoir. Asian Waterbird Census (AWC), 2015 for Jharkhand recorded presence of many water bird species at both the reservoirs. During inter-waterbody movements (between Getalsud and Patratu) birds mortality could happen due to collision with the transmission lines. The study area has reports of movement of Indian Elephant. A matured elephant with its trunk extended can reach upto a height of 6 metres. However, in flat terrain the minimum height of the transmission lines will be greater than 6 metres therefore chances of electrocution of elephants would be low. At the undulating terrain areas the risk of electrocution cannot be ruled particularly at the maximum sagging areas. However, the frequency of elephant movement is not regular and some straying elephant movement is reported at the forest areas by the forest department and local villagers. Therefore impact sensitivity has been considered as medium.

Overall the significance of impact on biological environment can be rated to be **moderate**.

6.1.7

Potential Impact on Socio-economic Conditions

Damage to Standing crops: Even though most of the construction activity has been planned during dry season there might be instances that during construction of the transmission tower foundation, erection of towers and subsequently stringing of transmission lines involve movement of men, machinery and equipment across agricultural fields leading to the tower locations. This may cause potential damage to the standing crops in agriculture field not only at the tower base and RoW of the transmission line but also may cause damage to the crops in adjacent agricultural plots due to movement of the vehicle and equipment and construction workers. This damage to crops will result in temporary loss of income for the cultivators.

Restriction on Land use and diminution of land value: As reported in Section 5.3, majority of all the three alignments passes through single crop agricultural land. No land would be acquired for the construction of tower footing. However, there would be restriction on use of land falling within right of way and tower base. As per the regulation of Government of Jharkhand¹, due to restriction of land use, compensation at the rate of 85% of land value would be paid to land owners for tower base area. For RoW, compensation at the rate of 15% of land value would be paid to land owners towards diminution of land value in the width of RoW Corridor. Further, even though there would be some loss of land and physical obstruction to use the land falling under the tower base, but the impacts would not be pronounced as non-mechanised agriculture is carried out in Jharkhand. The land owner would be able to use the land under the tower for agricultural purpose.

Influx of Labour: Labour would be required for erection of transmission lines. Even though unskilled labour would be required for civil work and would be preferably sourced from local areas, skilled labour required for erection of transmission tower, stringing of transmission lines etc, would be primarily migrant labour. Some of the significant issues related with migrant labour would include:

- Conflict amongst workers, and between workers and local community, based on cultural, religious or behavioural practices.
- Discontent amongst local community on engagement of outsiders.
- Outbreaks of certain infectious diseases due to interactions between the local and migrant populations. The most common of these are respiratory (TB), vector borne (Malaria, Dengue), water borne (Stomach infections, typhoid) and sexually transmitted diseases (HIV, Syphilis and Hepatitis).
- Security issues to local women from migrant workforce.
- Use of community facilities such as health centres, temples, transport facility etc. by migrant labour may lead to discontent with local community.
- In case contractors bring in unskilled migrant labour, there stands the risk of exploitation of a labourer. This can happen in the form of hiring underage labourers, low and unequal wage payments, forced labour and discrimination on basis of the basis of caste, religion or ethnicity

The impacts described above are primarily within the RoW or would only extend to the settlements in the immediate vicinity of the transmission line, therefore localize in nature. Moreover, the damage to crop and conflicts of the migrant labour with the community would be temporary. Overall, socio-economic impact during the construction phase of the transmission lines are is evaluated to be of **minor** significance.

6.2

COMMUNITY HEALTH & SAFETY

Excavation of Tower Footings: During the construction of the foundation for the tower footing the excavation can pose potential safety concerns for the inhabitants in the

1) Department of Power, Government of Jharkhand notification dated 15th December 2017

locality. This would be more relevant when the construction is carried out near a settlement or along a foot track or existing village road.

Interference with utilities and traffic: The stringing of the transmission lines would cross existing roads (NH 33, SH) including village and districts road, state and national highways and railways. During the stringing operations when the transmission line crosses any road/ railways line, hindrance may be caused to the movement of traffic. In some instances temporary closure of the road/ railway line may be required to facilitate stringing activities. This disruption in movement would cause inconvenience to the local population as access would be interrupted temporarily.

Changes in Environmental Conditions: Changes in baseline environmental conditions can be experienced by the local community in terms of increased nuisance levels from emissions of dust, contamination of surface water or ground water and high noise levels during the construction phases. Even though there would be minimal increase in dust and noise during the construction period and this has the potential to lead to health impacts associated with eye irritation and general disturbance to daily activities.

Increased Prevalence of Disease: A maximum of 30 workers (at one point of time) will be employed for the construction phase during the peak construction and commissioning. This influx of workers to the community may cause impacts to public health, especially an increase in prevalence of diseases as well as pressures on existing health infrastructure. There is also the possibility of increase in sexually transmitted diseases such as HIV/ AIDS as a result of the expected influx of workers to the area. In addition, vector-borne diseases will be sensitivity for settlements closer to campsites for the construction phase labour, particularly due to lack of hygienic conditions.

Electro Magnetic Field (EMF): During operation phase, Electro Magnetic Field (EMF) created by the transmission line can cause inconvenience on the surrounding community. It has been reported during the consultation that the people feel inconvenienced due to this charge especially when working on paddy fields underneath the conductors especially during the monsoon season. However, a review by the World Health Organization (WHO) held as part of the International EMF Project (1996), concluded that "From the current scientific literature there is no convincing evidence that exposure to radiation field shortens the life span of humans or induces or promotes cancer".

Considering good construction practices and planned embedded measures for mitigating these impacts, the overall significance of community health and safety impacts can be rated to be **minor**.

The occupational risk related to the construction of transmission lines is primarily due to fall from heights which might cause serious injuries. Transmission towers would be of different heights and minimum height of the tower would be approx. 25 m in case of 132 kV transmission line. A review of the incident database (OSHA's Integrated Management Information System (IMIS) database) ⁽¹⁾ indicate most of the incidents are due to fall from height while some incidents reported also include being struck by loads or falling objects during the erection of tower. Similarly there are risks of fall in the excavation created for tower footing.

Electrocution during the testing and charging: It has also been reported [OSHA's Integrated Management Information System (IMIS) database] that there has been fatalities due to electrocution. This occurs primarily during the testing and charging of the transmission lines is proper safety procedures are not followed.

The construction work would involve several contractors who in turn would engage different labourers having varied skillsets. The duration and extent for most workmen is expected to extend for a few months and the occurrence of any accidents and consequent injuries/fatalities will lead to adverse impacts that could range from loss of productive time to loss of livelihoods (of workmen). If local workers are hired, they may not have appropriate training for adopting a safety culture expected at an industrial construction site – so receptor sensitivity may be anticipated to be high. There is also a possibility of legal non-compliance which may lead to temporary stoppage of work affecting construction schedules. Hence the receptor sensitivity is high. Overall, the impact significance for occupational health and safety can be considered to be **moderate**.

(1) <https://www.osha.gov/laws-regs/federalregister/2015-04-15-0>

A stakeholder is defined as “an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project”. “Stakeholder Analysis” is the process of sorting identified stakeholder groups according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders or projects impact on them should be addressed in the project development plan or its operation.

The importance of stakeholder analysis lies in the assessment and understanding of the socio-political environment surrounding the project. It allows for:

- Identification of the interests, concerns and societal risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable “coalitions” of project sponsorship, ownership and co-operation as well as the mechanisms which may influence other stakeholders;
- Key groups/ individuals to be identified who need to be informed about the project during the execution phase;
- Identifying stakeholders (those who might have an adverse impact on the project) and taking appropriate measures to mitigate their influence; and;
- Development of a framework for participatory planning and implementation of various project activities including interventions for community development.

The identification of stakeholders and their inclusion in the decision-making process is thus essential in the process of prioritizing, analyzing and addressing issues; and in creating management systems and strategies to address the concerns/ expectations of various stakeholders.

The following sub-sections provide a profile of the various stakeholders in the project as well as their concerns and relative influence with regards to the project.

7.1 IDENTIFICATION OF STAKEHOLDERS

The stakeholders who would directly impact or are directly impacted by the project are known as Primary Stakeholders, those who have an indirect impact or are indirectly impacted are known as Secondary Stakeholders. Keeping in mind the nature of the project and its setting, the stakeholders have been identified and listed in the table below;

Table 7.1 *List of key stakeholders*

Stakeholder Category/ Group	Key Stakeholders
Primary Stakeholders	
Local Community	<ul style="list-style-type: none"> • Local Community

Stakeholder Category/ Group	Key Stakeholders
Other Primary Stakeholders	<ul style="list-style-type: none"> Jharkhand Urja Sancharan Nigam Limited World Bank
Secondary Stakeholder	
Institutional Stakeholders	<ul style="list-style-type: none"> District Administration Forest Department Tribal Development Department
Other Secondary Stakeholder	<ul style="list-style-type: none"> Contractors

Consultations with District Administration

Consultation was held with Additional Deputy Commissioner, Ranchi District on 23.05.2017. ADC was briefed on the background of the project and the objective and scope of the ESIA Study and his assistance was sought in forest clearance.

Consultations with Local Communities

Community consultation is central to every impact assessment study because it helps to gather the opinion of the public on the proposed project and assess its potential effect on the public especially vulnerable groups. Consultations were carried out with community people residing in the adjacent to the proposed transmission lines to understand their concerns and also assess the extent of impact on the common. The location where the consultations were held in Scheme D along with the target group and the dates of consultation are presented in *Table 7.2 and Figure 7.1*.

Table 7.2 *Details of Consultation in Scheme D*

Sl. No	Location	Date	Target group
1.	Simatoli Village, Baru Panchayet	16.10.2017	People in the village
2..	Jidu Village, Konki Panchayet	16.10.2017	Women Group
3.	Jidu Village, Konki Panchayet	16.10.2017	General Population
4	Kuchu Village, Kuchu Panchayet	17.10.2017	Women Group
5.	Kuchu Village, Kuchu Panchayet	17.10.2017	General Population
6.	Ukhrid Village,	17.10.2017	Women Group
7.	Khirabari Village, Palo Panchayet	17.10.2017	Women Group
8.	Gujrung Jamra Village,	17.20.2017	General Population
9.	Vasant Vihar Colony, Dumardaga, Ward No.6, Ranchi Municipality Corporation	18.10.2017	General Population

Figure 7.1 *Consultations with Local Communities*



Irba -Rutu (Barhu)



Irba -Ramgarh (Ramgarh)



Irba -Ramgarh (Chuttupullu)



Irba -Kanke (Ward No 6 Ranchi)



Irba Kanke (Kanke Substation)



Irba - Kanke (Kuchu)



Irba -Kanke (Kuchu)



Irba Ratu (Ukhrid)

Consultation at villages

The brief outcome of the consultations with the key stakeholder groups are listed below. The minutes of all consultations are recorded under *Annexure 3* of this document.

ERM undertook consultations/ meetings with identified stakeholders during the course of the site visit. The intensive deliberations provided a platform for two-way communication between the team of consultants and the stakeholder groups. This in turn helped in developing an understanding of the perceptions of stakeholders with regards to the project and also allowed for a means of recording their feedback. The key points discussed with each of these stakeholders are provided in the *Table 7.3.*

Table 7.3 *Key Points Discussed at Stakeholders Consultation*

S. No.	Stakeholder Category	Key Points Discussed	Findings of the Consultation
Local Community			
1.1	Place- Simatoli Village, Baru Panchayat ; Date- 16/10/2017; Number of Participants-4	<ul style="list-style-type: none"> • Current engagement scenario –livelihood options; • Basic amenities in the village – electricity, drinking water, etc.; • Health scenario in the village and distances of Hospitals/ Clinics; • Perception of local community towards the project 	<ul style="list-style-type: none"> • An intermediate school up to Class VIII is present in the village. • Availability of health infrastructure is very poor in this area. There was no Primary Health Centre and Maternity Centre in the village. • There is no piped water supply in this village. For domestic water need, people in this village primarily depend on bore well. Reportedly, quality of water is good. • Electricity is available in most of the houses. However, power cut is very frequent in this area. • For livelihood, majority of the people depends on cultivation. Paddy is the major agricultural produce. • Women's Samity is present in this village. • Females are interested to undertake training for livelihood. • Drainage system in the village needs improvement.
1.2	Place- Jidu Village, Konki Panchayat; Date- 16/10/2017; Number of Participants- 5		<ul style="list-style-type: none"> • It is a tribal village comprising of Oraon tribes and Lohar tribes. The lohar tribes are located in a separate hamlet /tola inside the settlement. • No health infrastructure is available in village. Nearest hospital is located in Pithoria village. • Maternity Centre is present in neighbouring Barwatoli village. • Women in this area mainly engages in household activities and also practice agriculture on their own land. • Paddy is the main agricultural produce of the area. Other than that vegetable are also produced. • Sarna is present near Barwatoli which is also a part of the Jidu Village • Women's Samity is present in the village. • People expressed that they have observed that the incidence of lightning during the

S. No.	Stakeholder Category	Key Points Discussed	Findings of the Consultation
1.3	Place- Kuchu Village, Kuchu Panchayat; Date- 17/10/2017; Number of Participants- 11		<p>thunderstorm have increased in their villages after the construction of the Power Grid transmission lines.</p> <ul style="list-style-type: none"> • Primary Health Centre is available in this village. • A medical bus from Sadar Hospital, Ranchi visits the village every 17th of month for medical check-up. • Maternity Centre is not present in the village, closest Maternity Centre is present in Piska and Salini village. • Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation. • Women's Samity is present. The samity mainly functions as a deposit bank at present and have not taken up any other activities till now. • Community are apprehensive considering their experience of the existing 400 KV transmission line which was constructed a few years back. The plots over which the line has passed it has become difficult to carry on agricultural activity during the monsoon due to electromagnetic induction. • Females are interested to undertake training for livelihood.
1.4	Place- Ukhrid Village; Date- 17/10/2017; Number of Participants- 5		<ul style="list-style-type: none"> • Medical facility is not available in this village. • Electricity is present but there are frequent power cuts. • Majority of the villagers work in agricultural field. • Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation. • Women's Samity is present in this village. • Females are interested to undertake training for livelihood. • Drainage system in the village needs improvement. • Community have raised their concerns about diminishing value of land within the RoW of transmission line.
1.5	Place- Khirabari Village, Palo Panchayat; Date- 17/10/2017; Number of Participants- 5		<ul style="list-style-type: none"> • This is a tribal village comprising of Bedia community. • Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation • Though electricity is available in this village, power connection is not provided in majority of the households. • Women's Samity is present • Females are interested to take based training to support their livelihood. • The major festivals in this village are

S. No.	Stakeholder Category	Key Points Discussed	Findings of the Consultation
1.6	Place- Gujrunj Jamra Village; Date- 17/10/2017; Number of Participants- 5		<p>Dusshera, Chhat, Karma, Munda Jhanda etc</p> <ul style="list-style-type: none"> • Sarna is present near Chutupalo. • School up to Class V is available in this village. • Primary Health Centre is not present. • For obtaining medical facility people of this village travel to Ramgarh town • There is no water supply in the village • Borewell is used for drinking water. The water quality was reported not to be good. • Electricity is present but there are frequent power cuts. • Majority of the villagers work in agricultural field. • Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation • People have raised their concerns that if construction work takes place during harvesting, it may damage crop.
1.7	Place- Vasant Vihar Colony, Dumardaga, Ward No.6, Ranchi Municipality Corporation; Date- 18/10/2017; Number of Participants- 3		<ul style="list-style-type: none"> • Maternity Centre is not present in the village, closest Maternity Centre is located in Ranchi • There is water supply from PHED • Borewell with depth of 100-150 feet is used for drinking water. The water quality was reported not to be good. • Electricity is present but there are frequent power cuts. • Majority of the people are service holders or in business. • Women's Samity is available in this area. • Females have shown interest to undertake training to support their livelihood. • Electromagnetic induction below transmission line was reported by the villagers who have given land for the existing transmission line. They have also reported not to plough that area and cultivate due to above mentioned reason.
Institutional Stakeholders			
2.1	District Administration	<ul style="list-style-type: none"> • Settlement of Forest rights 	<ul style="list-style-type: none"> • District administration advice to submit the formal proposal for the settlement of forest right under Forest rights Act. After that they will send it to concerned circle officer for forest rights settlement and gram sabha Clearance.

8.1 MITIGATION MEASURES & MANAGEMENT PLAN

This document provides the Environmental Management Plan (EMP) for the planning, construction and operation of the Project which is described in Sections below. This ESMP provides an action plan against each of the mitigations measures identified for an impact identified in the earlier section. It also defines the actions to be taken to check and monitor compliance and effectiveness of the mitigation measures to which JUSNL is committed. In addition, this EMP is used to ensure compliance with statutory requirements and World Bank safeguards policies

The environmental mitigation measures and plans are presented in form of a matrix according to the sequential flow of activities in the project life cycle. The matrix focuses on strategies to be adopted for safe guard of the environment from possible impacts resulting out of the project activities. These measures would be further updated by Contractor during the implementation of the EMP. The ESMP is provided in *Table 8.1*. To ensure that the conditions specified in the ESMP are adequately implemented by the Contractor, General Conditions of Contract has been developed. The General Conditions of Contract are presented in *Annexure 4*.

Table 8.1 Environment and Social Management Plan

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
	Planning/Preconstruction			
1.1	Location of transmission line/tower	Diminution of land value in the width of RoW , restriction on use of land	<ul style="list-style-type: none"> • Compensation at the rate of 85% of land value, as determined by District Magistrate or any other authority based on Circle rate/ Guideline value/ Stamp Act rates for tower base area (between four legs); • Compensation at the rate of 15% of land value, as determined based on prevailing Circle rate /Stamp Act rate towards diminution of land value in the width of RoW (27m) corridor. 	JUSNL Subdivision/Division/Circle
1.2		Exposure to safety related risks	Transmission line will be designed as per IS 5613 (Par 2) to provide setback from dwelling area.	Design Consultant
1.3		Exposure to electromagnetic interference	Transmission line would be designed considering international guidelines such as	Design Consultant

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
1.4		Damage to private property	Commission on Non-Ionizing Radiation Protection (ICNIRP), US National Council on Radiation, State Transmission Lines Standards and Guidelines in the USA etc. Avoid settlement / hamlets within RoW	Design Consultant
1.5		Impact on Cultural Heritage	<ul style="list-style-type: none"> Careful selection of route alignment to avoid socially, culturally and archaeological sensitive areas (i. g. sacred groves, graveyard, religious worship place, monuments etc.); and Maintain minimum distance of 100 m from archaeological monuments 	Design Consultant
1.6		Tree felling (Permission under the tree felling act)	Permission for felling of trees to be obtained before tree felling	JUSNL Circle/Divisional Office/External Consultant
2.1	Transmission line through forest/ protected area / precious ecological area	Loss of precious ecological values/ damage to precious species	Careful selection of route alignment to avoid natural habitats (i. g. National Parks, Wildlife Sanctuary, Biosphere Reserves/ Biodiversity Hotspots)	Design Consultant
2.2		Deforestation and loss of biodiversity edge effect	<ul style="list-style-type: none"> Avoid transmission line/ tower in protected and reserve forest, Jungle Jhari by careful selection of alignment If avoidance is not possible, minimise the land to be taken from forest, jungle jhari Obtain Stage I and Stage II Clearance from the forest department. 	Design Consultant
3.1	Line through identified migratory bird path and bird habitats and near waterbodies	Risk to the bird population primarily due to collision	Careful selection of route to avoid such areas with known avian populations e.g. nesting grounds, foraging grounds, migration corridors etc.	Design Consultant
3.3			Provide bird guards and markers [as per the specification provided in IS-5613 (Part-II)] in transmission lines when passing through/near nesting grounds, foraging grounds, migration corridors etc.	Design Consultant
4	Line through designated elephant corridor or local wildlife	Damage to the wildlife	The height above the ground at the lowest point of the lowest conductor or grounding wires (i.e., at maximum sag point) of	Design Consultant

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
	corridors		power lines shall be: <ul style="list-style-type: none"> a minimum of 20 feet (6.6 meters) above ground on level terrain (slope <20 degrees) a minimum of 30 feet (9.1 metres) above ground on steeper terrain (slope > 20 degrees) ⁽¹⁾ 	
	Construction			
5.1	Site preparation and construction work	Loss of topsoil	<ul style="list-style-type: none"> Top soil from the entire tower footing area (approx. 22 sq. m.) will be stripped (10 to 15 cm) before commencement of construction work; Top soil will be stored in a dedicated top soil storage site, having adequate mitigation measures for preventing erosion due to runoff; Activities will be scheduled (as far as possible) to avoid extreme weather events, such as heavy rainfall; After construction work is over, top soil will be reinstated at the construction site. 	Contractor
5.2.1		Noise and vibrations	All equipment/machineries to be regularly maintained to ensure efficient operation	Contractor
5.2.2			DG sets with acoustic enclosure should be used	Contractor
5.2.3			Construction work during night time (10 pm to 6 am) to be prohibited. In case of emergency work at night approval of JUSNL Division/ Circle is mandatory	Contractor
5.3.1		Air Pollution	Water sprinkling to be carried out twice a day during dry season on exposed surface area.	Contractor
5.3.2			Vehicles transporting loose construction/excavated materials shall be covered with tarpaulin sheets.	Contractor

(1)<http://www.moef.nic.in/sites/default/files/FIRSTDraft%20guidelines%20roads%20and%20powerlines.pdf>
[http://www.moef.nic.in/sites/default/files/FIRSTDraft guidelines roads and powerlines.pdf](http://www.moef.nic.in/sites/default/files/FIRSTDraft%20guidelines%20roads%20and%20powerlines.pdf)

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
5.3.3			Loose construction material/ excavated material shall be stored against any structure or would be kept covered with tarpaulin sheet at the construction site.	Contractor
5.3.4			All vehicles utilized in transportation of raw materials and personnel, will have valid Pollution under Control Certificate (PUCC)	Contractor
5.3.5			Regular maintenance of machines, equipment and vehicles that will be used for construction activities of substation/tower construction	Contractor
5.4		Water/Soil Pollution	Soak pits/modular bio-toilets would be provided at all construction camp, laydown area and labour camp	Contractor
6.1.1	Line through farm land	Disturbance to farming activity	<ul style="list-style-type: none"> • Use existing access roads wherever possible • Repair /reinstate damaged bunds on agricultural field etc after completion of construction work. 	Contractor
6.1.2			Construction activities and stringing of lines to be avoided during cropping season.	Contractor
6.1.3			<ul style="list-style-type: none"> • Compensation for fruit bearing trees at prevalent market rates, to be calculated as annual net product value multiplied by the number of productive years remaining; • Compensation for timber trees to be calculated based on girth and type of trees; • Compensation for one-year net harvest for seasonal crops at prevalent market rates; 	Contractor
7	Occupational health and safety	Injury and sickness of workers	<ul style="list-style-type: none"> • Provide safety equipment's (PPEs) for construction workers; • Prevent entry of unauthorised person at construction site; • Provide training on health and safety to all the workers. 	Contractor
8.1	Blasting (if blasting is required)	Noise and Vibration	<ul style="list-style-type: none"> • Adopt appropriate engineering safeguards to meet the regulatory standard [DGMS Prescribed 	Contractor

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
			<ul style="list-style-type: none"> Permissible Limit of Ground Vibration (refer Annexure 5) for blasting operation. 	
8.2		Damage to Structure	In case there are any damages to the structures due to blasting, the same will be assessed and would be repaired	Contractor
8.3		Injury of workers	<ul style="list-style-type: none"> Implement mitigation measures to control fly rock; Secure and limit access to blasting areas to qualified personnel involved in, and necessary for, blasting operations; Arrange for adequate safety measures (as per Explosives Rules, 2008) for transport and storage of explosives; Provide protective equipment to all the personnel engaged in blasting activity. 	Contractor
9.1	Community Health and Safety	Injury and sickness of local people	<ul style="list-style-type: none"> Coordination with local communities for construction schedules etc; Barricading construction area; Placing reflective tapes on the boundary of construction area; Undertaking regular health check-ups of the work-force and reporting any major illnesses at the earliest to Block health officer for disease control and surveillance; Creating mass and labour awareness on HIV and STDs; 	Contractor
9.2		Gender issue of local community	<ul style="list-style-type: none"> Labour Camp should be located away from the village and it should be access control for the local people; Awareness should be created among the migratory labour that they should not be entered in the village without prior information to the villagers; 	Contractor

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
			<ul style="list-style-type: none"> Local resource like handpump, bathing ghat should not be used by the labours. 	
10.1	Health, Hygiene, Safety and Security of Workers in Labour Camp	Labour camp related EHS and Hygiene Issues	<p>Facilities would be provided at the labour camp as per provisions of IFC Guidance Note on Worker's Accommodation 2009. Some of the relevant provisions to be complied are as follows:</p> <ol style="list-style-type: none"> 1. Worker's accommodation; 2. Provision of safe drinking water; 3. Appropriate arrangement for cooking; 4. Management of waste water and solid waste from the camp site; 5. Availability of medical facility (first aid); 6. Security arrangement of the camp site; 7. Arrangement to register and redress grievance of workers. 	Contractor
10.2		Conflict with local community due to sharing of local resources	<p>Refer Annexure 6 for detail guideline.</p> <p>Local resource like Handpump, pond, bathing ghat should not be used by the workforce.</p>	Contractor
11	Line through areas having vegetation (trimming /cutting of trees/ vegetation clearance)	Loss of vegetation	<ul style="list-style-type: none"> Avoid felling of trees during stringing unless it becomes absolutely necessary. After completion of stringing, natural regeneration or dwarf tree/medicinal tree plantation would be allowed to heights as per the standards mentioned in IS: 5613 and Government of India Circular 7-25/2012-FC dated 5th May 2014. 	Contractor
12	Line through forest land/near forest areas/ <i>near the elephant corridors</i>	Injury to small animal/ elephant	<ul style="list-style-type: none"> Install the protective fencing around excavated area (for tower foundation); Install reflector or beacons in case elephant movement 	Contractor

Sl. No.	Project Phase /Activity	Potential Impacts	Proposed Mitigation Measures	Responsibility
			is reported	
	Operation and Maintenance			
13	Operation of transmission lines	Collision of avifauna	Use of power line markers, which reduces of bird collision by increasing the visibility of transmission lines to birds.	JUSNL Subdivision Office
14	Uncontrolled growth of vegetation	Loss of vegetation	<ul style="list-style-type: none"> Periodic pruning of vegetation to maintain minimum clearance of 4m between conductor and trees would (As per Government of India Circular 7-25/2012-FC dated 5th May 2014). 	JUSNL Subdivision Office
15.1.1	Occupational health and safety of staff	Injury/ mortality to staff during O&M work	<ul style="list-style-type: none"> During the testing and charging of electrical lines, electricity insulating protective equipment like footwear (ISO 20345: 2004 Part-2), rubber gloves (IS 4770: 1991) would be provided to workers. In addition, provisions of the "Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations 2010" would be adhered to. 	JUSNL Subdivision Office
15.1.2			Induction training to all the new employee and six monthly refresher training for substation O&M staff would be organised.	JUSNL Subdivision Office
15.2		Injury/ mortality from emergency situation	Preparation of fire emergency action plan and training given to staff on implementing emergency action plan	JUSNL Subdivision Office
16	Community health and safety	Injury/ mortality to public	<ul style="list-style-type: none"> Barriers to prevent climbing on transmission towers Warning signs at transmission towers 	JUSNL Subdivision Office

8.2

ENVIRONMENTAL MONITORING & REPORTING

The monitoring indicators, frequency for measurement and the responsibility for monitoring for each of the mitigations proposed in the management plan are

described in *Table 8.2*. The monitoring of the ESMP provisions would be carried out by the respective agencies at a frequency mentioned in the ESMS monitoring plan.

For ensuring effective implementation and evaluation of the performance of the environmental mitigation measure a reporting mechanism has been drawn up and presented in *Section 5.3* of the Environmental and Social Management Framework. The reporting of the implementation of the ESMP for this project is presented *Annexure 7*.

Table 8.2 *ESMP Monitoring Plan*

Sl. No.	Project Phase /Activity	Potential Impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
	Planning/ Preconstruction				
1.1	Location of transmission line/tower	Diminution of land value in the width of RoW , restriction on use of land	Compensation received by land owner, grievance recorded from land owner	Once before construction work	JPSIP PIU
1.2		Exposure to safety related risks	Setback distances to nearest dwelling units	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
1.3		Exposure to electromagnetic interference	Electromagnetic field strength for proposed line design	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
1.4		Damage to private property	Distance from nearest dwellings units	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
1.5		Impact on Cultural Heritage	Distance from socially, culturally and archaeological sensitive areas	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
1.6		Tree felling (Permission under the tree felling act)	Number of trees felled against the permissible number of trees which can be felled	Once- Before commencement of construction activity	JUSNL Subdivision/Division/Circle/ JPSIP PIU
2.1	Transmission line through forest/ protected area / precious ecological area	Loss of precious ecological values/ damage to precious species	Distance to natural habitats	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
2.2		Deforestation and loss of biodiversity edge effect	Distance to nearest protected and reserve forest and Jungle Jhari; Stage-I and	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU

Sl. No.	Project Phase /Activity	Potential Impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
Stage-II clearance					
3.1	Line through identified migratory bird path and bird habitats and near waterbodies	Risk to the bird population primarily due to collision	Proximity of transmission lines to nesting grounds, foraging grounds, migration corridors etc.	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
3.3			Provision of bird guards and markers in transmission lines	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
4	Line through designated elephant corridor or local wildlife corridors Construction	Damage to the wildlife	Minimum/maximum ground clearance inside Elephant Corridor	Once during the detailed design	JUSNL Subdivision/Division/Circle/ JPSIP PIU
5.1	Site preparation and construction work	Loss of topsoil	Practice adopted to store and reuse topsoil which is removed from the construction site	Every week during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.2.1		Noise and vibrations	Maintenance log book of vehicle/machinery, Number of equipment /vehicle undergoing regular maintenance	Every week during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.2.2			Presence of acoustic enclosure in DG set	Every week during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.2.3			How many night time approval was taken	Every week during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.3.1		Air Pollution	Water sprinkling at dust generating area	Every week during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.3.2			Tarpaulin cover on vehicle carrying loose construction/excavated materials	Every week during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU

Sl. No.	Project Phase /Activity	Potential Impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
5.3.3			Tarpaulin cover on loose construction/excavated materials	Every week during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.3.4			Number of vehicle not having valid PUCC certificate	Every month during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.3.5			Maintenance log book of vehicle/machinery, Number of equipment /vehicle undergoing regular maintenance.	Every month during tower construction work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
5.4		Water/Soil Pollution	Availability of Septic tanks and soak pits/modular bio-toilets	Every month during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
6.1.1	Line through farm land	Disturbance to farming activity	No of new access roads constructed, number of grievance recorded from local community	Every month during line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
6.1.2			Construction work schedule	Every month during line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
6.1.3			Disbursement of Compensation	Every month during line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
7	Occupational health and safety	Injury and sickness of workers	Awareness of workers, use of PPE by workers	Every 15 days during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
8.1	Blasting (if blasting is required)	Noise and Vibration	Measures adopted to control noise and vibration at blasting site	Weekly during blasting work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
8.2		Damage to Structure	Record of any damaged and repaired structure	Weekly during blasting work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU

Sl. No.	Project Phase /Activity	Potential Impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
8.3		Injury of workers	Measures adopted to control fly rock, safety measures adopted for transport and storage of explosives, use of protective equipment, measures adopted for access restriction at blasting site	Weekly during blasting work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
9.1	Community Health and Safety	Injury and sickness of local people	Number of accidents of local people (if any) at construction site; number of grievance recorded; Review of document related to regular health check-up of the work force; Review of document related to awareness camp organised periodically	Every month during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
9.2		Gender issue of local community	Physical observation of the labour camp; grievance received from local community.	Every month during tower construction/line stringing work	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
10.1	Health, Hygiene, Safety and Security of Workers in Labour Camp	Labour camp related EHS and Hygiene Issues	Condition of labour camp, awareness of workers, complainant register	Every 15 days during operation of labour camp	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
10.2		Conflict with local community due to sharing of local resources	No of registered grievances and redressal status	during operation of labour camp	JUSNL Subdivision/Division/Circle Office/ JPSIP PIU
11	Line through areas having vegetation (trimming /cutting of trees/ vegetation clearance)	Loss of vegetation	Tree felling in the RoW corridor, minimum clearance b between conductor and trees	Every month during line stringing work	JUSNL Subdivision/Division/Circle/ Head Office

Sl. No.	Project Phase /Activity	Potential Impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
12	Line through forest land/near forest areas Operation and Maintenance	Injury to small animal	Availability of fencing, reflector or beacons	Every month during tower construction work	JUSNL Subdivision/ Division/Circle/ Head Office
13	Operation of transmission lines	Collision of avifauna	Bird nests in towers, number of power line markers between towers	Monthly throughout the operation phase of the project	JUSNL Division/Circle/ Head Office
14	Uncontrolled growth of vegetation	Loss of vegetation	Minimum clearance between conductor and trees	Monthly the operation phase of the project	JUSNL Division/Circle/ Head Office
15.1.1	Occupational health and safety of staff	Injury/ mortality to staff during O&M work	Accident-Incident register	Monthly the operation phase of the project	JUSNL Division/Circle/ Head Office
15.1.2			Document pertaining to training/awareness programs and mock drills/awareness level of staff engaged in O&M work of substation	Monthly the operation phase of the project	JUSNL Division/Circle/ JPSIP PIU
15.2			Accident-Incident list	Monthly the operation phase of the project	JUSNL Division/Circle Office/ JUSNL PIU
16	Community health and safety	Injury/ mortality to public	Accident-Incident list	Monthly the operation phase of the project	JUSNL Division/Circle/ Head Office

For the implementation of the Jharkhand Power System Improvement Project JUSNL has developed a Project Implementation Unit (JPSIP PIU). The JPSIP PIU is located at the JUSNL headquarters in Ranchi and is headed by the Chief Engineer (Transmission O&M) i.e. the Project Director (PD). Presently it includes four other members. The JPSIP PIU would also be responsible for driving the implementation of the E&S safeguards in JPSIP.

At the field level the Divisional/ Circle offices of JUSNL, who would be responsible for implementing the technical aspects of the JPSIP; he would also be responsible for the implementation of the E&S safeguards. The Junior Engineer of the respective division of JUSNL responsible for overseeing the project would also be responsible for overseeing that the provisions of the ESMP is being implemented by the Contractor. The Chief Engineer cum GM of the Ranchi Zone however has the ultimate responsibility of ensuring that the project is implemented successfully and also ensuring the project's desired environmental and social outcomes are attained. In addition the Environmental Officer and the Social Officer at the Project Implementation Unit of JPSIP would also undertake periodic site visits to oversee the operations and suggest corrective actions in case it is warranted.

In addition, the Contractor implementing the subprojects would also have an Environment and Social personnel to actually carry out the E&S safeguards on the ground.

8.4

COMMUNICATION PLAN

Through the process of consultation and disclosures, JPSIP would ensure that the project information are communicated to the stakeholder and the feedback from the community is integrated into the execution of the project.

A Consultation Framework has been prepared to ensure involvement of stakeholders' at each stage of project planning and implementation. To ensure community participation at different stages of the project the Consultation framework for JPSIP has been proposed in below table.

Table 8.3 *Summary of Consultation Framework*

Project Phase	Activity	Details	Responsible Agency	Target Stakeholders
Planning	Check Surveys	Identification of sensitivities around the transmission line corridor and common property which might get affected	Contractor along with the JUSNL Circle/Divisional	Community People especially the land owners adjacent to the transmission line corridor, Revenue Officer, Village

Project Phase	Activity	Details	Responsible Agency	Target Stakeholders
				Panchayat
Construction	Commencement of Construction	Communicate about the activity and period of activity.	Contractor along with the JUSNL Circle/Divisional	
Operation	Commencement of operation	Communicate about the date of start of operation and charging of transmission line	JUSNL Circle/Divisional	

8.5

GRIEVANCE MECHANISM

A three tier Grievance Mechanism would be used for handling any grievances of community related to the project. The Three Tier grievances redressal process is presented in **Box 8.1**.

Box 8.1

Three tier Grievance Redress Mechanism of JPSIP

Tier1: Circle Level: The aggrieved stakeholder can file a complaint with the respective Junior Engineer in charge of the site or at the Divisional/Sub-Divisional Offices of JUSNL. The complaints would be attended to by the Electrical Superintending Engineer of the Ranchi Division and all the Executive Engineers and Assistant Engineers in the Ranchi circle within 21 days of the filing of Complaint. In case the aggrieved is not satisfied with the solution provided Tier 1 he may escalate it to Tier 2: Zone Level.

Tier 2: Zone Level: The Chief Engineer cum GM of Ranchi Zone and all the Superintending Engineers of the Ranchi Zone would be the members of Tier 2 level. They would hear the aggrieved and also review the proceedings of the Ranchi Division and provide relief to the aggrieved. The entire process would be completed within 45 days of the complaint being referred to Tier II. Unsatisfied with the solution the Complainant can approach the Tier III: GRC Level.

Tier 3: Grievance Redresses Cell (GRC): The GRC for JPSIP would be housed at the JPSIP-PIU. The cell would be headed by the Managing Director, JUSNL or his representative not below the rank of Director (Projects). It would have the Director Projects, JUSNL Chief Engineer (Transmission (O&M)), Superintendent Engineer, JPSIP-PIU, Executive Engineer (JPSIP-PIU) as members. The Chief Engineer of Ranchi Zone would be an invited member. Hearing the complaint the GRC would provide its decision. The process at the GRC would be completed with 60 days of the complaint being registered in Tier 3.

Court of Law: If the grievance/ complaint is not resolved at GRC Level or the complainant is not satisfied with the solution provided by GRC, the person may approach the Court of Law.

Mechanism for Registering and Communicating grievances: The Junior Engineer responsible for overseeing the activities of the project would be the first point of contact for registering the grievance. He shall be responsible for registering all grievances in the Grievance Form. The Grievance Form

(Annexure 8) would be placed at the Office of the Junior Engineer of the respective sub-division and would also be available with the Supervisor of the Contractor. The contact number of the Junior Engineer shall also be displayed prominently at the site of the construction activity. The aggrieved person can either fill the Grievance Redress form and submit it at the nearest sub-division office of JUSNL or call up the Junior Engineer and register the grievance. The Junior Engineer in the latter case complete the grievances Redress Form and pass it to the Tier 1 for redressal. The outcome of the grievances redressal process shall be sent to the person registering the grievance by Registered Post.

It is understood from the ESIA study that the Project activities related to the construction of the transmission lines may create some impacts on:

- air quality (due to movement of vehicles during foundation construction and tower erection);
- ecology (primarily due to felling of trees and diversion of forest areas along the alignment);
- community health and safety (arising out of excavation of towers foundation near pathways);
- Occupational health safety (risks of falling from height and electrocution) during the construction phase.

However most these impacts are temporary and can be mitigated with proper mitigation measures.

In the operation stage there would be no impacts on the physical environment, the impacts on ecology would also be reduced to a major extent because the natural vegetation beneath the conductors would be allowed to regenerate to a safe height. The development of the 132/33 KV transmission lines and the associated 132/33 KV substation would improve the availability of quality power in the region.

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to the Project activities and also discusses implementation mechanisms. The implementation of the mitigation measures suggested can help in managing the negative impacts on air quality, ground water etc whereas the economic opportunities in terms of local employment are assessed as positive.

To conclude, implementation of ESMP will help the Project to comply with national/state regulatory framework as well as to meet World Bank's requirement of the environmental and social performance.

Annexure 1

List of Sub Projects in JPSIP

PHASE-I

Scheme – D			
1	132/33 Kv GSS Irba (2x50 MVA)	100	Zone-I
			Transferred
2	132 kV D/C Irba-Ramgarh Trans. line		50
3	132 kV D/C Irba-Kanke Trans. line		13
4	132 kV D/C Irba-Ratu Trans. line		25
Scheme – E			
1	132/33 kV GSS at Shikaripara (2x50 MVA)	100	Zone-II
			Transferred
2	132 kV D/C 3 Ph. Dumka - Shikaripara Trans. line		40
Scheme – H			
1	132/33 kV GSS at Silli (2x50 MVA)	100	Zone-I
			Transferred
2	132 kV D/C 3 Ph. Silli - Chouka Trans line		46
3	132 kV D/C 3 Ph. Silli - Sikidiri Trans line		32
Scheme – O			
1	132/33 kV GSS at Mahuadanr (2x50 MVA)	100	Zone-IV
			Transferred
2	132 kV D/C 3 Ph. Latehar- Mahuadanr Trans line		45
Scheme – P			
1	132/33 kV GSS at Angada (2x50 MVA)	100	Zone-I
			Transferred
2	132 kV D/C 3 Ph. Silli-Angada Transmission line		43
3	132 kV D/C 3 Ph. Angada-Sikidiri Trans. line		50
Scheme – S			
1	132/33 kV GSS at Jarmundi (2x50 MVA)	100	Zone-II
			Transferred
2	LILO of 132 kV D/C 3 Ph. Dumka-Deoghar Transmission line at GSS Jarmundi		6
Scheme – X			
1	132/33 kV GSS at Chakuliya (2x50 MVA)	100	Zone-III
			Transferred
2	132 kV D/C 3 Ph. Chandil-Chakuliya Trans. line		65
3	132 kV D/C 3 Ph. Bahragora-Chakuliya Trans. line		60
4	132 kV D/C 3 Ph. Dhalbhumgarh-Chakuliya Trans. Line		25
Scheme – Q			
1	132/33 kV GSS at Hansdiha (2x50 MVA)	100	Zone-II
			Transferred
2	LILO of 132 kV Lalmatia-Dumka Trans Line at GSS Hansdiha		35
3	132 kV D/C Hansdiha-Jasidih Trans Line		52
Scheme – T			
1	132/33 kV GSS at Amarapara (2x50 MVA)	100	Zone-II
			Transferred
2	132 kV D/C 3 Ph. Amarapara-Godda Transmission line		80

3	132 kV D/C 3 Ph. Amarapara - Pakur Trans. line		45
4	132 kV D/C 3 Ph. Amarapara-Dumka Transmission line		50

PHASE-II (7)

Scheme-A			
1	132/33 kV GSS at Chainpur (2x50 MVA)	100	Zone-I Identified
2	132 kV D/C 3 Ph. Chainpur-Mahuandarr Tran. line		42
3	132 kV D/C Chainpur-Gumla Trans. Line		50
Scheme - G			
1	132/33 KV GSS Sundarnagar (2x50 MVA)	100	Zone-III Transferred
2	132 kV D/C 3 Ph. Sundarnagar - Jadugoda		30
Scheme - K			
1	132/33 kV GSS at Ramkanda (2 x 50 MVA)	100	Zone- IV Not Identified
2	132 kV D/C 3 Ph. Ramkanda - Garhwa Trans line		60
Scheme - N			
1	132/33 kV GSS at Chhatarpur (2x50 MVA)	100	Zone-IV Identified
2	132 kV D/C 3 Ph. Chhatarpur-Daltonganj Transmission line		50
3	132 kV D/C 3 Ph. Chhatarpur-Japla Trans.line		40
Scheme - W			
1	132/33 kV GSS at Kalebira (2x50 MVA)	100	Zone-I Identified
2	132 kV D/C 3 Ph. Kalebira-Kamdara Transmission line		40
3	132 kV D/C 3 Ph. Kalebira-Simdega Trans. line		70
Scheme - AA			
1	132/33 kV GSS at Chouka(2x50 MVA)	100	Zone-III Identified
2	132 kV D/C 3 Ph. Chouka - Tamar Trans. line		40
Scheme - R			
1	132 kV D/C Chaibasa-Chakradharpur Trans. Line		22
2	132 kv D/C Nowamundi- Chaibasa Trans. Line		80
3	LILO of one ckt of 132 kV D/C 3 ph Nowamundi- Chaibasa Trans Line at 132/33 kV GSS Kendposi including 2 nos 132 kV bays		14
4	LILO of one ckt of 132 kV D/C 3 ph Chaibasa- Manoharpur Trans Line at 132/33 kV GSS Goelkera including 2 nos 132 kV bays		14
5	132 KV D/C Jadugoda old - Jadugoda New T/L		15

PHASE-III (10)

Scheme - F			
1	132/33 kV GSS at Meral (2 x 50 MVA)	100	Zone-IV Not Identified
2	132 kV D/C Meral - Garhwa Trans. line		20

Scheme - I			
1	132/33 kV GSS at Panki (2x50 MVA)	100	Zone-IV Not Identified
2	132 kV D/C Panki - Chhatarpur trans. line		50
Scheme - J			
1	132/33 kV GSS at Nagar Untari (2 x 50 MVA)	100	Zone-IV Identified
2	132 kV D/C 3 Ph. Nagar Untari-Garhwa Trans. line		40
Scheme - V			
1	132/33 kV GSS at Kandra (2x50 MVA)	100	Zone-III Not Identified
2	LILO of 132 kV Chaibasa-Rajkharsawan at Kandra		10
Scheme - Y			
1	132/33 kV GSS at Kurdeg (2x50 MVA)	100	Zone-I Identified
2	132 kV D/C 3 Ph. Kurdeg-220/132 kV Simdega GSS Transmission line		45
Scheme - Z			
1	132 kV GSS at Chandwa (2x50 MVA)	100	Zone-IV Identified
2	132 kV D/C Chandwa - Latehar Trans. Line		30
Additional Scheme-1			
1	132/33kV GSS at Sarath (2 x 50 MVA)	100	Zone-II Identified
2	132k DC Sarath-Palojori TL		24
3	132k DC Sarath-Madhupur TL		30
4	132k DC Sarath-Chitra TL		20
Additional Scheme-2			
1	132/33kV GSS at Surda (2 x 50 MVA)	100	Zone-III
2	132k DC Surda-Jadugoda TL		19
3	132k DC Surda-Musabani (DVC) TL		5
Additional Scheme-3			
1	132/33kV GSS at Naudiha (Palamu) (2 50 MVA)	100	Zone-IV
2	132k DC Naudiha-Panki TL		74
3	132k DC Naudiha-Chhatarpur TL		19
Additional Scheme-4			
1	132/33kV GSS at Narayanpur (Devipur) (2 x 50 MVA)	100	Zone-II
2	LILO of 132kV DC Jamtara-Madhupur TL at Narayanpur (Devipur)		12

Annexure 2

First Level and Second Level Screening

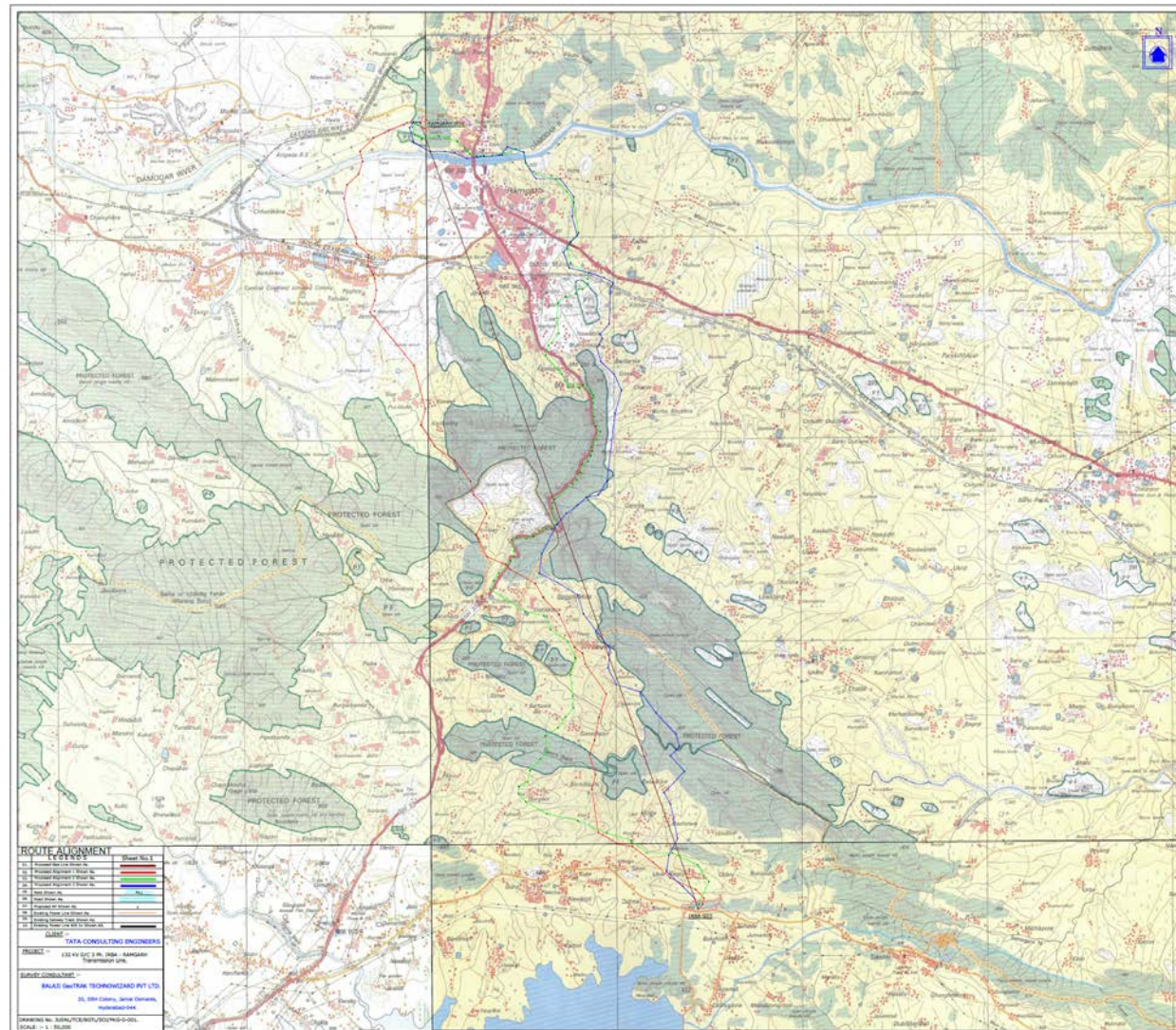
First Level Screening- Environmental and Social details for Transmission Lines

Sl. No	Description	Irba- Kanke				Irba - Ratu		Irba - Ramgarh		
		Alternative-1	Alternative-2	Alternative-3	Alternative-1	2	Alternative-3	Alternative-1	Alternative-2	Alternative-3
1	Route particulars									
	Length (km)	23.598	24.458	24.715	42.677	42.695	42.97	23.59	28.66	25.59
	Terrain	Undulating	Undulating	Undulating	Undulating	Undulating	Undulating	Undulating	Undulating	Undulating
	Environmental									
2	Details									
	Town/settlement	AP-26 -	0	0	AP-5 - Lotwa	AP-18 -	AP-7 - Kute	AP-4 -	Ramgarh	Ramgarh City
	in Alignment	Kuchu 500m			300m	Ormanjhi	400m	Hethnagru	City - 500m	- 500m
	(within 2km)	AP-38 -			AP-11 -	750m	AP-12 -	200m	AP-12 -	AP-18 -
		Chardi 600m			Dardag 500m	AP-48 -	Chetarbari	AP-15 -	Gurgain	Dohakatu
		AP-41 -			AP-45 -	Pithoria	450m	Jaidiha 400m	300m	400m
		Kumharia			Thakurgaon	700m	AP-49 -	AP-25 -	AP-34 -	AP-28 - Burha
		500m			1200m	AP-53 -	Pithoria	Chutupalu	Chutupalu	Khukra 900m
						Ichapiri	800m	250m	500m	AP-30 -
						500m		AP-33 -		Jatahdih 500m
						AP-57 -		Kande 300m		
						Uruguttu		AP-40 -		
						400m		Barkakana		
								400m		
	Houses within	17	29	22	81	75	70	37	58	31
	RoW									
3	Forest Details									
	Forest Area in km	0	AP (13-14) -	AP (15-16) -	AP (19-20) -	AP (14-15) -	AP (22-23) -	AP (11-12) -	AP (40-60) -	AP (8-9) -
			200m	250m	100m	200m	400m	250m	3800m	200m
				AP (16-17) -	AP (23-25) -	AP (33-34) -	AP (35-37) -	AP (28-29) -	AP (70-73) -	AP (10-11) -
				200m	350m	200m	400m	120m	450m	200m
						AP (38-40) -	AP (43-44) -		AP (85-89) -	AP (17-18) -
						1200m	200m		800m	500m
						AP (43-44) -			AP (94-99) -	AP (22-26) -
						200m			1250m	1000m
										AP (27-28) -
										100m
										AP (28-29) -
										100m
										AP (37-33) -
										100m

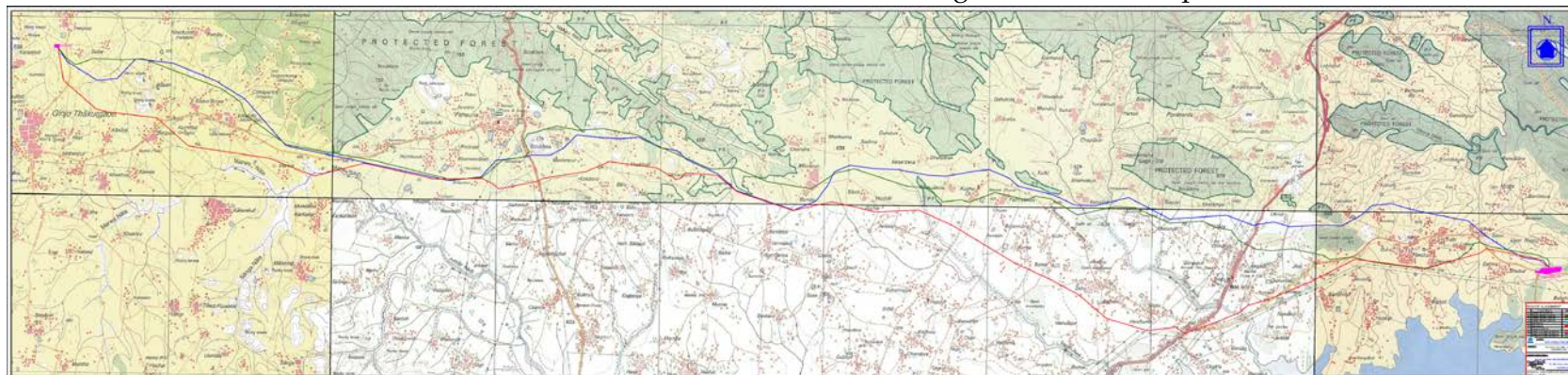
Sl. No	Description	Irba- Kanke			Irba - Ratu			Irba - Ramgarh		
		Alternative-1	Alternative-2	Alternative-3	Alternative-1	Alternative-2	Alternative-3	Alternative-1	Alternative-2	Alternative-3
										AP (49-52) - 800m AP (56-59) - 600m AP (60-61) - 250m
	Type of forest	Protected Forest	No Forest	Protected Forest	Protected Forest	Protected Forest	Protected Forest	Protected Forest	Protected Forest	Protected Forest
	Density of Forest	Primarily through Non-Forest areas. Moderately Dense at locations where it intersects forest areas. Passes from few Shrubs area.			Primarily through Non-Forest areas. Moderately Dense at locations where it intersects forest areas. Passes from few Shrubs area.			Primarily through non- forest areas Moderately Dense at locations where it intersects forest areas.		
	Historical and cultural monuments	None	None	None	None	None	None	None	None	None
4	Compensation	Impact on crop if stringing is carried out during cropping season.			Impact on crop if stringing is carried out during cropping season.			Impact on crop if stringing is carried out during cropping season.		
5	No of crossings	1	1	1	2	2	2	2	4	2
	Road	0	0	0	0	0	0	1	1	1
	Railway	3	3	3	7	3	3	1	0	0
	Transmission Lines	0	0	0	0	0	0	1	1	1
	River Crossing	All alignments are within 1 km of the Getalsud reservoir AP-8 very near to a Getalsud Reservoir			All alignments are within 1 km of the Getalsud reservoir AP-9 very near to a Getalsud Reservoir			AP-11 very near to a stream AP 50 -51 are located on the banks of the river Damodar.	AP-28-60 are coinciding with NH-33	AP-11 very near to a stream AP-49-58 are situated on banks of Damodar river which is very prone to flood

Based on this exercise, Alternative 1 for Irba-Ramgarh, Irba Ratu and Irba-Kanke transmission line alignment is found to be the least disturbance in terms of social and environmental issues and based on technical consideration (such as length, number of angle points (APs), river/canal crossings, railway crossing, road crossing, EHV line crossing etc.). Technically, the Alignment 1 for all the three transmission line alignment has also been considered the best alignment and selected for detailed surveys.

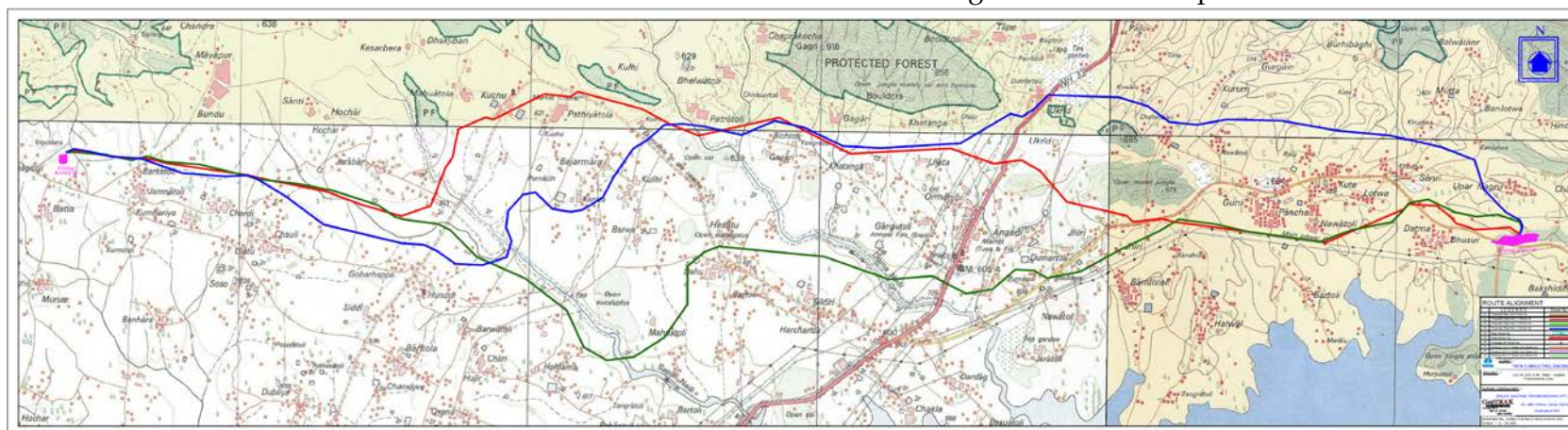
132 Kv Irba – Ramgarh Transmission Line: Alternative Alignments on Sol Toposheet



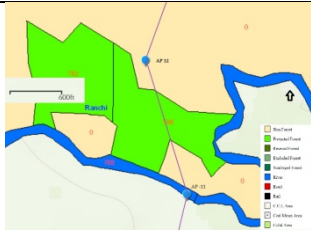
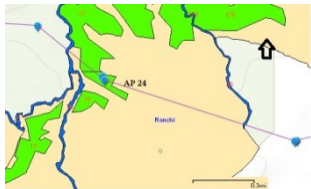
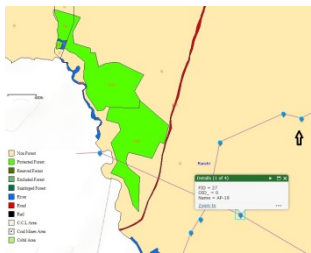
132 KV Irba -Ratu Transmission line Alternative Alignments on SoI Toposheet



132 KV Irba-Kanke Transmission Line: Alternative Alignments on SoI Toposheet



Second Level Screening carried out during the ESIA

Line	Area of Concern	Description	Response
Irba-Ramgarh		The alignment between AP 11 and AP 12 would be intersects a protected forest. The area to the left and right are both non-forested. The line need to be rerouted to	The shifting would be carried out during the detailed surveys.
Irba Ratu	 	The AP 24 fall within a forest land. Shifting the angle point in the southern direction would ensure that the forest land along the line is eliminated The alignment intersects the forest land between AP 19 and AP 20. A downward shift would eliminate the transmission lien intersecting the forest patch	

Annexure 3

Minutes of Meeting of Consultation

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Simatoli Village, Baru Panchayet	
	Date		16.10.2017	
D	Attended By			
	Sr.	Name	Designation	
	1.	Avijit Ghosh	ERM	
	2.	Indrani Ghosh	ERM	
	3.	Kuldeep Suman	ERM	
	4.	Muslim Ansari	Village Resident	
	5.	Salma Khatoon	Village Resident	
	6.	Noor Sabah Parveen	Village Resident	
	7.	Md. Idris Ansari	Village Resident	
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• An intermediate school up to Class VIII is present in the village• Primary Health Centre and Maternity Centre is not present in the village• The nearest hospital is in Pithoria• Anganwadi is present• There is no water supply to the village• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the villagers work in agricultural field, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Paddy is the major agricultural produce• Women’s Samity is present• Females are interested to undertake training for livelihood• Major festival is Id, Dusshera, Dipawali			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Jidu Village, Konki Panchayet	
	Date		16.10.2017	
D	Attended By			
	Sr.	Name		Designation
	1.	Avijit Ghosh		ERM
	2.	Indrani Ghosh		ERM
	3.	Kuldeep Suman		ERM
	4.	Samanchi Devi		Village Resident
	5.	Fulo Devi		Village Resident
	6.	Rashmi Kumari		Village Resident
	7.	Rekha Devi		Village Resident
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• A school up to Class V is present in the village• Primary Health Centre is present in the village• Maternity Centre is present in neighbouring Barwatoli village• Anganwadi is present• There is no water supply to the village• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the villagers work in agricultural field• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Women’s Samity is present• Females are interested to undertake training for livelihood• Major festival is Sarhul, Sohrai, Dusshera• Sarna is present near Barwatoli			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Jidu Village, Konki Panchayet	
	Date		16.10.2017	
D	Attended By			
	Sr.	Name	Designation	
	1.	Avijit Ghosh	ERM	
	2.	Indrani Ghosh	ERM	
	3.	Kuldeep Suman	ERM	
	4.	Mong Prakash Oran	Village Resident	
	5.	Arant Pradhan	Village Resident	
	6.	Bandhan Lohar	Village Resident	
	7.	Bursa Oran	Village Resident	
	8.	Roshan Oran	Village Resident	
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• Approximately 100 households is present in the village• It is a tribal village comprising of Oraon tribes and Lohar tribes. The lohar tribes are located in a separate hamlet /tola inside the settlement• A school up to Class V is present in the village• Primary Health Centre is present in the village• There is no water supply to the village• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported to be good• Auto is used for public transportation• Majority of the villagers work in agricultural field• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Major festival is Sarhul, Sohrai, Dusshera• Sarna is present near Barwatoli which is also a part of the Jidu Village• People expressed that they have observed that the incidence of lightning during the thunderstorm have increased in their villages after the construction of the PowerGrid transmission lines.			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Kuchu Village, Kuchu Panchayet	
	Date		17.10.2017	
D	Attended By			
	Sr.	Name	Designation	
	1.	Avijit Ghosh	ERM	
	2.	Indrani Ghosh	ERM	
	3.	Kuldeep Suman	ERM	
	4.	Meena Devi	Village Resident	
	5.	Rasam Devi	Village Resident	
	6.	Nirala Devi	Village Resident	
	7.	Baijo Devi	Village Resident	
	8.	Dashami Devi	Village Resident	
	9.	Anjali Kumari	Village Resident	
	10.	Savita Devi	Village Resident	
	11.	Shaloo Devi	Village Resident	
	12.	Susheela Devi	Village Resident	
	13.	Poonam Devi	Village Resident	
	14.	Laganmani	Village Resident	
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• School up to Class 12 is present• Primary Health Centre is present• Maternity Centre is not present in the village, closest Maternity Centre is present in Piska and Salini• Anganwadi is present• A medical bus from Sadar Hospital, Ranchi visits the village every 17th of month• There is water supply in the village• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported not to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the villagers work in agricultural field• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Women’s Samity is present. The samity mainly functions as a deposit bank at present and have not taken up any activities till now.• Females are interested to undertake training for livelihood• Major festival is Dusshera, Dipawali, Holi• The women are apprehensive considering their experience of the 400 KV transmission line which was constructed a few years back. The plots over which the line has passed it has become difficult to carry on agricultural activity during the monsoon.			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Kuchu Village, Kuchu Panchayet	
	Date		17.10.2017	
D	Attended By			
	Sr.	Name	Designation	
	1.	Avijit Ghosh	ERM	
	2.	Indrani Ghosh	ERM	
	3.	Kuldeep Suman	ERM	
	4.	Bisheswar Mahato	Village Resident +	
	5.	Mustaq Ahmad	Village Resident	
	6.	Sarang Mehta	Village Resident	
	7.	Sankar Karmali	Village Resident	
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• School up to Class 12 is present• Primary Health Centre is present• Maternity Centre is not present in the village, closest Maternity Centre is present in Piska and Salini• Anganwadi is present• A medical bus from Sadar Hospital, Ranchi visits the village every 17th of month• There is water supply in the village• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported not to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the villagers work in agricultural field• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Women’s Samity is present• Females are interested to undertake training for livelihood• Major festival is Dusshera, Dipawali, Holi• It was reported by the villagers who has their land below the existing transmission towers that electromagnetic induction is observed at the tower footings for which they are unable to plough that area and cultivate.			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Ukhrid Village,	
	Date		17.10.2017	
D	Attended By			
	Sr.	Name		Designation
	1.	Avijit Ghosh		ERM
	2.	Indrani Ghosh		ERM
	3.	Kuldeep Suman		ERM
	4.	Balo Devi		Village Resident
	5.	Asha Devi		Village Resident
	6.	Savi Devi		Village Resident
	7.	Janki Devi		Village Resident
	8.	Meini Devi		Village Resident
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	• Primary school is present			
	• Primary Health Centre is not present			
	• Maternity Centre is not present in the village, closest Maternity Centre is present in Piska and Salini			
	• Anganwadi is present			
	• There is no water supply in the village			
	• Borewell going up to a depth of 200 feet is used for drinking water. The water quality was reported not to be good			
	• Auto is used for public transportation			
	• Electricity is present but there are frequent power cuts			
	• Majority of the villagers work in agricultural field			
	• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation			
	• Women’s Samity is present			
	• Females are interested to undertake training for livelihood			
	• Drainage system in the village needs improvement			
	• Community have raised their concerns about diminishing value of land within the RoW of transmission line.			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Khirabari Village, Palo Panchayet	
	Date		17.10.2017	
D	Attended By			
	Sr.	Name		Designation
	1.	Avijit Ghosh		ERM
	2.	Indrani Ghosh		ERM
	3.	Kuldeep Suman		ERM
	4.	Sanjoo Devi		Village Resident
	5.	Bala Kumari		Village Resident
	6.	Fulkumari Devi		Village Resident
	7.	Suvanti Devi		Village Resident
	8.	Meini Devi		Village Resident
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	• This is a tribal village comprising of Bedia's • School up to Class VIII is present • Primary Health Centre is not present Anganwadi is present • There is no water supply in the village • Borewell going up to a depth of 220 feet is used for drinking water. The water quality was reported not to be good • Auto is used for public transportation • Electricity is present but not in majority of households • Majority of the villagers work in agricultural field • Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation • Women's Samity is present • Females are interested to undertake training for livelihood • Drainage system in the village needs improvement • The major festival is Dusshera, Chhat, Karma, Munda Jhanda, etc • Sarna is present near Chutupalo			

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project
B	Stakeholder Title:		Discussion with the resident villagers
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.			
C	Basic details:		
	Location:	Gujrung Jamra Village,	
	Date	17.10.2017	
D	Attended By		
	Sr.	Name	Designation
	1.	Avijit Ghosh	ERM
	2.	Indrani Ghosh	ERM
	3.	Kuldeep Suman	ERM
	4.	Beena Devi	Village Resident
	5.	Bhajni Devi	Village Resident
	6.	Rani Kumari	Village Resident
E	Purpose of Consultation		
	• Collection of information regarding baseline socio-economic condition.		
F	Key Points Inferred:		
	<ul style="list-style-type: none">• School up to Class V is present• Primary Health Centre is not present• Anganwadi is present• For obtaining medical facility Ramgarh is the closest town• There is no water supply in the village• Borewell going up to a depth of 300-400 feet is used for drinking water. The water quality was reported not to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the villagers work in agricultural field• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Women’s Samity is present• Females are interested to undertake training for livelihood• People have raised their concerns that if construction work takes place during harvesting, it may damage crop.		

A	Project Title:		ESIA Study, Jharkhand Power System Improvement Project	
B	Stakeholder Title:		Discussion with the resident villagers	
Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.				
C	Basic details:			
	Location:		Vasant Vihar Colony, Dumardaga, Ward No.6, Ranchi Municipality Corporation	
	Date		18.10.2017	
D	Attended By			
	Sr.	Name		Designation
	1.	Kuldeep Suman		ERM
	4.	Arun Pandey		Village Resident
	5.	Gudia Devi		Village Resident
	6.	Bina Devi		Village Resident
E	Purpose of Consultation			
	• Collection of information regarding baseline socio-economic condition.			
F	Key Points Inferred:			
	<ul style="list-style-type: none">• School up to Class 12 is present• Primary Health Centre is present• Maternity Centre is not present in the village, closest Maternity Centre is present in Ranchi• Anganwadi is present• There is water supply from PHED• Borewell going up to a depth of 100-150 feet is used for drinking water. The water quality was reported not to be good• Auto is used for public transportation• Electricity is present but there are frequent power cuts• Majority of the people are service holders or in business• Paddy is the major agricultural produce, the cultivation of other crops such as wheat, vegetables depends upon the irrigation• Women’s Samity is present• Females are interested to undertake training for livelihood• Major festival is Dusshera, Dipawali, Holi• It was reported by the villagers who has their land below the existing transmission towers that electromagnetic induction is observed at the tower footings for which they are unable to plough that area and cultivate.			

Annexure 4

General Conditions of Contract

1.1 GENERAL EHS CONDITIONS

- GCC 1.1
- i. The contractor shall take all necessary measures and precautions, otherwise ensure that the execution of the works and all associated operations on-site or of-site are carried out in conformity with statutory and regulatory environmental health safety requirements including those prescribed elsewhere in the Environmental and Social Management Framework and the Environmental and Social Management Plans attached to the report
 - ii. The Contractor shall ensure that the construction site will be secured by means of fencing to prevent unauthorized entry into the site. The Contractor shall also ensure that the access to the construction site is restricted to public at all times.
 - iii. The Contractor shall take all the measures and precautions to avoid any nuisance or disturbance arising from execution of the work. This shall, wherever possible, be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. The provisions of the Environmental, Social Health Safety Management Plan would be implemented for the suppression of nuisance, but it shall not be limited to these provisions of the ESMP. The provisions of this sub-clause shall however, be disregarded in respect of emergency work required for saving life or the safety of the works.
 - iv. In event of any spoil or debris or silt from the sites being deposited on adjacent land, the Contractor shall immediately remove such spoils, debris or silt and restore the affected area to its original state to the satisfaction of the JUSNL. No debris should be dumped on the community land like Gochars, thans etc. In case the extra excavated earth is placed for levelling the playground the same should be done with the written consent of the community. Such materials should be spread in such a manner as to limit subsequent erosion and shall be re-vegetated as existing ground cover dictates. JUSNL should be absolved of any liabilities arising such works which are undertaken
 - v. Surplus excavated material from the tower footing shall be carried out to the substation for the purpose of filing in case the tower is located within 15 kms of the substation area. The cost of hauling the material shall be considered within the cost for the earthwork for the substation. Additional borrow pits shall only be allowed by the Junior Engineer, only after the excavated material has been exhausted. In case this is not feasible the contractor shall remove the excess excavated material from the area of the construction of tower footing before the completion of the tower erection. All other provisions specified in the EMP shall be implemented.
 - vi. The Contractor should contain requisite quantity and type of spill kits to control the spills of fuel and other oils e.g. transformer oil to prevent the pollutant from spreading either outside the area of the spill or into the ground.
- GCC 1.2
- a) All fuel and chemical storage shall be sited on an impervious base within an embanked area and secured by fencing. The storage area shall be located away from any watercourse or wetland. The base and walls of the embankment shall be impermeable and of sufficient capacity to contain

110% of the volume of tanks/ containers taken together.

In case of filling/ refuelling of fuel or oil, filling and refuelling shall be strictly controlled and subjected to formal procedures. The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contamination happens or discharges enter any drain or watercourses. All discharge from the Oil storage areas shall be passed through a Oil Water Separator (OWS) before it being discharged outside.

- b) All internal drainage channels from the site would be connected to a peripheral site drainage channel. The peripheral site drainage channel would be provided with a sedimentation tank and oil-water separator to prevent sediments and oil & grease to be carried away by the runoff.
- GCC 1.3 (i) All water and liquid waste products arising on the sites shall be collected and disposed off at location onsite or offsite and in a manner that shall not cause nuisance or pollution.
- (ii) The Contractor shall not discharge or deposit any matter arising from the execution of the works into any place except at the designated places without the permission of the Environmental and Social Officer and the regulatory authorities concerned.
- GCC 1.4 (i) The Contractor shall carry out dust suppression by sprinkling of water or methods of working to minimise dust, gaseous or other air born emissions and carry out the works in such a manner as to minimise adverse impacts on air quality. Sprinkling of water shall be carried out twice a day on exposed surface area during dry season.
- (ii) Stockpiles of materials should be sited in sheltered areas or within hoarding, away from sensitive areas. Stockpiles of friable materials shall be covered with clean tarpaulins with application of sprayed water during dry and windy weather. Stockpiles of debris shall be dampened prior to their movement, except where this is contrary to the specifications.
- (iii) Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitting side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin should be properly secured and extended to at least 300 mm over the edges of the sideboard and tailboard.
- (iv) During high wind, no dust generating operations shall be permitted within 200m of residential areas having regard to the prevailing direction of the wind.
- (v) Construction vehicles and machinery shall be kept in good working order and engines turned off when not in use. Appropriate measures shall be taken to limit exhaust emissions from construction vehicles, machinery and plant and the contractor shall include details of such proposed measures in the mitigation and monitoring plan to be submitted to the Employer or his representative.
- (vi) All vehicle employed in the project shall have valid Pollution under Control (PUC) Certificate. The Contractor should maintain PUC Certificate log book on a regular basis and shall provide it to the Employer or his

representation for inspection when asked for.

- GCC 1.5 (i) The Contractor shall consider noise as an environmental concern in his planning and during execution of the works.
- (ii) The Contractor shall use plant and equipment conforming to National and International standards and directives on noise, vibrations and emissions.
- (iii) The Contractor shall take all necessary measures to ensure that operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking into account all applicable environmental requirements. The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good condition so as to minimise the noise emissions during construction works.
- (iv) The operations of the Contractor which is likely to generate noise shall be restricted during the night time (22.00 hrs to 6.00 hrs) especially if it is near residential areas.
- GCC 1.6 (i) The Contractor shall take all necessary measures to protect any archaeological finds or antiquities as required.
- (ii) Where antiquities are shown on the drawing or otherwise identified during the course of the works, these shall be protected by means of suitable fencing and barriers to the satisfaction of the EHS Engineer of JUSNL. The Contractor shall abide by the provisions of the Indian Treasure Trove Act, 1878, Jharkhand Ancient Monuments and Archaeological Sites, Remains and Art Treasures Act, 2016.
- GCC 1.7 On completion of the works, the Contractor shall reinstate all areas with natural vegetation to the satisfaction of the Environmental Officer of JPSIP PIU. Where directed by the Environment Officer the Contractor shall improve and reinstate the land on which informal roadside service area have been established by removing all debris and contaminated soils, re-grading to natural ground levels and re-establishing the natural vegetation where appropriate. All debris and contaminated materials shall be disposed off site as approved by the Environment Officer at the PIU.
- GCC 1.8 The Contractor shall ensure that the labour accommodation within the site /fly camp/ laydown area is provided with toilets/modular bio-toilets, septic tank and soak pits. The municipal solid waste generated shall be composted in pits located within the site.
- GCC 1.9 The Contractor shall adopt all possible means to ensure that groundwater usage is minimised during the construction activities. The bore well/s used for extraction of water for construction purpose shall be provided with water metres to monitor the ground water abstraction. The Contractor should maintain a daily water abstraction log book of water extracted from the bore well. Daily water abstraction log book should be produced to the employer or his representative on demand.

1.2 COMPLIANCE WITH LABOUR REGULATIONS

- GCC 2.1 During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all applicable existing labour enactments and rules made thereunder, regulations notifications and byelaws of the State or Central Government or local authority and any other labour law (including rules), regulations byelaws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The employees of the Contractor and the Sub-contractor in no case shall be treated as the employees of the Employer at any point of time.
- GCC 2.2 The Contractor shall keep JUSNL indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments.
- GCC 2.3 If the Employer is caused to pay under any law as principal employer such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications / byelaws/ Acts / Rules/regulations including amendments, if any, on the part of the Contractor, the Employer shall have the right to deduct any money due to the Contractor under this contract or any other contract with the employer including his amount of performance security for adjusting the aforesaid payment. The Employer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.
- GCC 2.4 The contractor shall abide by the provision of the following acts:
- a) Workmen Compensation Act 1923
 - b) Payment of Gratuity Act 1972
 - c) Employee P.F. and Miscellaneous Provision Act 1952
 - d) Maternity Benefit Act 1951:
 - e) Contract Labour (Regulation & Abolition) Act 1070
 - f) Minimum Wages Act 1948
 - g) Payment of Wages Act 1936
 - h) Equal Remuneration Art 1970
 - i) Payment of Bonus Act 1965
 - j) Industrial Dispute Act 1947
 - k) Industrial Employment (Standing Orders) Act 1946
 - l) Trade Unions Act 1926
 - m) Child Labour (Prohibition & Regulation) Act 1986
 - n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service Act 1979
 - o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996
 - p) Factories Act 1948
- GCC 2.5. During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all applicable existing World Bank Group labour requirements (refer Annex11 Management of Labour Influx of the Environmental and Social Management Framework)

COMPLIANCE TO ENVIRONMENTAL & SOCIAL REGULATIONS

GCC 3.1 If the employer is caused to pay under any law as proponent such amounts as may be necessary to cause or observe, or for non-compliance of the provisions or negligence of the Contractor for any provision stipulated in the notifications / byelaws/ Acts / Rules/regulations including amendments and Orders of the Hon'ble National Green Tribunal/ Hon'ble Court of Law, if any, on the part of the Contractor, the Employer shall have the right to deduct any money due to the Contractor under this contract or any other contract with the employer including his amount of performance security for adjusting the aforesaid payment.

The Contractor shall ensure to adhere provisions of the following acts;

- a) The Water (Prevention and Control of Pollution) Act, 1974
- b) The Air (Prevention and Control of Pollution) Act, 1981
- c) The Environment (Protection) Act 1986
- d) The Public Liability Insurance Act, 1991
- e) Wild Life Protection Act, 1972, as amended
- f) Forest Conservation Act, 1980 & Forest Conservation Rules, 2003 (as amended) & corresponding orders and judgements
- g) Jharkhand Biological Diversity Rules 2007
- h) Ancient Monuments & Archaeological Sites and Remains Act, 1958
- i) Indian Treasure Trove Act, 1878
- j) Jharkhand Ancient Monuments and Archaeological Sites, Remains and Art Treasures Act, 2016
- k) Jharkhand Timber and Other Forest Produce (Transit and Regulation) Rules, 2004
- l) Ozone Depleting Substances (Regulation and Control) Rules, 2000
- m) The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR 2013)
- n) Chota- Nagpur Tenancy Act, 1908
- o) Santal Pargana Tenancy Act, 1949
- p) Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
- q) E-Waste (Management) Rules, 2016
- r) Battery (Management & Handling) Rules 2001
- s) Ozone Depleting Substances (Regulation and Control) Rules, 2000
- t) Central Ground Water Authority (CGWA) Public Notice dated 4th January 2017
- u) Regulation of Polychlorinated Biphenyls Order, 2016

GCC 3.2 (i) If the Employer is caused to pay under any law as principal employer such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications / byelaws/ Acts / Rules/regulations including amendments, if any, on the part of the Contractor, the Employer shall have the right to deduct any money due to the Contractor under this contract or any other contract with the employer including his amount of performance security for adjusting the aforesaid payment. The Employer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

(ii) The Contractor shall (a) abide by the Environmental Management Plan (b) carry out all the monitoring and mitigation measures set forth in the environmental management plan and (c) allocate the budget required to

ensure that such measures are carried out. The Contractor shall submit to the Employer Monthly Reports on the carrying out of such measures.

(iii) The Contractor shall adequately record the conditions of roads, agricultural land and other infrastructure prior to transport of material and construction commencement before start of the construction activity. In case of deterioration during the construction activity the Contractor shall fully reinstate pathways, other local infrastructure and agricultural land to at-least their pre-project condition upon construction completion. In case of any grievance of the community regarding damage to any common property e.g. roads/ walkways/ pathways, bridges, wells or any place of worship due to any construction activity; it shall be the responsibility of the Contractor to reinstate the same to its original condition (before the start of construction) unless other he can prove that the same was not constructed due to his activities.

(iv) The Contractor shall undertake detailed survey of the affected persons during transmission line alignment finalization under the Project, where applicable. The Contractor shall provide the information to the employer for records and use wherever required. Any compensation due to the damage of property shall be commensurate to the provisions in the entitlement matrix.

(v) The Contractor shall include a Social Officer in his team. The Social Officer shall explain to the land owners the process of the procurement of land through a negotiated settlement process.

(vi) The Contractor shall conduct health and safety programme for workers employed under the Contract and shall include information on the risk of sexually transmitted diseases, including HIV/ AIDS in such programs.

- GCC 3.3 The procurement or deployment of any machinery by the Contractor for the project should be in accordance to the environmental rules and regulations in place at the time of implementation. All DG sets should conform to the CPCB standards for noise and emission mentioned under the under the Environment (Protection) Act, 1986.
- GCC 3.4 The Contractor shall procure transformer oil in conformance to the Regulation of Polychlorinated Biphenyls Order, 2016.
- GCC 3.5 The Contractor shall procure CFC free equipment in conformance to the Government of India Guidelines

- GCC4.1 The Contractor shall observe all applicable regulations regarding safety on the Site.
Unless otherwise agreed, the Contractor shall, from the commencement of work on Site until handing over, provide:
- a) fencing, lighting, guarding, putting up reflective strips and watching of the Works wherever required, and
 - b) temporary roadways, footways, guards and fences which may be necessary for the accommodation and protection of Employer / his representatives and occupiers of adjacent property, the public and others.
- GCC 4.2 The Contractor shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the employer or to others, working at the Site. The Contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislations or as may be directed by the Engineer of JUSNL or as he may deem necessary.
- GCC 4.3 The Contractor will notify well in advance to the JUSNL Division / JPSIP PIU of his intention to bring to the site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The JUSNL Division / JPSIP PIU shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The JUSNL Division / JPSIP PIU shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by JUSNL. JUSNL shall not entertain any claim of the Contractor towards additional safety provisions/conditions to be provided for/constructed as per the JUSNL Division /JUSNL PIU Instructions. Further, any such decision of the JUSNL Division /JUSNL PIU shall not, in any way, absolve the Contractor of his responsibilities and in case use of such a container or entry thereof into the Site area is forbidden by the JUSNL Division /JUSNL PIU, the Contractor shall use alternative methods with the approval of the JUSNL Division /JUSNL PIU without any cost implication to the Employer or extension of work schedule.
- GCC 4.4 All equipment used in construction and erection by Contractor shall meet Indian/International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipment shall be strictly operated and maintained by the Contractor in accordance with manufacturer's Operation Manual.
- GCC 4.5 Periodical examinations and all tests for all lifting/hoisting equipment & tackles shall be carried-out. In accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated Laws/Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the JUSNL Division /JUSNL PIU or by the person authorised by him.

- GCC 4.6 The Contractor shall provide suitable personal safety equipment of prescribed standard to all employees and workmen according to the Job Safety Analysis carried out by the Contractor, or as may be directed by the Employer. The Employer or his representative will also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability. The Contractor shall arrange biannual safety training for all workers.
- GCC 4.7 The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection, good and standard quality of material only shall be used by the Contractor.
- GCC 4.8 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Owner or other Contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Employer to handle such fuses, wiring or electrical equipment.
- GCC 4.9 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or the Employer, he shall:
- a) Satisfy the JUSNL Division /JUSNL PIU that the appliance is in good working condition;
 - b) Inform the JUSNL Division /JUSNL PIU of the maximum current rating, voltage and phases of the appliances;
 - c) Obtain permission of the JUSNL Division /JUSNL PIU detailing the sockets to which the appliances may be connected.
- GCC 4.10 The JUSNL Division /JUSNL PIU will not grant permission to connect until he is satisfied that:
- a) The appliance is in good condition and is fitted with suitable plug;
 - b) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.
- GCC 4.11 No electric cable in use by the Contractor/Owner will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
- GCC 4.12 No repair work shall be carried out on any live equipment. The equipment must be declared safe by the JUSNL Division /JUSNL PIU and a permit to work shall be issued by the JUSNL Division /JUSNL PIU before any repair work is carried out by the contractor. While working on electric lines/equipment, whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the Contractor to electricians/workmen/officers.
- GCC 4.13 The Contractors shall employ necessary number of qualified, full time electricians/electrical supervisors to maintain his temporary electrical installation.

- GCC 4.14 The Contractor employing more than 100 workmen whether temporary, casual, probationer, regular or permanent or on contract, either directly or through the Contractor shall employ at least one full time officer exclusively as EHS Officer (who shall have a Bachelors degree in Environmental Management/ Environmental Engineering /Environmental Science with additional qualification in safety) to supervise safety aspects of the equipment and workmen, who will coordinate with the Environmental Officer and Social Officer . In case of work being carried out through Sub-Contractors, the Sub-Contractor's workmen/employees will also be considered as the Contractor's employees/workmen for the above purpose. Contractor shall employ a social team as it may deem fit. The Social Team would be led by the Social Officer (who shall have degree Sociology/ Anthropology/ Economics or any other Social Science with experience in handling resettlement of multilateral funded projects) and would assist the Contractor to carry out negotiation with the land owners. The name and address of such EHS Officer and Social Officer of the Contractor will be promptly informed in writing to JUSNL with a copy to JUSNL Division /JUSNL PIU before he starts work or immediately after any change of the incumbent is made during currency of the Contract.
- GCC 4.15 In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever. It shall be the responsibility of the Contractor to promptly inform the same to the JUSNL Division /JUSNL PIU in prescribed form and also to all the authorities envisaged under the applicable laws.
- GCC 4.16 The JUSNL Division /JUSNL PIU shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the JUSNL Division /JUSNL PIU within 3 days of such stoppage of work and decision of the JUSNL Division /JUSNL PIU in this respect shall be conclusive and binding on the Contractor.

1.4 EHS RULES

- GCC 5.1 Each employee of the Contractor shall be provided with initial indoctrination regarding Environment Health and Safety by the Contractor, so as to enable him to conduct his work in a safe and sustainable manner.
- GCC. 5.2 No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.
- GCC 5.3 Under no circumstances shall an employee hurry or take unnecessary chance when working under hazardous conditions.

- GCC 5.4 Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate firefighting equipment shall be provided at crucial location.
- Employee should also not leave any equipment/ machinery /activity unattended if it has the potential to cause harm to the environment
- GCC 5.5 Employees under the influence of any intoxicating beverage, even to the slightest degree shall not be permitted to remain at work.
- GCC 5.6 The contractor shall make suitable arrangement at every work site for rendering prompt and sufficient first aid to the injured.
- GCC 5.7 The staircases and passageways shall be adequately lighted.
- GCC 5.8 The employees when working around moving machinery must not be permitted to wear loose garments. Safety shoes, safety helmets (IS 2925: 1984) are recommended when working in the construction site or any activity related to the project where materials or tools are likely to fall. When working at height the Contractor shall ensure that all employees use full body harness (as per IS 3521: 1999). Only experienced workers shall be permitted to go behind guard rails or to clean around energized or moving equipment. The employer shall at periodic intervals or as he may deem fit inspect these equipment and ask the Contractor for replacement of the personal safety equipment.
- GCC 5.9 The employees must use the standard protection equipment intended for each job. Each piece of equipment shall be inspected before and after it is used. During the testing and charging of electrical lines and substation, the Contractor shall provide electricity insulating protective equipment like footwear (ISO 20345: 2004 Part-2), rubber gloves (IS 4770: 1991) to workers. In addition, provisions of the “Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations 2010” would be adhered to.
- GCC 5.10 Requirements of ventilation in underwater working to licensed and experienced divers, use of gum boots for working in slushy or in inundated conditions are essential requirements to be fulfilled.
- GCC 5.11 In case of rock excavation, blasting shall invariably be done through licensed blasters and other precautions during blasting and storage/ transport of charge material shall be observed strictly.

Annexure 5

DGMS Prescribed Permissible Limit of Ground Vibration

DGMS Prescribed Permissible Limit of Ground Vibration

Type of structures	Dominant excitation frequency, Hz		
	< 8Hz	8-25Hz	>25Hz
(A) Buildings/structures not belong to the owner			
1. Domestic houses/structures (Kuchcha, bricks & Cement)	5	10	15
2. Industrial building	10	20	25
	2	5	10
3. Objects of historical importance & sensitive Structures			
(B) Buildings belonging to the owner with limited span of life			
1. Domestic houses/structures	10	15	20
2. Industrial buildings	15	25	50

Annexure 6

Management Plan for Labour Influx

It is envisaged that during construction phase of the project, labourers for various jobs such as civil, mechanical and electrical works will be hired through authorised manpower agencies. The labour requirement will range from 10 to 15 construction of tower footings. Since these will be employed from outside the region and will therefore, be migrant labourers and hence, accommodation will be provided. These migrant labourers will be accommodated in a temporary campsite within the project area. This could result in stress on local resources, disruption in community relations, and movement of labours.

Objective:

The influx of migrant labour will have both negative and positive impacts on the nearby community and local environment. The labour will be accommodated in temporary campsite within the project boundary which can have significant interface with the nearby community. However, the influx of migrant workers would lead to a transient increase of population in the immediate vicinity of the project area for a limited time. This would put pressure on the local resources such as roads, fuel wood, water etc. Hence, a plan has been designed to demonstrate the:

- Potential impacts associated with influx on the host population and receiving environment are minimized;
- Provision of safe and healthy working conditions, and a comfortable environment for migrant labour; and
- To ensure compliance with the IFC PS 2 and 4 and national labour laws;

IFC Performance Standards:

International Finance Cooperation (IFC) Performance Standard 2- Labour and Working Conditions is specific to labour and working conditions. This Standard focuses on the protection of the basic rights of workers, fostering constructive worker-management relationships, as well as promoting fair treatment and the provision of a safe and healthy workplace. The basic provisions for migrant workers under PS 2 are enumerated below:

- As per the provisions of PS 2, the client shall identify migrant workers engaged through third party and ensure that they are engaged on substantially equivalent terms and conditions to non-migrant workers carrying out similar work (if any);
- The contractor shall ensure provision of adequate accommodation, transportation, and basic services including water, sanitation, and medical care for the workers working on that project;
- The compensation paid to the migrant workers should be non-discriminatory and the principle of equal opportunity and fair treatment to be followed; and

- Wastewater, sewage, food and any other waste materials are to be properly handled, in compliance with local standards– whichever is more stringent – and without causing any significant impacts to the biophysical environment or surrounding communities.

IFC PS 4 – Community Health, Safety and Security carries health and safety through to the community environment. The objectives of the Performance Standard are:

- To minimise and manage health and safety risks to local communities; and
- To ensure that the project does not harm community health and safety.

General Requirements:

All migrant workers are envisaged to be accommodated in temporary campsite within the project area. If migrant workers are accompanied by their families, provisions should be made accordingly. Guidance on Workers Accommodation developed by IFC and EBRD is also referred for inclusion of requirements for labour camp to be established by contractor during construction phase of the project . Contractor shall ensure implementation of the following measures to minimise the potential negative impacts of worker accommodation and workers on local communities:

Cleanliness: Pest extermination, vector control and disinfection are to be carried out throughout the living facilities in compliance with local requirements and/or good practice.

Complaints and incident reporting: A formal Complaints Procedure will be implemented to ensure timely and transparent response to complaints as received from labour.

Labour education: The workforce will be sensitized to local social and cultural practices through provision of an induction course for all employees that stipulates expected behaviour;

Labour behaviour in campsite provided: A Code of Behaviour governing appropriate behaviour in the accommodation facilities to be kept in place and to be strictly enforced. The contractor shall ensure implementation of the “rules of engagement” between labours living in campsite and community and shall be implemented by construction contractors for all engaged labours. Labour Compensation and Accommodation: Client shall ensure that labours are provided with benefits such as annual leave, weekly rest day, etc. Accommodation to be provided for the construction labour which cover facilities (including catering facilities, dining areas, washing and laundry facilities etc.) and supporting utilities.

Hiring and Recruitment Procedures:

The manpower contractor shall, wherever possible, locally recruit the available workforce and shall provide appropriate and requisite on job and

EHS training as necessary. The following general measures shall be considered for the workforce during their employment tenure:

- Project should include a code of conduct relating to the accommodation to be signed with the contract document of contractor.
- The contractor shall not employ any person below the age of 18 years nor will have any forced labour;
- The construction labourers will be provided with documented information regarding their rights under national labour and employment law such as but not limited to Factories Act, Minimum Wages Act, Trade Unions Act and Workmen's Compensation Act;
- First priority for employment of labour should be given those impacted by the project such as landowners who have lost land or those who have their land parcels under ROW;
- No discrimination shall be done by the contractor with respect to recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, termination of employment or retirement, and disciplinary practices;
- The contractor to ensure that work hours are set at eight hours a day, 48 hours a week, with a weekly rest day for all engaged labours;
- Every labour is entitled for maximum of only two hours a day as Overtime (OT) work. OT pay is twice the hourly remuneration;
- Project shall ensure equal wages for male and female workers for work of equal nature or value is maintained;
- A grievance redress mechanism for workers shall be put in place by the contractor to raise workplace concerns. The workers will be informed about the grievance mechanism at the time of recruitment; and
- The Project shall ensure that the contractor develops and implement a procedure to review the performance of their sub-contractors, if any.
- The procedure developed should include regular inspection of the camp sites, maintaining information pertaining to labours sourced by sub-contractors;

Workers' Accommodation:

The Project will supervise and monitor the activities performed by their contractor and accommodation facilities provided in the campsite. The following measures shall be provided:

- The labour will be provided with accommodation on twin sharing basis made of insulated material and locally available building material, etc.;
- The migrant workers with families shall be provided with individual accommodation comprising bedroom, sanitary and cooking facilities;
- The units will be supported by common latrines and bathing facilities duly segregated for male and female labour;
- Adequate number of toilets shall be provided in the accommodation facilities. A minimum of 1 unit to 15 males and 1 unit for 10 females shall be provided;

- The contractor shall provide a kitchen facility for the construction workers and the food will be of appropriate nutritional value and will consider religious/cultural backgrounds;
- All doors and windows shall be lockable and mobile partitions/curtains shall be provided for privacy;
- Facilities for the storage of personal belongings for workers shall be provided within the campsite only;
- Dustbins shall be provided for collection of garbage and will be removed on a daily basis;
- It is also required to provide first aid box in adequate numbers; and
- Ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

Security:

The contractor shall put in place the following security measures to ensure the safety of the workers. The following measures shall be incorporated:

- Access to the campsite shall be limited to the residing workforce;
- The contractor shall be responsible for deploying adequate number of guards;
- Adequate, day-time night-time lighting shall be provided;
- The security personnel shall be provided with training to respect the community traditions and in dealing with, use of force etc.; and
- The rental accommodation shall be provided with firefighting equipment and portable fire extinguishers.

Provision of Drinking Water:

Access to an adequate and convenient supply of free potable water is necessity for workers. The domestic water supply shall be made available by the contractor.

- Safe drinking water conforming to the IS 10500:2012 for drinking water shall be provided;
- Private tanks can be utilized for provision of drinking water for the migrant labours;
- The direct usage of water from bore well should not be allowed and water shall be adequately treated;
- The Project should regularly monitor the quality of drinking water available. In case of non-compliance with the Drinking Water Specifications, additional treatment shall be provided or alternative sources of water supply shall be arranged; and
- All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

Cooking Arrangement:

The construction phase will involve engagement of large number of migrant people in the project area for a limited time. Hence, there shall be requirement of provision of cooking facilities (kitchen) as listed below:

- Places for food preparation are designed to permit good hygiene practices, including protection against contamination between and during food preparation;
- Adequate personal hygiene including designated areas for cleaning hands and cleaning of utensils; and
- All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials;
- Food preparation area to be durable, easily cleanable, non-corrosive surface made of non-toxic materials.

To ensure that the fuel need of labourers in the project area does not interfere with the local requirements, necessary arrangements for supply of cooking fuel to the labourers shall be done by the contractor. In case, fuel requirement for cooking purposes are only to be met by fuel wood then that must be purchased from authorized vendors.

Waste Water Generation:

There will be generation of wastewater from the campsite. About 80% of water used shall be generated as sewage/wastewater. Contractor shall ensure that the campsite are equipped with septic tank and soak pit for disposal of sewage or with mobile bio-toilets. It is also recommended that the storm water and sewage system should be separate. The surface water drainage shall include all necessary gutters, down pipes, gullies, traps, catch pits, manholes etc. Sanitary and toilet facilities are constructed of materials that are easily cleanable. Sanitary and toilet facilities are required to be cleaned frequently and kept in working condition.

Solid Waste Management:

The solid waste generated from campsite will mostly comprise of compostable wastes like vegetable residues (kitchen waste) and combustible waste like paper, cans, plastic and some non-degradable waste like glass/glass bottles. Improper disposal of solid waste will lead to environmental degradation and health hazards to labour as well as nearby community.

The following measures shall be adopted by contractors for ensuring effective management of solid waste:

- The solid wastes of domestic nature generated shall be collected and stored separately in appropriate containers with proper sealing on them;
- Separate bins with proper markings in terms of recyclable or non-recyclable waste shall be provided in the houses and kitchen premises in sufficient numbers for collection of garbage;

- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation; and
- It is the responsibility of contractor to ensure safe disposal of all wastes generated out of labour camps.

Medical Facility:

Effective health management is necessary for preventing spread of communicable diseases among labour and within the adjoining community. The following medical facilities shall be provided by contractors for the construction workers:

- A first aid centre shall be provided for the labour within the construction site equipped with medicines and other basic facilities;
- Adequate first aid kits shall be provided in the campsite in accessible place. The kit shall contain all type of medicines and dressing material;
- Contractor shall identify and train an adequate number of workers to provide first aid during medical emergencies;
- Regular health check-ups shall be carried out for the construction labourers every six month and health records shall be maintained;
- Labours should have easy access to medical facilities and first aid; where possible, nurses should be available for female workers;
- First aid kits are adequately stocked.
- Information and awareness of communicable diseases, AIDS etc. shall be provided to workers.
- Basic collective social/rest spaces are provided to workers.;

Inspection of camp sites:

- Campsite shall be inspected at frequent intervals to ensure that the facilities are well organized and maintained to acceptable and appropriate standards by the contractor. The key areas are:
- Daily sweeping of rooms and houses shall be undertaken;
- Regular cleaning of sanitary facilities shall be undertaken;
- The kitchen and canteen premises shall be established under good hygiene conditions;
- Daily meal times shall be fixed for the labour;
- Smoking and alcohol consumption shall be prohibited in the workplace;
- Water logging shall be prevented at areas near the accommodation facilities and adequate drainage is to be provided; and
- Checklists pertaining to the daily housekeeping schedule shall be maintained and displayed at houses, toilets and kitchen.

To limit the impact due to cumulative labour onsite during construction phase, contractor shall provide adequate number of labour camps which should be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers.

- Contractor should assess the location of labour camp, that it should not be constructed in immediate vicinity of any drainage channel;

- All tanks used for the storage of drinking and cooking water to be covered as to prevent water stored therein from becoming polluted or contaminated and all the migrant workers will be instructed accordingly;
- Contractor should ensure that accommodation which is provided is not overcrowded and does not pose a risk to the health and safety of workers;
- The labour camp will be equipped with septic tanks and soak pits and avoid presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes;
- Contractor should ensure that the disruption of local communities is minimum and if required limit the worker's movements in the nearby areas;
- Security staff should have a clear mandate and instructions about their duties and responsibilities such as not to harass, intimidate, discipline or discriminate against workers;
- Contractor should ensure that workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff;

Grievance Redress Mechanism:

A Grievance Redress Mechanism (GRM) shall be formulated for the construction labourers (local and migrant) comprising of a review committee including representatives elected by labour and management representatives. Project can extend the grievance mechanism developed for the project to the contractor also. A documented GRM shall have the following elements:

- Proper system for lodging grievances;
- Provision for raising anonymous complaints;
- Appropriate level of management for addressing concerns;
- Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff;
- Provision for timely action and feedback;
- Monitoring and review of grievances raised and action taken; and scope for continual improvement of the system.

Annexure 7

Format for Reporting of ESMP Implementation

JHARKHAND POWER SYSTEMS IMPROVEMENT PROJECT

ENVIRONMENTAL MANAGEMENT PLAN MONTHLY IMPLEMENTATION STATUS REPORT

Name of the Transmission Line _____ Period/Month _____

EMP Refere nce	Activities	Observation/ Status till end of last Observation/ Period	Status till end of this Period
1c	Has the final route selection avoided the displacements/ damage to property		
2bi	Has the final route been able to avoid transmission line/ tower in Forest, Jungle Jharis by careful selection of alignment		
2bii	Has the final route minimizes the need of deforestation by reducing the RoW requirement wherever possible as per the MoEF Circular No F. No.7-/25.-2012 -FC		
3ai	Has the route included bird guards and markers in transmission lines as per the specification provided in IS-5613, near the migratory bird path and bird habitats e.g. nesting grounds, foraging grounds, migration corridors etc		
6aii	Has the pre-construction equipment checks been carried out (use additional sheets to provide the monitored Leq values)		
6aii	Is regular equipment maintenance being carried out? (Use additional sheets to provide maintenance log)		
6aiv	Has monthly noise monitoring been carried out for DG sets		
6av	Has any permission been provided by Chief Engineer for night time work?		
6bi	Has quarterly air quality monitoring been carried out during the earthwork?		
6biii	Is PUCC certificate log book being maintained on regular basis?		
6biv	Instrument, machine, vehicle maintenance log book should be maintained on regular basis		
7ci	Has the Cut and fill slopes been protected with using standard engineering practices?		
7 dii	Has peripheral site drainage channel and provision of oil-water separator been made for the site?		
7di	Has septic tanks and soak pits/modular bio-toilets would be provided at construction camp?		

EMP Refere nce	Activities	Observation/ Status till end of last Observation/ Period	Status till end of this Period
9 aiv	Has the safety practices been undertaken during the construction? Please explain in details whether barricading, reflective tapes has been undertaken?		
7g	What steps has been taken for coordination with local communities?		
7h	What initiatives have been taken to prevent obstruction to traffic?		
10	Please indicate the actions which have been taken to prevent conflicts with local workers?		
12ai	Have the workers been provided with relevant PPE?		
12aai	How many observation on non - compliance in using personal protective equipment?		
12bi	Has the Contractor carried out Health Safety training for workers? (Please provide details of training carried out). This should include the details of carrying out the induction training, refresher training etc.		
13b	Has the fences been installed near the transmission lines near the elephant corridors or local wildlife corridors		

Annexure 8

Format for Registering
Grievance from
Community/Project Affected
Persons

JHARKHAND POWER SYSTEMS IMPROVEMENT PROJECT

GRIEVANCE REDRESSAL MECHANISM

Format for Grievance Recording

Name of the Village: _____

Name of Block: _____

Name of the Transmission Line _____

Period/Month _____

*The project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback. Mentioning the name and Contact details are essential as this would help us in getting in touch with you. Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name.*

Thank you.

Managing Director

Jharkhand Urja Sancharan Nigam Limited

Date	Sub Division of Registration (to be filled by JE)
Contact Information/Personal Details	
Name	
Home Address	
Village/Block	
Phone Number	
Complaint/Suggestion/Comment/Question : <i>Please provide the details (who, what, where and how) of your grievance below:</i>	
<i>If included as attachment/note/letter, please tick here:</i>	

For Official Use Only

Registered by (<i>Name of the Junior Engineer Registering grievance</i>)
Mode of Communication: Letter Verbal/Telephonic
Reviewed by (Name /Position of Official reviewing Grievance
Action Taken
Whether Action Taken has been communicated to the Complainant: Yes/No

Annexure 9

Critical Habitat Criteria (IFC PS6
Guidance Note 2012)

Critical Habitat Criteria (IFC PS6 Guidance Note 2012)

Criteria	Tier 1	Tier 2
Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	a) Habitat required to sustain ≥ 10 % of the global population of a CR or EN species / sub / species and where there known regular occurrences of the species and where habitat could be considered a discrete management unit for the species. b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.	c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of Red-listed EN species where that habitat could be considered as a discrete management unit for the species/subspecies. d) Habitat of significant importance to CR/EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species. e) As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	a) Habitat known to sustain ≥ 95 % of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species.	b) Habitat known to sustain ≥ 1 % but < 95 % of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;	a) Habitat known to sustain, on a cyclical or otherwise regular basis, 95 % of the global population of a migratory or congregatory species at any point of the species lifecycle where that habitat could be considered a discrete management unit for that species.	(b) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 1 % but < 95 % of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment. (c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or for Identifying Wetlands of International Importance. (d) For species with large but clumped distributions, a provisional threshold is set at ≥ 5 % of the global population for both terrestrial and marine species. (e) Source sites that contribute ≥ 1 % of the global population of recruits.

Annexure 10

Candidate Critical Habitat Species (Criteria 1-3) and Assessment

Candidate Critical Habitat Species (Criteria 1-3) and Assessment

Common Name	IUCN Listing	Criterion 1	Criterion 2	Criterion 3	Species Information	CH Rationale
Indian Elephant	EN	X			Elephant movement is reported in proximity of the transmission lines	The study area of the transmission lines cannot be included as habitat containing regionally- important concentrations of the elephants and thereby does not trigger Criterion 1, Tier 2c and 2e for
Wood Sandpiper, Little Stint, Great Crested Grebe, River Tern, Black Headed Gull, White Wagtail, Northern Pintail,, Red Rumped Swallow, Gadwall, Northern Shoveller, Ruddy Shelleduck, Eurasian Wigeon, Common Pochard,	VU/NT/LC			X	All the species are winter visitors and migrates to the Indian subcontinent from the colder regions of the north.	The study area and Getalsud Dam is not likely to hold between 1 and 95% of the global populations of any of these 13 migratory avian species and therefore does not trigger Criteria 3 Tier 2b

IUCN Categorization- VU=Vulnerable; NT= Near Threatened, LC= Least Concern

Annexure 11

Assessment of Impact Significance

Impacts on Aesthetics & Visual Quality

Impact	Aesthetic and visual impact			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
Significance of impact is considered Negligible				

Impacts on Air Quality

Impact	Air quality impact			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
Significance of impact is considered Negligible to Minor				

Impacts on Noise Quality

Impact	Noise quality impact			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
Significance of impact is considered Minor				

Impact on Land use

Impact	Impact on land use		
Impact Nature	Negative	Positive	Neutral
Impact Type	Direct	Indirect	Induced
Impact Duration	Short Term	Medium Term	Long Term
Impact Extent	Local	Regional	National

Impact Scale	Low		Medium		High	
Impact Magnitude	Positive	Small		Medium		Large
Resource/ Receptor Sensitivity	Low		Medium		High	
Impact Significance	Negligible	Minor		Moderate		Major
	Significance of impact is considered Moderate					

Impact on Soil

Impact	Impact on water resource			
Impact Nature	Negative		Positive	Neutral
Impact Type	Direct		Indirect	Induced
Impact Duration	Short Term		Medium Term	Long Term
Impact Extent	Local		Regional	National
Impact Scale	Low		Medium	High
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low		Medium	High
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered Minor			

Impacts on Road & Traffic

Impact	Impacts on Road & Traffic			
Impact Nature	Negative		Positive	Neutral
Impact Type	Direct	Indirect		Induced
Impact Duration	Short Term		Medium Term	Long Term
Impact Extent	Local		Regional	National
Impact Scale	Low		Medium	High
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low		Medium	High
Impact Significance	Negligible		Minor	Moderate
				Major
	Significance of impact is considered Negligible to Minor			

Impact on Biological Environment

Impact	Impact to Biological Environment			
Impact Nature	Negative		Positive	Neutral
Impact Type	Direct		Indirect	Induced
Impact Duration	Short Term		Medium Term	Long Term
Impact Extent	Local		Regional	National
Impact Scale	Low		Medium	High
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low		Medium	High
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered Moderate			

Impact on Socio-economic Conditions

Impact	Impact on Socio-economic Conditions			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered Minor			

Impact on Community Health and Safety

Impact	Community Health and Safety			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered Minor			

Impact on Occupational Health and Safety

Impact	Occupational Health and Safety			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered Minor to Moderate			



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