Initial Environmental Examination (Part 2)

Project Number: 51228-001
April 2018

India: Railways Track Electrification Project
Ranchi Jn-Lohardaga-Tori Jn Section

Prepared by the Central Organization for Railway Electrification for the Asian Development Bank

Figure-14: Sub project Alignment on Survey of India Topo Sheets (Contd.)

NOTES:

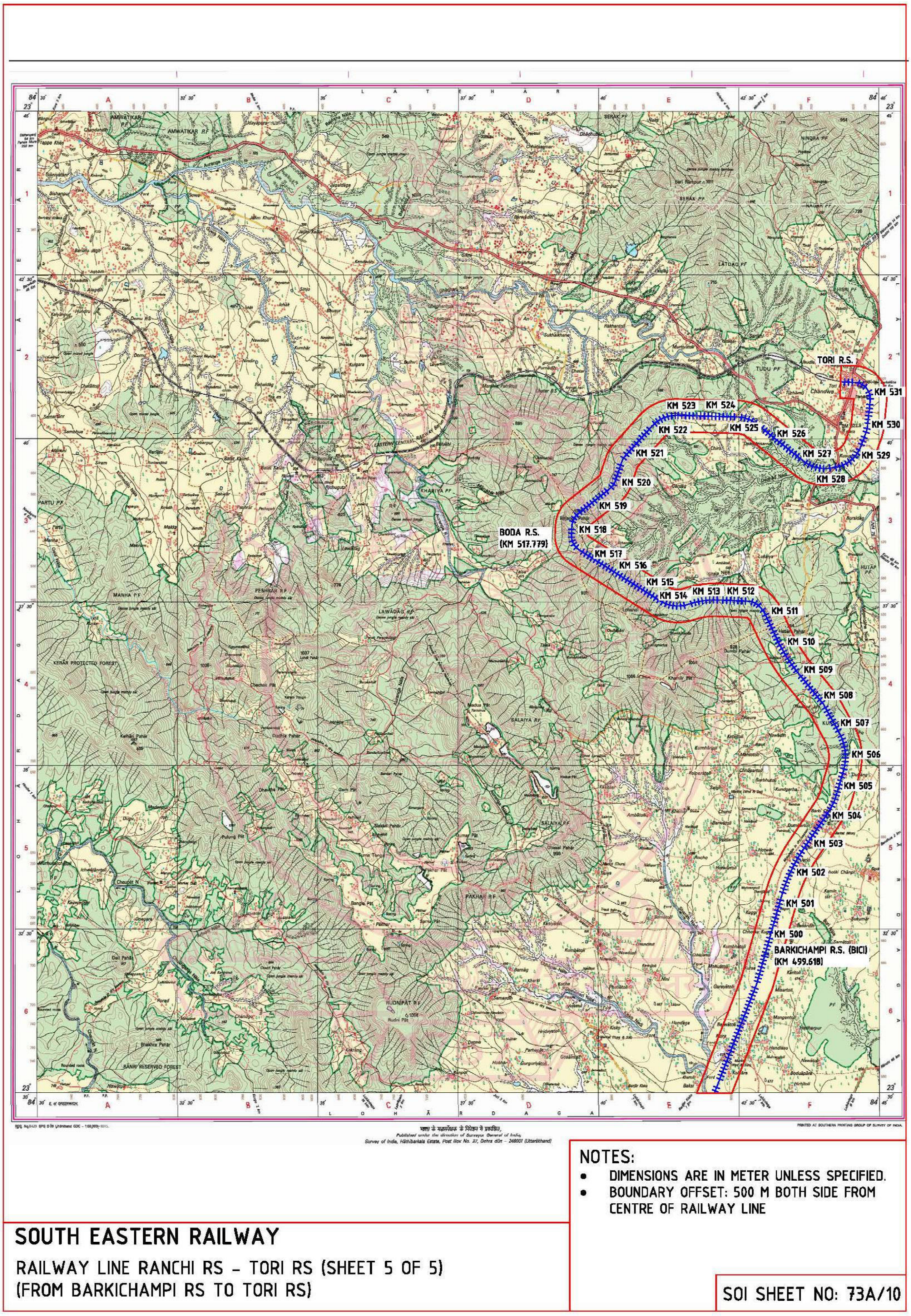
- DIMENSIONS ARE IN METER UNLESS SPECIFIED.
- BOUNDARY OFFSET: 500 M BOTH SIDE FROM CENTRE OF RAILWAY LINE

SOUTH EASTERN RAILWAY

RAILWAY LINE RANCHI RS – TORI RS (SHEET 4 OF 5)
(LOHARDAGA RAILWAY STATION)

SOI SHEET NO: 73A/15

Figure-14: Sub project Alignment on Survey of India Topo Sheets (Contd.)



Source: Survey of India, Government of India.

61. **Flora:** The forest vegetation subproject region varies from rich sal forest to miscellaneous forests and sparsely covered grassland. The sub project area harbors mostly of moist tropical deciduous vegetation. No trees are observed in the mine leased area. There is very little or no vegetation seen scattered in the area. Species like Sal (*Shorea robusta*) dominates with 55% of the total growing stalk. Main species of forest are Sal (Shorea, Asan (*Terminalia tomentosa*), Gamhar (*Gmelina arborea*), Bijasal (*Pterocarpus marsupium*), Karam (*Adina cordifolia*), Salai (*Boswellia serrata*), Khair (*Acacia catechu*), Dhawra (*Anogeissuslatifolia*), Semul (*Bombaxceiba*), Jamun (*Syzygiumcumini*), Mahua (*Madhuca Indica*), and Palash (*Beuteamonosperma)*. Amongst these species only Bijasal (*Pterocarpus marsupium*) is **vulnerable** as per Red Data List published by International Union for Conservation of Nature (IUCN). Ground vegetation mainly consists of grasses and small shrubs. Among the grasses, *Apluda varia* (Dudhia sauri) and *Arundinella setosa* (Jharu/Motaminijhar), Panicum montana (*Khrj*) *Saccharum munja* (Munj) are seen growing in the moist areas.

Figure-15: Photographs showing Flora in Subproject Region

View of Vegetation at CH 450+000

View of Vegetation at CH 479+000

View of Agriculture Field near Rail Track at CH 480+100

View of Vegetation in Forest Area at CH 509+000

View of Reserved Forest Area at CH512+000

View of Vegetation at CH 528+000

62. **Fauna:** The forest of Jharkhand harbour rich and varied wildlife. Some of the important animals are Indian elephant (Elephas maximus), Tiger (Panthera tigris), Leopard (Panthera pardus), Bison (Bos gaurus), Wolf (Canis lupus pallipes), Sloth Bear (Lelur susursinus), Common Langur (Presbytis entellus), Monkey (Rhesus macaque), Wild dog (Cuon alpines), Cheetal (Axis axis), Sambhar (Cervus unicolor), Nilgai (Boselaphus tragecamelus), Wild boar(Sus scrofa), Barking Deer (Muntiacus muntijak), and Hyaena (Hyaena hyaena). Besides a large variety of avifauna, reptiles and amphibians are also found. The wildlife conflict / accident with train movement has not been recorded so far as train services in Barkichampi-Tori section have been started in March 2017. It may further be emphasized that at present there is only one train service in a day through the forest area as only one passenger train runs between Ranchi and Tori. This train starts in morning from Ranchi and same train returns back in the afternoon from Tori junction. The IUCN status and protected status as per Wild Life Act (WPA) is provided **Table-7** below:

TABLE-7: IUCN STATUS AND WPA STATUS OF FAUNAL SPECIES IN FOREST AREA

Sl. No.	Common Name / English Name	Scientific Name	IUCN Red List	WPA 1972
1	Sloth Bear	*Melursus ursinus*	Vulnerable	Schedule II
2	Bison Indian or Gaur	*Bos gaurus*	Vulnerable	Schedule II
3	Indian Wild Boar	*Sus scrofa*	Least Concern	Schedule III
4	Barking Deer or Munjtac	*Muntiacus muntjak*	Least Concern	Schedule III
5	Spotted Deer or Chital	*Axis axis*	Least Concern	Schedule III
6	Indian Wild Dog	*Cuon alpinus*	Endangered	Schedule II
7	Indian Elephant	*Elephas maximus*	Endangered	Schedule I
8	Hyena Stripped	*Hyaena, hyaena*	Near Threatened	Schedule III
9	Common Langur	*Presbytis entellus/Semnoppithecus entellus*	Least Concern	Schedule I
10	Leopard or Panther	*Panthera pardus*	Near Threatened	Schedule I
11	Macaque Rhesus	*Macaca mulatta*	Least Concern	Schedule II
12	Nilgai or Blue Bull	*Boselaphus tragocarmelus*	Least Concern	Schedule III
13	Sambhar	*Cervus (Rusa) unicolor*	Vulnerable	Schedule III

14	Tiger	*Panthera tigris*	Endangered	Schedule I
15	Wolf	*Canis lupus*	Least Concern	Schedule I

IUCN= International Union for Conservation of Nature, WPA 1972 = Wild Life Protection Act, 1972
Source: Jharkhand Forest Department, Ranchi.

2. Flora and Fauna Outside Forest Area (Around Alignments of Rail Line and Transmission Line)

63. As mentioned earlier, most portion of subproject is located outside forest area (CH 418+419 to CH 506+000. In the non forest area railway track is surrounded by the agriculture fields, waste land or built-up habitations. The common trees seen are Imli (*Tamarindus indica*), Bargad (*Ficus bengalensis*), Pipal (*F. religosa*), Aam or Mango (*Mangifera indica*), Bael or Golden Apple (*Agle marmelos*), Kusum (*Schleichera oleosa*), Mahua (*Madhuca indica*), Neem (*Azadirachta indica*), Jamun (*Sygygium cumini*), babool (Acacia sp)., drumsticks and species of bamboo. None of the above mentioned trees are endangered or critically endangered. The alignments of both the transmission lines are also in agriculture and non- forest area. The trees to be cleared as part of the project construction are of same species as mentioned above. The common fauna has been given below in **Table-8**:

TABLE-8: COMMON FAUNA IN OPEN AREA IN SUBPROJECT REGION

Scientific Name	English Name	WLPA 1972: Schedule	IUCN Threat Category
(a) Mammals			
Lepus nigricollis	Hare	Schedule IV	Least Concern
Canis aureuss	Jackal	Schedule II	Least Concern
Funambulus palmarum	Indian Panai Maram Squirrel	Not listed	Least Concern
Rattus norvegicus	Field mouse	Schedule V	Least Concern
Macaca radiata	Bonnet Monkey	Schedule II	Least Concern
Bandicota bengalensis	Bandicoot rat	Schedule V	Least Concern
Rousettus leschenaultia	Fruit bat	Schedule V	Least Concern
Mus musculus	Common (House) mouse	Schedule V	Least Concern
Hystrix indica	Indian porcupine	Schedule IV	Least Concern
Herpestes edwardsii	Common Mongoose	Schedule IV	Least Concern
(b) Reptiles			
Plyas mucosus	Rat snake	Schedule II	Not known No conservation issue CITES Appendix II
Nerodia piscator	Fresh water snake	Schedule IV	Least Concern
Naja naja	Cobra	Schedule II	No special status CITES Appendix II
Bungaras bungaroides	Krait	Schedule IV	Least Concern
Calotes versicolor	Garden lizard	Common, widespread	No known threat issue
Chamaleo zeylanicus	Indian chameleon	Not listed	NT SL
(c) Birds			
Eudynamys scolopaceus	Asian koel	Not listed	Common & widespread; no conservation issue
Corvus splendens	House crow	Schedule V	Least Concern
Acridotheres tristis	Common myna	Schedule IV	Least Concern
Columba livia	Rock pigeon	Schedule IV	Least Concern

Scientific Name	English Name	WLPA 1972: Schedule	IUCN Threat Category
Tylo alba	Barn owl	Schedule IV	Least Concern
Bubulcus ibis	Cattle egret	Schedule IV	Least Concern
Milvus migrans	Pariah kite	Not listed	Least Concern
Coracias benghalensis	Indian roller	Schedule IV	Least Concern
Centropus sinensis	Crow pheasant	Schedule IV	Least Concern
Passer domesticus	House sparrow	Not listed	Least Concern
Orthotomus sutorius	Tailor bird	Not listed	Least Concern
Microcarbo niger	Little cormorant	Schedule IV	Least Concern
Quilis contronix	Grey quail	Schedule IV	-
Phalacrocorax fuscicollis	Large (Indian) cormorant	Schedule IV	Least Concern
Cypsiurus balasinensis	Panai Maram swift	Not listed	Least Concern
Oriolus kundoo	Indian oriole	Schedule IV	Least Concern
Ploceus philippinus	Weaver bird	Not listed	Least Concern
Cuculus micropterus	Indian cuckoo	Schedule IV	Least Concern

IUCN= International Union for Conservation of Nature, WPA 1972 = Wild Life Protection Act, 1972.
Source: Consultants Discussion with Locals.

C. Economic Resources

1. Industries

64. In all three districts of the sub project region, industrial development is playing an important role in the economic activity. There have been extensive industrial and mining activities in the district of Ranchi the notable among them being the establishment of Heavy Engineering Corporation (H.E.C.), Hatia. The rapid development of Ranchi city bears ample testimony to the powerful industrial revolution coming in the wake of the exploitation of the district's vast mineral resources. In the earlier part of this century, the only industries of any importance in the district were the collection and manufacture of lac, which were carried on principally at Bundu in Bundu Subdivision and the manufacture of tea a part from the cottage industries carried on by the village artisans. The main centers of trade in the district are Ranchi and Bundu.

65. Lohardaga is considered as the industrially most under developed district but it is operating center of two important aluminium companies engaged in Bauxite mining. There also used to be a Lac factory at Lohardaga. Manufacturing of bell metal utensils was of very high order in the past. The Lohardaga town is well known for vegetable market located here. Large quantities of vegetables are supplied to places far and near through rail and road transport.

66. **Latehar:** The district is rich in a few minerals. The important minerals being commercially mined are limestone, dolomite and coal. There is no heavy industry in the district. There is, however, two medium industries in the district. There are about 4 registered Small Scale Industries. Further, there are other small industries which are agro based, mineral based, chemical based and engineering and allied based. There are about 137 food processing units, 18 leather based industries and 17 metal based units. The growth in industrialization, however, is not very encouraging mainly due to infrastructure bottlenecks the primary being lack of electricity. The detail of commodities manufactured in the subproject region is given in **Table-9.**

Table-9: Important Commodities Manufactured in the Subproject region

Sl. No.	District	Sub Project CD Blocks	Name of important commodities manufactured / Produced
1	Ranchi	Kanke, Nagri, Mandar, Bero, Itki	Cocking Coal, Cement, Cocoon Industries, H.E.C, Wire, Lac, Furniture, Leaf Plate, chair, Soap, Backery, Handicraft, Aluminium Powder, Bamboos Item, Pattals Plate, Plastic, Wood Cartoon, Cable Wire, Paiet Box, Mineral Water, Ball Bearing, Wood Timber, Oil Mill, Bag, Pickle
2	Lohardaga	Kisko, Kairo, Lohardaga, Bhandra	Carpet, Soap, Vegetables
3	Latehar	Chandwa	Lac, Blanket, Furniture

Source: Census of India, 2011.

2. Minerals and Mining

67. The minerals found in the Ranchi district are Limestone in Babhne, Hoyar and Khelari, and China-clay to the south of Raj-Barkakana section of the Eastern Railway. In addition to above, coal, asbestos, berates, steatite, ornamental stones, and mineral pigments are also found in Ranchi district but they have little economic value.

68. Bauxite is the main mineral found in the Lohardaga district. There are huge deposits of bauxite ores at Bagru, Pakhar, Maruapat and Maidnapat hills of the district. Similarly, the Latehar district is also very rich in various mineral deposits. There is abundance of deposit of Coal, Bauxite, Laterite, Dolomite, and Graphite etc. Granite, Quartz, Fireclay, and Felspar etc.

3. Transportation

69. Transport and communication is the nervous system of the economy of a particular area. Ranchi district is well connected by Air, Road and Rail with other parts of the country. All three districts are connected by state highways other important road and railways. The Ranchi district is well served by a network of good roads and has been called the motorist's paradise. The roads managed by the Road Construction Department (RCD), Government of Jharkhand, extend to 3186 km. out of which 840 km. are metalled. Municipal roads are maintained by the Municipal Corporation at Ranchi. Considerable length of village roads has been constructed through Gram Panchayats. The Forest Department has also constructed a few fair-weather forest roads. Ranchi district has a good number of metalled roads and almost all the block headquarters are connected by such roads.

70. The opening of the Purulia Ranchi Branch of the Bengal Nagpur (now South-Eastern Railway) Railway brought the railway to the district. The Gomoh-Barkakana-Daltonganj section of the Eastern Railway (Opened in 1927) runs for about 26 km through Ranchi district. It has a rail head at Ranchi Road (which lies in Ramgarh district) situated about 51 km from Ranchi town. With the opening of Chandrapura Main section in the South Eastern Railway, Ranchi got directly connected by trains from Patna. Besides the broad gauge line referred to above there was a narrow gauge line running from Ranchi to Lohardaga over a distance of 67 km, but now a days it is converted to broad gauge line. This is part of subproject rail line. Ranchi is also connected with Rourkela (Odisha), Purulia (West Bengal) and Tatanagar (Jamshedpur) by rail. The Ranchi City is on the air-map of India and there are daily flights to Calcutta, Patna, Mumbai, Bengaluru, Hyderabad, Indore and Delhi.

71. **Lohardaga:** The district of Lohardaga is well served by a network of roads. The roads are maintained by the RCD, the Rural Engineering Organization, Zila Parishad and the Municipality. The length of the road from Ranchi to Lohardaga is 70 Km. Lohardaga is connected to the state capital, Ranchi, by road and rail. The subproject rail line connects city of Lohardaga to Ranchi. The track has been extended 44 km more to connect with Tori railway

station in Latehar district. The construction works of Lohardaga - Tori section have been completed in March 2017. The train service has also started in this portion in March 2017 only. This has reduced the railway distance between Ranchi and Delhi and the railway travel time by three hours. The district headquarter town of Lohardaga is also directly connected with nearby towns of like Jashpur and Raigarh of Chattishgarh, and Medininagar, and Gumla of Jharkhand.

72. Road communication of this Latehar district is not at par with the other districts of the state. Important Roads in the district are Daltonganj-Ranchi Road (road runs from Daltonganj through Latehar and Chandwa to Ranchi covering 155 kms), Chandwa – Balumath- Chatra – Road (this road runs through Balumath for 36 km in the district and joins Dhovi on the G.T. Road), Latehar-Barwadih-Garu- Netherhar-Mahuadanar road (this road runs with start from Latehar through Barwadih, Garu, Netherhar). Mahuadanr. Rail line from Barwadih to Gomoh under Eastern Central Railway runs through the district from Latehar and Chandwa.

4. Trades and Commerce

73. In place of old Mahajans and landlords, various banks are operating their branches in all the three districts of subproject. But, it is a matter of fact that most of the villages are so scattered that the system of primary trade is in the hands of few traders locally known as 'Vyaparis' and village 'Sahukars'. Paddy thrashing, dona pattal making, bamboo basket making, selling of mahua flowers. Lacs, kendu leaves and other minor forest produces are main components of trading activities in the subproject region. In the absence of major industries and employment opportunities, the options of economic development are limited. Animal husbandry, piggery and fisheries etc. have good potential, but this sector has still to emerge.

5. Land Use

74. The predominant land use in the sub project districts is agricultural. The subproject rail line passes through 5 CD Blocks of Ranchi district, 4 CD blocks of Lohardaga district and one CD block of Latehar district. As per Census of 2011, the total area of the five CD blocks of Ranchi district is 1079.6sq km area out of the district geographical area of 5097 sq km. Similarly geographical area of Lohardaga district is 1419 sq km and out of this area of four CD blocks through which subproject rail line passes is 665.8sq km. The area of the single CD block of Latehar district (Chandwa), through which subproject rail line passes, is 572.6 sq km out of 3659.59 sq km of geographical area the District. The land use of CD Blocks, through which subproject rail line passes, is given below in **Table-10.**

Table-10: Land use of Blocks Falling under the Subproject Districts

Sl. No.	District	CD Block	Total number of inhabited villages	Total area (in Hectares)	Percentage of cultivable area to total area	Percentage of irrigated area to total cultivable area
1	Ranchi	Kanke	103	33756.95	32.99	12.29
2		Nagri	44	11627.72	47.36	22.48
3		Mandar	69	23823.52	41.53	9.58
4		Bero	84	29069.84	59.28	12.69
5		Itki	30	9686.00	44.14	9.76

6	Lohardaga	Kisko	52	25328.81	23.24	13.66
7		Kairo	26	10526.30	50.94	13.36
8		Lohardaga	38	14685.93	82.53	25.12
9		Bhandra	45	16045.75	60.76	21.65
10	Latehar	Chandwa	83	57260.40	31.36	4.05

Source: Census of India, 2011.

6. Agriculture and Economic Development

75. The economic activity in the rural and urban areas in the sub project districts are primarily dependent on agricultural. In the Ranchi district out of total workers 25.78 percent as main workers and 19.55 percent as marginal workers and proportion of non-workers in the district is 54.66 percent. The cultivators (41.07%) and agricultural laborers (33.53%) together constitute 74.60 percent of the total workers of the Ranchi district. The agriculture sector has absorbed nearly about 75% of the total main workers. The proportion of other workers is 22.19 percent of the total workers of the district. Among the main workers male work participation rate in the district is 33.89 percent while that of females is only 17.44 percent as per 2011 census.

76. Out of total population of District Lohardaga, workers (main workers and marginal workers taken together) account for 47.93 percent whereas the proportion of non-workers is as high as 52.07 percent. Main workers constitute 22.30 percent of the total population. The contribution of marginal workers is to the extent of 25.62 percent. There is apparently a wide range of difference in proportion of workers including main workers between the two sexes. The proportion of total workers and main workers is 30.52 and 21.75 percent respectively for males as against 13.96 and 29.55 percent for females which indicates that the participation of females in economically productive work on full time basis is quite low as per 2011 Census. The proportion of main workers is highest (26.22%) in Bhandra C.D. Block and the lowest 16.73% in Kairo C.D. Block. In the Lohardaga district the cultivators (45.08 percent) and agricultural laborers (36.52 percent) together constitute 81.60 percent of the total workers in the district. The agricultural sector have absorbed more than three fourth of the total main workers. The proportion of cultivators varies between 66.23 percent in Bhandra C.D. Block to 29.15 percent in Lohardaga C.D. Block. Proportion of agricultural laborers varies between 45.85 percent in Kisko C.D. Block to 25.21 percent in Bhandra C.D. Block. The Proportion of other workers is 10.64 percent of the total workers in the district.

77. In the Latehar district the work participation rate is 16.94 percent as main workers and 26.97 percent as marginal workers and proportion of non-workers in the district is 56.89 percent. Similarly the economic activity in the rural and urban area is primarily dependent on agricultural which is supported by the fact the cultivators (34.57%) and agricultural laborers (47.24%) together constitutes 81.81 percent of the total workers of the district. The total cultivators constitute 4.93 percent and agricultural laborers constitute 13.30 percent of the total workers of urban areas. The proportions of male and female cultivators are 4.86 and 5.23 percent respectively. The proportion of male and female agricultural laborers is 10.76 and 23.10 percent respectively. The Household industry workers constitute 3.65 percent of the total workers of urban areas the proportion of household industry workers among male is 3.39 percent and that of females is 5.67 percent. Other workers constitute 77.90 percent of the total workers of urban areas. The proportion of male and female other workers are 80.99 and 66.00 percent respectively.

7. Electrification

78. Availability of electricity is essential need for industrial development. The Ranchi district receives most of its power supply from the Jharkhand Urja Sanchar Nigam Ltd. (JUSNL) through the Thermal Power Station located at Patratu and Hydle Power Station

located at Sikidiri. All the 15 towns of the Ranchi district have the electricity. In rural areas, the pace of electrification is comparatively slow. The city of Ranchi and its adjoining areas consume bulk of the electricity on account of their being a large industrial complex.

79. The Lohardaga and Latehar district receives most of its power supply from the Jharkhand State Urja Sanchar Nigam Ltd. through the Thermal Power Station located at Patratu. The town of Lohardaga was electrified in the year 1956. All the towns of the district have electricity. In the rural areas, however, the pace of electrification is comparatively slow and less than 50% of the households of the sub project districts are receiving electricity. Most of the villages in the districts have not received electricity supply. However there is huge gap in electrification status for household of urban and rural population in all three districts. District wise households and electrification status has been present in **Table-11** below:

Table-11: District-wise Households and Electrification status as per Census, 2011 (%)

Sl. No.	District	Households		Electrification status Rural		Electrification status Urban	
		Urban	Rural	Electrified	Un-electrified	Electrified	Un-electrified
1	Ranchi	57.95	42.05	43.21	56.79	90.34	9.66
2	Lohardaga	12.06	87.94	24.92	75.08	79.59	20.41
3	Latehar	7.37	92.63	0.03	99.97	0.34	99.66

Source: Census of India, 2011.

D. Social and Cultural Resources

1. Population and Communities

80. According to the census data of 2011, the total population of the Ranchi district is 2914253 of which 56.9% in rural and 43.1% in urban areas. There has been decadal population growth of 24 per cent since 2001. The rural populations in the district have increased by 18.21 percent while the urban population growth over the decade has been as much as 32.55 percent. The sex ratio in the district and State are equal 949 in 2011. In the rural areas of the district the sex ratio is high at 971 while it is only 921 in urban areas. The density of population is 572 persons per sq km as compared to 414 persons per sq km in the state.

81. The district of Lohardaga is the one of the smallest district of Jharkhand State. As per 2011 census the population 461,790 of the Lohardaga district consists of 232,629 male and 229,161 female. Decadal growth rate of 26.68 percent has been recorded in the district during 2001-2011 period. The population density in the district is 307 persons per sq km. Proportion of rural and urban population are 87.6(rural) and 12.4(urban). Among the C.D. Blocks, Lohardaga has shown the highest increase in population over the decade with 21.91 percent.

82. The total population of the Latehar district is 7, 26,978 consists of 3, 69,666 male populations and 3, 57,312 female populations. The population density in the district is 169 persons per sqkm. Proportion of rural and urban population is 92.87 (rural) and 7.13(urban). Decadal growth rate of 29.61 percent has been recorded in the district during 2001-2011 periods. Among the C.D. Blocks highest increase in population is observed in Latehar i.e. 34.88 and in Chandwa i.e. 30.33. The number of villages and rural population of the sub project districts are given in the **Table-12** below.

Table-12: Demographic Profile of the Subproject Districts

Sl. No.	District	Total number of inhabited villages	Total rural population			Sex ratio
			Persons	Males	Females	
1	Ranchi	1,296	16,56,918	8,40,528	8,16,390	971

2	Lohardaga	352	4,04,379	2,03,255	2,01,124	990
3	Latehar	749	6,75,120	3,42,566	3,32,554	971

Source: Census of India, 2011.

2. Health Facilities

83. Among all the districts Ranchi district is having the highest number 57 of Primary Health Centers (PHCs) and there are no community health centers in any of the districts. Medical facilities in Latehar are poor compare to other two districts. The data on medical facilities in the subproject districts is given in **Table-13** below:

Table-13: Health Facilities in the State and Project Districts

Sl. No.	Name of District	Community health centre	Primary health centre	Primary health sub centre	Maternity and child welfare centre	T.B. clinic	Hospital-allopathic
1	Ranchi	0	57	269	86	18	57
2	Lohardaga	0	25	94	36	15	21
3	Latehar	0	22	94	54	4	13
	Total	**0**	**104**	**457**	**176**	**37**	**91**

Source: Census of India, 2011.

Table-13: Health Facilities in the Project Districts (continued)

Sl. No.	Name of District	Hospital-alternative medicine	Dispensary	Veterinary hospital	Mobile health clinic	Family welfare centre	Others	No medical facility
1	Ranchi	47	40	15	10	38	31	742
2	Lohardaga	7	16	20	12	30	1	220
3	Latehar	8	19	2	2	4	5	540
	Total	**62**	**75**	**37**	**24**	**72**	**37**	**1502**

Source: Census of India, 2011.

3. Education Facilities and Literacy

84. The literacy rate of the Ranchi, Lohardaga and Latehar Districts is 67.81 percent, 64.98 percent and 54.83 percent and respectively. Only Literacy rate of Ranchi district of subproject is higher comparing to literacy rate i.e. 66.41 per cent in the state of Jharkhand. The male literacy rate in all the subproject districts (Ranchi 78.63%, Lohardaga 75.54% and Latehar 65.56%) is higher than that of female literacy rate (Ranchi 56.68%, Lohardaga 54.33% and Latehar 43.85%). The gap between male and female literacy rate is 21.95 points in Ranchi district which is higher in compare to other two districts during 2011. As per Census 2011, the CD Block Itki has the highest literacy rate 73.58% and CD Block Chandwa lowest 57.92% in the sub project CD Blocks. The male literacy is higher to the female literacy and gap between male and female literacy rate ranges from 16.87 to 22.94 points. The literacy rate of the sub project Districts and CD Blocks are given in the **Table-14** below:

Table-14: Literacy rate of the Subprojects District and CD Blocks

Sl. No.	Name of CD Block and District	Literacy rate (%)			Gap in male-female literacy rate
		Persons	Males	Females	
1	Kanke	71.81	81.81	61.14	20.67
2	Nagri	70.57	79.68	61.33	18.35
3	Mandar	67.63	76.28	58.79	17.49
4	Bero	67.49	77.45	57.3	20.15
5	Itki	73.58	81.95	65.08	16.87

Sl. No.	Name of CD Block and District	Literacy rate (%)			Gap in male-female literacy rate
		Persons	Males	Females	
	District Ranchi	**67.81**	**78.63**	**56.68**	**21.95**
6	Kisko	64.54	74.89	54.02	20.87
7	Kairo	64.36	74.88	54.01	20.87
8	Lohardaga	67.73	77.61	57.76	19.85
9	Bhandra	63.27	73.24	53.28	19.96
	District Lohardaga	**64.98**	**75.54**	**54.33**	**21.21**
10	Chandwa	57.92	69.31	46.37	22.94
	District Latehar	**54.83**	**65.56**	**43.85**	**21.71**

Source: Census of India, 2011.

E. Archaeological Resources

85. There are no heritage sites notified by Archaeological Survey of India (ASI) within the regulated distance of 300 m from the subproject railway track and tentative alignments of both the electric supply transmission lines.

F. Common Propert Resources

86. No common property resources such as educational institutes, health facilities, public wells, water tanks, play grounds, common grassing grounds or pastures, market areas and community buildings are located within the right of way Ranchi Jn-Lohardaga-Tori Jn rail track as well as in the proposed alignments of both the electric supply transmission lines.

IV. ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

A. Environmental Impacts

87. The electrification of Ranchi Jn-Lohardaga-Tori Jn Section will cause some minor impacts on the environment due to creation of associated infrastructure and establishment of TSS, SP and SSP along the rail line RoW. This IEE examines the potential impacts anticipated during the construction and operation of the subproject, namely "Ranchi Jn-Lohardaga-Tori Jn Section of North Eastern Railways" including:

(i) **Location impacts.** Impact associated with site selection of SP, SSP and TSS locations and alignment of electric supply transmission line including effect on the environment and resettlement or livelihood-related impacts on communities.
(ii) **Design impacts and preconstruction impacts.** Impact arising from project design, including the technology used, scale of operations, discharge standards, topographic survey, geotechnical survey, etc.
(iii) **Construction impacts.** Impact resulting from construction activities including site clearance, earthworks, civil works, erecting electricity towers (for transmission lines) and electric masts (in electrification), etc.
(iv) **Environmental Audit of Ongoing Construction Works**. Since construction works are in progress in Ranchi- Lohardaga section of subproject railway track, therefore, an environmental audit has been taken up to see compliances with ADB SPS 2009. In this audit corrective actions have also been recommended, wherever, some gaps were observed.
(v) **Operation and maintenance impacts.** Impacts associated with the operation and maintenance of the infrastructure built in the subproject.

88. ADB's Rapid Environmental Assessment checklist for 'Roads and Highways' was used while screening the alignment and recommending mitigation measures. The REA checklist of Roads and Highways has been used as the project is linear in nature and there is no checklist for electrification.

B. Location Impacts

89. The Ranchi Jn-Lohardaga-Tori Jn railway track is an existing corridor and all works for track electrification will be taken up within the available RoW. However, for two transmission lines (a) from Miral village (source 132 kV Feeder Tower line) to TSS location at Piska and (b) 132 kV substation at Lohardaga to Lohardaga TSS, these will traverse agriculture fields and no land acquisition is planned. Hence it can be said that no new land has been acquired for the subproject, nor has anyone been displaced in anticipation of this proposed ADB project. There are no significant ecological resources (no reserved or protected forest, and protected areas such as Wild Life Sanctuary, Bird Sanctuary, etc.) in the surroundings of the planned alignment of both transmission lines, however, railway track from CH506+000 to CH522+000 passes through the Kundgada Reserved Forest (RF) and from CH 526+000 to CH 528+000 passes through Tudu Protected Forest (PF). The electrification works may have local impacts during construction. But no additional land of reserved forest or protected forest is planned for the electrification works. The reserved forest and protected forest are not part of buffer zone or core zone of any protected area (National Park / Wild Life sanctuary / Tiger Reserve / Bird sanctuary). The electrification works are planned within the existing formation width of railway track and within the existing RoW. There are no heritage sites notified by ASI (state archaeological department) within the subproject area or in the immediate surroundings. No significant impacts can arise due to establishment of project related infrastructure as this infrastructure will not impinge upon any additional area of reserved/protected forest, or within

the regulated 300 distance from protected archaeological or historical monuments.

90. The Ranchi Jn. - Lohardaga- Tori Jn Section is located within seismic zone II (as indicated in Figure-11 in previous section) which implies that subproject site and surroundings are moderately susceptible to earthquakes. The Zone II is low damage risk zone.

C. Impacts during Design and Preconstruction Phase

91. As noted above, the all works will be taken up within the RoW of railway track owned by the South Eastern Railway (SER) Division of Indian Railways.. There is an estimated tree cutting of about 15 trees in the alignment of Transmission line from Miral Village to Piska TSS and about 15 trees from Lohardaga substation to Lohardaga TSS transmission line. The trees in the alignment of transmission are not endangered or critically endangered. There is no requirement of tree cutting in the rail corridor (including reserved and protected forest portion) for erection of electric poles and at locations SSP, SP and TSS construction. Based on the environmental screening of the subproject area, there are no significant adverse environmental impacts during the design and preconstruction phases.

92. **Climate Change Impact:** The finished rail line level has been kept 1 m above HFL based on 50 year return flood period. This level will be sufficient to take care flooding risk due to changing weather pattern also. The subproject area is not prone to floodingAlthough rail line does not cross any river or natural stream, historical data showed that flood may occur due to sudden heavy rains. Further, for electrification works, electric poles and foundation strengths have been designed to withstand a wind speed of 39 m/s (140 kmph) in the event of storms. This strength will also be sufficient to withstand storms risks on account of climate change. It may be mentioned that subproject region is not prone to storms.

D. Impacts during Construction Phase

93. All construction activities to be undertaken at the site in charge appointed by the CORE office at Ranchi. The construction stage impacts due to the proposed subproject components are generic to the construction activities. The EMP emphasizes on the construction impacts and necessary mitigation measures to be strictly followed by the contractor and supervised by the CORE. The key potential impacts are covered in the following paragraphs.

94. **Impact due to stock piles of construction materials:** Improper stockpiling of construction materials along the transmission line corridor site could obstruct movement along access roads and nearby drainage. In case works along rail track all storage will be within RoW of railway land. The storage of construction materials will not be significant as it will be required only for small foundation works for towers in transmission lines, poles in electrification works and small building construction at TSS, SP and SSP locations. The construction materials are being sourced locally. No impacts on traffic is likely as roads providing connectivity to various SSP, SP, TSS, Tower Wagon Shed, OHE PSI Depots have very lean traffic. Hence, due consideration will be given for proper material storage on construction sites along the transmission line and along the rail corridor in the balance period of construction works. Stock piles will be covered to protect from dust and erosion. Waste materials will be disposed off at identified and approved locations.

95. **Disposal of construction waste:** The construction waste could lead to untidy conditions at sites of TSS, SP and SSP and may find its way to local natural drains and may cause siltation in these drains and may result into obstruction to natural flow in these drains and streams. The disposal of construction waste in Reserved and Protected Forest may also result into damage to flora. In the subproject, it shall be mandatory for the contractors to ensure proper disposal of the construction wastes at the disposal sites as designated and approved by the CORE.

96. **Quarry and/or borrow pits operations:** Since the civil works are of a small size, all construction material will be procured from market. There will not be any need for direct procurement of stones and building material from quarries.

97. **Increase in noise levels:** Noise levels in the immediate proximity of subproject site are expected to increase during construction within the vicinity of the construction site. Construction noise due to electrification works (foundation for poles, transportation of poles by flat wagon and wiring works) may create nuisance at the settlement and schools that are very close to the track. However, these will be largely imperceptible as civil works will be confined to relatively small area and rail line in major portion being away from habitations. This increase will be felt up to a maximum distance of 500 m only. The construction sites of SP at CH 467+400 and SSPs at CH 448+100, CH448+100, CH 458+200, CH 478+000, CH 500+255 and CH 517+779 are more than 1.5 km from the habitations, so no impacts of construction activities are anticipated. The construction sites of SPs at Ranchi and Tori and TSS at Piska and Lohardaga are near habitations. At these locations marginal increase (2-3 dB(A)) on intermittent basis is expected on account of construction activities of TSS and SPs. Further, construction noise due to electrification works (foundation for poles, transportation of poles by flat wagon and wiring works) may be felt at residential areas through which rail line is passing. The project area is however sparsely populated; close to rail line are Ranchi, Piska, Nagjua, and Irgaon in Ranchi to Lohardaga portion and Chandwa town in Lohardaga to Tori portion. The electrification and civil works construction activity noise in these areas may exceed 70-75 dB(A) for a short time, and will only be temporary. This conclusion is drawn based on typical noise generation from use of construction equipment (**Table-15).** The equipment likely to be used in electrification works are small portable concrete mixers, welding generator / portable generator, Bulldozer, etc. and noise generated from these equipment (generation expected at source 71-82 dB(A) range) will attenuate due to natural barriers (vegetation, walls, etc.) and likely noise levels will be in the above mentioned range of 70-75 dB(A). It may be mentioned that residential houses / and or commercial establishments are about 12 m at Ranchi, 15 m at Piska, 30 m at Nagjua and Irgaon, 25 m at Lohargdaga and about 30 m at Chandwa from the rail line.

Table-15: Typical Noise Levels of Principal Construction Equipment

Clearing Equipment		**Structure Construction Equipment**	
Equipment	**Noise Level dB(A)**	**Equipment**	**Noise Level dB(A)**
Bulldozer	80	Crane	75-77
Front end loader	72-84	Welding generator	71-82
Jack hammer	81-98	Concrete mixer	74-88
Crane with ball	75-87	Concrete pump	81-84
		Concrete vibrator	76
Excavation & Earth Moving		Air compressor	74-87
Bulldozer	80	Pneumatic tools	81-98
Backhoe	72-93	Bulldozer	80
Front end loader	72-84	Cement and dump trucks	83-94
Dump truck	83-94	Front end loader	72-84
Jack hammer	81-98	Dump truck	83-94
Scraper	80-93	Paver	86-88
Grading and Compacting		**Landscaping and Clean-up**	
Grader	80-93	Bulldozer	80
Roller	73-75	Backhoe	72-93
		Truck	83-94
PAVING		Front end loader	72-84
Paver	86-88	Dump truck	83-94

Truck	83-94	Paver	86-88
Tamper	74-77	Dump truck	83-94

Source: U.S. Environmental Protection Agency. Noise from Construction Equipment and Operations. Building Equipment and Home Appliances. NJID. 300.1. December 31. 1971.

98. Completion of construction works for segments of electrification is however anticipated to last for 45 days for all works; SSP, SP and other building construction will take a few months to complete. Civil works and transportation of construction materials will be confined to daytime. Noise attenuation will take place on account of natural barriers (natural vegetation, trees, boundary walls, etc.) in forest and open areas. The construction noise may temporarily drive away local fauna (e.g birds, monkeys, etc.) in forest vegetation, but the fauna are expected to return after the construction completion. In forest areas, noise shall also be controlled by regulating construction activities and their timings and coordinated with the forest officials at Local Forest Office at Chandwa. In addition to mitigation measures, necessary monitoring of noise levels will also be taken up as part of environmental monitoring plan during the construction phase along the subproject corridor. To minimize occupational noise, contractors will be required to use PPEs to reduce occupational noise impact on them.

99. **Impacts on biodiversity during construction phase:** No major impacts are expected on the biodiversity during the construction phase as the rail corridor portion where construction works are to be taken up is devoid of trees. This is because rail line portion from Ranchi to Lohardaga has been converted from meter gauge to broad gauge in 2007 and portion from Lohardaga to Tori have been completed in March 2017. Due to new formation width construction, there are almost no trees in the RoW. The poles to be erected for the electrification are within the formation width of rail line and within the formation width there is not even vegetation because of presence of ballast. However, there is requirement for cutting of about 15 trees in the transmission lines route from Miral village to Piska TSS and about 15 trees from Lohardaga substation to Lohardaga TSS. There are no shrubs expected to be removal at locations of TSS, SSP and SP since the specified locations of these subcomponents are devoid any flora. The work on SSP and SP locations is in progress from Ranchi to Lohardaga portion. There will be no requirement for cutting of trees in protected and reserved forest portions of subproject. As part of compensatory plantation, 300 trees will be planted as per requirements of MOEFCC and State Forest Department in the vacant space along the corridor of Ranchi Jn. - Lohardaga- Tori Jn. rail line. There are no endangered or rare species of flora at any of the sites of project where construction works to be taken up for the electrification of track. The significant presence of wildlife has not been reported in protected and reserved forest portions as no conflict of wild animals with train movement has been reported by the locals and forest officials so far; this section started operating in March 2017.

100. **Disturbance to traffic during construction phase:** The disturbance to the traffic is not likely as electrification works are not likely to interfere with road traffic (Rail corridor away from local roads) as well as Rail traffic on the rail line as necessary safe spacing has been kept between the track and locations of SSP, SP, TSS and poles**.** The transportation of poles will be through tower wagon. The minor construction material required for civil works will be through the approach roads. Since the construction works are of small scale so construction materials requirement is not significant and these will be sourced from the local markets in the vicinity of construction site. Since transportation/ hauling of material is not for significant distance so increase in traffic in the subproject area on account of construction activity will not be felt. Further, as observed during site visit to the corridor all connecting roads to the rail line have very lean traffic.

101. **Impact on cultural properties:** The proposed Ranchi Jn- Lohardaga- Tori Jn. Rail Electrification subproject will not have any impacts on any religious structure or any other structure of historical and/or cultural significance.

102. **Groundwater:** Existing water supply source of South Eastern Railway will be used for construction water. These sources include some existing hand pumps also. Since the water requirement for the construction will be very less in quantity, because project involves construction of small foundations, so ground water table is not likely to affected. The subproject is in water rich area and ground water exploitation is not in critical category (in subproject region) as per studies of Central Ground Water Board in all the three districts.

103. The problem of ground water contamination is also not anticipated during the construction phase since there will be proper disposal of the waste water as one construction camp have been established Piska area of Ranchi and a separate labor camp has also been established in the existing building near Staish Chowk in outer skirts of Ranchi city. At other locations of construction sites, no labor camps have been established as these sites are in open and away from habitation. The contractor is employing local labor at these locations.

104. **Ambient air quality:** Generation of dust is anticipated during transportation of construction materials, excavation works for foundations, and construction activities. Some dust and gaseous emissions will also be generated during the construction period from machines such as mixers, and vehicles engaged in transportation of construction materials. Pollutants of primary concern at this stage include respirable and suspended particulate matter and gaseous emissions (nitrogen oxide, sulfur dioxide, carbon monoxide, etc.). However, transportation of construction materials will be confined to a few trips per day depending upon the extent of construction activity. Therefore, impact at this stage will be temporary and restricted to the close vicinity of the construction sites only. In the reserved and protected forest portions no SSP or SP is planned, so impact on air quality in the forest area will be insignificant. No construction camp or workers accommodation is planned in the forest area.

105. All vehicles and construction equipment operating for the contractor and the supervising CORE team will obtain and maintain “Pollution under Control” certificates. To control dust emissions, vehicles deployed for transporting material, sand, and aggregate haulage, will be covered with tarpaulins to prevent spillage. Regular sprinkling of water during excavations, loading, unloading, vehicular movement, and raw material transport will prevent spread of dust and other contaminants. During the construction contractor will ensure that emissions will comply with the vehicle emission standards specified by the Government of India and ambient air quality standards specified by the Central Pollution Control Board at the construction sites. The contractor will submit emission monitoring results as a compliance with environmental monitoring plan. The submission of record of monitoring and pollution under control certificates will be ensured by the TA consultants once non sovereign loan agreement is signed and TA consultants are mobilized to site.

106. **Construction waste:** Some waste will be generated due to excavated earth material and waste from construction. Debris and excavated earth material can be reused subject to the approval of the CORE supervision team during construction. Waste generated during construction will be disposed off as per law to the satisfaction of the employer. The clean-up and restoration operations will be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures and dispose off all garbage from construction sites. All construction zones used and affected by the subproject will be left clean and tidy, at the contractor’s expense as per the satisfaction the CORE.

107. The contractors of electrification and transmission lines works are likely to engage local labor for various construction activities. However, in case of migrant labor has to be engaged, the contractors will establish properly designed labor camps with all basic amenities such as potable drinking water supply and sanitation facilities (septic tanks and soak pit). Dust bins will be placed in adequate numbers. The EMP lays down some measures to address likely adverse impacts associated with the labor camp.

E. Environmental Impacts during Operation Phase

108. **Noise:** Electrification works along the existing rail corridor and transmission line works once completed will have environmental impacts such as noise generation. The train movement will normally consist of relatively short periods of high noise levels throughout the day and night periods. However, with limited number of train movement (currently only one round trip) the intermittent noise peaks will be limited. To assess the noise impacts noise predictions have been carried out and detailed in the subsections to follow.The noise level though nearby settlement and other sensitive receptor viz schools etc. will be minimized by provision of acoustic barriers and provision of speed limitation, if required. Noise measurements shall be carried out along the track to ensure the effectiveness of mitigation measures.

109. **Wastes:** generation of some lubricating oils due to periodic maintenance of transformers. This waste lubricating oil generated will be collected and will be disposed off along with other waste oil at rail workshops at Ranchi / Muri. The waste oil generated at the transformers of transmission line will also be disposed off by the JUSNL as per law and established procedure of the company. No solid waste generation or air emissions are likely to be generated from the infrastructure facilities created for rail electrification.

110. There is apprehension that cases of electrocution of birds and monkeys will rise due to accidental contact with the electrified conductor (wire). No wildlife crossing through rail line have been indicated by the forest department during discussion at Ranchi on December 29, 2017. Since no crossings have been identified so conflict with train movement are not anticipated.

111. The electrification project is likely to have following positive impacts during the operation phase:

- Reduction in road traffic due to increase in rail journey popularity on account of reduced travel cost, enhanced and better controlled speed and likely increase in frequency of trains. This will result in lower vehicular emissions and noise levels in the surroundings of existing roads connecting Ranchi to Tori Junction;
- Lower air and noise pollution along the corridor on account of movement of electric locomotives on the rail track and reduction of Greenhouse gas emissions;
- The reduction in noise generation on account of electric locomotives movement will have positive impacts on wildlife in sanctuary area;
- The better control of electric locomotive speed will reduce accident / conflict with wildlife in the forest area
- Reduction in travel time from Delhi to Ranchi by about 3 hours as this route will shorten distance between Delhi and Ranchi by about 100 km
- Possibility to increase services of passenger and express trains between Ranchi and Tori after electrification as currently only one passenger train moves on the line and
- Overall positive impact on economic development on account of improvement rail transport in the region.

112. **Safety measures:** The design of the Electrification related structures includes structural and seismic safety measures required by India's latest building codes (in seismic zone II). The other safety features are explained below:

- The SSP, SP, TSS and Bay of transmission line at Lohardaga substation will be equipped with fire-fighting systems with portable fire extinguishers and smoke detectors. No bay construction required for Piska to Miral village transmission line

as power supply will be directly taken from 132 kV transmission line available. All locations of SP, SSP, TSS and 132 kV substation of JUSNL at Lohardaga can be approached by the local roads in case of any fire or eventuality.

- During natural calamities, the operations will be stopped. The passengers and staff will be safely evicted as per the disaster management plan of Indian Railways.
- The first aid facilities will be available at all stations along the Rail Line corridor.

113. **Socio-economic impacts:** As mentioned above, the project will have positive impacts on socio-economic environment such as easier access to education and health facilities at Ranchi and access to other locations in the state such as Lohardaga, and Chandwa, Muri, Jamshedpur (via Tori junction or Ranchi). and reduction in travel and time cost on account of cheaper and reliable train journey.

114. **Flora and fauna:** During finalization of alignments of electric supply transmission lines, tree cutting has been minimized by adjusting the respective alignments. There will also be compensatory plantation, as per regulatory requirements(MoEFCC), in the vacant RoW space of the rail corridor. There will be compensatory plantation of 300 trees to compensate for 30 trees to be cut in the alignments of two electric supply transmission lines. There will be plantation of locally grown trees only and no plantation of any endangered species of plants.

115. **Predicted Noise and Vibration Levels:** During the operation phase noise levels will be felt on account of movement of electric locomotives instead of existing diesel locomotives. The noise levels predictions have been carried out taking reference noise levels (noise levels generated at source) for passengers train, express trains and goods train from the document titled as ' Metro Rail Transit system - Guidelines for Noise and Vibrations, September 2015 (Published by Track Design Directorate Research Designs and Standards Organization, Ministry of Railways, India). The detailed methodology of predictions has been given in Appendix -5. The predicted noise levels are given below in Table-16. There will be instantaneous noise levels during passage of train along residential areas which peaks prevail for approxiimately 2 to 3 minutes. Currently, there is only one passenger train movement and 3 to 4 freight trains movement on this Ranchi - Tori rail line. So noise generation is not continuous. It is clear that as per evaluation criteria of noise (refer Appendix 5 for details) predicted peak noise levels are within acceptable limits. It is also concluded that for the present scenario of train movements (with no increase of frequency or introduction of new train services) noise levels will reduce by about 3-7 dB(A) upon shifting to electric locomotives in the post electrification phase. The Predicted peak levels in reserved and protected forests are expected to be below threshold limit of 85 dB(A). After electrification, reduction in noise levels in forest area will have rather a positive impact on fauna as it will experience lower noise levels on account of electric locomotives movements. Additionally, air emissions from diesel locomotive movement will get eliminated.

116. The increase in vibration levels is ruled out as the existing rail will be used in the post electrification phase also. There is also no plan of laying of any additional rail track.

Table-16: Predicted Noise Levels in the Surroundings of Rail Line

Sl. No.	Location	Chainage	Distance from Railway Track (m)	Existing Peak Ambient Level with passage of Train dB(A)	Predicted Peak Noise Level with Passage of Electric Locomotive dB(A)	Permissible/Acceptable limit as per OSHA dB(A)
1	Ranchi City near SP location	419+520 on LHS	10.0	94.9	84.60	115
2	Near TSS Location at at Piska	432+400 on LHS	12.0	89.3	84.57	115
3	Narkopi village	CH 458+000 on LHS	15.0	88.7	84.53	115
4	Lohardaga Town	CH 485+500 on RHS	25.0	91.6	84.44	115
5	Forest Area	CH 512+000 on LHS	10.0	86.7	84.60	115
6	Tori Junction near End Point	CH 528+500 on LHS	27.0	91.3	84.43	115

OSHA=Occupational Safety and Health Association, USA.

117. **Emergency Plan for Accident and Natural Hazards:** For operation phase onsite emergency plan will be prepared by the Divisional Executive Engineer's office for any local mishaps and fire as this is a regulatory requirement and part of Indian Railways Safe Operating Procedures (SOPs).. For natural calamities the Disaster Management Plan prepared by South Eastern Railway will be followed. The Disaster Management Plans have been prepared by the respective departments of GOI as per provisions of Disaster Management Act 2005 of Government of India.

F. Environmental Audit of Ongoing Construction Works

118. As mentined earlier, the construction works (construction of foundations of poles, and erection of poles) are in progress in Ranchi Jn to Lohardaga section in the subproject. In addition to works along rail line, construction is in progress at SP locations at CH 419+520 and CH 467+400 and SSP locations at CH 448+100, and CH 458+200. These construction works commenced in June 2017. All works have been awarded to a single contractor named M/s CEC-PGIPL(JV)'. At present about 20-25 % construction works have been completed. An environmental audit has been taken up to review the exsting activities compliance with ADB SPS principles and regulatory requirements of GOI and State Government of Jharkhand. Corrective actions for the compliance of ADB safeguard policy principles and regulatory requirements have also been given for the ongoing construction works. The environmental audit findings (Photographs of findings provided in **Appendix-6**) and recommendations for corrective actions have been summarised below in **Table-17.**

Table-17: Environmental Audit of Ongoing construction works, Findings and Recommendations / Corrective Actions

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
1. Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment	Yes	Not complied with. Works have been started in Ranchi - Lohardaga section. But no consultations taken up with forest officials at Chandwa as portion from Barkichampi station to Tori (CH 501 to 524 and CH 525 to 526) passes through reserved and protected forest. In electric supply transmission line JUSNL has taken into consideration environmental issues while finalizing alignments of transmission lines. In the alignment of these transmission line reserved / protected forest, water bodies and habitations have been avoided.	1-Permission for construction works in forest areas to be obtained by the CORE for works to be taken up in forest portion from CH 506+000 to 522+000 and Ch 526+000 to 528+000. . 2- JUSNL to confirm that no clearance under the Forest (Conservation) Act, 1980 for the locations of transmission lines crossing RoW of NH / SH / Railway track is needed. 3- Environmental assessment being taken up as part of safeguard due diligence will suffice.
2. Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic, and physical cultural resources in the context of the project's area of influence.	Yes	Not complied with. This is because national regulatory framework has exempted railway projects from the ambit of prior environmental clearance and environmental assessment process.	The environmental assessment being taken up as part of Safeguard Due Diligence will be sufficient. The electrification works will have minor and localized impacts, so an IEE report is being prepared to comply with ADB SPS requirement. In this IEE report all impacts during project life cycle have been assessed. The anticipated adverse environmental impacts of the project are not significant. The executing agency and implementing agencies display a high awareness about potential negative environmental impacts of the project.
3. Examine alternatives to the	Yes	Complied with	None

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
project's location, design, technology, and components and their potential environmental and social impacts, then document the rationale for selecting the particular alternative proposed. Also, consider the no- project alternative.		The locations SSP, SP, TSS, and Tower Wagon Shed have been finalized after visiting the potential sites by the design team and during the finalization of locations tree cutting and resettlement issues were avoided.. The equipment and materials based on latest technology are being procured and installed. There is no involuntary resettlement issue in the project nor has any person been displaced in the anticipation of project. Adequate compensation for crop damage will be paid by the CORE through JUSNL for the electric supply Transmission line completion. No project alternative is not desirable as this will result in to inefficiency of rail track utilization as well as generation of GHG on account of Diesel loco movement.	
4. Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.	Yes	Not Complied with Refer to Principle 1 above. The environmental regulatory framework provides no environmental assessment requirement for railway projects as compared to ADB's safeguards requirements.	1-Due to ADB financing, the project will follow EARF of Railway Sector Investment Program and SPS principles ensure preparation of the IEE report. The IEE report will have mitigation measures (EMP) for preconstruction, construction and operation phases. The EMP in the IEE will contain environmental monitoring and reporting requirements for the category 'B' projects. 2-The positive impacts will be enhanced through compensatory tree plantation in vacant space in RoW. In the IEE report, Capacity building measures for EA and IAs will also be covered. The EMP budget and performance indicators are also part of IEE report. The EMP implementation, capacity building, monitoring of

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
			performance indicators will be carried out in the remaining period of construction phase and in the post construction phase.
5. Carry out meaningful consultation with affected people and all other stakeholders. Continue consultations during project implementation.	Yes	Not Complied with. No consultations have been carried out as community residing along the corridor; land owners in the transmission lines alignment and other stakeholders have not been informed about the project. There has been no informal or formal discussion with the Forest officials also for the electrification works in the portion of subproject falling in the reserved and protected forests.	There is no institutional vehicle to ensure consultation with all stakeholders at the implementing agencies and executing agency. This needs to be built in into the activities of the executing agency and implementing agencies as part of capacity development. This capacity development will be taken up through ADB financed TA. During the project implementation consultations will be taken up comply with the EARF and IEE requirements. The consultations will be taken up by the safeguard consultants planned to recruited through planned TA. . .
6. Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, at an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment and its updates, if any, to affected people and other stakeholders.	Yes	Not Complied with No environmental assessment or EMP document has been prepared by the CORE for the subproject works.	To enable implementing agencies to ensure timely disclosure of safeguard processes and documentation in local languages, it is necessary to build institutional capacity through the inclusion of safeguard consultants in the implementation team and through training on safeguards to the contractor staff and technical team of CORE. The details of institutional capacity building have been covered in the IEE report. In the current case, IEE report prepared will be disclosed on the CORE website, ADB website and on the Ministry of Rail website.

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
7. Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions and disclose monitoring reports.	Yes	Not complied with. This is because no EMP has been prepared by the CORE	The EMP to be prepared as part of IEE report will be implemented for the remaining period of construction. The monitoring results and monitoring reports will be also be disclosed. The environmental monitoring will be taken up in remaining construction phase
8. Do not implement project activities in areas of critical habitats. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. Use a precautionary approach to the use, development, and management of renewable natural resources.	No	In the stretch where construction works are in progress, there are no legally protected areas.	Not applicable. However, end portion of subproject for about 25 km length passes through reserved and protected forests. The electrification works in this portion yet to be started. Mitigation measures will be elaborated in EMP to be prepared as part of IEE report. These mitigation measures will be implemented. But these protected and reserved forests are not part of any protected area (National Park, Wild Life sanctuary, Tiger Reserve, Bird sanctuary, wetland, etc.)
9. Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health, and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases	Yes	Not complied with. Following violations in respect of World Bank Group's Environmental, Health, and Safety Guidelines were observed: • The workers were not using personal protective equipment such as Helmets, Shoes, Hand gloves, etc. at Tangarbansali SSP location (CH 448+100) • No sanitation facilities for construction workers have been provided at labor camp established near Satish Chowk at outer skirts of Ranchi city. However, sanitation facilities are under construction at this location. These should be completed. At construction camp, established near Piska station (CH 438+000) sanitation facilities	1- In order to comply with World Bank Group's Environmental, Health and Safety guidelines, EMP implementation and monitoring is required. It is recommended that sanitation facilities be constructed at labor camp established at Satish Chowk locality, cooking fuel (LPG/ Kerosene) may be made available and drinking water quality should be tested to confirm drinking water meeting standards specified in IS: 10500. It is also recommended that cooking place at labor camp should be enclosed. At labor camp site folding cots, or hard beds may be provided as at present labors are sleeping on floor. The construction materials will be properly stored and

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.		have been provided. • Clean fuel (LPG or Kerosene) has not been provided for cooking at the labor camp near Satish Chowk. • Drinking water is being used from the existing Hand Pumps. But water quality has not been tested to ascertain drinking water quality conformance with drinking water standards. • Storage of construction materials (specially sand and sub grade) was not proper and not covered and source of dust generation due to local surface wind at construction sites at Narkopi SP (CH 458+200), and at Nagjua SP under construction at CH 467+400 (RHS) • No water sprays at construction sites to suppress dust especially at excavated areas. • No caution tape was seen around excavated sites where construction works were in progress (SP location at CH 419+520 (RHS), SSP location at Tangarbansali at CH 448+100 (RHS), Narkopi SP at CH 458+200 (RHS) and SP location at Nagjua at CH 467+400) • At many locations of Poles along the railway track, left over construction materials were seen. • At some locations concrete hole constructed for electric masts as part of foundation works have been left uncovered. • No storage of hazardous chemicals and materials such as fuels, lubricants and	covered. Further, usage of PPEs shall be ensured at construction sites. 2- It is also recommended that all contractors (Electrification works and transmission lines works) should have adequate insurance as per law for the construction laborers and also to meet contractual requirements. There should be training on Occupational Safety and Health issues to the contractor staff and construction workers.

ADB Policy Principle	Triggered by the Subproject	Compliance Status in Construction Works	Recommendations / Corrective Actions
		paints was seen at sites. • No caution signanges were seen at construction sites.	
10. Conserve physical and cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a preapproved management and conservation approach for materials that may be discovered during project implementation.	No	In the Ranchi Jn. - Lohardaga stretch where construction work is in progress, there are no archaeologically protected monuments, buildings, or structures close to railway track and close to the sites of SSP, SP, and TSS. No other culture resources such as heritage sites were seen during the site visits. No 'chance find' issue has come so far in the construction works.	Protocol for ' Chance Find' needs to be developed by safeguard team of CORE during EMP implementation at site.
11. Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures.	Yes	Not Complied with. Safe working conditions not provided as no usage of PPEs was seen at site. No onsite emergency plan has been prepared by the contractor for mishaps at site.	EMP implementation needs to be effective and onsite Emergency Plan needs to be prepared by the contractor. For this capacity development of contractor is required. PPE usage has to be more effective at all construction sites.

ADB = Asian Development Bank, CORE= Central Organization for Railway Electrification, EMP = environmental management plan, IEE = initial environmental examination, GHG= Green House Gas Emissions, JUSNL= Jharkhand Urja Sanchar Nigam Ltd.,LPG= Liquefied Petroleum Gas, PPEs=Personal Protective Equipment, SPS = Safeguard Policy Statement, TSS= Traction Sub Station, SSP=Sub- Sectioning and Parallel Post, SP= Sectioning and Parallel Post
Source: Asian Development Bank.

G. Description of Planned Mitigation Measures

119. Screening of environmental impacts is based on the magnitude and duration of the impacts. **Table 18** provides the potential environmental impacts and the mitigation measures including the institutional responsibilities for implementing the same. The subproject rail line stretch from Ranchi to Tori is located sufficiently away from protected areas and the components proposed will not impact any environmentally sensitive or protected areas.

Table-18: Summary of Environmental Impacts and Planned Mitigation Measures

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
1: Location Impacts					
1.1	Lack of sufficient planning to assure long-term sustainability of the project related infrastructure to ensure protection specially from earthquakes and other natural disasters	Permanent	Major	The design of project related structures has been done considering earthquake coefficient of zone II. There will be regular maintenance of all infrastructure created as part of the maintenance schedule to ensure long term sustainability. The major bridge on rivers and other streams have been designed considering 50 year return flood period and all guidelines and codes of IRC have been followed. The design is new as construction works have been completed recently. During the earthquake or any other natural calamity Disaster Management Plan prepared by the South Eastern Railway will be followed.	CORE Ranchi
1.2	Subproject portions from CH 506+000 to CH522+000 and CH 526+000 to CH 528+000 pass through pass through Kundgada RF and Tudu PF respectively. The electrification works may have	Permanent	Moderate	1- No additional forest land being acquired. All works are planned in available RoW devoid of plantations as rail line in this section have been completed in March 2017 only. . 2- No SP, SSP or TSS planned in forest areas.	Not Applicable

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
	impacts on these forests.			3- SER has obtained forest clearance under the Forest (Conservation) Act, 1980 for laying the rail line.	
2: Design and Preconstruction Impacts					
2.1	Permissions, permits / License, clearances, NOC, etc.	Permanent	Major	Obtain all necessary permissions, permits, clearance, NOCs, etc., prior to start of construction works, specially tree cutting permissions, Government approval for the payment of crop damage to the farmers in the alignments of transmission lines, license from local labor office, permission from local forest department for carrying out works in forest areas.. Acknowledge in writing and provide report on compliance for all obtained permissions, licenses, clearance, NOCs, etc. Include in detailed design drawings and documents all conditions and provisions, if necessary.	CORE Ranchi
2.2	Layout of components to avoid impact on the aesthetics of the site	Permanent	Major	Project components will not have any adverse impact on aesthetics of rail corridor as it involves electrification works in the existing RoW space. Hence, no mitigation measures are warranted.	Not Applicable
2.3	Slope stability-related issues	Permanent	Minor	The project related works are on plain land. No stability issue is involved as there are no construction of bridges, culverts or high embankment stretches as part of	Not applicable

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				electrification works. No mitigation measures are warranted.	
2.4	Increased storm water runoff from alterations of the construction site's natural drainage patterns due to excavation works, construction of foundations, and addition of paved surface	Permanent	Moderate	Design of proposed works for transmission line, SSP, SP, and TSS will allow efficient drainage at the site and maintain natural drainage patterns. The designs of TSS, SP and SSP have been carried out considering existing Rail levels after detailed topographic survey.	CORE and JUSNL
2.5	Integration of energy efficiency and energy conservation programs in design of subproject works	Permanent	Moderate	The following measures have been included in the design to enhance energy efficiency: • Usage of recyclable materials like wood substitutes • Installation of Bureau of Energy Efficiency-certified equipment • Usage of energy-efficient lighting fixtures (LED and solar)	CORE and JUSNL
2.6	Provision of plastic wire mesh over the charged electrical conductor to reduce electrocution of birds and monkeys in Reserved and Protected Forest Areas	Permanent	Moderate	A plastic wire mesh is recommended over the electrical conductor in protected and Reserved forest areas (CH506+000 to CH522+000 and CH 526+000 to CH 528+000) to reduce electrocution of birds and monkeys in post electrification	CORE and Contractor
3: Construction Impacts					
3.1	Construction camp—location, selection, design and layout	Temporary	Moderate	The construction camp in the ongoing construction works has been established on Railway land near Piska Railway station. Labor camp has been established in a private building in Satish Chowk locality. For transmission lines camps will either be	Contractor, CORE / JUSNL

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				established at TSS locations (or at 132 kV substation at Lohardaga and or land owned by JUSNL). These camps will not affect the day to day activities of local villagers as both the rail line and substations are located away from habitation. Adequate sanitation facilities shall be provided at camp sites and no waste water will be discharged outside. For the existing camps recommendations made in environmental audit will be implemented.	
3.2	Impacts on flora and fauna in Transmission line(Cutting of 15 Trees in alignment of electricity supply transmission line route from Miral village to Piska TSS and 15 trees in alignment route from 132 kV substation at Lohardaga to TSS location Lohardaga	Temporary	Moderate	Minimize tree cutting by adjusting alignment of transmission lines through open fields. Prepare tree plantation plan for compensatory plantation in 1: 10 ratio (minimum 300 trees). The location for plantation for these trees may be identified by the CORE in available vacant space in RoW of rail line and CORE may ensure that JUSNL takes up compensatory tree plantation in the available land. Impacts on fauna not anticipated in transmission line works as these have been planned through open agriculture and / or waste land. In the electrification works, no requirement of tree cutting has been identified at locations of SSP, TSS and SP. The poles are	JUSNL, CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				planned within formation width, which has no trees or vegetation.	
3.3	Impacts on Flora and fauna in Forest areas (including removal of vegetation and trees and conflict with forest fauna)	Moderate /	Temporary	1- No storage of construction materials or dumping of construction waste in forest area 2- Work from Sunrise to sunset hours only 3- No establishment of construction camp or workers' camp in forest area 4-No usage of any forest material for the construction purposes 5- During construction noise levels specified by MoEFCC for sensitive area (Day - 50 dB (A) and Night Time -40 dB (A)) to be adhered to. Necessary periodic noise level monitoring will be carried out. 6- No water source of forest area will be used for construction purposes 7- Necessary permission from local forest office at Chandwa / Latehar will be obtained for carrying out electrification works in forest areas. 8- No access road construction for transportation of construction materials in reserved and protected forest areas.	Contractor, CORE
3.4	Site clearance activities, including delineation of construction areas for TSS, SSP, SP, locations of poles in transmission line, and along rail line and bay sites at transmission	Temporary	Moderate	The commencement of site clearance activities for the remaining works in the railway track will be undertaken with due permission from the SSE or the authorized official appointed by the CORE.	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
	line substation at Lohardaga			All areas used for temporary construction operations will be subject to complete restoration to their former condition with appropriate rehabilitation procedures.	
3.5	Drinking water availability at construction camp, labor camps and at construction sites	Temporary	Major	Sufficient supply of potable water will be provided and maintained. If drinking water is taken from existing water sources then quality will be tested to confirm that it conforms drinking water quality standards. The drinking water will be stored in a tank of suitable size to ensure uninterrupted water supply. For the existing camps drinking water quality will be tested.	CORE and Contractor (s)
3.6	Waste disposal	Permanent	Major	Locations of disposal site for construction waste will be finalized by the CORE office Ranchi. They will confirm that disposal of the material will not impact the water body or environmentally sensitive areas especially reserved and protected forests. They will also ensure that no endangered or rare flora is impacted by such materials.	Contractor(s), CORE
3.7	Stockpiling of construction materials	Temporary	Moderate	The stock piling of construction materials shall be avoided near the roads, agriculture fields, and drains. Stockpiles shall be covered to protect from dust and erosion.	Contractor(s), CORE
3.8	Soil erosion	Temporary	Moderate	Temporary slope protection may be required during construction at the excavated areas for	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				foundations at locations of TSS, SP, SSP and towers of electricity supply transmission line. Adequate measures will be taken up so that there is no soil erosion causing risks in the vicinity. It will be ensured that during dewatering at locations of transmission tower, the water will be pumped to a nearby drain to avoid soil erosion in the agriculture fields.	
3.9	Soil and water pollution due to fuel and lubricants, construction waste	Temporary	Moderate	1-The vehicle cleaning and parking of vehicles (associated with the construction works) shall be avoided near local drains and Rivers to avoid pollution. 2- Vehicle parking shall also be avoided in forest areas.	Contractor(s), CORE
3.10	Siltation of water bodies due to spillage of construction wastes	Temporary	Moderate	1-No construction wastes will be disposed into any streams near the rail line and / or electric supply transmission line routes. Extraneous construction wastes will be transported to the pre-identified disposal site for safe disposal. 2-Construction camp will not be located in nearby water bodies	Contractor(s), CORE
3.11	Generation of dust	Temporary	Moderate	The contractor(s) will take every precaution to reduce the levels of dust at construction sites along the Rail corridor as well as along the transmission line alignment corridor. The construction sites	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				near built up areas at Chandwa, Piska and Lohardaga will be properly barricaded with adequate height prefabricated mild steel sheets from all sides to avoid air emissions and dust impacts on houses.	
3.12	Emission from construction vehicles, equipment and machinery	Temporary	Moderate	Vehicles, equipment, and machinery used for construction will conform to the relevant standards (vehicular emission standards of Government of India and CPCB specified standards for equipment and machinery) and will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements.	Contractor(s), CORE
3.13	Noise pollution	Temporary	Moderate	1-The TSS construction sites at Piska and Lohardaga will be properly barricaded with adequate height prefabricated mild steel sheets from all sides to avoid construction activity noise impacts on neighboring houses. The tower wagon shed site at Lohardaga will also properly barricaded to avoid air and noise impacts. noise and vibration shall be controlled by regulating construction activities and their timings.	Contractor(s), CORE
3.14	Material handling at sites	Temporary	Moderate	1-Workers employed on mixing cement, lime mortars, concrete, etc., will be provided with protective footwear and protective goggles.	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				2-Workers who are engaged in welding works will be provided with welder's protective eye shields. 3-The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. The contractor(s) will give at least 6 working days' notice of the proposed use of any chemical. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor(s). 4- Recommendations made in environmental audit shall be followed for material handling.	
3.16	Safety measures during construction	Temporary	Moderate	1-Adequate safety measures for workers during handling of materials at site will be taken up. The training to construction workers on OHS issues will also be provided. 2-The contractors have to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger to workers from fire, accidental injury, etc. First aid treatment will be made available for all injuries likely to be sustained during the course of work. 3- The contractors will conform to all anti-malaria instructions given to him by the CORE.	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				4- The recommendations made in environmental audit will be followed.	
3.17	Onsite emergency plan for minor accidents and mishaps and Disaster Management Plan for Natural Calamities	Temporary	Major in case of natural calamity and minor in case of accidents or mishaps at construction sites	The onsite emergency plan will be prepared by the respective contractors in consultation with CORE and JUSNL officials. For natural calamities, disaster management plan prepared by the South Eastern Railway and JUSNL under the provisions of Disaster Management Act 2005 will be followed.	Contractor(s)
3.18	Clearing of construction of camp and restoration	Temporary	Major	Contractor(s) will prepare site restoration plans for approval by the CORE. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta, or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expense, to the satisfaction of the CORE for rail line corridor works and JUSNL for electricity transmission line works.	Contractor(s), CORE

4: Operation and Maintenance impacts					
4.1	Environmental Conditions	Temporary	Moderate	Air quality, water quality, and noise levels will be monitored periodically as per the environmental monitoring plan prepared.	CORE
4.2	Safety risks	Temporary	Major	Proper demarcation and flagging of the area requiring safety observations at sites of SSP, TSS, and SP. . While working on foundations for electricity masts and other electrification works safety of community and rail staff will be taken care.	CORE
4.4	Onsite emergency plan for minor accidents and mishaps and Disaster Management Plan for Natural Calamities	Temporary	Major in case of natural calamity and minor in case of accidents or mishaps at construction site	The emergency procedure prepared by Indian Railways will be followed for any minor mishaps. For natural calamities, the disaster management plan prepared by South Eastern Railways will be followed.	South Eastern Railways operation department
4.5	Maintenance of plastic wire mesh over electrical conductor in forest area	Permanent	Major	Necessary maintenance of plastic wire mesh will be carried out in forest area to minimize bird and monkeys electrocution.	South Eastern Railway operation department
4.6	Operational Noise	Permanent	Moderate	Acoustic barriers shall be maintained near the noise sensitive locations Speed limitation in vibration and noise sensitive location like hospitals, schools	

CORE = Central Organization for Rail Electrification, CPCB= Central Pollution Control Board, LED = light emitting diode, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., NOC = no objection certificate, MoEFCC= Ministry of Environment, Forest and Climate Change, SER= South Eastern Railways, TSS= Traction Sub Station, SSP=Sub-Sectioning and Parallel Post, SP= Sectioning and Parallel Post .
Source: Asian Development Bank.

V. ENVIRONMENT MANAGEMENT PLAN

A. Institutional Arrangements for Project Implementation

120. The project is to be implemented by the Chief Project Director (CPD) office at Kolkata. The CPD is being assisted by the Deputy Chief Engineer Electrical (DCEE) and Assistant Executive Engineer Electrical (AEE). The Senior Section Engineer (SSE) will be the for the day to day implementation of works for electrification in Rail corridor and Sub Divisional Officers (SDO) of JUSNL at Ranchi for transmission line works from Miral village Adda to Piska TSS and SDO of Lohardaga Division for transmission line works from Lohardaga substation to Lohardaga TSS. The entire three sites in charges will be assisted by the officers of their departments in the project implementation. The SSE reports to AEE for any clarification and guidance for the project related works.

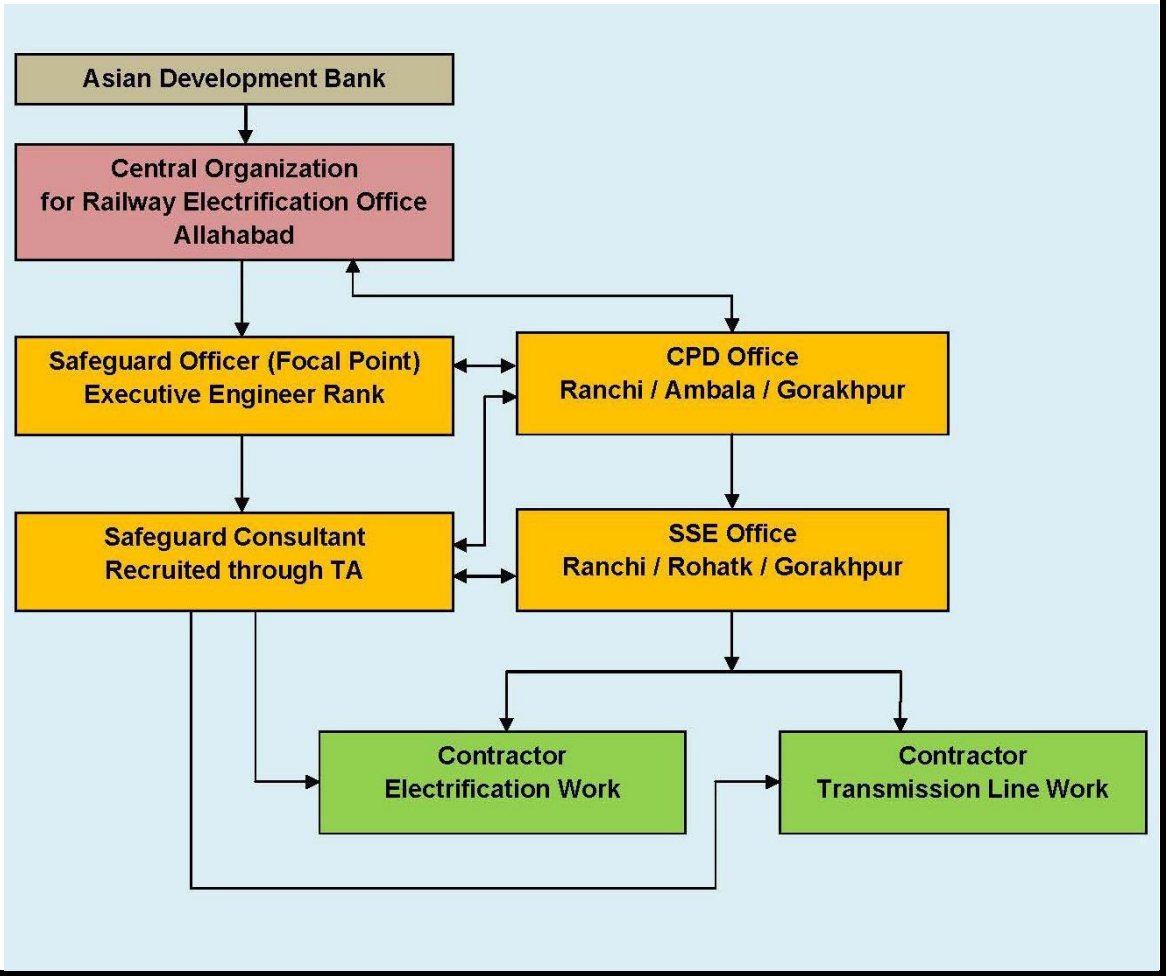
121. In order to ensure effective implementation of safeguard related components in the project, CPD office will designate Safeguard Officerto ensure compliance with the IEE requirements, and implementation of environmental management plan of the corridor and oversee work of the contractor and subcontractors. The designated safeguard officer of CORE will be assisted by safeguard consultants which will be available through ADB TA. These safeguard consultants will help designated safeguard officer to prepare semiannual environmental monitoring reports during construction for submission to ADB as part of SPS 2009 compliance and annual monitoring reports during operation phase.

122. As part of TA, one team of safeguards consultants comprising of Environmental Specialist cum Team Leader, Health and Safety and Environment (H&) Specialist, Labor Expert, Social Safeguards Specialist and Biodiversity and Forestry Specialist will be based at corporate office of CORE at Allahabad. This team will do overall safeguards guidance, capacity building of CORE, associated contractors and CORE Regional Offices and report to ADB and other statutory undertakers. Four teams will be formed for subproject safeguards requirement implementation. These four teams will be based in four regional offices. Each regional team of safeguard consultants will comprise of Environmental Specialist cum Team Leader, HSE Specialist, and Social Safeguard Specialist. The brief responsibilities/ ToR of Team members at regional level and corporate level are given in **Appendix-7.**

132. Contractors for Electrification and both transmission lines will designate one officer as safeguard cum safety officer for the implementation of IEE and EMP requirements at sites. The project implementation arrangement for safeguard compliance has been shown below in **Figure -16**.

123. The EMPs for pre construction, construction and operation phases are given in **Tables-19 to 21** for Rail Track Electrification works, in **Tables- 22 to 24** for Electric Supply Transmission line works from Miral village to Piska TSS and in **Tables 25 to 27** for Electric Supply Transmission Line works from 132 kV Substation at Lohardaga to Lohardaga TSS **.**

FIGURE-16: PROJECT IMPLEMENTATION ARRANGEMENT FOR SAFEGUARD COMPLIANCES



B. Responsibility for updating IEE during Pre-Construction and Construction

124. **Responsibility for monitoring:** During construction, the regional Safeguards Consultants (from TA team) with the assistance of designated safeguard officer from CPD Ranchi office and the designated representative engineer of the contractors will monitor the contractor's performance on EMP compliances. The safeguards consultants will help TA team Leader in preparation of semiannual annual monitoring reports. . After the duration of the TA, suring the operation phase, monitoring will be the responsibility of the Divisional Executive Engineer. For any non-compliance observed, corrective actions will be taken in a time bound manner. The cost for mitigating non-compliance will be borne by the contractor as per contract provisions. In case of mitigation costs not coming in scope of contract, these will be met out of contingencies built in EMP cost and in overall project cost.

Table-19: Environmental Management Plan for Preconstruction Phase for Remaining Electrification Works

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
1	Lack of sufficient planning to assure long-term sustainability of the improvements and ensure protection of the assets created	• Design has included provisions for ensuring effective maintenance and protection of the assets being created to ensure their long-term sustainability. The long-term sustainability has been ensured by taking into consideration the appropriate Bureau of Indian Standards Codes for design, Seismic Zone II coefficient, appropriate wind load factor (corresponding to 39 m/s wind speed), and detailed design after carrying geotechnical investigations and topographic survey. The rail line level is 1 m above Highest Flood Level considering 50 year return period to take care of floods due to climate change. The wind load (39 m/s) will ensure no damage to electric poles and other electrification assets on account of storms.	Verification of design parameters	SSE	CORE	Review after completion of detailed design	Project cost
2	Layout of components to avoid impacts on the aesthetics of the site	• The electrification works are planned in the existing RoW of Rail Corridor and these will blend well with aesthetics as corridor is in open area in most portion. The tower wagon shed is planned near Lohardaga station. This is	Tower wagon shed building exterior and TSS building Exterior	SSE	CORE	Review after completion of detailed design	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		within RoW in an open area and will mix well with other buildings such TSS being constructed on the opposite side of Rail line.					
3	Slope stability related issues	• The construction sites of SSP, SP and TSS and locations of Poles are in flat terrain, however, during construction any exposed slopes at excavated areas will be covered and slope protection measures will be provided.	Slope protection measures on side slopes of excavated areas for the foundations	SSE	CORE	Review of recommended slope protection measures	Project cost
4	Increased storm water runoff from alterations of the subproject sites' natural drainage patterns due to excavation works and addition of paved surfaces at TSS, SP, SSP and Tower wagon sites	• The proposed structures for construction are too small in size and existing drainage pattern of rail corridor is unlikely to affect drainage. However, during construction any storm water generated will be diverted to local drains through a properly constructed drainage system.	Arrangement for proper diversion of storm water runoff from construction sites of TSS, SSP, SP and Tower Wagon shed	SSE	CORE	Continuously at construct sites at Piska, Ranchi Junction, Tangarbansali, Narkopi, Nagjua and Irgaon After mobilization of contractor at remaining sites and during construction works for foundations	Incidental to construction cost
5	Integration of energy efficiency and energy conservation	• The detailed designs for the subproject have ensured that environmental sustainability principles, including energy efficiency, resource recycling,	Specifications structures, electrical fixtures	SSE	CORE	During finalization of detailed designs	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
	programs in design of subproject components	waste minimization, etc. The design considers the following energy efficiency measures: - Usage of recyclable materials like wood substitutes. - Installation of Bureau of Energy Efficiency-certified equipment - Usage of energy efficient lighting fixtures (LED)					
6	License, permits, clearances, NOC, etc.	• Obtain all necessary license, permits, clearance, NOCs, etc. prior to start of civil works especially for works in portion of subproject in protected forest (CH 525+000 to 526+000) and Reserved Forest (CH 501+000 to CH 524+000). • Acknowledge in writing and provide report on compliance all obtained licenses, permits, clearance, NOCs, etc.	Licenses, permits, clearance, and NOCs' records and communications	SSE	CORE	Check labor License, Forest and permission from forest department for works in forest area	Project cost
7	Establishment of baseline environmental conditions	• Conduct documentation of location of components, areas for construction zone (camp, staging, storage, stockpiling, etc.) and surroundings (within direct impact zones). Include photos and GPS coordinates for remaining sites where.	Records and photographs	Contractor	SSE	Once prior to construction at TSS sites at Piska and Lohardaga.	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		• Conduct base line monitoring in respect of noise levels at TSS sites as per monitoring plan					
8	Utilities	• The locations and operators of utilities to be impacted if any should be identified and documented in detailed project design documents to prevent unnecessary disruption of services during the construction phase. • Require contractor to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Prepare the list of affected utilities and operators with the help of appointed contractor. • If relocations are necessary, contractor will coordinate with the providers to relocate the utility.	• List and maps showing utilities to be shifted • Contingency plan for services disruption	• SSE office will prepare preliminary list and maps of utilities to be shifted • During detailed design phase, contractor to (i) prepare list and operators of utilities to be shifted; and (ii) contingency plan	CORE	Prior to start of construction works at remaining sites of SSP, SP and railway track balance portion from Lohardaga to Tori junction	Contractor
9	Social and Cultural Resources	• Consult Archaeological Survey of India or Jharkhand State Archaeology Department to obtain an expert assessment of the archaeological potential of Ranchi- Tori Railway track for' Chance Find' • Include state and local archaeological, cultural and historical authorities, and interest	Chance find protocol	SSE Office	CORE	To be taken up immediately as construction works have commenced	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		groups in consultation forums as project stakeholders so that their expertise can be made available. • Develop a protocol for use by the construction contractor in conducting any excavation work, to ensure that any 'Chance Finds' are recognized and measures are taken to ensure they are protected and conserved.					
10	Construction camp— location, selection, design and layout	• Sitting of the construction camp for balance construction works shall be as per the guidelines below and details of layout to be approved by SSE in consultation with Safeguard Consultants and Designated Safeguard Officer at CPD office • Potential sites, within the Railway Track RoW, for the labor camp will be lined up to be visited by the environmental expert of CPD office. The one having least impacts on the environment will be approved by the SSE and Safeguards Expert. The intention of establishing construction camp within rail corridor is to avoid impacts on surrounding land. • The storage location of construction materials shall be at the construction sites or any	Construction camp site, and locations of material storage areas, sanitation facilities	Contractor	CORE	At the time of construction camp establishment and finalization of storage areas for remaining construction portion of Railway corridor and implementation of recommendations of environmental audit for the camps under operation at Piska station and Staish Chowk locality at outer skirts of Ranchi city	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		available vacant building stations close to the construction sites. • At construction camp sanitation facilities shall be adequately planned. • No construction camp will be planned in Protected Forest or Reserved Forest Areas. • For existing construction camps and labor camp recommendations made in environmental audit will be implemented.					
11	Sources of construction materials	• Use quarry sites and sources licensed by the Government of Jharkhand. If materials are procured from market, ensure supplier source is from licensed quarries. This should be ensured in the ongoing construction works also. • Verify suitability of all material sources and obtain approval from SSE. • Submit monthly to SSE office a documentation of sources of materials.	Permits issued to quarries or sources of materials	Contractor SSE to verify sources of construction materials	CORE	Upon submission of details of construction material sources by contractor	Project cost
12	Access for construction material transportation	• Transport all construction materials to the sites through the metalled (paved) roads to avoid generation of dust and damage to agriculture fields.	Construction vehicles movement	Contractor	CORE	During delivery of construction materials	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		• Schedule transport and hauling activities during nonpeak hours. • Locate entry and exit points in areas where there is low potential for traffic congestion in Chandwa, Lohardaga and Ranchi city. • Keep the site free from all unnecessary obstructions. • Drive vehicles in a considerate manner.					
13	Occupational health and safety	• Comply with International Finance Corporation Environmental, Health, and Safety Guidelines on Occupational Health and Safety in developing comprehensive site-specific health and safety plan. The overall objective is to provide guidance to contractors on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries, and illnesses for workers performing activities and tasks associated with the project. • Include in the health and safety plan measures such as (i) type of hazards in the construction works of electrification, (ii)	Health and safety plan	Contractor	CORE	During construction phase	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		corresponding personal protective equipment for each identified hazard, (iii) health and safety training for all site personnel, (iv) procedures to be followed for all site activities, and (v) documentation of work-related accidents. • Provide medical insurance coverage for workers. • Follow environmental audit recommendations in the ongoing construction works					
14	Public consultations and Disclosure	• Continue information dissemination, consultations, and involvement or participation of stakeholders during project implementation especially Forest officials at Chandwa and Latehar officials • CORE will have an available copies of IEE at Ranchi Office, and CPD office Kolkata office	Disclosure records; consultations	SSE	CORE	• During update of IEE report • During preparation of site- and activity-specific plans as per environmental management plan • Prior to start of construction in remaining portion • During construction	Project cost
15	Bird and Monkeys electrocution	• In order to reduce electrocution of birds and monkeys plastic wire mesh over electrical	Plastic wire mesh over electrical	Contractor	CORE	• During construction	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
	issues in post electrification works	conductor may be provided over the electrical conductor in Forest areas (CH506+000 to CH522+000 and CH 526+000 to 528+000)	conductor in forest areas			works in sanctuary area	

CORE= Central Organization for Electrification, CPD = Chief Project Director, SSE= Senior Section Engineer, IEE = initial environmental examination, NOC = no objection certificate, LED = light emitting diode, TSS= Traction Sub Station, SSP=Sub- Sectioning and Parallel Post, SP= Sectioning and Parallel Post.
Source: Asian Development Bank.

Table-20: Environmental Management Plan for Construction Phase for Electrification Works (Currently in Progress and Balance Works to be taken up in Lohardaga to Tori Junction Section)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Sanitation and Drinking water facilities at construction camps	• The contractor shall provide sanitation facilities at the camp sites in ongoing construction works as wells camps to be established in Lohardaga - Tori junction portion. These facilities will include dust bins in adequate numbers for solid waste collection, and separate toilets for male and females. • Toilet facilities shall be maintained and septic tanks or soak pits shall be provided. The dust bins shall be regularly emptied and waste from camp site shall be	1-Construction camp sanitation facilities (conditions of toilets, bathing Places, rest areas, and Housekeeping) 2- Drinking water availability and quality (Compliance with Drinking Water Quality standards, IS : 10500)	Contractor	SSE	Regularly (Weekly) during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		disposed of at designated locations.					
2	Traffic circulation plan during construction	• Prior to commencement of site activities (in balance portion from Lohardaga to Tori section) and mobilization on ground, the contractor will prepare and get approval from the SSE office for a circulation plan, for each construction site on the rail corridor, during construction for safe passage of public vehicles so that locals are not inconvenienced. Traffic circulation plan shall also be prepared for ongoing construction works portion of Railway track • The contractor with support of SSE will disseminate these information and circulation plan at the site and at all level crossings.	Safe movement of traffic around SP location at Ranchi and TSS location at Piska	Contractor	SSE	Every day during construction phase	Contractor fee
3	Site clearance activities, including delineation of construction areas in Lohardaga to Tori Junction portion of Railway track	• Only ground cover or shrubs that directly affect the permanent works or necessary temporary works shall be removed with prior approval from the safeguards expert of CORE • All areas used for temporary construction operations will be subjected to complete restoration to their former	Preconstruction records of sites and vegetation in area of construction	Contractor	SSE	Duration of site preparation	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		condition with appropriate rehabilitation procedures. • Photographic records shall be maintained for the temporary sites used for construction. These will help in proper restoration. • In Forest areas clearance activities will be taken up with utmost care					
4	Drinking water availability at construction camp and construction sites	• Sufficient supply of cold potable water to be provided and maintained. No public supply source in the vicinity of construction sites along the corridor will be used for drinking or construction purposes. The drinking water will be stored in a suitable size storage tank to ensure uninterrupted availability. In case existing water source such as Hand Pump of Indian Railway or existing well is used, its quality will be tested through an accredited laboratory to confirm that it meets drinking water standards specified in IS: 10500 • Contractor will submit his plan on how availability of drinking water shall be assured.	Water supply source and availability of water, water quality test report	Contractor	SSE	Regularly during construction phase	Contractor fee
5	Waste disposal	• The pre-identified disposal location shall be part of the	Waste disposal sites, waste	Contractor	SSE	Regularly during	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		comprehensive waste disposal plan. • A solid waste management plan will be prepared by the contractor in consultation with local civic authorities. • The designated safeguard officer of CORE with the help of TA consultants shall approve these disposal sites after conducting a joint inspection on the site with the contractor. • Contractor shall ensure that waste shall not be disposed off near storm water natural drain in the surrounding of the sites and along the access roads to these construction sites • Contractor will not dispose off any waste in forest areas.	management plan			construction phase	
6	Stockpiling of construction materials	• Stockpiling of construction materials will be done in such a way that it does not impact and obstruct the drainage. • Stockpiles will be covered to protect from dust and erosion. • No stockpiling of construction materials will be taken up in the forest areas.	Subproject stockpiling sites	Contractor	SSE	Regularly during construction phase	Contractor fee
7	Arrangement for construction water	• The contractor shall provide a list of locations and type of sources from where water for construction shall be acquired.	Source of water	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		• To avoid disruption or disturbance to other water users, the contractor shall arrange water from the market through authorized tanker suppliers or from the local municipality or existing source used by South Eastern Railway and consult SSE before finalizing the source. • In no case construction water will be taken from existing water sources in Reserved and Forest areas					
8	Soil erosion and water ponding on account of excavation	• Slope protection measures will be undertaken as per design to control soil erosion especially at excavated locations at construction sites • The excavation works will be avoided during monsoon months to avoid soil erosion, stagnation of water, and vector - borne diseases. • Any water accumulated on account of excavation, due to high water table in project area, shall be pumped to nearest natural drain	Locations of slope protection	Contractor	SSE	Weekly during monsoon months and at time of unseasonal rains	Contractor fee
9	Water pollution from construction wastes	• The contractor shall take all precautionary measures to prevent entry of construction waste in the local drains	Construction waste collection and disposal	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		• In no case construction waste will be disposed off in natural streams					
10	Water pollution from fuel and lubricants	• The contractor shall ensure that all construction vehicle parking locations; fuel and lubricants storage; vehicle, machinery, and equipment maintenance and refueling sites shall be located at least 500 m away from the natural streams as well as these activities will not be taken up in Forest areas (CH 506+000 to CH 522+00 and CH 526+000 to CH 528+000) • Contractor shall ensure that all vehicles and machinery, as well as equipment operation, maintenance, and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. • Waste water from vehicle parking, fuel storage areas, workshops, wash down, and refueling areas shall be treated in an oil interceptor before discharging it on land, or into surface water bodies, or into other treatment system. The waste oil skimmed from oil interceptor will be stored in leak proof drums and will be	Vehicle parking, refueling sites, oil interceptor functioning	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		sold to authorize recyclers only.					
11	Soil pollution due to fuel spills and discarded lubricants, and construction wastes	• The fuel storage and vehicle cleaning will be avoided at construction sites as works are relatively small in size. If due to any reason, these are required then it will be ensured that vehicles and fuels are stationed such that spillage of fuels and lubricants does not contaminate the ground.	Vehicle maintenance and parking area at construction sites of SSP and TSS, visual observation for soils contamination at construction sites	Contractor	SSE	Regularly during construction phase	Contractor fee
12	Siltation of water bodies due to spillage of construction wastes	• No disposal of construction wastes will be carried out into the surface water bodies such as ponds, natural streams and rivers. • Extraneous construction wastes will be transported to the pre-identified disposal sites for safe disposal.	Water bodies specially village ponds near the construction sites and natural streams and Rivers	Contractor	SSE	Regularly during construction phase	Contractor fee
13	Generation of dust	• The contractor will take every precaution to reduce the levels of dust at construction sites. Water will be sprayed as required, on locations of excavations, internal unfinished roads/walkways and locations of sand and sub grade storages. The water for spraying will be used from the water stored for construction.	Subproject site visual observation and water spray records	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		The water spray records will be maintained at site. • All filling works are to be protected or covered in a manner to minimize dust generation. • Recommendations made in environment audit will be followed to avoid dust generation at the construction sites, where work is in progress					
14	Emission from construction vehicles, equipment and machinery	• All vehicles, equipment, and machinery used for construction shall conform to the Government of India vehicle emission norms. For equipment emission norms as specified in Environmental Protection Rules 2000 will be followed. • The discharge standards promulgated under the Environment (Protection) Act, 1986 shall be strictly adhered to. The silent or quiet equipment available in the market shall be used in the subproject. • The Contractor shall maintain a record of pollution under control Certificates for all vehicles and machinery used during the contract period, which shall be produced for	Pollution under control certificates (Vehicle emission norms specified by GOI) of vehicles and machinery	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		verification whenever required.					
15	Noise pollution	• The contractor shall confirm that all construction equipment shall strictly conform to the Ministry of Environment, Forests and Climate Change and Central Pollution Control Board noise standards. • Contractor must ensure that all vehicles and equipment used in construction shall be fitted with exhaust silencers. • At the construction sites, noisy construction work such as operation of diesel generator sets, use of high noise generation equipment shall be stopped during the night time between 10:00 p.m. to 6:00 a.m. • Noise limits for construction equipment used in this project will not exceed 75 dB (A) at 1 m distance. However, noise levels as specified in ambient noise standards (55 dB (A) during day time and 45 dB (A) during night time) will be adhered to during the construction phase. • Noise level monitoring, at TSS locations, will be carried out as per monitoring plan.	Certificates of vehicles conforming noise standards, noise monitoring results	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		• During construction works in Forest area noise limits of sensitive area (50 dB (A) during day and 40 dB (A) during night time) shall be strictly adhered to. For this periodic monitoring of noise levels will be taken up. No construction works in sanctuary area will be taken up after Sun set hours.					
16	Impacts on flora and fauna outside Forest area	• Limit activities within the work area delineated for TSS, SP and SSP • Since no tree cutting identified along the rail corridor, vegetation removal shall be limited to the delineated areas of construction sites of SSP, SP and TSS • Impacts on fauna are not anticipated as railway track passes through open agriculture land, none forest land and built-up areas in most portion.	Delineation of TSS, SP and SSP areas	Contractor	SSE	Regularly during construction phase	Contractor fee
17	Impacts on Flora and Fauna in Reserved and Protected Forest areas	1- No storage of construction materials or dumping of construction waste in Forest areas (CH 506+000 to 522+000 and CH 526+000 to 528+000) 2- Work from Sunrise to Sunset hours only	Noise level measurements, transportation of construction materials and poles, water sources close	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		3- No establishment of construction camp or workers' camp in Forest areas (CH 506+000 to 522+000 and CH 526+000 to 528+000) 4-No usage of any forest material for the construction purposes 5- During construction noise levels specified by MoEFCC for sensitive area (Day -50 dB (A) and Night Time -40 dB (A)) to be adhered to. Necessary periodic noise level monitoring will be carried out. 6- No water source of forest area will be used for construction purposes 7- All conditions of forest department given in permission letter for works shall be complied with. 8- Necessary plastic wire mesh will be provided over the electrical conductor to reduce bird and monkeys electrocution in post electrification phase. 9- No construction of access road to rail line for transportation of construction materials in forest areas so that impact is minimum on vegetation removal.	to Railway track				
18	Material handling at sites	• Workers employed on mixing cement, lime mortars, concrete, etc., will be provided	Data on available personal	Contractor	SSE	Regularly during	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		with protective footwear and protective goggles. • Workers engaged in welding works will be provided with welder's protective eye shields. • The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. The contractor will give at least 6 working days' notice of the proposed use of any chemical to the SSE office. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor. • For construction sites where work is in progress recommendations made in environmental audit will be followed.	protective equipment, Usage of PPE			construction phase	
19	Disposal of construction waste, debris, cut material	• The contractor shall confirm that safe disposal of the construction waste will be ensured in the pre-identified disposal locations. • In no case will any construction waste will be disposed of around the construction sites or along the rail corridor indiscriminately. • No construction waste disposal will be taken up in	Disposal sites monitoring	Contractor	SSE	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		Forest areas along rail line (CH 506+000 to 522+000 and CH 526+000 to 528+000)					
20	Safety measures during construction	• Adequate safety measures for workers during handling of materials at site will be taken up. Training on Occupational Health and Safety (OHS) will be provided to contractor staff and construction workers • The contractor has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger to workers from accidental injuries, fire, etc. First aid treatment will be made available for all injuries likely to be sustained during work. • The contractor will conform to all anti-malaria instructions given to him by the SSE • All safety measures recommended in environmental audit will be complied with.	Records of availability of personal protective equipment, availability of first aid kits	Contractor	SSE	Regularly during construction phase	Contractor fee
21	Onsite emergency plan for minor accidents and mishaps and Disaster	• 1-The onsite emergency plan will be prepared by the contractor in consultation with SSE and CORE safeguard designated officer	• Onsite emergency plan document and Disaster Management	Contractor	SSE	Mock Drill every quarter	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
	Management Plan for Natural Calamities	• 2- For natural calamities, disaster management plan prepared by the South Eastern Railways under the provisions of Disaster Management Act 2005 will be followed.	Plan document of South Eastern Railways				
22	Clearing of construction of camp and restoration	• Contractor to prepare site restoration plans for approval by the SSE. The plan is to be implemented by the contractor prior to demobilization. • On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense, to the entire satisfaction of the SSE	Restoration plan, and records of preconstruction of temporary sites	Contractor	SSE	End of construction phase	Contractor fee

CORE= Central Organization for Electrification, SSE= Senior Section Engineer, TSS= Traction Sub Station, SSP=Sub- Sectioning and Parallel Post, SP= Sectioning and Parallel Post, SER = South Eastern Railways.
Source: Asian Development Bank.

Table-21: Environmental Management Plan for Operation Phase for Electrification Works

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Environmental conditions	• Periodic monitoring of the ambient Noise Levels at TSS sites at Piska and Lohardaga, sensitive receptors along the railway track and in Forest area	Monitoring results and relevant standards	South Eastern Railways through Pollution Monitoring Agency	CORE	As per monitoring plan	CORE
2	Cleanliness conditions at locations of TSS, SSP and SP due to irregular solid waste collection	• The South Eastern Railway will maintain cleanliness at locations of SSP, SP and TSS created as part of electrification works • Solid waste disposal will be integrated with the disposal of nearest railway station to the facilities	Maintenance schedule of TSS, SSP and SP	South Eastern Railway	CORE	Regularly during operation phase	CORE
3	Natural disasters	• Necessary procedures to be followed by the passengers and Rail staff shall be written at prominent locations at stations.	Warnings of disasters by the Meteorological Department	District administration	CORE	During disasters	CORE
4	Waste Generation on account of maintenance and operations Electrification installations along the rail corridor	• The electrification will be maintained by the SSE. Any waste generated due to maintenance will be taken by the SSE office staff for possible reuse and recycle.	Waste generated from the operation and maintenance of electrification installations	SSE	CORE	During entire operation phase	CORE
5	Maintenance of compensatory plantation in Rail Corridor	The Deputy Chief Engineer (Electrical) South Eastern Railway Ranchi office through appropriate support staff will be responsible for maintenance of shrubs, tree plantation planted as part of	Survival of planted trees, shrubs, and grass in landscape area.	Deputy Chief Engineer (Electrical) Office Ranchi	CORE	Every year before onset of monsoon for first 3 years	CORE

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		compensatory plantation. Minimum 90 % survival of plants and shrubs will be maintained. Any shortfall will be made up before onset of monsoon every year.					
6	Maintenance of plastic wire mesh over electrical conductor in Forest area	Necessary maintenance of plastic wire mesh will be carried out in sanctuary area to minimize bird and monkeys electrocution.	Maintenance of plastic wire mesh over electrical conductor	Deputy Chief Engineer (Electrical) Ranchi Office	CORE	Every maintenance schedule of electrification works	CORE

CORE= Central Organization for Electrification, SSE= Senior Section Engineer, TSS= Traction Sub Station, SSP=Sub- Sectioning and Parallel Post, SP= Sectioning and Parallel Post.
Source: Asian Development Bank.

Table-22: Environmental Management Plan for Preconstruction Phase for Electric Supply Transmission Line from Miral Village to Piska TSS

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
1	Lack of sufficient planning to assure long-term sustainability of the improvements and ensure protection of the assets created	• Design has included provisions for ensuring effective maintenance and protection of the assets to be created to ensure their long-term sustainability. The long-term sustainability has been ensured by taking into consideration the appropriate Bureau of Indian Standards Codes for design, Seismic Zone II coefficient, appropriate wind load factor	Verification of design parameters	JUSNL SDO office Ranchi	CORE	Review after completion of detailed design	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		(corresponding to 39 m/s wind speed), and detailed design after carrying geotechnical investigations and topographic survey. This takes into consideration safety of poles and wires in the event of worst storms on account of climate change.					
2	Layout of components to avoid impacts on the aesthetics of the site	• The transmission line is planned through open agriculture fields, where already some transmission lines of JUSNL are existing so impacts on aesthetics will not be felt	Transmission line route	JUSNL SDO office	CORE	Review after finalization of transmission line alignment	Project cost
3	Slope stability related issues	• The construction sites of Poles in the alignment of transmission line are in flat terrain, however, during construction any exposed slopes at excavated areas will be covered and slope protection measures will be provided.	Slope protection measures on side slopes of excavated areas for the foundations	JUSNL SDO office Ranchi	CORE	Review of recommended slope protection measures	Project cost
4	Increased storm water runoff from alterations of the site's natural drainage patterns due to excavation works and	• There will be generation of storm water due to pumping of water from the excavated areas of Poles (for foundations). This water shall be regulated to natural drains for disposal to avoid damage to crop.	Arrangement for proper diversion of storm water runoff from the locations of excavations	JUSNL SDO office Ranchi	CORE	After mobilization of contractor at site and during excavation and construction works for foundations of poles	Incidental to construction cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
	addition of paved surfaces at locations of electric poles						
5	Integration of energy efficiency and energy conservation programs in design of subproject components	• The detailed designs for the subproject have ensured that environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, etc. The design considers the following energy efficiency measures: - Usage of recyclable materials like wood substitutes. - Installation of Bureau of Energy Efficiency-certified equipment in the works	Specifications structures, electrical fixtures	JUSNL SDO Office Ranchi	CORE	During finalization of detailed designs	Project cost
6	License, permits, clearances, NOC, etc.	• Obtain all necessary license, permits, and permissions for tree cutting from Revenue office/ Panchayat and or / Forest department , NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained licenses, permits, clearance, NOCs, etc.	Licenses, permits, clearance, and NOCs' records and communications	JUSNL SDO office Ranchi	CORE	Check labor License, district collector and or / local Panchayat permission for establishment of labor camp, if needed	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
7	Utilities	• The locations and operators of utilities to be impacted if any should be identified and documented in detailed project design documents to prevent unnecessary disruption of services during the construction phase. • Require contractor to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • If relocations are necessary, contractor will coordinate with the providers to relocate the utility.	• List and maps showing utilities to be shifted • Contingency plan for services disruption	• JUSNL SDO office at Ranchi will prepare preliminary list and maps of utilities to be shifted • During detailed design phase, contractor to (i) prepare list and operators of utilities to be shifted; and (ii) contingency plan	CORE	Preconstruction Phase	Contractor
8	Social and Cultural Resources	• Consult Archaeological Survey of India or Jharkhand State Archaeology Department to obtain an expert assessment of the archaeological potential of transmission line route • Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project	Chance find protocol	JUSNL SDO Office Ranchi	CORE	Prior to start of construction activities	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		stakeholders so that their expertise can be made available. • Develop a protocol for use by the construction contractor in conducting any excavation work, to ensure that any 'Chance Finds' are recognized and measures are taken to ensure they are protected and conserved.					
9	Construction camp—location, selection, design and layout	• Sitting of the construction camp shall be as per the guidelines below and details of layout to be approved by SDO office of JUSNL in consultation with CPD Safeguard officer • Potential sites, along the corridor, for the labor camp will be lined up to be visited by the environmental expert of CPD office. The one having least impacts on the environment will be approved by the SDO office and Safeguards Expert. As far as possible establish camp within vacant space of JUSNL or SER. The intention is to avoid impact on agriculture land. • The storage location of construction materials shall	Construction camp site, and locations of material storage areas, sanitation facilities	Contractor	CORE	At the time of construction camp establishment and finalization of storage areas	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		be at the construction sites or any available vacant building at local JUSNL office near Satish Chowk • At construction camp sanitation facilities shall be adequately planned.					
10	Sources of construction materials	• Use quarry sites and sources licensed by the Government of Jharkhand. If materials are procured from market, ensure supplier source is from licensed quarries. • Verify suitability of all material sources and obtain approval from SDO. • Submit monthly to SDO office a documentation of sources of materials.	Permits issued to quarries or sources of materials	Contractor SDO to verify sources of construction materials	CORE	Upon submission by contractor	Project cost
11	Access for construction material transportation	• Transport all construction materials to the alignment through metalled road to avoid generation of dust and damage to agriculture fields. • Schedule transport and hauling activities during nonpeak hours.	Construction vehicles movement	Contractor	CORE	During delivery of construction materials	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
12	Occupational health and safety	• Comply with International Finance Corporation Environmental, Health, and Safety Guidelines on Occupational Health and Safety in developing comprehensive site-specific health and safety plan. The overall objective is to provide guidance to contractors on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries, and illnesses for workers performing activities and tasks associated with the project. • Include in the health and safety plan measures such as (i) type of hazards in the construction works of electrification, (ii) corresponding personal protective equipment for each identified hazard, (iii) health and safety training for all site personnel, (iv) procedures to be followed for all site activities, and (v) documentation of work-related accidents.	Health and safety plan	Contractor	CORE	During construction phase	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		• Provide medical insurance coverage for workers.					
13	Public consultations	• Continue information dissemination, consultations, and involvement or participation of stakeholders during project implementation.	Disclosure records; consultations	SDO Office	CORE	• During update of IEE report • During preparation of site- and activity-specific plans as per environmental management plan • Prior to start of construction • During construction	Project cost

CORE= Central Organization for Electrification, CPD= Chief Project Director, SDO= Sub Divisional Officer, IEE = initial environmental examination, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., NOC = no objection certificate, SER= South Eastern Railways.
Source: Asian Development Bank.

Table-23: Environmental Management Plan for Construction Phase for Electric Supply Transmission Line from Miral Village to Piska TSS

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Sanitation facilities at construction camp	• The contractor shall provide sanitation facilities at the camp site. These facilities will include dust bins in adequate numbers for solid waste collection, and separate toilets for male and females. • Toilet facilities shall be maintained and septic tanks or	1-Construction camp sanitation facilities facilities (conditions of toilets, bathing Places, rest areas, and Housekeeping)	Contractor	SDO Office	Regularly (weekly) during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		soak pits shall be provided. The dust bins shall be regularly emptied and waste from camp site shall be disposed off at designated locations • . Drinking water quality at camp sites will be tested to ensure that it meets Drinking water standards specified in IS: 10500	2- Drinking water availability and quality (Compliance with Drinking Water Quality standards, IS : 10500)				
2	Traffic circulation plan during construction	• Prior to commencement of site activities and mobilization on ground, the contractor will prepare and get approval from the SDO office for a circulation plan, for each construction site electric pole of transmission line, during construction for safe passage of public vehicles so that locals are not inconvenienced. • The contractor with support of SDO office will disseminate these information and circulation plan at the site.	Safe movement of traffic at crossing of transmission line with NH and SH	Contractor	SDO Office	Every day during construction phase	Contractor fee
3	Site clearance activities, including delineation of construction areas	• Only ground cover or shrubs that directly affect the permanent works or necessary temporary works shall be removed with prior approval from the safeguards expert of CORE • All areas used for temporary construction operations will be subjected to complete restoration to their former condition with	Preconstruction records of sites and vegetation in area of construction	Contractor	SDO Office, Ranchi	Duration of site preparation	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		appropriate rehabilitation procedures. • Photographic records shall be maintained for the temporary sites used for construction. These will help in proper restoration.					
4	Drinking water availability at construction camp and construction site	• Sufficient supply of cold potable water to be provided and maintained. The drinking water will be obtained from the market. No public supply source in the vicinity of construction sites along the corridor will be used for drinking or construction purposes. The drinking water will be stored in a suitable size storage tank to ensure uninterrupted availability. • Contractor will submit his plan on how availability of drinking water shall be assured. The original source of the water supplied by the tankers will be recorded.	Water supply source and availability of water, source of water used by the tankers	Contractor	SDO Office Ranchi	Regularly during construction phase	Contractor fee
5	Waste disposal	• The pre-identified disposal location shall be part of the comprehensive waste disposal plan. • A solid waste management plan will be prepared by the contractor in consultation with local civic authorities • Contractor shall ensure that waste shall not be disposed off near storm water natural drain in	Waste disposal sites, waste management plan	Contractor	SDO Office	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		the surrounding of the sites and along the access roads to these construction sites					
6	Stockpiling of construction materials	• Stockpiling of construction materials will be done in such a way that it does not impact and obstruct the drainage. • Stockpiles will be covered to protect from dust and erosion.	Subproject stockpiling sites	Contractor	SDO Office, Ranchi	Regularly during construction phase	Contractor fee
7	Arrangement for construction water	• The contractor shall provide a list of locations and type of sources from where water for construction shall be acquired. • To avoid disruption or disturbance to other water users, the contractor shall arrange water from the market through authorized tanker suppliers or from the local municipality and consult SDO before finalizing the source.	Source of water used by the tankers	Contractor	SDO Office, Ranchi	Regularly during construction phase	Contractor fee
8	Soil erosion and water ponding on account of excavation	• Slope protection measures will be undertaken as per design to control soil erosion especially at excavated locations at construction locations of poles • The excavation works will be avoided during monsoon months to avoid soil erosion, stagnation of water, and vector - borne diseases. • Any water accumulated on account of excavation, shall be pumped to nearest natural drain	Locations of slope protection	Contractor	SDO Office , Ranchi	Weekly during monsoon months and at time of unseasonal rains	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
9	Water pollution from construction wastes	• The contractor shall take all precautionary measures to prevent entry of construction waste in the local drains	Construction waste collection and disposal	Contractor	SDO Office , Ranchi	Regularly during construction phase	Contractor fee
10	Water pollution from fuel and lubricants	• The contractor shall ensure that all construction vehicle parking locations; fuel and lubricants storage; vehicle, machinery, and equipment maintenance and refueling sites shall be located at least 500 m away from the natural streams. • Contractor shall ensure that all vehicles and machinery, as well as equipment operation, maintenance, and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. • Waste water from vehicle parking, fuel storage areas, wash down, and refueling areas shall be treated in an oil interceptor before discharging it on land, or into surface water bodies, or into other treatment system. The waste oil skimmed from oil interceptor will be stored in leak proof drums and will be sold to authorize recyclers only.	Vehicle parking, refueling sites, oil interceptor functioning	Contractor	SDO Office, Ranchi	Regularly during construction phase	Contractor fee
11	Soil pollution due to fuel spills and discarded	• The fuel storage and vehicle cleaning will be avoided at construction sites as works are relatively small size. If due to any	Vehicle maintenance and parking area at	Contractor	SDO Office, Ranchi	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
	lubricants, and construction wastes	reason, these are required then it will be ensured that vehicles and fuels are stationed such that spillage of fuels and lubricants does not contaminate the ground.	construction sites transmission line alignment , visual observation for soils contamination at construction sites				
12	Siltation of water bodies due to spillage of construction wastes	• No disposal of construction wastes will be carried out into the surface water bodies. • Extraneous construction wastes will be transported to the pre-identified disposal sites for safe disposal.	Water bodies specially village ponds near the construction sites	Contractor	SDO Office	Regularly during construction phase	Contractor fee
13	Generation of dust	• The contractor will take every precaution to reduce the levels of dust at construction sites. Water will be sprayed as required, on locations of excavations, and locations of sand and sub grade storages. The water for spraying will be used from the water stored for construction. The water spray records will be maintained at site. • All filling works are to be protected or covered in a manner to minimize dust generation.	Subproject site visual observation and water spray records	Contractor	SDO Office	Regularly during construction phase	Contractor fee
14	Emission from construction vehicles,	• All vehicles, equipment, and machinery used for construction shall conform to the Government of India vehicle emission norms.	Pollution under control certificates (Vehicle	Contractor	SDO Office	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
	equipment and machinery	For equipment emission norms as specified in Environmental Protection Rules 2000 will be followed. • The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. The silent or quiet equipment available in the market shall be used in the transmission line works. • The Contractor shall maintain a record of pollution under control for all vehicles and machinery used during the contract period, which shall be produced for verification whenever required.	emission norms specified by GOI) of vehicles and machinery				
15	Noise pollution	• The contractor shall confirm that all construction equipment shall strictly conform to the Ministry of Environment, Forests and Climate Change and Central Pollution Control Board noise standards. • Contractor must ensure that all vehicles and equipment used in construction shall be fitted with exhaust silencers. • At the construction sites, noisy construction work such as operation of diesel generator sets, use of high noise generation equipment shall be	Certificates of vehicles conforming noise standards, noise monitoring results	Contractor	SDO Office	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		stopped during the night time between 10:00 p.m. to 6:00 a.m. • Noise limits for construction equipment used in this project will not exceed 75 dB (A) at 1 m distance. However, noise levels as specified in ambient noise standards (55 dB (A) during day time and 45 dB (A) during night time) will be adhered to during the construction phase.					
16	Impacts on flora and fauna	• Limit activities within the work area delineated for electric poles • Trees to be cut should be identified and compensatory plantation should be taken up at vacant space of rail corridor in consultation with CORE Officials. • For the estimated 15 trees to be cut, at least 150 trees should be taken up as compensatory plantation	Identification Trees to be cut, and compensatory tree plantation	Contractor	SDO Office	Regularly during construction phase	Contractor fee
17	Material handling at sites	• Workers employed on mixing cement, lime mortars, concrete, etc., will be provided with protective footwear and protective goggles. • Workers engaged in welding works will be provided with welder's protective eye shields. • The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. The contractor will give at least 6	Data on available personal protective equipment	Contractor	SDO Office	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		working days' notice of the proposed use of any chemical to the SDO Office. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor.					
18	Disposal of construction waste, and debris	• The contractor shall confirm that safe disposal of the construction waste will be ensured in the pre-identified disposal locations. • In no case will any construction waste will be disposed of around the construction sites or along the transmission line alignment and or in the agriculture fields indiscriminately.	Disposal sites	Contractor	SDO Office	Regularly during construction phase	Contractor fee
19	Safety measures during construction	• Adequate safety measures for workers during handling of materials at site will be taken up. Training on Occupational Health and Safety (OHS) will be provided to contractor staff and construction workers • The contractor has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger to workers from accidental injuries, fire, etc. First aid treatment will be made available for all injuries likely to be sustained during work.	Records of availability of personal protective equipment, availability of first aid kits	Contractor	SDO Office	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		• The contractor will conform to all anti-malaria instructions given to him by the SDO Office					
20	Onsite emergency plan for minor accidents and mishaps and Disaster Management Plan for Natural Calamities	1-The onsite emergency plan will be prepared by the contractor in consultation with SDO and designated safeguard officer at CPD office 2- For natural calamities, disaster management plan prepared by the JUSNL under the provisions of Disaster Management Act 2005 will be followed.	• Onsite emergency plan document and Disaster Management Plan document of JUSNL	Contractor	SDO Office	Mock Drill every quarter	Contractor
21	Clearing of construction of camp and restoration	• Contractor to prepare site restoration plans for approval by the SDO. The plan is to be implemented by the contractor prior to demobilization. • On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense, to the entire satisfaction of the SDO	Restoration plan, and records of preconstruction of temporary sites	Contractor	SDO Office	End of construction phase	Contractor fee

CORE= Central Organization for Electrification, CPD= Chief Project Director, SDO= Sub Divisional Officer, GoI= Government of India, IEE = initial *environmental examination,* JUSNL= Jharkhand Urja sanchar Nigam Ltd.,
Source: Asian Development Bank.

Table-24: Environmental Management Plan for Operation Phase for Electric Supply Transmission Line from Miral Village to Piska TSS

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Natural disasters	• Necessary procedures to be followed by the JUSNL staff at Substation	Warnings of disasters by the Meteorological Department	District administration	JUSNL	During disasters	JUSNL
2	Waste Generation on account of maintenance and operations of Transmission line	• The transmission line will be maintained by the JUSNL. Any waste generated due to maintenance will be taken by the JUSNL office staff for possible reuse and recycle.	Waste generated from the operation and maintenance of electrification installations	JUSNL	CORE	During entire operation phase	JUSNL

CORE= Central Organization for Electrification, JUSNL = Jharkhand Urja Sanchar Nigam Ltd., SDO = Sub Divisional Officer.

Table-25: Environmental Management Plan for Preconstruction Phase for Electric Supply Transmission Line from 132 kV Substation Lohardaga to TSS near Lohardaga Station

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
1	Lack of sufficient planning to assure long-term sustainability of the improvements and ensure protection of the assets created	• Design has included provisions for ensuring effective maintenance and protection of the assets to be created to ensure their long-term sustainability. The long-term sustainability has been ensured by taking into consideration the appropriate Bureau of Indian Standards Codes for design, Seismic Zone II coefficient, appropriate wind load factor (corresponding to 39 m/s wind speed), and detailed design after carrying geotechnical investigations and topographic survey. This takes into consideration safety of poles and wires in the event of worst storms on account of climate change.	Verification of design parameters	JUSNL SDO Office Lohardaga	CORE	Review after completion of detailed design	Project cost
2	Layout of components to avoid impacts on the aesthetics of the site	• The transmission line is planned through open agriculture fields, where already some transmission lines of JUSNL and Power Grid Corporation Ltd. are existing so impacts on aesthetics will not be felt	Transmission line route	JUSNL SDO Office Lohardaga	CORE	Review after finalization of transmission line alignment	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
3	Slope stability related issues	• The construction sites of Poles and Bay of transmission line at 132 kV substation are in flat terrain, however, during construction any exposed slopes at excavated areas will be covered and slope protection measures will be provided.	Slope protection measures on side slopes of excavated areas for the foundations	JUSNL SDO Office at Lohardaga	CORE	Review of recommended slope protection measures	Project cost
4	Increased storm water runoff from alterations of the site's natural drainage patterns due to excavation works and addition of paved surfaces at location of Bay at 132 kV substation at Lohardaga and at locations of electric poles	• There will be generation of storm water due to pumping of water from the excavated areas of Poles and Bay (for foundations). This water shall be regulated to natural drains for disposal to avoid damage to crop.	Arrangement for proper diversion of storm water runoff from the locations of excavations	JUSNL SDO Office at Lohardaga	CORE	After mobilization of contractor at site and during excavation and construction works for foundations for poles and Bay	Incidental to construction cost
5	Integration of energy efficiency and energy conservation programs in design of subproject components	• The detailed designs for the transmission line works will ensure that environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, etc. The design will consider the following energy efficiency measures:	Specifications structures, electrical fixtures	JUSNL SDO Office at Lohardaga	CORE	During finalization of detailed designs	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		- Usage of recyclable materials like wood substitutes. - Installation of Bureau of Energy Efficiency-certified equipment in the works					
6	License, permits, clearances, NOC, etc.	• Obtain all necessary license, permits, permission for tree cutting, and for crossings of transmission line at NH/ SH/ Railway tracks. any other NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained licenses, permits, permissions, NOCs, etc.	Licenses, permits, clearance, and NOCs' records and communications	JUSNL SDO Office at Lohardaga	CORE	Check labor License, district collector and or / local Panchayat permission for establishment of labor camp, if needed, validity of permissions and NOCs	Project cost
7	Utilities	• The locations and operators of utilities to be impacted if any should be identified and documented in detailed project design documents to prevent unnecessary disruption of services during the construction phase. • Require contractor to prepare a contingency plan to include actions to be done in case of	• List and maps showing utilities to be shifted • Contingency plan for services disruption	• JUSNL SDO office at Lohardaga will prepare preliminary list and maps of utilities to be shifted • During detailed design phase,	CORE	Preconstruction Phase	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		unintentional interruption of services. • If relocations are necessary, contractor will coordinate with the providers to relocate the utility.		contractor to (i) prepare list and operators of utilities to be shifted; and (ii) contingency plan			
8	Social and Cultural Resources	• Consult Archaeological Survey of India or Jharkhand State Archaeology Department to obtain an expert assessment of the archaeological potential of transmission line route • Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available. • Develop a protocol for use by the construction contractor in conducting any excavation work, to ensure that any 'Chance Finds' are recognized and measures are taken to ensure they are protected and conserved.	Chance Find protocol	JUSNL SDO office at Lohardaga	CORE	Prior to start of construction activities	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
9	Construction camp—location, selection, design and layout	• Sitting of the construction camp shall be as per the guidelines below and details of layout to be approved by SDO office of JUSNL in consultation with designated safeguard officer at CPD office appointed by CPD office • Potential sites, along the corridor, for the labor camp will be lined up to be visited by the environmental expert of CPD office. The one having least impacts on the environment will be approved by the SDO office and Safeguards Expert. As far as possible establish camp within vacant space of 132 kV substation at Lohardaga. The intention is to avoid impact on agriculture land. • The storage location of construction materials shall be at the construction sites or any available vacant building at 132 kV substation. • At construction camp sanitation facilities shall be adequately planned.	Construction camp site, and locations of material storage areas, sanitation facilities	Contractor	CORE	At the time of construction camp establishment and finalization of storage areas	Contractor
10	Sources of construction materials	• Use quarry sites and sources licensed by the Government of Jharkhand. If materials are	Permits issued to quarries or	Contractor	CORE	Upon submission by contractor	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		procured from market, ensure supplier source is from licensed quarries. • Verify suitability of all material sources and obtain approval from SDO. • Submit monthly to SDO office a documentation of sources of materials.	sources of materials	SDO to verify sources of construction materials			
11	Access for construction material transportation	• Transport all construction materials to the alignment through metalled road to avoid generation of dust and damage to agriculture fields. • Schedule transport and hauling activities during nonpeak hours.	Construction vehicles movement	Contractor	CORE through JUSNL SDO office at Lohardaga and	During delivery of construction materials	Contractor
12	Occupational health and safety	• Comply with International Finance Corporation Environmental, Health, and Safety Guidelines on Occupational Health and Safety in developing comprehensive site-specific health and safety plan. The overall objective is to provide guidance to contractors on establishing a management	Health and safety plan	Contractor	CORE through JUSNL SDO office at Lohardaga	During construction phase	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
		strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries, and illnesses for workers performing activities and tasks associated with the project. • Include in the health and safety plan measures such as (i) type of hazards in the construction works of electrification, (ii) corresponding personal protective equipment for each identified hazard, (iii) health and safety training for all site personnel, (iv) procedures to be followed for all site activities, and (v) documentation of work-related accidents. • Provide medical insurance coverage for workers.					
13	Public consultations	• Continue information dissemination, consultations, and involvement or participation of stakeholders during project implementation.	Disclosure records; consultations	SDO Office Lohardaga	CORE	• During update of IEE report • During preparation of site- and activity-specific plans as per environmental management plan	Project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Fund Sources for Implementing Mitigation Measure
						• Prior to start of construction • During construction	

CORE= Central Organization for Electrification, CPD= Chief Project Director, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., SDO= Sub Divisional Officer, IEE = initial environmental examination, NOC = no objection certificate.
Source: Asian Development Bank.

Table-26: Environmental Management Plan for Construction Phase for Electric Supply Transmission Line from 132 kV Substation Lohardaga to TSS near Lohardaga Station

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Sanitation and Drinking water facilities at construction camp	• The contractor shall provide sanitation facilities at the camp site. These facilities will include dust bins in adequate numbers for solid waste collection, and separate toilets for male and females. • Toilet facilities shall be maintained and septic tanks or soak pits shall be provided. The dust bins shall be regularly emptied and waste from camp site shall be disposed off at designated locations. • It will be ensured through testing that water quality meets drinking water quality standards specified in IS: 10500	1- Construction camp sanitation facilities (conditions of toilets, bathing Places, rest areas, and Housekeeping) 2- Drinking water availability and quality (Compliance with Drinking Water Quality standards, IS : 10500)	Contractor	JUSNL SDO Office at Lohardaga	Regularly (Weekly) during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
2	Traffic circulation plan during construction	• Prior to commencement of site activities and mobilization on ground, the contractor will prepare and get approval from the SDO office for a circulation plan, for each construction site of electric pole of transmission line, during construction for safe passage of public vehicles so that locals are not inconvenienced. • The contractor with support of SDO office will disseminate these information and circulation plan at the site.	Safe movement of traffic	Contractor	JUSNL SDO Office at Lohardaga	Every day during construction phase	Contractor fee
3	Site clearance activities, including delineation of construction areas	• Only ground cover or shrubs that directly affect the permanent works or necessary temporary works shall be removed with prior approval from the safeguards expert of CORE • All areas used for temporary construction operations will be subjected to complete restoration to their former conditions with appropriate rehabilitation procedures. • Photographic records shall be maintained for the temporary sites used for construction. These will help in proper restoration.	Preconstruction records of sites and vegetation in area of construction	Contractor	JUSNL SDO Office at Lohardaga	Duration of site preparation	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
4	Drinking water availability at construction camp and construction site	• Sufficient supply of cold potable water to be provided and maintained. The drinking water will be obtained from the market. No public supply source in the vicinity of construction sites along the corridor will be used for drinking or construction purposes. The drinking water will be stored in a suitable size storage tank to ensure uninterrupted availability. • Contractor will submit his plan on how availability of drinking water shall be assured. The original source of the water supplied by the tankers will be recorded.	Water supply source and availability of water, source of water used by the tankers	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
5	Waste disposal	• The pre-identified disposal location shall be part of the comprehensive waste disposal plan. • A solid waste management plan will be prepared by the contractor in consultation with local civic authorities. • The Designated safeguard officer of CORE shall approve these disposal sites after conducting a joint inspection on the site with the contractor.	Waste disposal sites, waste management plan	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		• Contractor shall ensure that waste shall not be disposed off near storm water natural drain in the surrounding of the sites and along the access roads to these construction sites					
6	Stockpiling of construction materials	• Stockpiling of construction materials will be done in such a way that it does not impact and obstruct the drainage. • Stockpiles will be covered to protect from dust and erosion.	Transmission line works stockpiling sites	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
7	Arrangement for construction water	• The contractor shall provide a list of locations and type of sources from where water for construction shall be acquired. • To avoid disruption or disturbance to other water users, the contractor shall arrange water from the market through authorized tanker suppliers or from the local municipality and consult SDO before finalizing the source.	Source of water used by the tankers	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
8	Soil erosion and water ponding on account of excavation	• Slope protection measures will be undertaken as per design to control soil erosion especially at excavated	Locations of slope protection	Contractor	JUSNL SDO Office at Lohardaga	Weekly during monsoon months and at time of	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		locations (at proposed locations of poles and bay) • The excavation works will be avoided during monsoon months to avoid soil erosion, stagnation of water, and vector - borne diseases. • Any water accumulated on account of excavation shall be pumped to nearest natural drain				unseasonal rains	
9	Water pollution from construction wastes	• The contractor shall take all precautionary measures to prevent entry of construction waste in the local drains	Construction waste collection and disposal	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
10	Water pollution from fuel and lubricants	• The contractor shall ensure that all construction vehicle parking locations; fuel and lubricants storage; vehicle, machinery, and equipment maintenance and refueling sites shall be located at least 500 m away from the natural streams. • Contractor shall ensure that all vehicles and machinery, as well as equipment operation, maintenance, and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. • Waste water from vehicle parking, fuel storage areas,	Vehicle parking, refueling sites, oil interceptor functioning	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		wash down, and refueling areas shall be treated in an oil interceptor before discharging it on land, or into surface water bodies, or into other treatment system. The waste oil skimmed from oil interceptor will be stored in leak proof drums and will be sold to authorize recyclers only.					
11	Soil pollution due to fuel spills and discarded lubricants, and construction wastes	• The fuel storage and vehicle cleaning will be avoided at construction sites as works are relatively small size. If due to any reason, these are required then it will be ensured that vehicles and fuels are stationed such that spillage of fuels and lubricants does not contaminate the ground.	Vehicle parking area at construction sites, transmission line alignment , visual observation for soils contamination at construction sites	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
12	Siltation of water bodies due to spillage of construction wastes	• No disposal of construction wastes will be carried out into the surface water bodies. • Extraneous construction wastes will be transported to the pre-identified disposal sites for safe disposal.	Water bodies specially village ponds near the construction sites	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
13	Generation of dust	• The contractor will take every precaution to reduce the levels of dust at construction sites. Water will	Subproject site visual observation	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		be sprayed as required, on locations of excavations, , locations of sand and sub grade storages. The water for spraying will be used from the water stored for construction. The water spray records will be maintained at site. • All filling works are to be protected or covered in a manner to minimize dust generation.	and water spray records				
14	Emission from construction vehicles, equipment and machinery	• All vehicles, equipment, and machinery used for construction shall conform to the Government of India vehicle emission norms. For equipment emission norms as specified in Environmental Protection Rules 2000 will be followed. • The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. The silent or quiet equipment available in the market shall be used in the transmission line works. • The Contractor shall maintain a record of pollution under control certificates for	Pollution under control certificates (Vehicle emission norms specified by GOI) of vehicles and machinery	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		all vehicles and machinery used during the contract period, which shall be produced for verification whenever required.					
15	Noise pollution	• The contractor shall confirm that all construction equipment shall strictly conform to the Ministry of Environment, Forests and Climate Change and Central Pollution Control Board noise standards. • Contractor must ensure that all vehicles and equipment used in construction shall be fitted with exhaust silencers. • At the construction sites, noisy construction work such as operation of diesel generator sets, use of high noise generation equipment shall be stopped during the night time between 10:00 p.m. to 6:00 a.m. • Noise limits for construction equipment used in this project will not exceed 75 dB (A) at 1 m distance. However, noise levels as specified in ambient noise standards (55 dB (A) during day time and 45 dB (A) during night time) will be	Certificates of vehicles conforming noise standards, noise monitoring results	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		adhered to during the construction phase.					
16	Impacts on flora and fauna	• Limit activities within the work area delineated for electric poles • Trees to be cut should be identified and compensatory plantation should be taken up at vacant space of rail corridor in consultation with CORE Officials. • For the estimated 15 trees to be cut, at least 150 trees should be taken up as compensatory plantation.	Tree identification and marking for cutting and compensatory plantation	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
17	Material handling at sites	• Workers employed on mixing cement, lime mortars, concrete, etc., will be provided with protective footwear and protective goggles. • Workers engaged in welding works will be provided with welder's protective eye shields. • The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. The contractor will give at	Data on available personal protective equipment	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		least 6 working days' notice of the proposed use of any chemical to the SDO Office. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor.					
18	Disposal of construction waste, and debris	• The contractor shall confirm that safe disposal of the construction waste will be ensured in the pre-identified disposal locations. • In no case will any construction waste will be disposed of around the construction sites or along the transmission line alignment and or in the agriculture fields indiscriminately.	Disposal sites	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee
19	Safety measures during construction	• Adequate safety measures for workers during handling of materials at site will be taken up. Training on Occupational Health and Safety (OHS) will be provided to contractor staff and construction workers • The contractor has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger to workers from	Records of availability of personal protective equipment, availability of first aid kits	Contractor	JUSNL SDO Office at Lohardaga	Regularly during construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		accidental injuries, fire, etc. First aid treatment will be made available for all injuries likely to be sustained during work. • The contractor will conform to all anti-malaria instructions given to him by the SDO Office					
20	Onsite emergency plan for minor accidents and mishaps and Disaster Management Plan for Natural Calamities	1-The onsite emergency plan will be prepared by the contractor in consultation with SDO and designated safeguard officer at CPD office 2- For natural calamities, disaster management plan prepared by the JUSNL under the provisions of Disaster Management Act 2005 will be followed.	• Onsite emergency plan document and Disaster Management Plan document of JUSNL	Contractor	JUSNL SDO Office at Lohardaga	Mock Drill every quarter	Contractor
21	Clearing of construction of camp and restoration	• Contractor to prepare site restoration plans for approval by the SDO. The plan is to be implemented by the contractor prior to demobilization. • On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the	Restoration plan, and records of preconstruction of temporary sites	Contractor	JUSNL SDO Office at Lohardaga	End of construction phase	Contractor fee

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		contractor's expense, to the entire satisfaction of the SDO					

CORE= Central Organization for Electrification, CPD= Chief Project Director, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., SDO= Sub Divisional Officer, IEE = initial environmental examination.
Source: Asian Development Bank.

Table-27: Environmental Management Plan for Operation Phase for Electric Supply Transmission Line from 132 kV Substation Lohardaga to TSS near Lohardaga Station

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Cleanliness conditions at locations of location of Bay at the 132 kV substation at Lohardaga due to irregular solid waste collection	• The JUSNL will maintain cleanliness at location of Bay • Solid waste disposal will be integrated with the disposal of Lohardaga town	Maintenance schedule of Bay at Substation	JUSNL	CORE	Regularly during maintenance phase	CORE
2	Natural disasters	• Necessary procedures to be followed by the JUSNL staff at Substation	Warnings of disasters by the Meteorological Department	District administration	JUSNL	During disasters	JUSNL
3	Waste Generation on account of maintenance and operations of Transmission line	• The transmission line will be maintained by the JUSNL. Any waste generated due to maintenance will be taken by the JUSNL office staff for possible reuse and recycle.	Waste generated from the operation and maintenance of electrification installations	JUSNL	CORE	During entire operation phase	JUSNL

CORE= Central Organization for Electrification, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., SDO = Sub Divisional Officer.
Source: Asian Development Bank.

C. Emergency Response Plan

125. The Government of India enacted the Disaster Management Act in 2005. To implement this Act, the National Disaster Management Authority (NDMA) has been established at the central level and State Disaster Management Authorities (SDMA) was established in each state including Haryana. The Chief Minister is the chairman of Jharkhand SDMA.

126. As per Section 40 of the Disaster Management Act, 2005, each government department, in conformity with the guidelines laid down by the NDMA / SDMA, shall draw up their own disaster management plans.

127. Accordingly, Ministry of Railways has prepared 'Disaster Management Plan 2014' to tackle any major disasters due to natural calamity or human error.

128. The Indian Railways will handle any disaster in close coordination with State Disaster Management Authority and district administration.

129. The Disaster Management Plan document covers natural calamities including earthquakes, floods, cloud bursts, landslides, etc. In the document clear procedures have been given and these have to be followed during natural calamities.

130. Further, all public and private structures have to be designed on the basis of the seismic zoning and structural engineering standards prescribed by the Bureau of Indian standards and the provisions of India's National Building code. These codes cover all aspects of building construction including administrative regulations, development control rules; fire safety requirements; stipulations regarding materials, structural design and construction (including safety).

131. The Ministry of Railways has adopted robust standard operating procedures (SOP) for responding to any disaster. It has also established an incident response system, which is activated after any event for search, evacuation, rescue, relief and rehabilitation. The SOP lays down, in a comprehensive manner, the specific actions required to be taken by various departments and agencies of Government as well as organizations under the control of Government of India for responding to natural disasters. The SOP covers the preparedness, early warning, response, relief and restoration phases of disaster management for effective and efficient response.

132. During the balance construction phase (18 months), the electrification works will be under the jurisdiction of Indian Railways and Electric Supply transmission line works will be under the JUSNL jurisdiction. Hence, JUSNL will be responsible for ensuring that the transmission line contractor follows relevant building codes and safety norms. Similarly electrification works contractor will follow relevant codes and safety norms of Indian Railways.

133. Hence, instead of preparing a separate emergency response plan for the project or any sub-project (and might be redundant exercise). All the statutory provisions of Government of Jharkhand and the Government of India, including those pertaining to disaster mitigation and response requirements, needs to be adhered to through Disaster Management Plans of Ministry of Rail and JUSNL during construction and operation.

D. Environmental Monitoring Plan

134. Environmental monitoring (covers EMP and all of the Government of Jharkhand's rules with respect to the environment, and handling of solid and liquid waste) at site will be undertaken by the contractors during preconstruction (valid for transmission lines) and construction stages, and be monitored by SSE (electrification works) and JUSNL(electric supply transmission line works). Environmental monitoring during post construction will be

undertaken by the South Eastern Railways and be monitored by CORE. The designated Safeguard officer of CORE will coordinate with SSE and JUSNL to ensure environmental parameters are monitored and reported.

135. An EMP has been prepared to ensure the effective implementation of mitigation measures to address all the environmental issues during construction and operation phase of the subproject. The proposed environmental monitoring plan covering all relevant environmental parameters, with a description of the environmental parameters required for monitoring, frequency of monitoring, applicable standards, and responsible agencies is presented in the **Tables 28 and 29** below for rail track electrification works and Electric Supply Transmission Line works respectively.

Table-28: Monitoring Plan for Electrification Works for Pre-construction, Construction, and Operation Phases

Sl. No.	Field (environmental attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/ US$)
1	Noise levels	During preconstruction phase	Noise quality as per National Ambient Noise Standards on dB(A) scale	Construction sites of TSS at Piska, Lohardaga and Boda Railway station in forest area. . During operation phase also at the above mentioned three locations	Once before start of works at TSS sites to establish baseline and in Forest area at Boda Railway station	Contractor through approved monitoring agency during construction phase and SER operations department during operations phase.	INR 108 ,000/ US$1700
		During construction phase			Once every 3 months (except monsoon season) during remaining period construction phase at TSS sites		
		Operation phase			Once every season except monsoon season for first 2 years		
2	Ambient Air Quality Monitoring	During preconstruction phase	Ambient Air quality parameters- SO2, NOx, $PM_{2.5}$, and PM_{10}	Construction sites of TSS at Piska and Lohardaga and Reserve Forest Area near Boda station. During operation phase also at the above mentioned three locations	Once before start of works at both TSS sites and near Boda station in forest area	Contractor through approved monitoring agency during construction phase and SER operations department in post construction phase	INR 360,000/ US $5550
		During construction phase			Once every 3 months (except monsoon season) during remaining period construction phase at both TSS sites and one location near Boda station in forest area		
		Operation phase			Once every season except monsoon season for first 2 years at all three locations mentioned above		
3	Waste Disposal and Cleanliness at construction sites and construction camps	During preconstruction phase	Delineation of area for temporary waste storage	TSS, SP, and SSP	Identification for temporary storage at all work at sites and at construction camps	Contractor	Contractor fee
		During construction phase	Waste storage and disposal at	TSS, SP, and SSP	Regularly (Weekly) during construction	Contractor	Contractor Fee

Sl. No.	Field (environmental attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/ US$)
			camp and construction site				
		Operation phase	Maintenance and waste disposal at TSS, SP and SSP	TSS, SP, and SSP	Regularly during operation phase	South Eastern Railways	Part of operation cost
4	Compensatory Plantation for tree cutting in transmission line	Operation Phase	Survival Rate (minimum 90 % any short fall to be planted before onset of monsoon)	Location of compensatory plantation in rail corridor	Proper upkeep of planted saplings	Operations Department of South Eastern Railways	Part of operation cost

TSS= Traction Sub Station, SSP=Sub- Sectioning and Parallel Post, SP= Sectioning and Parallel Post.
Source: Asian Development Bank.

Table-29: Monitoring Plan for Both Electric Transmission Lines Works for Pre-construction, Construction, and Operation Phases

Sl. No.	Field (environmental attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/ US$)
1	Waste Disposal and Cleanliness at construction site and construction camps	During preconstruction phase	Delineation of area for temporary waste storage	Bay site at 132 kV substation at Lohardaga and locations of poles (along transmission line routes)	Identification for temporary storage once before start of work at sites and at construction camps	Contractor	Contractor fee
		During construction phase	Waste storage and disposal at camp and construction site	Construction camps in both the transmission lines	Regularly during construction	Contractor	Contractor Fee
		Operation phase	Maintenance and waste disposal at substation site Lohardaga	132 kV substations at Lohardaga	Regularly during operation phase	JUSNL	Part of operation cost
2	Compensatory Plantation for	Operation Phase	Survival Rate (minimum 90 % any short fall to be planted	Location of compensatory plantation in rail corridor	Proper upkeep of planted saplings	South Eastern Railways	Part of operation cost

Sl. No.	**Field** (environmental attribute)	**Phase**	**Parameters to be Monitored**	**Locations**	**Frequency**	**Responsibility**	**Cost (INR/ US$)**
	cutting of 30 trees		before onset of monsoon)				

Source: Asian Development Bank.

E. Summary of Site and Activity-Specific Plans

136. **Table 30** summarizes site and activity-specific plans to be prepared as per EMP tables.

Table-30: Environmental Management Plan–Site and Activity Plans and Programs

Preparation Phase	Specific Plan/Program	Purpose	Responsible for Preparation	Responsible for Implementation
Construction phase (Immediately as work is in progress)	Environmental monitoring program	Indicate monitoring locations, methodology and parameters	DCEE / SSE	Contractor
Construction phase (Immediately as work is in progress)	Chance Find Protocol	To address archaeological or historical finds	DCEE/ SSE	Contractor
Construction phase (Immediately as work is in progress)	List of preapproved sites	Location/s for work camp, areas for stockpile, storage and disposal	DCEE/ SSE	Contractor
Construction phase (Immediately as work is in progress)	Waste or spoil management plan	Mitigate impacts due to waste generation	Contractor	Contractor
Preconstruction phase	Spill prevention and containment plan	Mitigate impacts of accidental spills of oil, lubricants, fuels, concrete, and other hazardous materials	Contractor	Contractor
Construction phase (Immediately as work is in progress)	Health and safety plan	Occupational health and safety	Contractor	Contractor

DCEE= Deputy Chief Executive Engineer, SSE = Senior Section Engineer.
Source: Asian Development Bank.

F. Capacity Building

137. At present CORE does not have capacity to implement and supervise environmental and social safeguards to comply with ADB SPS 2009. The project will have the opportunity to build capacity of CORE and its contractors and consultant's workforce associated in the design and implementation on the environmental and social safeguards. It is planned that a safeguard focal person will be appointed at CORE corporate office and this safeguard focal person will be of Deputy Chief Engineer rank official. Similar to corporate office, one officer of DCE rank shall also appointed as a designated safeguards officer at each CPD office. Training workshops for monitoring and implementation of EMP, for CORE officials, and contractors will be organized by the CORE. Resource persons for training program will be through ADB funded TA. The training would cover basic principles of environmental assessment and management, mitigation plans and programs, implementation techniques, monitoring methods and tools. The proposed training

program along with the frequency of sessions is presented in **Table 31**.

Table-31: Training Modules for Environmental Management

Program	Description	Participants	Duration	Training Conducting Agency
A. PRECONSTRUCTION STAGE				
Sensitization Workshop on Environment	• Introduction to Environment: environmental assessment and social due diligence requirements in the project, regulatory clearances, and permission requirements in the project • Environmental management plan implementation, introduction of ADB Safeguard Policy Statement, 2009, and ADB Guidelines on Environmental considerations in planning, design and implementing projects	CORE and JUSNL officials involved and staff of contractors	½ working day	Environmental and Social safeguard specialists from TA team
Session 1	• Environmental impact assessment for subprojects in construction and operation phases, pollution generation activities during preconstruction and construction phases • Environmental management, environmental provisions, implementation arrangements, methodology of assessment good engineering practices to be integrated into contract documents	All CORE officials from Ranchi office including DCEE, SSE, and JUSNL officials involved in the transmission line works	1 working day	Environmental and Social safeguard specialists from TA team
B. CONSTRUCTION STAGE				
Session 2	• Roles and responsibilities of officials, contractors, consultants toward protection of environment • Implementation arrangements and environmental monitoring during construction phase	All CORE officials from Ranchi office, and JUSNL officials involved in the transmission line works	½ working day	Environmental and Social safeguard specialists from TA team
Session 3	• Monitoring and reporting system	All CORE officials from Ranchi office and JUSNL officials involved in the transmission line works	½ working day	Environmental and Social safeguard specialists from TA team

CORE= Central Organization for Electrification, DCEE= Deputy Chief Engineer (Electrical), JUSNL= Jharkhand Urja Sanchar Nigam Ltd., SSE= Senior Section Engineer, TA= Technical Assistance Team.
Source: Asian Development Bank.

G. Environmental Budget

138. Most of the mitigation measures require the contractors to adopt good site practices, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Only those items not covered under budgets for construction are included in the initial environmental examination (IEE) budget. The IEE costs include mitigation, monitoring, and capacity building costs. The summary budget for the environmental management costs for the subproject is presented in **Table 32.**

Table-32: Environmental Management and Monitoring Costs

(INDIAN RUPEES)

Monitoring Component	Rate	Amount	Source of Fund
1: RAIL LINE CORRIDOR ELECTRIFICATION WORKS			
A: PRECONSTRUCTION AND CONSTRUCTION PHASE			
Noise Quality Two locations of TSS sites (at Piska and Lohardaga) and one location in Forest area (near Boda station) before start of construction works and once a season at TSS sites at Piska, Lohardaga and Forest area during construction phase (Total 18 samples)	3000	54,000	Contractor
Ambient Air Quality 1-Both TSS sites (Piska and Lohardaga) and one location in reserved forest area near Boda station before start of construction works (3 samples in pre construction phase) 2- Once a season at TSS sites at Piska and Lohardaga Bazar and one location near Boda station in reserved forest area during remaining period of construction phase (Total 15 samples in construction phase) Total Pre construction and construction phase samples =18	10,000	180,000	Contractor
Compensatory Plantation of 300 trees to compensate for 30 number tree cutting in transmission line routes including 3 years maintenance	1500	450,000	CORE
Training for Capacity Building of stakeholders	Covered in the consultancy cost of Planned TA		
Total Construction Phase Monitoring Cost (A)		**684,000**	

B: OPERATIONS & MAINTENANCE (O&M) PHASE			
Noise Quality At both TSS locations and Forest , thrice a year, for first 2 years (three samples a year, total of 18 samples)	3,000	54,000	CORE / Northern Railway through Monitoring agency
Ambient Air Quality At both TSS locations and near Boda station in reserved forest area, thrice a year, for first 2 years (three samples a year, total of 18 samples)	10,000	180,000	
Maintenance of compensatory plantation,	Covered in per tree cost considered		
Total O&M Phase Monitoring Cost (B)		**234,000**	**CORE/South Eastern Railways**
Total Cost (A+B)		**918,000**	
Contingencies @ 5%		**45,900**	
Total Budgeted Cost (INR)		**963,900(Say 1,000,000)**	
2: ELECTRIC SUPPLY TRANSMISSION LINE			
A: PRECONSTRUCTION AND CONSTRUCTION PHASE			
Construction waste collection and disposal from camp and construction site	**Covered in Engineering cost of contractor**		
B: OPERATIONS & MAINTENANCE (O&M) PHASE			
Waste disposal and cleanliness maintenance at Bay site at Substation	Covered under operation and maintenance cost (electricity charges recovered by JUSNL from South Eastern Railways for the electricity) of Transmission Line		
Total Budgeted cost	-	**Nil**	
3: Total EMP Budget for Subproject			
Total EMP Budget (INR) for electrification and transmission line		1.0 million	

CORE= Central Organization for Railway Electrification, EMP= Environmental Management Plan, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., TA= Technical Assistance.
Source: Asian Development Bank.

H. Environmental Monitoring and Reporting

139. The CPD office, through DCEE and / or SSE and designated safeguard officer, will monitor and measure the progress of EMP implementation while supervising civil construction activities. Safeguard consultants recruited through TA will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. DCEE/ SSE office will submit monthly EMP monitoring and implementation reports to CPD office, who will take follow-up actions, if necessary. The CPD office with the assistance of appointed environmental safeguard consultants will review and consolidate the monthly reports to prepare semi-annual monitoring reports to ADB.

140. ADB will review project performance against the CORE's commitments as agreed in the loan documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. ADB will monitor projects on an ongoing basis until a project

completion report is issued.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Process for Consultations Followed

141. The electrification of Ranchi Jn.- Lohardaga- Tori Jn. Railway track does not involve any elements that could have an adverse impact on the community. There is no deprivation of any sort for the residents or displacement of any groups. Particularly as to environmental impacts, subproject is passing through one reserved forest and one protected forest. The length of subproject in 18 km in reserved forest and 2 km in protected forest. The electrification will lead to positive impacts on environment, so it can be said that environmental impacts due to project implementation are minor in nature.

142. In view of Railway projects are exempted from the prior environmental clearance process, the need for holding a public hearing (as defined in EIA Notification 2006 of the Government of India) is not perceived at this stage. However, in compliance with ADB's guidelines, focused public consultations with stakeholders were undertaken during the site visits in subproject area. Residents of the area were informed about the proposed subproject and their views were obtained. During the preparation of this IEE, consultations have been held with the officials of CORE, JUSNL, Principal Chief Conservator of Forest Jharkhand in Ranchi, Conservator of Forest and other stakeholders such as Rail users, elected representatives of village Panchayat, and public living along the corridor. The process of consultations was taken up as an integral part of the subproject due diligence in accordance with the following objectives:

(i) Inform the general public, especially potentially impacted or benefited communities, individuals, and stakeholders about the proposed subproject activities.
(ii) Familiarize the people with technical and environmental issues of the subproject for better understanding.
(iii) Solicit the opinion of the communities and individuals on environmental issues and assess the significance of impacts due to the proposed development;
(iv) Foster cooperation among officers of CORE, the community, and the stakeholders to achieve a cordial working relationship for smooth implementation of the subproject.
(v) Identify the environmental issues relating to the proposed activity especially in forest areas.

143. During the consultations, locals had positive opinions for the electrification project and opined that this was long awaited. The stakeholders also opined that electrification of corridors will also lead to the increased speed of trains and increased frequency of train services in the region. They demanded fast implementation of the subproject. The dates of consultations and stakeholders consulted are summarized in **Table 33**

Table-33: Stakeholder Consulted and Dates of consultations

Sl. No.	Stakeholders Consulted	Dates of Consultations
1	CORE officials at Ranchi	26- 30 December 2017
2	Jharkhand Urja Sanchar Nigam Ltd.	26 and 28 December 2017
3	Principal Chief Conservator of Forest, Jharkhand	29 December 2017
4	Residents of Jajpur Village (near CH 433)	27 December 2017
5	Residents of Narkopi Town (near CH 459+000)	27 December 2017

Sl. No.	Stakeholders Consulted	Dates of Consultations
6	Jajpur villagers (Transmission line route) near Piska TSS transmission line Route	28 December 2017
7	Kaimo Village (Near 132 kV substation Lohardaga and CH 488+000)	28 December 2017
8	Principal Chief Conservator of Forest, Jharkhand	29 December 2017
9	National Commission for Schedule Tribe	29 December 2017
10	Tribal Welfare Commission, Government of Jharkhand	29 December 2017

CORE = Central Organization for Rail Electrification, JUSNL= Jharkhand Urja Sanchar Nigam Ltd. TSS= Traction substation.
Source: Asian Development Bank.

144. The views, comments, and suggestions of stakeholders and their incorporation in project design are presented in **Tables 34 and 35.** The consultation photographs are given in **Appendix 8.** It is clear that most of the suggestions of stakeholders have been taken care in the project design.

Table-34: Views, Comments, and Suggestions of Stakeholders in Subproject Sites Addressed in Project Design

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
1	Jajpur Village (near Transmission line route of Miral Village to Piska TSS)	28/12/2017	Local villagers of Jajpur village, General Public crossing rail line and Rail users	• Electric Supply Transmission line route • Impacts on agriculture fields due to transmission line • Environmental Impacts due to transmission line works • Compensation for crop damage Rail Electrification Benefits	• The participants welcomed the electrification project and conveyed the consultants that they do not face any problem due to ongoing electrification works. • The participants also informed the consultants that no damage to crop and local roads is there due to implementation of project. • The villagers demanded that locals should be given preference during transmission line works. The consultants replied that once contractor is mobilized by JUSNL, locals may contact for employment. • The locals suggested that transmission line should not impact trees and works may be taken up during summer when there are no crops in the fields. The consultants CORE and JUSNL officials replied

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					that their suggestion has been noted and will be taken care during transmission line works execution. • One participant enquired about start date of construction works for transmission line. The JUSNL official replied that bids are yet to be invited. It will take minimum 4 months to start the work. • The participants enquired about compensation payment for crop damage. The social expert replied that payment for crop damage will be as per policies of Government of Jharkhand. • The villagers were not opposed to transmission line works
2	Narkopi Village (Near CH 459+000)	27/12/2017	Rail users, local villagers residing along railway track	• Rail Electrification and need • Electrification benefits • Implementation schedule • Environmental and social impacts during electrification	• The participants welcomed the railway electrification project and demanded that rail service frequency is only once a day. It should be increased. The consultants replied that after electrification works, frequency may be increased. This is a recently completed railway track. • The consultants enquired from the participants whether they are at inconvenience due to ongoing electrification works. The participants replied that they do not face any difficulty due to ongoing works. There have been no damages to crops also on account of electrification works. • The female participants complained of too much

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					crowd in train so difficult to use. The consultants and CORE officials replied that after electrification works, there will be increase in frequency in all probability. • The environmental expert asked the participants to suggest measures to avoid environmental impacts in the electrification works. The participants suggested that waste of any kind should not be left along RoW. The consultants replied that EMP will be implemented and this issue will not be there.
3	Kaimo Village (Near 132 kV substation Lohardaga and CH 488+000)	28/12/2017	Villagers whose landfall in alignment of Transmission line route, rail users, and villagers residing along railway track	• Electric Supply Transmission line route • Impacts on agriculture fields due to transmission line • Compensation for crop damage • Rail Electrification Benefits • Environmental and Social issues in the subproject	• The consultants briefed the participants about the project and informed them that electrification will result into less noise and air pollution during train movement and control of speed will also be better. • The participants welcomed the project and enquired about route of transmission substation from 132 kV substation at Lohardaga to TSS location near Lohardaga railway station. The consultants replied that route is being finalized by the JUSNL, but length of alignment is about 5 km. • The participants enquired when electrification work will start. The consultants replied that work has already been awarded to M/s CEC-PGIPL. The work is in progress in Ranchi-Lohardaga section and in Lohardaga- Tori section it will start shortly.

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					• The environmental expert asked the participants to suggest measures to avoid environmental impacts in the electrification works. The participants in general suggested that there are no trees in vacant RoW. The tree plantation may be taken up. The consultants replied that compensatory plantation for trees to be cut in Transmission line route will be taken up in RoW of Railway track. • One of the participants enquired about locations of TSS (in Railway land or Government land). The consultants replied that both TSS locations are proposed in Railway land near Piska and Lohardaga Railway stations.

CORE= Central Organization for Rail Electrification, EMP= Environmental Management Plan, JUSNL= Jharkhand Urja Sanchar Nigam Ltd., RoW= Right of Way, TSS = Traction Sub-station.
Source: Asian Development Bank.

Table-35: Summary of Stakeholder Consultation at Institutional Level

Sl. No.	Place and date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
1	CORE office Ranchi, 26/12/2017 to 29/12/2017	CORE Officials	Clearances, permissions, Tree cutting, Land acquisition, locations of TSS, SP and SSP and Transmission line routes, construction works	• The Staff consultants (environmental and social experts) of ADB explained the ADB Safeguard Policy Statement 2009 and other modalities to be met for the proposed Rail Electrification project. • The environmental expert enquired about forest areas along the railway track and in the alignments of transmission line routes. The Deputy Chief Engineer replied that in the end portion after Barkichampi station (CH 500+000) rail line is passing through Forest areas. Work of electrification in this portion has not been started. No discussions have

Sl. No.	Place and date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
				been held with the forest department so far for electrification works. All construction works are limited within the RoW. • The social expert enquired about requirement for land acquisition for the project. The CORE officials replied that there will be no requirement for land acquisition for the project related facilities. • For transmission line route Deputy Chief Engineer explained that alignment is being finalized by the JUSNL and CORE has deposited money based on their estimates for transmission line works. • The Deputy Chief Engineer also explained that for Electrification works along the Railway track, no tree cutting is required as Ranchi-Lohardaga portion has recently been converted to Broad Gauge (Around 2007).
2	Jharkhand Urja Sanchar Nigam Ltd. Ranchi, and Lohardaga on 26/12/2017 and 28/12/2017	Officials of JUSNL	Transmission line route, tree and vegetation removal, compensation payment strategy, Forest Clearance, etc.	• The ADB consultants provided an overview of ADB SPS 2009 and requirements of compliance for the transmission lines to be implemented as part of electrification works, enquired about transmission route finalization, tree cutting, forest clearance, crop damage compensation, land acquisition and involuntary resettlement issues in the transmission line works. • The Executive Engineer JUSNL explained that one transmission line is planned from Miral Village to Piska TSS. For this transmission line, there is no requirement of substation as 132 kV transmission line exists near Miral village. The power supply will be tapped from there. Its tentative route finalized and showed the alignment on Google Map. The length of transmission line is about 3.8 km. There is no requirement for forest clearance. The transmission line alignment route has avoided

Sl. No.	Place and date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
				reserved or protected forest and protected areas, water bodies, orchards, habitations. The tree cutting required for the line will be around 15 trees in agriculture fields in the proposed corridor. The second transmission line will start from 132 kV substation at Lohardaga and will terminate at Lohardaga TSS location. The length of this transmission line is about 5 km. About 15-20 trees need to be cut and no requirement for forest clearance. • The JUSNL officials also explained compensation payment policy to the affected landowners. They also confirmed that there will be no requirement for environmental clearance for the proposed transmission lines, however, permissions and / or NOCs at crossings with NH / SH/ Railway line may be required. These will be obtained by the contractor during implementation. For this, cost has been included in the estimates. • The environmental expert enquired about compensatory plantation ratio for trees to be cut. The JUSNL officials explained that compensatory plantation will be as per directions of forest officials and CORE.
3	Forest Department, Government of Jharkhand, Ranchi 29/12/2017	Principal Chief Conservator of Forest,	Permission required from forest department for electrification works	• The Environmental Expert explained about the subproject to the Principal Chief Conservator of Forest and enquired about permissions required as end portion of Railway track passes through reserved and protected forest . The Principal Chief Conservator of forest explained that since Barkichampi-Tori line has been recently completed and SER must have obtained forest clearance for forest land diversion, so only note explaining electrification works need to be submitted at Latehar Forest Division Office and DFO after examination will give permission. For transmission line route JUSNL

Sl. No.	Place and date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
				may confirm from local forest offices about alignment passing through forest area or not.
4	National Commission of Schedule Tribe 29/12/2017	Assistant Director	Any specific and or additional compensation to be paid to the land owners belonging to Schedule Tribe in the transmission line routes	• The social expert briefly explained the subproject and ADB SPS 2009 and enquired whether any special or additional compensation is required to be paid, if affected land owners in transmission line route belong to Schedule Tribe community. The Assistant Director explained that from Central Government, there are not any specific circular or guidelines on this issue. However, advised to submit list of affected Schedule Tribe land owners and compensation paid to them so that if any complaint is filed it can be resolved immediately.
5	Tribal Welfare Commission, Government of Jharkhand	Project Director	Any specific and or additional compensation to be paid to the land owners belonging to Schedule Tribe in the transmission line routes	• The social expert briefly explained the subproject and ADB SPS 2009 and enquired whether any special or additional compensation is required to be paid, if affected land owners in transmission line route belong to Schedule Tribe community. The officials explained that there are not any special guidelines on this issue.

CORE= Central Organization for Rail Electrification, DFO= Divisional Forest Officer, EMP= Environmental Management Plan, JUSNL = Jharkhand Urja Sanchar Nigam Ltd., RoW = Right of Way, TSS = Traction Sub-station, SPS 2009= ADB Safeguard Policy Statement 2009.
Source: Asian Development Bank.

B. Consultation and Information Disclosure

145. **Consultation:** To ensure continued public and stakeholder participation in the subproject life cycle, periodic consultations shall be taken up at regular intervals along the rail corridor during implementation. This participatory process will ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process.

146. **Information disclosure:** Once the IEE is approved by the CORE and ADB, an electronic version of the IEE will be placed in the official websites of CORE, Ministry of Rail, and ADB. Upon written request, any person seeking information can obtain a hard copy of the complete IEE document from offices CORE at Allahabad, Ranchi and CPD office Kolkata. .

C. Grievance Redress Mechanism

147. The affected person(s) / aggrieved party can raise their grievance verbally or in written to the local site office of the sub-project. Grievances of affected person will first be brought to the attention of the site in charge, who can resolve the issue at the site level. If the matter is not solved

within 7 days period by the site in charge, it will be brought to the Grievance Redress Committee (GRC) constituted for the purpose in Deputy Chief Engineer Electrical (DCEE) office. This GRC shall discuss the issue in its monthly meeting and resolve the issues within one month of time after receiving the grievance.

148. GRC at DCEE office shall discuss the issue and try to resolve it and inform the site office accordingly. If the matter is not resolved by the GRC at DCEE level within one month of time the matter will be referred to the Chief Project Director (CPD), who will resolve the compliant within one month. The site office shall keep records of all grievances received including contact details of complainant, date of receiving the complaint, nature of grievance, agreed corrective actions and the date these were affected and final outcome. For this a complaint register will be maintained site. The grievance redress process is shown below **Figure-17.** The cost for functioning of Grievance Redress Mechanism will be accounted for in project cost as part of DCEE Office functioning.

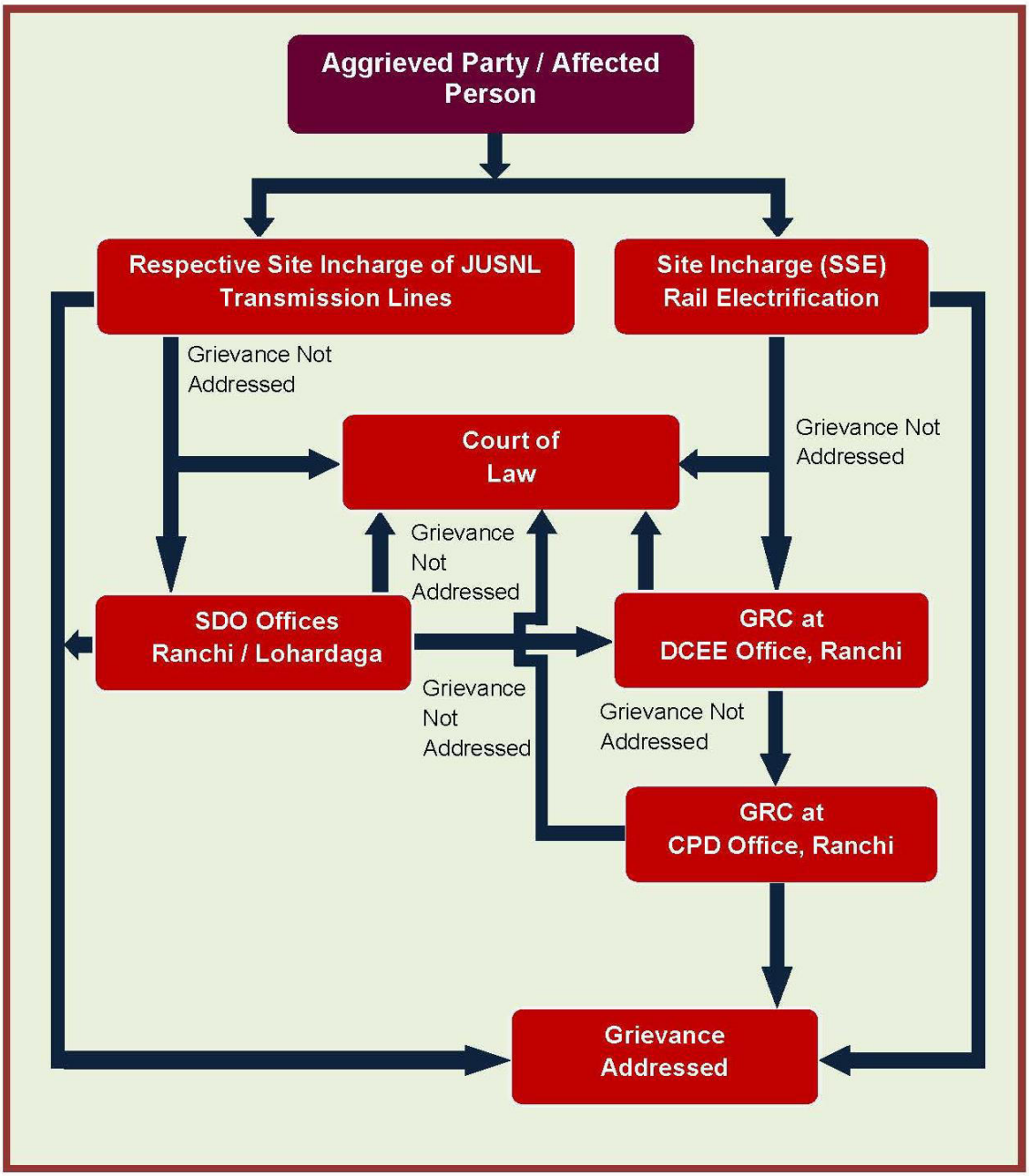
149. Since the transmission lines for both the TSS will be implemented by the JUSNL separately under the instructions of CORE, any person (s) / aggrieved party can approach to the respective site offices of JUSNL (for both the transmission lines). The site in charge will resolve the complaint within a week. If the complaint is not resolved within a week, it will be sent to the SDO offices at Ranchi (for Miral Village to Piska TSS transmission line) and Lohardaga(for Lohardaga Substation to Lohardaga TSS Transmission line). The SDO offices respective locations will resolve the issue within a month. If the complainant is not satisfied, s/he may approach GRC at DCEE office and procedure as explained above will be followed to address the complaint.

150. In addition to above mentioned GRM, all stakeholders will have access to ADB's Accountability Mechanism. The accountability mechanism provides an independent forum and process whereby people can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected person(s) / aggrieved party should first make a good faith effort to solve their problems by working with the ADB Private Sector Operations Department (PSOD) including the India Resident Mission.

151. **DCEE Level Grievance Redress Committee (GRC- DCEE):** This committee will comprise of DCEE, SSE and one officer from contractor team. The GRC- DCEE will be headed by DCEE. It will meet at least once a month. The agenda of the meeting will be circulated to all the members and the affected persons/aggrieved party along with venue, date and time at least a week prior to the meeting.

152. This GRC at CPD office will headed by the CPD, JUSNL Executive Engineer (Ranchi), and senior representative of contractor. This committee will also meet once in a month. The aggrieved party / person(s) can approach court of law any time with or without filing complaints at SSE or JUSNL site office and / or CPD office.

Figure-17: Grievance Redress Mechanism



DCEE = Deputy Chief Engineer Electrical, CPD = Chief Project Director, GRC= Grievance Redress Committee, JUSNL = Jharkhand Urja Sanchar Nigam Ltd, SDO = Sub-Divisional Officer.
Source: Asian Development Bank.

VII. FINDINGS AND RECOMMENDATIONS

153. The proposed subproject components do not involve any interventions in and around the natural and cultural heritage destinations and have less significant (direct or indirect) environmental impacts. It is expected that the proposed subproject will enhance economic growth, reduce air and noise pollution and greenhouse gas emissions, improve safety and travel time.

154. This IEE has identified minor likely impacts on water, air, and noise during the construction and has defined mitigation measures. Those mitigation measures will be implemented and monitored during the subproject execution. The overall environmental quality of subproject surroundings will be improved in post electrification phase. In order to minimize impacts on Protected and Reserved Forest mitigation measures specified in IEE will be implemented.

155. The specific management measures laid down in the IEE will effectively address any adverse environmental impacts due to the subproject. The effective implementation of the measures proposed will be ensured through the building up of capacity towards environmental management within the CORE supplemented by the technical expertise of Safeguards Specialists to be hired. Further, the environmental monitoring plans provide adequate opportunities towards course correction to address any residual impacts during construction or operation stages.

VIII. CONCLUSIONS

156. Based on this IEE, it is expected that the proposed subproject components have only minor, localized and temporary environmental impacts. These can be mitigated through adequate mitigation measures and regular monitoring during the design, construction, and post construction phases of the Ranchi Jn-Lohardaga-Tori Jn Section electrification project. Negative impacts on water, air quality, and noise levels during civil works and operation phase, which will be appropriately monitored and adequately mitigated. This report has not identified any comprehensive, broad, diverse, or irreversible adverse impacts caused by the subproject. Based on the findings of the IEE, the classification of the subproject as category 'B' is confirmed.

APPENDIX 1: ENVIRONMENT CATEGORIZATION

A. Instructions

(i) The project team completes and submits the form to the Environment and Safeguards Division (RSES) for endorsement by RSES Director, and for approval by the Chief Compliance Officer (CCO). OM F1/OP on *Safeguard Review Procedures* (paras. 4-7) provides the requirements on environment categorization.
(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for re-categorization, and endorsement by RSES Director and by the CCO. The old form is attached for reference.
(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

B. Project Data

Country/Project No./Project Title : Railways Track Electrification Project
(Subproject: Ranchi Jn-Lohardaga-Tori Jn Section Electrification)

Department/ Division : **Private Sector Transaction Support Division**
Processing Stage : Investment Committee Meeting after site appreciation of sample corridors
Modality :

[] Project Loan [ ] Program Loan [ ] Financial Intermediary [×] General Corporate Finance
[ ] Sector Loan [ ] MFF [ ] Emergency Assistance [ ] Grant
[ ] Other financing modalities:

C. Environment Category

[×] New [ ] Recategorization — Previous Category [ ]

[ ] Category A	[×] Category B	[ ] Category C	[ ] Category FI

D. Basis for Categorization/ Recategorization (please. attach supporting documents):

[×] Rapid Environmental Assessment Checklist

[×] Other: Support Documents Attached:
1. Initial Environmental Examination report (Subproject – Electrification of Ranchi Jn-Lohardaga-Tori Jn Section)

E. Comments

The electrification works of rail tracks will include erection of poles, establishment of Traction sub-station (TSS), Sectioning and Paralleling Post (SP), and Sub- Sectioning and Paralleling Posts (SSP) for regulation of electricity supply and wiring and sagging as part of overhead electrification works along the track. As part of electrification, there will be installation of transmission lines for the supply of electricity to the track. These transmission lines will connect TSS to the grid. The electrification project will have positive impacts such as reduction in air and noise pollution, reduction in green house gas emissions, better safety, improved and cheaper access to educational and health facilities and overall economic development in the surroundings of each rail track identified for the electrification in the project. In all 29 rail tracks have been	**SDES Comments**

identified, one of them is Ranchi Jn- Lohardaga- Tori Jn. This rail track is of about 111 km length. As part of electrification two electricity supply transmission lines of about 3.8 and 5 km are also planned (a) one from 132 kV transmission line near Miral village TSS location at Piska and (b) second from 132 kV substation of JUSNL at Lohardaga to TSS location near Lohardaga Railway Station. The railway track from CH 506+000 to CH522+000 passes through Kundgada Reserved Forest and from CH 526+000 to 528+000 through Tudu Protected Forest. Both the transmission lines do not pass through any protected area, reserved forest and / or any other environmental sensitive feature. The railway track crosses few natural streams, but no new bridge is planned as part of project. All electrification works will be carried out on existing bridges only. There are no wetlands; mangroves; or estuaries in or near the rail track of the Ranchi Jn.-Lohardaga-Tori Jn. Section and proposed alignments of both the transmission lines.	

F. Approval

Proposed by:	**Endorsed by**:	
Project Team Leader: Date:	Director, SDES Date:	
Endorsed by:	**Approved by**:	☐ Highly Complex and Sensitive Project
Director, Date:	Chief Compliance Officer Date:	

APPENDIX 2: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: **Railways Track Electrification Project (Subproject: Electrification of Ranchi Jn-Lohardaga-Tori Jn Section)**

Sector Division: **Private Sector Transaction Support Division**

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		√	There is no cultural heritage site within 5 km aerial distance of Ranchi Jn-Lohardaga-Tori Jn rail track and proposed transmission line routes for electricity supply (from 132 kV transmission line near Miral Village and 132 kV substation at Lohardaga to TSS locations at Piska and Lohardaga respectively)
▪ Protected Area		√	The Railway track passes through Kundgada Reserved Forest from CH 506+000 to CH 522+000 and CH 526+000 to CH 528+000 through Tudu Protected Forest. But electrification works will be limited within the formation width and within the RoW. No additional land of forest area will be used. There are no notified protected areas within 10 km aerial distance from the proposed alignments of both electric supply transmission lines as well as Railway Track .
▪ Wetland		√	There is no wetland around railway track and proposed alignments of both electric supply transmission line
▪ Mangrove		√	There are no Mangroves around railway track and proposed alignment routes of both transmission lines as both are not close to coast or creek.

Screening Questions	Yes	No	Remarks
▪ Estuarine		√	The rail track from Ranchi Jn. to Tori Jn. via Lohardaga and proposed routes of both transmission lines are not close to estuary as both are away from coast.
▪ Buffer zone of protected area		√	The Railway track and Electric Supply Transmission line alignments are not in buffer zone of any protected areas
▪ Special area for protecting biodiversity		√	There is no special area for biodiversity protection near the Ranchi Jn. Lohardaga-Tori Jn. rail track and proposed alignment of electric Transmission line
B. Potential Environmental Impacts Will the Project cause…			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	The subproject and its associated facilities will not cause any encroachment on historical/cultural areas, or disfiguration of landscape as electrification works to be to be taken up in the existing RoW of rail line and the electric transmission line route is also through open area.
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?		√	The Railway track passes through Kundgada Reserved Forest from CH 506+000 to CH 522+000 and CH 526+000 to CH 528+000 through Tudu Protected Forest But electrification works will be limited within the formation width and within the RoW of South Eastern Railways in the Forest area. No additional land of forest area will be used for electrification purposes. The alignments of electric supply transmission line do not encroach upon any precious ecology.
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	In the electrification works (including electric supply transmission line works) for Ranchi Jn-Lohardaga-Tori Jn rail track, no cross drainage structures have been proposed, so question of alteration of surface water hydrology does not arise.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		√	There are no earthworks in the electrification works as well as electric supply transmission line erection, so chances of any impact on surface water quality are not there. Further, no construction camp is planned close to village ponds and natural streams(being crossed by the existing Rail line).
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?		√	In the electrification works of rail track as well as erection of transmission line for the electric supply, no rock crushing, cutting and filling and asphalt processing are involved. Any dust generated due to material handling for the foundation works will be controlled through water spray.

Screening Questions	Yes	No	Remarks
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?		√	There are no risks and vulnerabilities related to occupational health and safety during the subproject life cycle.
▪ Noise and vibration due to blasting and other civil works?		√	Vibrations are not expected due to construction works. There will be marginal increase in noise generation during construction. It will be intermittent in nature. During operation phase generation on account of electric locomotive movement, noise levels will decrease.
▪ Dislocation or involuntary resettlement of people?		√	All works are planned in the existing RoW of rail line. No land acquisition planned for project related infrastructure. For electric transmission line also no land acquisition planned. However, farmers will be compensated for crop loss for transmission line erection.
▪ Dislocation and compulsory resettlement of people living in right-of-way?		√	There are no habitations or houses in the right of way of Ranchi Jn-Lohardaga-Tori Jn rail line so no requirement for compulsory resettlement and dislocation.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Since there are no resettlement issues in the subproject, therefore, there are no impacts on poor and women. There will be positive impacts on tribal population on account of improved transport in subproject region. There are no Indigenous Peoples habitations along the Ranchi Jn.- Lohardaga- Tori Jn. rail line as well as proposed alignments of both electric supply transmission lines, so no impacts on Indigenous People as well.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		√	The civil construction works are small in nature; hence subproject will not trigger any respiratory problems.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?		√	The construction work of subproject will not interfere with road traffic so there are no chances of creation of hazardous driving conditions.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		√	The large influx of construction workers is not anticipated as works in the subproject are small in nature. The sanitation facilities at construction camps will be maintained. The solid waste will be regularly collected and will be disposed off at the identified sites. The workers will be sensitized on HIV/AIDS by the safeguard consultants (hired through TA) regularly. These all issues have been addressed in the EMP document prepared as part of IEE report. The EMP prepared will be implemented.

Screening Questions	Yes	No	Remarks
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	The water stagnation at construction camps and construction sites will be avoided through proper drainage arrangements and maintenance of sanitation facilities.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		√	The construction works of the subproject are not likely to interfere with the road traffic as these will be away from roads (both for electric transmission lines and electrification works.)
▪ Increased noise and air pollution resulting from traffic volume?		√	The increase in traffic volume on account of subproject works will not be significant, so increase in air and noise pollution will also be insignificant. All the poles for the electrification works will be transported through rail transportation only.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		√	The increase in water pollution is not anticipated as usage of vehicles for the works will be very less due to small nature of civil works as well as works being away from roads and water bodies. No chances of contamination as at camp sites vehicle maintenance will not be taken up
▪ Social conflicts if workers from other regions or countries are hired?		√	The workers for the construction will be local only as there are no highly specialized works that require immigrant workers or workers from other regions of the country. Hence, there are no chances of any social conflict.
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	The construction works in the subproject are of small scale so large population influx is not anticipated as workers will be locals only. The contractor will make arrangements for water supply and sanitation facilities so burden on social infrastructure and services is not anticipated.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The explosives, chemicals and fuels will not be stored or transported at site during the construction. Any requirement for fuels shall be met from the existing refueling stations on local roads. During operation phase transportation of these commodities through goods trains will be governed by the prevailing' Manufacture, Storage, and Import of Hazardous Chemicals Rules 2000' and 'Explosive Rules, 2008' and 'Petroleum Rules 2002' promulgated by the Government of India
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		√	The community risks due to accidental and natural causes will be minimized through implementation of 'On site emergency plan' for minor mishaps during construction and 'Disaster Management Plan' for natural hazards and risks.

APPENDIX 3: A CHECKLIST FOR PRELIMINARY CLIMATE RISK SCREENING

Country/Project Title: India/ Railways Track Electrification Project (Subproject: Electrification of Ranchi Jn-Lohardaga-Tori Jn Rail line Section)
Sector: Transportation
Subsector: Rail
Division/Department: Private Sector Transaction Support Division

Screening Questions		Score	Remarks[6]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	The electric transmission lines as well as electrification infrastructure along the railway track are likely be impacted due to extreme storms
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	No
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	The climatic conditions in the subproject region do not demand use of any specialized construction materials
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	The prevailing weather conditions will not require any change in the scheduled maintenance of the subproject related infrastructure.
Performance of project outputs	Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	Not Applicable

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

[6] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium Risk

Other Comments: None

Prepared by: Shreeniwas Verma, Environmental Safeguard Consultant

APPENDIX 4: ENVIRONMENTAL ASSESSMENT AND REVIEW FRAMEWORK ADOPTED

Environmental Assessment and Review Framework

March 2011

India: Railway Sector Investment Program

Prepared by Ministry of Railway for the Asian Development Bank.

CURRENCY EQUIVALENTS
(as of 15 March 2011)

Currency unit	–	Indian rupee (Rs)
Rs1.00	=	$0.22222
$1.00	=	Rs 45.00

ABBREVIATIONS

ADB	Asian Development Bank
CDM	clean development mechanism
EIA	environmental impact assessment
EMP	environment management plan
GOI	Government of India
IA	implementing agency
IEE	initial environmental examination
MOR	Ministry of Railways
PIU	project implementation unit
REA	rapid environmental assessment
RVNL	Rail Vikas Nigam Ltd.
SPS 2009	ADB Safeguard Policy Statement, 2009
TOR	terms of reference

WEIGHTS AND MEASURES

km	–	kilometer
m	–	meter
mm	–	millimeter

NOTE

In this report, "$" refers to US dollars.

This environmental assessment and review framework is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

ENVIRONMENTAL IMPACT ASSESSMENT REVIEW FRAMEWORK

A. Introduction

1. The proposed Railway Sector Investment Program (RSIP) is a Multi Tranche Financing Facility (MFF) that will be implemented over a period of 8 years. The program is expected to increase the capacity of the existing rail network to handle traffic demand necessary to sustain the country's economic growth. The program has three components (i) investment, (ii) efficiency enhancement and (iii) carbon mechanism. The candidate subprojects to be considered under RSIP are (i) doubling of about 840 km of (a) Daund – Gulbarga section (224 km); (b) Sambhalpur – Titlagarh section (182 km); (c) Raipur – Titlagarh section (203 km); and (d) Hospet – Tinaighat section (229 km) and (ii) electrification of the Pune – Guntakhal section (641 km).

2. Considering that this is a long term program that will be implemented in tranches it is not possible to finalize all the project details before starting the program. Therefore this EARF is prepared to ensure that all environment safeguard requirements of ADB as well as the Government of India are met during the course of implementing the MFF.

B. Assessment of Legal Framework and Institutional Capacity

3. A number of acts, rules and ambient standards exist under the Government of India (GOI) which will help to ensure that the program will be implemented in an environmentally safe and friendly manner. Key policies that the program is subjected to comply with are: the Environment (Protection) Act, 1986; the Environmental Impact Assessment Notification, 2006 and its amendment in 2009; Environmental Impact Assessment Guidelines for Rail, Road and Highways Projects, 1989; Forest Conservation Act 1980 (Amended 1988) and Rules (1981 Amended 2003); Wildlife Protection) Act, 1972 (Amended 1993); Water Prevention and Control of Pollution Act 1972 (Amended 1988) and its Rules 1974; Air Prevention and Control of Pollution Act, 1981, (Amended 1987) and its Rules 1982; Noise Pollution (Regulation and Control) Rules, 2000 (Amended 2002); Hazardous Waste Management, Handling and Transboundary Movement Rules 2008 (Amended 2009), and Batteries Management and Handling Rules 2001.

4. These Acts and Regulations require that:

(i) No environmental clearance is required for railway projects. However, periodic review will be made of amendments if any in this notification, for the applicability and need of environmental clearance for railways sub project.

(i) Forest clearance from Department of Forests is required for diversion of forest land for non-forest purpose. Prior permission is required from forests department to carry out any work within the forest areas and felling of rail side trees. Cutting of trees need to be compensated by compensatory afforestation as per the requirement of forest department.

(ii) Placement of hot-mix plants, quarrying and crushers, batch mixing plants, discharge of sewage from construction camps requires No Objection Certificate (Consent to Establish and Consent to Operate) from State Pollution Control Board prior to establishment.

2

(iii) Permission from Central Ground Water Authority is required for extracting ground water for construction purposes, from areas declared as critical or semi critical from ground water potential prospective by them.

5. In addition based on ADB's Safeguard Policy Statement (SPS), 2009, the program and its subprojects will be subject to the following requirements:

(i) Completion of the Rapid Environmental Assessment (REA) checklist and categorization of the project based on the nature and scale of environmental impacts anticipated
(ii) Preparation of Environmental Assessment reports, EIA for category A and IEE for category B projects including an Environmental Management Plan (EMP).

6. Currently no category A subprojects are anticipated under the program. However, if there are any changes in project details and context that warrants a subproject to be under category A, an EIA report will be prepared, disclosed on ADB website 120 days before board approval of the respective subproject. For category B projects, if there are any changes in project details or anticipated impacts, the respective EMP will be updated with mitigation measures to address the new issues adequately.

7. The Executing Agency (EA) for the program is the Ministry of Railways (MOR) and the Implementing Agency (IA) is the Railway Vikas Nigam Limited (RVNL) under the Government of India. Currently RVNL does not have any environment unit or focal person. However, it has been agreed that one Environmental Focal person at the Corporate level and Environmental Officers at each of the five Project Implementation Units (PIU) will be appointed. Supervision consultants will be recruited to help the IA and PIUs to monitor implementation of the EMP and selected environmental quality parameters. Training of the relevant officials from the EA, and the Environmental Officers from the IA and PIU on Environment safeguard issues and implementation and monitoring of the EMP will be carried out under the Piggy Back TA under RSIP.

C. Anticipated Environmental Impacts

8. There are three components under the program: (i) investment, (ii) efficiency enhancement, and (iii) carbon development mechanism (CDM). It is mainly the first component that will result in environmental impacts. Under this component, 840 km of rail routes will be double tracked and 641 km of a rail section will be electrified. While the third component on CDM will result in demonstration of reduction in carbon emissions from the program it does not involve any physical activities that will have environmental impacts. Activities under this component will be administered under a separate TA.

9. No significant or adverse environmental impacts are anticipated under the investment component. Most of the impacts are likely to occur during construction stage and are temporary in nature. The land use around the alignment is primarily agriculture. Hence no significant impacts are anticipated on biodiversity or physical cultural resources. Impacts are primarily from embankment formations, cutting of trees, and transportation of construction material. It will be made mandatory for the contractor to adopt safe construction practices and ensure use of requisite personnel protective equipment to protect occupational health of labour and communities around the construction sites. Although the environmental impacts related with the project are manageable, monitoring the EMP implementation and environmental conditions needs to be done systematically to ensure mitigation of any unexpected environmental impacts.

D. Environment Assessment for Subprojects and/or Components

10. Draft IEE reports have already been prepared for all the candidate subprojects in accordance with ADB SPS 2009 requirements. As of the now all subprojects fall under category B. However, given that the program will be implemented over a duration of 8 years and subprojects will be implemented on a tranche basis, there is potential for changes in subproject details and context of project sites during implementation. Considering this situation if there are any changes in subproject details and project context that require re-categorization, new REA checklists will have to be prepared and re-categorization forms completed. For re-categorization into a category A subproject, a detailed EIA report will be prepared and posted on the ADB website for 120 days before board approval of the respective subproject. For cases of new information or change in design details the respective EMP will be updated.

11. In line with the requirements of ADB SPS 2009, no new subproject areas that fall in critical habitats will be included in the project.

12. Before processing a new tranche, it must be ensured that adequate environmental due diligence is carried for the earlier tranche. Only upon ensuring that all environmental safeguard requirements have been satisfactorily met in the earlier tranche and successful due diligence reports are produced will the next tranche be approved.

E. Consultation, Information Disclosure and Grievance Redress Mechanism

13. RVNL is responsible for ensuring that all environmental assessment documents including the environmental due diligence and monitoring reports are properly and systematically kept as part of RVNL project record.

14. All environmental documents are subject to public disclosure. Therefore, these documents will be posted on the ADB website and made available to public if requested for.

15. If any of the subprojects get re-categorized into a category "A" subproject, the EIA report will be disclosed to public through ADB and RVNL/Indian Railways websites, 120 days before ADB Board approval of the respective tranche with the subproject.

16. Public consultations have been carried out during the preparation of the draft IEE reports for the subprojects. Further consultations must be carried out if there are any changes in subproject details and context to ensure that all environment related concerns of the affected persons are addressed.

17. A Grievance Redress Mechanism will be established within the existing institutional set up of RVNL before starting implementation of any of the subprojects. The purpose of this mechanism will be to help address any environment related concerns or grievances of the affected people. It will be ensured that the existence of such a mechanism will be communicated to the respective affected communities through public consultations.

4

F. Institutional Arrangement and Responsibilities

18. MOR is the EA and RVNL is the IA. At present RVNL does not have any environmental cell or officials to manage environmental and social aspect associated with their activities. Therefore, it has been agreed that an environmental focal person will be appointed at RVNL and environmental officers will be appointed at each of the PIUs. The Environmental focal person at RVNL will be responsible for ensuring the implementation of the EARF. Training workshops for officials of RVNL and PIU on environment safeguard issues and monitoring and implementation of the EMP will also be organized by RVNL. Resource persons for the training will be from the supervision consultants or individual consultants that will be recruited under the piggy back TA.

19. The costs for environment related issues will be covered as given in the following: (i) costs for implementation the EMP to be included under the contractor's construction costs, (ii) cost for environmental training will be covered under the piggy back TA, and (iii) the cost for monitoring the EMP and monitoring of specific environmental features to be included in the supervision consultant's contract.

20. The IA RVNL[1] will be responsible for the following:

(i) Prepare environmental screening checklist and reclassification subprojects if required.
(ii) Prepare terms of reference (TORs) to conduct EIA if required in accordance with the policy principles for environmental safeguards under SPS (2009)
(iii) Hire an environmental consultant to prepare EIA report including EMP if required
(iv) Ensure that the preparation of all environmental studies will be completed through meaningful consultations with affected people and other concerned stakeholders, including civil society. For category B projects at least one consultation with affected people will be carried out, and for category A projects two step consultations will need to be carried out
(v) Undertake initial review of the IEE or EIA, and EMP reports to ensure its compliance with the Government's and ADB's requirement
(vi) Obtain necessary consents or permissions (e.g. environmental clearance, forest clearance, and water board clearance) from relevant Government Agencies. Also ensure that all necessary regulatory clearances will be obtained prior to commencing any civil work of the subproject;
(vii) Submit to ADB the IEE or EIA including EMP reports, clearances certificate and its conditions from relevant Government Agencies for ADB's consideration in approving the follow up actions for the subprojects as part of documentation for approval of subprojects
(viii) Ensure that the EMP which include required mitigation measures and monitoring requirements with defined Bill of Quantity, forms part of bidding document;
(ix) Ensure that contractors have access to the IEE or EIA report including EMP of the subprojects;
(x) Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities

[1] Railway Vikas Nigam Limited is a special purpose Vehicle of Ministry of Railways Government of India. RVNL, the executing agency mandate is to do project development, resource mobilization and undertaking projects on behalf of Ministry of Railways directly or by creation of project specific special purpose vehicle.

(xi) Ensure and Monitor that the EMP including Environmental Monitoring Plan will be properly implemented;
(xii) In case, unpredicted environmental impacts occur during project implementation stage, prepare and implement an environmental emergency program in consultation with relevant Government Agency and ADB if necessary ;
(xiii) In case, during project implementation a sub project needs to be realigned, review the environmental classification and revise accordingly, and identify whether supplementary IEE or EIA study is required. If it is required, prepare the TOR for undertaking supplementary IEE or EIA and hire an environment consultant to carry out the study;
(xiv) Ensure that construction workers work under safe and healthy working environment
(xv) Ensure effective implementation of Grievance Redress Mechanism to address affected people's concerns and complaints, promptly, using understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people; and
(xvi) Submit annual reports on the implemention of EMPs including the implementation of environmental emergency program (if any) to the State Pollution Board, MOEF, and ADB, and availability of the same for public disclosure.
(xvii) Prepare Environmental Due Diligence reports for the earlier tranche/PFR before starting implementation of the next tranche/PFR

21. RVNL has the main responsibility for undertaking environmental due diligence and monitoring the implementation of environmental mitigation measures for all subprojects. The due diligence report as well as monitoring implementation of the environmental management plan as part of the annual report needs to be documented systematically. RVNL has to ensure that this environmental assessment review framework is well implemented. RVNL will give access to ADB to undertake environmental due diligence for all subprojects, if needed.

APPENDIX 4: METHODOLOGY FOR RAILWAY NOISE LEVELS PREDICTIONS AND EVALUATION CRITERIA FOR NOISE LEVEL EXPOSURE

1.0 Background

The noise level predictions have been carried out to assess noise impacts around rail line in post electrification phase. For this noise levels variation with perpendicular distance from rail line was studied from past projects. The procedure used for noise level predictions in 'Eastern Dedicated Freight Corridor (World Bank funded)' was adopted with modifications of the assumptions applicable for current railway track.

2.0 Methodology

The railway noise generated by conventional trains (local passenger trains, express trains and goods trains), main causes include (1) movement of train car , (2) structures and (3) machines equipped to the train. Among them, the train movement contributes to the generation of noise maximum. However, from the observed levels it is difficult to identify the contributions of each component to the total noise emissions.

Therefore, prediction was carried out applying the actual data of railway noise level (L_{AE}), running speed (V) of trains, and the distance from centre of the nearest railway track (D). Based on the obtained data of rail movement noise at 18 sites (in DFCC project), the empirical equation was developed by using a simple regression and correlation analysis. The data at 2 sites was examined to extract the empirical equation and the recorded values at various distances were close to predicted values within error of ± 5-10 %. It was decided to use this equation for noise prediction. Assuming V is constant, D is only one variable, and the empirical equation is shown below.

$$L_{Amax} = A_1 + B_1 \text{ Log10 } (D) \quad (1)$$

$$L_{Aeq1\ (one\ hour)} = L_{Amax} + 10 \text{ Log10 } (N/T) \quad (2)$$

3.0 Predicted Noise Levels in the Surroundings Rail Line:

A predicted railway noise level is shown in the below table.

Train	A_1	B_1	Railway Noise Level (L_{AE} & L_{Aeq} (dB))						Noise Level
			12.5 m	15 m	25 m	30 m	50 m	200 m	
Freight (Electric)	90*	-0.4	89.60	89.53	89.44	89.40	89.32	89.10	L_{Amax}
			54.04	53.95	53.88	53.84	53.76	53.54	$L_{Aeq\ hourly}$
Freight (Electric)	85**	-0.40	84.56	84.53	84.44	84.41	84.32	84.10	L_{Amax}
			49.00	48.97	48.88	48.85	48.76	48.54	$L_{Aeq\ hourly}$

Note: N – No. Trains in one hour= 1; T – Unit Time: per second= 3600 seconds; r^2 – 0.97 (regression coefficient.

* Noise level generation at Track due to transit of freight train with horn (Reference: Guidelines for Noise and Vibrations, Metro Rail Transit System, Ministry of Railway, Government of India).

** Noise level generation at Track due to transit of freight train without horn (Reference: Guidelines for Noise and Vibrations, Metro Rail Transit System, Ministry of Railway, Government of India).

It may be mentioned that predictions have been carried out for worst case scenario (freight train loaded, generating maximum noise levels), for movement of other trains, levels will be lower than mentioned above.

4.0 Evaluation Criterian for Noise Levels

The impacts of noise levels in the surroundings will be instantaneous peaks of certain noise levels during the passage of train. The acceptable noise levels prescribed by the Occupataional Safety and Health Association (OSHA) for various exposure of time are given below in the table:

Sl. No.	Exposure Time (Hour)	Permissible Limit (dB(A))
1	8	90
2	6	92
3	4	95
4	3	97
5	2	100
6	1.5	102
7	1	105
8	0.50	110
9	0.25 or less	115

APPENDIX 5: ENVIRONMENTAL AUDIT PHOTOGRPAHS SHOWING NONE COMPLIANCES IN ONGOING CONSTRUCTION

Foundation of Electric Poles left with open hole(unsafe) and no caution tap

Hapahazard storage of construction materials at SSP construction site at CH 448+100

Improper storage of construction material at SP Construction site at CH 467+400 (Nagjua)

SP Construction site at Narkopi (CH 458+200) without caution Tape and passage between rail track and SP site blocked

Toilet Facility Seen at Construction camp at Piska (2)

Untidy and unsafe conditions at locations of Electric poles foundation at CH 479+000

Untidy Conditions at Workers' camp near Satish Chowk Locality

Workers at Construction camp near Piska seen using PPEs

Workers seen Working without PPEs at SSP construction site at Tangribansali at CH 448+100

Workers Sleeping Room seen without Cots at Workers'camp at Satish Chowk Locality

APPENDIX 6: RESPONSIBILITIES/BROAD TERM OF REFERENCE (TOR) OF ADB TECHNICAL ASSISTANCE (TA) SAFEGUARD CONSULTANTS TEAM

(a) Preamble

Asian Development Bank through Private Sector Operations Department (PSOD) will implement a Technical Assistance Program to CORE for enhancing the environmental and social safeguard capacity in electrification projects being implemented. For this one team will be formed at Corporate level and 4 teams at regional level. These 4 teams will be deployed at regioanl offices to cover all corridors selected for electrifocation under ADB non-sovereign funding. The responsibilities / broad ToRs of each team member of TA team at corporate and regional levels is given below:

(b) Safeguard Team at Corporate Level

The safegaurd team of TA consultants at corporate level will comprise of Environmental Specialist cum Team Leader, Social Safeguard Specialist, HSE Specialist, Labour Expert, procurement expert and one Biodiversity and Forestry Expert. The broad responsibilities of consultants are as follows:

(i) Environmental Specialist-cum-Team Leader-will be responsible for overall management of safeguard issues in the electrification works of subprojects. Broad responsibilities will be as follows:

- To liase with CORE management, local CPD offices, and statutory undertakers and submit application forms for all environmental related clearances such as forest, wildlife, tree cutting permissions, etc;
- Develope Standard Operating Procedures (SOPs) and Manuals on environmental issues for easy comprehension of technical staff at sites and corporate level;
- To organize capacity development training programs on environmental and social safeguards at corporate office with assistance of external agencies for corporate staff, safeguard team at regional offices and contractors' magaement staff;
- To coordinate with ADB Safeguards Team for IEE, EMP, Resettlement Plan implementation requirements and to provide feed back on implementation;
- To coordinate with safeguard team posted at regional offices for data / information for compilation of Semi- annual and annual monitoring report;
- To ensure timely preparation of semi annual and annual environmental safeguard reports for submission to ADB; and
- To interact with other team members of safeguard team at corporate for effective implementation of safguard related matters in the electrification project.

(ii) Social Safeguard Specialist- will be responsible for overall management of resettlement plans in the rail track electrification project. Broad responsibilities will be as follows:

- To liase with the CORE management to ensure that disbursement for compensation is as per schedule and as per RP documents;
- To participate in capacity development training programs and provide training and assistance to contractor and CORE staff;
- To prepare land procurement and compensation manual for easy comprehension of technical staff of CORE, CPD offices staff and Staff of Transmission line contractors;
- To coordinate with ADB Safeguards Team for Resettlement Plan implementation requirements and to provide feed back on implementation of RP and disbursement of compensatons to project affected families;
- To collect information/ data for submission of semi annual and annual monitoring reports to ADB;
- To help CORE in Grievance Redressal of project affected families; and

- To interact with other team members of safeguard team at corporate for effective implementation of safguard related matters in the electrification project.

(iii) HSE Specialist- will be responsible for preparation of HSE manual based on World Bank Group's Environmental, Health and Safety Guidelines. Broad responsibilities will be as follows:

- To interact with CORE management and other team members of safeguard team and with management level officials of contractor to developbe HSE guidelines and manual;
- To particiapte in capacity development training programs organized by CORE or TA team and contribute as speaker to educate requirements during implementation;
- To intearct with HSE experts of regional teams for collection of data / information for preparation of semi -annual and annual monitotring reports;
- To coordinate with ADB Safeguards Team for HSE related implementation requirements in the project and to provide feed back on implementation;
- To help CORE in Grievance Redressal of general public or work force at site;
- To interact with other team members of safeguard team at corporate level and regional level for effective implementation of HSE related matters in the electrification project; and
- To provide support to Team Leader for preparation of monitoring and reporting related documents..

(iv) Labour Expert - will be responsible for preparation of manual to ensure labour related issues for welfare, compensation and safety requirements are covered in addition to requirements of all statutory complainces. Broad responsibilities will be as follows:

- To preapare a manual indicationg all regulatory requirements such as permits, permissions, labour camp facilities, compensation, etc. are covered;
- To interact with contractors to assess all regulatory requirements and facilities to works force are being met ;
- To iteract with other team members of TA team and take part in capacity development training programs organized by TA Team and CORE;
- To intearct with ADB safeguard team to apprise them about ADB SPS requirements related to labour activities are being complied with;
- To visit few sample corridor where work is in progress to see the compliance with Factories Act, 1948, IFC EHS guidelines , etc. ;
- To help CORE in redressal of Grievances of Labour; and
- To support team leader in preparation of monitoring and reporting related documents.

(v) Procurement Expert will be responsible for standardization of Bidding document, tendering process, bid evaluation and award of contract. The expert will interact with ADB technical team so that any specific requirements of ADB PSOD department are also included in the bidding document.

(vi) Biodiversity and Forestry Specialist- will be responsible for preparation of guidelines and / or manual for electrification works and electric supply transmission line works. Broad responsibilities will be as follows:

- To prepare a manual / guidelines for taking up electrification works in forests, protected areas, and ther eco-sensitive areas. This manual will indicate clearly clearance requirements and procedures to be followed for carrying out electrification and civil works;
- To preapare guidelines for compensatory plantation and landscaping;
- To advise CORE Management and to provide support in submission of application forms to satautory bodies for clearances, wherever required under the Forest (Conservation) Act, 1980 and Wildlife (Protection), 1972;
- To asses budget for compensatory plantation and ensure budget is released by CPD offices and compensatory plantation is taken up;

- To interact with other team members of safeguard team at corporate as well as at Regional offices of CORE for effective implementation of safguard related matters in the electrification project; and
- To support team leader in preparation of monitoring and reporting related documents.

(c) Safeguard Teams at Regional Offices of CORE

It is planned to field 4 safeguard teams at 4 regional offices of CORE to cover all corridor being taken up for electrification. Each safeguard team will comprise of (a) Environmental Specialist cum Team Leader, (b) Social Safeguard specialist and (c) HSE Specialist. The broad responsibilities of safeguard team consultants at regional offices will be as follows:

(i) Environmental Specialist -cum -Team Leader will be responsible for overall management of safeguard issues in all corridors in the region of his / her deployment. Broad responsibilities will be as follows:

- To intearct with the designated safeguard officers in CPD offices in the deployment region;
- To visit all the corridors regulary in consultation with designated safeguard officers to see EMP implementation at sites;
- To intearct with the designated safeguard officers of the contractor (s) at the respective corridors;
- To ensure that contractors are implementing EMP and monitoring plan as per schedule;
- To provide recommendations to the CPD offices and contractors for corrective actions for observed non complainces during site visits;
- To help CPD offices and contractors in resolving safegurad related grievances of community, individuals or gropus ;
- To collect information/data for preparation of monthly, semi annual and annual monitoring reports and send this to corporate level TA Team Leader for complilation of overall reports;
- To organize capacity building training programs (with the support of designated safeguard officers at CPD offices) as indicated in IEE report for contractors and CORE technical staff;
- To report any unforeseen impacts and or events;
- To ensure that all permissions, NOCs and clearances related to environment are update and copies are available at sites;
- To ensure that contractors prepare on site emergency plans for minor mishaps at site and they conduct regular reharsals of this plan; and
- To intearct and support other team members of TA team for effective implementation of safeguard related mitigation measures.

(ii) Social Safegaurds Specialist will be responsible for overall management of Resettlement Plans implementation in all corridors in the region of his / her deployment. Broad responsibilities will be as follows:

- To intearct with the designated safeguard officers in CPD offices in the region and to monitor disbursement of compensation to project affected families;
- To visit the corridors regulary in consultation with designated safeguard officers to see recommended mitigations in resettlement plan documents are being complied with;
- To intearct with the designated safeguard officers of the contractor (s) at the respective corridors;
- To help CPD offices and contractors in resolving safegurad related grievances of community, project affected families, individuals or gropus, etc. ;
- To collect information / data for preparation of monthly, semi annual and annual monitoring reports and send this to corporate level TA Team Leader for complilation of overall reports;

- To organize capacity building training programs (with the support of designated safeguard officers at CPD offices) as per requirements indicated in Resettlement plan documents and overall project policy;
- To report any unforeseen impacts and or events related to social impacts; and
- To intearct and support other team members of TA team for effective implementation of safeguard related mitigation measures.

(iii) HSE Specialist- will be responsible to ensure that all electrification and project related works comply with the World Bank Group's EHS guidelines, and EHS guidelines / Manual prepared by the corporate level TA team in all corridors in the region of his / her deployment. Broad responsibilities will be as follows:

- To vsit all the corridor of region regulary to see that works comply with EHS guidlines;
- To advise designated safeguard officers of contractors at site for corrective actions for the observed non complainces;
- To conduct training programs on HSE for CORE and Contractor technical staff for capacity development
- To collect information / data for monitoring reports and update team leader and designated safeguard officer of CORE at CPD offices about non compliances at sites; and
- To intearct and support other team members of TA team for effective implementation of safeguard related mitigation measures.

APPENDIX 7: CONSULTATION PHOTOGRAPHS

Discussion with Construction workers at Construction camp at Piska

Consultations with Locals near Transmission Route alignment at Jajpur village

Focus Group Discussion with stakeholders at CH 459+000

Discussion with villagers at Kaimo village near CH 488+000