Initial Environmental Examination (Part 2)

Project Number: 51228-001
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India: Railways Track Electrification Project
Rohtak-Panipat Railway Track

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

C. Economic Resources

1. Industries

70. In the subproject region, Rohtak has been primarily an agricultural district. Its old industries were confined to village and cottage sector. These included pottery, stone dressing, leather tanning, handloom weaving, phulkari, utensil making, and glass bangles salt making. Most of these have, however, been gradually decaying due to one reason or another, partition shattered the economic structure of the district. Emigration of Muslim craftsmen who formed the backbone of village industries brought about their virtual extinction. However, joint efforts of many brave, sturdy and enterprising migrants from Jhang, Layallpur, Multan and Muzzafargarh to the district brought a speedy recovery to the industry of the district. Government also helped through various schemes. First large industrial unit M/s Haryana Co-operative Sugar Mills Ltd. Rohtak was established in 1954-55 in Co-operative sector in the district. Another sugar mill in the Co-operative sector was set up at Meham in 1991-92.

71. In Sonepat district also, industrial units are not much, but district is emerging as an educational hub due establishment of Rajiv Gandhi Education city on National- Highway-1 and development of residential areas towards Delhi border. The small-scale industries include Agritools, Bags, lighting, repairing of transformers, etc.

72. Panipat district in the subproject area is one of the important industrial centers in the State of Haryana. Panipat Town, known for handlooms at national and international markets, is an export hub for cotton durries, mats, carpets, floor coverings, etc. For its exquisite hand tufted woolen carpets and other handloom products, it has earned the name of “Weavers City of India”. About 40 percent of the total handloom exports of the country are said to be from Panipat District alone. Panipat houses important large industries like National Fertilizer Limited, PepsiCo, Panipat Thermal Power Station, and Panipat Refinery of Indian Oil Corporation. Besides, Panipat district is also known for its pickles industry. Various food products and pickles are being exported to Middle East and European Countries. There are five industrial estates developed by the State Government in Panipat. Of the 1,706 industrial plots developed in these five estates, 1,652 have been allotted to enterprisers and industries have been established. The detail of commodities manufactured in the subproject region is given in **Table 8.**

Table 8: Important Commodities Manufactured In The Subproject Region

Sl. No.	District	Sub Project CD Blocks	Name of important commodities manufactured
1	Rohtak	Rohtak	Agri Tools, Rewri & Gajjak, Milk Product
2	Sonepat	Kathura, Mundlana, Gohana	Agri Tools, Doormat, Bag, CFL Tube, Transformers
3	Panipat	Panipat, Madlauda, Israna	Agri Tools, Foot Mat, Textile, Durries, Carpets, Power Kohlu, Crane Crusher

Source: Census of India, 2011

2. Minerals and Mining

73. The subproject falls in the Indo-Gangetic plainsm. The mining potential is not much in the subproject region. The geological structure of the district is formed of Alluvium rocks of cecent period containing deposits of clay, silt, sand and loose gravels. Lime Kankar is found in some areas of the project region. Brick earth or ordinary clay suitable for manufacturing of bricks is available in plenty in all parts of the subproject region. Mining in Haryana State is lying closed since March 2010 due to Environmental non-clearance.

3. Transportation

74. Transport and communications is the nervous system of the economy of a particular area. Prior to 1870 only fair weather unmetalled roads served for the transport of grain to the market and up till 1910, no railway or telegraph line touched the district. Delhi-Bathinda and Bathinda-Rewari Railway Lines connected the district with other parts of the country in 1910. It was only after Independence, the policy to develop communications resulted in great emphasis on road development in the project region. During 1965-66 there were railway lines besides a network of metalled and unmettalled roads. As on 31-07-2013 Rohtak district is having 141 kilometers of National Highways and 79 kilometers of State Highways along with 15 kilometers of Major other district roads. The district possesses a total of 801 kilometers of other district roads and 571 kilometers of HSAMB roads.

75. National Highway-10 also known as Maharaja Aggarsain Marg i.e. Delhi-Rohtak-Hisar-Fatehabad-Sirsa-Fazilka; N.H.-71 Sangrur-Narwana-Jind-Rohtak-Jhajjar-Rewari-Bawal Road and N.H.-71A Rohtak-Gohana-Panipat road traverse the project districts. Further, Delhi-Amritsar (NH-1), State Highway-16 Sanauli to Panipat and Rohtak to Bhiwani Road; S.H.-16-A Gohana-Lakhan Majra-Maham-Chang; SH-18 Rohtak-Kharkhoda-Delhi Road; and S.H.-20 Kharkhoda-Sampla-Jhajjar also pass through the project region apart from other important roads like Bahadurgarh-Chhara-Dujhana-Beri-Kalanaur.

76. Railways routes passing through the project districts are Delhi-Rohtak-Jakhal Mandi, Delhi- Panipat -Ambala, Rohtak-Gohana-Panipat and Rohtak-Bhiwani are Broad Gauge Railway Lines.

4. Land Use

77. The predominant land use in the project districts is agricultural. As per Census of 2011, the geographical area of Rohtak District is 1745 sq kms (this includes 105.98 sq.kms. of urban area and 1568.09sq. kms rural area). Out of the total rural area of 156,809 hectares, 133,274 hectares is net sown area; 2,672 hectares is culturable waste (including gauchar and groves) and 2,382 hectares of area is not available for cultivation which can be barren and unculturable land. Net area sown in the district is 84.99 percent of total area.

78. As per the Census of India 2011 the geographical area of Panipat District is 1268.00 sq.kms (this includes 79.35 sq.kms. of urban area and 1222.44 sq. km rural area). Out of the total area of 122,244 hectares, 98,003 hectares is net sown area; 1,943 hectares is culturable waste (including gauchar and groves) and 931 hectares of area is not available for cultivation which can be barren and uncultivable land. Net area sown in the district is 80.17 percent of total area.

79. As per the Census of India 2011 the geographical area of Sonepat District is 2,122.00 sq.kms (this includes 82.01 sq.kms. of urban area and 2076.24 sq. kms rural area). Out of the total area of 207,624 hectares, 168,332 hectares is net shown area; 3,061 hectares is culturable waste (including gauchar and groves) and 3,843 hectares of area is not available for cultivation which can be barren and unculturable land. Net area sown in the district is 81.08 per cent of total area. Gohana tehsil has a rural area of 790.63 sq.kms. The land use of CD Blocks through which Rohtak- Panipat rail line passes is given below in **Table 9**.

Table 9: Land Use Of Blocks Falling Under The Subproject

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	Rohtak	Rohtak	52	49123	85.1	90.81
2	Sonepat	Mundlana	29	29217	83.78	91.63
3	Sonepat	Kathura	17	20501	84.39	96.03
4	Sonepat	Gohana	35	28759	82.17	95.5
5	Panipat	Madlauda	35	33668	78.14	100.00
6	Panipat	Panipat	33	14883	78.13	100.00
7	Panipat	Israna	31	27808	81.57	100.00

Source: Census of India, 2011

5. Agricultural and Economic Development

80. The subproject area is mostly surrounded by agricultural field. Crops like Bajra/ Jawar/ Guar, Paddy, Cotton, Sugarcane are cultivated as Kharif crop and Wheat, Mustard, Sugarcane, Barley and Gram are cultivated as Rabi crop.

81. Economy of the all districts is transforming from predominantly agricultural to mixed economy. In Rohtak District proportions of main workers engaged in agricultural activities (cultivators and agricultural laborers') have gone down tremendously from 46.0 percent in 2001 to 34.98 percent in 2011 as per Census published data. But proportion of marginal workers engaged in agricultural activities is still very high (54.77 percent). Owing to nearness to the National Capital, it has been able to increase proportion in tertiary activities from 51.7 percent in 2001 to 54.7 percent in 2011.

82. Due to Increase in the tertiary activities in the Panipat district the agricultural activities have been reduced, yet the marginal workers proportions engaged in agricultural activities are very high (55.3 percent). Main workers engaged in agricultural activities which were 54.2 percent of the total main workers in 1991 were reduced to 32.1 percent in 2001 Census, further reduced to 28.8 percent in 2011.

83. The economy of the Sonepat district was mainly agricultural but now tertiary activities are taking lead in the district, yet the proportion of marginal workers engaged in agricultural activities (cultivators and agricultural laborers) are very high (63.1 per cent). Main workers engaged in agricultural activities during 2001 were 45.8 per cent whereas they are now 41.4 percent in 2011 Census showing a steep decline in these activities. Mixed economy prevails and is progressive overall.

6. Cropping Pattern

84. The crops grown in three districts of subproject region are divided into two main categories viz. kharif and rabi, locally called as sawani and sadhi. The former is the summer season harvest and the latter the winter season harvest. Any crop which does not strictly fall within these two harvests is known as a zaid crop and its harvest is called the zaid kharif or zaid Rabi, according to the harvest with which it is assessed. Toria (an oilseed) is cultivated as zaid kharif and vegetables, melon and green fodder as zaid Rabi. Major Kharif crops of the district are sugarcane, American and desi cotton, jowar, bajra, and paddy while the minor ones are pulses (moong, mash, and moth), vegetables, til, san, patsan, gwara (guar), groundnut and fruits etc. The major rabi crops are wheat, gram, barley and oilseeds (sarson, taramira) while the minor ones are barseem, lucerne, methi, tobacco, potatoes and vegetables, etc.

7. Electrification

85. Power availability in the State has improved drastically over the last four decades which was 601 million KWH during 1966-67 and 26,466 million KWH during 2007-08. During 1966-67 per capita consumption were 48 units KWH which increased to 507 units per capita KWH during 2000-01 and 905 units per capita KWH during 2009-10.

86. **Rohtak**: In Rohtak district, out of 136 inhabited villages, all villages make use of electricity for domestic purposes, as well as for agricultural and other purposes Census 2011 results show 95.2 percent of the households in the district makes use of electricity for lighting purposes. The district with these percentage ranks 6th among the districts of the State.

87. **Sonepat:** There were 47.9 lakh total electric connections in the State, out of which 35,12,501 were domestic connections in 2009-10 whereas in Sonepat circle including Sonepat district there were 2,31,186 domestic connections out of total 2,77,084 connections.

88. In Sonepat district, power supply position is quite good. As regards use of electricity for domestic purposes, cent per cent of the villages in the district are electrified. Out of 319 inhabited villages, all the villages make use of electricity for agricultural purposes, domestic purpose and for other purposes. In Sonepat 93.8 per cent of the households use electricity as the main source of lighting in comparison to 90.5 per cent of the State and 67.3 per cent households in India.

89. **Panipat:** There were 47.9 lakh total electric connections in the State, out of which 36.8 lakh were domestic connections in 2010-2011 whereas in Panipat circle including Panipat district there were 1.48 lakh domestic connections out of total 2.09 lakh connections.

90. In Panipat district, power supply position is quite good. As regards use of electricity for domestic purposes, cent percent of the villages in the district are electrified. Out of 176 inhabited villages, all the villages make use of electricity for agricultural purposes, domestic purpose and for other purposes. In Panipat district 95.3 percent of the households use electricity as the main source of lighting in comparison to 90.5 percent of the State and 67.3 percent households in India.

D. Social and Cultural Resources

1. Population and Communities

91. As per the census of 2011 the Rohtak district having a population of 1,061,204 consists of 568,479 male populations and 492,725 female populations. Decadal growth rate of 12.9 percent has been recorded in the district during 2001-2011 periods. The density of population in the district has gone up to 608 persons per square kilometer in 2011 as against 539 persons in 2001. As per Census 2011 in Haryana the rank of density is 11th out of 21 districts of Haryana. Out of a total population of 1,061,204 in the district, 615,040 persons live in rural area whereas 446,164 persons live in urban area. About 42.0 percent of the total population of the district lives in urban area but accounts for 5.0 percent of the total urban population of the state in 2011. The decadal growth of population in the district is 12.9 percent during 2001-2011 and it is 0.7 percent in rural area and 35.4 percent in urban area.

92. Panipat district having a population of 1,205,437 consists of 646,857 male populations and 558,580 female populations. Decadal growth rate of 24.6 percent has been recorded in the district during 2001-2011 period. The density of population in the district has gone up to 951 persons per square kilometer in 2011 as against 763 persons in 2001. As per Census

2011 in Haryana the rank of density is 3rd out of 21 districts of Haryana.

93. Sonepat district having a population of 1,450,001 consists of 781,299 male populations and 668,702 female populations. Decadal growth rate of 13.4 per cent has been recorded in the district during 2001-2011 periods. The density of population in the district has gone up to 683 persons per square kilometer in 2011 as against 603 persons in 2001. As per Census 2011 in Haryana the rank of density is 8th out of 21 districts of Haryana.

94. Rohtak CD block has the highest concentration of population in all the CD blocks but it has the lowest Sex ratio 852 in the sub project CD blocks. CD Block Gohana has the highest sex ratio 897. The number of villages and rural population of the sub project blocks are given in the **Table 10** below.

Table 10: Demographic Profile Of The Blocks Of The Sub Project

Sl. No.	District	Community Development Block	Total number of inhabited villages	Total rural population			Sex Ratio
				Persons	Males	Females	
4	Rohtak	Rohtak	52	2,05,347	1,10,868	94,479	852
1	Sonepat	Mundlana	29	1,11,980	60,537	51,443	850
2	Sonepat	Kathura	17	72,709	39,509	33,200	840
3	Sonepat	Gohana	35	1,21,637	64,136	57,501	897
2	Panipat	Madlauda	35	1,34,077	71,601	62,476	873
3	Panipat	Panipat	33	1,14,441	61,779	52,662	852
4	Panipat	Israna	31	1,26,075	67,453	58,622	869

Source: Census of India, 2011

95. There is no population notified as Scheduled Tribes in the entire state. Out of the total population of the concerned district the scheduled castes population is greater in Panipat CD block (24.76 percent) followed by Madlauda CD block (23.22 percent) and lowest is in Gohana CD block (19.2 percent). The SC and ST population in the CD Blocks through which Rohtak-Panipat rail track passes is given in **Table 13** below:

Table 11: SC And ST Population Of The Subproject Cd Blocks

Sl. No.	District	Community Development Block	Total scheduled castes population	Total scheduled tribes population	Percentage of scheduled castes population to total population	Percentage of scheduled tribes population to total population
1.	Rohtak	Rohtak	39604	0	19.29	0
2.	Sonepat	Mundlana	23294	0	20.8	0
3	Sonepat	Kathura	14436	0	19.85	0
4.	Sonepat	Gohana	23360	0	19.2	0
5.	Panipat	Madlauda	31129	0	23.22	0
6.	Panipat	Panipat	28339	0	24.76	0
7.	Panipat	Israna	24833	0	19.7	0

Source: Census of India, 2011 of India, 2011

2. Health Facilities

96. Medical facilities in the subproject districts are satisfactory. Medical College of Rohtak

is the major Institution for Medical Education and Research and a tertiary care centre for provision of specialized health care services not only to the people of the State of Haryana, but also to those from Punjab, Rajasthan, Delhi and western U.P. In the year 1994, Medical College, Rohtak was renamed as Pt. B.D.Sharma, Medical College, and Rohtak and subsequently it was upgraded to a Post Graduate Institute of Medical Sciences in the year 1995. Today Pt. B.D.Sharma, PGIMS, Rohtak is a famous institution not only for medical education but also for the health care facilities both at the National as well as International level. The data on medical facilities in the subproject districts is given in **Table 12** below:

97. Among all the districts Sonepat district is having the highest number of PHC's, community health Centre and sub centres. Medical facilities in Panipat are poor compare to other three districts.

Table 12: Health Facilities In The State And Project Districts

District	Hospitals	PHCs	Dispensaries	CHCs	Sub-Centres	Total
Rohtak	3	23	4	7	114	151
Sonepat	2	33	10	8	164	217
Panipat	2	17	4	1	90	114
Haryana	57	468	125	94	2,630	3,374

Source: Statistical Abstract of Haryana 2015-16, Department of Economic and Statistical Analysis, Haryana 2017

98. As per the details of census 2011 primary health sub centres are maximum in CD Block Rohtak in the sub project CD Blocks and population of all the CD blocks are having access to Medical facilities. The details of the medical institutions in sub project CD Blocks are given in the **Table 13** below whereas CD block wise health facilities have been given in **Table 14**.

Table13: Health Facilities In The Sub Project CD Blocks

Sl. No	District	CD Block	Villages having Medical institutions					
			Community health centre	Primary health centre	Primary health sub centre	Maternity and child welfare centre	T.B. clinic	Hospital-allopathic
1	Rohtak	Rohtak	1	6	38	8	0	0
2	Sonepat	Mundlana	1	2	21	1	1	0
3	Sonepat	Kathura	0	2	12	1	2	0
4	Sonepat	Gohana	0	5	20	5	4	1
5	Panipat	Madlauda	0	2	19	2	0	0
6	Panipat	Panipat	0	2	16	2	0	0
7	Panipat	Israna	1	2	18	3	2	0
	Total		**3**	**21**	**144**	**22**	**9**	**1**

Source: Census of India, 2011

Table 14: Health Facilities In The Project Blocks

Sl. No.	District	CD Block	Villages having Medical institutions									
			Hospital-alternative medicine	Dispensary	Veterinary hospital	Mobile health clinic	Family welfare centre	Medical practitioner (with MBBS Degree)	Medical practitioner (with other degree)	Medicine shop	Others	No medical facility
1	Rohtak	Rohtak	0	10	36	0	3	5	12	11	0	3
2	Sonepat	Mundlana	0	4	19	0	0	3	17	10	0	1
3	Sonepat	Kathura	0	1	13	0	0	4	6	9	0	0
4	Sonepat	Gohana	1	5	20	0	0	2	7	9	0	6
5	Panipat	Madlauda	5	5	24	0	0	2	10	13	0	3
6	Panipat	Panipat	2	2	20	0	0	5	11	9	4	3
7	Panipat	Israna	5	4	21	0	0	9	11	13	3	3
Total			**13**	**31**	**153**	**0**	**3**	**30**	**74**	**74**	**7**	**19**

Source: Census of India, 2011

3. Education Facilities and Literacy

99. The literacy rate of the Rohtak, Panipat and Sonepat districts is 80.2 percent, 75.9 percent and 79.1 per cent respectively. Literacy rate in all the three subproject districts is higher comparing to the state literacy rate i.e. 75.6 percent. The male literacy rate in all the subproject districts (Rohtak 87.7%, Panipat 83.7% and Sonepat 87.2%) is higher than that of female literacy rate (Rohtak 71.7, Panipat 67.0 and Sonepat 69.8). The gap between male and female literacy rate is 16.0 points in Rohtak district, 16.7 points in Panipat district and 17.4 points in Sonepat district during 2011.

100. The CD Block Rohtak has the highest literacy rate 77.92% and CD Block Madlauda lowest 72.77% 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 19.5 to 21.00 points. The literacy rate of the sub project CD Blocks are given in the **Table 15** below:

Table 15: Literacy Rate Of The Sub Projects Cd Blocks

Sl. No.	District	CD Block	Literacy rate (%)			Gap in male-female literacy rate
			Persons	Males	Females	
1	Rohtak	Rohtak	77.92	87.17	67.12	20.05
2	Sonepat	Mundlana	74.39	83.92	63.24	20.68
3	Sonepat	Kathura	75.08	84.31	64.15	20.16
4	Sonepat	Gohana	76.47	85.75	66.25	19.5
5	Panipat	Madlauda	73.83	82.98	63.43	19.55
6	Panipat	Panipat	72.77	81.95	62.09	19.86
7	Panipat	Israna	73.16	82.98	61.98	21.00

Source: Census of India, 2011

101. The details of educational facilities available in the sub project CD Blocks have been provided in **Table 16** below:

Table 16: Educational Institutions In The Project CD Blocks

Sl. No.	District	CD Block	Villages having educational institutions							
			Pre-primary school	Primary school	Middle school	Secondary school	Senior secondary school (SS)	Degree college of arts science & commerce	Degree college of engineering	Medical college
1	Rohtak	Rohtak	29	46	44	40	33	0	1	1
2	Sonepat	Mundlana	27	29	27	25	16	0	1	0
3	Sonepat	Kathura	16	17	17	15	11	0	0	0
4	Sonepat	Gohana	24	34	31	26	20	1	2	1
5	Panipat	Madlauda	28	34	32	26	17	0	1	0
6	Panipat	Panipat	23	29	27	18	9	0	0	0
7	Panipat	Israna	13	31	28	19	12	1	4	0
	Total		**160**	**220**	**206**	**169**	**118**	**2**	**9**	**2**

Source: Census of India, 2011

E. Archaeological Resources

102. There are no heritage sites notified by Archaeological Survey of India (ASI) within the regulated distance of 300 m from the subproject area.

F. Common Property Resources

103. 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 Rohtak-Panipat rail track as well as in the proposed corridor of transmission line.

IV. ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

A. Environmental Impacts

104. The electrification of Rohtak- Panipat rail corridor 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 "Electrification of Rohtak- Panipat rail corridor" 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 electric towers and poles, etc.
(iv) **Operation and maintenance impacts.** Impact associated with the operation and maintenance of the infrastructure built in the subproject.

105. 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.

B. Location Impacts

106. The Rohtak-Panipat rail corridor is an existing corridor and all works for track electrification will be taken up within the available RoW. However, for transmission line from Mundalana substation to TSS location will be brought through agriculture fields and for this line also 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 rail line and in the planned alignment of transmission line. 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 area of ecological, archaeological or historical importance. The rail line is existing and operational since the year 1960.

107. The Rohtak- Panipat rail corridor and transmission line are located within seismic zone

IV which implies that subproject site and surroundings are moderately susceptible to earthquakes.

C. Impacts during Design and Preconstruction Phase

108. As noted above, the all works will be taken up within the rail corridor owned by the Indian Railways. There are no issues arising due to land acquisition or involuntary resettlement in transmission line also. During transmission line erection damage for the crop loss will be compensated as per policy of the State Government. The details have been covered in the short resettlement plan in the separate cover. There is an estimated tree cutting of about 150 trees in the alignment of Transmission line. These are common trees in the existing alignment and are not endangered or critically endangered. There is no requirement of tree cutting in the rail corridor for erection of electric poles and SSP, SP and TSS. Based on the environmental screening of the subproject area, there are no significant adverse environmental impacts during the design and preconstruction phases.

109. **Climate Change:** 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. As mentioned earlier, although rail line does not cross any river or natural stream, but flood may occur due to sudden heavy rains due to cloud burst situations. 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

110. All construction activities to be undertaken at the site in charge appointed by the CORE office at Rohtak. The construction stage impacts due to the proposed project 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 safeguard team. The key potential impacts are covered in the following paragraphs.

111. **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. The storage of construction materials will not be significant as it will be required only for small foundation works poles and at TSS, SP and SSP locations. Hence, due consideration will be given for proper material storage on construction sites along the transmission line and along the rail corridor. Stock piles will be covered to protect from dust and erosion. Waste materials will be disposed off at identified and approved locations. The locations will be identified the contractor and approved by the designated safeguard officer of CORE and Safeguard consultants hired by the CORE under the TA.

112. **Disposal of construction waste:** The construction waste could lead to untidy conditions at sites of TSS, SP and SPP 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. In the proposed subproject, it shall be mandatory for the contractors to ensure proper disposal of the construction waste at the disposal site as designated by the CORE and remove from the site as soon as possible to a licensed facility (e.g. material recovery facility).

113. **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.

114. **Increase in noise levels:** Noise levels in the immediate proximity of subproject site

are expected to increase during construction within the vicinity of the site. These will be limited during construction phase only. 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. 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 levels will be reduced on account of natural barriers (natural vegetation, trees, boundary walls, etc.). To minimize occupational noise, contractors will be required to use PPEs to reduce occupational noise impact on them. Noise measurements should be carried out along the track to ensure the effectiveness of mitigation measures.

115. Noise level increase during construction will be limited to civil works and will be confined to relatively small area as rail line in major portion being away from habitations (only Gohana, Panipat and Rohtak cities and Brahamanwas village (near CH8+000) have built-up areas on either side of Railway RoW). The duration of construction will also be relatively brief (two years). Transportation of construction materials and construction activities will be limited to daytime to avoid disturbance to nearby communities. The construction noise is not expected to be felt at residential areas as most of the locations of construction (TSS, SP, SSP and Transmission line) are away from habitations in open areas. The electrification and civil works construction activity noise (foundation for poles, transportation of poles, and wiring and sagging) will not be felt at receptors, at the above mentioned built up locations, exceeding 70-75 dB(A) for a short time. This conclusion is drawn based on typical noise generation from use of construction equipment (**Table 17).** 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.). The noise at built up locations (Brahamnawas village, and Rohtak, Gohana and Panipat cities) is expected to be 70-75 dB(A) range. It may be mentioned that residential houses / and or commercial establishments are, at about 20 m at Rohtak, 30 m at Gohana, 20 m at Panipat and 15 m at Brahamanwas village, from Rohtak- Panipat rail line.

Table 17: 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

Clearing Equipment		Structure Construction Equipment	
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

116. Further, at residential locations close to rail line, adverse noise impacts are not anticipated as Occupational, Safety and Health Association (OSHA), USA has specified a limit of 90 dB(A) for 8-hour continuous exposure for workers. The construction activities of electrification works are not likely to generate 90 dB(A) noise continuous for 8 hours. But necessary monitoring of noise levels will be taken up as part of environmental monitoring plan during the construction phase.

117. **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. 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. There is no requirement of cutting of trees at locations of SSP, SP, TSS and Tower Wagon Shed locations also. However, there is requirement for cutting of about 150 trees in the transmission line route. Some of the scattered wild shrubs will have to be cleared for the construction of the TSS, SSP, SP and bay at 132 kV Mundala substation for the transmission line. As part of compensatory plantation, 1500 trees will be planted in the vacant space along the corridor of Rohtak- Panipat rail line as per statutory requirements of MoEFCC. There are no endangered or rare species of flora and fauna at any of the sites of project where construction works to be taken up for the electrification of track as well as along the alignment of electric supply transmission line.

118. **Disturbance to traffic during construction phase:** The disturbance to the traffic is minimal as electrification works are not likely to interfere with road traffic (Rail corridor away from Panipat - Rohtak road) 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 are not for significant distance so increase in traffic in the subproject area on account of construction activity will not be felt.

119. **Impact on cultural properties:** The proposed Rohtak- Panipat Rail Electrification subproject will not have any impact on any religious structure or any other structure of historical and/or cultural significance.

120. **Groundwater:** Ground water will not be extracted and used for construction purposes. The water requirement for the construction will be very less in quantity because project involves construction of small foundations. The contractor will arrange for water from the market. It will be supplied by water tankers. The problem of ground water contamination is also not anticipated during the construction phase since there will be proper disposal of the waste water.

121. **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.

122. 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.

123. **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.

124. The contractors of electrification and transmission line 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

125. 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 the surroundings of Rohtak- Panipat National Highway; and
- Overall positive impact on economic development on account of improvement rail transport in the region.

126. **Noise Levels:** Electrification works along the existing rail corridor and transmission line works once completed will have environmental impacts such as noise generation and the train movement will normally consist of relatively short periods of high noise levels throughout the day and night periods. The noise level predictions have been carried out and predicted levels given in subsequent paragraphs. However, with limited number of train movement the intermittent noise peaks will be limited. The noise level though nearby settlement and other

sensitive receptor viz schools etc. will be minimized by provision of suitable noise mitigation measures such as speed limitation, plantation and noise barrier walls (if needed). Noise measurements should be carried out along the track to ensure the effectiveness of mitigation measures.

127. **Wastes**: Electrification works along the existing rail corridor and transmission line works once completed will have limited environmental impacts such as 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 Rohtak / Panipat. The waste oil generated at the transformers of transmission line will also be disposed off by the HVPNL as per law and established procedure of HVPNL. No solid waste generation or air emissions are likely to be generated from the infrastructure facilities created for rail electrification.

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

- The SSP, SP, TSS and Bay of transmission line at 132 kV substation will be equipped with fire-fighting systems with portable fire extinguishers and smoke detectors. All locations of SP, SSP, TSS and 132 kV substation of HVPNL can be approached by the local roads in cash 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.

129. **Socioeconomic impacts:** As mentioned above, the project will have positive impacts on socio-economic environment such as easier access to education and health facilities at Rohtak and Panipat cities, and reduction in travel and time cost on account of cheaper and reliable train journey.

130. **Flora and fauna:** During finalization of alignments of electric supply transmission lines, tree cutting has been minimized by adjusting the alignment. The impact on flora will be positive as there will be compensatory plantation in the vacant RoW space of the rail corridor. There will be compensatory plantation of 1500 trees to compensate for 150 trees to be cut in the alignment of transmission line, as per regulatory requirements (MoEFCC). There will be plantation of locally grown trees only and no plantation of any endangered species of plants.

131. **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 6.** The predicted noise levels are given below in **Table 18.** The noise levels during passage of train will be in the form peaks and these will prevail for 2-3 minutes. There is only 6 times movement of passenger trains and 3-4 freight trains movement. So noise generation is not continuous. It is clear that as per evaluation criteria of noise (refer Appendix 6 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 3-6 dB(A) on account of movement of electric locomotives in the post electrification phase. It may further be mentioned that Rohtak- Panipat rail line is single line so movement of two trains in opposite directions and parallel is ruled out.

132. 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 18: 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	Rohtak City at location	0+800 (near SP site) on RHS	22	89.9	84.46	115
2	Residential Houses near Makrauli Station	10+000 on RHS	30	87.5	84.41	115
3	Gohana City	30+500 on RHS	32	91.2	84.40	115
4	TSS Location Near Mundalana	42+600 on LHS	30	87.0	84.41	115
5	Residential area near Israna railway Station	53+500 on LHS	50	86.3	84.32	115
6	Panipat City	69+000 on RHS (near SP site)	20	91.0	84.47	115

OSHA=Occupational Safety and Health Association, USA

133. **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 Safe Operating Procedures (SOPs) of Indian Railways. For natural calamities the Disaster Management Plan prepared by Northern 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. Description of Planned Mitigation Measures

134. Screening of environmental impacts is based on the magnitude and duration of the impacts. **Table 19** provides the potential environmental impacts and the mitigation measures including the institutional responsibilities for implementing the same. The subproject site is located sufficiently away from protected areas and the components proposed will not impact any environmentally sensitive or protected areas.

Table 19: 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 IV. There will be regular maintenance of all infrastructure created as part of the project to ensure long term sustainability. The foundations for poles and other planned infrastructure such SP, SSP buildings, Tower and wagon shed have been designed taking into consideration zone IV seismic coefficient. The rail corridor and proposed alignment of transmission line is not crossing any river or major stream. During the earthquake or any other natural calamity Disaster Management Plan prepared by the Northern Railway will be followed.	CORE Rohtak
2: Design and Preconstruction Impacts					
2.1	Permissions, permits / License,	Permanent	Major	Obtain all necessary permissions, permits, clearance, NOCs, etc., prior to start of	CORE Rohtak

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
	clearances, NOC, etc.			construction works, specially tree cutting permission, Notification of district collectors for the payment of crop damage to the farmers in the alignment of transmission line, license from local labor office, etc. 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.	
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. No mitigation measures are warranted.	Not applicable
2.4	Increased storm water runoff from alterations of the construction site's natural drainage patterns due to l 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.	CORE and HVPNL
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	CORE and HVPNL

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				• Usage of energy-efficient lighting fixtures (LED and solar)	
3: Construction Impacts					
3.1	Construction camp—location, selection, design and layout	Temporary	Moderate	The construction camp will be located within the available land of Railway for works in rail Corridor and in available land of 132 kV substations at Mundalana for transmission line works. These camps will not affect the day to day activities local villagers as both the rail line and 132 substations are located away from habitation. Adequate sanitation facilities shall be provided at camp site and no waste water will be discharged outside.	Contractor, CORE /HVPNL
3.2	Impacts on flora and fauna (Cutting of 150 Trees in alignment of electricity supply transmission line route)	Temporary	Moderate	Minimize tree cutting by adjusting alignment of transmission line through open fields. Prepare tree plantation plan for compensatory plantation in 1: 10 ratio (minimum 1500 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 HVPNL takes up compensatory tree plantation in the available land.	HVPNL, 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	Temporary	Moderate	The commencement of site clearance activities will be undertaken with due permission from the SSE or the authorized official appointed by the CORE. All areas used for temporary construction operations will be subject to complete restoration to	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
	site at 132 kV station at Mundalana			their former condition with appropriate rehabilitation procedures	
3.5	Drinking water availability at construction camp and at work sites	Temporary	Major	Sufficient supply of potable water will be provided and maintained. The drinking water will be obtained from the market through authorized tankers. This water will be stored in a tank of suitable size to ensure uninterrupted water supply.	
3.6	Waste disposal	Permanent	Major	Location of disposal site for construction waste will be finalized by the CORE office Rohtak. They will confirm that disposal of the material will not impact the water body or environmentally sensitive areas. 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 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 power, the water will be pumped to a nearby drain to avoid soil erosion in the agriculture fields.	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
3.9	Soil and water pollution due to fuel and lubricants, construction waste	Temporary	Moderate	The vehicle cleaning and parking of vehicles (associated with the construction works) shall be avoided near local drains to avoid pollution.	Contractor(s), CORE
3.10	Siltation of water bodies due to spillage of construction wastes	Temporary	Moderate	No construction wastes will be disposed into any streams near the rail line. Extraneous construction wastes will be transported to the pre-identified disposal site for safe disposal.	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 near built up areas at Rohtak, Gohana, and Panipat will be properly barricaded with adequate height prefabricated mild steel sheets from all sides to avoid air emissions and dust impacts on houses.	Contractor(s), CORE
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	Noise limits for construction equipment used in this project will not exceed 75 dB (A) at 1 m distance as per CPCB norm. The construction sites at Rohtak, Gohana and Panipat will be properly barricaded with adequate height prefabricated mild	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				steel sheets from all sides to avoid construction activity noise impacts on neighboring houses.	
3.14	Material handling at sites	Temporary	Moderate	Workers employed on mixing cement, lime mortars, concrete, etc., will be provided with protective footwear and protective goggles. Workers who are 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(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).	Contractor(s), CORE
3.15	Disposal of construction waste	Temporary	Moderate	Safe disposal of the construction waste will be ensured in the pre-identified disposal locations. In no case will construction waste be disposed off around the project site and especially in vacant plots or in the agriculture fields	Contractor(s), CORE
3.16	Safety measures during construction	Temporary	Moderate	Adequate safety measures for workers during handling of materials at site will be taken up and training of construction workers on OHS issues will also be taken up. The contractors have to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger to workers from	Contractor(s), CORE

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
				fire, accidental injury, etc. First aid treatment will be made available for all injuries likely to be sustained during the course of work. The contractors will conform to all anti-malaria instructions given to him by the CORE.	
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 HVPNL officials. For natural calamities, disaster management plan prepared by the Northern Railway and HVPNL under the provisions of Disaster Management Act 2005 will be followed.	Contractor(s)
3.18	Clearing of construction of camp and restoration	Temporary	Major	Contractors 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 HVPNL 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

Sl. No.	Potential Environmental Issues	Duration / Extent	Magnitude	Proposed Mitigation Measures	Institutional Responsibilities
4.2	Safety risks	Temporary	Major	Proper demarcation and flagging of the area requiring safety observations at sites of SSP, TSS, and SP	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 Northern Railway will be followed.	Northern Railway operation department

CORE = Central Organization for Rail Electrification, HVPNL = Haryana Vidyut Prasaran Nigam Limited, LED = light emitting diode, NOC = no objection certificate, 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

135. The project is to be implemented by the Chief Project Director (CPD) office at Ambala. The CPD is being assisted by the Deputy Chief Engineer Electrical (DCEE) and Assistant Executive Engineer Electrical (AEE). The CORE also has an office at Rohtak. The Senior Section Engineer (SSE) will be the for the day to day implementation of works for electrification in Rail corridor and Sub Divisional Officer (SDO) of HVPNL at Rohtak for transmission line works. Both the site 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.

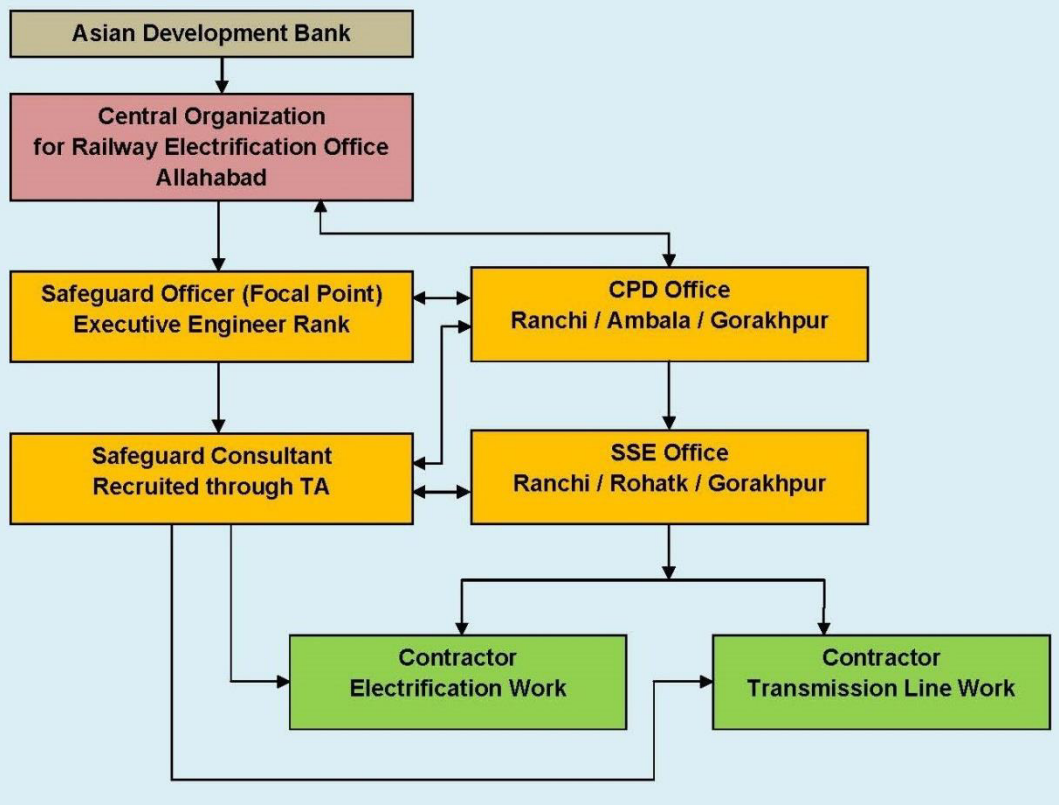
136. In order to ensure effective implementation of safeguard related components in the project CPD office will designate an officer as Safeguard Officer. This Safeguard Officer will ensure compliance with the IEE requirements, and implementation of environmental management plan of sub-project at sites through the SSE and contractor. The designated safeguard officer of CORE will be assisted by safeguard consultants available through 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.

137. As part of TA, one team of safeguards consultants comprising of Environmental Specialist cum Team Leader, Health, Safety and Environment (HSE) 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 monitoring, capacity building of CORE, associated contractors and CORE Regional Offices and reporting to ADB and other statutory undertakers. For subprojects level implementation, four teams will be formed. 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**.

138. Both the contractor(s) at the respective sites of Electrification and Transmission line 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 13**.

139. The EMPs for pre-construction, construction and operation phases are given in **Tables 20 to 22** for Rail Track Electrification works and in **Tables 23 to 25** for Electric Supply Transmission works.

Figure 13: Project Implementation Arrangement For Safeguard Compliance



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

140. **Responsibility for monitoring:** During construction, the Safeguards Consultants from CPD Ambala office and the designated representative engineer of the contractor's will monitor the contractor's performance on EMP compliances. During the operation phase, monitoring will be the responsibility of the Divisional Executive Engineer. The safeguards Consultants will prepare semiannual reports.

141. **Responsibility for Reporting:** The CPD Ambala office will submit semi-annual reports on the implementation of the EMP to ADB. It will permit ADB to field environmental review missions to examine in detail, the environmental aspects of the project. Any major lapses in adhering to the IEE and / or EMP the subproject should be reported to ADB immediately. The Safeguard Consultants will assist the CPD office in finalizing the semi-annual and annual progress reports. For any non-compliance observed corrective actions will be taken in a time bound manner. The cost for mitigating none 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 20: Environmental Management Plan For Preconstruction Phase For 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 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 IV 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) ill 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 at Gohana station. It will mix well with the Gohana station building.	Tower wagon shed 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
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

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
4	Increased storm water runoff from alterations of the site's natural drainage patterns due to l 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	After mobilization of contractor at site and during construction works for foundations	Incidental to construction cost
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 - Usage of energy efficient lighting fixtures (LED)	Specification s structures, electrical fixtures	SSE	CORE	During finalization of detailed designs	Project cost
6	License, permits,	• Obtain all necessary license, permits, clearance, NOCs, etc. prior to start of civil works.	Licenses, permits,	SSE	CORE	Check labor License, district collector and or /	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
	clearances, NOC, etc.	• Acknowledge in writing and provide report on compliance all obtained licenses, permits, clearance, NOCs, etc.	clearance, and NOCs' records and communications			local Panchayat permission for establishment of labor camp, if needed	
7	Establishment of baseline environmental conditions prior to start of civil works	• 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. • Conduct base line monitoring in respect of noise levels at TSS as per monitoring plan	Records and photographs	Contractor	SSE	Once prior to construction	Contractor
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	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
9	Social and Cultural Resources	• Consult Archaeological Survey of India or Haryana State Archaeology Department to obtain an expert assessment of the archaeological potential of Rohtak- Panipat rail corridor • Consider alternatives if the site is found to be of medium or high risk. • 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	SSE Office	CORE	Prior to start of construction activities	Project cost
10	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 SSE in consultation with Safeguard Consultants at CPD office • Potential sites, within the rail 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	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
		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 available vacant building stations close to the construction sites. • At construction camp sanitation facilities shall be adequately planned.					
11	Sources of construction materials	• Use quarry sites and sources licensed by the Government of Haryana. If materials are procured from market, ensure supplier source is from licensed quarries. • 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 by contractor	Project cost
12	Access for construction material transportation	• Transport all construction materials to the sites through the metalled (paved) road to avoid generation of dust and damage to agriculture fields. • Schedule transport and hauling activities during during day time (9.0 AM to 6.0 PM).	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
		• Locate entry and exit points in areas where there is low potential for traffic congestion in Gohana 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) corresponding personal protective equipment for each identified hazard, (iii) health and safety training for all site personnel, (iv) procedures to be	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
		followed for all site activities, and (v) documentation of work-related accidents. • Provide medical insurance coverage for workers.					
14	Public consultations and Disclosure	• Continue information dissemination, consultations, and involvement or participation of stakeholders during project implementation. • CORE will disclose IEE document immediately on their website and make available copies of IEE at Ambala Office, and CEE office Rohtak,	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 • During construction	Project cost

CORE= Central Organization for Electrification, 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 21: Environmental Management Plan for Construction 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	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 of at designated locations.	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
2	Traffic circulation plan during construction	• Prior to commencement of site activities	Safe movement of traffic around TSS site at	Contractor	SSE	Every day during construction	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
		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. • The contractor with support of SSE will disseminate these information and circulation plan at the site and at all level crossings.	Mundalana railway crossing and Mundalana village			phase	
3	Site clearance activities, including delineation of construction areas	• Only ground cover or shrubs that directly affect the permanent works or necessary	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
		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 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 supply source and availability of water, source of water used by the tankers	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
		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.					
5	Waste disposal	• The pre-identified	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
		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 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	management plan			construction phase	

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		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	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. • To avoid disruption or disturbance to other water users, the contractor shall	Source of water used by the tankers	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
		arrange water from the market through authorized tanker suppliers or from the local municipality and consult SSE before finalizing the source.					
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	Locations of slope protection	Contractor	SSE	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
		excavation, due to high water table in project area, shall be pumped to nearest natural drain					
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
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.	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
		• 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					

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		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 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	Water bodies specially village ponds near the	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 surface water bodies. • Extraneous construction wastes will be transported to the pre-identified disposal sites for safe disposal.	construction sites				
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. The water spray	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
		records will be maintained at site. • All filling works are to be protected or covered in a manner to minimize dust generation.					
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,	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
		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 for 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	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
		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.					

Sl. No.	Environmental Issues	Mitigation Measures	Parameter / Indicator for Compliance	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		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 location, will be carried out as per monitoring plan.					
16	Impacts on flora and fauna	• 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	Record barricades along excavation works	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
		construction sites of SSP, SP and TSS					
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 chemicals (Paints, thinners, solvents, etc.) will be strictly in accordance with the manufacturer's instructions. The contractor will give at least 6 working days'	Data on available personal protective equipment	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
		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. The chemicals mentioned above are meant for site consumption. The empty barrels of these chemicals will be sent back to the manufacturers for recycle and reuse.					
18	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 and in accordance with	Disposal sites	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 waste management plan approved by SSE • In no case will any construction waste will be disposed of around the construction sites or along the rail corridor indiscriminately.					
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	Records of availability of personal protective equipment, availability of first aid kits	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 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					
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 SSE and CORE safeguard Officer and Safeguard Consultants engaged	• Onsite emergency plan document and Disaster Management Plan document of Northern Railway	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
		through ADB funded TA. • 2- For natural calamities, disaster management plan prepared by the Northern Railway under the provisions of Disaster Management Act 2005 will be followed.					
21	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	Restoration plan, and records of preconstruction of temporary sites	Contractor	SSE	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
		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					

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 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 site as suggested in the monitoring plan through an approved monitoring agency.	Monitoring results and relevant standards	Northern Railway 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 Northern 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	Northern Railway	CORE	Regularly during operation phase	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
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 Northern Railway Rohtak office through appropriate support staff will be responsible for maintenance of shrubs, tree plantation planted as part of compensatory plantation. Minimum 90 % survival of plants and shrubs will be maintained. Any shortfall will be made up before onset of monsoon every year.	Survival of planted trees, shrubs, and grass in landscape area.	Deputy Chief Engineer Office Rohtak	CORE	Every year before onset of monsoon for first 3 years	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 23: Environmental Management Plan for Preconstruction Phase for Electric Supply Transmission Line

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 IV 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	HVPNL	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 HVPNL are existing so impacts on aesthetics will not be felt	Transmission line route	HVPNL	CORE	Review after finalization of transmission line alignment	Project cost
3	Slope stability related issues	• The construction sites of Poles and Bay of transmission line at	Slope protection measures on	HVPNL	CORE	Review of recommended	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
		substation are in flat terrain, however, during construction any exposed slopes at excavated areas will be covered and slope protection measures will be provided.	side slopes of excavated areas for the foundations			slope protection measures	
4	Increased storm water runoff from alterations of the site's natural drainage patterns due to l excavation works and addition of paved surfaces at location of Bay at 132 kV substation 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	HVPNL	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 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.	Specifications structures, electrical fixtures	HVPNL	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
		- Installation of Bureau of Energy Efficiency-certified equipment in the works					
6	License, permits, clearances, NOC, etc.	• Obtain all necessary license, permits, clearance, 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	HVPNL	CORE	Check labor License, district collector and or / local Panchayat permission for establishment of labor camp, if needed	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 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	• HVPNL 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	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
8	Social and Cultural Resources	• Consult Archaeological Survey of India or Haryana State Archaeology Department to obtain an expert assessment of the archaeological potential of transmission route • Consider alternatives if the alignment is found to be of medium or high risk. • 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	SDO Office	CORE	Prior to start of construction activities	Project cost
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 HVPNL in consultation with Safeguard Consultants hired through ADB funded TA	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
		• 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 Mundalana. 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 Mundalana village or 132 kV substations (close to the construction sites). • At construction camp sanitation facilities shall be adequately planned.					
10	Sources of construction materials	• Use quarry sites and sources licensed by the Government of Haryana. If materials are procured from market, ensure supplier source is from licensed quarries. • Verify suitability of all material sources and obtain approval from SDO.	Permits issued to quarries or sources of materials	Contractor SDO to verify sources of construction materials	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
		• Submit monthly to SDO office a documentation of sources of 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	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 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.	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
		• 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	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, HVPNL = Haryana Vidyut Prasaran Nigam Ltd., NOC = no objection certificate
Source: Asian Development Bank.

Table 24: Environmental Management Plan For Construction Phase For Electric Supply Transmission Line

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 of at designated locations. • Drinking water quality at camp sites will be tested to ensure that it meets Drinking water 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	SDO Office	Regularly (weekly) during construction phase	Contractor fee
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.	Safe movement of traffic at transmission line crossing at NH-71	Contractor	SDO Office	Every day 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 with support of SDO office will disseminate these information and circulation plan at the site.					
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 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	SDO Office	Duration of site preparation	Contractor fee
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	Water supply source and availability of water, source of water used by the tankers	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
		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.					
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 with the help of safeguard consultants appointed through TA 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	Waste disposal sites, waste management plan	Contractor	SDO Office	Regularly during construction phase	Contractor fee
6	Stockpiling of construction materials	• Stockpiling of construction materials will be done in such a way that it does not	Subproject stockpiling sites	Contractor	SDO Office	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
		impact and obstruct the drainage. • Stockpiles will be covered to protect from dust and erosion.				construction phase	
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	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 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, due to high water table in project	Locations of slope protection	Contractor	SDO Office	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
		area, shall be pumped to nearest natural drain					
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	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, 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	Vehicle parking, refueling sites, oil interceptor functioning	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
		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 maintenance and parking area at construction sites transmission line alignment, visual observation for soils contamination at construction sites	Contractor	SDO Office	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	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, internal unfinished roads/walkways and locations of sand and sub grade storages. The water for spraying will be used	Subproject site visual observation and water spray records	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
		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.					
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 for all vehicles and machinery used during the contract period, which shall be produced for verification whenever required.	Pollution under control certificates (Vehicle emission norms specified by GOI) of vehicles and machinery	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
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.	Certificates of vehicles conforming noise standards, noise monitoring results	Contractor	SDO Office	Regularly during construction phase	Contractor fee
16	Impacts on flora and fauna	• Limit activities within the work area delineated for electric poles	Record barricades along	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
		• Trees to be cut should be identified and compensatory plantation (for 150 trees to be cut) should be planned. After complementary plantation, minimum survival of 90 % will be ensured before onset of monsoon every year. For any shortfall fresh saplings be planted. • Should be taken up at vacant space of rail corridor in consultation with CORE Officials.	excavation works				
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 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	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
		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. • The contractor will conform to all anti-malaria	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
		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 of CORE and TA Consultants appointed through ADB funded TA. 2- For natural calamities, disaster management plan prepared by the HVPNL under the provisions of Disaster Management Act 2005 will be followed.	• Onsite emergency plan document and Disaster Management Plan document of HVPNL	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, IEE = initial environmental examination, HVPNL = Haryana Vidyut Prasaran Nigam Ltd.,
Source: Asian Development Bank.

Table 25: Environmental Management Plan for Operation Phase for Electric Supply Transmission Line

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 due to irregular solid waste collection	• The HVPNL will maintain cleanliness at location of HVPNL • Solid waste disposal will be integrated with the disposal of Mundalana town	Maintenance schedule of Bay at Substation	HVPNL	CORE	Regularly during maintenance phase	CORE
2	Natural disasters	• Necessary procedures to be followed by the HVPNL staff at Substation	Warnings of disasters by the Meteorological Department	District administration	HVPNL	During disasters	HVPNL
3	Waste Generation on account of maintenance and operations of Transmission line	• The transmission line will be maintained by the HVPNL. Any waste generated due to maintenance will be taken by the HVPNL office staff for possible reuse and recycle.	Waste generated from the operation and maintenance of electrification installations	HVPNL	CORE	During entire operation phase	HVPNL

CORE= Central Organization for Electrification, HVPNL= Haryana Vidyut Prasaran Nigam Limited, SDO = Sub Divisional Officer
Source: Asian Development Bank.

C. Emergency Response Plan

142. 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 Haryana SDMA.

143. 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.

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

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

146. 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.

147. 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).

148. 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.

149. During the construction phase (24 months), the electrification works will be under the jurisdiction of Indian Railways and Electric Supply transmission line works will be under the HVPNL jurisdiction. Hence, HVPNL 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.

150. 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 Haryana 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 HVPNL during construction and operation.

D. Environmental Monitoring Plan

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

Railways and be monitored by CORE. The Safeguard Officer of CORE will coordinate with SSE and HVPNL to ensure environmental parameters are monitored and reported.

152. 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 26 and 27** below for rail track electrification works and Electric Supply Transmission Line works respectively.

Table 26: 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 site of TSS	Once in preconstruction phase to establish baseline	Contractor through approved monitoring agency during construction phase and Northern Railway Operations Department /CORE during operation phase	INR 39,000/ US $ 600
		During construction phase			Once every 3 months (except monsoon season) during construction phase		
		Operation phase			Once every season except monsoon season for first 2 years		
	Ambient Air Quality	During preconstruction phase	PM 2.5, PM10, SO2 and NOx	Construction site of TSS	Once in preconstruction phase to establish baseline	Contractor in construction phase and Northern Railway during operation phase	INR 130,000/ US $ 2000
		During construction phase			Once every 3 months (except monsoon season) during construction phase		
		Operation phase			Once every season except monsoon season for first 2 years		
2	Waste Disposal and Cleanliness at construction site and construction camp	During preconstruction phase	Delineation of area for temporary waste storage	TSS, SP, and SSP	Identification for temporary storage once before start of work at sites and at construction camp	Contractor	Contractor fee
		During construction phase	Waste storage and disposal at camp and construction site	TSS, SP, and SSP	Regularly during construction	Contractor	Contractor Fee

Sl. No.	Field (environmental attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/ US$)
		Operation phase	Maintenance and waste disposal at TSS, SP and SSP	TSS, SP, and SSP	Regularly during operation phase	Northern Railway	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	Northern Railway	Part of operation cost

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

TABLE 27: Montiring Plan for Electric Transmission Line 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 camp	During preconstruction phase	Delineation of area for temporary waste storage	Bay site at 132 kV substation and locations of poles	Identification for temporary storage once before start of work at sites and at construction camp	Contractor	Contractor fee
		During construction phase	Waste storage and disposal at camp and construction site	Construction camp	Regularly during construction	Contractor	Contractor Fee
		Operation phase	Maintenance and waste disposal at substation site	132 kV substation	Regularly during operation phase	Northern Railway	Part of operation cost
2	Compensatory Plantation	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	Northern Railways	Part of operation cost

Source: Asian Development Bank.

E. Summary of Site and Activity-Specific Plans

153. **Table 28** summarizes site and activity-specific plans to be prepared as per EMP tables.

Table 28: Environmental Management Plan–Site And Activity Plans And Programs

Preparation Phase	Specific Plan/Program	Purpose	Responsible for Preparation	Responsible for Implementation
Preconstruction phase	Environmental monitoring program	Indicate monitoring locations, methodology and parameters	SSE	Contractor
Preconstruction	Chance find protocol	To address archaeological or historical finds	SSE	Contractor
Preconstruction phase	List of preapproved sites	Location/s for work camp, areas for stockpile, storage and disposal	SSE	Contractor
Preconstruction phase	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	Health and safety plan	Occupational health and safety	Contractor	Contractor

SSE = Senior Section Engineer
Source: Asian Development Bank.

F. Capacity Building

154. 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 at 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 either from sister organization RVNL or individual consultants recruited under a separate TA provided by ADB. 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 29**.

Table 29: 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 HVPNL 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 Rohtak office, SSE Rohtak, and HVPNL 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 Rohtak office, SSE Rohtak, and HVPNL 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 Rohtak office, SSE Rohtak, and HVPNL officials involved in the transmission line works	½ working day	Environmental and Social safeguard specialists from TA team

CORE= Central Organization for Electrification, SSE= Senior Section Engineer, HVPNL = Haryana Vidyut Prasaran Nigam Ltd., TA= Technical Assistance Team
Source: Asian Development Bank.

G. Environmental Budget

155. 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 30.**

Table 30: 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 One location at TSS site (one sample at preconstruction and six samples during construction phase; total 7 samples)	3000	21,000	Contractor
Ambient Air Quality One location at TSS site (one sample at preconstruction and six samples during construction phase; total 7 samples)	10,000	70,000	Contractor
Compensatory Plantation of 1500 trees to compensate for 150 trees cutting in transmission line including 3 years maintenance	1500	2,250,000	CORE
Training for Capacity Building of stakeholders	Covered in the consultancy cost of Planned TA		
Total Construction Phase Monitoring Cost (A)		**2,341,000**	**Contractor**
B: OPERATIONS & MAINTENANCE (O&M) PHASE			
Noise Quality One location at TSS site, thrice a year, for first 2 years (three samples a year, total of six samples)	3,000	18,000	CORE / Northern Railway through Monitoring agency
Ambient Air Quality One location at TSS site, thrice a year, for first 2 years (three samples a year (total of six samples)	10,000	60,000	CORE/ Northern Railways operations department through monitoring agency
Maintenance of ompensatory plantation,	Covered in per tree cost considered		
Total O&M Phase Monitoring Cost (B)		**78,000**	**CORE/Northern Railway**
Total Cost (A+B)		**2,419,000**	
Contingencies @ 5%		**120,950**	
Total Budgeted Cost		**2,539,950 (Say 2.6 million)**	
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**		

Monitoring Component	Rate	Amount	Source of Fund
B: OPERATIONS & MAINTENANCE (O&M) PHASE			
Waste disposal and cleanliness maintenance at Bay site at Substation	Covered operation and maintenance cost (electricity charges recovered by HVPNL from Northern Railway for the electricity) of Transmission Line		
Total Budgeted cost	-	**Nil**	
3: Total EMP Budget for Subproject			
Total EMP Budget for electrification and transmission line		2.6 million	

CORE= Central Organization for Railway Electrification, EMP= Environmental Management Plan, HVPNL= Haryana Vidyut Prasaran Nigam Ltd., TA= Technical Assistance
Source: Asian Development Bank.

H. Environmental Monitoring and Reporting

156. The CPD office through SSE Rohtak will monitor and measure the progress of EMP implementation while supervising civil construction activities. Safeguard Consultants engaged through TA will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. 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 semiannual monitoring reports for submission to ADB during construction and annual monitoring reports during operations phase.

157. 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

158. The electrification of Rohtak-Panipat rail 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, the sub-project can be characterized as innocuous.

159. In view of this, 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 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, Haryana Vidyut Prasaran Nigam Ltd. 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.

160. During the consultations, local residents opined the need for the electrification of the corridor for the better services of rail passengers through incorporation of electrified locomotives. 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 31**.

Table 31: Stakeholder Consulted And Dates Of Consultations

Sl. No.	Stakeholders Consulted	Dates of Consultations
1	CORE officials at Rohtak	15 -16 November 2017
2	Haryana Vidyut Prasaran Nigam Ltd.	16 November 2017
3	Residents of Jassia Village	16 November 2017
4	Residents of Mundalana Village	16 November 2017
5	Rail Passengers at Rohtak Junction	16 November 2017
6	General Public at Level Crossing at Rohtak Junction Railway Station	16 November 2016

CORE = Central Organization for Rail Electrification
Source: Asian Development Bank.

161. The views, comments, and suggestions of stakeholders and their incorporation in project design are presented in **Tables 32 and 33.** 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 32: 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	Level Crossing Rohtak Junction Railway station	16/11/2017	Local Shop keepers near crossing, General Public crossing rail line and Rail users	• Rail Electrification and need • Electrification benefits • Implementation schedule • Environmental and social impacts during electrification	• The participants welcomed the electrification project and requested for fast implementation. • The participants suggested that existing rail services should not be disturbed during implementation. The consultants replied that existing train services will not be disturbed during electrification. • The participants enquired about additional express trains on the corridor to be introduced after

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					electrification. The CORE official accompanying consultants replied that this decision will be taken by the Ministry of Rail after completion of electrification works. • The participants suggested during the project works execution works should avoid any waste disposal. The consultant replied that no waste will be left after completion works. An EMP has been prepared and this EMP will be implemented.
2	Rohtak Junction railway station	16/11/2017	Rail Passengers and Railway Officials at station	• Electrification of corridor • Problems faced during train journey and suggestions for improvement • Environmental and social impacts • Project benefits • Implementation schedule	• The passengers welcomed the electrification project and requested for early implementation • . The passengers complained that there is huge rush during morning service of trains so frequency should be increased. The consultants replied that Railway authorities will look into this after electrification and suggestion will be conveyed to the authorities. • One of the passenger suggested that train sanitation facilities should be maintained properly. The consultants replied that suggestion has been noted. • The environmental expert requested the participants for suggestions to reduce pollution during project implementation. The passengers suggested that solar power should be planned and trees should be planted to compensate vegetation removal and tree cutting. The environmental expert

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					replied that Indian railway is adopting roof top solar system in its new buildings. Tree cutting is not likely in electrification works, but in electric supply transmission line erection some tree cutting will be required. For this compensatory plantation will be taken up in 1: 10 ratio (10 new trees to be planted for every tree to be cut).
3	Mundalana Village	16/11/2017	Local Villagers	• Electrification of corridor • Problems faced during train journey and suggestions for improvement • Environmental and social impacts • Project benefits • Electric Transmission line from 132 Substation to TSS	• 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 station to TSS and enquired about compensation payment. The consultants replied that exact route will be finalized by the HVPNL during transmission line erection, but it will be avoided through village, tree plantations, and water bodies. The transmission line length is about 8 km. The social expert replied that compensation for crop damage for transmission line will be paid as per policy of Government of Haryana. • The participants demanded for an underpass for facilitation of track crossing near the village. The consultants replied that current project is only track electrification and underpass provisions may be considered during lying of additional line.

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
					• The participants complained of late arrival of train due to this difficulty is faced by the working people, villagers visiting Rohtak Medical college Hospital for health needs and students commuting by the train to the cities of Panipat and Rohtak. The consultants replied that after electrification efficiency will improve and delays are expected to be less. • The participants complained of heavy crowd in the trains and demanded for the increased frequency of local passenger trains. They told that train journey is cheaper and time saving in comparison to road journey. The consultants suggested that for this they should write to railway authorities. • One participant suggested that roof top solar panel should be installed at the new buildings to minimize electricity consumption. The consultants informed the participants that suggestion has been noted and will be conveyed to CORE. • One of the participants enquired about location of TSS (in Railway land or Government land). The consultants replied that TSS location is near Level crossing and it is on Government land.
4	Jassia village	16/11/2017	Local villagers and road users	• Electrification of corridor • Problems faced during train journey and suggestions for improvement	• The consultants briefly explained the project details to the participants and also explained advantages of electrification such as reduced air emissions and noise levels. • The local participants complained of delayed

Sl. No.	Place	Date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
				• Environmental and social impacts • Project benefits	train arrivals and none availability of persons at booking counter of Jassia station. They suggested that there should be improvement in these. They welcomed the electrification project. The consultants replied that above problems are not pertaining to the electrification project. It's better, a written communication is sent to the Rail Authorities by the village Panchayat. • The locals demanded that construction waste of the project should not be disposed off in the agriculture fields or close to irrigation channels. The consultants replied that in the current project generation of construction waste will be insignificant. But no waste will be disposed off in agriculture fields or close to irrigation channels. An EMP is being prepared and this will be implemented.

CORE= Central Organization for Rail Electrification, EMP= Environmental Management Plan, HVPNL= Haryana Vidyut Prasaran Nigam Ltd., TSS = Traction Sub-station
Source: Asian Development Bank.

Table 33: 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 Rohtak, 15/11/2017 and 16/11/2017	CORE Officials	Clearances, permissions, Tree cutting, Land acquisition and Transmission route	• The ADB Team and Staff consultants 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 tree cutting in the project. The CORE officials explained that there will be no requirement for tree cutting within the rail corridor. But there may be requirement for tree cutting in the electric transmission line to be raised from 132 kV substations from Mundlana to TSS site.

Sl. No.	Place and date	Stakeholders	Issues Discussed	Outcome of Discussions and Consideration in Project Design and Implementation
				• 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. • The environmental expert enquired whether the rail corridor from Rohtak to Panipat passes through reserved forest or any Wild Life sanctuary. The CORE officials replied that Rail Corridor from Rohtak to Panipat is not passing through any reserved forest or Wild Life area.
2	Haryana Vidyut Prasaran Nigam Ltd., Panipat, 16/11/2017	Officials of HVPNL	Transmission line route, tree and vegetation removal, compensation payment strategy	• The ADB consultants provided an overview of ADB SPS 2009 and requirements of compliance for the current project and enquired about transmission route finalization. • The HVPNL officials explained that electric transmission line for the TSS is planned from Mundalana 132 substation and length is about 8 km. They further explained that route is not passing through any reserved or protected forest and protected areas. The tree cutting required for the line will be around 150 trees in agriculture fields in the proposed corridor. • The HVPNL 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 corridor.

CORE= Central Organization for Rail Electrification, EMP= Environmental Management Plan, HVPNL= Haryana Vidyut Prasaran Nigam Ltd., TSS = Traction Sub-station
Source: Asian Development Bank.

B. Consultation and Information Disclosure

162. **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.

163. **Information disclosures:** 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.

C. Grievance Redress Mechanism

164. 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's (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.

165. 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 14**. The cost for functioning of Grievance Redress Mechanism will be accounted for in project cost as part of DCEE functioning.

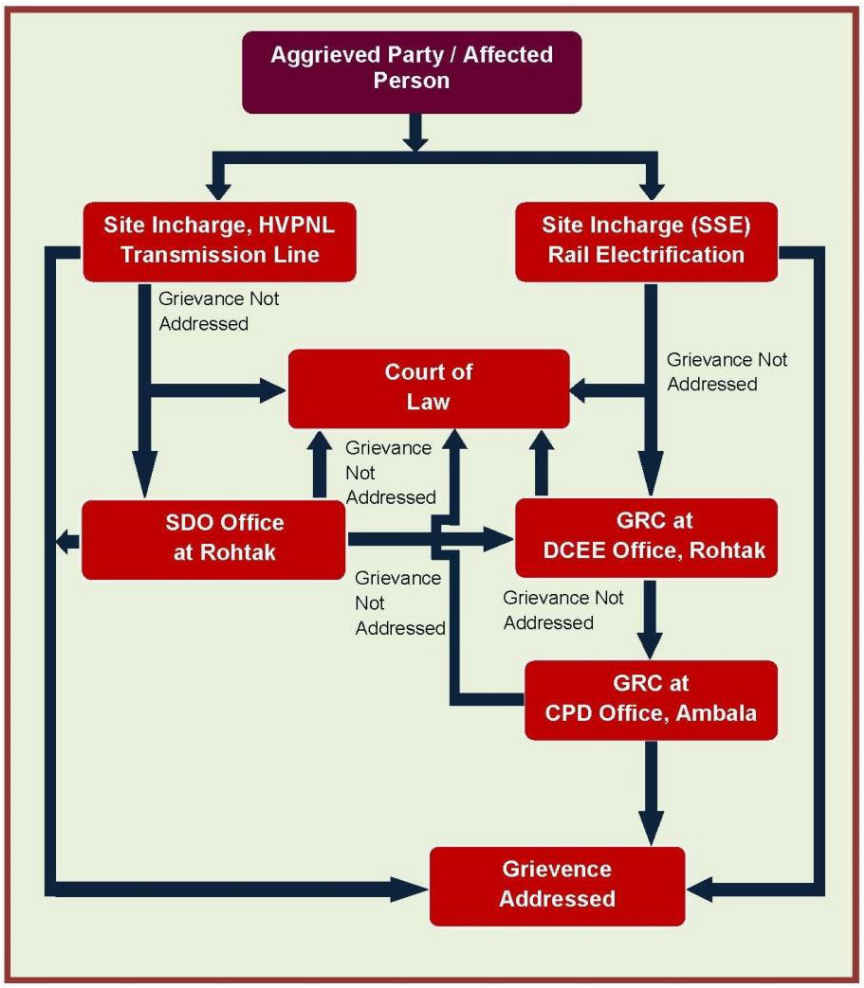
166. Since the transmission line for the TSS will be implemented by the HVPNL separately under the instructions of CORE, any person (s) / aggrieved party can approach to the site office of HVPNL. The site incharge will resolve the complaint within a week. If the complaint is not resolved within a week, it will be sent to the SDO office at Rohtak. The SDO office Rohtak 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.

167. In addition to above mentioned GRM, all stakeholders will have access 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's Private Sector Operations Department (PSOD) including the India Resident Mission.

168. **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.

169. This GRC at CPD office will headed by the CPD, HVPNL SDO, 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 HVPNL site office and / or CPD office.

Figure 14: Grievance Redress Mechanism



DCEE = Deputy Chief Engineer Electrical, CPD = Chief Project Director, GRC= Grievance Redress Committee
Source: Asian Development Bank.

VII. FINDINGS AND RECOMMENDATIONS

170. 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.

171. 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.

172. 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

173. 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 Rohtak- Panipat rail track 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: Rohtak- Panipat Rail Track 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 Rohtak- Panipat Rail Track)

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 identified, one of them is Rohtak to Panipat. This rail track is of about 71 km length. As part of electrification one electricity supply transmission line of about 8 km is also planned from 132 kV substation of HVPNL at Mundalana to TSS site proposed at km 42+600 (LHS). The rail track and transmission do not pass through a pass through any protected areas (national parks, bird sanctuaries, tiger reserves, etc.), reserved or protected forests. There is no crossing of any perennial river or water body by the rail track and transmission line. There are no wetlands; mangroves; or estuaries in or near the rail track of the Rohtak- Panipat route and proposed alignment of transmission line.	**SDES Comments**

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: Rohtak- Panipat Rail Track Electrification)**

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 Rohtak- Panipat rail track and proposed transmission line route for electricity supply (from 132 kV substation at Mundalana to TSS location near Mundalana village)
▪ Protected Area		√	There are no protected areas within the aerial distance of 10 km from the Rohtak-Panipat rail track as well as proposed alignment of electric supply transmission line
▪ Wetland		√	There is no wetland around rail track and proposed route of electric transmission line
▪ Mangrove		√	There are no Mangroves around rail track and proposed route of transmission line as both are not close to coast or creek.
▪ Estuarine		√	The rail track from Rohtak to Panipat and proposed route of transmission line are not close to estuary as both are away from coast.
▪ Buffer zone of protected area		√	The subproject alignment is not in buffer zone of protected area
▪ Special area for protecting biodiversity		√	There is no special area for biodiversity protection near the Panipat- Rohtak 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 electrification project 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.

Screening Questions	Yes	No	Remarks
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?		√	There is no presence of any sensitive or protective areas close to Rohtak- Panipat rail track as well as route of electric transmission line.
▪ 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 for Rohtak-Panipat 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 surface water sources such as village ponds, rivers or natural streams close to Rohtak- Panipat rail track and proposed alignment of transmission line, so chances of any impact on surface water quality are not there.
▪ 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 cutting, 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.
▪ 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 project 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 Rohtak- Panipat 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 are no tribal and / or Indigenous Peoples habitations along the Rohtak- Panipat rail line, so no impacts on these communities 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.

Screening Questions	Yes	No	Remarks
▪ 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 camp 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 and will be part of contract document to the appointed contractor.
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	The water stagnation at construction camp 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 line 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 rail line is not crossing any perennial stream or river. No chances of contamination as camp site as vehicle maintenance will not be taken up at camp side.
▪ 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

Screening Questions	Yes	No	Remarks
▪ 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: Rohtak- Panipat Rail Track Electrification)
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 line is 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

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 Specialist

[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.

Appendix 4: Environmental Assesment 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.

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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 5: Continuous Ambient Air Quality Monitoring Data At Rohtak (Jan 2015 To Oct 2016)

Haryana State Pollution Control Board

Continuous Ambient Air Quality Monitoring Report

Monitoring Agency	:	ENVIRONNEMENT SA INDIA PVT LTD
Month& Year	:	January 2015 to Oct 2016
Name of City	:	MDU, Rohtak
Name of Station	:	HSPCB Bahadurgarh

Parameters/ Units	PM_{10}	$PM_{2.5}$	CO	NO	NO_2	NO_x	O_3	SO_2
Months	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
Jan-15	*	59.74	1.02	7.19	24.24	31.43	22.86	2.76
Feb-15	94.34	*	0.88	7.92	27.16	35.34	24.45	4.16
Mar-15		48.93	0.79	3.10	26.49	29.67	26.13	3.91
Apr-15	95.71	*	0.62	9.88	28.10	38.05	27.38	3.87
May-15	*	52.13	0.99	7.46	24.91	32.29	18.50	2.43
Jun-15	95.75	*	0.60	6.91	18.99	25.90	24.41	2.66
Jul-15	72.56	54.46	0.62	9.14	29.10	38.24	18.25	2.55
Aug-15	83.40	36.64	0.83	9.42	26.65	35.92	21.02	2.30
Sep-15	100.13	47.80	0.75	2.71	24.52	27.23	34.55	4.16
Oct-15	89.01	50.80	0.55	4.47	21.65	26.09	25.52	2.89
Nov-15	102.87	57.09	0.97	4.84	20.24	25.05	18.64	3.80
Dec-15	*	73.15	0.93	5.85	25.22	31.07	18.93	3.64
Jan-16	*	61.42	0.74	9.35	23.09	32.41	20.26	3.94
Feb-16	*	68.27	0.98	9.79	21.59	31.38	20.17	4.55
Mar-16	*	55.91	1.15	10.69	23.01	33.70	18.65	4.76
Apr-16	*	47.57	1.09	7.84	21.70	29.53	20.13	4.66
May-16	*	41.78	1.02	7.02	17.70	24.73	19.53	4.13
Jun-16	*	39.37	0.80	4.44	10.91	15.35	16.86	3.93
Jul-16	*	32.10	0.49	4.50	16.77	21.28	22.32	3.36
Aug-16	*	36.02	0.49	4.59	16.27	20.86	23.59	2.81
Sep-16	*	43.61	0.81	6.47	18.28	24.75	19.02	2.59
Oct-16	*	58.58	0.57	5.58	19.75	25.32	30.66	3.80
Nov-16	*	72.84	0.79	5.99	15.03	20.98	19.55	3.40
Dec-16	*	97.93	0.70	8.07	16.97	25.31	21.24	3.92
Jan-17	*	84.80	0.87	6.76	13.59	20.35	19.45	4.56
Feb-17	*	76.96	0.83	7.76	12.16	19.92	20.06	4.57
Mar-17	*	57.87	0.48	5.09	14.29	19.39	26.11	4.13
Apr-17	*	73.22	0.37	4.70	11.89	16.59	30.55	5.06
May-17	*	78.11	0.53	5.30	13.13	18.59	23.19	9.52
Jun-17	*	55.70	0.84	5.29	19.10	24.08	24.42	3.96
Jul-17	*	57.97	0.77	6.65	20.12	26.78	22.48	3.89
Aug-17	*	79.70	0.63	5.22	17.55	23.22	27.42	6.71
Sep-17	*	129.41	0.83	16.43	16.83	26.65	27.75	6.49

Parameters/ Units	PM_{10}	$PM_{2.5}$	CO	NO	NO_2	NO_x	O_3	SO_2
Months	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
DAILY AVRAGE								
01-10-17	*	144.63	1.08	11.99	15.90	23.98	21.09	6.48
02-10-17	*	139.88	1.08	12.07	15.93	24.16	21.10	6.48
03-10-17	*	34.64	1.03	12.12	16.11	22.41	10.46	10.11
04-10-17	*	68.24	0.96	6.80	15.64	18.59	15.66	13.09
05-10-17	*	80.16	0.86	4.15	16.97	17.00	24.16	11.50
06-10-17	*	78.28	0.97	3.78	18.01	17.65	22.53	9.28
07-10-17	*	72.41	0.98	3.91	17.46	18.31	21.84	9.50
08-10-17	*	67.76	0.92	4.01	16.70	17.29	22.75	8.24
09-10-17	*	*	*	*	*	*	*	*
10-10-17	*	*	*	*	*	*	*	*
11-10-17	*	83.14	0.87	3.04	18.28	14.10	21.31	3.94
12-10-17	*	81.52	0.85	4.36	16.88	13.87	20.98	4.06
13-10-17	*	79.83	1.67	5.23	14.78	14.18	21.64	4.91
14-10-17	*	71.65	1.00	3.90	15.53	13.51	19.77	5.06
15-10-17	*	81.19	1.11	5.16	18.56	16.13	18.37	6.82
16-10-17	*	70.85	1.03	7.25	23.09	24.43	32.36	11.16
17-10-17	*	93.49	1.74	7.23	24.23	24.03	31.99	14.56
18-10-17	*	138.91	1.51	8.60	24.74	21.12	16.25	11.29
19-10-17	*	177.47	1.69	13.69	29.63	26.28	23.15	16.24
20-10-17	*	177.98	5.92	16.31	24.10	24.69	12.99	7.41
21-10-17	*	141.03	3.66	12.58	23.8	21.36	13.4	7.12
22-10-17	*	81.79	2.02	10.87	24.88	21.18	12.98	7.14
23-10-17	*	131.68	2.17	8.19	18.69	17.02	13.27	5.88
24-10-17	*	124.99	2.35	7.11	18.84	17.07	14.32	2.16
25-10-17	*	130.84	2.48	5.79	20.28	17.81	14.04	2.06
26-10-17	*	137.95	2.58	5.05	15.19	13.4	15.13	4.2
27-10-17	*	144.99	2.18	4.17	13.68	11.6	15.41	4.11
28-10-17	*	106.52	2.44	4.19	13.66	11.61	15.26	4.32
29-10-17	*	124.01	2.29	4.17	13.67	11.6	15.48	4.17
30-10-17	*	140.57	2.64	5.13	14.51	12.62	16.27	3.81
31-10-17	*	178.19	3.81	6.22	14.92	13.38	15.57	4.16
Average	*	107.37	1.79	7.17	18.56	18.11	18.71	7.32

Source: Haryana State Pollution Control Board

District level month wise Rainfall data from 2012 to 2016 in Subproject Region

District	YEAR	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEPT		OCT		NOV		DEC	
		R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP
Rohtak	2012	3.1	-84	0.4	-98	0	-100	18.1	95	5.3	-73	8	-84	58	-70	145	-26	21.8	-68	3	-78	0	-100	1	-87
	2013	1	-95	4.3	-74	0	-100	18	94	0	-100	26.8	-46	49.6	-74	113	-42	33.3	-51	17	27	0	-100	0	-100
	2014	2	-90	7	-58	9.6	-46	8.6	-8	11.4	-42	8.9	-82	26.8	-86	22.6	-88	40.6	-41	0	-100	0	-100	10.2	29
	2015	6.6	-66	0.2	-99	37.3	110	69.8	651	6	-70	35.1	-29	77.2	-60	78.4	-60	4	-94	6.5	-52	1.2	-79	0	-100
	2016	0	-100	0.2	-99	15.3	-13	0	-100	21.4	8	16.5	-67	107	-45	123	-37	0.8	-99	0	-100	0	-100	0	-100
Sonepat	2012	6.7	-65	0	-100	0	-100	15.6	63	1.2	-93	1.4	-97	49.1	-75	237	13	27.2	-68	1.4	-93	0.8	-86	21.9	177
	2013	24.9	28	107	585	0	-100	0.9	-91	0	-100	32.9	-29	122	-37	178	-15	68.9	-19	39.4	93	0.5	-92	2.5	-68
	2014	15.5	-20	25.3	62	23.1	60	5.4	-44	23.6	41	9.7	-79	52.9	-73	34.8	-83	65.3	-23	0.1	-99	0	-100	0.4	-95
	2015	13.9	-28	1.1	-93	82.4	472	42.2	340	21.4	28	72.8	57	180	-8	85.2	-59	10.6	-88	0	-100	5.7	-4	0	-100
	2016	0	-100	1.4	-91	42.5	195	0	-100	29.5	77	29.8	-35	115	-41	82.8	-60	6	-93	0.5	-98	0	-100	0	-100
Panipat	2012	11.2	-46	0	-100	0.2	-98	8.8	-7	1.7	-83	7.7	-86	42.5	-76	156	-24	32.3	-63	0	-100	1.9	-60	9.8	31
	2013	34.7	68	106	572	**5.** 1.3	**6.** -90	**7.** 2	**8.** -79	**9.** 1.3	**10.** -87	**11.** 35	**12.** -36	**13.** 38.1	**14.** -78	**15.** 139	**16.** -32	**17.** 15.3	**18.** -82	**19.** 17.6	**20.** -19	**21.** 1.1	**22.** -77	**23.** 2.8	**24.** -63
	2014	36.1	75	30.2	91	31.8	152	5.7	-40	21.5	117	13.9	-75	30.3	-83	42.5	-79	142	64	6	-72	0	-100	1.8	-76
	2015	7.8	-62	4.3	-73	80.1	535	29.9	214	25.9	162	51.7	-6	188	6	81.2	-60	45	-48	4.4	-80	4.1	-14	0	-100
	2016	0	-100	0.8	-95	43.9	248	0	-100	27.8	180	19.2	-65	86.9	-51	136	-33	5.4	-94	1.2	-94	0	-100	0	-100

Source: IMD, New Delhi

Note: (1) The District Rainfall in millimetres (R/F) shown below are the arithmetic averages of Rainfall of Stations under the District

(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.

(3) Blank Spaces show non-availability of Data

Appendix 6: 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 with 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 7: Responsibilities/ Broad Terms Of Reference (TOR) Of ADB Technical Assistance (TA) Safeguards 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 8: Consultation Photographs

Consultations at Rohtak near start point of Rail Track

Consultations at Jassia Village

Consultations at 132 kV station at Mundalana

Consultations at Mundalana village near TSS location