
Environmental Assessment Document

F. REHABILITATION OF 9 ROADS IN JHAJJAR DISTRICT

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I. INTRODUCTION

A. Background

1. The Project aims to promote growth and balanced development of the whole National Capital Region through providing economic base in the identified major settlements (Metro Centres/Regional Centres) for absorbing economic development impulse of Delhi, efficient transport network, development of physical infrastructure, rational land use pattern, improved environment and quality of life. In line with the objectives of the Regional Plan, the primary objective of this project are to improve quality of life and well-being of urban residents in the National Capital Region (NCR): This will be achieved by way of support to various agencies in the constituent States through NCRPB a line of credit to compliment the ongoing efforts of NCRPB in financing the regional Plan priorities and technical assistance to improve quality of planning, design and management interventions in the region. To address the twin business propositions of the National Capital Region Planning Board (NCRPB), – planner of relevance and a strategic financier, - the ADB line of credit comprises of both an investment loan USD 140 million and a TA component of USD 10 million. The projects to be taken up are typical of regions needs –small town water and sanitation, connectivity investments and transport infrastructure which provides multi modal transport linkages.

2. This Initial Environmental Examination (IEE) assesses the environmental impacts due to the proposed improvements to the following roads, 9 road stretches for a total length of 78.7km in Jajjar and Bahadurgarh districts in Haryana:

- Jharli Mohanbari Approach road (3.235 km)
- Jhajjar, Talao, Chhuchakawas road (13.460 km)
- Beri, Rohtak road (8.560 km)
- Badli to Durina via Ladpur Munimpur (11.430 km)
- Badli Pela Sondhi Yakubpur road (9.800 km)
- Subana (SH-22) Sarola Ahri road (6.640 km)
- Patauda (MDR-132 Dhani Saniyan Kahari Machroli(NH-71).(10.080 km)
- Jhajjar Farrukhnagar road (SH15A) Mubarakpur Ismailpur Mundakhera (MDR-136) Badli, Iqbalpur Galibpur upto Distt Border. (11.755 km)
- Badli Iqbalpur road Lohat Delhi Border. (3.765 km)

3. The IEE specifies measures towards addressal of the impacts. The IEE has been prepared based on a review of sub-project designs; field visits, and secondary data to characterize the environment and identify potential impacts; and consultations with stakeholders. An Environmental management plan (EMP) outlining the specific environmental measures to be adhered to during implementation of the sub-project has been prepared.

B. Compliance to ESMS of NCRPB

4. Recognizing the environmental and social issues that can arise in infrastructure projects, NCRPB has prepared a Draft Environmental and Social Management Systems (ESMS) in line with ADBs safeguard requirements for Financial Intermediaries (FIs). The ESMS provides an overall management system to NCRPB to identify, assess, and mitigate environmental and social issues that are likely to arise in projects financed by NCRPB and implemented by Implementing Agencies (IAs). The ESMS outlines the policies, methods of assessments and procedures that will enable NCRPB to ensure that

a project that it funds is developed in accordance with ESMS and is adequately protected from associated risks. IAs will have to comply with the ESMS conditions while submitting their loan application. This IEE has been prepared in line with the ESMS of NCRPB.

C. Purpose of the IEE

5. The proposed components will result in positive environmental impacts. The alignments are proposed along the existing routes and all proposed improvements is envisaged within the available RoW. In case of stretches within settlements, resettlement impacts have been avoided through design of constricted cross-sections and provision of appropriate traffic management measures. Design of the alignment adopting this approach has enabled avoidance of impacts related to land acquisition, and impacts on agriculture lands.

6. Given the magnitude of civil works, there would be typical construction related impacts, and could be mitigated by appropriate mitigation measures and adoption of good construction practices. Further, these will be of limited intensity and of short duration. None of the project interventions as part of these proposed road improvements are proposed within locations in or near sensitive and valuable ecosystems, including protected areas and forests. Therefore, as per the ESMS, the sub-projects are categorized as 'B' and an IEE carried out. This IEE provides mitigation measures for impacts related to construction, operation, and maintenance.

D. Environmental Regulatory Compliance

7. The realm of environmental regulations and mandatory requirements for the proposed sub-project is shown in Table 1. The Environmental Impact Assessment (EIA) notification, 2006 by the Ministry of Environment and Forests (MoEF, GoI) specifies the mandatory environmental clearance requirements. Accordingly, all projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man-made resources. This project does not require any environmental clearances under the Environmental Protection Act 1986. However, the project will require consent from Competent Authorities such as the Haryana State Pollution Control Board.

Sub-Component	Applicability of Acts/Guidelines	Compliance Criteria
Roads and highways	Environmental (Protection) Act, 1986 (and as amended subsequently in 2006), and in 2009 The EIA notification, 2006 categorization of projects into category A and B, based on extent of impacts. All new state highway projects and state highway expansion projects in hilly terrain or in ecologically sensitive areas are categorized as category B projects.	According to the notification, the project roads do not fall under either category A or Category B. The roads included are district roads and are not state highways. Therefore, environment clearance is not required for the project. However, permission for felling of road side trees will be required. Consent for Establishment and Consent for Operation from the State Pollution Control Board will be required.

8. The ADB guidelines, stipulate addressing environmental concerns, if any, of a proposed activity in the initial stages of Project preparation. For this, the ADB Guidelines categorizes the proposed components into categories (A, B or C) to determine the level of environmental assessment¹ required to address the potential impacts. None of the project interventions are proposed within locations in or near sensitive and valuable ecosystems, including protected areas and forests. The sub-project has been categorized as B. Accordingly this IEE is prepared to address the potential impacts, in line with the recommended IEE content and structure for Category B projects. The IEE was based mainly on secondary sources of information and field reconnaissance surveys. Stakeholder consultation was an integral part of the IEE.

E. Report Structure

9. This Report contains 8 sections including this introductory section: (i) introduction; (ii) description of project components; (iii) description of the environment; (iv) environmental impacts and mitigation measures; (v) institutional requirements; (vi) public consultation and information disclosure; (vii) finding and recommendation; and (viii) conclusions. An Environmental management plan (EMP) outlining the specific environmental measures to be adhered to during implementation of the sub-project has been prepared.

¹ Level of environmental assessment required for each category of Project, as per ADB's Safeguards Policy Statement, 2009 and Environmental Assessment Guidelines 2003 is as follows: (i) Category A. Sub-project components with potential for significant adverse environmental impacts. An environmental impact assessment (EIA) is required to address significant impacts; (ii) Category B. Sub-project components judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for Category A projects. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report. (iii) Category C. Sub-components unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.

II. DESCRIPTION OF PROJECT COMPONENTS

A. Project Description

10. The thirteen road stretches proposed for rehabilitation and widening is shown in table below. Location map of the project roads is provided in the Figure below.

Table 1: Project Roads – Jhajjar District

Road No.	Name of Work	Length in (km)	Existing width (m)
1.	Jharli Mohanbari Approach road	3.235	3.66
2.	Jhajjar, Talao, Chhuchakawas road	13.460	5.50
3.	Beri, Rohtak road	8.560	5.50
4.	Badli to Durina via Ladpur Munimpur	11.430	5.50
5.	Badli Pela Sondhi Yakubpur road	9.800	5.50
6.	Subana (SH-22) Sarola Ahri road.	6.640	3.66
7.	Patauda (MDR-132 Dhani Saniyan Kahari Machroli(NH-71).	10.080	3.66
8.	Jhajjar Farrukhnagar road (SH15A) Mubarakpur Ismailpur Mundakhera (MDR-136)	11.755	3.66
9.	Badli Iqbalpur road Lohat Delhi Border.	3.765	3.66
	Total	78.73	

15. The HSRDC expressed their intention that land acquisition should be used as last resort and hence improvements are limited within the available land width. As such, there is no need to design the road links for high speed as most of the road users have their prime concern to reduce wear and tear to their vehicle by plying over good surface instead of present earthen/ gravel road. Therefore, the scope of geometric improvement can be considered fairly limited for this project except improvement to enhance blind curves which pose a major safety issue. Following paragraphs briefly explain features of each road.

16. Jharli - Mohanbari Approach road: This Road Starts at km 17/40 of MDR130 and terminates at Mohanbari village. The single lane bituminous carriageway is badly damaged. Extensive cracks, pot holes and raveling is noticed for the entire length. The proposed Fuel storage yard for Thermal Power Plant is located along the project road alignment and on commissioning of the yard, Tanker Lorries can use this road to carry fuel to the yard. No properly developed shoulder or defined ROW is noticed in this road. The project road is traversing through plain terrain and in general it is passing through agricultural land. The existing profile is generally at same level with general ground level and hence proper road drainage is absent. The pavement failure can be generally attributed to the poor drainage condition and lack of maintenance. The project road crosses Rewari – Jhajjar broad gauge railway line at Km 1+290. About 1.2km of the initial stretch of the project road has trees on the right side of the project road. Eccentric widening on the left side will save these trees. Project alignment is also passing through built-up locations with narrow RoW.

17. Jhajjar-Talao-Chhuchakawas road: This Road start from Jhajjar town and about 400m of alignment is passing through town area of Jhajjar having commercial and residential buildings on the either side of road. On the way it crosses Jhajjar bypass at Km0+400 and it ends at centre of Chuchhakwas village. One section of Project Road No.13 to Kheri village starts from Km 7+580. At chainage 0+840, construction of a new formation of railway line from Jhajjar to Rohatak is in progress and ROB/level crossing is required on commencement of train service. Big Eucalyptus trees on both the sides of the alignment is observed and about 1300 trees needs to be cut for the proposed widening. Intermediate lane bituminous carriageway with 1 to 1.5m wide earthen shoulder partially covered by vegetation exists all along the project road length. The existing alignment traverse through flat terrain and general land use is agricultural with exception of few builtup stretches. The height of embankment of the project road varies from 1.5 to 2m with earthen drain for about 2km. Existing condition of pavement is very poor with pot holes, alligator cracks and raveling present throughout the project road. Village portion of the alignment is provided with concrete road and it is in fair condition. Project road crosses two irrigation canals. The 5.5 m wide minor bridge on these canal crossings is found in good condition and can be widened.

18. Beri - Rohtak Road: The project road stretch starts at km 35+050 of MDR 122 and ends at Jhajjar district boundary in Ritoli village at Km 8+560. The alignment runs through plain agriculture fields and low lying areas prone to flooding. Flooding is observed at three stretches of about aggregate length of 900m where rising of embankment is required. Earthen shoulder is totally covered by vegetations and bushes. Pot holes, cracks and raveling are observed for the entire length of the alignment and pavement condition is rated as poor. Present avenue plantations are very close to the pavements in some stretches and that needs to be cut for proposed widening. Existing culverts are to be improved and new culverts to be introduced on low lying area where embankment rising is required.

19. Badli to Durina via Ladpur Munimpur: This road starts on the main market place in Badli town at km 17+200 of MDR 123 and ends at km 10+200 of SH15A.

Predominantly flexible pavement with 5.5m wide carriageway exist except at builtup stretches where concrete pavement with width varying from 3.5 to 5.5m. In most of the village areas no offset distance is available to the buildings from pavement/drain edge and hence further widening would be near impossible. Shoulder is missing in general and average embankment height of the project road which is generally runs through plain agricultural field is 1.5m. Pavement condition is generally poor which requires immediate strengthening to protect the residual life of existing crust.

20. Badli Pela Sondhi Yakubpur Road: This road also starts on the main market place in Badli town at km 18/9 of MDR123 and ends at km 20/1 of SH15A. Starting stretch of about 350m is passing through builtup section with buildings abutting on the edge of the pavement. Most of the project road is passing through flat terrain and agricultural land. About 700m of the project road is in low lying area where the road to be raised and proper cross drainage structures also to be provided. Towards the end, from Km 7+800 to Km 9+800 has avenue plantation on either side of the road. Pavements condition varies from good to fair except at few bad stretches of about 1500m.

21. Subana (SH-22) Sarola Ahri road: Project road starts at km 18/4 on SH.22 and ends in Km. 7+280 in Ahari village. Initial 400m is running through built up area, where domestic waste water is directly discharged into the road side drain and it often overflows and causing stagnation of waste water into the pavement leading to pavement failure. Most of the stretches are covered by agricultural land except village Sarola where buildings are constructed adjacent to the road edge preventing further widening. Some of the places are affected by water logging and the pavement is in very bad condition. Road stretch from Km 2+600 to end of the road could not be accessed due to ongoing road construction activities.

22. Patauda (MDR-132 Dhani Saniyan Kahari Machroli(NH-71)): This road begins at km 31/5 of MDR123 and ends at km 17/2 of NH 71. The alignment traverse largely through plain agricultural land and the average embankment height of the project road is about 1m. Continuous avenue tree plantations on either side of the road are observed on stretches from Km 1+ 800 to 4+800 and Km 7+600 to 10+000. Poor pavements condition is found on the entire length project road. Water stagnation is noticed at Km 7/6 due to poor drainage condition and at present vehicular movement is obstructed.

23. Jhajjar Farrukhnagar road (SH15A), Mubarakpur Ismailpur Mundakhera (MDR-136) Badli, Iqbalpur Galibpur upto Distt Border: This road has two distinct parts in which one part starts at km 26/7 of SH.15A from Jhajjar and ends at MDR 136 and the second part starts from MDR 136 about 1850m away from end of the previous stretch. It has an abandoned railway crossing at Km 0+297. Alignment runs mostly through plain agricultural land. Pavements are in bad condition throughout except at newly laid stretches of about 600m.

24. Badli Iqbalpur road - Lohat - Delhi Border: This road starts at km 34/2 of MDR 136 and ends at Delhi border. Most of the stretches are passing through agricultural field and avenue tree plantation is seen on intermittent stretches. Existing bituminous pavements are generally in good to fair condition.

2. Design Standards and parameters

25. The project roads are proposed to be designed as per the standards of Other Districts Roads. Accordingly IRC 73 "Geometric Design Standards for Rural Highways-1980" published by the Indian Road Congress is referred for finalizing project design standards. The design parameters considered for the project road improvements are summarized in the **Table 7.11**.

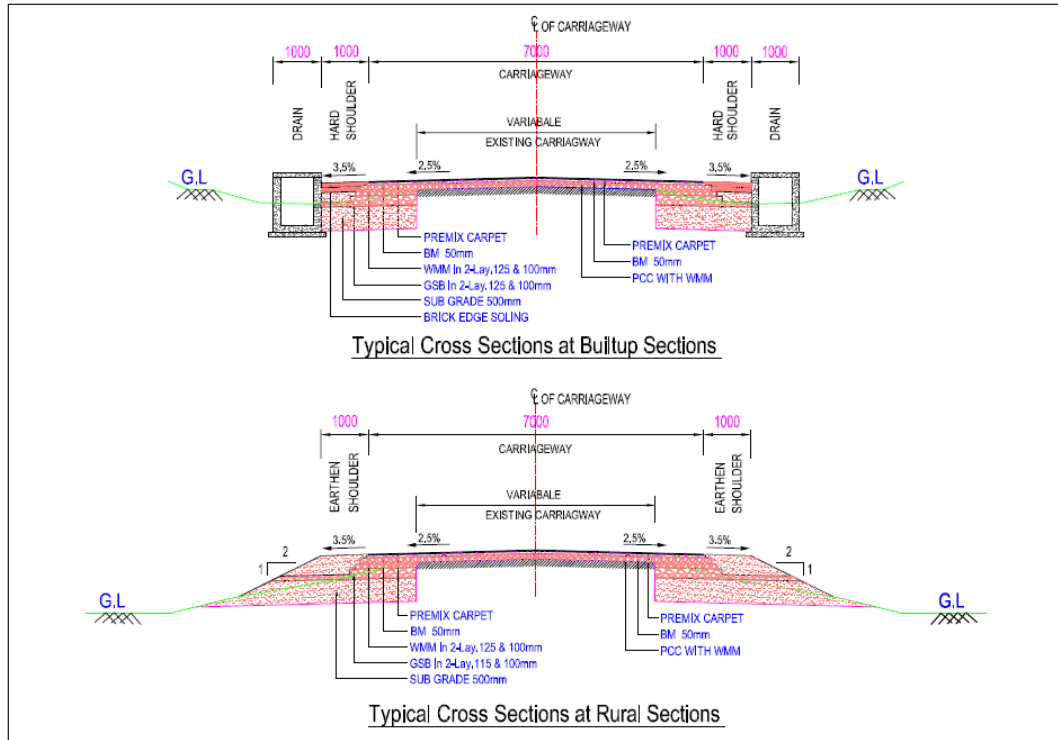
26. Table 7.11 Design Parameters

S. No	Description	IRC Standards		
1	Design speed Plain and Rolling	Max – Min	65 - 50 km/hr	
2	Lane width		3.5 m	
3	Paved shoulder width		1.5 m	
4	Earthen Shoulder		1.0	
5	Road Way Width	Intermediate Lane Two Lane	7.5 m (5.5 m carriageway) 9.0 m	
6	Right of Way		15 m	
7	Cross-slopes	Carriageway Paved shoulder Unpaved shoulder	2.5 % 2.5 % 3.5 %	
8	Maximum super elevation		7.0 %	
9	Minimum horizontal curve radius	For 65 Km/hr For 50 Km/hr	150 m 90 m	
10	Radii beyond which super elevation not required	For 65 Km/hr For 50 Km/hr	750 m 450 m	
11	Super elevation runoff rate	For Plain and rolling For mountainous & steep	<1 in 150 <1 in 60	
12	Transition curves to be used with length of spiral more than or equal to length of super elevation runoff			
13	Extra widening of carriageway on curves	For curve radius >300m 101 to 300m	Nil 0.6m	
14	Gradient	Ruling Gradient Limiting Gradient Exceptional Gradient	3.3 % 5 % 6.7%	
15	Minimum Length of Vertical Curves / Grade change not requiring vertical curve	Design Speed	min. curve length	max. grade change
		65 km/hr 50 km/hr	40m 30m	0.8% 1.0%
16	Vertical curve 'K' values Crest vertical curve/Sag vertical curve	For design Speed	Crest	Sag
		65 km/hr 50 km/hr	18.4 8.1	10 17.4
17	Vertical clearance	Road over road Road over railway Electrical lines H.T.Electrical lines Telecommunication Lines	5.5 m 6.525 m 6.0m (Up to 650 V) 6.5m (More than 650 V) 5.5m (Up to 110 V)	

27. The traffic projection for the design period of 10 years indicate that the projected traffic is within the design service volume of two lane road and therefore two lane road cross section is proposed for the project roads.

B. Design cross-sections

28. Designs are based on IRC codes - and typical cross section is presented In Figure 3. While these are the typical cross-sections, modifications to these have been worked out at locations with RoW constraints, either in rural areas or within built up stretches to minimize land acquisition and resettlement.



C. Implementation Schedule

29. The project is proposed to be implemented over a period of 18 months and as a single construction package. Consultations with the communities along the project roads indicated that the agriculture activities shall be impacted if the construction activities are taken up in the harvesting and sowing periods. The implementation schedule shall be worked out to ensure minimum disruption to the communities, due to the construction activities.

III. Description of the Environment

30. Jhajjar district, carved out of Rohtak district of Haryana, is situated in the southern part of the State of Haryana. The district lies between 28°22' and 28°49' N latitude and 76°18' and 76°59' E longitude.

A. Physical Environment

1. Topography

31. The Jhajjar district forms a part of Indo-Gangatic alluvial plain, with undulating dunes in some parts and small isolated hill in south-western part. Altitude of the district is ranges from 212 m to 276 m above mean sea level (MSL). It slopes from north-east to south-west, with southern part sloping towards north causing saucer like depression in the flat eastern part. Uneven areas suffer from inundation and water logging during monsoon season. In absence of natural drainage, the area is drained by Main Drain No.8 of the district. The canal system of the district drains rain water during rainy season.
32. All the project roads pass through plain terrain with mild gradients. In Jhajjar district most of the area is covered by Quaternary alluvium. The adjoining areas around the project roads mainly consist of flat agricultural fields and brick kilns. In addition to the few scattered water bodies and village ponds existing along the roads, borrowing of earth for brick kilns has resulted in depressions adjoining the identified roads.

2. Climate

33. The climate of the district is sub-tropical, semiarid, continental and monsoon type. Average temperature ranges from 7°C in January to 40.5°C in May and June. January is the coldest month, bringing down the temperature to 3°C; while in summer season it goes up to 47°C. Four seasons of the district are winter from end of November to middle of March, dry summer from April to June, south-west monsoon from July to September and post monsoon season in October and November. Annual average rainfall is 444 mm, with 23 normal rainy days in a year. Average rainfall of 379 mm in monsoon accounts for 85% of the total rainfall. Air is generally dry in the district; while hot desiccating winds (loo), dust-storms are common in summer. Relative humidity ranges from 95% in monsoon to 15% in summer.

3. Soils

34. The soils of the district are fine to medium textured, comprising of sand to sandy loam of yellowish and brown colour in north-eastern part covering Bahadurgarh and Jhajjar blocks, massive beds of pale reddish brown coloured clay in the southern eastern parts. Soil types are Arid Brown (Solonized) and Sierozem. The nitrogen contents are low in the soils of the area. Potassium and phosphorous is medium in Salahwas block whereas high potassium, medium phosphorus occur in the soils of the district. There are sediments consisting of sand, silt, gravel and kankar. The organic Carbon, Nitrogen and Phosphorous are low with medium to high Potash. The sandy to sandy loam soil of Sahlawas and Mattanhail Block are light in colour, deficient in organic carbon, low in Nitrogen and Phosphorous with

medium to high available potash. Poor drainage brackish water and compact kankar layer below root zone in few areas cause more alkalinity and salinity. Soil parameters observed in the district show pH varying from 7.0 to 7.6 (neutral to slightly alkaline), Electrical conductivity ($\mu\text{S}/\text{cm}$) from 832 to 2,154, Organic Carbon – 0.20% (low) to 0.55% (medium), Nitrogen (kg/ha) – 193 to 688 (low to high), available phosphorus was medium to high, while available potassium was low to medium. The micronutrients copper, zinc, and iron were in the range of 0.32 to 0.43 mg/kg, 0.51 to 0.65 mg/kg, and 4.62 to 5.55 mg/kg, respectively, indicating fertile soil. (Source: ADB EIA 42933-IND-SEIA Jhajjar, Jan. 2009)

4. Geology

35. The area forms a part of in Dugan ethnic plain ranging from Pleistocene to recent in age Aeolian deposits of sub-recent age cap the plains. The sediments comprise of clay, sand and Kankar mixed in different proportions. No exposure of hard rock forming the basement is seen in the area. With the exception of few small outliers of Alwar quartzite belonging to the Delhi system, there is nothing of geological interest in the district which is almost entirely covered by alluvium.

5. Water systems

36. There is no river in this part of the NCR. However, there are some water bodies adjoining the identified roads, in form of village ponds and lakes. The water table is shallow and within 5 m depths in the northern parts of Jhajjar district. In the remaining parts of the district the water table is between 5 and 20 meters. In Jhajjar district fresh water aquifers of limited thickness are underlain by saline water aquifers, and have limited yielding potential. However, freshwater is available up to a depth of 30 meters in most parts of the district. At present, the water table in Jhajjar District, though is not overexploited, there are areas wherein the water is brackish.

6. Surface Waters

37. Surface water is contributed by canals, tanks and ponds. The district is in Yamuna sub-basin of Ganga basin; and it is drained by artificial Drain No.8 flowing from north to south. Jawahar Lal Nehru feeder and Bhalaut sub-branch are main canals of the district. Jhajjar and Bahadurgarh blocks form part of Sahibi river basin. Area under canal irrigation is about 690 sqkm, out of 1780 sqkm of the total irrigated area.

7. Groundwater

38. In the district ground water occurs under semi confined to unconfined aquifer conditions. The unconfined aquifers are tapped by dug wells whereas the semi confined aquifers are tapped by shallow tube wells. The groundwater gradient is towards the east. The Hydraulic gradient of ground water is very gentle. Ground water movement in the north-western part is from south-east to north-west; in the south-western part it is from south-west to north-east. Depth of water level in the district varies from 0.98 m to 14.37 m below ground level (bgl) during pre-monsoon period and 1.17 m to 14.37 m bgl during post-monsoon period. About 90% of the area fetches ground water at less than 10 m bgl. Ground water near the water bodies yields fresh water. More than 40% of cropped area is irrigated by tube wells. In Salhawas and Jhajjar blocks ground water is in over exploited

category, while Bahadurgarh under critical. Ground water of the district is alkaline in nature with pH ranging from 7.56 to 8.09. Chemical constituents in the ground water are more than the permissible limit, EC ($\mu\text{mho/cm}$ at 25°C) – 1025 to 7520; F (mg/l) – 0.13 to 5.94; Fe – 2.9 mg/l. High chloride content in ground waters of eastern and western parts of the district shows high specific conductivity. The shallow ground water around Kablana in Bahadurgarh block, Kasni Salahwas in Salahwas block is highly mineralized. (Source: Ground water information Booklet, Jhajjar district, Central Ground Water Board, Chandigarh). Ground water quality monitoring in some of the villages of Jhajjar block are given in table.

Parameter	Measured	Indian Standard	
		Desirable limit	Permissible limit
pH	7.1 – 8.2	6.5 – 8.5	No relaxation
TDS (mg/l)	116 – 10016	500	2000
Total hardness (as CaCO ₃), mg/l	116-3950	300	600
Alkalinity (mg/l)	75.0-3180.0	200	600
Chloride (mg/l)	34.0-3879.0	250	1000
Calcium (mg/l)	22.0-509.0	75	200
Magnesium (mg/l)	15.0-651.0	30	200
Fluride (mg/l)	0.04-1.02	1.0	1.5

(Source: EIA/EMP Report for 1320 MW Thermal Power Plant at Jhajjar, Haryana. January 2008.)

8. Ambient Air quality

39. Air quality values for suspended particulate matter (SPM) and respirable particulate matter (RPM) observed in Jhajjar block exceeded the standards for residential, rural, and other areas. High SPM and RPM levels occurred due to strong winds that generated dust storms in summer. Levels of sulfur dioxide (SO₂) and NO_x were well within the permissible standards for residential, rural, and other areas.

Parameter	Observed in Jhajjar in April-June 2007.	Standards
SPM ($\mu\text{g}/\text{m}^3$)	105.0 – 385.0	50 – 100
RPM ($\mu\text{g}/\text{m}^3$)	58.0 – 153.0	--
SO ₂	1.0 – 9.3	30 – 120
NO _x	4.0 – 38.0	30 – 120

Source: HPGCL baseline data as collected by MECON Limited for summer season 2007; EIA/EMP Report for 1,320 MW Thermal Power Plant at Jhajjar, Haryana. MECON Limited, 2008.

9. Ambient Noise Levels

40. Average noise levels monitored in the Jhajjar block of the district on rural and residential areas varied from 46.8 to 54.4 dB(A) during the day and 40.1 to 43.6 dB(A) at night, and are within the prescribed limits. Day time noise levels near the Jharli Railway station averaged 60 dB(A), exceeding the limit of 55 dB(A); while night time noise levels averaged 46.1 dB(A), exceeding the limit of 45 dB(A). The monitored noise levels for residential areas were within the prescribed limits.

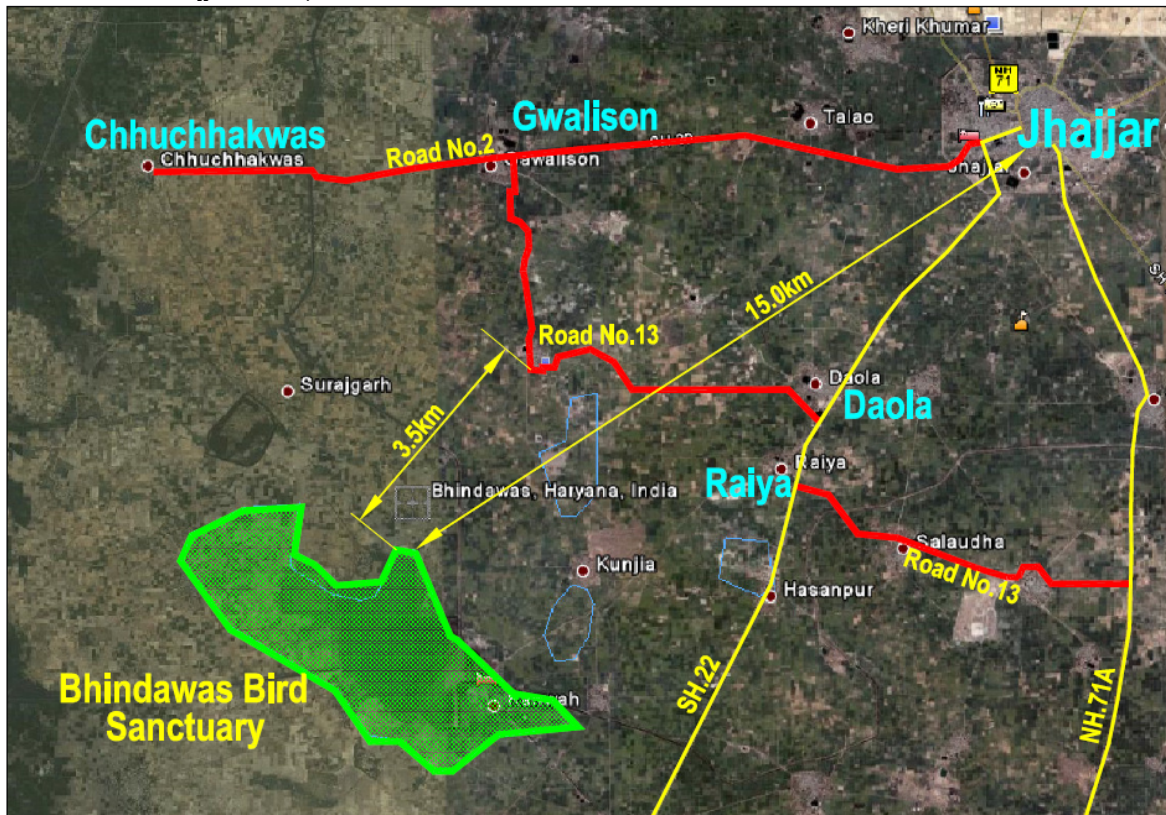
10. Agriculture

41. The main crops grown in the district during rabi season are wheat, gram, barley, mustard, sarson, sugarcane; and in kharif season are cotten, paddy, jawar, bajra, gawar, arhar, till, groundnut, soya bean, moong. Fruits grown in the district include ber, guava, anola and jamun. All major vegetables, spice crops like chillies, garlic, an flowers like chrysanthemum, Gladiolus marigold are cultivated in the district.

11. Ecological Resources

42. There are no reserved or protected forests or areas near and around the project roads. The Bhindawas Bird Sanctuary, situated about 15 km from Jhajjar town and about 6 km from Jhajjar-Talao-Chhuchakawas Road, is the only protected area in the project districts. There are no impacts envisaged on this sanctuary due to the proposed road developments. Given that there are no major protected areas, and that the alluvial plains, and especially the project roads, are largely inhabited, there is hardly any wildlife existing, with exception of nilgai (blue bull). Flora and fauna in the district are not unique. No endangered flora and fauna is noted.

43. Bhindawas Bird Sanctuary (notified as protected area in June 2009) in the north-east (15 km from Jhajjar town) and Sultanpur bird sanctuary in the east (55 km from Jhajjar town) are the nearest sensitive sites.



44. Trees and shrubs noted in the district include shisam (*delbergia sisoo*), siris (*albizzia lebbek*), tun (*cedrela toona*), mulberry (*morus*), mango (*mangifera indica*), pipal (*ficus religiosa*), guler (f. *Cunia*), bar (f. *Indica*), lasura (*cordial myxa*), and shimbal (*bombax heptophylla*), kikar (*acacia arabica*), nim (*azadirachta indica*), jand (*prosopis spicigera*), nimbar or raunjh (*acacia leucopholoea*), jamans (*zizygium jambolanum*), kaindu (*diospyrus tomentosa*), kaim (*stephygone parvifolia*), amala (*emblica officinalis*), rohera (*tecoma nudulata*), barna (*cratoeva religiosa*), bel patta (*aegle marmelos*), amaltas (*cassia fistula*), dhak (*butea frondosa*), farash (*tamarix orientalis*), jhao (*tamarix dioica*), kharjal (*salvadora persica*), hingo (*balanites aegyptiaca*), hindok, kair (*acacia katechu*), labul (*acacia eburnean*), karil (*capparis aphylla*), jal (pilu), ber or jharpala (*zizyphus jujuba*), hinsa (*capparis horrid*), bansa (*adhatoda vesica*), shimalu (*vitex negundo*), kanger (*pistachio integerrima*), mral or marelau (*lyceum europaeum*), nagpan or prickly pear (*cactus indicus*), ak (*calotropis procera*), jawasa (*alhagi maurorum*), kanda salianasan or yellow-thorned poppy (*argemone Mexicana*), kandai pasarma (*solanum xanthocarpum*), dadain (*aeschynomene indica*), bhuin (*anabasis multiflora*), khip (*orthanthera viminea*), kharsana (*crotolaria burhia*), banna (*tamarix gallica*) and rerka or bausa (*tephrosia purpurea*). The grasses are numerous in the district, which include sar (*saccharum munja*), dub (*cynodon dactylon*), kans (*saccharum spontaneum*), gandra or pau or jhuad (*anatherum muricatum*), makrah, deila, samak (*panicum colonum*) and bhurat (*cenchrus ochinatum*).
45. Fauna includes rhesus macaques, squirrels, mongoose, garden lizards, desert cat, caracal, Indian wolf, desert fox, chinkara, blackbuck, Indian pangolin, ratel, black-naped hares, Neelgai and deer. Insects include varieties of butterflies, grass yellow dragonflies, and damselflies.
46. Blue Peafowl, Gray Francolin, Black Francolin, Graylag Goose, Ruddy Shelduck, Bar-headed Goose, Comb Duck, Gadwall, Eurasian Wigeon, Great Cormorant, Common Teal, Northern Pintail, Northern Shoveler, Red vented Bulbul, Common Pochard, Black-rumped Flameback, Common Hoopoe, White-throated Kingfisher, Green Bee-eater, Black Drongo, Pied Cuckoo, Common Hawk Cuckoo, Rose-ringed Parakeet, Spotted Owlet, Blue Rock Pigeon, Great Egret, Purple Swamphen, Great Bittern, Eurasian Collared Dove, Mallard, Crested Lark, Jungle Babbler, Ashy Prinia etc are some of the more common birds found in Bhindawas Birds Sanctuary. The bird species noted in other parts of the district include the Eurasian collared dove, green bee-eaters and common mynas, red-wattled lapwings, rose-ringed parakeets, ashy prinias and Indian peafowl.

12. Fisheries

47. The fish farming in Jhajjar is carried out in village / panchayat ponds on lease. Fishes caught in the district include magur, soil and singhora.

13. Land Use

48. Land use in the district is dominated by agriculture, with net area sown at 85.29% of total geographical area. Growth induced by inclusion of the district in the National Capital Region (NCR) is reflected by increase of land use for residential and industrial purposes. Only a negligible area is under forest cover in this district.

14. Disasters

49. According to the Vulnerability Atlas of India the NCR falls in the,
- High damage risk zone (MSK VIII) for earthquakes
 - Very high damage risk zone B ($V_b = 50\text{m/s}$) for wind and cyclone hazards
 - Areas liable to floods, which are more site specific and consist of low-lying areas and the flood plain.
50. There are a number of faults and other tectonic features that trigger earthquakes in the NCR. The major ones are, Sohna fault, Aravalli fault, Hidden Moradabad fault in the Indo-Gangetic basin, Sonapat-Delhi-Sohna fault, Junction of Aravalli and Sohna fault, and the Delhi-Haridwar ridge. Earthquakes of intensity lower than four on the Richter scale have originated from 14 epicentres located in the NCR. Two major lineaments, namely Delhi-Haridwar ridge and Delhi- Moradabad fault, pass through the NCR, both having potential of generating earthquakes of magnitude up to 6.5 to 6.7 and normal depth of 30 kms. The NCR lies in the earthquake zone IV, the second highest vulnerable zones with respect to seismic impacts. The proposed design integrates the risks of seismic activities on the project roads, through adoption of the IRC codes and standards.

B. Social and Cultural Resources

1. Demographic profile

51. Total population of Jhajjar district was 880,072 in Census 2001, representing 4.16% of Haryana State. More than seventy five percent of total population lives in rural areas (77.83%) and 22.17% in urban areas (Urbanization of the state-28.9%). Sex-ratio of the district stood at 847 (rural-854, urban-823), when it was 860 for the State. Scheduled castes population is 17.79% (rural-18.32%; urban-15.90%); while no Scheduled Tribe has been notified. Population below 6 years of age in Jhajjar district is 14.97% (rural-15.11%; urban-14.48%), having sex-ratio of 801 (rural-800; urban-804). Total literacy rate (TLR) of the district was 72.37% as against 67.90% of Haryana, in rural areas it was 70.36% (State-63.19%) and in urban 79.42% (State-79.16%). Female literacy rate (FLR) in the district was 59.64% (rural-56.72%; urban-70.10%).
52. Workers participation rate (WPR) of the district was 44.17% of the total population (State-39.62%); it was 47.32% in rural areas (State-42.93%) and 33.10% in urban (State-31.49%). Sex-ratio of the total work force was 588 (rural-683; urban-237), when compared with the State figures of 466 (rural-579; urban-182). Majority of the work force are main workers; 71.06% of the total workers are main workers (in rural-68.33%; in urban-84.74%). 57.17% of the total workers are engaged in cultivation and agricultural sector; it was 66.61% in rural and 9.77% in urban areas.

2. Industries

53. Agriculture is the major activity in the district. Livestock rearing is also an important activity. Bahadurgarh, Najafgarh, Jhajjar, Beri towns of the district has

seen faster growth of industries, due to proximity of these areas to the cities of Delhi and Gurgaon and infrastructure development. Many of the industries in this district are engaged in production of materials used in building and construction sector. Thermal power plants are generating electricity. Infrastructure development fosters growth of tertiary sector industry. Special Economic Zone has been proposed along the National Highway passing through this district for industrial development.

3. Physical Infrastructure Services

54. Health services of the Government is rendered through 100 bedded hospitals in Jhajjar town and Bahadurgarh, 2 community health centres (CHC), 18 primary health centres (PHC), 8 dispensaries and 123 sub-centres.

IV. Identification of Environmental Impacts and Mitigation Measures

A. Land acquisition and resettlement impacts

55. The rehabilitation proposed for 9 road corridors in Jhajjar District does not involve any land acquisition as all improvement works are proposed within the existing Right-of-Way (RoW). However, the project will impact some encroachers who have encroached upon the RoW and some community assets (bus shelters, water tank, community building, compound walls of common resources, etc) that have been built encroaching upon the RoW. There are no impacts to indigenous peoples.

56. In built-up stretches no widening is proposed in order to minimise involuntary resettlement and it has been proposed to only strengthen the existing road with proper drainage facility. Necessary traffic arrangement measures with proper signage have been proposed to ensure smooth flow of traffic in these constricted stretches.

57. In line with the Draft+ ESMS of NCRPB, projects funded by NCRPB will require a resettlement plan and/or an indigenous peoples plan commensurate with the significance² of impact. Rehabilitation of 9 roads in Jhajjar District will come under S-2 category for involuntary resettlement and S-3 category for indigenous peoples as per NCRPB's social categorization.

58. A short resettlement plan has been prepared in line with the Draft ESMS requirements.

B. Environmental Impacts

59. The assessment for each physical component proposed for this project has been carried out with respect to the potential impacts during the following stages of the project planning and implementation:

- Location impacts. Impacts associated with site selection, including impacts on environment and resettlement or livelihood related impacts on communities
- Design impacts. Impacts arising from project design, including the type of designs, design standards etc
- Construction impacts. Impacts resulting from construction activities including site clearance, earthworks, civil works, etc.

² As per the Draft ESMS projects are categorized based on the significance of involuntary resettlement and impact to indigenous peoples. Involuntary resettlement categories are (a) Category S-1 (Significant Impact): means 200 or more people will experience major impacts, which are defined as (i) being physically displaced from housing, or (ii) losing 10% or more of their productive assets (income generating). Category S-1 projects require a full resettlement plan; (b) Category S-2 (Not Significant). Category S-2 projects include involuntary resettlement impacts that are not deemed significant and require a short resettlement plan; and (c) Involuntary Resettlement Category S-3: There is no involuntary resettlement impacts and hence does not require any action. Indigenous Peoples categories are (a) S-1 Significant impacts are those projects that directly or indirectly affect the dignity, human rights, livelihood systems, or culture of indigenous peoples or affect the territories or natural or cultural resources that Indigenous peoples own, use, occupy or claim as their ancestral domain. Category S-1 projects will require a indigenous peoples plan; (b) S-2 Not Significant are projects where the indigenous peoples are the sole or the overwhelming majority of project beneficiaries, and when only positive impacts are identified. Category S-2 projects will require a summary note on IP in project document; and (c) S-3 are projects where no impacts on indigenous peoples are envisaged and hence does not require any action.

- O&M impacts. Impacts associated with the operation and maintenance of the infrastructure built in the project.

60. The potential impacts occurring from this project have been identified below.

1. Location and design impacts

61. Location impacts are not likely to be significant as there are no major environmentally sensitive areas along the project roads. Impacts on water bodies along the project roads have been minimized through careful design of the alignments to avoid encroachment onto the water bodies. Impacts pertaining to cutting of roadside (including eucalyptus and acacia species) have been unavoidable and will be compensated through compensatory plantation. The impacts pertaining to road safety, especially for stretches in urban areas have been addressed through incorporation of appropriate safety measures in designs.

2. Construction impacts

62. The impacts during the construction stage shall include impacts associated with road construction activities and can be addressed through adoption of good engineering practices and undertaking specific mitigation measures towards minimization of construction impacts on the sensitive receptors and communities in the vicinity of the project roads. The mitigation measures for the various impacts are outlined in the Table xx, and are summarized in the following sub-sections.

63. Drainage: Construction activities in the vicinity of natural drainage channels and water bodies, if drainage is not adequately provided, would cause change in the drainage character of the site and lead to water logging.

64. Soil: Construction of road increases the paved surface and permanent loss of top soil under these civil construction works. Excavation for forming the drains and borrowing also involves loss of top soil as well as scarifying the surface with construction machinery and equipment. Spillage of fuel, lubricants, other oils and chemicals will contaminate the soil in the area.

65. Sourcing of materials. While material such as bitumen may be acquired from local hot-mix plants and aggregate from already identified quarries, procurement of soil will still need to be carried out. Considering that the brick kilns have already used the top soil in many areas, sites for the procurement of soil may have to be carefully identified.

66. Water Bodies: Stockpiles of construction debris if left unattended near water bodies as in Jasor Khari will be washed off as runoff into nearby water bodies causing siltation. Spillage of oil, lubricants and other chemicals also mix with the runoff and contaminate the water bodies.

67. Air Pollution: Emission from Construction Vehicles, Equipment and Machinery used for excavation and construction would induce impacts on the air pollution in the construction site as well as on the surrounding settlements. Construction activities generate dust in the surrounding area causing increase in particulate matter. Hot-mix plants installed for road construction will lead to generation of fugitive dust and exhaust emissions. Adequate siting criteria for the hot mix plants to be adopted based on the environmental sensitivity of surrounding land uses.

68. Noise and Vibration Impacts: Generation of noise from construction equipments is a major concern during construction stage. Use of heavy construction machinery in the construction site would generate vibrations and affect the adjacent structures in the settlements. Noise generated during construction is however intermittent and would be of limited duration but would affect the construction workers in case of unprotected prolonged exposure.

69. Material Handling: Storage of Bitumen and other hazardous material if stored near drainage channels would induce hazardous situations to the environment from possibility of leaching into ground and flow as runoff. Spillage of debris and construction

material to surface water bodies may lead to surface water quality deterioration. Stockpiling of materials along the edge of the road will obstruct the drainage and restrict the free movement of vehicles.

70. Safety during construction: Appropriate measures during construction shall be worked out to address safety issues during construction. Prolonged exposure of workers to consistently high decibel noise levels above 90 dB(A) also induces hearing losses. Similarly, prolonged exposure of the workers to dusty environment of the construction site induces respiratory problems and loss of man days. Traffic diversions have to be notified sufficiently in advance and where necessary temporary diversions have to be provided for safe crossing of the traffic.

71. Site clearance and Restoration of Construction Camps: Post construction clearance if not adequate, would create unsightly conditions and affect aesthetics of the area. Campsites if not removed usually become a refuge for unscrupulous activities and sometimes develop as another settlement putting strain on the resources. Sanitary pits may cause contamination of surface and ground water.

3. Operational impacts

72. Impacts on environmental conditions associated with the operation stage of the project are identified to be due to increased of air and noise pollution from the increased vehicular traffic along the route. The proposed improvements and safety provisions, in settlement areas would reduce accidents and congestion and result in more public and private transport vehicles also plying in the area. Improved drainage provision within the settlements shall ensure avoidance of water logging and poor drainage conditions along the project roads.

V. Environmental Management Plan

73. Potential environmental impacts identified in the IEE due to implementation of the project components are to be minimized or avoided through appropriate mitigation and avoidance measures mentioned in Table 5. The agencies that are responsible for implementing the measures that are required to be undertaken have been identified.

Table 2: Environmental Impacts and mitigation measures

SI No	Environmental Issues	Durati on / Extent	Magni tude	Mitigation Measures	Responsibilit y
1	Location Impacts				
1.1	Land acquisition and resettlement impacts required due to widening of roads at certain locations, where required.	Perma nent	Major	Land acquisition impacts to be minimal as the proposed strengthening of the road will be restricted to the existing RoW.	HSRDC & Design Consultants
2	Design and pre-construction Impacts				
2.1	Alterations of drainage pattern of the site	Perma nent	Major	Design of cross drainage structures would be carried out so as to avoid alteration of drainage pattern. Design would be done considering 50 year return flood level to avoid overtopping of the roads and maintain natural drainage	HSRDC, Design Consultants
2.2	Damage to roadside trees	Perma nent	Sever e	If removal of any tree is unavoidable, obtain tree clearance approval from Forest Department. Identify each tree along the proposed route and adequately mark each tree within proposed construction areas. For trees not proposed to be cut, but within the construction area, take all precautions to protect trees not impacted from any damage including placement of tree guards	HSRDC & Design Consultants
2.3	Impact on cultural properties, shrines, temples etc	Perma nent	Tempo rary	The designs shall be worked out to minimize impacts on cultural properties, shrines etc. All precautionary measures to address impacts on structures including protection measures required shall be provided in the designs.	HSRDC & Design Consultants
3	Pre-construction Activities by Contractor				
3.1	Construction Camps – Location, Selection, Design and Layout	Tempo rary	Moder ate	The construction camps will be located at least 500m away from habitations at identified sites.	Contractor / Management Consultant
3.2	Drinking water availability and water arrangement	Tempo rary	Sever e	The contractor will be responsible for arrangement of water in every workplace at suitable and easily accessible place for the whole construction period. Sufficient supply of cold potable water (as per IS: 10500) to be provided and maintained. If the drinking water is obtained from an intermittent public water supply then, storage tanks will be provided.	Contractor / Management Consultant
	Establishment of construction camps and / or hot mix plants, if required	Tempo rary	Moder ate	Obtain the consent-to-establish and consent-to-operate from the Pollution Control Board Adhere to the air pollution and water pollution standards prescribed.	HSRDC, PMC & Contractors
3.3	Identification of disposal sites	Perma nent	Major	Location of disposal sites will be finalized based on consultations with the Engineer. The Engineer will certify these are not located within designated environmentally sensitive areas and confirm that: Disposal of the material does not impact natural	Contractor / Management Consultant

SI No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				drainage courses No endangered / rare flora is impacted by such material Settlements are located at least 1000m away from the site	
3.4	Quarry Operations	Permanent	Major	It has to be ensured that materials are obtained from licensed quarries having environmental clearance. Quality and legality to be examined by the Contractor and copies of environmental clearances for these needs to be submitted prior to sourcing of material.	Contractor / Management Consultant
3.5	Batching Plants	Temporary	Moderate	Batching plants will be located sufficiently away from habitation, where possible such plants will be located at least 1000m away from the nearest habitation. The contractor will obtain the consent to operate the plants from the SPCB.	Contractor / Management Consultant
4	Construction Impacts				
4.1	Improper stockpiling of construction materials can cause impacts starting from obstruction of drainage, disturbance/safety hazard to local population, traffic blockage, etc.	Temporary	Moderate	Due consideration will be given for material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. Stockpiles will be covered to protect from dust and erosion.	Contractor / Management Consultant
4.2	Quarry / Borrow pits Operations	Permanent	Moderate	Adequate safety precautions will be ensured during transportation of quarry material from quarries to the construction site. Vehicles transporting the material will be covered to prevent spillage. Operations to be undertaken by the contractor as per the direction and satisfaction of the Engineer.	Contractor / Management Consultant
4.3	Stripping, stocking and preservation of top soil	Permanent	Moderate	The topsoil from borrow areas, areas of cutting and areas to be permanently covered will be stripped to a specified depth of 150mm and stored in stockpiles. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is to be restricted to 2m. Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes.	Contractor / Management Consultant
4.4	Soil Erosion	Permanent	Moderate	At the outfall of each culvert, erosion prevention measure, will be undertaken, as per the direction and satisfaction of the Engineer The work will consist of measures as per design, or as directed by the Engineer to control soil erosion, sedimentation and water pollution. All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earthwork or other items of work.	Contractor / Management Consultant
4.5	Compaction of Soil	Temporary	Minor	To minimize soil compaction construction vehicle,	Contractor /

SI No	Environmental Issues	Durati on / Extent	Magni tude	Mitigation Measures	Responsibilit y
		rary		machinery and equipment will move or be stationed in designated area (RoW or Col, haul roads as applicable) only. The haul roads for construction materials will be routed to avoid agricultural areas	Management Consultant
4.6	Blasting	Perma nent	Moder ate	<p>Except as may be provided in the contract or ordered or authorized by the Engineer, the Contractor will not use explosives.</p> <p>Where the use of explosives is so provided or ordered or authorized, the Contractor will comply with the requirements of the following Sub-Clauses of MoRTH 302 besides the law of the land as applicable.</p> <p>The Contractor will at all times take every possible precaution and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives and will, at all times when engaged in blasting operations, post sufficient warning flagmen, to the full satisfaction of the Engineer.</p> <p>The Contractor will at all times make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whomsoever concerned or affected or likely to be concerned or affected by blasting operations.</p> <p>Blasting will be carried out only with permission of the Engineer. All the statutory laws, regulations, rules etc., pertaining to acquisition, transport, storage, handling and use of explosives will be strictly followed.</p> <p>all directions at least 10 minutes before the blasting.</p>	Contractor / Management Consultant
4.8	Loss of Access	Tempo rary	Moder ate	<p>The contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property access connecting the project road. Construction activities that will affect the use of side roads and existing access to individual properties will not be undertaken without providing adequate access.</p> <p>The construction works will not interfere with the convenience of the public or the access to, use and occupation of public or private roads, or any other access to properties, whether public or private.</p>	Contractor / Management Consultant
4.9	Soil and Water Pollution due to fuel and lubricants, construction waste	Tempo rary	Moder ate	<p>The fuel storage and vehicle cleaning area will be stationed such that runoff from the site does not drain into the water body.</p> <p>Oil interceptor will be provided at construction vehicle parking area, vehicle repair area and workshops ensuring that all wastewater flows into the interceptor prior to its discharge.</p>	Contractor / Management Consultant
4.10	Siltation of Rivers and streams due to spillage of construction wastes	Tempo rary	Moder ate	<p>Silt fencing to be provided at all water bodies near construction sites to prevent sediments from the construction site to enter into the watercourses.</p> <p>The number of units of silt fencing to be installed is to be decided by the engineer.</p> <p>Discharge standards promulgated under the</p>	Contractor / Management Consultant

SI No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				Environmental Protection Act, 1986 for surface water bodies will be strictly adhered to. No disposal of construction wastes will be carried out into the river.	
4.1 1	Generation of Dust	Temporary	Moderate	The contractor will take every precaution to reduce the levels of dust at construction sites to the satisfaction of the Engineer. All earthwork to be protected/covered in a manner acceptable to the satisfaction of the engineer to minimise dust generation.	Contractor / Management Consultant
4.1 2	Emissions from batching plants	Temporary	Moderate	Batching plants will be located atleast 500m away from environmentally sensitive areas as Reserved Forests / National Parks and sensitive receptors i.e., hospital and college. The exhaust gases will comply with the requirements of the relevant current emission control legislation. All operations at plants will be undertaken in accordance with all current rules and regulations protecting the environment. Monitoring of air and noise parameters will be as per monitoring plan	Contractor / Management Consultant
4.1 3	Emission from Construction Vehicles, Equipment and Machinery	Temporary	Moderate	The discharge standards promulgated under the Environmental Protection Act, 1986 will be strictly adhered to. All vehicles, equipment and machinery used for construction will conform to the relevant Bureau of Indian Standard (BIS) norms. All vehicles, equipments and machinery used for construction will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of SPCB and the Engineer. 'PUC' certificates will be obtained regularly for all vehicles used for the project. Copies will be submitted regularly to the Engineer.	Contractor / Management Consultant
4.1 4	Dust Pollution from Crushers	Temporary	Minor	All crushers will obtain siting clearance from SPCB or only those crushers that have already have obtained license from SPCB will be used.	Contractor / Management Consultant
4.1 5	Noise from construction Equipments	Temporary	Moderate	Maintenance of vehicles, equipment and machinery will be regular and to the satisfaction of the Engineer, to keep noise from these at a minimum. All vehicles and equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked and if found to be defective will be replaced. Noise limits for construction equipment used in this project (measured at one metre from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), as specified in the Environment (Protection) Rules, 1986 Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of noise emission.	Contractor / Management Consultant
4.1 6	Traffic Control and Safety	Temporary	Moderate	The contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades,	Contractor / Management Consultant

SI No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				including signs, marking flags, lights and flagmen as per Engineer's direction and satisfaction, for the information and protection of traffic approaching or passing through the section under improvement. Before taking up any construction, detailed Traffic Control Plans will be prepared and submitted to the Engineer for approval, 5 days prior to commencement of work on any section of road. The traffic control plans shall contain details of arrangements for construction under traffic and details of traffic arrangement after cessation of work each day. The Contractor will ensure that the running surface is always maintained in good condition, particularly during the monsoon so that no disruption to traffic flow occurs	
4.17	Road furniture	Temporary	Minor	All roadside structures / furniture, protection, intersections, traffic islands, rotaries, facilities and amenities etc. will be constructed as per engineering design and to the satisfaction of the engineer. Similarly restoration of bus shelters including bus bays complete with seating arrangement, other infrastructure etc. will be carried out as per design and to the satisfaction of the engineer.	Contractor / Management Consultant
4.18	Material Handling at Site	Temporary	Minor	All workers employed on mixing asphaltic material, cement, concrete etc., will be provided with protective footwear and protective goggles. Workers, who are engaged in welding works, would be provided with welder's protective eye-shields. Workers engaged in stone breaking activities will be provided with protective goggles and clothing and will be seated at sufficiently safe intervals. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions.	Contractor / Management Consultant
4.19	Disposal of Bituminous wastes / Construction Waste / Debris / Cut Material	Temporary	Moderate	The bituminous waste generated will be reused in road construction based on its suitability of reuse to the maximum extent possible. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. In no case, any construction waste will be disposed around the project road indiscriminately. Cut material generated because of construction will be utilized for as filling material. Remaining material if any will be disposed off safely at the disposal sites.	Contractor / Management Consultant
4.20	Safety Measures During Construction	Temporary	Moderate	All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 will be adhered to. Adequate safety measures for workers during handling of materials at site will be taken up. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The Personal Protective Equipment for workers on	Contractor / Management Consultant

SI No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				the project will conform to respective IS codes.	
4.2 1	Risk caused by Force Majeure	Temporary	Minor	All reasonable precaution will be taken to prevent danger of the workers and the public from fire, flood, drowning, etc. All necessary steps will be taken for prompt first aid treatment of all injuries likely to be sustained during the course of work.	Contractor / Management Consultant
4.2 2	Malaria Risk	Temporary	Minor	The Contractor will, at his own expense, conform to all anti-malaria instructions given to him by the Engineer.	Contractor / Management Consultant
4.2 3	First Aid	Temporary	Minor	At every workplace, a readily available first aid unit including an adequate supply of sterilized dressing material and appliances will be provided as per the Factory Rules. Suitable transport will be provided to facilitate transfer of injured or ill person(s) to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided.	Contractor / Management Consultant
4.2 4	Hygiene	Temporary	Minor	All latrines will be provided with dry-earth system (receptacles), which will be cleaned at least four times daily and at least twice during working hours and kept in a strict sanitary condition. Receptacles will be tarred inside and outside at least once a year. All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. Garbage bins must be provided in the camps and regularly emptied and the garbage disposed off in a hygienic manner. Adequate health care is to be provided for the work force. Unless otherwise arranged for by the local sanitary authority, the local medical health or municipal authorities will make arrangement for disposal of excreta. On completion of the works, all such temporary structures will be cleared away, all rubbish burnt, excreta tank and other disposal pits or trenches filled in and effectively sealed off and the outline site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the engineer.	Contractor / Management Consultant
4.2 5	Archaeological Property chance find	Temporary	Minor	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing and will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work will be stopped 100 m all directions from the site of discovery. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence work on the site.	Contractor / Management Consultant
4.2 6	Clearing of Construction of Camps & Restoration	Temporary	Major	Contractor to prepare site restoration plans for approval by the Engineer. The plan is to be implemented by the contractor prior to demobilization.	Contractor / Management Consultant

SI No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				On completion of the works, all temporary structures will be cleared away, all rubbish burnt, 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 Engineer.	
5	O&M Impacts				
5.1	Environmental Conditions	Permanent	Moderate	The HSRDC will undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared.	HSRDC
	Survival of trees planted	Permanent	Moderate	Proper care shall be taken to increase survival rate of saplings like regular watering, pruning, provision of tree guards, manure for better nourishment, etc. including timely replacement of perished saplings.	HSRDC
5.2	Increased air and noise pollution due to increased traffic using the improved roads	Permanent	Moderate	Smooth and better road surface will reduce generation of noise. Provision of vegetative barriers where ever possible. Other measures such as improved transport fuel quality, more stringent environmental norms, installation of no horn signages at educational institutes and at hospitals	HSRDC
5.3	Drainage of roadsides	Permanent	Moderate	To ensure efficient flow of surface water and to prevent water logging along the side of the roads adequate size and number of cross-drainage structures and longitudinal drains are provided in the design. These will be adequately maintained by cleaning and avoiding clogging of openings.	HSRDC
5.4	Traffic and Accident Safety	Permanent Risk	Major	Depending on the level of Congestion and traffic hazards, traffic management plans will be prepared. Traffic control measures including speed limits to be enforced strictly. Road control width to be enforced. Local government bodies and development authorities will be encouraged to control building development along the highway.	HSRDC

VI. Institutional Requirements

A. Institutional Arrangements

74. Haryana State Roads Development Corporation (HSRDC), as the Implementing Agency (IA) will undertake all actions for the implementation of the project. HSRDC will have one specialist identified to overseeing the implementation of the EMP, and will be outsourced. An Environmental Officer (consultant) shall be inducted within the HSRDC to address the environmental impacts due to the project. The identified officer should be a Civil Engineer specializing in Environment or a related field with experience in the management of infrastructure projects. S/he should be similar with Indian legislation and the implementation of multi/bilateral loan projects.

75. Roles and Responsibilities

- Review of IEE and other environment documents based upon ADB's Environmental Assessment Guidelines, or other multilateral or bilateral agency guidelines, as required.
- Liaise and obtain clearances from with required state and central departments for clearances and compliance to regulations.
- Monitor and oversee the implementation of the Environmental Management Plan
- Ensure inclusion of EMP in contractor's ToRs.
- Oversee implementation and monitor compliance to the EMP
- Undertaken required interactions with civil society groups and community for projects under implementation
- Ensure inclusion of public concerns and grievances in EMP and project implementation. Undertake dialogue with affected communities, as required.
- Review environmental performance of project through periodical environmental monitoring reviews. Where additional environmental safeguards are identified incorporate them in project design, construction or implementation or other follow-up actions, as required.
- Provide required support for the management of environmental concerns in the implementation of the project
- Develop, review and plan and implement training and capacity building for contractors and consultants involved in the project

76. A consultant shall be hired for supervising construction activities. This agency will need an officer identified for overseeing the implementation of the EMP. The roles and responsibilities of this individual will be,

- Work closely with Corporation's environmental specialist for the implementation of EMP and ensure compliance to environmental safeguards, support its implementation
- Work with Corporation's environmental specialist for getting environmental clearances for the project
- Review of EMP implementation and advice the Corporation's environmental specialist on the implementation status
- Review any changes in project design, identify environmental safeguards if required and work with the Corporation's environmental specialist to reflect identified safeguards in EMP
- Ensure all identified systems – safety, accident management and control, waste are in place, functioning and implementing personnel have adequate training to implement actions

- Ensure that all safety gear for workers and on the project location are in place
- Consultation with stakeholders and inclusion of their concerns in project implementation
- Incorporate additional environmental safeguards as required during project implementation.

B. Environmental Monitoring Plan

77. Prior to developing a monitoring plan there is a need for the development of a baseline for some activities. This would help with the monitoring activities. The baseline is described below.

1. Development of a baseline

78. Prior to developing a monitoring plan there is a need for the development of a baseline for some activities. This would help with the monitoring activities. The baseline is described below.

Sl. No.	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Responsibility	Cost estimates INR
1	Air Quality	Pre construction	SPM and RSPM, NOx, CO	Ten – two on each of the roads – for all 5 roads, near habitations.	In morning, rush hours or time of high traffic and late evening	DPR consultant	4000/sample
2	Noise	Pre construction	Decibels	Ten – two on each of the roads – for all 5 roads, near habitations.	In morning, rush hours or time of high traffic and late evening	DPR consultants	1000/sample
3	Water quality	Pre construction	Surface water quality	Sample waterbodies along with construction activities will be undertaken	Once, prior to construction	DPR consultants	2000/ sample
4	Site for quarries and borrow pits	Pre construction	The site situation – for rehabilitation, photographs	All sites identified for quarries, borrow pits, waste and construction labour camps and offices	Once prior to construction	DPR consultants/ agency identified to supervise construction	30,000 lump sum
5	Vegetation removal	Pre construction	Vegetative survey to identify type and amount of vegetation that requires to be replaced	Along paths that are to be cleared off trees for construction activities	Once prior to construction	DPR consultants	300000 lump sum

2. Monitoring Actions

Sl. No.	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Responsibility	Cost estimates INR
1	Air Quality	Construction	SPM and RSPM, NOx, CO	Twenty – two on each of the roads – for all roads, near habitations.	Thrice annually	Contractor	4000/sample
2	Noise	Construction	Decibels	Twenty – two on each of the roads – for all roads, near habitations..	Thrice annually	Contractor	1000/sample
3	Water quality	Construction	Surface water quality	Sample waterbodies along with construction activities will be undertaken	Thrice annually	Contractor	2000/sample
4	Site for quarries and borrow	Construction	After construction activity over – if rehabilitated	All quarries, borrow pits, waste and construction labour camps and offices	Once prior to construction	Contractor	40,000 total

Sl. No.	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Responsibility	Cost estimates INR
	pits			sites			
5	Tree/vegetation plantation	Construction	Ensure all vegetation/tree replacement activity undertaken	Based upon discussions with local community and Forest Department	During construction	Contractor	40,000 total
6	Air Quality at Residential area	Operation	RPM, SPM, SO ₂ , NO _x , CO and Hydrocarbons	At ten locations, especially around sensitive receptors and settlements	Once in a season (except monsoons) for the first 3 years of operation	Contractor	100000 per year
7	Noise Levels at residential and silence zone	Operation	Equivalent Day & Night Time Noise Levels	At ten locations, especially around sensitive receptors and settlements	Once in a season for the first 3 years of operation	Contractor	50000 per year

C. Training & Capacity Building

79. The training programme will start with a Sensitization Workshop for officials of HSRDC and also the Contractor's personnel. Typical modules that would be present for the training session would be as follows:

- Sensitization
- Introduction to Environment Considerations in Urban Development Projects
- Review of IEE and Integration into Design
- Improved Co-ordination within Nodal Departments, on special issues, if any.
- Role during construction
- Monitoring & Reporting System

80. The proposed training program along with the frequency of sessions is presented in the table below.

Program	Description	Participants	Form of Training	Duration	Trainer / Agency
Introduction and sensitisation to environment issues	Sensitisation on environmental concerns <ul style="list-style-type: none"> ▪ Environmental impacts of road's projects ▪ Gol environmental regulations ▪ ADB/multilateral/bilateral environmental regulations ▪ Coordination between departments for implementation of environmental safeguards 	Senior department engineers HSRDC officials responsible for implementing project and office in-charge of implementing environmental safeguards	Workshop	Half day workshop	External Consultants/ NCRPB

Program	Description	Participants	Form of Training	Duration	Trainer / Agency
EMP implementation	Implementation of environment EMP <ul style="list-style-type: none"> ▪ Identification of environment impacts ▪ Monitoring and reporting for EMP ▪ Public interactions and consultations ▪ Identification of various government 	Department head at Haryana PWD B&R and HSRDC in-charge of the project, officer in-charge of project implementation, identified officer in-charge of implementing EMP	Lectures and field visit		External Consultants/ NCRPB
EMP implementation	Implementation of EMP <ul style="list-style-type: none"> ▪ Identification of environment impacts ▪ Monitoring and reporting for EMP ▪ Public interactions and consultations 	Officer in charge of implementing this project activities at HSRDC, officer implementing EMP for agency/contractors	Lecture and field visit	One day session	External Consultants/ NCRPB
Implementation of EMP	Reporting and coordination <ul style="list-style-type: none"> ▪ Coordination for consents and with various departments ▪ Identification of environmental impacts ▪ Monitoring formats filling and review of impacts 	Officer in charge of implementing this project activities, officer implementing EMP for agency	Lecture and interactive session	Half day session	External Consultants/ NCRPB
Recurring training programmes	Management of Environmental impacts Identification of Environmental impacts Environmental regulations Environmental monitoring and review	Department head at Haryana PWD B&R and HSRDC in-charge of the project, officer in-charge of project implementation, identified officer in-charge of implementing EMP	Lecture and interactive session	One day session	External Consultants/ NCRPB

D. Environmental Budget

81. As part of good engineering practices in the project, there have been several measures as erosion prevention, rehabilitation of borrow areas, safety, signage, provision of temporary drains, etc the costs for which will be included in the design costs. Therefore, these items of costs have not been included in the IEE budget. Only those

items not covered under budgets for construction and RP are costed in the IEE budget. The IEE costs include mitigation, monitoring and capacity building costs. The summary budget for the environmental management costs for the project is presented in the following table.

Sl. No.	Particulars	Stages	Unit	Total number	Rate (INR)	Cost (INR)
A.	Mitigation Measures					
1	Management of dust and sand during construction activities – suppression etc	Construction	Lump sum			200,000
2	Ensuring occupational safety for workers at camps and construction sites	Construction	Lump sum			400,000
	Sub -Total (A)					600,000
B.	Monitoring Measures					
	Water quality	Pre-Construction / Construction	Per sample	30	4000	120,000
	Air	Pre-Construction / Construction	Per sample	60	2000	120,000
	Noise	Pre-Construction / Construction	Per sample	60	1000	60,000
	Burrow pits sites etc	Pre-Construction / Construction	Lump sum			70,000
	Vegetation/tree survey and monitoring implementation of tree plantation	Pre-construction / construction	Lump sum			70,000
	Sub -Total (B)					440,000
C	Capacity Building					
2	Sensitisation, awareness	Pre-construction	Lump sum			472000
3	Monitoring and management	Construction	Lump sum			187000
	Sub-Total (C)					659000
	Total (A+B+C), INR					1,303,000

VII. Public Consultation and Information Disclosure

A. Process of Consultation Followed

82. During the preparation of the project, consultations with stakeholders were held on environmental issues with HSRDC, communities along the project roads and affected persons. The general impression from the consultations was that all stakeholders were glad for the development as it would result in a better environment in the area, ease traffic and reduce travel time, and will also result in fewer accidents. Summary of the consultations undertaken is given in Table below.

Table 3: Summary of Consultations

S.No.	Place	Date	Number of participants	Participants	Issues discussed
1	Ladpur	28 November, 2009	5	Residents and local business owners	The residents identified the need for better and broader roads. The quality of the roads needed improvement Pavements and proper shoulders for roads must be considered as a part of the design
2	Lalpur village	28 November, 2009	8	Residents and passersby	Participants discussed the need for better roads – which were well surfaced. Speed breakers, shoulders along the roads and trees were also suggested. Speed breakers were specifically requested for in front of schools to ensure the safety of children.
3	Munimpur village	28 November, 2009	10	Residents and users of road	The need for better roads and proper surfacing of roads was suggested. A proper covered drain and culverts were suggested by the participants. Speed breakers at points where village roads met the main roads, animal crossings and along schools were suggested. Some concerns were raised about the possibility of residences in the vicinity of the roads being broken for the broadening and strengthening activities for the roads. It was confirmed that the impacts to private properties is not envisaged and all construction and improvement activities will be carried out within the available RoW.
4	Village Dhania	28 November, 2009	7	Farmers	All acknowledged the need for better roads – broader and also of better quality which did not get damaged fast.
	Along road	28 November, 2009	4	Farmers	The consultation also highlighted that often the roads were damaged due to water logging and therefore appropriate design considerations must be ensured so that the roads

S.No.	Place	Date	Number of participants	Participants	Issues discussed
					last longer. There was also a suggestion for speed breakers to ensure the safety of all persons and animals using the road
	Kheri Sultan	28 November, 2009	10	Road users and residents	The need for better roads, speed breakers and shoulders was suggested The residents also said that they had to use their own vehicles to access markets due to the lack of public transport, which was because of the lack of proper roads The residents also wanted speed breakers to reduce speed of vehicles and ensure the safety of children and animals who also crossed the road. Summer months were suggested for all construction activities.

B. Framework for continued public participation

83. A grievance redressal cell will be set up within the HSRDC to register grievances of the people regarding technical, social and environmental aspects. This participatory process will ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process. Further, to ensure an effective disclosure of the project proposals to the stakeholders and the communities in the vicinity of the project locations, an extensive project awareness campaigns will be carried out.

84. For the benefit of the community the Summary IEE will be translated in the local language and made available at: (i) Office of the HSRDC Division at Jhajjar, (ii) Office of the District Commissioners, Jhajjar and Bahadurgarh districts. These copies will be made available free of cost to any person seeking information on the same. Hard copies of the IEE will be available in the HSRDC office as well as the local library, and accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document at the cost of photocopy from the office of the Divisional office of the HSRDC at Jhajjar, on a written request and payment for the same. Electronic version of the IEE will be placed in the official website of the HSRDC and the website of ADB after approval of the documents by Government and ADB. The HSRDC will issue notification on the disclosure mechanism in local newspapers, ahead of the initiation of implementation of the project, providing information on the project, as well as the start dates etc. The notice will be issued in local newspapers one month ahead of the implementation works. This will create awareness of the project implementation among the public. Posters designed to mass campaign the basic tenets of the IEE will be distributed to libraries in different localities that will be generating mass awareness.

VIII. Findings and Recommendations

85. It is to be noted that as per the statutory requirements of Government of India (Environmental Impact Assessment Notification, September 2006, and its subsequent amendment 2009) Environmental Impact Assessments are not required for the proposed road improvements. The proposed development does not fall either in Category A or in Category B as per Gol EIA requirements. Right of Way (RoW) has been kept minimum to minimize environmental impacts associated with widening of the roads. The significance of the environmental impacts will be more due to the construction related impacts than any impacts associated with areas of rich environmental sensitivity. It is to be noted that the resultant potential impacts from these proposals can be offset through provision of proven mitigation measures during the design and adoption of good engineering practices during construction and implementation. EMP prepared to this affect addresses these potential impacts through appropriate mitigation, management and monitoring measures.

86. The effective implementation of the measures proposed will be ensured through the building up of capacity towards environmental management within the HSRDC supplemented with the technical expertise of an Environmental Specialist as part of the Management Consultants. Further, the environmental monitoring plans prepared as part of the EMP will provide adequate opportunities towards course correction to address any residual impacts during construction or operation stages.

IX. Conclusions

87. The project will have a number of benefits such as – reduced time taken to travel on the roads with reduced congestion, reduced accidents on the road and smoother flow of traffic. Also, considering the low levels of environmental impacts expected it will not require any major mitigation. The proposed components should proceed through to implementation, subject to mitigation measures and monitoring programs as per EMP for potential impacts identified in the IEE. It may be emphasized that the present IEE, which identifies potential impacts and EMP which presents appropriate mitigation measures, is sufficient enough to safeguard the environment. There are no significant adverse impacts, which are irreversible or may lead to considerable loss/destruction of environment, envisaged. All the impacts are generic and have proven mitigation measures to minimize/mitigate the same.

X. Appendix 1: REA Checklist

ROADS AND HIGHWAYS

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- 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:

Jhajjar Roads, Haryana. NCRPB, India

Sector Division:

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			There are no special or protected areas.
■ CULTURAL HERITAGE SITE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ PROTECTED AREA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ WETLAND	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ MANGROVE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ ESTUARINE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ BUFFER ZONE OF PROTECTED AREA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE...			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The topography of the area is relatively flat. There are a few village ponds near the roads as they pass through the villages. Surface runoff during rains could lead to stagnating water in the fields adjoining the roads or in the villages. The project design therefore needs to include culverts and road side drainage.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concerns may exist as there will be a need to get labour from outside, therefore requiring labour camps.
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> ▪ noise and vibration due to blasting and other civil works? ▪ dislocation or involuntary resettlement of people 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Increasing noise and vibrations during construction and civil works shall be an impact, to address which, construction timing therefore will need to ensure that disruptions are low.
<ul style="list-style-type: none"> ▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Road widening may result in some areas encroached upon requiring acquiring.
<ul style="list-style-type: none"> ▪ hazardous driving conditions where construction interferes with pre-existing roads? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> ▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Local population do not work as construction labour, therefore workers from outside will be specially brought for the construction of the road, requiring labour camps and associated amenities.
<ul style="list-style-type: none"> ▪ creation of temporary breeding habitats for mosquito vectors of disease? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	At labour camps, quarries and borrow pits the possibility of temporary breeding habitats for mosquito vectors is possible.
<ul style="list-style-type: none"> ▪ dislocation and compulsory resettlement of people living in right-of-way? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There is nobody living in right of way. The identified land is mainly for agricultural
<ul style="list-style-type: none"> ▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> ▪ increased noise and air pollution resulting from traffic volume? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> ▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

88. Altitude of the district is ranges from 212 m to 276 m above mean sea level (MSL). Bhadurgarh rail head at north-eastern side connects the district to Delhi and Rohtak; while Jharli railhead at south-western end connects it with Riwari and Bhiwani. Delhi is the nearest airport. It is located in Seismic Zone IV.

89. The Haryana Development and Regulation of Urban Areas Act, 1972 regulates the use of land in order to prevent ill-planned and haphazard urbanization in or around towns in the State of Haryana. The Punjab scheduled roads and controlled area restriction of unregulated development Act, 1963 regulates erection or re-erection of any building or make or extend any excavation or lay out any means of access to a road within one hundred meters of either side of the road reservation of a bye-pass or within thirty meters on either side of the road reservation of any scheduled road not being bye-pass or expressway.