Environmental Assessment Document

D. BADLI BYPASS

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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 Plannnig 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 Badli bypass in Jhajjar district, Haryana. 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

3. Recognizing the environmental and social issues that can arise in infrastructure projects, NCRPB has prepared a 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

4. The proposed components will result in positive environmental impacts. The entire length of the project road is proposed on a green field alignment and the eccentric two lane cross section is proposed for the first phase in such way that the centre line of the proposed four lane centre line will coincide with the centre line of the right of way (A 60m wide strip of land is being acquired for the project to accommodate four lanes). 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

5. 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), EIA notification, 2006 and in 2009, 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.	The roads included are district roads and are not state highways. According to the notification, the project roads do not fall under either category A or Category B. 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.

6. 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 assessment[1] 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

7. 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. Need for the project

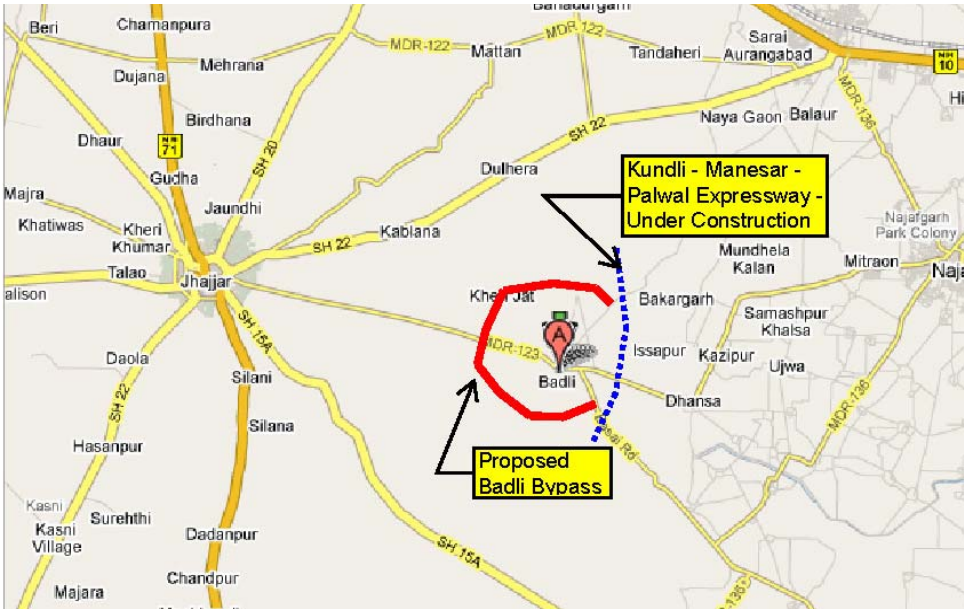
8. The state of Haryana surrounds the National Capital on three sides. The road network of Haryana act as a conduit to enter the National Capital for large number of commercial traffic from Jammu & Kashmir, Punjab, Himachal Pradesh, Rajasthan and Parts of Utter Pradesh. Eight districts of Haryana viz. Faridabad, Mewat, Gurgaon, Rohtak, Sonepat , Rewari, Jhajjar and Panipat are part of the NCR. Many major development projects are taking place in NCR of Haryana, which includes 20 SEZs with an investment of Rs 870 Billion. All this developments also attracts heavy good and industrial traffic to the NCR region of Haryana from surrounding states.

9. The rapid growth in the region is putting pressure on the main road network and especially the towns along these routes with the narrow width and heavy urban traffic. One such town is Badli in Jhajjar district of Haryana where about 8 roads cross the town which includes roads from the major villages around and connecting roads to Delhi, Gurgaon, Jhajjar and Bahadurgarh. Large number of trucks transporting material for the bitumen plants located on the north-east of Badli town. The material is transported from all around Badli town and the output from the bituminous plants mostly transported to various parts of NCTD. In addition, large regional traffic also travels through Badli town resulting in congestion in the town and there is little scope for widening the road through the town. In order to mitigate the transport situation in and around Badli, it is proposed to develop a Bypass to cater to all through traffic which has no business in the town.

10. The traffic studies indicate that more than 50% of the traffic currently going through Badli town is bypassable. This will have a major positive impact on the traffic situation in the town and improve the traffic safety. The savings to the society in terms of vehicle operating with reduced congestion is large enough as can be seen from the economic rate of return of the project and is therefore highly justified in social cost benefit terms.

B. The Proposed Badli bypass alignment

11. The proposed Badli Bypass starts from Km 16/550 of Gurgaon – Bahadurgarh road and its joins the same road at Km 18/580 and will be 5.68 km long connecting 8 roads converging in Badli town. The road is designed as a 4 lane divided carriageway and in the first phase two lane carriageways with paved shoulders will be constructed. The proposal also involves rehabilitation of existing road section of Gurgaon – Bahadurgarh road from Km 16/550 to Km 18/580 and about 1.3 km length of cross roads. The project road location is shown in Figure 5.1.



Note: Section of KMP Expressway near Badli only is shown

Figure 5.1: Project Road Location

C. Alignment Description

12. The proposed Badli Bypass, starts from Km 16/550 of Gurgaon – Bahadurgarh road and joins back the same road at Km 18/580. The entire project alignment is traversing through plain terrain and the project corridor is predominantly passing through agricultural land. The subgrade soil is generally silty clay and the entire alignment is proposed on embankment. As the project road alignment is passing through agricultural fields and on embankment, adequate provision of balancing culverts are required to avoid any chance of flooding on one side on the road. The project road alignment in true sense will act as a ring road to Badli town along with Gurgaon – Bahadurgarh road and it crosses six other roads and hence effectively preventing the through traffic from those roads entering to the town center. The cross roads, which will cross the bypass alignment, are given in Table 5.2.

Table 5.2 List of Cross Roads

S No	Crossing Road
1	Rohad Road
2	Goelakalan Road
3	Kheri Road
4	Jhajjar Road
5	Munimpur Road
6	Yakubpur Road

13. The proposed alignment is not crossing any railway line or river. The construction of Palwal-Manesar-Kundli Express way is in progress, which is crossing the Gurgaon – Bahadurgarh road about 100m before the start of the bypass alignment in the north, and again it is crossing the Gurgaon – Bahadurgarh road about 100m after the end of bypass. Presently grade separated crossing is planned for the Expressway without any connection to Gurgaon – Bahadurgarh road.

14. The basic industries located in the Jhajjar district are ceramics, glass, chemicals, engineering, electrical & electronics. The area is under rapid industrial growth owing to its proximity to Delhi. The cross roads on the proposed Badli bypass are frequently used for transportation of stone metals/ crushed material to Gurgaon and capital city of Delhi for development works, as most of the quarries are located across this area. Moreover high growth of heavy traffic is expected as two Thermal Power Plants are proposed to be installed at Chhuchkawas and Badli.
15. The bypass alignment passes through agricultural fields and is also linked to a number of local roads and MDR 123. The area is largely rural with Badli village being surrounded by agriculture fields and brick kilns. Along the alignment only a few trees may require removal for the construction of the road. The area has many brick kilns and the topsoil in part of identified area has been removed and sold to the brick kilns.

D. Design Standards

16. The project road has been proposed to be constructed to a four lane divided carriageway in two phases and two lane with paved shoulder will be constructed in the first phase. Based on the traffic estimate, the second phase may need to be taken up in about 2020. The DPR is prepared for the first phase with adequate provisions for future widening. Considering the requirement of future four laning, 60m wide RoW is proposed in the DPR. The proposed 60m wide RoW will adequately accommodate the utilities, road side plantation, service road etc.

17. The project road is designed as per the standards of State Highways. 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 5-8.

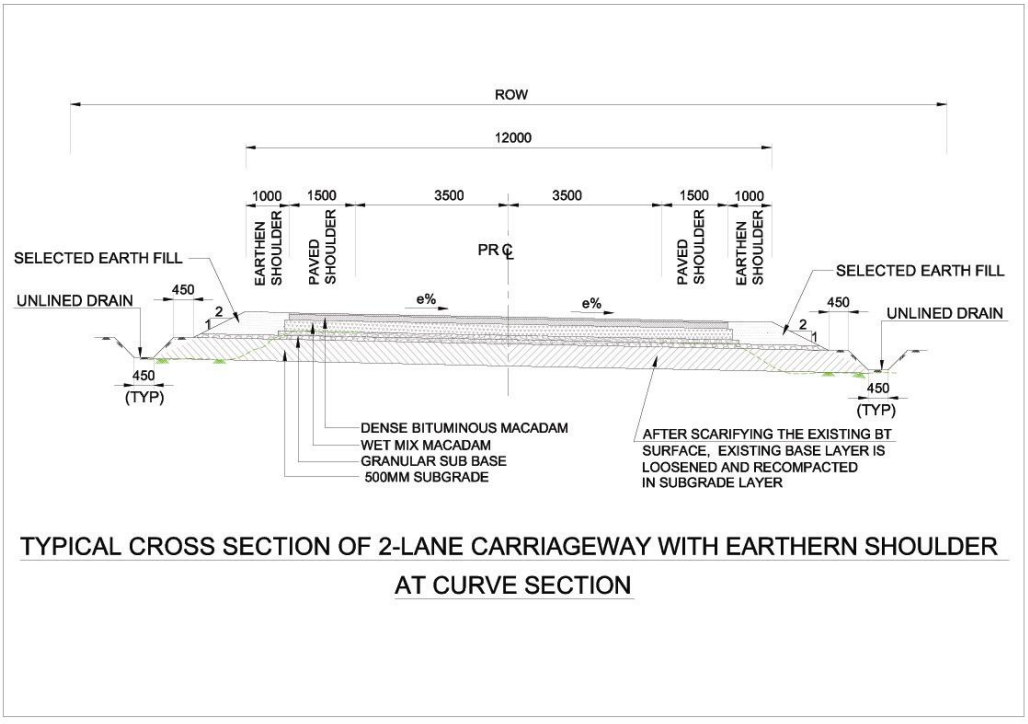
Table 5-8 Design Parameters

S. No	Description	IRC Standards	
1	Design speed Plain and Rolling	Max – Min	100 - 80 km/hr
2	Lane width		3.5 m
3	Paved shoulder width		1.5 m
4	Earthen Shoulder		1.0
5	Road Way Width	Two Lane	12.0 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 100 Km/hr For 80 Km/hr	360 m 230 m
10	Radii beyond which super elevation not required	For 100 Km/hr For 80 Km/hr	1800 m 1100 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

S. No	Description	IRC Standards		
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
		100 km/hr 80 km/hr	60m 50m	0.5% 0.6%
16	Vertical curve 'K' values Crest vertical curve/Sag vertical curve	For design Speed 100 km/hr 80 km/hr	Crest 74 33	Sag 42 26
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)	

E. Typical Cross Sections

18. The entire length of the project road is proposed on a greenfield alignment and the eccentric two lane cross section is proposed for the first phase in such way that the centre line of the proposed four lane centre line will coincide with the centre line of the right of way. The recommended typical cross sections for straight and super elevated sections are shown in Figure 5-2 and Figure 5-3.



TYPICAL CROSS SECTION OF 2-LANE CARRIAGEWAY WITH EARTHERN SHOULDER AT CURVE SECTION

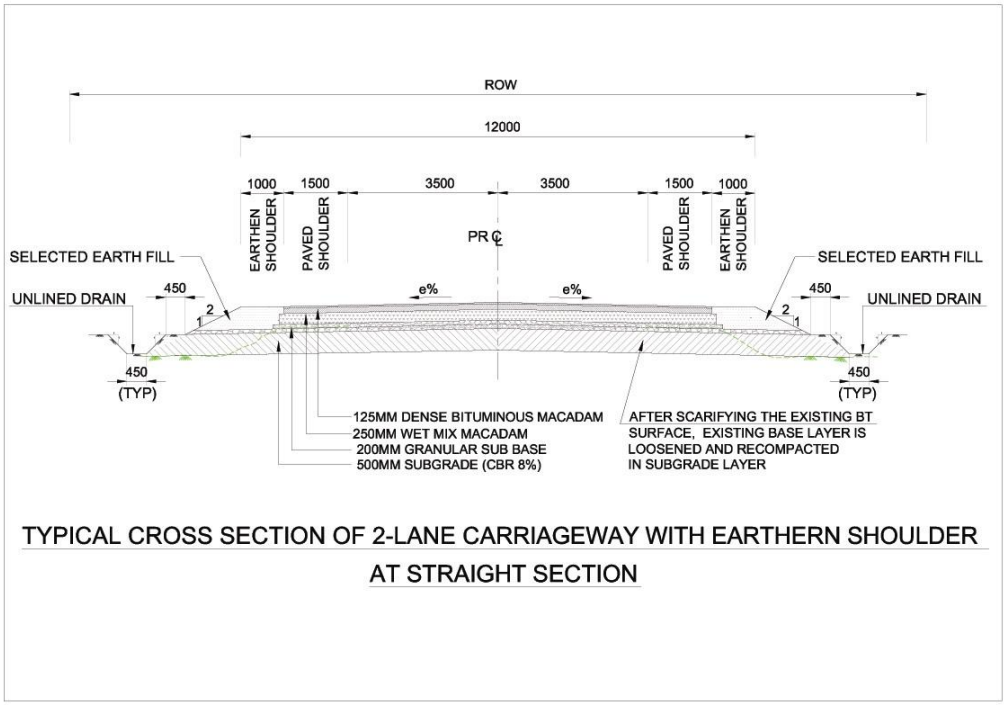


Figure 5.3 Suggested Typical Cross Sections

F. Implementation Schedule

19. The implementation of the project shall be completed over a period of 18 months. The project will be implemented by the Project Implementation Unit (PIU) of the HSRDC. The HSRDC is implementing a number of similar projects and have the institutional capacity to undertake the project. The project involves land acquisition for the entire length and involves utility shifting for the rehabilitation of Gurgaon – Bahadurgarh road section and sections of cross roads included. The project is proposed to be implemented as a single contract package.

III. Description of the Environment

20. Badli in Jhajjhar District, is located at an important junction of roads going to the towns of Delhi, Gurgaon, Jhajjhar, Bahadurgarh, and a number of villages. It is located at 28^{0}34'17.41" N and 76^{0}48'29.33" E. The environmental characteristics of Jhajjar district is discussed in the following sections.

A. Physical Environment

1. Terrain

21. The Jajjar district forms part of Indo-Gangatic alluvial plain, with undulating dunes in some parts and small isolated hill in south-western part. 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. The canal system of the district drains rain water during rainy season.

2. Climate

22. The climate of the project area is sub-tropical, semiarid, continental and monsoon type. Average temperature ranges from 7^{o}C in January to 40.5^{o}C in May and June. January is the coldest month, bringing down the temperature to 3^{o}C; while in summer season it goes up to 47^{o}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. 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

23. 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. 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. Soil parameters observed in the district show pH varying from 7.0 to 7.6 (neutral to slightly alkaline), Electrical conductivity (µS/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

24. The area forms a part of in Dugan ethic 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 farming 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. Land Use

25. 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 the project area.

6. Surface Waters

26. There are no waterbodies or wetlands in the area where the bypass is planned. However, due to the large number of brick kins in the area the top soil for a number of farmland has been removed leaving areas which fill up with water after rains. Project road alignment does not cross any river or stream and hence no bridges are required. However cross drainage structures in the form of balancing culverts are required as the alignment generally passing through agricultural fields. A total of 22 culverts are provided in DPR to address the drainage requirements.

7. Groundwater

27. 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 (µmho/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).

8. Ambient Air quality

28. 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 (SO_2) 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 (µg/m^3)	105.0 – 385.0	50 – 100
RPM (µg/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. Vegetation

29. 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.

10. Ecological Resources

30. 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. There are no environmentally sensitive areas in the vicinity of the Badli town. The trees and shrubs found in the area are those that are found in other parts of the districts, and the characteristics of the vegetation described below.
31. Trees and shrubs noted in the district include shisam (delbergia sisoo), siris (albizzia lebbek), tun (cedrela toona), mulberry (morus), mango (mangifera indca), 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 tomontosa), 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 (balanitos 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 marelan (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 paui or jhuad (anatherum muricatum), makrah, deila, samak (panicum colonum) and bhurat (cenchrum ochinatum).

B. Social and Cultural Resources

1. Demographic profile

32. The total population of Badli was 13,477 according to the 2001 census. Of the total population there were 7506 men and 5971 women. There is no schedule tribe population in Badli, though there is a small population of schedule castes – a total of 1922 persons, 1075 men and 847 women.

33. 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.

34. 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%).

35. 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

36. Agriculture is the major activity in the district. The settlements in the vicinity of Delhi as Badli have seen faster growth of industries, due to proximity of these areas to the cities of Delhi and Gurgaon. Many of the industries in this district are engaged in production of materials used in building and construction sector. A number of economic activities are planned for Badli and the neighbouring areas. These include two number Thermal Power Plants are at Chhuchkawas and one at Badli. Furthermore, this area is also has a number of quarries and stone crushers which provide building material to Delhi and Gurgaon.

IV. Identification of Environmental Impacts and Mitigation Measures

A. Land acquisition and resettlement impacts

37. The proposed bypass is a new formation and involves land acquisition. The first 2.570 km falls under Bahadurgarh Division and the remaining 3.110km falls under Jhajjar Division. Private agricultural land measuring 63.15 acres will be required for the formation of the bypass.

38. The Sec 4(1) notification is yet to be pronounced and the land plan schedule will be prepared only after 4(1) notification. However, the sample surveys carried out in the project area indicate that the project will cause significant impact to 31 households and the impact on another 96 households will be not significant. There are no impacts to indigenous peoples.

39. The acquisition of 63.15 acres of private agricultural land will cause loss of income to the landowners from whom land is proposed to be acquired. The sample socio-economic surveys indicate that the involuntary resettlement impacts are expected to be not significant as the acquisition is linear. Preliminary discussions and consultations have revealed that there are no IP amongst the landowners or among agricultural labourers and hence the project will not require any IPP.

40. 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. Formation of bypass at Badli will come under S-2 category for involuntary resettlement and S-3 category for indigenous peoples as per NCRPB's social categorization.

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

B. Environmental Impacts

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

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

[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-I 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.

1. Location and design impacts

44. Location impacts are not likely to be significant as there are no major environmentally sensitive areas (cultural heritage, protected area or its buffer, wetlands, mangrove, estuaries or any protected area for biodiversity) along or in the vicinity of the proposed alignment. Impacts on water bodies along the project roads have been minimized through careful design of the alignments to avoid encroachment onto the water bodies.

45. The area identified for the construction of the bypass is largely agricultural lands. In addition, there are few brick kilns in the area. Impacts pertaining to loss of agricultural lands have been unavoidable. Similarly, clearance of vegetation and trees along the proposed alignment is required, and will be compensated through compensatory plantation.

2. Construction impacts

46. 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.

47. 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.

48. 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, especially in the vicinity of productive agricultural lands.

49. 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 kins have already used the top soil in many areas, sites for the procurement of soil may have to be carefully identified.

50. Water Bodies: Stockpiles of construction debris if left unattended near water bodies and low lying areas along the project alignment will be washed off as runoff into the water bodies causing siltation. Spillage of oil, lubricants and other chemicals also mix with the runoff and contaminate the water bodies.

51. 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.

52. 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.

53. 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.

54. 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.

55. 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

56. Impacts on environmental conditions associated with the operation stage of the project are identified to be due to increased of traffic and the resultant air and noise pollution from the increased vehicular traffic along the bypass. There are risks of potential land use changes due to the development induced along the bypass, in the absence of any development controls or land use regulations along the bypass.

V. Environmental Management Plan

57. 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 1: Environmental Impacts and mitigation measures

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
1	Location Impacts				
1.1	Land acquisition and resettlement impacts required due to widening of roads at certain locations, where required.	Permanent	Major	Given that the alignment is a Greenfield alignment, land acquisition has been unavoidable. Measures to minimize impacts on productive agricultural land have been considered during the selection of alignment.	HSRDC & Design Consultants
2	Design and pre-construction Impacts				
2.1	Alterations of drainage pattern of the site	Permanent	Major	Design of cross drainage structures would be carried out so as to avoid alteration of drainage pattern.	HSRDC, Design Consultants
2.2	Damage to roadside trees	Permanent	Severe	If removal of any tree / vegetation 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	Permanent	Temporary	The designs shall be worked out to minimize impacts on existing 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	Temporary	Moderate	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	Temporary	Severe	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	Temporary	Moderate	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	Permanent	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 drainage courses No endangered / rare flora is impacted by such material Settlements are located at least 1000m away from the site	Contractor / Management Consultant
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	Contractor / Management Consultant

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				prior to sourcing of material.	
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 and that it does not cause hindrance to the communities. 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	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, machinery and equipment will move or be stationed in designated area (RoW or CoI, haul roads as applicable) only. The haul roads for construction materials will be routed to avoid agricultural areas	Contractor / Management Consultant
4.6	Blasting	Permanent	Moderate	Except as may be provided in the contract or ordered or authorized by the Engineer, the Contractor will not use explosives. 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. 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. The Contractor will at all times make full liaison with and inform well in advance and obtain such permission as is	Contractor / Management Consultant

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				required from all Government Authorities, public bodies and private parties whomsoever concerned or affected or likely to be concerned or affected by blasting operations. 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.	
4.8	Loss of Access	Temporary	Moderate	Construction activities that will affect the use of side roads and existing access to individual properties will not be undertaken without providing adequate access. 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.	Contractor / Management Consultant
4.9	Soil and Water Pollution due to fuel and lubricants, construction waste	Temporary	Moderate	The fuel storage and vehicle cleaning area will be stationed such that runoff from the site does not drain into the water body. 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.	Contractor / Management Consultant
4.10	Siltation of Rivers and streams due to spillage of construction wastes	Temporary	Moderate	Silt fencing to be provided at all water bodies near construction sites to prevent sediments from the construction site to enter into the watercourses. The number of units of silt fencing to be installed is to be decided by the engineer. Discharge standards promulgated under the 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.	Contractor / Management Consultant
4.11	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
4.12	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
4.13	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
4.14	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
4.15	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.	Contractor / Management Consultant

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				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.	
4.16	Traffic Control and Safety	Temporary	Moderate	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.	Contractor / Management Consultant
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.	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 the project will conform to respective IS codes.	Contractor / Management Consultant
4.21	Risk caused by Force Majure	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
4.22	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

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
					Consultant
4.23	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
4.24	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
4.25	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
4.26	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. 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.	Contractor / Management Consultant
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
	Induced development impacts	Permanent	Major	To address issues of induced development along the bypass, appropriate land use plans and regulations to ensure that growth along the bypass is in orderly. Local government	

Sl No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				bodies and development authorities will be encouraged to control building development along the bypass.	
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.	HSRDC

VI. Institutional Requirements

A. Institutional Arrangements

58. 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.

59. 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

60. 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
- Consultation with stakeholders and inclusion of their concerns in project implementation
- Incorporate environmental safeguards as required during project implementation.

B. Environmental Monitoring Plan

61. 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

62. 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	Two on the bypass, alignment,	Once	DPR consultant	4000/sample
2	Noise	Pre construction	Decibels	Two on the bypass, Badli alignment	Once	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	Ten – two on each of the roads – for all 5 roads, near habitations.	Thrice annually	Contractor	4000/sample
2	Noise	Construction	Decibels	Ten – two on each of the roads – for all 5 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 pits	Construction	After construction activity over – if rehabilitated	All quarries, borrow pits, waste and construction labour camps and offices sites	Once prior to construction	Contractor	40,000 total
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

63. 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

64. 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 ▪ Environmental impacts of road's projects ▪ GoI 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
EMP implementation	Implementation of environment EMP ▪ 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-chare of project implementation, identified officer in-charge of implementing EMP	Lectures and field visit		External Consultants/ NCRPB
EMP implementation	Implementation of EMP ▪ 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 ▪ 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	Department head at Haryana PWD B&R and HSRDC in-charge of the project, officer in-chare of project implementation, identified officer in-charge of implementing EMP	Lecture and interactive session	One day session	External Consultants/ NCRPB

Program	Description	Participants	Form of Training	Duration	Trainer / Agency
	Environmental monitoring and review				

D. Environmental Budget

65. 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			100,000
2	Ensuring occupational safety for workers at camps and construction sites	Construction	Lump sum			200,000
	Sub -Total (A)					300,000
B.	Monitoring Measures					
	Water quality	Pre-Construction / Construction	Per sample	8	4000	36,000
	Air	Pre-Construction / Construction	Per sample	18	2000	36,000
	Noise	Pre-Construction / Construction	Per sample	18	1000	18,000
	Burrow pits sites etc	Pre-Construction / Construction	Lump sum			30,000
	Vegetation/tree survey and monitoring implementation of tree plantation	Pre-construction / construction	Lump sum			30,000
	Sub -Total (B)					150,000
C	Capacity Building					
2	Sensitisation, awareness	Pre-construction	Lump sum			472,000
3	Monitoring and management	Construction	Lump sum			187,000
	Sub-Total (C)					659,000
	Total (A+B+C), INR					1,318,000

VII. Public Consultation and Information Disclosure

A. Process of Consultation Followed

During the preparation of the project, consultations with stakeholders were held on environmental issues with HSRDC, communities along the project roads and affected persons. Consulted stakeholders include – users, village elected members at Badli, residents of Badli and farmers whose land is to be acquired. Apart from discussions with people in the village, a transact walk on part of the way identified for the construction of the bypass was taken where discussions with farmers – land owners and share croppers was taken and a visit was made to the take off point for the bypass where vehicles stopped and discussions with users were undertaken. 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 2: Summary of Consultations

S.No.	Place	Date	Number of participants	Participants	Issues discussed
1	Badli agriculture fields	6 November, 2009	1	Share cropper	The development is positive as it will reduce traffic jams and inconvenience in the village No loss of livelihood perceived as can take up other areas for cultivation
2	Agricultural fields in Badli area	6 November, 2009	2	Land owners	Happy about the construction activity as profits from agriculture is low since irrigation water is limited – tubewells with water tables are at 70 ft depths and dropping and water is saline Loss of crop in bad rain years is the norm There will be some loss of land, but will gain better road conditions and safety in village as accidents will reduce Too much dust in the town due to the excessive through traffic passing A farmer plans to open an eatery on his remaining land once the bypass is constructed Trust in the government giving money on time There is expected to be no major inconvenience caused by the construction A farmer suggested that there should be no construction up to 30 meters from the road as it obstructs traffic and entry to the bypass should be restricted to a few points to ensure smooth flow of traffic
3	Present road and take off point	6 November, 2009	3	Users	The bypass will also ensure that they have a shorter route and there is too much congestion and waste of time in congestions in the town The present route also increases risks of accidents and therefore an alternate route should be considered Would like some facilities like tyre puncture repair shops and eateries on the bypass so that there is no need to go to Badli
4	Bhadurgarh	6 November, 2009	1	PWD B&R	The demand for a bypass has been there for a long time as the present road results in traffic jams in the village However, the present road was a bypass

S.No.	Place	Date	Number of participants	Participants	Issues discussed
					but people constructed along side the road which has resulted in the need for another bypass. Unless this can be prevented for the planned bypass, in a while the situation of the present bypass will also occur for the planned one There is a lot of development planned for the area like the medical and educational centres, brick kins, crushers and hot-mix plants are there in the area. Therefore, traffic can be very heavy on the present road Risk of accidents in the town are high due to the heavy traffic
5	Badli	6 November, 2009	2	Elected representatives	Dust, noise and pollution from the present road is a major concern and therefore there has been a demand for the bypass Sometimes congestion in the village is so bad that roads are blocked for over an hour, especially as the local market is situated on the road Accidents on the road are a major concern – children are at the highest risk
6	Badli	6 November, 2009	1	Resident	Dust, noise and pollution are major problems from the traffic on the present road There is always a threat of accidents due to the heavy traffic and alternate routes need to be identified to divert the traffic from the area

B. Framework for continued public participation

66. 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.

67. 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 Commissioner Jhajjar 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 at Badli, 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

68. 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 GoI EIA requirements. 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 some of the resultant potential impacts from these proposals are already minimized/mitigated through necessary changes in the design and will also be offset through adoption of good engineering practices, and implementation of suggested mitigation measures during construction and implementation. EMP prepared to this affect addresses these potential impacts through appropriate mitigation, management and monitoring measures.

69. 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

70. The project will have a number of benefits such as – reduced congestion on the existing road through the Badli town, and thereby savings of time, reduced accidents and smoother flow of traffic, and improved air quality / noise levels within the town. The impacts associated with induced development along the bypass shall be addressed through appropriate development controls and land use regulations during the operation of the bypass. 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. These will be updated and detailed during detailed design stage, and based on above recommendations. 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:

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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	☐	■	
▪ PROTECTED AREA	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ WETLAND	☐	■	
▪ MANGROVE	☐	■	
▪ ESTUARINE	☐	■	
▪ BUFFER ZONE OF PROTECTED AREA	☐	■	
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY	☐	■	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?	☐	■	
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?	☐	■	
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	■	☐	The topography of the area is relatively flat. However, surface runoff during rains could lead to stagnating water in the fields adjoining the roads. The project design therefore needs to include culvets 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?	■	☐	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?	■	☐	This would occur, however as it is planned to procure all material from the
▪ noise and vibration due to blasting and other civil works? ▪ dislocation or involuntary resettlement of people	■	☐	A new road is to be made increasing noise and vibrations. However, disturbance will be limited considering that there are no settlements in the area.
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	■	☐	There is a need for relocation as agriculture land is to be acquired for the project.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	☐	■	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	■	□	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.
▪ creation of temporary breeding habitats for mosquito vectors of disease?	■	□	At labour camps, quarries and borrow pits the possibility of temporary breeding habitats for mosquito vectors is possible.
▪ dislocation and compulsory resettlement of people living in right-of-way?	□	■	There is nobody living in right of way. The identified land is mainly for agricultural
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life?	□	■	
▪ increased noise and air pollution resulting from traffic volume?	□	■	
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	□	■	