Initial Environmental Examination

March 2013

Widening and Strengthening of UP border Sonepat Gohana upto district Sonepat boundary road from km. 11.600 to 74.00

Prepared by Haryana State Road Development Corporation

ABBREVIATIONS

ADB	:	Asian Development Bank
NCRPB	:	National Capital Region Planning Board
HSRDC	:	Haryana State Roads & Bridges Development

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EXECUTIVE SUMMARY

Proposal

The Initial Environmental Examination (IEE) Report has been prepared for the Widening and Strengthening of 62.40 km length of existing road of dual two lane in Km 11/6 – 23/0 and two lane with paved shoulder in Km 23/0 – 74/0 lane to two-lane.. The HSRDC is the implementing agency at the district level under PWD and proponent of the Initial Environmental Examination study for this Sonepat Gohana road project.

Background

HSRDC has approached NCRPB for financing the project. It is proposed to fund the project under the National Capital Region Urban Infrastructure Financing Facility (NCRUIFF) supported by Asian Development Bank (ADB). As per the NCRPB Environmental and Social Management System (ESMS), the project is classified as ADB as environment Category E2 (equivalent to ADB category B) and accordingly requires preparation of initial environmental examination (IEE) Report.

Objective

The main objective of the IEE study is to identify the impacts of physical, biological, socio-economic and cultural environment of the sub-project area. The specific objectives of the proposed IEE study include:

i) Identify the major impacts that may arise as a result of proposed works on biophysical, socio-economic and cultural environment of the project area.
ii) recommend practical and site specific environmental mitigation and enhancement measures, prepare and implement environmental monitoring plan for the Subproject, and
iii) provide information on the general environmental setting of the sub-project area as baseline data and make sure that IEE is sufficient for the proposed road Subproject

Relevancy of the proposal

Road widening and strengthening has several benefits from the project to the people living in the vicinity of project area in terms of easy access, saving of time on travel, easy transportation facilities for people. The widening and strengthening of the proposed road may uplift social and economical status of the local people.

Description of Sub-Project

The project road proposed for improvement is a State Highway (SH 11), and is an important road of Sonepat District. The existing road consists of carriageway width varying from 10m to dual two lane and 1m to 1.5 wide earthen shoulders on both sides. The present traffic is 22341 pcu at 11/6 – 23/00 i. e. Bahalgarh Chowk and Sonepat and Traffic is 9411 pcu in section 23/0 – 74/0 i. e. Sonepat-Gohana district boundary Sonepat and the current traffic in the entire stretch of the project road exceeds the DSV. This indicates the immediate requirement of capacity augmentation in form of upgrading carriageway. Sections of the road pass through a few built-

up areas with not only inadequate road geometry, but also with various deficiencies such as riding surface distress, weak and unsafe cross drainage structures and safety procedures etc

Under the project, it is proposed to widen and strengthen existing road stretch of total 62.45 km from current status to higher status with removing various road engineering deficiencies. The widening proposal in road corridor is within the existing right-of-way. The improvement work extends to all components of the road, namely, pavements, drains, structures within Right-of-Way (Row), improvement of the road geometry etc. The project road passes through plain terrain with mild gradients. The proposal is generally restricted within the available ROW. There are no rivers crossing the existing road, however, there are 51 culverts.

Description of the Environment

Location - Sonepat District is located in the south-east of the State of Haryana. The district lies between 28o48'30" to 29o17'54" N latitude and 76o 28' 30" to 77o 13'40"E longitude. Sonepat is the District Headquarter and other smaller towns are Gohana, Ganaur, Mundlana, Kharkhoda and Rai. The total area of Sonepat district is 2,260 sq km and its population is 10,64,000. Sonepat is bordered by the states of Delhi and Uttar Pradesh as well as the districts of Rohtak, Jind and Panipat. River Yamuna runs along the eastern boundary of the district.

Topography, Geology, and Soils: Sonepat district forms part of the Indo-Gangetic plains and exhibit flat terrain with slope from north to south. This area is devoid of any prominent topographic features, except a natural depression in north and northwest of Gohana. Altitude of the plains in the district varies from 212 m to 230 m above mean sea level (MSL). The geological classification of the project area has been broadly divided into two formations viz. the older alluvial formation and the Yamuna older alluvial formation. Over most of the district, the soil is fine loam of rich color. Soils along the project area vary from sandy to clayey loam, because of its presence in the banks of the Yamuna river and being a part of Indo-Gangetic alluvial plain.

Climate - The climate is characterized by an intensely hot summer and a cold winter. November to March is winter; summer season prevails during May and June. Rainy season is from July to September.

Air Quality - TSPM and PM10 observed in Sonepat were above the standard limits. Concentrations of SO2 and NO2 were found below the permissible limits. Higher concentration of TSPM and SO2 observed during winter seasons causes respiratory diseases. Ambient air quality as observed during the monitoring carried out by Green Consultants in Sonepat is provided in Main Report.

Noise - Average noise levels monitored in Sonepat district in rural and residential areas varied from 46.2 to 63.8 dB(A) during the day and 40.9 to 44.7 dB(A) at night, and are within the prescribed limits. Day time noise levels near the Sonepat Railway station averaged 67.1 dB(A), exceeding the limit of 55 dB(A); while night time noise levels averaged 47.3 dB(A), exceeding the limit of 45 dB(A). The monitored noise levels for residential areas were within the prescribed limits. .

Surface Water - There are no perennial rivers in this part of the NCR. However, there are some water bodies adjoining the identified road, in form of village ponds and lakes. The water quality in the district varies with some areas showing excess levels (beyond permissible limits of GoI

guidelines) of nitrates, fluorides, and fluoride. The water table is shallow and within 5 m depths in the northern parts of Sonepat district. In the remaining parts of the district the water table is between 5 and 20 meters. At present, the water table in Sonepat District, though is not overexploited, there are areas wherein the water is brackish.

Groundwater - Ground water occurs in depths of 10-25 m in the district. The quality of ground water in shallow dug wells is fresh in the eastern and north, northwest parts and gradually gets deteriorated in the western and southwestern parts. The total replenish-able ground water resource in the district is 449.58 mcm, while the total existing ground water draft by all means is 511.10 mcm. The shallow ground water of the district is alkaline in nature and with moderate to high mineral content with EC ranging from 597 to 6710 µS/cm at 25^{o}C. The concentration of Arsenic (2 mg/l) and Iron (6 mg/l) are observed more than permissible limits in few areas.

Ecological Resources - There are no reserved forests near and around the project road. The Bhindawas Bird Sanctuary, situated about 50 km from the Kharkhauda-Assaudha Road, is the only protected area in the project district. No endangered flora and fauna has been noted.

In Haryana, the strip of land along the roads is notified as Protected Forest as per Forest(Conservation) Act, 1980 (amended in 1988), and widening of road therefore requires diversion of forest land for the road purposes and also requires permission of Forest Department to cut the trees. The road widening and cutting of trees (there are 6090 trees in the right of way) requires permission of Forest Department. Except this, there are no other reserved/protected forest areas involved in this project area.

Economic Development

Land Use along the road: The section-wise existing land use along the proposed road is provided in Table 5 of of Main Report. In the starting stretch of Bahalgarh to Sonepat, there are industries. In Sonepat Town, commercial establishments exist on both sides of the road. In Sonepat, construction of a ROB (Road Over Bridge) at a railway level crossing is in progress. After Badwasana till Gohana there are number of trees on the either side of the road which are falling in the proposed RoW.

Industry and Agriculture - Industries in this district are involved in manufacturing wooden products, agro products, chemical and rubber wares, engineering goods, sports and leather goods, mineral based products, textiles, pharmaceuticals, and chemicals. Most of the existing industrial units are concentrated at Sonepat. and Kundli. Agriculture is the major activity in the district. Paddy, wheat, sugarcane and bajra contribute major crops in the project area due to good water holding capacity of the soil. Fruits grown include malta-orange, sweet lime, kaghzi lime, mango, guava and ber, pomegranate, grape and phalsa.

Social and Cultural Resources

Demography - Total population of Sonepat district was 1,480,080 in Census 2011, representing 5.84% of Haryana State. About seventy five percent of total population lives in rural areas (74.88%) and 25.12% in urban areas (Urbanization of the state-28.9%). Scheduled castes population is 18.09% (rural-18.91%; urban-15.62%); while no Scheduled Tribe has been

notified. In 2011, Sonepat had population of 1,480,080 of which male and female were 798,948 and 681,132 respectively. The 2011 Sex Ratio in Sonepat stood at 853 per 1000 male (which is an increase from2001 census figure of 839) and much below the national average of 940.

Health Facilities - Health services of the Government is rendered through 100 bedded hospital at Sonepat town, 7 community health centres (CHC) including one at Gohana town with 50 beds, and 29 primary health centres (PHC).

History, Culture and Tourism - There are no historically or archeologically or religiously important places along the project road. In overall district as well there are no such important places; the tourism importance of Sonipat is almost negligible.

ANTICIPATED IMPACTS AND MITIGATION MEASURES

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 - Location Impacts are not likely to be significant as there are no major environmentally sensitive areas along the road proposed for improvement. However, project requires diversion of 26 ha of protected forest, which is basically, tree plantation along strip of land adjoining the right of way and around 6090 no.s trees need to be removed for the project. In Haryana, the strip of land along the roads is notified as Protected Forest as per Forest (Conservation) Act, 1980 (amended in 1988), and widening of road therefore requires diversion of forest land for the road purposes and also requires permission of Forest Department to cut the trees. Trees will be cut with prior permission of Forest Department and necessary cost of afforestation, at a rate of 10 trees per each tree removed, will be provided to Forest Department. Application is already submitted to the Forest Department and approval is under process (Appendix 3). The impacts pertaining to road safety, especially for stretches in urban areas have been addressed through incorporation of appropriate safety measures in designs.

Construction impacts - The impacts during the construction stage shall be typical of road construction 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 road. The mitigation measures for the various impacts are outlined in Table 8 of Main Report.

Operational impacts - Impacts on environmental conditions associated with the operation stage of the project are mainly due to increase of air and noise pollution from the increased vehicular traffic along the route. The proposed improvements and safety provisions, in area 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 road.

INSTITUTIONAL ARRANGEMENTS

Haryana State Roads Development Corporation (HSRDC) is the Implementing Agency (IA) of this project. IA will undertake all actions for the implementation of the project. An Environmental Officer (EO) shall be inducted within the HSRDC to address the environmental impacts and implement EMP during the project life cycle. During construction, the construction supervision is

conducted by HSRDC with the assistance of Supervision Consultant (SC). The Supervision Consultant Team shall include an Environmental Management Specialist (EMS), who will assist EO in implementation of EMP.

GRIEVANCE REDRESS MECHANISM

HSRDC will constitute a three-member Grievance Redressal Committee (GRC) comprising of the DGM, HSRDC, (jurisdictional DGM), the elected member of the project area and one member from the public who is known to be persons of integrity, good judgment and commands respect among the community. The existence of the GRC will be disseminated to the villagers through printed handouts providing details of the structure and process in redressing grievances. Any aggrieved person (whose complaint to the complaint cell is not redressed to his/her satisfaction) can approach GRC, chaired by the DGM, HSRDC and if the grievance is not addressed, the aggrieved person will be directed to approach the District Collector. The aggrieved person will have the right to approach the court of law, if he/she is still unsatisfied with the decisions taken by the GRC and the Collector.

ENVIRONMENTAL MANAGEMENT PLAN

Environmental management plan is an important tool to ensure the implementation and monitoring of mitigation measures for minimizing adverse impacts and maximizing the beneficial impacts. Similarly, environmental monitoring generates useful information and improves the quality of implementation of mitigation measures. The Environmental Impact Mitigation & Monitoring Program, Training & Capacity Building and Environmental Management Costs have been detailed in Main Report.

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A series of public consultation meetings were conducted during the project preparation and IEE preparation. Various consultation forms were adopted, direct interaction, interviews with the local community members, passerby and people residing nearby area, particularly people living in the villages along the road stretches was conducted. The basic purpose of the project discussed with the stakeholders and the proposed widening / strengthening of Road was explained in detail to the General Public living in the area with details of improvement works proposed and the extent (two-lane) to which the roads are proposed for widening. The reason for identifying the stretch for widening / strengthening of Road was discussed with the villagers and in particular the volume of traffic crossing; the need for Road widening/strengthening, the likely impact to land and structures along the widening/strengthening of road and its peripherals, and disturbance, inconvenience and safety issues during the construction and the efforts to be taken for minimizing the impacts. The interactions of the Public Consultation conducted has been provided in detail in Main Report.
The public consultation shall be a continuous process and will continue in the future. The HSRDC will extend and expand the consultation and disclosure process during implementation.

FINDINGS AND RECOMMENDATIONS

Potential negative impacts were identified related to design, location, construction and operation of the project. Negative impacts due to the design and location are assessed to be minimal, and due to minimal operational and maintenance activities, there are no major negative impacts of operation.

The potential adverse environmental impacts of the proposed project are mainly related to the construction phase and which can be minimized by the proposed mitigating measures and environmentally sound engineering and construction practices. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

Preparation of a Traffic Management Plan is also recommended for ensuring site specific management measures to ensure road safety, and smooth traffic flow. An environmental monitoring plan has been developed to assess the environmental performance of subproject implementation. The EMP will be incorporated into the construction bid/contract.

The important recommendation of this IEE is that this Road Improvement Project can proceed for implementation provided all impacts are addressed through suggested mitigation measures. The other important recommendation is that the involuntary resettlement issues, which are identified through a parallel process of resettlement planning, need to be addressed by RP implementation prior to award of contract for civil works.

CONCLUSIONS

The main objective of the proposed Widening and Strengthening of Road From NH-1 (Bahalgarh Chowk) to Sonepat to Gohana Up to District Jind Boundary (Km 11.600 To Km 74.000) is to :-

- Reduce time taken to travel on the road with reduced traffic congestion.
- Reduce road accidents
- Improve ride quality, reduce air pollution

This IEE has assessed all potential environmental impacts associated with the project. There are no impacts, which are significant or complex or which needs an in-depth study to assess the impact or to develop the mitigation measures. The environmental impacts identified are manageable, and HSRDC will implement the mitigation measures as stated in IEE.

The project does not fall under the ambit of the EIA Notification, 2006 of Government of India, and therefore do not require Environmental Clearance from Ministry of Environment and Forest. However, the project requires permission and approval of Forest Department for diversion and use of forest land for road widening, and for cutting of trees, and this will be obtained before award of the Contract. Also, the Contractor requires consent of pollution control board for facilities like hot mix plants and crushers. It will be ensured that the consent is in place before start of the work.

I. INTRODUCTION

Overview

1. The Haryana State Road Development Corporation (HSRDC) of Government Haryana, is proposed to improve the existing Road from National Highway -1 (at Bahalgarh Chowk) to Sonepat, and further to Gohana upto District Jind Boundary (Km 11.600 to Km 74.000) to facilitate free and easy movement of traffic and improve road safety. The proposed project includes strengthening and widening of 62.40 km length of existing road of dual two lane in Km 11/6 – 23/0 and two lane with paved shoulder in Km 23/0 – 74/0 lane to two-lane.

2. HSRDC has approached NCRPB for financing the project. It is proposed to fund the project under the National Capital Region Urban Infrastructure Financing Facility (NCRUIFF) supported by Asian Development Bank (ADB).

3. As per the NCRPB Environmental and Social Management System (ESMS), the project is classified as ADB as environment Category E2 (equivalent to ADB category B) and accordingly requires preparation of initial environmental examination (IEE) Report. This IEE Report has been prepared for the project of widening and strengthening of UP Border to Sonepat – Gohana district upt Sonepat Boundary road from Km 11.600 to 74.000–in Haryana State. This project covers widening & strengthening of an existing road, including geometric improvements, removing deficiencies and reconstruction of cross drainage structure with new structures.

Environmental Compliance Requirements

NCRPB Environmental Policy and ESMS

4. Recognizing the importance of environmental and social issues that can arise in infrastructure projects, NCRPB has established Environmental and Social Management Systems (ESMS) in line with Government and other multilateral agencies like ADB 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 funded by NCRPB. 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. Implementing Agencies (IAs) will have to comply with the ESMS and Policy.

5. **Screening and Categorization.** According to NCRPB ESMS, the projects are screened for their expected environmental impacts and are assigned to one of the following categories: E1, E2 or E3.

(i) **Category E1** (Significant impacts or in eco-sensitive areas): If the project has significant adverse environmental impacts that are irreversible, diverse, or unprecedented, then it is regarded to have environmental scenario. These impacts may affect an area larger than the sites or facilities subject to physical works. These impacts will be considered significant if these are in eco-sensitive areas.

(ii) **Category E2** (Limited environmental impacts): If the project has impacts that are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed.

(iii) **Category E3** (No environmental impacts): If the project is likely to have minimal or no adverse environmental impacts

6. The proposed project of widening and strengthening of Balagarh – Sonepat – Jind Road is unlikely to have significant impacts. The project site is also not located in or near any eco-sensitive area. The subproject is however likely to have typical impacts associated with the construction activity and therefore classified as Category E2.

15. According to ESMS, E2 projects require carrying out Initial Environmental Examination (IEE) and preparation of IEE Report. This IEE report is prepared accordingly.

Applicable Legislations

7. The implementation of the subprojects will be governed by the national government and state of Haryana environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize and/or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether national, state or municipal and/or local.

8. **Environmental Assessment Requirements**. The GoI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects require EC from the national Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries. Owing to its scale and nature, this project does not falls under the ambit of the EIA Notification, and, therefore EC is thus not required.

9. **Forest Clearance**. The strip of land with trees along the roads in Haryana is notified as Protected Forests. The widening of road requires diversion of Protected Forest land for non-forest (i.e. for road widening) purpose. Cutting of trees also require permission of Forest Department The project requires following environmental related approvals/clearances from regulatory agencies:

Table 1: Clearances and Approvals

	Component	Clearance	Responsibility	Status
1	Use of forest land and tree cutting	Approval from forest department Forest department will take up afforestation program at a rate of 10 trees per each tree cut at the cost of HSRDC.	HSRDC	Application submitted to Forest Department (Appendix 3).
2	Hot mix plant, crusher etc	Consent for Establishment and Consent for Operation from Haryana Pollution Control Board	Contractor	-

	Component	Clearance	Responsibility	Status
3	Disposal of Hazardous Wastes	Consent for disposal of Hazardous Waste as per Hazardous Waste (Management and Handling) Rules, 1989	Contractor	-
	Disposal of Sewage from Labour Camps	Consent for disposal of sewage from labour camps under Water (Prevention and Control of Pollution) Act 1974 prior to setting up labor camps.	Contractor	-
	Employing Labourers/ Workers	Employing Labourers/ Workers as per The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.	Contractor	-

II. DESCRIPTION OF SUBPROJECT

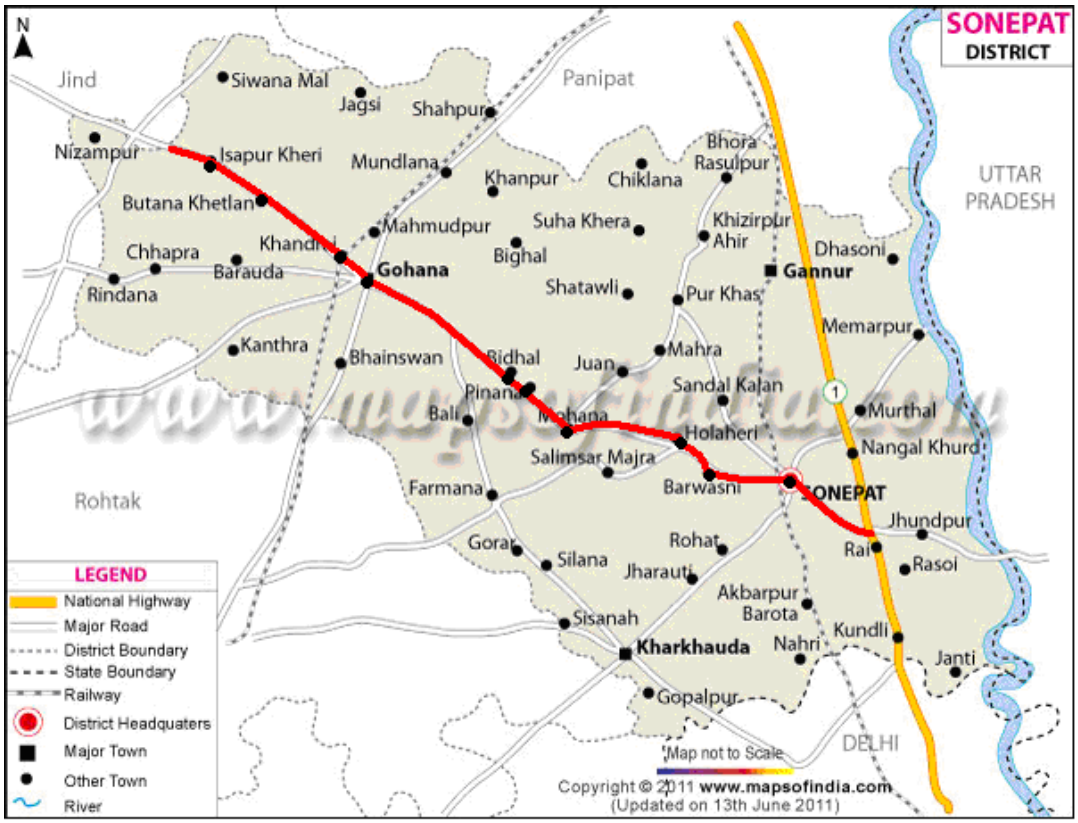
Need for the Subproject

10. The project road proposed for improvement is a State Highway (SH 11), and is an important road of Sonepat District. The existing road consists of carriageway width varying from 10m to dual two lane and 1m to 1.5 wide earthen shoulders on both sides. The present traffic is 22341 pcu at 11/6 – 23/00 i. e. Bahalgarh Chowk and Sonepat and Traffic is 9411 pcu in section 23/0 – 74/0 i. e. Sonepat-Gohana district boundary Sonepat and the current traffic in the entire stretch of the project road exceeds the DSV. This indicates the immediate requirement of capacity augmentation in form of upgrading carriageway. Sections of the road pass through a few built-up areas with not only inadequate road geometry, but also with various deficiencies such as riding surface distress, weak and unsafe cross drainage structures and safety procedures etc.

Description of Subproject

11. **Figure 1** shows the location of project (Widening and Strengthening of Road from NH-1 (Bahalgarh Chowk) to Sonepat to Gohana up to District Jind Boundary) road in Sonepat District.

Figure 1: Project Road



12. Under the project, it is proposed to widen and strengthen existing road stretch of total 62.45 km from current status to higher status with removing various road engineering

deficiencies. The widening proposal in road corridor is within the existing right-of-way. The improvement work extends to all components of the road, namely, pavements, drains, structures within Right-of-Way (Row), improvement of the road geometry etc. The widening of this road stretch will facilitate smooth flow of traffic thereby reducing travel time and cost. Further, the poor pavement condition, bad geometry and the heavy traffic growth combined together warrant for an immediate protection and capacity augmentation of the project road. The project road passes through plain terrain with mild gradients. The proposal is generally restricted within the available ROW. There are no rivers crossing the existing road, however, there are 51 culverts. .

13. The following are the proposed components of the project:

Road Widening: The present traffic requires developing the existing two lane carriageway to four lane with hard shoulder carriageway to ensure good riding quality with reasonable riding comfort and speed. No major constraint in widening of the carriageway as no land is required to be acquired.

Horizontal alignment is achieved by improving the existing at various locations on the project roads.

- Design speed :
  - 60 kph for the built-up areas.
  - 80 kph for rest of the alignment.
- Smoothening of kinks with high radii within the ROW
- Introduction of proper transition curve for design speed assigned
- Realignment of curves with deflection angle < 5 degrees for minimum required length

Vertical profile has been taken care of by rising the formation wherever requires.

Carriage way:

(i) From NH-1 to Sonepat

Item	Four lane with Hard Shoulder
Carrageways	2x7.0 m
Median	1.5m
Unpaved shoulder (gravel)	2 × 1.0 m
Total Roadway width	17.5 m

(ii) From Sonepat to Sonepat/Jind District Boundary

Item	Two Lane with Paved Shoulder
Carrageways	1x7.0 m
Paved Shoulder	2x1.5m
Unpaved shoulder (gravel)	2 × 1.0 m
Total Roadway width	12.00 m

For the road sections passing through built-up areas, unpaved shoulder is extended to 2.0m width before a lined drain is placed.

Proposed Road Pavement Composition: New pavement for widening and reconstruction is proposed to be constructed with following composition.

(i) Section -1 NH-1 to Sonepat City (Km 11.6 – Km 23.0)

Pavement Layers	Widenning	New / Reconstructions
Surfacing Layer	50mm BC + 165mm DBM	50mm BC + 165mm DBM
Base Course	250mm Wet Mix Macadam (WMM)	250mm Wet Mix Macadam
Sub-base	230mm granular drainage quality, CBR>30%	230mm granular, drainage quality, CBR>30%
Sub-grade	500 mm, in Tibba Sand, CBR> = 7%	500mm, Tibba Sand, CBR >= 7%

(ii) Section - 2 & 3 Sonepat City to Sonepat/Jind District Boundary (km 23.0 – km 74.0)**:**

Pavement Layers	Widenning	New / Reconstructions
Surfacing Layer	40mm BC + 115mm DBM	40mm BC + 115mm DBM
Base Course	250mm Wet Mix Macadam (WMM)	250mm Wet Mix Macadam
Sub-base	230mm granular drainage quality, CBR>30%	230mm granular, drainage quality, CBR>30%
Sub-grade	500 mm, in Tibba Sand, CBR> = 7%	500mm, Tibba Sand, CBR >= 7%

Shoulder: Hard shoulder is proposed with the composition of adjoining pavement. For earthen shoulder, selected earth fill is proposed over granular sub-base layer. For built-up areas, earthen shoulder/ margin of 1.00 - 1.50m between paved shoulder and lined drain is proposed with paver blocks which will be utilized for non-motorised vehicles:
Granualr sub-base material + 50 mm sand fill + 100 mm Thick Interlocking Block (M-40)

Drains. Roadside drains are proposed in all villages for disposal of surface run-off away with covered slab of 1.5m width which will be served as pedestrian footpath..

Culverts: Out of the 51 existing culverts, only 9 slab culverts will be retained. Remaining 42 culverts will be replaced with new ones along with the construction of 90 new culverts.

Junctions: All the existing 29 junctions are proposed to be improved with separation of directional movement and channelization of turning traffic.

Road Safety. Traffic Control and safety measures have been taken care by adequate road signs and pavement marking as per IRC Standards. 10 pairs of bus stops by way of lay-by / widening the carriage way are proposed.

Environmental up gradation: Following are included in the project as enhancement measures:

- Turfing of side slopes to avoid erosion, and also to arrest dust and improve aesthetics
- Plastic Reuse: Use of waste plastic in bituminous surface for builtup areas
- Interception drains to collect storm water drain
- Installation operation of ambient air quality monitoring station along the project road
- Solar lighting and rain water harvesting

Required provisions for site clearance, earthwork, sub base & base course, Bituminous course, cement concrete pavement, drainage and cross drainage works, traffic safety, road appurtenances, forest clearance, environmental upgradation and shifting utilities have provided for making a reasonably accurate cost estimation. Amount required for have also been provided.

14. **Proposed Road Cross Sections**: Typical cross sections of the proposed road are shown in Figure 2 and Figure 3. While these are the typical cross-sections, modifications have been made to at various locations with Right of Way (RoW) constraints to minimize land acquisition and resettlement. Separate cross sections are adopted for various sections according to site conditions.

Figure 2: Typical cross-section of the Road: Rural Section

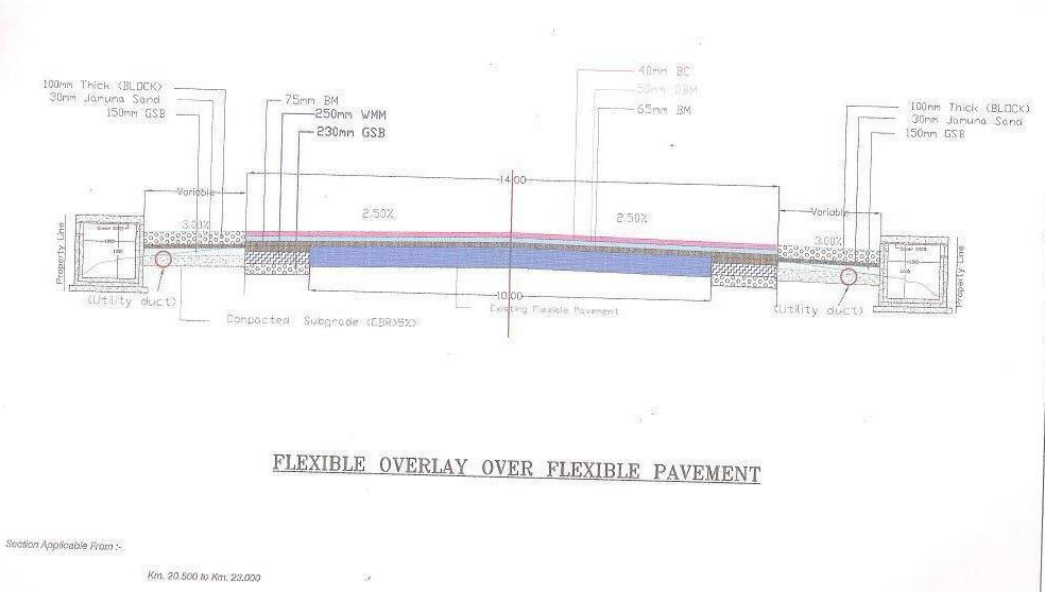
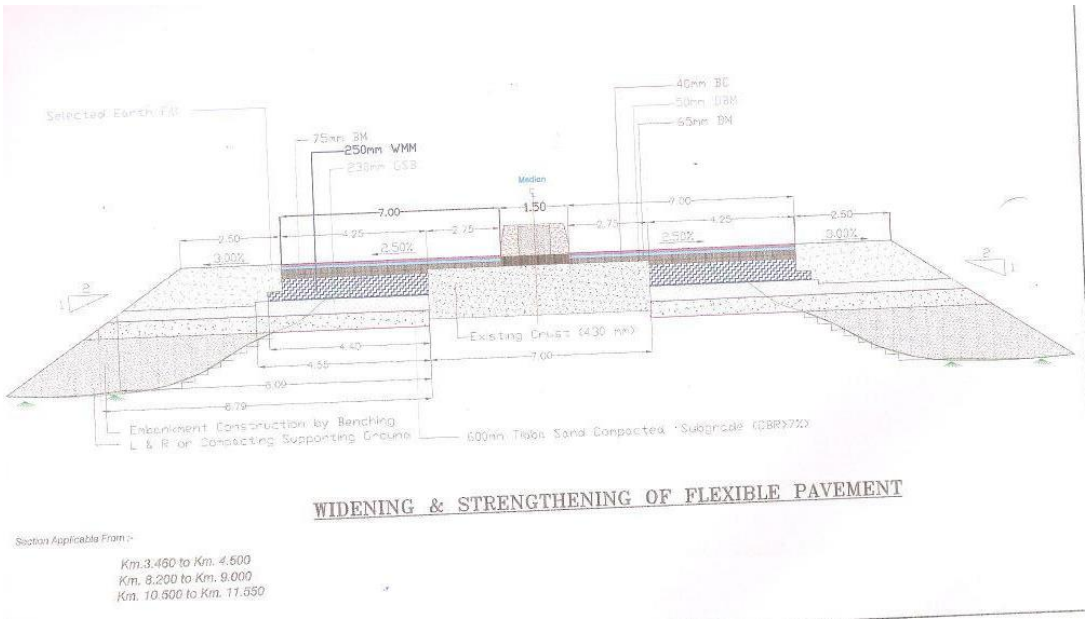


Figure 3: Typical cross-section of the Road: Urban/Built up Sections



15. **Design Parameters**. Guidelines and standards / Specifications by Indian Roads Congress (IRC), Ministry of Road Transport and Highways (MORTH) of GoI, Bureau of Indian Standards (BIS), and Government of Haryana are followed as the basis for the design. Following is a summary of the recommended design standards adopted for the project road other than intersections.

(i) Design Speed (kmph) : 80 (Ruling), 65 (Minimum)
(ii) Desired Level of Service: LOS-B upto Year 2021
(iii) Roadway Widths : 12.00 m
(iv) Roadway Elements –
  a. Carriageway, Two-Lane: 1 x 7.00 m
  b. Paved Shoulder : 2x 1.50 m
  c. Unpaved shoulder : 2 x 1.00m
  d. Carriageway Four-Lane : 2 x 7.00m
    i. Medium : 1 x 1.5.00m
  e. Unpaved Shoulder : 2 x 1.00m
  f. Roadwaywidth : 17.5m
(v) Camber –
  a. Carriageway/ Paved Shoulder: 2.5%
  b. Unpaved Shoulder : 3.0%
(vi) Right of Way : Minimum 20m
(vii) Embankment Slope –
  a. In filling : 1 Vertical : 2 Horizontal
  b. In cutting : 1 Vertical : 1 Horizontal
(viii) Super-elevation : Maximum 7%

(ix) Radii for Horizontal Curves: 360m for design speed of 100km/hr
230m for design speed of 80km/hr

(x) Ruling Gradient : 3.33%

Construction Activities

16. Following provides the details of construction activities, requirement of quarry material, construction equipment and workers.

Table 2: Construction Activities & Requirement

Component	Description	Remarks
Construction process	• Tree cutting • Utility shifting • Site clearance • Earthwork, • Sub base & base course, • Bituminous course, • Cement concrete pavement (at 3 locations of 200 m length) • Drainage and cross drainage works • Traffic safety, road appurtenances • Rain water harvesting & turfing	Yes, 4580 Trees Yes Yes Yes Yes Yes No Yes Yes No & Yes turfing included with earth work.
Material required	Gravel • Quantity: Nil m3 • Likely Source: N.A. Road metal (stone aggregate • Quantity: 460846.75 cum • Likely Source: Any approved source by Engineer Any other • Quantity: 107773.52 cum (Stone Dust) • Likely Source: Approved by the Engineer. • Water for Construction processes	**Yes** (No public water sources will be used for road construction. As per data available from Central Ground Water Board, Sonepat district does not fall under notified area as per ground water availability)
Waste generation	Road strip debris: (Qty) 354465.30 Sqm. Reuse: Yes in Bituminous work. Disposal location : Any low lying area finalized by the Engineer	---------- Nil ----------
Plant & machinery to be established	• Hot mix plant : Yes • Crusher : Yes	
Construction workers	Number of workers: Variable (Approximately) Likely source of labour: Locally or outside (Both) Construction camps: 01 nos.	

Implementation Schedule

17. Detailed design work has been completed, and Detailed Project Report has been approved. The project is proposed to be implemented over a period of 21 months and as a single construction package. Bids will be invited in May 2013, and construction work will commence in November 2013 and will be completed by July 2015.

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III. DESCRIPTION OF THE ENVIRONMENT

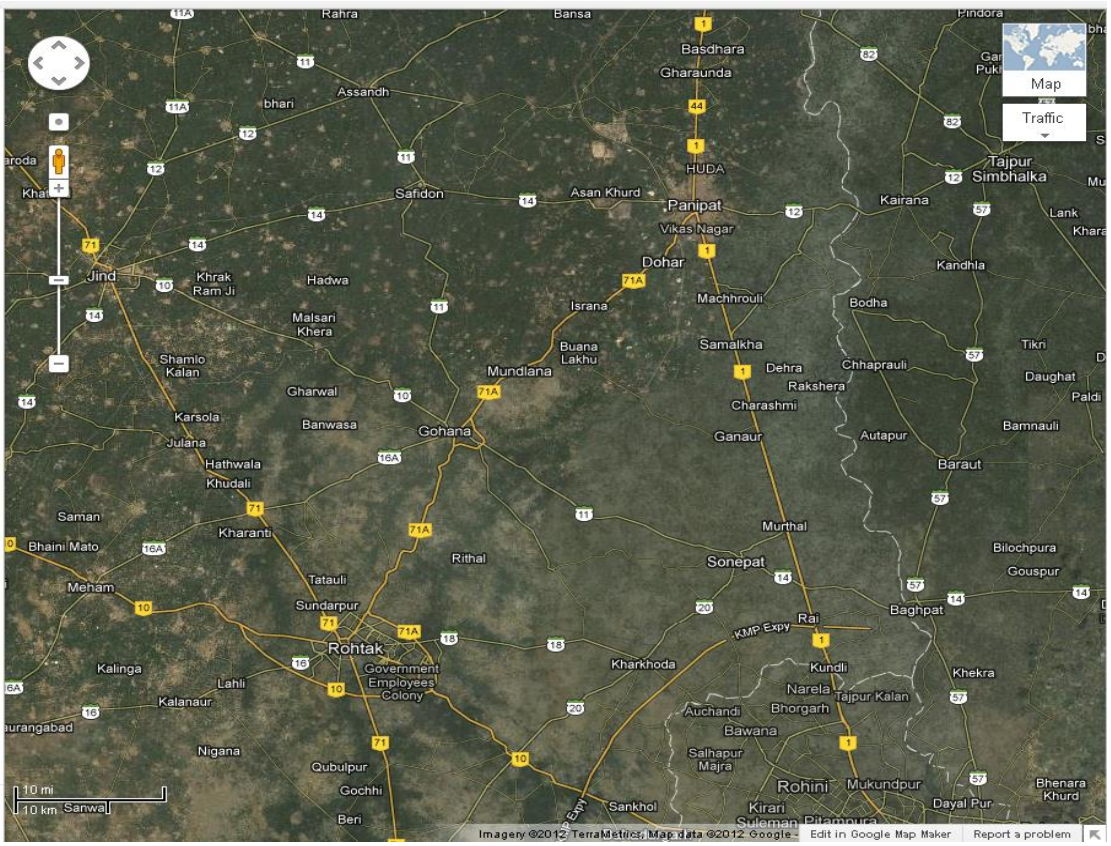
Physical Features

Location

18. Sonepat District is located in the south-east of the State of Haryana. The district lies between 28º48'30" to 29o17'54" N latitude and 76o 28' 30" to 77o 13'40"E longitude. Sonepat is the District Headquarter and other smaller towns are Gohana, Ganaur, Mundlana, Kharkhoda and Rai. The total area of Sonepat district is 2,260 sq km and its population is 10,64,000. Sonepat is bordered by the states of Delhi and Uttar Pradesh as well as the districts of Rohtak, Jind and Panipat. River Yamuna runs along the eastern boundary of the district.

19. District Sonepat comprises of 3 sub-divisions namely Ganaur, Sonepat and Gohana and seven blocks (Ganaur, Sonepat, Rai, Kharkhoda, Gohana, Kathura and Mundlana). Sonepat District has been carved out of Rohtak District in 1972. Sonepat is the largest *tahsil* followed by Gohana. The detailed Map of Proposed Project Road is provided in Appendix 5.

Figure 4: Location of Proposed Road in Sonepat District



Topography, Geology, and Soils

20. Sonepat district forms part of the Indo-Gangetic plains and exhibit flat terrain with slope from north to south. This area is devoid of any prominent topographic features, except a natural

depression in north and northwest of Gohana. Altitude of the plains in the district varies from 212 m to 230 m above mean sea level (MSL). The quaternary sediments of the area are composed of recent and fresh matter deposits of clay, silt and sand which are of loose to semi-consolidated nature of recent to sub-recent age. Topographically the district can be divided into three units, viz., (i) active flood plains along the present day course of the river Yamuna in eastern part of the district; (ii) abandoned flood plains of recent past, bordering the active flood plains and are wider, low lying flat tracts; and (iii) upland plains aligned along the western Yamuna canal representing the relatively older river deposits.

21. Main water system in the district comprises of River Yamuna and the irrigation canals flowing out of it. There is no perennial river in the district. The underground water resources differ from area to area. The depth of the water table is the lowest in the Khader area along the Yamuna, where it is below 10 ft. It increases to 30 to 40 ft. in some of the western and south eastern part of the district. The ground water in some areas is saline and brackish. The ground water conditions indicate that the district faces the problem of occurrence of brackish water and water logging in eastern parts of the district. Broadly speaking, the district is a continuous part of the Haryana-Punjab plain, but the area is not leveled in some parts.

22. The entire project road passes through plain terrain with mild gradients. The Sonepat district is part of the alluvial plain formed by the Yamuna and the Ganga rivers that occupies a major portion of NCR. In Sonepat district most of the area is covered by Quaternary alluvium. The adjoining areas around the project road mainly consist of flat agricultural fields and brick kilns. In addition to the few scattered water bodies and village ponds existing along the road, borrowing of earth for brick kilns has resulted in depressions adjoining the identified road.

23. The district may be roughly divided into three regions:

(i) **The Khadar**. Along the River Yamuna is a narrow flood plain, 3 to 6 km wide, and is formed by the river along its course. The Khadar plain is 20 to 30 ft. lower adjoining upland plain. It is comprised of fine clay loam left by the receding floods of the Yamuna. Presently, rice and sugar cane cultivation is undertaken by the farmers in the Khadar area. Recently, the farmers have started planting Banana, Pappaya and other fruits trees in this area.

(ii) **The Upland Plain**. It consists of Sonepat tehsil lying to the west of the Khadar, and is the most extensive of the three regions: The Upland Plain is covered with old alluvium, which if properly irrigated, is highly productive. Extensive Farming of crops, oil seeds, horticultural plants, vegetables and flowers, is undertaken in this region. The ridges in Gohana tehsil represent the northern most extension of the Aravallis.

(iii) **The Sandy Region**. A very smaller part of the district is covered with soil comprising of sand or sandy loam. Parts of this region has high pH value leading to kallor land.

24. **Geology**. The geological classification of the project area has been broadly divided into two formations viz. the older alluvial formation and the Yamuna older alluvial formation. The older alluvial formation, occurs at higher level arid, and consists of silt, silty clay and clay, accompanying ‘kankar’ at certain places. Yamuna older alluvial formation, consists of grayish silt, silty sand with sporadic pebbles of quartzites basic rock fragments and clay pockets, occurs concomitant to the Yamuna channel in the form of recent flood plain and low lying terrace deposits. Sand occurring in abundance in this district is useful for construction. Brick clays from

silty clays used for brick making and salt peter in Gohana and Sonepat taluks are mineral resources in this district.

25. 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, Sonepat-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-Hardwar 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 road, through adoption of the IRC codes and standards.

26. **Soil Profile**. Over most of the district, the soil is fine loam of rich color. However, some areas has sandy soil and others are comprised of Kallar. The plain has a gradual slope to the south and east. District Sonepat, comprising of Sonepat, Gohana and Ganaur sub divisions, has 343 villages and covers an area of 2,13,080 hectares. The irrigated area (both with the help of canal irrigation as well as through tubewells) is 2,86,504 acres and the un-irrigated rainfed area is 43,979 acres.

47. Soils along the project area vary from sandy to clayey loam, because of its presence in the banks of the Yamuna river and being a part of Indo-Gangetic alluvial plain. About 67 per cent soil in the district is sandy loam, 25.5 per cent sandy and 7.25 per cent clay. The soil is deficient in organic matter, salinity and alkalinity. Soil parameters observed for cultivation in the district show fertility of the land (pH – 6.5 to 8.6, Conductivity – below 2.5µmho/cm, Organic Carbon – below 0.4%, P – below 10 kg/ac, K – above 135 kg/ac, Zn – above 0.6 ppm, Mn – above 2.00 ppm, Iron – above 4.5 ppm). Soils in Gohana area of the district show pH of 8.0 to 8.9; conductivity (µmho/cm) – 0.13 to 1.14; Zn (ppm) – 0.68 to 3.04; Cu (ppm) – 0.48 to 1.66; Fe (ppm) – 5.30 to 23.98; Mn (ppm) – 4.36 to 11.61 (Source: Soil Testing Register, 2009 - KRIBHCO).

Climate

27. The climate is characterized by an intensely hot summer and a cold winter. November to March is winter; summer season prevails during May and June. Rainy season is from July to September.

(i) **Temperature**. The winter starts in December when day and night temperatures fall rapidly. January is the coldest month when the mean daily minimum temperature is 6 to 7 Degree C. During cold waves, the minimum temperature may go down to the freezing point of water, and frosts can occur. During the summer months of May and June, the maximum temperature sometimes reaches 47 Degree Centigrade. Temperature drops considerably with the advancement of monsoon in June. However, the night temperature during this period continues to be high.

(ii) **Humidity**. Humidity is considerably low during the greater part of the year. The district experiences high humidity only during the monsoon period. The period of minimum humidity (less than 20%) is between April and May.

(iii) **Rainfall.** The annual rainfall varies considerably from year to year. However, the maximum rainfall is experienced during the monsoon season, which reaches its peak in the month of July. In fact, the monsoon period accounts for 75% of the

annual rainfall in the district. On an average there are 24 days in a year with rainfall of 2.5 mm (or more) per day in district Sonepat. Annual average rainfall in the district is 511.4 mm.

(iv) **Wind**. During the monsoon, the sky is heavily clouded, and winds are strong in this period. Winds are generally light during the post-monsoon and winter months. Similarly, in the monsoon periods winds are strong, and in post-monsoon and winter months it is light. Thunder storm and dust storm, often accompanied with squalls (andhis) experienced during the period April to June.

(v) **Region Specific Weather Phenomena.** Sonepat experiences a high incidence of thunder storms and dust storms, often accompanied by violent squalls (andhis) during the period April to June. Sometimes the thunder storms are being accompanied by heavy rain and occasionally by hail storms. In the winter months, fogs sometimes appear in the district.

Air Quality

28. TSPM and PM10 observed in Sonepat were above the standard limits. Concentrations of SO2 and NO2 were found below the permissible limits. Higher concentration of TSPM and SO2 observed during winter seasons causes respiratory diseases. Ambient air quality as observed during the monitoring carried out by Green Consultants in Sonepat is presented in the following Table.

Table 3: Ambient Air Quality

Parameter	Observed in Sonepat during Oct – Nov, 2012	Standards
TSPM (μ/m^3)	132.3 – 1630.6	-
PM10(μ/m^3)	68.2 – 456	60
NO2	14.6 – 75.4	80
SO2	3.8 – 84	80

Noise

29. Average noise levels monitored in Sonepat district in rural and residential areas varied from 46.2 to 63.8 dB(A) during the day and 40.9 to 44.7 dB(A) at night, and are within the prescribed limits. Day time noise levels near the Sonepat Railway station averaged 67.1 dB(A), exceeding the limit of 55 dB(A); while night time noise levels averaged 47.3 dB(A), exceeding the limit of 45 dB(A). The monitored noise levels for residential areas were within the prescribed limits. .

Surface Water

30. There are no perennial rivers in this part of the NCR. However, there are some water bodies adjoining the identified road, in form of village ponds and lakes. The water quality in the district varies with some areas showing excess levels (beyond permissible limits of GoI guidelines) of nitrates, fluorides, and fluoride. The water table is shallow and within 5 m depths in the northern parts of Sonepat district. In the remaining parts of the district the water table is between 5 and 20 meters. In Sonepat 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 Sonepat District, though is not overexploited, there are areas wherein the water is brackish.

50. The River Yamuna in the eastern side and Western Yamuna Canal passing through the district are the major sources of surface water. The drains constructed in the district take out excess monsoon water to Yamuna River. The water quality near National Highway No. 1 in

Yamuna River is presented in Table 4. Cadmium, Nickel, Chromium, Zinc and Iron are the heavy metals observed in the Yamuna River near the Sonepat district.

Table 4: Water Quality in River Yamuna - Location along NH1 in Sonepat district

Parameter	Values
Temperature (º C)	14.0 to 32.0
Dissolved Oxygen (mg/l)	5.7 to 12.0
pH	7.04 to 8.42
Free Ammonia (mg/l)	BDL to 1.77
Total Kjeldhal Nitrogen(mg/l)	0.28 to 3.05
COD (mg/l)	4 to 49
BOD (mg/l)	1 to 6
Conductivity (µmho/cm)	192 to 619
Total Coliform (Nos./100ml)	3200 to 112000
Fecal Coliform (Nos./100ml)	560 to 10500

Source: Water Quality Status of Yamuna River (1999-2005), CPCB

31. There are no rivers crossing the project road. There 6 irrigation canals crossing the road, where there are 6 minor bridges. There are 10 existing culverts.

32. **Water logging**. Water logging is a serious problem in some parts of Sonepat District affecting the productivity of land. The water logged area, in which the water table is between 0 to 5 ft faces a serious problem. There has been an alarming rise in the water table during the last two decades, specially in the areas adjoining the canals. This has led to appearance of *Thur* on the surface of soil, followed by *sem* in several parts of the district.

Groundwater

33. Ground water occurs in depths of 10-25 m in the district. The quality of ground water in shallow dug wells is fresh in the eastern and north, northwest parts and gradually gets deteriorated in the western and southwestern parts. The total replenish-able ground water resource in the district is 449.58 mcm, while the total existing ground water draft by all means is 511.10 mcm. The shallow ground water of the district is alkaline in nature and with moderate to high mineral content with EC ranging from 597 to 6710 µS/cm at 25oC. Ground water occurring in the southern and north-western parts of the district is more saline as compared to ground water occurring in the rest of the district. 68% of the ground waters are not suitable for drinking due to salinity, fluoride (13 mg/l) contents above permissible limits. The concentration of Arsenic (2 mg/l) and Iron (6 mg/l) are observed more than permissible limits in few areas.

Ecological Resources

34. There are no reserved or protected forests or areas near and around the project road. The Bhindawas Bird Sanctuary, situated about 50 km from the Kharkhauda-Assaudha Road, is the only protected area in the project district. There are no impacts envisaged on this sanctuary due to the proposed road developments. Given that there are no protected areas, and that the alluvial plains, and especially the project road, are largely inhabited, there is hardly any wildlife existing, with exception of nilgai. No endangered flora and fauna is noted.

35. The project requires diversion of 26 ha of protected forest, which is basically, tree plantation along strip of land adjoining the right of way and around 6090 no.s trees need to be removed for the project. The details of type of trees to be cut (species and number) is provided in **Appendix 3**. In Haryana, the strip of land along the roads is notified as Protected Forest as per Forest (Conservation) Act, 1980 (amended in 1988), and widening of road therefore

requires diversion of forest land for the road purposes and also requires permission of Forest Department to cut the trees. Trees will be cut with prior permission of Forest Department and necessary cost of afforestation, at a rate of 10 trees per each tree removed, will be provided to Forest Department. Application is already submitted to the Forest Department and approval is under process (Appendix 6).

36. **Fisheries**. Surface waters in the form of river, drains, canals and ponds in the district facilitate growth of fisheries. Fish species noted in the district include Parri (Notopterus chitala (Hamilton)) and N.notopterus (Pallas) Parri Family Cyprinidae (Tne Carps), Katla, Theil (Catla catla (Hamilton)), Kalabans, Dhai (Labeo calbasu (Hamilton)), Rohu (L. rohita (Hamilton)), Akhrot (L. Pangusia (Hamilton)), Puntius sarana sarana (Hamilton) Family Bagridae (Catfishes), Aorichthys seenghala (Syes), Mystus vittatus (Bloch), Rita rita (Hamilton) Family Heteropneustidae (Catfishes), Heteropneustes fossilis (Bloch) Family Schilbeidae (Catfishes), Clupisoma garva (Hamilton), Silonia silondia (Hamilton) Family Siluridae (Catfishes), Wallago attu (Schneider) Family Sisoridae (Catfishes), Bagarius varrelli (Sykes) Family Channidae thurrels), Channa gaehua (Hamilton), C.marulius (Hamilton), C.Punctatus (Bloch), C.striatus (Bloch), Hurdwabra (Rhinomugil Corsula (Hamilton).

Economic Development

Land Use

37. Existence of fertile soil conditions and irrigation facilities favour utilisation of major portion of the land in the district for agricultural purposes; only a lesser portion is put to use for non-agricultural purposes. In the recent past several industries have been established and development induced by the growth of the National capital of Delhi led to more residential settlements in this district. Only 10 sq.km of area is under forest cover in this district.

38. **Land Use along the road**: Following table shows the section-wise land use along the proposed road. In the starting stretch of Bahalgarh to Sonepat, there are industries, which include major industries such as ECE Limited, Kalinga Cables, Vimlesh Industries Pvt. Ltd., Jasch Textile Industries, Maruti Suzuki and Tata Motors showroom along with the service centres. In Sonepat Town, commercial establishments exist on both sides of the road. In Sonepat, construction of a ROB (Road Over Bridge) at a railway level crossing is in progress. After Badwasana till Gohana there are a numbers of trees on the either side of the road which are falling in the proposed RoW.

Table 5: Existing Land Use along the Road

Chainage (km)	Location and land use
11.600 - 24.000	Sonipat industrial and city area; buildup area
24.000 – 26.000	Agricultural lands on both sides
26.000 – 26.800	Barvasini village; built up area
26.800 – 36.500	Agricultural lands on both sides
36.500 – 37.200	Mohana village built up area
37.200 – 41.000	Agricultural lands on both sides
41.000 – 42.100	Pinana village; built up area
42.100 – 42.300	Agricultural lands on both sides
42.300 – 42.800	Bidhal village; built up area
42.800 – 49.000	Agricultural lands on both sides
49.000 – 49.500	Kheri Damkan village; built up area

Chainage (km)	Location and land use
49.500 – 52.000	Agricultural lands on both sides
52.000 – 52.500	Badota village; built up area
52.500 – 53.300	Agricultural lands on both sides
52.300 – 59.000	Gohana; built up area
59.000 – 65.000	Agricultural lands on both sides
65.000 – 68.000	Butana town and village area; built up area
68.000 – 70.800	Agricultural lands on both sides
70.800 – 71.500	Khera village; built up area
71.500 – 74.000	Agricultural lands on both sides

Industry and Agriculture

39. Industries in this district are involved in manufacturing wooden products, agro products, chemical and rubber wares, engineering goods, sports and leather goods, mineral based products, textiles, pharmaceuticals, and chemicals. Most of the existing industrial units are concentrated at Sonepat. and Kundli. Proximity to the National Capital of Delhi and other important industrial towns, and its connectivity by road and railway, growth of industries in this district shows a positive trend. This area has a number of quarries, stone crushers and brick kilns that provide building material to Delhi and Gurgaon and nearby areas. The village and cottage sector industries include pottery, carpentry, stone-dressing, leather-tanning, handloom weaving and utensil-making.

55. Agriculture is the major activity in the district. Paddy, wheat, sugarcane and bajra contribute major crops in the project area due to good water holding capacity of the soil. Other crops include jawar, maize, cotton, moong gram, barley, oil seeds (such as Sarson, toria and tarmira/tira), robi pulses, and vegetables (such as tar or kakri, ghia, kadoo, tori, Petha, tinda, karela, brinjal, tomato, Bhindi (lady finger) and sweet potato in summer and radish, turnip, carrot, Palak, methi, cabbage in winter). Fruits grown include malta-orange, sweet lime, kaghzi lime, mango, guava and ber, pomegranate, grape and phalsa.

Social and Cultural Resources

40. **Demography.** Total population of Sonepat district was 1,480,080 in Census 2011, representing 5.84% of Haryana State. About seventy five percent of total population lives in rural areas (74.88%) and 25.12% in urban areas (Urbanization of the state-28.9%). Scheduled castes population is 18.09% (rural-18.91%; urban-15.62%); while no Scheduled Tribe has been notified. In 2011, Sonepat had population of 1,480,080 of which male and female were 798,948 and 681,132 respectively. The Sex Ratio in Sonepat stood at 853 per 1000 male compared to 2001 census figure of 839. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate.

41. Population of the district grew by 15.71 percent during 2001-2011, and in the previous decade of 1991-2001, it was 22.39 percent. The initial provisional data suggest a density of 697 in 2011 compared to 603 of 2001. Total area under Sonepat district is 2,122 sq.km. Average literacy rate of Sonepat in 2011 were 80.80 compared to 72.80 of 2001. If things are looked out at gender wise, male and female literacy were 89.40 and 70.90 respectively. For 2001 census, same figures stood at 83.10 and 60.70 in Sonepat District.

Table 6: Demographic Characteristics – Sonepat District

Description	2011	2001
Actual Population	1,480,080	1,279,175
Male	798,948	695,723
Female	681,132	583,452
Population Growth	15.71%	22.39%
Area Sq. Km	2,122	2,122
Density/km2	697	603
Proportion to Haryana Population	5.84%	6.05%
Sex Ratio (Per 1000)	853	839
Child Sex Ratio (0-6 Age)	790	787
Average Literacy	80.80	72.80
Male Literacy	89.40	83.10
Female Literacy	70.90	60.70
Total Child Population (0-6 Age)	187,926	181,877
Male Population (0-6 Age)	104,981	101,792
Female Population (0-6 Age)	82,945	80,085
Literates	1,044,513	492,953
Male Literates	620,434	305,146
Female Literates	424,079	798,099
Child Proportion (0-6 Age)	12.70%	14.22%
Boys Proportion (0-6 Age)	13.14%	14.63%
Girls Proportion (0-6 Age)	12.18%	13.73%

Table 7: Rural – Urban Demographic Characteristics of Sonepat District

Description	Rural	Urban
Population (%)	69.48 %	30.52 %
Total Population	1,028,393	451,687
Male Population	557,103	241,845
Female Population	471,290	209,842
Sex Ratio	846	868
Child Sex Ratio (0-6)	794	781
Child Population (0-6)	133,273	54,682
Male Child(0-6)	74,301	30,700
Female Child(0-6)	58,972	23,982
Child Percentage (0-6)	12.96 %	12.11 %
Male Child Percentage	13.34 %	12.69 %
Female Child Percentage	12.51 %	11.43 %
Literates	702,898	341,489
Male Literates	425,204	195,169

Female Literates	277,694	146,320
Average Literacy	78.53 %	86.02 %
Male Literacy	88.07 %	92.43 %
Female Literacy	67.35 %	78.73 %

42. Workers participation rate (WPR) of the district was 40.89% of the total population; it was 44.59% in rural areas and 29.84% in urban. Sex-ratio of the total work force was 514 (rural-605; urban-207). Majority of the work force are main workers; 73.31% of the total workers are main workers (in rural - 69.90%; in urban-88.53%). 52.97% of the total workers are engaged in cultivation and agricultural sector; it was 63.22% in rural and 7.31% in urban areas.

43. **Health Facilities**. Health services of the Government is rendered through 100 bedded hospital at Sonepat town, 7 community health centres (CHC) including one at Gohana town with 50 beds, and 29 primary health centres (PHC). Intestinal diseases are the major illness recorded throughout the district.

History, Culture and Tourism

44. There are no historically or archeologically or religiously important places along the project road. In overall district as well there are no such important places; the tourism importance of Sonipat is almost negligible.

IV. ANTICIPATED IMPACTS AND MITIGATION MEASURES

45. This section of the IEE reviews possible subproject-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. 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.
- **O&M impacts**: Impacts associated with the operation and maintenance of the infrastructure built in the project.

46. **Location impacts** are not likely to be significant as there are no major environmentally sensitive areas along the road proposed for improvement. However, there are a number of trees (6090 no,s) in the right of way which will be removed for the project. Trees will be cut with prior permission of Forest Department and necessary cost of afforestation, at a rate of 10 trees per each tree removed, will be provided to Forest Department. The project also requires diversion of 26 ha of protected forest land for road widening. As indicated earlier, the strip of land along the roads with tree cover are notified as protected forested, and therefore the widening of road requires permission of Forest Department. Application is already submitted to the Forest Department and approval is under process (Appendix 3). The impacts pertaining to road safety, especially for stretches in urban areas have been addressed through incorporation of appropriate safety measures in designs.

47. **Construction impacts**. The impacts during the construction stage shall be typical of road construction 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 road. The mitigation measures for the various impacts are outlined in the Table 8, and are summarized in the following sub-sections.

48. Traffic Movement. The road construction work will affect the traffic movement on the road. Work will be conducted one side, leaving the other side open for traffic. It is proposed to construct 132 culvers in the proposed road stretch of 62 km, 2 to 3 culverts for every km of road. These require traffic diversions and have to be notified sufficiently in advance for safe passage of the traffic. Traffic guides with red flags, and security persons shall be employed to guide the traffic. A traffic management plan shall be prepare prior to start of construction at every stretch.

49. Dust and Air Emissions: Since the work is conducted mostly in dry season, there is lot of potential to generate dust from various activities like site clearance, material transport, material loading and unloading, spreading on site etc. Crushers are one of the main sources of dust. Emission from 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. 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. Dust and emission control measures should be followed during construction.

50. Tree Cutting: Proposed Widening and Strengthening of Sonepat-Gohana Road involves tree cutting along the proposed road. However there will be negligible impact on slope instability, soil erosion due to tree cutting as topography is almost flat throughout the project area. Prior clearance will be obtained before commencing of construction work. In Haryana, the strip of land along the roads is notified as Protected Forest as per Forest (Conservation) Act, 1980 (amended in 1988), and widening of road therefore requires diversion of forest land for the road purposes and also requires permission of Forest Department to cut the trees. Trees will be cut with prior permission of Forest Department and necessary cost of afforestation, at a rate of 10 trees per each tree removed, will be provided to Forest Department.

51. Public and workers safety during construction: Since the work is conducted on existing road passing through inhabited areas, the general public an traffic will come in close contact with the construction areas, and there is potential risk to public and as well as workers. 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.

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. Sourcing of materials**:** While material such as bitumen may be acquired from local hot-mix plants and aggregate from already identified & licensed 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.

54. 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.

55. 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.

56. Water Bodies**:** Stockpiles of construction debris if left unattended will be washed off as runoff into nearby areas causing siltation. Spillage of oil, lubricants and other chemicals also mix with the runoff and contaminate the land.

57. Soil: Proposed Widening and Strengthening of Road from NH-1 (Bahalgarh Chowk) to Sonepat to Gohana Upto District Jind Boundary (Km 11.600 To Km 74.000) increases the paved surface and permanent loss of top soil under these civil construction activities. 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. Storage of hazardous material will also have a considerable impact on the top soil if not handled as per norms.

58. 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.

59. **Operational impacts**. Impacts on environmental conditions associated with the operation stage of the project are mainly due to increase of air and noise pollution from the increased vehicular traffic along the route. The proposed improvements and safety provisions, in area 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 road.

V. INSTITUTIONAL ARRANGEMENTS

60. Following agencies are involved in execution of this sub project of construction of Sonepat – Gohana road.

i. NCRPB: National Capital Region Planning Board is the funding agency for the project.
ii. Implementing Agency (IA): Implementing Agency of the project will be Public Works Department (PWD)Haryana State Roads & Bridges Development Corporation (HSRDC)
iii. Design and Supervision Consultants: Implementing Agency will be assisted by Design and Supervision Consultants (DSC) in tendering, and reviewing and revising designs during the construction, if required, and supervising the construction to ensure quality.
iv. Construction Contractors: IA will appoint Construction Contractors (CC) to construct the infrastructure elements.

61. Haryana State Roads Development Corporation (HSRDC) is the Implementing Agency (IA) of this project. IA will undertake all actions for the implementation of the project. Implementing the project according to and incompliance with the policies, the funding agency, NCRPB will be the responsibility of the Implementing Agency. The Environmental and Social Management Cell (ESMC) of NCRPB will deal with environmental and social safeguard issues. ESMC would guide and monitor IA in complying with its ESMS policy. An Environmental Officer (EO) shall be inducted within the HSRDC to address the environmental impacts and implement EMP during the project life cycle. During construction, the construction supervision is conducted by HSRDC with the assistance of Supervision Consultant (SC). The Supervision Consultant Team shall include an Environmental Management Specialist (EMS), who will assist EO in implementation of EMP.

62. The ESMC will be housed inside the appraisal function of NCRPB and will have two distinct sub-functions, i.e. managing environmental safeguards and social safeguards. ESMC will be provided with one full-time staff-safeguard officer, who will look after the day-to-day activities related to the safeguard compliance. Safeguard Officer will be responsible for both environmental and social safeguard functions. Based on the necessity, the Safeguards Officer will source expertise from outside/external consultants on a case-to-case basis.

63. ESMC will review and approve IEE, oversee disclosure and consultations, and will monitor the implementation of environmental monitoring plan and environmental management plan wherever required. The Construction Contractor (CC) will implement mitigation measures in construction. IA or DSC will monitor the implementation of mitigation measures by the CC. ESMC will oversee the implementation of EMP. Implementation of mitigation and monitoring measures during the Operation and Maintenance (O&M) stage will be the responsibility of the implementing agency.

64. Roles and Responsibilities of EO with assistance of EMS of Supervision consultant are as follows:

- 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 bid and contract.
- 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
- A consultant shall be hired for supervising construction activities. This agency will need an officer identified for overseeing the implementation of EMP. The roles and responsibilities of this individual will be-
- Work closely with corporations environment specialist for the implementation of EMP and ensure compliance to environmental safeguards, support its implementation
- Work with corporations environmental specialist for getting environmental clearances for the project
- Review of EMP implementation and advice the corporations environmental specialist on the implementation status
- Review any changes in project design, identify environmental safeguards if required and work with the corporations 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 additional environmental safeguards as required during project implementation.

65. The Contractor should employ an Environmental, health and safety (EHS) expert with experience in road construction projects, for implementation of EMP on site.

VI. GRIEVANCE REDRESS MECHANISM

66. As the work is being done along inhabited areas and areas with various human activities, and most of the impacts are construction-related, and therefore it is anticipated that improper or inadequate implementation of EMP may lead to disturbance and inconvenience to local people and traffic. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, HSRDC will establish a Grievance Redress Mechanism, which will be functioned throughout the construction period.

67. A Complaint receiving system will be put in place at the project office of HSRDC in Sonepat. A complaint register and complaint forms will be made available at the site office of each contractor, with a display board indicating availability of such facility. This will accept complaints regarding the environment safeguard issues in implementation of the project. The grievances received and actions taken will be included into the environmental monitoring reports submitted to NCRB.

68. HSRDC will constitute a three-member Grievance Redressal Committee (GRC) comprising of the DGM, HSRDC, (jurisdictional DGM), the elected member of the project area and one member from the public who is known to be persons of integrity, good judgment and commands respect among the community. The existence of the GRC will be disseminated to the villagers through printed handouts providing details of the structure and process in redressing grievances. Any aggrieved person (whose complaint to the complaint cell is not redressed to his/her satisfaction) can approach GRC, chaired by the DGM, HSRDC and if the grievance is not addressed, the aggrieved person will be directed to approach the District Collector. The aggrieved person will have the right to approach the court of law, if he/she is still unsatisfied with the decisions taken by the GRC and the Collector.

69. The GRC will meet every month, determine the merit of each grievance, and resolve grievances within a month of receiving the complaint; failing which the grievance will be addressed by the District Collector. If not satisfied, the affected households will have the option of approaching the appropriate courts of law. Records will be kept of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were affected, and final outcome.

VII. ENVIRONMENTAL MANAGEMENT PLAN

Environmental Impact Mitigation & Monitoring Program

70. The potential impacts identified and assessed and the mitigation measures formulated to minimize those impacts to acceptable levels are summarized in the following table. The table also delegates the responsibility of implementing mitigation measures to various agencies involved in the project implementation. Table 9 presents the Environmental Monitoring Plan.

Table 8: Environmental Management Plan

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
1	**Location Impacts**				
1.1	Temporary impacts on road side shops and other livelihood activities.	Temporary	Low	Implement compensatory measures as per the Short Resettlement Plan (SRP)	HSRDC
2	**Design and pre-construction Impacts**				
2.1	Road furniture	Permanent	Medium	All roadside structures / furniture, protection, intersections, traffic islands, etc is provided as per the road safety requirement	HSRDC
2.2	Alterations of drainage pattern of the site	Permanent	Medium	Necessary cross-drainage works proposed and designed to avoid alteration of drainage pattern. Design has been done considering 50 year return flood level to avoid overtopping of the road and maintain natural drainage	HSRDC
2.3	Removal road side trees	Permanent	High	Unavoidable as the trees are within the proposed road carriage way; trees within the RoW but not required to be cut are identified. 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 Prior approval and clearance from Forest Department will be obtained; necessary budget for compensatory afforestation will be deposited with the Forest Department as per the Forest Departments procedures Tree plantation will be taken up in the ROW where land is available, considering the road safety issues	HSRDC
2.4	Impact on community and cultural properties and religions places	Temporary	Negligible	The designs are worked out to avoid impacts on cultural properties, shrines etc.	HSRDC
3	**Pre-construction Activities by Contractor**				
3.1	Construction Camps – Location, Selection, Design and Layout	Temporary	Medium	The construction camps will be located at least 500m away from habitations	Contractor
	Abstraction of Ground Water and/or Surface Water for construction	Temporary	High	Obtain required permissions for abstraction of groundwater and/or surface water for use in construction activities and camps.	Contractor

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
	Activities/Camps				
3.2	Drinking water availability and water arrangement	Temporary	Medium	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
	Establishment of hot mix plants, crushers, etc if required	Temporary	High	Establish plants/crushers away from habitations Obtain the consent-to-establish and consent-to-operate from the Pollution Control Board Adhere to the air pollution and water pollution standards prescribed.	Contractor
3.3	Identification of disposal sites	Permanent	Low	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
	Authorization for disposal of Hazardous Wastes	Temporary	High	Obtain authorization for disposal of hazardous wastes as per Hazardous Waste (Management and Handling) Rules 1989	Contractor
3.4	Quarry Operations	Permanent	Medium	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. If new borrow pits are made for gravel in the private or revenue lands, quarry pit closure/restoration plans shall be prepared and implemented before completion of work	Contractor
3.5	Batching Plants	Temporary	High	Batching plants will be located sufficiently away from habitation, where possible such plants will be located at least 500m away from the nearest habitation. The contractor will obtain the consent to operate the plants from the SPCB.	Contractor
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	High	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

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
4.2	Quarry / Borrow pits Operations	Permanent	Medium	Material should be procured only from licenced quarries 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
4.3	Stripping, stocking and preservation of top soil	Permanent	Low	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. 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
4.4	Soil Erosion	Permanent	Low	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
4.5	Compaction of Soil in agricultural area	Temporary	Low	To minimize soil compaction construction vehicle, machinery and equipment will move or be stationed in designated area (RoW or CoI, haul road as applicable) only. The haul road for construction materials will be routed to avoid agricultural areas	Contractor
4.6	Blasting	Temporary	Low	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

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				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. 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. all directions at least 10 minutes before the blasting.	
4.8	Loss of Access	Temporary	Medium	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. 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
4.9	Soil and Water Pollution due to fuel and lubricants, construction waste	Temporary	Medium	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
4.10	Siltation of irrigation canals due to spillage of construction wastes	Temporary	Low	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
4.11	Generation of Dust	Temporary	High	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. Dust control measures like water sprinkling shall be carried out	Contractor
4.12	Dust/emissions from batching/hot mix plants	Temporary	High	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	Contractor

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				operations at plants will be parameters will be as per monitoring plan undertaken in accordance with all current rules and regulations protecting the environment. Monitoring of air and noise	
4.13	Emission from Construction Vehicles, Equipment and Machinery	Temporary	Low	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
4.14	Dust Pollution from Crushers	Temporary	High	All crushers will obtain siting clearance from SPCB or only those crushers that have already have obtained license from SPCB will be used.	Contractor
4.15	Noise from construction Equipments	Temporary	Medium	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
4.16	Traffic Control and Safety	Temporary	High	The contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, 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 Management 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	Contractor

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				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	Material Handling at Site	Temporary	Medium	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
4.18	Disposal of Bituminous wastes / Construction Waste / Debris / Cut Material	Temporary	Low	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
4.19	Safety Measures During Construction	Temporary	Medium	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 shall conform to respective IS codes.	Contractor
4.20	Risk caused by Force Majure	Temporary	Low	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
4.21	Malaria Risk	Temporary	Medium	The Contractor will undertake all measures as required to avoid such risk to the workers	Contractor
4.22	First Aid	Temporary	High	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	Contractor

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				facilitate transfer of injured or ill person(s) to the nearest hospital. At every workplace and construction camp, a staff trained in first aid will be made available	
4.24	Hygiene	Temporary	High	Temporary toilets shall be provided with septic tank and soak pits, and will be regularly cleaned to maintain hygiene. 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
4.25	Clearing of Construction of Camps & Restoration	Temporary	Medium	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
5	**O&M Impacts**				
5.1	Environmental Conditions	Permanent	Low	The HSRDC will undertake seasonal monitoring of air and noise 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
5.2	Survival of trees planted	Permanent	Medium	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
5.3	Increased air and noise pollution due to increased traffic using the improved road	Permanent	Low	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	Low	To ensure efficient flow of surface water and to prevent water logging along the side	HSRDC

S No	Environmental Issues	Duration / Extent	Magnitude	Mitigation Measures	Responsibility
				of the road 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.	
5.4	Traffic and Accident Safety	Permanent	Low	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

Table 9: Environmental Monitoring Plan

Sl. No.	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Responsibility	Cost estimates INR
	Pre Construction						
1	Integration of local peoples environmental concerns	Pre construction	Implementation of measures as suggested in the EMP	On-site/Off-Site	During the study and design process and prior to approval	Design Supervision consultant	Part of DSC cost
2	Incorporation of mitigation measures and environmental codes of conduct into designs	Pre Construction	Implementation of measures as suggested in the EMP	On-Site	During Project Approval	DSC	Part of DSC cost
	Construction Phase						
1	Implementation of construction phase impact mitigation measures	Construction	Implementation of measures as suggested in the EMP	On-site	Weekly-one	Environmental Management Specialist (Supervision Consultant Team) / Environmental Officer (HSRDC)	As part of Consultant Team costs
2	Construction and location of drainage facilities	Construction	Drains	Site inspections at places where such drains are required	During construction	Contractor	Part of project cost
3	Care and safe storage of top soil for later use	Constrution	Loose soil	Site clearance activities	Weekly	Contractor	Part of project cost
4	Care of vegetation in the immediate vicinity	Construction	vegetation	Site clearance activities	Weekly	Contractor	Part of project cost
5	Safeguarding of community infrastructures	Construction	Public toilets, bus stops etc	Site observation	During and immediately after construction	Contractor	Part of project cost
6	Safe disposal of	Construction	Soil, debris etc	At excavation sites	Weekly	Contractor	Part of

	excavated materials and other construction wastes						project cost
9	Impacts on agricultural land due to spoil, soil erosion, water logging etc	Construction	Topography	Respective locations	Weekly	Contractor	Part of project cost
10	Plantation of vegetation in the cut slope	Construction	Along the shoulder slopes	At elevated alignment	Before starting, in between and after completion	Contractor	Part of project cost
11	Information Sign Boards	Construction	Information about work	Construction sites	Before starting, in between construction	Contractor	To be included in BOQ. Part of project cost
2	Air Quality	Construction	SPM, and RSPM, NOx, CO	7 locations (near habitations).	Quarterly	Contractor	4400/sample
3	Noise	Construction	Equivalent Day & Night Time Noise Levels	At seven locations, especially around sensitive receptors and settlements	Quarterly	Contractor	1400/sample
4	Water quality	Construction	Canal water quality – General parameters and Oil and grease,	Four water bodies – 2 points at each location , upstream and down stream	Quarterly	Contractor	2800/sample

Training & Capacity Building

71. A Sensitization Workshop for officials and engineering staff of HSRDC concerning with the project and also the Contractor's personnel will be conducted. This workshop shall be conducted at Project Office of HSRDC immediately after the mobilization of the Contractor. The workshop will be conducted by the Environmental Officer of HSRDC with the support of Environmental Management Specialist of the Supervision Consultant. This sensitization workshop shall include the following topics:

- Introduction to environment considerations in Road Projects
- Review of IEE/EMP and Integration into design and construction
- Improved Co-ordination within Nodal Departments, on special issues, if any.
- Roles and responsibility of project agencies in EMP implementation during construction
- Monitoring & Reporting procedures

Environmental Management Costs

72. The subproject is assessed to have no major design or location impacts. There were many construction stage impacts but these are typical for the construction activity and mitigation provided is mainly in terms of good construction practices like water sprinkling to arrest dust generation, clearing of excess soil, which will be incorporated into the construction contractor's contractual agreements, which will be binding on him for implementation. Therefore there will be no additional costs of environmental management.

73. The monitoring proposed mainly includes site inspections and informal discussions with workers and local people and this will be the responsibility of HSRDC with the assistance of Supervision Consultant. As the existing road is being improved, traffic will be affected. Moreover there a number of culverts proposed in the project, which requires proper diversion and management of traffic. It is suggested that Contract should prepare a Traffic Management Plan and implemented during construction. The water, air quality and noise level monitoring of construction phase will be conducted by the contractor.

74. The environmental management and monitoring costs are summarized in the table below. The costs of environmental management and monitoring costs are estimates as INR 912,800 during the implementation.

Table 10: Environmental Management and Monitoring Cost

Item		Quantity	Unit Cost INR	Total Cost INR	Source of Fund
Implementation of EMP (24 months)					
A. Environmental Management Specialist		6 months	-	-	Part of supervision consultant team
B. Preparation of Traffic Management Plan		1	Lump sum	500,000	Contractor
C. Environmental monitoring survey expenses during construction					
I	Ambient air quality during construction	48 samples	4,400	2,11,200	Contractor
ii	Noise quality during construction	48 samples	1,400	67,200	Contractor
iii	Water quality monitoring	48 samples	2,800	1,34,400	Contractor
			Total (B)	9,12,800	

VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public Consultations Conducted

75. A series of public consultation meetings were conducted during the project preparation and IEE preparation. Various consultation forms were adopted, direct interaction, interviews with the local community members, passerby and people residing nearby area, particularly people living in the villages along the road stretches was conducted.

76. The basic purpose of the project discussed with the stakeholders and the proposed widening / strengthening of Road was explained in detail to the General Public living in the area with details of improvement works proposed and the extent (two-lane) to which the roads are proposed for widening. The reason for identifying the stretch for widening / strengthening of Road was discussed with the villagers and in particular the volume of traffic crossing; the need for Road widening/strengthening, the likely impact to land and structures along the widening/strengthening of road and its peripherals, and disturbance, inconvenience and safety issues during the construction and the efforts to be taken for minimizing the impacts.

77. The villagers as well as the daily users of the Road welcomed the proposal for widening / strengthening of Road and wanted the work to be undertaken immediately and completed as early as possible. However, there were some villagers having the shops near to the road who expressed concern about the dust pollution during road work may lead to less customers visiting their shops. They were also of the impression that the widening might require more land their by affecting their business. But during detailed discussion all the concerns were properly addressed. It was shared by the HSRDC Officials that no land acquisition is required and in the built up areas the improvements will be carried out within the available width of the road. The queries and concern of the villagers and the response given is detailed in the following Table.

Table 11: Stakeholders Concerns & Responses

S. No.	Query/Concern	HSRDC Response
1.	The road gets damaged after each monsoon and repair works are delayed	It was explained that proper drainage has been proposed in the design and there will be no flooding of the road. Hence once laid, with minimum maintenance, the road will last for a long time.
2.	What is the width of the Road	Two-lane road has been proposed and minimum 13-15 meters will be required.
3.	What will happen in the village area where you will not have the required space	In built-up places, it is proposed to restrict widening within available space and provide realignments at later stage.
4.	What will be the basis of fixing compensation	No compensation is required to be paid as there is no acquisition of land.
5.	Wanted the widening to start immediately and said encroachments can be demolished	Work will be executed as per the Schedule of HSRDC and it was explained that adequate notice will be given before civil works start.
6.	Wanted to know if construction will be carried out in one half of the Road so that the other half would be available for access	It was explained that road will be only strengthened and widened so movement of traffic will be on the other half of the road with proper signage and speed restrictions.
7.	Will the construction of Road requires more land	There will be no land acquisition required as sufficient space is available.

78. The IEE will be translated into Hindi. Both the English and Hindi versions will be made available to the villagers by the implementing agency viz. Haryana State Roads and Bridges

Development Corporation Limited (HSRDC). Copies of the IEE will be available at the office of the Executive Engineer, Sonepat Division and its availability as part of public disclosure will be widely publicized through the village Panchayats. HSRDC will continue consultations, information dissemination, and disclosure. Final IEE Report will also be disclosed in websites of ADB, HSRDC and NCRPB

Future Consultation and Disclosure

79. The public consultation shall be a continuous process and will continue in the future. The HSRDC will extend and expand the consultation and disclosure process during implementation.

Consultation during construction:

(i) Public meetings with affected communities to discuss and plan work programmes and allow issues to be raised and addressed once construction has started; and
(ii) Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

Project disclosure

(i) Public information campaigns (via newspaper, TV and radio) to explain the project to the wider population and prepare them for disruption they may experience once the construction programme is underway;
(ii) Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Hindi and;
(iii) Providing a mechanism through which comments can be made.

IX. FINDINGS AND RECOMMENDATIONS

80. The initial environmental examination process described in the earlier sections of this report assessed the environmental impacts of the proposed widening and strengthening of Bahalgarh – Sonepat – Jind Road Project. Potential negative impacts were identified related to design, location, construction and operation of the project. Negative impacts due to the design and location are assessed to be minimal, and due to minimal operational and maintenance activities, there are no major negative impacts of operation.

81. The potential adverse environmental impacts of the proposed project are mainly related to the construction phase and which can be minimized by the proposed mitigating measures and environmentally sound engineering and construction practices. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

82. As stated above, most impacts are due to construction, this is because construction work is to be carried out on existing road carrying traffic and passing through habitation areas. The important impacts identified are: generation of dust and noise from construction activities; impacts due to disposal of large quantities of construction waste soil; disturbance and inconvenience to local people; affect on road side hawkers and vendors and public safety.

83. The potential impacts will be mitigated through provision of proven mitigation measures in the design and can further be offset by 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. 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 Management Specialist as part of the Supervision Consultant Team. Further, the environmental monitoring plans prepared as part of the EMP provide adequate opportunities towards course correction to address residual impacts during construction stages.

84. Preparation of a Traffic Management Plan is also recommended for ensuring site specific management measures to ensure road safety, and smooth traffic flow. An environmental monitoring plan has been developed to assess the environmental performance of subproject implementation. The EMP will be incorporated into the construction bid/contract.

85. The important recommendation of this IEE is that this Road Improvement Project can proceed for implementation provided all impacts are addressed through suggested mitigation measures. The other important recommendation is that the involuntary resettlement issues, which are identified through a parallel process of resettlement planning, need to be addressed by RP implementation prior to award of contract for civil works.

X. CONCLUSIONS

86. The main objective of the proposed Widening and Strengthening of Road From NH-1 (Bahalgarh Chowk) to Sonepat to Gohana Up to District Jind Boundary (Km 11.600 To Km 74.000) is to :-

- Reduce time taken to travel on the road with reduced traffic congestion.
- Reduce road accidents
- Improve ride quality, reduce air pollution

87. Thus ultimately this subproject aims to improve overall socio-economic conditions. This initial environmental examination has been conducted to identify and assess negative impacts. The project involves straightforward construction. Not many environmental issues were noticed during this initial environmental examination. In most cases, environmental issues identified are typical for the type of construction components, and a range of proven mitigation strategies exist to address them.

146. This IEE has assessed all potential environmental impacts associated with the project. There are no impacts, which are significant or complex or which needs an in-depth study to assess the impact or to develop the mitigation measures. The environmental impacts identified are manageable, and HSRDC will implement the mitigation measures as stated in IEE. The project therefore does not warrant environmental impact assessment (EIA). The project does not fall under the ambit of the EIA Notification, 2006 of Government of India, and therefore do not require Environmental Clearance from Ministry of Environment and Forest. However, the project requires permission and approval of Forest Department for diversion and use of forest land for road widening, and for cutting of trees, and this will be obtained before award of the Contract. Also, the Contractor requires consent of pollution control board for facilities like hot mix plants and crushers. It will be ensured that the consent is in place before start of the work.

APPENDIX 1
Photographs of Project Road & Consultation


POWER GRID CORPORATION OF INDIA LTD.

APPENDIX 2
General Environmental Measures

A. Dust Control

- Barricade the work area which will also act as a dust and noise barrier
- Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization
- Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process;
- Use tarpaulins to cover loose material/soil that is transported to and from the site by truck
- Control dust generation while unloading the loose material (particularly aggregate) at the site by sprinkling water and unloading inside the barricaded area
- Clean wheels and undercarriage of haul trucks prior to leaving construction site
- Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition where loaders, support equipment and vehicles will operate
- Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing/barricading

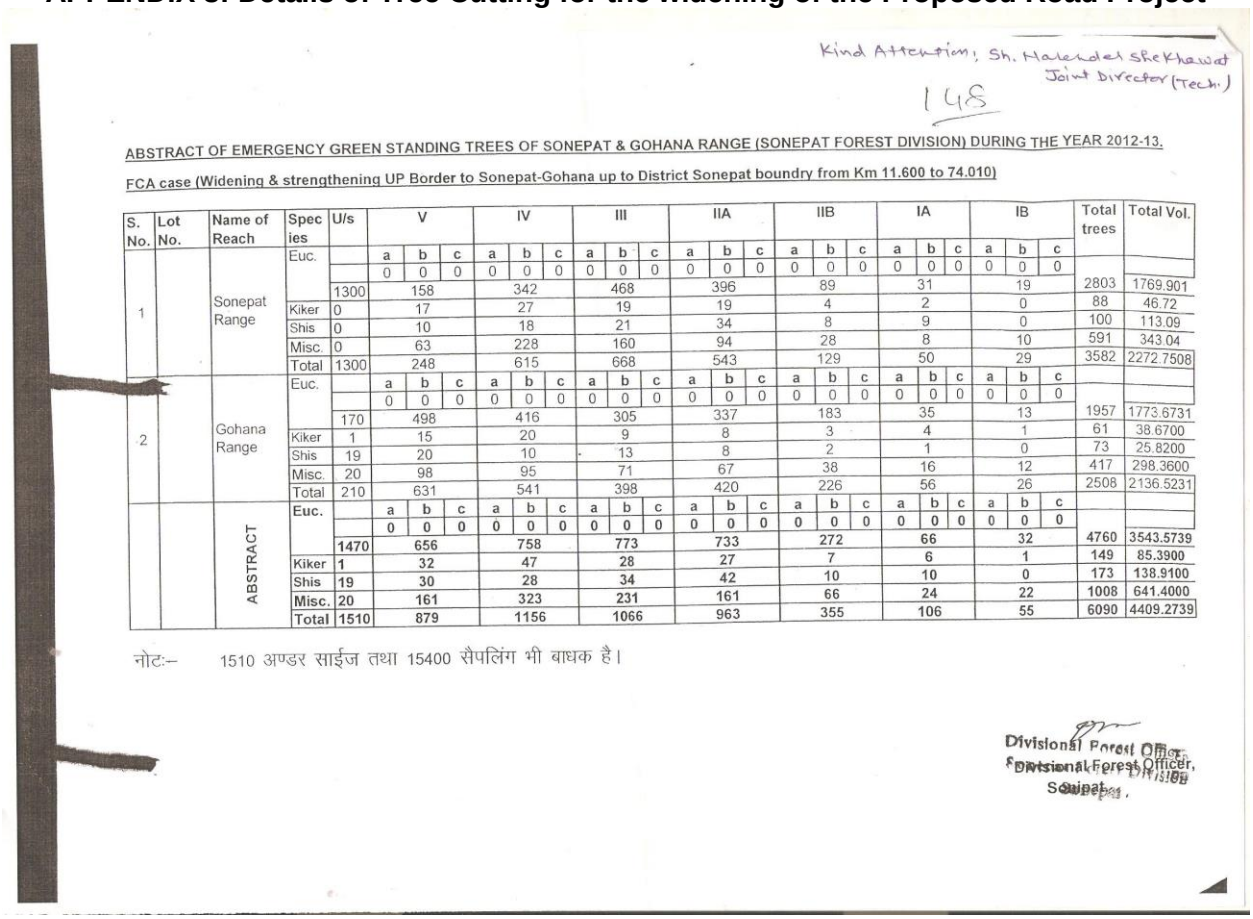
B. Safety

- Follow standard, safe and quality construction practices;
- Display Contractor Safety Policy on-site prominently
- Prohibit public entry – unauthorized / accidental and enforce strictly – enclose/barricade the construction area; provide warning boards and sign boards and posting of security guards throughout the day and night
- Ensure that all workers are provided with and use appropriate Personal Protective Equipment (helmet, hand gloves, boots, masks, safety hoists when working at height, etc);
- Barricade the entire area that may come under influence in case of accidents – this may particularly critical if heavy duty cranes are used;
- Follow standard practices of safety checks as prescribed before use of equipments such as cranes, hoists, etc.
- Provide on -site Health and Safety Training for all site personnel;
- Report accidents to the authorities promptly, and maintain records
- Conduct 15 minute safety briefing session every day prior to start of work

C. Traffic Management

- Prepare a Traffic Management Plan
- Provide alternative traffic arrangement/detours so that traffic can be distributed and move on different roads and ensure that public is informed about such traffic diversions;
- Allow smooth traffic movement by confining and barricading the construction area; ideal vehicles and equipment shall be parked within the confined area;
- Provide necessary personnel to guide and control the traffic;
- Provide information to the public through media – daily news papers and local cable television (TV) services, about the need and schedule of work, and alternative routes;
- At work site, public information/caution boards shall be provided - information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official’s name and contact for public complaints;
- Barricade the site properly; avoid accidental entry of traffic (pedestrian/vehicular) into site.

APPENDIX 3: Details of Tree Cutting for the widening of the Proposed Road Project



Kind Attention; Sh. Mahender Shekhawat
Joint Director (Tech.)

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ABSTRACT OF EMERGENCY GREEN STANDING TREES OF SONEPAT & GOHANA RANGE (SONEPAT FOREST DIVISION) DURING THE YEAR 2012-13.

FCA case (Widening & strengthening UP Border to Sonepat-Gohana up to District Sonepat boundry from Km 11.600 to 74.010)

S. No.	Lot No.	Name of Reach	Species	U/s	V			IV			III			IIA			IIB			IA			IB			Total trees	Total Vol.
					a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c		
					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1		Sonepat Range	Euc.	1300		158			342			468			396			89			31			19		2803	1769.901
			Kiker	0		17			27			19			19			4			2			0		88	46.72
			Shis	0		10			18			21			34			8			9			0		100	113.09
			Misc.	0		63			228			160			94			28			8			10		591	343.04
			Total	1300		248			615			668			543			129			50			29		3582	2272.7508
					a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c		
					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2		Gohana Range	Euc.	170		498			416			305			337			183			35			13		1957	1773.6731
			Kiker	1		15			20			9			8			3			4			1		61	38.6700
			Shis	19		20			10			13			8			2			1			0		73	25.8200
			Misc.	20		98			95			71			67			38			16			12		417	298.3600
			Total	210		631			541			398			420			226			56			26		2508	2136.5231
					a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c		
					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		ABSTRACT	Euc.	1470		656			758			773			733			272			66			32		4760	3543.5739
			Kiker	1		32			47			28			27			7			6			1		149	85.3900
			Shis	19		30			28			34			42			10			10			0		173	138.9100
			Misc.	20		161			323			231			161			66			24			22		1008	641.4000
			Total	1510		879			1156			1066			963			355			106			55		6090	4409.2739

नोटः— 1510 अण्डर साईज तथा 15400 सैपलिंग भी बाधक है।

Divisional Forest Officer,
Sonepat.

APPENDIX 4: Rapid Environmental Assessment 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: Widening & Strengthening of UP border Sonepat Gohana upto district Sonepat boundary road from km 11.600 to 74.000, 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	☐	■	No
▪ PROTECTED AREA	☐	■	No
▪ WETLAND	☐	■	No
▪ MANGROVE	☐	■	No
▪ ESTUARINE	☐	■	No
▪ BUFFER ZONE OF PROTECTED AREA	☐	■	No
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY	☐	■	No
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…			

SCREENING QUESTIONS	Yes	No	REMARKS
▪ 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?	☐	■	No water body is likely to be affected due to the proposed upgradation/expansion/strengthening of existing road alignment
▪ 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?	■	☐	Pollution control measures will be in place
▪ noise and vibration due to blasting and other civil works? ▪ dislocation or involuntary resettlement of people	■	☐	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.
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	■	☐	Road widening may result in some areas encroached upon requiring acquiring.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	☐	■	
▪ 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?	☐	■	

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?		√	No
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability ?		√	No.
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g.,high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	No
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area ?		√	No

APPENDIX 5: Detail Map of Proposed Project Road

Haryana State Roads & Bridges Development Corporation Ltd.
(A State Govt. undertaking)
P.W.D. Campus, Near Rest House, Railway Road, Sonepat Fax:-0130-2200346

From

Deputy General Manager -III,
HSRDC, Sonepat

To

Joint Director (Tech.),
National Capital Region Planning Board,
India Habitat Centre, Lodhi Road,
New Delhi – 110003.
(Mob. No. 09582257618)

No. 1740 Dated 30-04-13

Subject: - Topomap of widening and strengthening of Bahalgarh Chowk (NH-1) to Sonepat-Gohana upto district Sonepat Boundary road Km. 11.600 to 74.000.

Reference: Your E-Mail dated 26.04.2013.

Please find enclosed herewith the map needed by ADB to "confirm that include road neither passes through nor is located within 10 Km from any wildlife sanctuary, national park, or any other environmentally sensitive or protected areas. It traverses predominantly through agricultural land and follow existing alignment. All widening is also confined to existing ROW. The majority of the activities have short term minor, negligible, or no residual impacts." (10 Km means 5 Km from each side of the road.)

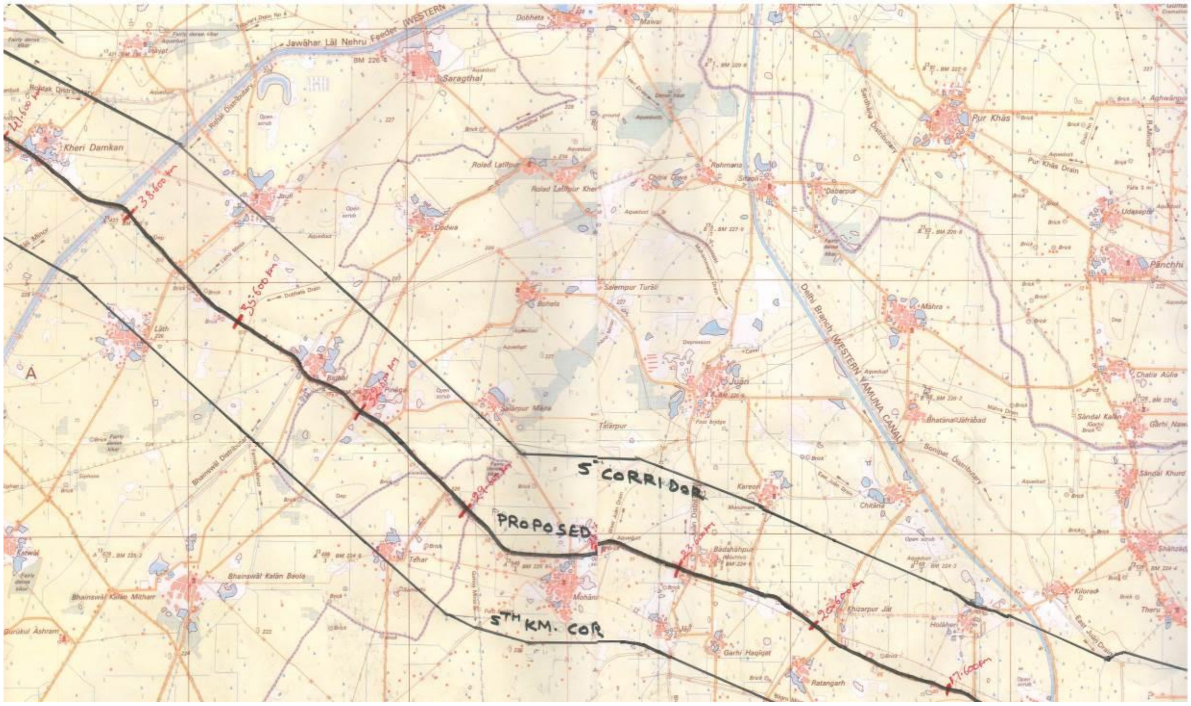
DA/As above

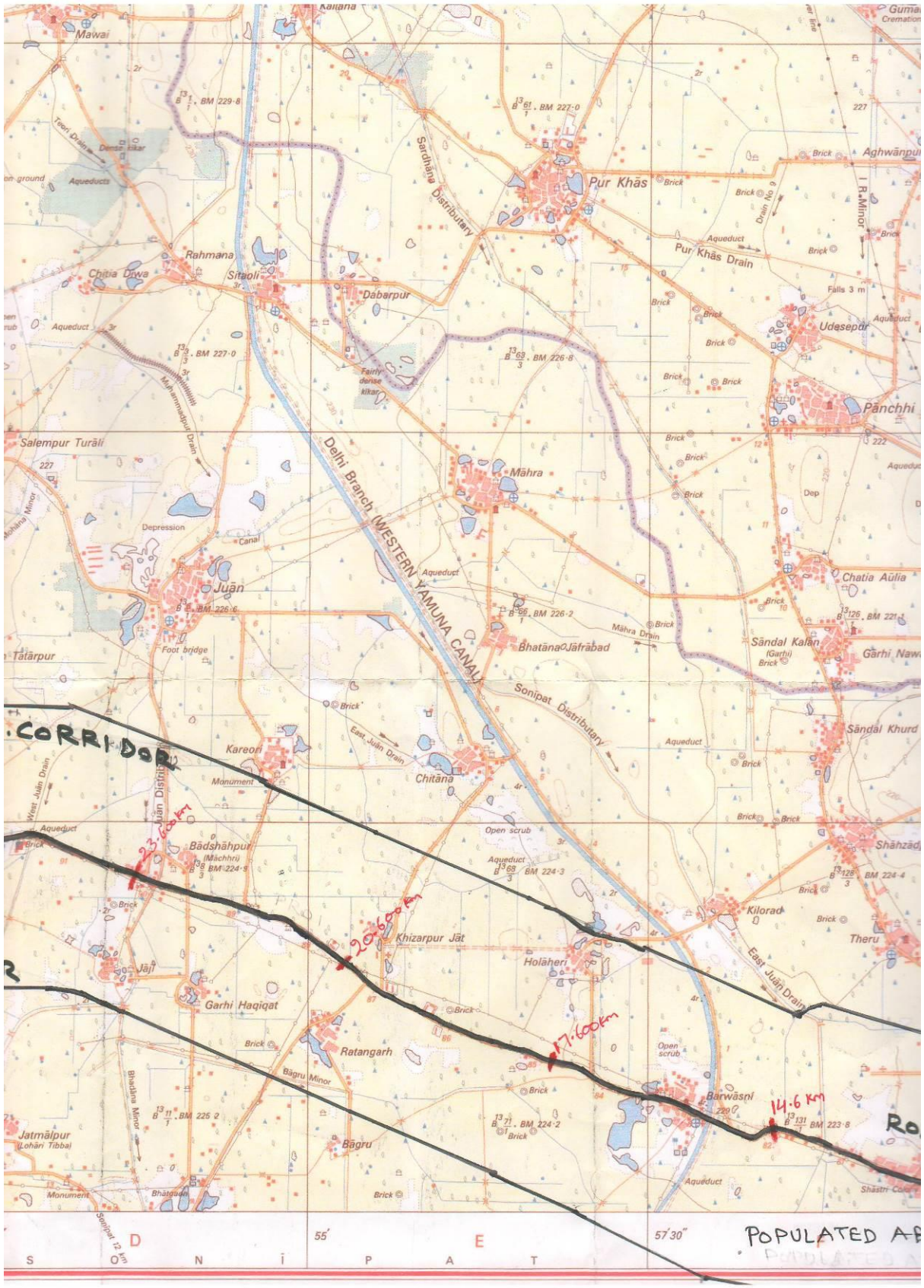
Deputy General Manager -III,
HSRDC, Sonepat

93/NCR/13
1/5/13

T.L. (P.M.C.)
You may like to see
Sunet
2/5/13

386


5th CORRIDOR
PROPOSED
5TH KM. COR
Kheri Damkan
Saragthal
Pur Khas
Jasri
Western Yamuna Canal
Badshahpur
Mohana


Mawai
Kaliana
Pur Khās
Aghwānpur
Sardhāna Distributary
R. Minor
Pur Khās Drain
Rahmana
Chitia Diwa
Sitaoli
Dābarpur
Udesepur
Pānchhi
Salempur Turāli
Delhi Branch (WESTERN YAMUNA CANAL)
Māhra
Juān
Chatia Aūlia
Tatārpur
Bhatāna Jāfrabad
Sāndal Kalan
Sonipat Distributary
Sāndal Khurd
CORRIDOR
Kareori
Chitāna
Bādshāhpur
Khizarpur Jāt
Holāheri
Kilorad
Theru
East Juān Drain
Jāj
Garhi Haqiqat
Ratangarh
Barwāsni
Jatmālpur
Bāgru
23.400 Km
20.600 Km
17.600 Km
14.6 Km
POPULATED A-B
55'
57'30"
D
E
P
A
T


PART-I
PROPOSED ROAD
CORRIDOR
GOHANA
Sikandpur Majra
Barotha
Nagar
Garhi
Gudha
Thaska
Wazirpura
Hasangarh
Ramgarh
Senipura
Mahmudpur
Sarsadh
Gangesar
Bichpari
Siwanka
Majra
NORTHERN RAILWAY Rohtak Panipat Branch
Nai Nala Drain
Tributary Drain No 3

Appendix 6: Application under Forest Conservation Act, 1980 for diversion of Protected Forest Land for Road Widening

FCA 1- 8 -

कंमाक /

दिनांक /

प्रेषकः वन मण्डल अधिकारी,
सोनीपत।

सेवा में : वन संरक्षक मध्य परि0,
रोहतक।

विषयः **Diversion of 21.36 Ha. forest land for widening & strengthening of UP Border to Sonepat-Gohana upto District Sonepat boundary from Km 11.600 to 74.010 under Division & Distt. Sonepat** के रास्ते हेतु वन भूमि का उपयोग।

उपरोक्त विषय के सम्बन्ध में आपको सूचित किया जाता है कि यः **Diversion of 21.36 Ha. forest land for widening & strengthening of UP Border to Sonepat-Gohana upto District Sonepat boundary from Km 11.600 to 74.010 under Division & Distt. Sonepat** हेतु वन भूमि का उपयोग किया जाना है। प्रस्तावित स्थल पर **Widening of road** का कार्य किया जाना है। उक्त केस वन संरक्षण अधिनियम 1980/2003 के तहत तैयार करके चार प्रतियो में आपको आगामी आवश्यक कार्यवाही हेतु भेजा जाता है। उक्त केस में वन विभाग की कुल **21.36 Ha.** सुरक्षित वन भूमि प्रभावित होगी तथा प्रभावित होने वाली वन भूमि में वन विभाग के **4580** वृक्ष **4409.2739** घनत्व **16910** अण्डर साईज/सैपलिंग बाधक है। इस केस में प्रभावित वन क्षेत्र के बदले क्षतिपूर्ति पौधारोपण **Baroda Minor RD 0 to 30 L&R and Bhadana Minor RD 0 to 20 L&R** पर **45800** पौधे लगवाकर करवाया जाएगा। प्रस्तावित स्थल (सुरक्षित वन भूमि) पर प्रयौक्ता ऐजेन्सी द्वारा कार्य नही किया गया है। अतः आपसे अनुरोध है कि संलग्न केस को अपने स्तर पर चैक करके उच्चाधिकारियों को भेजने का कष्ट करे। क्षतिपूर्ति पौधारोपण एवं नेट प्रैजेन्ट वैल्यू की राशी युजर ऐजेन्सी से स्वीकृति उपरान्त प्राप्त कर ली जाएगी। Dy. No. 568

Date 22-2-13
O/o D.G.M. N. S. R. O. J
Gowedar

वन मण्डल अधिकारी,
सोनीपत।

पृ0 कंमाक 2268-70 दिनाक 22-2-13

इसकी एक प्रति

1. उप महाप्रबन्धक, तृतीय, हरियाणा राज्य सड़क एवं पुल विकास निगम लि0, पी0डब्ल्यू0डी0, विश्रामगृह परिसर, सोनीपत को भेजते हुए सूचित किया जाता है कि विषयाकिंत केस वन संरक्षक अधिनियम 1980/2003 के तहत तैयार करके उच्चाधिकारियो को स्वीकृति हेतु भेज दिया गया है। जब तक इस केस की स्वीकृति भारत सरकार के पर्यावरण एवं वन मन्त्रालय/उच्चाधिकारियो से प्राप्त