TERMS OF REFERENCE (TOR)

FOR

THE PREPARATION OF

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PLAN (EMP)

FOR

CONSTRUCTION OF 6 LANE KUNDLI MANESAR PALWAL EXPRESSWAY IN THE STATE OF HARYANA

SUBMITTED BY

HARYANA STATE INDUSTRIAL AND INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.
HARYANA

1.0. GENERAL

1.1. This Terms of Reference (TOR) covers the technical specifications for conducting Environmental Impact Assessment (EIA) study for the proposed Construction of 6 Lane Kundli Manesar Palwal Expressway in the State of Haryana (135.650 km)

1.2. For the purpose of the EIA study, the term environment shall mean the physical, biological and socio-economic environment.

1.4 For the purpose of assessing impacts, the project shall include all processes and activities associated with planning, design, site preparation, construction, operation, maintenance and post-monitoring of the roads.

1.5 The study area considered for the purpose of assessing the impacts on the environment has been determined as per the applicable EIA guidelines as well as the requirements of MoEF, State Pollution Control Board and EAC.

2.0 SCOPE OF WORK

2.1 Environmental Impact Assessment (EIA) Study shall include preparation of Impact Assessment delineation of mitigatory measures, Environmental Management Plan (EMP) for pre construction, construction and operation phases of the project and associated cost of EMP. Preparation of EIA Report shall be based on one season of data excluding monsoon season. The broad scope of work to conduct EIA study for proposed project will be as follows:

- Collation, collection of data on flora fauna, in the project influence area. Aquatic data of major water bodies along the road alignment. The water bodies will be mainly western Yamuna canal, Yamuna river, Gurgaon Canal & some major drains.
- The study area of 15 km on either side of the route will be delineated and will be marked on survey of India Topo sheet Map.
- Assessment of general physico-chemical quality of water of the study area covering ground and surface water sources.
- Assessment of sediment quality and its texture of the water bodies in the study area

- Collection of information on ecologically sensitive targets (Reserved and protected forest, Sultanpur National Park, Endangered Species of flora and Fauna) in the study area of project
- Assessment of qualitative and quantitative waste load likely to accrue from the project during pre construction, construction and operation phases of the project.
- Study of land use of project area and impact of the project through appropriate techniques
- Establishment of baseline conditions in respect of Ambient Air Quality, Noise Levels, Ground & Surface Water Quality and Soil Quality in the study area through primary data collection. The parameters and number of sampling locations will be decided based on requirements indicated in EIA manual prepared by Ministry of Environment and Forests, New Delhi.

2.2 Prepare Environmental Management Plan (EMP) for all three phases of the project (Pre construction, construction and operation phases) covering the following aspects:

(i) Environmental Monitoring Plan,

(ii) Risk Assessment & Disaster Management Plan (RA & DMP),

(v) Post Project Monitoring Plan, and

(vi) EMP Implementation Plan

(vii) EMP Costs

2.3 Conduct Public Hearing and Public Consultation/ Stakeholder Consultation: Public hearing has already been done.

2.4 Ensure environmental compliance with various requirements and provisions under applicable Acts, Rules and Regulations of MoEF and other statutory requirements relevant to the development of the roads.

The detailed scope of work (service) shall be as specified under following clauses.

3.0 Environmental Impact Assessment (EIA)

The Environmental Impact Assessment shall be viewed as an important tool for incorporating environmental concerns at the project level. EIA for the proposed project has been done and Environment Clearance was obtained in 2007. The EC conditions were abided, thus making the project environmentally sound and sustainable.

After the expiry of EC in February 2012, the construction work was halted except routine maintenance of already constructed road. HSIIDC is again applying for EC to complete the left over work.

The specific objectives of EIA study shall be as follows:

i) Determine the baseline environmental conditions of the project area;

ii) Identify, predict and assess environmental impacts that might arise from development of proposed road.

iii) Prepare an Environmental Management Plan for the proposed road; and

iv) Prepare EIA Report and other requisite documents to obtain environmental clearance from EAC and to comply with various statutory requirements of other agencies

The Environmental Impact Assessment (EIA) shall be based on one season field monitoring data (except monsoon).The EIA study shall cover the environmental components, aspects and activities as given under following clauses.

3.1 AIR ENVIRONMENT

a) The study on air environment shall broadly cover the following:

- Monitoring the existing status of ambient air quality within the impacted region. 6 locations will be selected in the project influence area.
- Monitoring the site-specific meteorological data, viz. wind speed and direction, humidity, ambient temperature, rainfall etc. In the present case IMD data from nearest monitoring station such as IGI Airport and Safdarjung will be considered.
- Estimation of quantities of air emissions for the projected traffic including fugitive emissions from the material handling during construction phase.

- Identification, quantification and evaluation of other potential emissions (including those of vehicular traffic) within the impact zone and estimation of cumulative of all the emissions/impacts.
- Prediction of changes in the ambient air quality with the help of computer based appropriate models due to projected vehicular traffic.
- Delineation of mitigation measures at source, path ways and receptors

b) Ambient Air Quality shall be monitored for twice a week for one season at each monitoring station. The monitoring stations have been selected in accordance with the Ministry of Environment and Forest (MoEF) guidelines (EIA manual) applicable pertaining to IS-5182 (Part 14)–1985, past meteorological data and the surrounding land use pattern. At all locations, concentrations of Respirable Particulate Matter (PM_{10} & $PM_{2.5}$), Sulfur Dioxide (SO_2), Nitrogen Oxides (NOx), Carbon Monoxide (CO), and Hydrocarbons (HC) shall be measured.

c) Meteorological parameters, i.e., wind speed, wind direction, cloud cover, relative humidity, surface temperature, rainfall. visibility, fog, and solar radiation have to be monitored for one season at one meteorological station in the study area. Data on above meteorological parameters and rainfall for the past 5 years will be collected from the India Meteorological Department.

3.2 NOISE ENVIRONMENT

a) The study on noise environment shall broadly cover the following:

- Monitoring the present status of noise levels within the impact zone, and prediction of future noise levels resulting from the proposed project with the help of projected Traffic data
- Identification of impacts due to any anticipated rise in noise levels on the surrounding environment due to projected traffic.
- Recommendations on mitigation measures for noise pollution

b) Noise levels shall be monitored at all the ambient air quality monitoring locations. Noise readings shall be taken every hour for 24 hours, once at each location. Noise Monitoring Locations will be selected near Noise Sensitive

Receptors (roads, crossings, sensitive areas along RoW). It is anticipated that noise will be monitored at least at 6 locations.

3.3 WATER EVIRONMENT

a) Deterioration in surface water quality can occur during both the construction and operation phases. During construction, pollution may result from soil runoff and sanitary wastes from construction camp. The study on water environment shall broadly cover the following:

- Baseline status of surface and ground water quality
- Water availability for the project
- Prediction of impacts on the water quality and of the receiving water body or stream using appropriate techniques.
- Assessment of impacts of road construction on ground and Surface water sources in the study area
- Evaluation of the proposed pollution prevention and water treatment and suggestions on modification, if required.
- Catastrophic events like flash floods and earthquakes.
- HFL of nearby rivers

b) Water environment includes both surface and ground water environment. Water availability in the area has to be assessed. Samples of fresh water (both ground and surface) shall be collected along the study area. Surface Water quality shall be measured for parameters, i.e., pH, TDS, TSS, O&G, COD, BOD, DO, Chlorides, Sulfates, Hardness and Alkalinity according to Standard Methods. It is suggested that 6 ground water and 5 surface water samples will be collected to characterize the baseline scenario.

3.4 LAND ENVIRONMENT

a) The study on land environment shall broadly cover the following:

- Geography & Physiography
- Critical review of the geological features around the project area;
- Tectonics and earthquakes
- Impact of the project on geological environment;

- Studies on soil characteristics, existing land use and topography, landscape and drainage patterns within the impact zone.
- Estimation of impacts of project on land use, landscape, topography, drainage and hydrology.

b) Baseline data collection shall include the following:

- Land-use pattern around the project site, i.e., forest cover, agricultural land, industries, residential and commercial areas, ecologically sensitive areas based on primary and secondary data
- Soil quality data in the project region for parameters, i.e., texture, % moisture, sand, % silt, % clay, % organic matter, alkalinity, acidity, Sodium Absorption Ratio (SAR), specific gravity, bulk density, porosity/void ratio, infiltration capacity, pH, electrical conductivity, NPK values and Ca, Mg & K, Chlorides, Sulfates and Carbon, Iron, Copper, Zinc, Manganese, NaCl, Na_2CO3. Land use study in an area of 10 km. around project site shall be carried out. The numbers of samples are 6 in the entire project length.

3.5 BIOLOGICAL ENVIRONMENT

a) The study on biological environment shall broadly cover the following:

- Collection of available information on both terrestrial and aquatic flora and fauna, including rare and endangered species in the project area
- Assessment of species diversity, density, abundance and vegetation cover in the project area
- Estimation of anticipated impacts on fisheries and other useful aquatic flora and fauna
- Assessment of potential damage to terrestrial and aquatic flora and fauna due to the project.
- Assessment of damage to terrestrial flora and fauna due to pollution, land use and landscape changes.
- Assessment of damage to aquatic and terrestrial flora and fauna (including fishing) due to physical disturbances and alterations.
- Prediction of biological stresses within the impact zone of the proposed project.
- Delineation of mitigation measures to prevent and/or reduce the impact.

b) Data on flora and fauna, both terrestrial and aquatic, near the site and in the study area surrounding the project site shall be collected based on actual field visits and secondary data. Actual field visits are being undertaken to find out native and endangered species, if any, in the area.

3.6 SOCIO-ECONOMIC ENVIRONMENT

a) The study on economic environment shall broadly cover the following:

- Collection of demographic and related socio-economic data
- Collection of epidemiological data, including studies on prominent endemic diseases (e.g. fluorosis, malaria, filaria, malnutrition) and morbidity rates among the population within the impact zone
- Projection of anticipated changes in the socio-economic and health due to the project and related activities including traffic diversion and delineation of measures to minimize adverse impacts.
- Assessment of impact on significant historical, cultural and archaeological sites/places in the area.
- Assessment of economic benefits arising out of the project.
- Assessment of rehabilitation requirements with special emphasis on scheduled areas, if any.

b) The existing quality of life of the people in the area surrounding the project sites shall be assessed. The following baseline information will be collected through secondary sources:

i) Health Status:

The general health status of the population will be assessed from district level health records.

ii) Basic Amenities:

Information shall be collected on drinking water resources and water supply, medical facilities, educational facilities, sanitation facilities, recreational facilities, transportation, communication and power supply.

iii) Traffic Analysis:

Analysis of vehicles shall be carried out as per requirement.

iv) Sensitive Locations:

All sensitive locations falling within study area shall be identified with respect to drinking water and surface water bodies, archaeological sites and public utility lines such as power cables, roads and railway lines, etc. Information shall be collected on major industrial and commercial activities, archaeological monuments and monuments of cultural and historic importance, places of scenic beauty within 10 km of the project site, festivals, rituals and recreational habits of the indigenous people based on the secondary data.

The outline of EIA Report shall be (but not limited to) as under:

- Executive Summary
- Introduction
- Project Description
- Policy, Legal and Administrative Framework
- Baseline Environmental Status
- Environmental Impacts and Mitigation and Enhancement Measures including project benefits
- Analysis of Alternatives
- Environmental Management Plan, RA & DMP, Institutional Requirements and Environmental Cost Benefit Analysis
- Findings and Recommendation
- Conclusions

4.0 METHODOLOGY

4.1 The methodology given as under while carrying out the EIA Study are as follows:

- Review of the features of the project to determine the applicability of various environmental regulations and laws
- Analysis of various regulatory requirements applicable for undertaking EIA study
- Collection of relevant baseline data through primary and secondary sources followed by their analysis and interpretation
- Prediction of potential beneficial and adverse environmental impacts due to the proposed project

- Evaluation of overall impacts of the proposed project on various environmental components within the study region
- Identification of mitigation measures to mitigate/minimize the adverse impacts and to enhance and strengthen the beneficial impacts
- Analysis of alternatives
- Formulation of an integrated Environment Management Plan with proper allocation of resources and responsibilities to enable effective implementation of the EMP

4.2 Review of Regulatory Requirements

The Consultant shall review the regulatory requirements in general and environmental regulations in particular to identify those features, which are applicable to the project and its activities directly and indirectly. Various procedural requirements as well as requirements pertaining to performance levels of various processes/activities of the project as may have been stipulated in various regulations and applicable to the project shall be discussed and implications of the same on the project shall be conferred.

4.3 Baseline Data Collection

In line with the objectives laid down for the study and the scope defined above, consultant shall identify the relevant environmental parameters that need to be collected and analyzed. The Consultant shall collect primary data wherever required and use the secondary data that are available and relevant to delineate a clear baseline status of the environment. While analyzing the existing environmental condition, an assessment will be made against regulatory standards wherever applicable. The consultant shall also make reasonable efforts to establish linkage with possible causes of degradation for those environmental attributes, which represent a relatively (compared to regulatory standards) degraded environmental condition through analysis of baseline data.

The consultant shall define the study area within the study region defined above taking into account the probable regions of influence of major project related environmental impacts and collect data on relevant physical, biological

and socio-economic conditions. Environmental components to be analyzed shall include but not limited to the following:

Physical: Geology, topography, soils, climate and meteorology (with emphasis on critical season/s), rainfall, ambient air quality, surface and groundwater hydrology, catchments, stream water quality status, noise, drainage, etc.

Biological: Forests and its classification (density, diversity, flora, fauna, etc.) ecologically sensitive areas (sanctuaries, national parks, endangered species, wildlife habitat etc.) wildlife in project region, water bodies, and their current usage

Socio-economic conditions: Population, land use, proposed and planned development activities, community structure, employment, distribution of income, health conditions, civic amenities, project affected etc.

4.4 Prediction of Environmental Impacts

The EIA study shall analyze the project and its activities (ranging from construction to decommissioning) to determine additional environmental burden that the project might exert on the existing environment and predict the level of their manifestations on various environmental attributes. For the purpose of prediction of incremental change in environmental quality, use of acceptable predictive models and tools wherever applicable will be made.

As part of the impact prediction, the EIA study will provide an adequate discussion of the following aspects:

- Use of relevant prediction models to quantify the pollution in various environmental domains due to the project especially during its construction and operation phases and their impact on the study region and adequately mention the approach, methodology, models, tools, techniques and facilities to be used for prediction of impacts
- The extent and quality of available data, critical data requirements, data gaps and uncertainties associated with predictions
- The environmental aspects which are not relevant and do not require prediction or assessment in the project cycle should be specified and discussed adequately

- The emphasis of impact assessment will be focused on the following aspects

1. Fly Ash generation potential in the project region and extent of usage planned. Environmental impacts likely due to handling and usage will be elaborated
2. The impacts with respect to land and property acquisition will be elaborated
3. Impact of vehicular emissions on surface water bodies specially rivers will be assessed.
4. The impact of ground water flow due to creation of compacted base will be assessed.
5. The impact assessment will include impacts on induced land use changes and unauthorized developments in the project influence area
6. The wet lands will be identified and marked clearly on SoI maps and impact of project implementation will be assessed on these water bodies
7. The impacts of ancillary development (Petrol Pumps, eating joints, automobile repair shop, etc.) will be assessed
8. Impacts of project implementation shall be assessed on wild life paths if available in the project region

4.5 Evaluation and Assessment of Impacts

The EIA report will evaluate significance of all environmental impacts having positive or negative, short term or long term, direct and indirect impact categories associated with different phases of the project development and implementation. Impacts, if any, those are irreversible and/or cannot be avoided or mitigated should be identified and discussed adequately. The resulting environmental quality after due consideration of the incremental change due to the project shall be analyzed against applicable regulatory standards where applicable. The impacts shall be evaluated based on their magnitude, frequency and duration using acceptable techniques as may be relevant.

4.6 Environmental Management Plan (EMP)

The EIA study will contain detailed EMP covering the measures to mitigate and or minimize the adverse impacts. The EMP shall also include Risk Assessment & Disaster Management Plan, Monitoring and Post-Project Monitoring Plans, EMP Implementation Plan and cost of EMP. In formulating the EMP, the consultant will integrate all these plans and findings of all modelling and sector-specific studies undertaken. The EMP shall cover, but not limited to the following details:

Mitigation Measures: For each of the significant adverse impacts, the EMP will recommend measures to eliminate and or mitigate the impact. Mitigation measures would include technical options & alternatives, appropriate management plan & practices as may be applicable along with their cost implications. In case any impact is immitigable, the same would be discussed adequately. The mitigation measures would be drawn in the following cases:

To prepare detailed Environment Impact Statement (EIS) duly bringing out the likely impacts of the project, mitigation, protection and enhancement measures including impacts due to hazardous & solid waste disposal, consideration of alternatives, 'no change alternative' etc with a summary and conclusion of the analysis, effect on flora and fauna and effects on water quality and quality, noise pollution etc. at important locations and to study the inherent polluting properties of the disposal materials and the resulting impact on the environment. To cover further, the environment degradation, effect on flora and fauna, ground water pollution in the adjacent areas, entry of toxic components and consequent effect on food nutrition value, damage/interferences to recreation facilities. Each of these impacts like soil erosion, siltation, fisheries, aquatic bacteria micro organisms suspended sediment concentrations, shall be weighed against the expected advantages like employment potential, economy of hinterland, traffic to ports etc and thus to make Environment Impact Statement.

The specific mitigation measures will be specified in the EMP for the following special impacts likely due to the project:

- Mitigation measures for fly ash handling and usage in the project

- Mitigation measures to minimize impacts on water bodies, borrow area operations, construction material handling, transportation and storage
- Mitigation measures to avoid induced and unauthorized land use changes
- Procedures will be specified to locate construction camp and workers camp at appropriate locations and adequate sanitation facilities
- Rain water harvesting will be included in the project design
- Mitigation measures will be specified for avoiding flooding in project region during construction and operation
- Mitigation measures will be included to minimize impacts on ground water potential in project region during construction and operation
- Proper mitigation measures will be addressed for project affected persons (PAPs)
- All clearance requirements for pre construction, construction and operation phases will be clearly spelt out
- Environmental enhancement and noise barriers will be planned at appropriate locations
- Mitigation measures will be elaborated for all impacts identified on common property resources

Risk Assessment & Disaster Management Plan (RA & DMP): A Risk Assessment and Disaster Management Plan will be prepared covering all activities during pre construction, construction and operation phases of Road project.

Monitoring Plans: The EMP shall also include environmental monitoring plan for Pre Construction, Construction and operation phases. Environmental monitoring plan shall monitor various environmental parameters for ensuring compliance against regulatory standards and also to enable comparison against the baseline scenario. A post-project monitoring plan shall be formulated to monitor the changes in the environmental quality after implementation of the expressway project.

Capacity Building for EMP Implementation: The EIA study shall prescribe the Implementation Schedule and Plan for effective implementation of EMP.

This shall involve identification of institutional stakeholders, their set-up and capacity and to propose a framework for institutional capacity building.

Resource Allocation and Conservation: The cost, both capital and recurring, associated with implementation of each mitigation or enhancement measure prescribed in the EMP shall be quantified and responsible implementing parties shall be identified. Each measure shall be drafted as contract clauses giving details of their technical and financial specifications which shall be incorporated in implementation agreements.

4.7 Analysis of Alternatives

For the identified impacts, assessment shall be carried out for the following three scenarios:

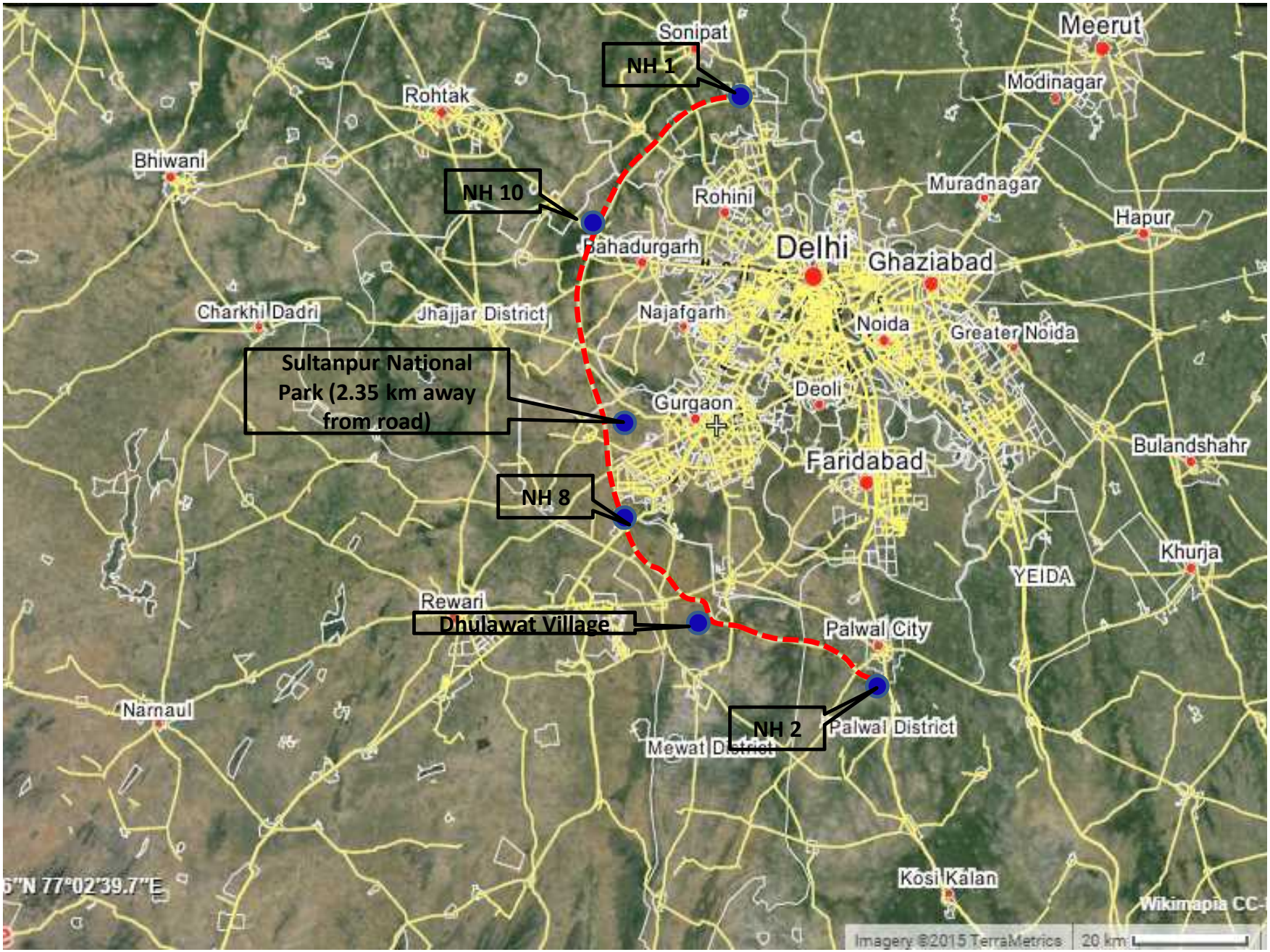
(i) No Project
(ii) EIA without EMP and
(iii) EIA and EMP

The first scenario is ruled out since this project was granted EC in February 2007 and part of the construction has already been done. The assessment under the second scenario shall be considered without an EMP whereas the same procedure shall be repeated under the third scenario in which an EMP would be in place. The difference between the two scenarios (EIA with and without EMP) shall indicate the effectiveness of the EMP in preserving environmental quality of the area along the project. The potential benefits of the EIA-EMP exercise shall be assessed both qualitatively and quantitatively, where possible.

Major environmental and ecological components that need to be kept in view during analysis of alternatives shall include:

- Legal aspects of the potential sites with respect to environmental legislation
- Impact on stream flow and water availability
- Impact on flora and fauna (terrestrial and aquatic)
- Impact on national parks and sanctuaries, if any

- Impact on wildlife (including birds) habitat, breeding area, feeding area and migration route, if any
- Impact on heritage and sensitive sites like monuments of historical, cultural and religious significance
- Impact on forest, agriculture, fishery and recreation etc.
- Impact on human settlement
- Impact on Socio-Economic Status



BASELINE MONITORING LOCATIONS

Location of Baseline Environmental Monitoring Stations for KMPE Project

S.No.	Particulars	Direction	Distance from Road
1	Crossing point of KMP & NH1, Kundli	Downwind, SE	Within 50 m
2	Crossing point of KMP & NH10, near Bahadurgargh	Upwind, NW	Within 100 m
3	Sultanpur National Park	Downwind, SE	2.3 km
4	Crossing point of KMP & NH8, IMT, Manesar	Downwind, SE	Within 50 m
5	Village Dhulawat, near NH71 B	Downwind, South	400 m
6	Crossing point of KMP & NH2, Palwal	Upwind, NW	Within 50 m

1. **Ambient Air & Noise Quality** (twice a week and for 3 months)

S.No.	Particulars	Monitoring Stations/sample
1	Crossing point of KMP & NH1, Kundli	2*4*3=24
2	Crossing point of KMP & NH10, near Bahadurgargh	2*4*3=24
3	Sultanpur National Park	2*4*3=24
4	Crossing point of KMP & NH8, IMT, Manesar	2*4*3=24
5	Village Dhulawat, near NH71 B	2*4*3=24
6	Crossing point of KMP & NH2, Palwal	2*4*3=24
	Total Samples (of air & noise each)	**144**

Note: -Location of monitoring station are shown in map

2. **Ground & Soil Water Quality** (once a month for 1 month)

S.No.	Particulars	Monitoring Stations/sample
1	Crossing point of KMP & NH1, Kundli	1
2	Crossing point of KMP & NH10, near Bahadurgargh	1
3	Sultanpur National Park	1
4	Crossing point of KMP & NH8, IMT, Manesar	1
5	Village Dhulawat, near NH71 B	1
6	Crossing point of KMP & NH2, Palwal	1

3. **Surface Water Quality** (once a month for 1 month)

S.No.	Particulars	Monitoring Stations/sample
1	Western Yamuna Canal	1
2	Gurgaon Water Supply Channel	1
3	Najafgarh Drain	1
4	Nuh Drain	1
5	Gaunchhi drain	1