Executive Summary

1.1 Introduction

Government of Maharashtra entrusted the construction of Yashwantrao Chavhan Expressway (YCEW), commonly known as Mumbai-Pune Expressway (MPEW), to MSRDC in the year 1996-1997. The construction of YCEW along with widening of NH-4 was completed in the year 1999-2000 and put into operation. At the time of construction of the Expressway, the alignment between Khopoli and Lonavala could not be constructed due to viability gap funding and other issues. Hence existing alignment of NH-4, in the hilly section, had to be followed by widening it to six lanes. Thus, in the hilly area, the alignment of YCEW and NH-4 is common and the traffic from six lanes of YCEW plus the four lanes of NH-4 merge. Hence a need for an alternative alignment, especially in this hilly section, is envisaged.

The proposed new alignment starts near Khopoli exit on YCEW in Raigad district and ends at Sinhagad institute near Lonavala in Pune district. The objective of the project is to construct the "Missing Link" of MPEW (hereafter called MPEW-ML) and to provide transport & communication facilities, considering the proposed growth of traffic on this route. The construction of this new alignment for MPEW-ML between Khopoli and Lonavala in mountainous and hilly section of the Mumbai Pune corridor, consists of tunnels, viaducts and capacity augmentation of the entire corridor i.e. existing NH-4 and YCEW including improvements to connectors between NH-4 and YCEW.

MSRDC has appointed S. N. Bhobe & Associates Ltd. for preparation of Detailed Project Report (DPR), who in turn, have appointed Building Environment (India) Pvt. Ltd., a NABET-accredited Consultant for A category Projects, to carry out the Environmental Impact Assessment (EIA) studies and to assist the Client in obtaining prior Environment Clearance and Forest Clearance.

1.2 Project Location and Description:

The project consists of construction of the missing link of MPEW from Khopoli exit to Sinhagad Institute, as a part of the Capacity Augmentation of MPEW with a new 8-lane, 13.3km long alignment. The missing link involves two tunnels of lengths 1.6km and 8.9km respectively, as well as two viaducts of lengths 900m and 650m respectively. Start of the missing link is at the point where Khopoli exit of NH-4 crosses MPEW from below, whereas end of the link is near Sinhagad institute.

Sr. No.	Particulars	:	Details	
1	Project road	:	Khopoli Exit tunnel to Sinhagad Institute as a part of Capacity Augmentation of MPEW with 8 lane new alignment for about 13.3Km length.	
2	Geographical location	:	Khopoli Exit in Raigad district: Latitude 18° 46' 14" N and Longitude 73° 20' 13" E Kusgaon in Pune district: Latitude 18° 44' 06" N and Longitude 73° 25' 58" E	
3	Location the proposed project	:	State	Districts
			Maharashtra	Raigad and Pune
4	Length of the Package passing through the Tehsils		The Alignment is passing through 2 Districts Raigad District: Taluka Khalapur (3.540km) Pune District: Taluka Mawal (9.96km)	
5	No. of affected villages	:	7 Raigad District: 3 (Adoshi, Chawani, Bhanvaj) Pune District: 4 (Kurvande, Bhushi, Kusgaon Budruk and Khandala)	
6	Total length of the proposed project	:	13.3km (missing link of MPEW) + 6.5km (capacity augmentation of existing YCEW from Khalapur toll plaza	

			CH32/000km to Khopoli exit CH38/500km and at Sinhagad Institute)
7	Total area of land acquisition	:	133.298 Ha
8	Total Project cost	:	4797.57 Cr
9	Seismic zone	:	Zone – III
10	Forest Land	:	80.03 Ha
11	Right of way	:	100m
12	Project Component		2 Tunnels, 2 Viaducts, 2 Horizontal shafts
13	Design Speed		120 kmph

1.3 Alternative Alignments Considered

As mentioned in the MOEF ToR, the areas were analysed by studying satellite imageries and digital terrain models. The three alignments were drawn up based on reconnaissance surveys and other data, like toposheets, satellite imagery and maps made available by MRSAC, showing geomorphology and land use. Alignment Selection was done in three stages as per ToR. In the first stage, three green alignments were made eccentric to existing alignment. In the second stage, detailed horizontal alignment corresponding to each of selected alternatives was fitted on satellite imageries and vertical profile for each alignment was developed using digital terrain model. In third stage, the final alignment plan was design for all the three alternative alignments to meet geometric standards of Expressway, as well as other parameters for a design speed of 100 km/h showing location of terminal points, final alignment plan with location of Viaducts, Tunnels and Horizontal shafts.

While laying the alignments, following basic principles were followed:

- Avoid Forest and Wildlife Sanctuary areas as far as possible;
- Avoid passing through areas already under planning / development (eg. Development plan areas of urban centres, industrial area, etc.);
- Minimize route through irrigated/ two-season crop area;
- Maximize route through barren land;
- Use existing Right of Way or Government lands wherever available;
- Minimum distance from habitations / Gaothans areas to be more than 150m;
- Alignment to have least number of curves and minimum radius to be 2000m;
- Minimize Railway over Bridges (RoB);
- Avoid water bodies.

1.4 Environmental Impact Assessment

The Environmental study for the project area has been carried out in accordance with the requirements of Government of India guidelines, for Rail /Road /Highway projects. For the purpose of Environment Study, a corridor of up to 10 km on either side of the project road has been studied. The Environment assessment process includes an inventory of baseline environmental conditions using data collected from secondary sources and field investigations; the identification of environmental issues /impacts and suggestion for mitigation measures to minimize adverse environmental impacts.

The pre-feasibility EIA report has been submitted as separate volume and prepared by following the "guidelines for preparation of pre-feasibility report for obtaining prior environmental clearance" with regards to the provision of EIA notification (2006), and amended thereto.

1.4.1 Need of the Study

Development of Expressway projects is generally intended to improve the economic and social welfare of the people. At the same time, it may also create adverse impact on the surrounding environment.

The environmental impact of highway projects include damage to sensitive eco-systems, soil erosion, changes to drainage pattern and thereby ground water, interference with wildlife movement, loss of productive agricultural lands, resettlement of people, disruption of local economic activities, demographic changes and accelerated urbanization. Highway development and operation, therefore, must be planned with careful consideration of the environmental impacts. To minimize these adverse effects that may be created by the highway development projects, an Environmental Impact Assessment (EIA) becomes necessary.

1.4.2 Scope of Work

Environmental assessment is a detailed process, which starts from the conceptualisation of the project and continues till the operation phases. The steps for environmental assessment are, therefore, different in different phases. The first steps for environmental assessment are known as Scoping and Screening. It is a preliminary Environmental Impact Assessment study for identifying major environmental issues and their broad mitigation measures. The findings of this preliminary study, become a guide for undertaking more focused Environmental Impact Assessment Study.

The basic aim of the present study is to assess the magnitude of actual and potential environmental concerns, likely to be caused due to the construction of the proposed 'Green-field', 8-lane new Expressway with paved shoulders. The secondary aim is to ensure that Environmental considerations are given due weight-age in the design, of the proposed new expressway, being studied. Environmental Screening of the study area has the following major objectives:

- To generate baseline environmental conditions of the proposed project areas, including Ambient Air Quality, Noise level, Water Quality (surface & ground), Soil Quality etc.
- To classify the type of environmental assessment required,
- To delineate the major environmental issues and identify the potential hotspots, which requires further study i.e. scope for Environmental Impact Assessment (EIA),
- To recognize the potential environmental concerns,
- To determine the magnitude of potential impacts, while selecting and designing the proposed highway improvements.

1.5 Project Location and Connectivity

The proposed new alignment starts from Khopoli Exit in Raigad district (at CH 38/700 of MPEW) with Latitude, Longitude 18° 46' 14" N, 73° 20' 13" E and diverts towards the South –East. It passes through the high mountains of Bor Ghat and meets again with the existing MPEW to end at Kusgaon in Pune district (at CH 58/200) near Sinhagad Institute with Latitude 18° 44' 06" N and Longitude 73° 25' 58" E. The missing link constitutes of two tunnels of length 1.6km & 8.9km, and 2 viaducts of length 900m & 650m respectively.

Proposed missing link of YCEW will be developed between Khalapur and Kusgaon. The nearest approach roads for various locations of missing link are existing YCEW, Mumbai-Pune old highway (NH-4) and Pali-Khopoli Road (SH-92).

Initial road link was by way of NH-4 with part additional link of Sion Panvel Highway. Navi Mumbai with Thane – Turbhe Industrial Area has developed alongside of Sion Panvel Highway which connects Mumbai and Navi Mumbai to NH-4. The existing NH-4 starts from Shil Phata – (Km 131/200) and ends at Nigadi, Dehu Road (Km 20/400) and is 111Km long. This is the main spine of Maharashtra, linking state capital Mumbai to 15 districts of developed western and central Maharashtra and Marathwada. This is contributing in a big way in economic and cultural growth of Maharashtra.

1.6 Importance of the Project

This project having following advantages is of great importance to the State:

- Travel time will be saved by 24 min.
- No/Low Tree disturbance.
- Smooth Gradient =3%.
- No fear of Rock-fall.
- Increasing traffic due to NMIA, JNPT, CIDCO, New SEZ will be improved.
- AAQ will be improved since vehicles will not travel on low gear/ low speed.
- No widening is required now in Ghats Section.
- Traffic will be segregated (Light/Heavy vehicles). High LOS.
- 68 % of Alignment will travel through tunnel about 50-150 m below Ground Level. Thus, Ecology above will not be disturbed.
- Natural ventilation by Shafts.
- Twin tubes and Interlinks
- This will help all 6 infrastructural connections under construction which will be ready in next 3 years (Surat, Nashik, Aurangabad, Hyderabad, Bangalore and Goa).
- Reduce possibility of accidents
- The improvements will give boost to developments of North, West and central part of Maharashtra.

1.7 Project Benefits

By improving the existing road, this Project will substantially reduce the existing transport bottleneck in the Mumbai-Pune corridor, and will foster regional economic cooperation. The entire region will be benefitted from the Project, while the project area will gain through economic development and increased access to markets and social services. Improving the project road will reduce transport cost, and will contribute to commercial and industrial development opportunities.

1.8 Existing Environmental Features

1.8.1 Climatic Data from Secondary Sources

Climatic conditions of a region are strongly influenced by its geographical conditions. It is distinctly different on the coastal strip where it is very humid and warm. On the other hand, the climate on the eastern slopes of the Western Ghats, as well as the plains at their foot slopes is comparatively less humid. The humidity ranges from 50 to 80 per cent throughout the year. On an average, the temperature ranges from 17.5^{o} to 33.3^{o} centigrade.

Rainfall is the most dominant single weather parameter that influences plant growth and crop production because of its uncertainty and variable nature. The district gets an assured rainfall of 2000-3500 mm, from the south-west monsoons, during the months of June to September. Generally, the highest rainfall is recorded in the month of July. It is less towards the north than south.

1.8.2 Geomorphology and Soil Types

The thickness, presence and structural characteristics of fine-grained compacted basalt, porphyritic basalt, and amygdaloidal basalt vary in different flows, depending on properties of the magma, cooling history and geological conditions at the time of their formation. These conditions, either make the rock type suitable or unsuitable for engineering structures. Vesicles and amygdales increase toward the top of a flow unit which in turn merges into the ‘red boles’ at some places. The red bole is overlain by the massive strata of the next younger flow unit. Vesicular basalt with empty gas cavities and amygdaloidal basalt with gas cavities filled with secondary minerals like zeolites, carbonate minerals and secondary silica, i.e. agate, etc., do not have a regular pattern of jointing and are massive, while compacted basalt with no gas cavities is usually jointed.
The Mineralogical content of basaltic rocks was analysed for each rock type.

Basalt generally has a composition of:

- SiO_2 (45–55%)
- Total Alkalis (2–6%)
- TiO_2 (0.5–2%)
- FeO (5–14%)
- Al_2O_3 (14% or more)
- CaO (about 10%) and
- MgO (usually in the range of 5–12%)

Major mineral composition of different types of Basalt found in the project area, are as follows:

1. *Fine-grained Compact / Porphyritic Basalt*:
   - Plagioclase (40–45%)
   - Pyroxene (15–20%)
   - Glass (10–15%)
   - Iron oxide (8–10%)
   - Secondary calcite (7–10%) and
   - Groundmass (Plagioclase, Pyroxene and Glass)
2. *Vesicular / Amygdaloidal Basalt*:
   - Plagioclase (35%)
   - Devitrified Glass (30%)
   - Pyroxene (20%)
   - Oxide phase (15%)

Raigad District

The soils in the district are formed from the weathering and decay of Deccan Trap, which is the predominating rock formation in the area, with small out crops of Laterite at a few places in Poladpur taluka and Matheran hill. The soils are grouped as Forest, Varkas, Rice, Khar or Saline, Coastal Alluvium and Laterite as per the location and topographical situation.

Pune District

Pune district possesses mainly three types of soils, viz. black-fertile, brown and mixed type. The mountainous terrain on the Western part of the district, the slopes at the base of the Sahyadri ranges, the extensive plateau areas without a thick soil cover and lateritic soils, have restricted the area under cultivation Even the area that is cultivated suffers from infertile soil and deficiency of moisture, making the soil brown in colour and of low quality, whereas soils of the eastern regionare fertile and plain. The richest alluvial soil track is found in the Bheema River Valley. The rivers Velu, Ghod are on the left-bank side of Bheema, while the rivers Indrayani, Bhama, Mula-Mutha etc. are on the right-bank side. Each tehsil of the district has at least one river, thus making the agro-climatic condition of district very favourable.

1.9 Policy, Legal and Administrative Framework

Review of the existing legislation, institutions and policies relevant to the Environmental Impact Assessment at the National and State levels has been done and clearance requirements for the project at various stages of the project has been identified.

1.9.1 Environmental Clearance

In terms of the provision of EIA Notification 2006 amended thereto, the project was classified as a category 'B' project.

The project road is passing through forest areas in several stretches and constitutes about 80.03 Ha of total Forest. The details have been obtained from Forest Department / Revenue records through which the project

highway passes. Amendment in the ToR was conducted in the 133rd SEAC-I meeting held on 24.08.2016. A separate forest clearance proposal is submitted as per provisions of Forest (Conservation) Act, 1980.

1.10 Methodology

The approach to carry out a rapid EIA study was organized in five tasks, and is based on the field investigations and reconnaissance surveys in the project area, collection, collation and analysis of secondary data and discussions with key stakeholders on the potential impacts of the project.

Task 1: Environmental Screening of the project

The Environmental Assessment for the proposed project began with the adoption of an environmental screening procedure during the feasibility stage. The purpose of the screening was to identify key environmental issues such as environmentally sensitive receptors along the selected alignment, change of land-use; impacts on surface water bodies, availability of borrow areas, impacts on community facilities, impacts on flora and fauna, etc.

Task 2: Review of Proposed Improvements and Review of Policies, Regulations and Institutional Arrangements

The objective of this review was to formulate an approach to conduct the EIA and the data requirements for the same. A review of all applicable operational policies / directives of MoEF, MSRDC and environmental laws / regulations in India, were carried out in this task. In addition to the above, the key environmental regulations / policies in India that may affect / influence the project environment both during preparation and implementation stages were also reviewed.

Task 3: Base line Environmental Profile of the Project

Base line environmental profile of the area was then prepared for the area delineated in the earlier task. This comprised of the following:

- Carrying out detailed field investigations (through specific reconnaissance survey formats and recording sensitive features through hand held GPS to prepare an environmental profile of the project area
- Collection of secondary information of physical, biological / ecological and social environment.
- Discussions with the local officials on the salient features of the project area, etc.

Task 4: Prediction of Environmental Impacts

With the base line environmental profile of the project as the base and analysis of the primary and secondary data collected, impacts of the proposed project on various environmental components were identified. The impacts were also analyzed with respect to pre-construction, construction and operation phases and were categorized in terms of magnitude and significance. The anticipated environmental impacts of proposed projects are as listed below

1. Land

- The impact assessment due to removal of vegetation, fragmentation of natural habitat, removal of buildings and severance of farm land.
- Impact assessment of the project construction leading to soil contamination, soil erosion, destabilization of slopes, side- tipping of spoil materials, loss of properties, loss of fertile lands and diversion of natural surface water flows.
- Assessment of Possibility of the adverse impacts of proposed project on road traffic in the surrounding areas (e.g. by causing increases in traffic congestion and traffic accidents).
- Assessment of Impacts on the local area developments and integration with local master plan.

2. Air

- Impact assessment on sensitive receptors such as habitation, hospitals, schools, notified sanctuaries, etc. up to 500m.
- Impact assessment during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials.
- Prediction of impact on ambient air quality using appropriate mathematical model, description of model, input requirement and reference of derivation, distribution of major pollutants and presentation in tabular form for easy interpretation are carried out.

3. Water

- Impact assessment on Surface water flow modifications, flooding, soil erosion, channel modification and siltation of streams.
- Impact assessment of proposed activity on Water quality (surface and groundwater).
- Impact assessment due to temporary project offices and temporary housing area for construction workers.
- Impact assessment of water quality degradation in downstream water courses or water bodies due to soil runoff from the bare lands resulting from earth-moving activities, such as cutting and filling.

4. Noise

- Impact Assessment of Noise levels during construction activity, due to operation of various machines and equipment.

5. Biological

- Assessment of Impacts due to clearance of vegetation
- Assessment of Impacts on Wildlife habitat and biodiversity
- Assessment of Impacts on Water quality, soil profile, noise and air pollution.

Task 5: Preparation of Environmental Management and Monitoring Plan

Based on the nature and type of environmental impacts anticipated, mitigation measures for preventing / minimizing the same were identified and an Environmental Management Plan was then recommended both for the project execution and operation phases.

1.11 Environmental Impact Assessment

The main environmental impacts have been analysed covering Environmental Resources, Human Use Values and Ecological Resources. A brief description of these impacts is given herewith.

1.11.1 Construction Phase

During the construction phases there would be minimal impact on:

- Ecology (flora and fauna)
- Ambient air quality
- Noise Quality
- Water Quality (Surface & Ground water)
- Soil
- Also, there would be some impact on quality of life due to inconvenience caused to public as a result of construction activities.

Causes of impact on Air quality are:

- Land clearing,
- Air mass contamination,
- Processing of raw material,
- Handling and transportation of construction & demolition material,

- Construction of pavement,
- From wind erosion of open sites and stockpiles areas.

Noise Pollution Impact:

- Operation of construction equipment like earth moving and material handling equipment.
- Stone crushing plants
- Blasting activities etc.

Impact on Water quality:

- Surface water flow modification
- Groundwater flow modification
- Water Quality degradation (surface & groundwater)

Impact on Soil:

- Loss of productive soil
- Erosion
- Contamination of soil
- Cumulative impacts

Impact on Ecology (flora & fauna):

At the selected stretches, trees falling within the Right of Way (RoW) would need to be felled. The existing Right of Way (RoW) does not pass through forest areas (Protected & Reserve Forest).

- Corridor restriction
- Aquatic habitat damage
- Ecological disequilibrium
- Contamination of the biota

Apart from widening and strengthening of road, some additional impacts, like rise in the noise and air pollution level to some extent, may be seen on the surrounding environment due to construction of the flyovers at major junctions.

1.11.2 Operation Phase

During the operation phase the environmental impacts are most likely to be positive. However, there could be some adverse impacts due to inadequate operation and maintenance or control. Decrease in air pollution is expected, but in long run due to increase in traffic volume air quality may deteriorate if long term mitigation measures are not included in the project vehicle design. Construction of Expressway will result in decrease in noise level due to smooth running of the vehicles. Construction of ROBs will shorten the travel time and cost and also reduce the probability of undue accident hazards. It is envisaged that there is possibility of positive impacts on surface water quality, during operation phase, due to the proposed widening & strengthening of existing road. Contamination of soil is expected due to deposition of the chemicals from emissions as well as spills from vehicles. The impact of the road improvement on the socio-economic environment will however be significantly beneficial, as it is likely to stimulate the economic growth of the area. The specific benefits of the road improvement will include reduction in travel time and travel cost.

1.12 Mitigation Measures

1.12.1 Construction Phase

On the basis of information collected during Environment Screening Survey, the following measures are recommended for mitigation or minimizing the environmental impacts that are likely to occur during the construction phase of the proposed project. It is, however, recognized that most of the measures, if not all, are generally taken care of in the design stage, as well as in construction and supervision stage through incorporation of suitable clauses in the project specifications. However, the responsible agency shall implement these mitigation measures under supervision and direction of MSRDC.

a. Prevention of top soil / erosion:

- Store and reuse topsoil – this requires that topsoil be separated from subsoil during the initial excavation and further utilize it for the restoration of borrow pits as well as for slope protection.
- Construction is to be scheduled so that large area of soil is not laid bare during the monsoon.
- Ground disturbances to be phased so that it is limited to workable size.
- Exposed surface needs to be resurfaced and stabilized as soon as possible.
- Stabilization of soil at bridge /culverts / high embankment approach through plantation.
- Replanting disturbed areas immediately after disturbance has stopped.
- Balance cutting and filling requirements through route choice, so as to avoided the production of excess spoil material and reduce the need for borrows pits.

b. Prevention of dust nuisance:

- On exposed construction surface during dry / windy periods fugitive dust generation need to be suppressed by spraying of water or other suitable means.
- Workers working in dust prone areas to be provided with masks and goggles.
- Excavated & construction materials transported by trucks need to be covered and or wetted to prevent dust nuisance.
- Selecting road alignments which avoid passing close to housing, schools and work places.
- Set-up of crushing and hot mix plant sufficiently away from the residential or ecological sensitive areas.

c. Noise emission from vehicles and construction activities:

- All construction vehicles need to be properly maintained and will have valid "Pollution under Control Certificate".
- Noisy construction activities to be carried out only during normal working hours and local residents will be advised of any unusual or unavoidable noise.
- Where feasible, sound barrier to be provided in inhabited areas.
- Surface design and maintenance.

d. Protection of Water quality:

- Flow speed especially near water crossing need to be controlled.
- Construction activity to be such as to ensure unhindered flow of watercourse at all times.
- Plant and machinery required for concreting etc. and construction workers camp to be sited away from the watercourse. The water quality to be monitored at regular interval to monitor the change, if any, during the project implementation.
- Recharge water table through rain water harvesting.

e. Health and Safety of Workers:

- All occupational health & safety requirements of workforce to be adhered.
- Periodic health's check-up of workers to be provided.
- A physician's service shall be retained to handle emergencies.
- Workers engaged in construction activity to be provided with proper protective equipment.

f. Environmental health & safety consideration at construction campsites & work-sites:

- Camps to be located so that they do not interfere with the existing alignment.
- Camps to be contained by surrounding the site with a bund or earthen mound with controlled drainage outlet.
- Campsites will have adequate provision of shelter, water supply, excreta & solid waste management
- Appropriate control measures to be taken to prevent insect/vector diseases especially malaria by measures such as spraying and/or preventing creation of stagnant pool of water.

g. Preventing impacts on places of cultural importance:

- Safe accesses to the cultural importance places need to be maintained.

1.12.2 Operation Phase

Impacts on physical and ecological environment and road safety due to increased vehicular traffic following completion of the project are the key aspects of operational phase impacts. These are also normally taken care of in the design and construction phase, but should be monitored during construction and operation phase.

a. Prevention of Air Quality Impacts:

- Vegetative cover to be developed as far as possible to reduced air pollution.

b. Prevention of Noise Level Impact:

- Mitigation at the same locations suggested under air quality during operational stage will also contribute in the reduction of noise levels.
- Mitigation of noise at sensitive locations and area having good habitation will also include the posting of signs prohibiting the use of horns.

c. Protection of Land Environment:

- Construction should be such as not to cause damage to the environment and the existing regulation should be enforced strictly.
- Plantation of trees, shrubs and bushes as appropriate to soil characteristic and local climatic conditions.

1.13 Environmental Management Plan

The Environmental Management Plan (EMP) is required for formulation, implementation and monitoring of environmental protective measures during and after commissioning of the projects. The Environmental Management Plan is proposed for the following two stages.

1.13.1 Construction Phase

Environmental Management Plan during construction stage is comprised the followings:

- To confirm whether all the recommended mitigate measures in environmental impact assessment have been incorporated in the detail design and engineering stages as well as construction stage.
- Adopting air, water, noise and soil pollution control measures in construction activities and construction camps.
- The construction zone in the river to be identified with flags or markers to prevent accidents/collision with moving vessels.
- The construction camp needs to be provided with adequate water supply, fuel, shelter and sanitation facilities to minimize / avoid dependence and degrading local resources.
- Primary health care facilities including a first aid unit have to be provided for the construction workers.
- Waste such as spoil or debris from the sites to be removed and the affected areas to be restored to its original site.
- Efforts to be made to prevent accidental spillage of oil and grease from construction equipment.
- All the borrow pits and quarries should be rehabilitate.
- Scarified bituminous waste generated from existing carriageway should be properly disposed at pre-identified land fill sites.
- Compliance all the conditions imposed by Ministry of Environment and Forest and other concerned authorities while issuing the permits.

1.13.2 Operation Stage

- Monitoring implementation of pollution control / mitigate measures for air, water, noise, soil quality during operation stage.
- Equipment generating noise at low level to be used whenever feasible.

1.14 Environmental Monitoring Programme

Environmental Monitoring Programme is proposed to be carried out regularly to assess the quality of various environmental attributes to detect pollution. The monitoring parameters will include air, water, noise and soil. The monitoring to be carried out to record seasonal variations. The periodic monitoring programme will ensure checking whether the concentration of pollutants at the project site within the permissible limits prescribed by CPCB and in compliance with regulatory requirements. In addition, monitoring would enable early detection of rise in levels of critical pollutants and facilitate timely corrective actions to control pollution.

1.15 Additional Studies:

- Studies directed by MOEFCC during TOR hearing are carried out.
- Issues raised during public hearing and the response of the project proponent shall be prepared in tabular form.
- Road design standards and safety equipment specifications are examined and training shall be provided to ensure that design details take safety concerns into account.
- Traffic management plan is prepared.
- Laws, regulations and enforcement related to speed, alcohol and vehicle safety is reviewed.
- Institutional framework for monitoring of road safety is prepared.
- Post-accident emergency assistance and medical care to accident victims is provided.

1.16 Proposed table of content for EIA report:

- Chapter 1 - Introduction
- Chapter 2 - Project Description
- Chapter 3 - Baseline Environmental Status
- Chapter 4 - Anticipated Impacts & Mitigation Measures
- Chapter 5 - Alternative Analysis (w.r.t. Site & Technology)
- Chapter 6 - Additional Studies (Risk Assessment & Public Hearing Issues)
- Chapter 7 - Project Benefits
- Chapter 8 - Environment Management Plan
- Chapter 9 - Environmental Monitoring Programme
- Chapter 10 - Disclosure of Consultants Engaged

1.17 Identification of Implementing Authority

A separate environment management cell comprising of a team of experienced and qualified personnel / Engineer reporting to a very senior level executive preferably an environmental engineer is proposed. Engineer will be assisted by well-trained staffs comprising of environmental and safety specialists. Staff will be trained for environment control measures like air, water quality monitoring, solid waste management, noise abatement etc.

The designated official will coordinate with other institutions/organizations like Forest Department, State Pollution Control Board, State Public Health Department, State Revenue Department, etc as and when required. Monitoring of air, noise, water and soil quality may be carried out by the designated authority of PIU through an authorized agency.

1.18 Conclusion

From the detailed analysis of the environmental impacts and the proposed preventive measures, it can be concluded that no significant deterioration in the eco-system is likely to occur due to mitigations suggested, during construction and operation phases of the project. On the other hand, the project is likely to have several benefits like improvement in employment generation and economic growth of the area by way of improved infrastructure and better socio-economic condition. Hence, the implementation of the project will lead to overall sustainable development in the area. A better and fast connectivity will increase business opportunities, which will reflect by changes in the pattern of economic activities, income generation, price

evolution and employment status. There will also be a greater accessibility to market-, health- and educational - facilities.