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# EXECUTIVE SUMMARY OF EIA/EMP ASSESSMENT REPORT

For Obtaining MoEF and CRZ Clearance for Proposed Multi Modal Corridor from Navghar to Chirner (near JNPT)

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## CHAPTER - 0: EXECUTIVE SUMMARY

### 0.1 PROJECT BACKGROUND AND DESCRIPTION

The purpose of this chapter is to introduce the scope and objective of the project works in general and EIA and EMP in particular within which the detailed Environmental Assessment studies of Multi Modal corridors have been carried out. This chapter also discusses the nature, size, location of the project along with brief structure of the EIA reports.

Multi Modal corridor has been planned to cater need of growing population along fringe areas. Other objective of the project is to provide connectivity to industrial and commercial establishment in SEZ area to residential areas of satellite towns of Mumbai Metropolitan region with diverse mode of transport. The proposed MMC alignment is take off from km 490.075 of NH-8 near Navgarh and ends it open agriculture land near Chirner village (near JNPT). The Project alignment is traversing through Palghar, Thane and Raigad District in the State of Maharashtra. The Total Length of the Project Mumbai Multi Modal Corridor is approx. 80 Km

#### Project Description

A Multi Modal Corridor is a single corridor in which multiple modes, such as buses, BRT, metro rail and cars, along with utilities such as water, sewage and gas lines are present in the same Right of Way. The Right of way (ROW) of Proposed Multi Modal Corridor is 99 meters.

The MMC was envisaged to provide connectivity to existing and future growth centers in the MMR. The MMC will help the growth of 7 Growth centers viz. Virar, Bhiwandi, Kalyan, Dombivali, Panvel, Uran and Talaja MIDC in the MMR Region. It would provide faster connectivity between the Urban Local Bodies (ULBs) located outside Greater Mumbai and improve accessibility to inter-city freight traffic.

The MMC will connect the major roads such as NH-8, Bhiwandi bypass, NH-3, NH-4, NH-4B, Mumbai Pune Expressway, NH-17 etc. The Corridor will provide faster connectivity to JNPT, Proposed Navi Mumbai Airport, MTHL Project and Dedicated Freight Corridor (DFC).

The Project area traverses through the plain and rolling terrain and passes through Palghar, Thane and Raigad district of Maharashtra. The Corridor is running parallel to Bassien Creek up to Ulhas River (near Kalher).

The Project alignment is traversing through Palghar, Thane and Raigad Districts in the State of Maharashtra. The total length of the Project Mumbai Multi Modal Corridor is approx. 80 Km. The entire length of the project alignment is divided into 6 sections are as follows:

The Section 1-2 of the MMC alignment (approx. 13 Km) starts from the junction of NH8 (Navghar) and the Diva Vasai Rail line and runs parallel to Diva Vasai Rail Line / Kaman village and ends near Kharbav Railway Station/Dunge Village.

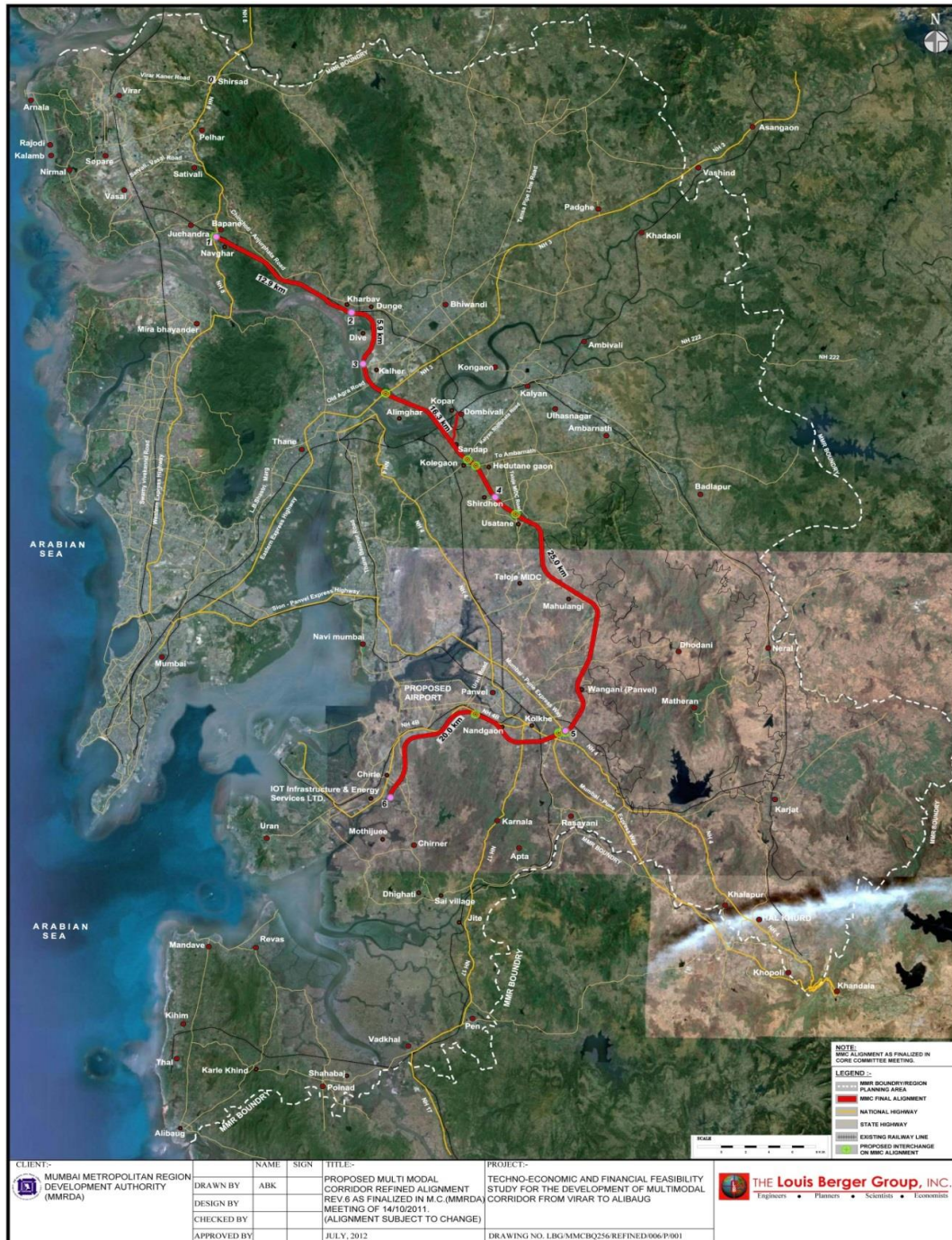
The Section 2-3 of the MMC alignment (approx. 5 Km) starts near Kharbav Railway Station/Dunge Village and ends near Kalher Reti Bunder passing through Dive Village Gavthan.

The Section 3-4 of the MMC alignment (approx. 16 Km) starts near Kalher Reti Bunder and ends at Shidhon Village near Hedutane Gaon passing through Alimghar Village, Ulhas River, west of Sandap Gaon and Kolegaon.



The Section 4-5 of the MMC alignment (approx. 25 Km) starts at Shidhon Village near Hedutane Gaon and ends near Kolkhe Village (near Panvel /Mumbai Pune Express Highway) passing through Utasane Village, Mahulangi Village and Wangani Village.

The Section 5-6 of the MMC alignment (approx. 20Km) runs from Kolkhe Village (near Panvel / Mumbai Pune Express Highway) and ends at Chirner near JNPT running parallel to NH 4 B passing through Nandgaon and Chirle Goan.



## 0.2 ENVIRONMENTAL ASSESSMENT OF THE PROJECT

The detailed design of the project has been closely coordinated with the preparation of this Environmental Impact Assessment Report and the Environmental Management Plans. The EA

preparation led to identification of potential negative environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements). Based on these findings Environmental Management Plans (EMPs) have been prepared for the implementation for each construction package. The EMPs detail the potential negative impacts and list specific mitigation measures that are required to be included and will form the part of the Contract documents between the Contractor and the Client.

### Baseline Environmental Status

Baseline data has been collected including meteorological data, water quality, air quality, soil quality, noise levels, flora, fauna, land used and socio-economic status for the Project influence area during the project preparation stage, which is summarized in **Table 11.1**.

**Table 11.1: Baseline Environmental Scenario in the Project Area**

Environmental Parameters	Multi Model Corridor (Navghar –Chirner)
Terrain	Flat and rolling terrain
Geology	Deccan trap, Basaltic
Soil Type	Alluvium and lateritic and sandy loam
Surface water bodies crossing/ along the MMC: River/Stream/ Pond or discarded area filled with water	5 River/16 streams or creek distributaries/13 Pond or discarded area filled with water,
Ground Water Bodies along the Project Road: HP/TW/Well	1 well / bore well.
Surface and ground Water Quality	Within permissible limit except BOD and Total Coli form which is slightly high
Air Quality	Within permissible limit except PM-10
Noise Level	Within permissible limit
Forest Along the Project Road	Only Road linear plantation declare as PF exist along the Project Road.
Trees in non forest areas like agricultural land/private land	Tree counting is under process
Eco-sensitive area with 10 km	Sanjay Gandhi National Park (SGNP)-crossing, Tungreshwar Wildlife Sanctuary, Thane-153m away, Karnala Bird Sanctuary (KBS)-5813m away and Matheran Eco-sensitive zone-105m away from the project alignment
Revenue village/ settlement area where land acquisition proposed )	42 Nos.
Religious Properties along the Project Corridor (Nos)	7 Nos.
Archaeological Properties along the Project Corridor	Nil
Educational Institutes Along the Project Corridor( Nos)	3
Critically Polluted Industrial Area along the corridor	2 critically Industrial polluted area Dombivili and Navi Mumbai located within the 10 km radius of the project.
Land Use Along the road	Agriculture, Built up Area, residential and river, creeks, road, railways, mangroves and CRZ areas
Diversion of land for proposed MMC	14.8ha National Park land, 69.2743ha Mangroves area,

Environmental Parameters	Multi Model Corridor (Navghar –Chirner)
	Non Forest= 725 hectares

### 0.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Key Environmental Issues along the Project Road:

- Surface Water Pollution
- Impact on Religious Properties
- Felling of trees along the project road as well as in agriculture areas
- Diversion of Forest land declare
- Diversion of Mangroves land
- Diversion of forest land
- Loss of agriculture land
- Road Safety

The assessment of impacts on various environmental components from the project roads is summarized in **Table 11.2:**

**Table 11.2: Environmental Impact Summary**

Sl. No.	Parameter	Details
	<b>Negative Impacts</b>	
1	Wells (Nos.)	1 Well
2	Diversion of Agricultural land (ha.)	725 hectares
3	Diversion of Forest Land	Under progress
4	Diversion of CRZ-I area (ha.)	69.2743ha
	CRZ IA (RF)	12.5297ha
	Other CRZ(III & IVB)	122.1294ha
5	Borrow Earth (Cum)	Required in large amount
6	Quarry Material (Cum)	Required in large amount
7	Water (KI)	Required in large amount during construction
9	Nos of trees to be felled (Nos) in non forest + forest	Tree counting under process
10	Surface water body	5 River/18 streams or creek distributaries/12 Pond or discarded area filled with water,
11	Cultural/Religious Properties	3 nos.
	<b>Positive Impacts</b>	
1	Enhancement sites	Through compensatory afforestation in degraded forest area/ revenue area and

Sl. No.	Parameter	Details
		avenue plantation along the corridor
2	Median Plantation	Provided (1500 plants / km ) i.e 450000 Shrubs
3	Connectivity and road safety	Improved
4	Safe Access to Educational Institute	Improved
5	Enhancement of Service road	Improved
6	Junctions/Interchange	All junction/ Interchange will be improve through provision of under passes
7	Sitting Arrangement	improved
	<b>Road safety Measures</b>	
1	Interchange	At 10 location interchange
2	Street lighting (locations)	Provided\ Improved all along the major bridges and flyovers /elevated sections
3	Signage	Improved all along the project road
4	Intersection Signs	Provided
5	Sign on Side roads	provided
6	School Signs	provided
7	Place identification Sign	Provided
8	Traffic calming measures (locations)	provided
9	Drainage	provided
10	Crash Barriers / Guardrails	Provided where as it required
11	Silence Zone Signs	Provided
12	Industrial establishment Signs	Provided

Mitigation measures are provided in the **Table 11.4**.

#### 0.4 ANALYSIS OF ALTERNATIVES

Analysis for alternatives was carried out for different parameters as given below:

**Table 11.3: “With” and “Without” Project Scenarios.**

Sl. No.	Scenario type	Long-Term Scenario “With” Project	Long-Term Scenario “Without” Project
	<b>Environment</b>		
<b>A.</b>	<b>Physical Environment</b>		
i)	Atmosphere and Climate	Travel time and traffic congestion will reduce as a result of 4-laning of the project road. Overall, a lower or similar level of air pollution. No change in climatic condition	Congested road will consume more travel time and will increase air pollution. No change in climatic condition
ii)	Topography and Soils	No major change in topography and soils, however, better road will reduce soil erosion and dust.	Further deterioration in present conditions
iii)	Geology and Seismology	No Impact	No change and possibly some deterioration in problems due



Sl. No.	Scenario type	Long-Term Scenario "With" Project	Long-Term Scenario "Without" Project
			to naturally weak geological conditions.
iv)	Water Bodies and Drainage	Improved drainage due to improvement in drainage structures and facilities but care should be taken during construction	No changes in present problems associated with inadequate drainage.
<b>B.</b>	<b>Ecological Environment</b>		
	Flora	Tree enumeration is under process, and through compensatory afforestation @ 1:3 will again improve the greenery of the area. Additional plantation along the project road will enhance the esthetic beauty of the area	No change in vegetation and number of trees.
	Fauna	Increase disturbance and chances of illegal hunting during construction period which will be minimized by the patrolling of forest department during construction. After MMC along with road side fencing/netting situation will improve positively.	Continued, and possibly increased disturbance to the fauna. Increased disturbance and chances of illegal hunting due to overall traffic growth on existing road
<b>C.</b>	<b>Social and Cultural Environment</b>		
	Social and Cultural Environment	Increased comfort and safety while traveling. Improved business environment for those living along the project road-increased passing trade from generated traffic and reduced transportation costs for imports and exports of the area.	Traveling may increase time, thereby transportation costs will increase. Reductions in comfort and safety due to congestion and deterioration in highway condition. Business opportunities remain largely the same as before.
<b>D.</b>	<b>Institutional Requirements</b>		
	Training of PIU	Training will need to be provided to relevant PIU officials to improve their environmental monitoring capacity during and after project construction. More staff will need to be recruited at the PIU office to enable smooth flow of all paperwork with regard to implementation of environmental policies and regulations.	No institutional strengthening is required.
<b>E.</b>	<b>Economic Situation</b>		
	Financial Implications	Higher capital costs for using Environmental Friendly techniques for preparation of project. Costs will also be incurred for training of PIU officials. Lower vehicle operating costs associated with smoother riding surfaces and shorter travel times.	No capital costs. However, increasing road maintenance and vehicle operating costs as road deteriorates and as travel times increase.
<b>F</b>	<b>Overall</b>		
		Long term improved social and environmental conditions but an increase in expenses for project activities during the course of project construction and it will slightly effect the forest area during construction period	Small deteriorations in environmental conditions, no increase in economic opportunities and increased expenses associated with maintenance.

The project should lead to an overall improvement in environmental and social conditions through the landscaping. It is, nevertheless important to use environmentally friendly road construction techniques.

## **0.5 ENVIRONMENTAL MONITORING PROGRAMME**

To ensure the effective implementation of the EMP, it is essential that an effective monitoring program be designed and carried out. The environmental monitoring programme provides such information based on which management decision may be taken during construction and operational phases. It provides basis for evaluating the efficiency of mitigation and enhancement measures and suggest further actions that need to be taken to achieve the desired effect.

The monitoring includes:

- Visual observations;
- Selection of environmental parameters at specific locations;

To know the effective implementation of the EMP, air, water and noise levels will be monitored during construction and operation phase of the project, details are described in **chapter 6**.

## **0.6 ADDITIONAL STUDIES**

### **PUBLIC CONSULTATIONS**

Discussions were held with most of the stakeholders with different type of consultations such as formal, informal and group discussions. The following issued have been discussed during public consultation which will be suitability incorporated in EMP

- Parking facilities
- Dust suppression measures should be adopted
- Sign boards for road safety
- Provision of service road
- Employment opportunity to local people during 4-laning of project road
- Junction improvement
- Drainage management
- Suitable compensation
- Plantation of trees along the project road
- Plantation of plant in median
- Air, and Noise management during construction

### **CONTINUED PARTICIPATION MECHANISM**

Two stages consultation was carried out in Project Corridor. In first stage consultation Information about the project was disseminated to the local people and their views/Grievances/ Suggestions were solicited. These suggestions were incorporated into the design to the extent

possible and Second round of consultation was carried out with a objective to inform the people about the design, suggestions which could be addressed and reasons for non incorporation of their suggestion thereof and communities were shown enhancement drawings and briefed about the enhancement measures and this process will continue through out the construction period.

## **0.7 PROJECT BENEFITS**

- Positive and negative aspects of the project have been discussed detailed in following paragraph. Key long-term environmental and social benefits from the project will arise mainly from traditional sources
- savings in travel times, reduce the emission of dust;
- reduced cargo delays – from faster vehicle speeds and reductions in travel time;
- reduced vehicle operating costs – from improved riding surfaces;
- reduced road maintenance costs – from higher quality infrastructure;
- reduced accidents – mainly as a result of reduced travel time and congestion but also because of the provision of safety infrastructure and warning signs, though this latter element was impossible to quantify – it was, however, estimated that the benefits from a 50% reduction in accidents; and
- A large volume of generated traffic is, however, also forecast. This is traffic stimulated by the reduction in travel costs and associated with new economic development. The benefits calculated subsume the benefits from:
  - improved access to the Navaghar to Chirner (JNPT)
  - new businesses, including that from increased passing trade

The key negative, permanent and irreversible impacts will occur along the realignment and will be:

- loss of hectares of forest land;
- loss of mangroves area
- loss of trees in forest and non-forest area
- loss of agriculture land
- a marginal reduction in aesthetic beauty

All the trees felled due to this project will be compensated to reduce the negative impact of the area

## **0.8 MITIGATION AND ENHANCEMENT MEASURES**

As far as possible avoidance and reduction of adverse impacts approaches were adopted during the design stage with consideration of the views of local communities and the design team including engineers, environmental and social experts. This is reflected in the finalization of the cross sections, construction methods, construction materials and alignment.

Compensatory and additional plantation along with landscaping will be carried to improve the esthetic value of the areas in future. All identified impact will be either suitably mitigated or

compensated, so that development will become eco-Friendly. A summary of mitigation measures proposed to mitigate the adverse impacts are presented in **Table 11.4:**

**Table 11.4: Key Environmental Impacts and Management/ Mitigation Measures**

Area	Impacts	Management/Mitigation Measures
<b>Construction Phase</b>		
Topography & geology	<ul style="list-style-type: none"> <li>Disfiguration &amp; change in existing profile of the land due to borrow pits &amp; construction of new bypass.</li> <li>Disturbance on geological setting due to quarrying.</li> <li>Uncontrolled digging of borrow pits resulting in water accumulation &amp; breeding of vector disease.</li> </ul>	<ul style="list-style-type: none"> <li>Borrow pits will be restricted to 1 m depth followed by resurfacing of pits.</li> <li>Road building materials will be procured from approved and licensed quarries only.</li> <li>Suitable seismic design of the bridge structures will be adopted to mitigate the earthquake impacts.</li> </ul>
Soil	<ul style="list-style-type: none"> <li>Disruption &amp; loss of productive top soil from agricultural fields due to borrow pits which may reduce crop yield.</li> <li>Loosening of top soil &amp; loss of vegetative cover along the road due to excavation &amp; back filling which will lead to enhanced soil erosion.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate measures like adequate drainage, embankment consolidation &amp; slope stabilization will be taken along the road to avoid soil erosion.</li> <li>Top soils (15 cm) of borrow pit sites will be conserved and restored after excavation is over.</li> <li>Accidental spillage of lubricants/oil and molten asphalt will be avoided by adherence to good practices.</li> </ul>
Land use	<ul style="list-style-type: none"> <li>Loss of agricultural land resources due to land acquisition for the road.</li> <li>Generation of solid waste in the form of construction spoils from construction sites.</li> <li>Changes in existing land use pattern of the ROW for construction of the road.</li> <li>Loss of trees and diversion of forest land</li> <li>Generation of bituminous waste due to scarifying of damaged pavement</li> </ul>	<ul style="list-style-type: none"> <li>Earth material generated from excavation of roadways &amp; drainage will be reused during site development.</li> <li>Construction debris will be disposed of in suitable pre-identified dumping areas.</li> <li>Dumping areas will be biologically reclaimed.</li> <li>Construction camp will be provided to avoid indiscriminate settlement of construction workers.</li> <li>Compensatory and additional plantation will be carried out along the road</li> <li>Staging of the debris on / along the road will not be allowed. Regular inspection of construction site will be carried out to ensure for this.</li> <li>Scarified bitumen will be recycled for use below Sub grade under pavement or below GSB under shoulder.</li> </ul>
Drainage	<ul style="list-style-type: none"> <li>Change in drainage pattern of the land.</li> <li>Increased incidence and duration of floods due to obstruction of natural drainage courses by the road embankment.</li> <li>Chances of filling of existing drainage courses during earth filling.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate lined and covered drains are provided for the project to facilitate its long life, and to avoid soil erosion &amp; land degradation.</li> <li>Adequate cross drainage works &amp; structures will be provided for smooth passage of runoff to avoid flooding.</li> <li>Steps at the bridge sites will be provided to inspect, regular cleaning and inspection of these sites.</li> <li>Filling of existing drainage courses will be strictly avoided.</li> <li>Suitable drainage at construction site &amp; camp will be provided to avoid water stagnation, soil erosion &amp; mosquito breeding.</li> </ul>



Area	Impacts	Management/Mitigation Measures
Water bodies	<ul style="list-style-type: none"> <li>Loss of water resources due to complete or partial filling up of few ponds/water bodies along the road.</li> </ul>	<ul style="list-style-type: none"> <li>Filling of water bodies along the road alignment will be minimized by providing retaining walls.</li> </ul>
Water use	<ul style="list-style-type: none"> <li>Impact on the local water sources due to use of construction water.</li> </ul>	<ul style="list-style-type: none"> <li>Minimum use of existing water sources for construction will be ensured to minimize likely impacts on other users.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>Increase of sediment load in the run off from construction sites and increase in turbidity in receiving streams/water bodies.</li> <li>Water pollution due to sewage from construction camps.</li> </ul>	<ul style="list-style-type: none"> <li>Sediment traps will be provided to reduce sediment load in construction wastewater.</li> <li>Proper sanitation facilities will be provided in construction camp to prevent health related problems.</li> <li>All the construction activities will be carried out during dry seasons only.</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>Deterioration of air quality due to fugitive dusts emission from construction activities like excavation, backfilling &amp; concreting, and hauling &amp; dumping of earth materials &amp; construction spoils, and vehicular movement along unpaved roads.</li> <li>Deterioration of air quality due to gaseous emissions from construction equipment &amp; vehicular traffic.</li> <li>Deterioration of air quality due to emission from asphalt and hot mix plants.</li> </ul>	<ul style="list-style-type: none"> <li>Construction materials will be stored in enclosed spaces to prevent fugitive emissions.</li> <li>Truck carrying soil, sand and stone will be duly covered to avoid spilling.</li> <li>Adequate dust suppression measures such as regular water sprinkling on haul &amp; unpaved roads particularly near habitation will be undertaken to control fugitive dust.</li> <li>Stringent construction material handling/overhauling procedures will be followed.</li> <li>Low emission construction equipment &amp; vehicles will be used.</li> <li>It will be ensured that all construction equipment &amp; vehicles are in good working condition, properly tuned &amp; maintained to keep emissions within permissible limits.</li> <li>Asphalt and hot mix plants will be located at least 500 m away from inhabited areas and 300 m from the road.</li> </ul>
Noise level	<ul style="list-style-type: none"> <li>Increase in noise level due to construction activities like operation of construction equipment &amp; vehicular traffic.</li> </ul>	<ul style="list-style-type: none"> <li>Construction camp and temporary labour sheds will be located away from the immediate vicinity of the construction sites and major road traffic.</li> <li>Protective gears such as ear plugs etc. will be provided to construction personnel exposed to high noise levels as preventive measure.</li> <li>Low noise construction equipment will be used.</li> <li>It will be ensured that all construction equipment &amp; vehicles are in good working condition, properly lubricated &amp; maintained to keep noise within permissible limits.</li> <li>Stationary construction equipment will be placed sufficiently away from inhabited areas and silence zones.</li> <li>Construction activities carried out near residential area will be scheduled to the day time only so that minimum disturbances are caused to people.</li> </ul>
Floral & fauna	<ul style="list-style-type: none"> <li>Loss of flora &amp; loss of habitat of avian fauna due to felling of trees along the ROW.</li> <li>Short term disturbance to avian fauna.</li> </ul>	<ul style="list-style-type: none"> <li>No tree shall be felled beyond the toe line of proposed cross section.</li> <li>Two times of area of diverted forest land will be afforested as per direction of forest department. PIU will deposit the required amount for afforested as forest department will specify for compensatory plantation. In addition to this Net</li> </ul>

Area	Impacts	Management/Mitigation Measures
		<p>Present Value (NPV) for the diverted forest land will be paid to forest department</p> <ul style="list-style-type: none"> <li>• Median hedge will be developed to enhance the aesthetic look &amp; reduce headlight glare on the four lane roads.</li> <li>• Cooking fuel should be provided to construction workers to avoid cutting/felling of trees for fuel wood.</li> </ul>
Amenities & cultural properties	<ul style="list-style-type: none"> <li>• Partial or total effect on roadside educational, medical &amp; other amenities, and religious &amp; cultural properties like temples &amp; mosques due to additional land acquisition.</li> </ul>	<ul style="list-style-type: none"> <li>• Affected tube wells, temples &amp; mosques will be suitably relocated.</li> <li>• Compensation will be given for other affected amenities like schools, colleges, hospitals, banks, post-offices &amp; markets.</li> </ul>
Rehabilitation & resettlement	<ul style="list-style-type: none"> <li>• Acquisition of agricultural land which is the source of sustenance of those families.</li> <li>• Demolition of houses &amp; other structures within ROW resulting in displacement of people.</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate &amp; equitable compensation, rehabilitation &amp; resettlement measures for PAPs are provided in RAP prepared for the project.</li> </ul>
Construction camp	<ul style="list-style-type: none"> <li>• Influx of construction work-force &amp; supplier who are likely to construct temporary tents in the vicinity.</li> <li>• Likely sanitation &amp; health hazards &amp; other impacts on the surrounding environment due to inflow of construction laborers.</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary construction camps with adequate potable water supply, sanitation &amp; primary health facilities and fuel for cooking will be provided to accommodate construction workers.</li> <li>• It will be ensured that the construction workers are provided fuel for cooking to avoid cutting of trees from the adjoining areas.</li> <li>• Domestic as well as the sanitary wastes from construction camps will be cleared regularly and disposed as per local practice stipulated by local administration (Municipalities, Panchayats etc.).</li> </ul>
Occupational health & safety	<ul style="list-style-type: none"> <li>• Health &amp; safety related problems to construction workers due to inadequate health &amp; safety measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate safety measures complying to the occupational safety manuals will be adopted to prevent accidents/hazards to the construction workers</li> <li>• Periodic health check-up of construction workers will be done.</li> </ul>
Road safety	<ul style="list-style-type: none"> <li>• Increase in incidence of road accidents due to disruptions caused in existing traffic movements.</li> </ul>	<ul style="list-style-type: none"> <li>• Proper traffic diversion and management will be ensured during construction at the interactions and construction areas.</li> <li>• Traffic calming measures Provided.</li> </ul>
<b>Operation Phase</b>		
Land use & Encroachment	<ul style="list-style-type: none"> <li>• Change of land use by squatter/ encroachment within ROW and induced development outside the ROW.</li> </ul>	<ul style="list-style-type: none"> <li>• Planning agencies and Collector/ Revenue Officer will be made involved for controlled development and prohibiting squatter/ encroachment within ROW.</li> </ul>
Drainage	<ul style="list-style-type: none"> <li>• Filthy environment due to improper maintenance of drainage.</li> </ul>	<ul style="list-style-type: none"> <li>• Drainage system will be properly maintained.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>• Chances of contamination of water bodies from road surface run off containing oil spills due to traffic movement &amp; accidents.</li> </ul>	<ul style="list-style-type: none"> <li>• Oil interceptor will be provided at construction yard.</li> <li>• Contingent actions will be taken for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents.</li> </ul>

Area	Impacts	Management/Mitigation Measures
Air quality	<ul style="list-style-type: none"> <li>Air pollution due to vehicular emission from road traffic.</li> </ul>	<ul style="list-style-type: none"> <li>Vehicular emission will be controlled through enforcement of laws and public awareness.</li> <li>Truck parking lay-byes and bus bays will be provided at required locations to facilitate smooth traffic flow.</li> <li>Regular monitoring of air quality at specified locations will be conducted.</li> </ul>
Noise level	<ul style="list-style-type: none"> <li>Noise pollution due to traffic noise.</li> </ul>	<ul style="list-style-type: none"> <li>Vehicular noise &amp; use of horns will be controlled through enforcement of laws and public awareness.</li> <li>Road signs prohibiting the use of horns will be placed at residential areas, sensitive locations &amp; silence zones.</li> <li>Regular monitoring of noise level at specified locations will be conducted by PIU.</li> </ul>
Flora & fauna	<ul style="list-style-type: none"> <li>Illegal felling of road side plantation.</li> <li>Effect on aquatic fauna in case of accidental spill of oil, fuel &amp; toxic chemicals into water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>Plantation along the ROW will be maintained properly and protected from illegal felling.</li> <li>Contingent actions will be taken in the event accidental spill of oil, fuel &amp; toxic chemicals.</li> </ul>
Access	<ul style="list-style-type: none"> <li>Significant severance problem on pedestrian &amp; cattle crossing and cross traffic due to widening, partially access control &amp; increase in traffic speed.</li> </ul>	<ul style="list-style-type: none"> <li>Intersection &amp; approach of existing major cross roads will be upgraded.</li> <li>Cattle/animal crossings to facilitate smooth traffic &amp; pedestrian movement to avoid accidents.</li> <li>Access of primary schools will be modified in S shaped to slow down the speed of the primary school children, when they come out. It will avoid chances for accidents of school children.</li> <li>Bus bays will be provided at suggested suitable locations.</li> </ul>
Road safety	<ul style="list-style-type: none"> <li>Impacts on human health due to accidents.</li> <li>Damage of road due to wear &amp; tear.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate traffic safety measures e.g. crash barriers &amp; pedestrian railings will be provided wherever required.</li> <li>Proper &amp; adequate road signs, road markings, kerb paintings and road furniture like overhead gantry signs, roadway delineators etc. will be provided.</li> <li>Adequate illumination will be provided at interchange locations for safe and efficient traffic operations especially during night and inclement weather.</li> <li>Periodical inspection of the road will be conducted to detect anomalies in pavement.</li> <li>Emergency telephone communication system, highway patrolling, crane and ambulance facilities will be provided.</li> </ul>

**Environmental Enhancement Measure**

To improve the aesthetic beauty of the corridor enhancement measures are provided for the project like plantation of trees along the project road, plantation of bushes and flowers in median, provision of dust sprinkling during consecution etc.

**Environmental Budget**

An Estimate of the cost component involved in mitigation of impacts, enhancements (through landscaping or specific enhancement measures for cultural properties and typical enhancements such as ponds) monitoring and evaluation of various components in pre-construction, construction and operation period has been estimated. The summary of Environment Budget is as follows in **Table 11.5**.

**Table 11.5: Summary of Environment Budget\***

Items	Cost (Rs.)
Mitigation	86180000.00
Monitoring	4260000.00
Training and other	300000.00
Environmental Expert Salary	9000000.00
Total	99740000.00
Contingency	4987000.00
<b>Total</b>	<b>104727000.00</b>

- *Cost of compensatory afforestation, cost of NPV, and wildlife management are to be estimated by the forest department and Wildlife department*

**0.9 INSTITUTIONAL ARRANGEMENTS**

The Mumbai Metropolitan Regional Development Authority (MMRDA), a nodal agency for development of infrastructure projects in the in the Mumbai Area. On behalf of Government of Maharashtra, MMRRDA is entrusted to develop MMC from Navghar to Chirner. The project will be either by EPC or Public Private Partnership (PPP) venture pattern.

The Chief Engineer, MMRDA will responsible for the successful implementation of the Project. Executive Engineers and his supporting staff as Employers representatives nominated for the project are responsible for the implementation of the Projects under his division.

**0.10 CONCLUSIONS**

The key improvements anticipated are:

- savings in travel time – from faster vehicle speeds and reductions in travel time;
- reduced cargo delays – also from faster vehicle speeds and reductions in travel time;
- reduced vehicle operating costs and passenger comfort– from improved riding surfaces;
- reduced maintenance costs – from higher quality infrastructure;
- reduced accidents – mainly as a result of reduced travel time and use of signage

- A large volume of generated traffic is forecasted. This will be traffic stimulated by the reduction in travel costs and associated with new economic development and deriving, amongst other things, from:
- New businesses, including those from increased passing trade.

In addition to the above, there should be:

- an overall reduction in problems from exhaust emission improved drainage; and

A wide range of short-term negative impacts are, however, envisaged during construction - these include: disturbance to wildlife and settlements; localised dust pollution; increased sediments in water bodies; small-scale erosion; and health hazards amongst construction workers and those residing in nearby settlements. However, most of these can be adequately mitigated through: practicing Environmental Friendly Road Construction techniques; proper location of construction camps; and equipping construction sites with adequate medical facilities.

The major long-term negative impact will be the permanent loss of about 14.8ha land of Sanjay Gandhi national Park, and 793 ha non forest land tree located within the proposed ROW of MMC will be removed. This can, however, be mitigated by plantation under compensatory afforestation. There may also be some small-scale temporary impacts on wildlife habitats. However, investigations show that this is not a significant issue for important protected species. Removal of only necessary vegetation during construction, and thereafter the maintenance of forest cover on both sides of the project road, will help minimise long-term negative impacts.