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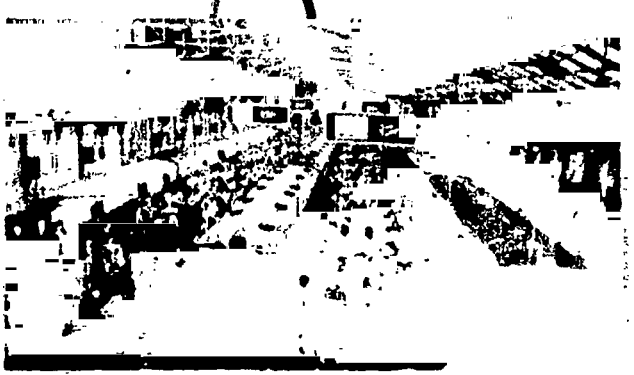
Volume 2

MUMBAI URBAN TRANSPORT PROJECT (MUTP)

CONSOLIDATED ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY



JUNE 2002

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY
BANDRA-KURLA COMPLEX, BANDRA (E)
MUMBAI - 400051

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CONSOLIDATED ENVIRONMENTAL ASSESSMENT

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JUNE 2002

Mumbai Metropolitan Region Development Authority
Bandra-Kurla Complex, Bandra – East
Mumbai 400 051, INDIA

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ABBREVIATIONS

BSES	Baseline Socio Economic Survey
BVQR	Borivali Virar Quadrupling of Railway
CEMP	Community Environment Management Plan
CRZ	Coastal Regulation Zone
CST	Chhartratpati Shivaji Terminal
CTS	Comprehensive Transport Strategy
DCR	Development Control Regulations
EA	Environmental Assessment
EMC	Environmental Management Committee
EMP	Environmental Management Plan
FSI	Floor Space Index
GOM	Government of Maharashtra
HC	Hydrocarbons
HLSC	High Level Steering Committee
IBRD	International Bank of Reconstruction and Development
IDA	International Development Association
IR	Indian Railways
JVLR	Jogeshwari Vikroli Link Road
MCGM	Municipal Corporation of Greater Mumbai
MMR	Mumbai Metropolitan Region
MMRDA	Mumbai Metropolitan Region Development Authority
MoEF	Ministry of Environment and Forest
MoST	Ministry of Surface Transport
MRVC	Mumbai Rail Vikas Corporation
MUTP	Mumbai Urban Transport Project
NSDF	National Slum Dwellers Federation
OD	Operational Directive (of the World Bank)
PAH	Project Affected Household
PCC	Project Coordinating Committee
PIC	Public Information Center
PIL	Pubic Interest Litigation
PM 10	Particulate Matter less than 10 microns
PMC	Project Management Consultant
NOx	Nitrogen Oxides
R & R	Resettlement and Rehabilitation
RAP	Resettlement Action Plan
RIP	Resettlement Implementation Plan
ROB	Road Over (Rail) Bridge
SATIS	Station Area Traffic Improvement Scheme
SCLR	Santacruz Chembur Link Road
SO2	Sulphur Di Oxide
SPARC	Society for Promoting Area Resources Centre
SPM	Suspended Particulate Matter
SRA	Slum Rehabilitation Authority
SRS	Slum Rehabilitation Society
TDR	Transfer of Development Rights
TMU	Traffic Management Unit

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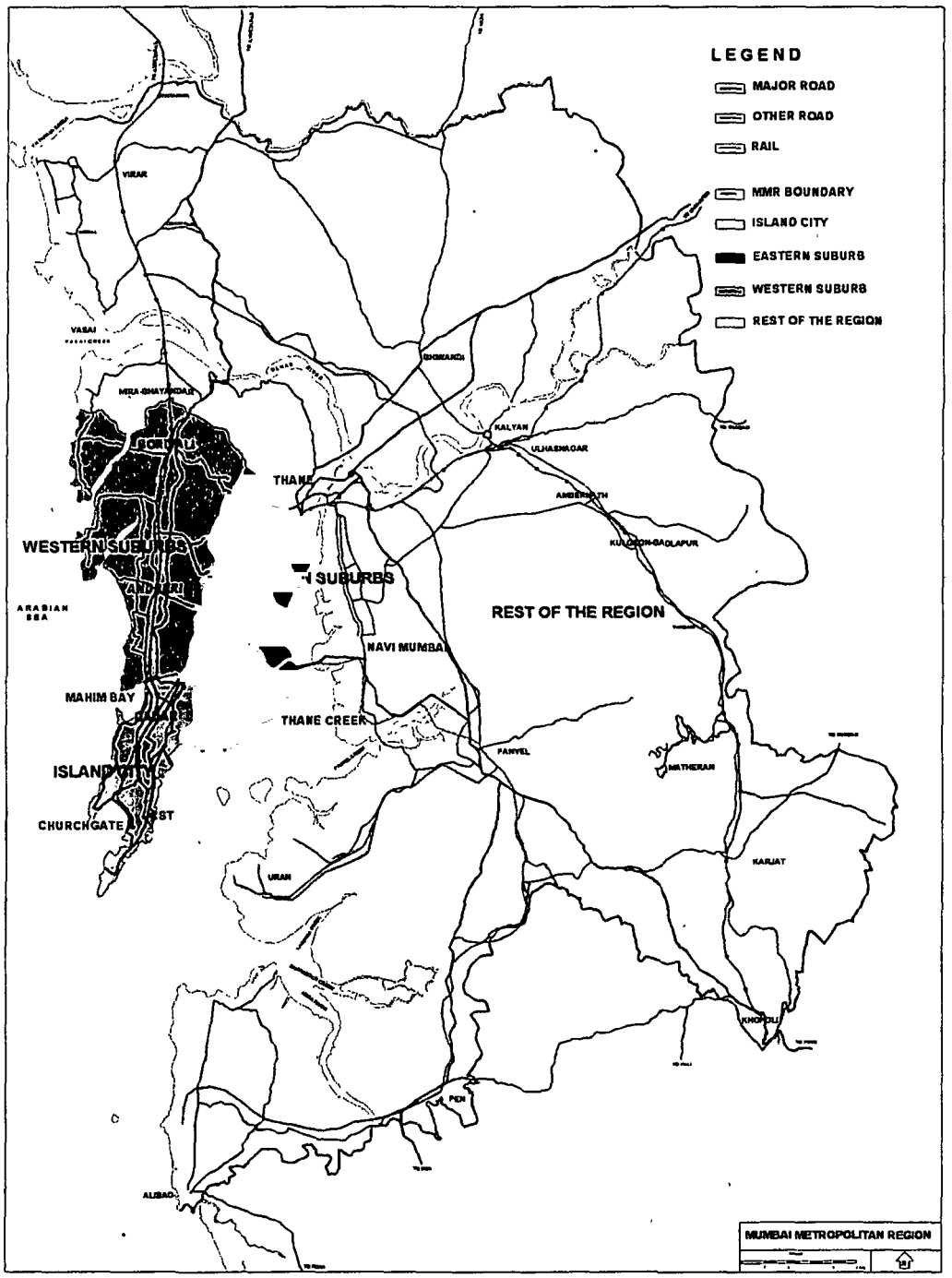
OVERVIEW

1. Mumbai, over the last few decades, has emerged as the financial and commercial capital of India Greater Mumbai's population that was around 4 million in 1961 is now 11.9 million in 2001 The urban growth has spread beyond the boundaries of Municipal Corporation of Greater Mumbai (MCGM) in the northern, north-eastern and eastern directions mainly along the suburban rail corridors to form Mumbai Metropolitan Region (MMR) Greater Mumbai has an area of 438 sq km and a population of 11.9 million and the MMR has an area of 4354 sq km and a population of about 18 million By 2011, MMR is expected to have a population of 22 million MMR generates about 5% of national GDP and contributes to over one third of India's tax revenues. **Map 1** shows various sub-regions of MMR

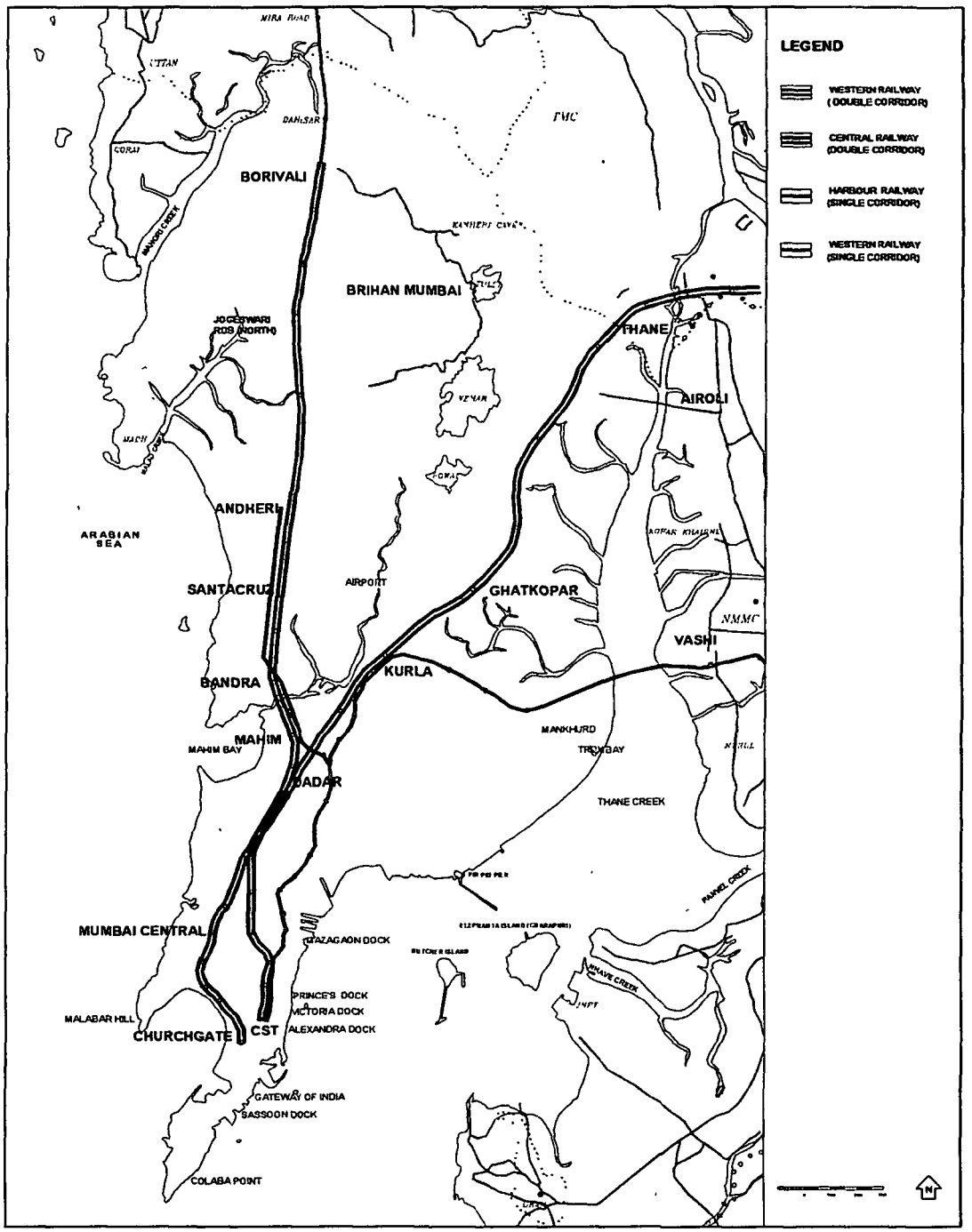
2 Mumbai has a unique distinction of satisfying 88 % of its peak period travel demand through public transport such as suburban trains and buses Of the remaining 12% peak travel demand, taxis and private vehicles meet 7 % and 5 % of the demand respectively Although these proportions are estimated to remain more or less same until 2011 (with public transport sector falling marginally from 88% to 85 %), the number of public transport trips in the peak period will rise substantially given the continued rise in population In terms of public transport, suburban rail services carry close to 6 million passengers per day Bus services are provided by Brihan Mumbai Electric Supply and Transport Undertaking (BEST), with 3000 buses, and cater to 4 5 million journeys per day, of which approximately 60 % are connected, with rail journeys The rail network comprises Western Railway, Central Railway and Harbor Lines. On Western Railway there are two corridors (one corridor comprises a pair of lines) between Churchgate and Borivali and one corridor beyond Borivali up to Virar. On Central Railway there are two corridors between Chhatrapati Shivaji Terminus (CST) and Kalyan and on Harbor Line there is a single corridor from CST to Andheri with a branch to Kurla - Belapur (**Map 2).** The road network in Mumbai is predominantly radial along the peninsula and comprises three main corridors - Western, Eastern, and the Central in the Island City two corridors in the suburbs (**Map 3).** The number of registered vehicles in Greater Mumbai grew from 308,881 in 1981 to 628,488 in 1991and 859,734 in 1998 It was estimated that the number is 1,048,734 in 2001

3 As a result of population growth and increase in private ownership of vehicles, public transport is under severe stress For example, trains that have the rated capacity of 2600 passengers carry over 4500 passengers during peak hours Buses too are overcrowded during peak period. Over-aged buses (500 out of a fleet of 3000) and increasing private vehicle ownership particularly of two and three wheeler vehicles with two stroke engines have given rise to increased traffic congestion and air and noise pollution Until now, solutions to Mumbai's acute transport problems have been hindered by the likely magnitude of displacement and resettlement of slum dwellers by the fragmentation of institutional responsibilities and the inadequacy of financial resources

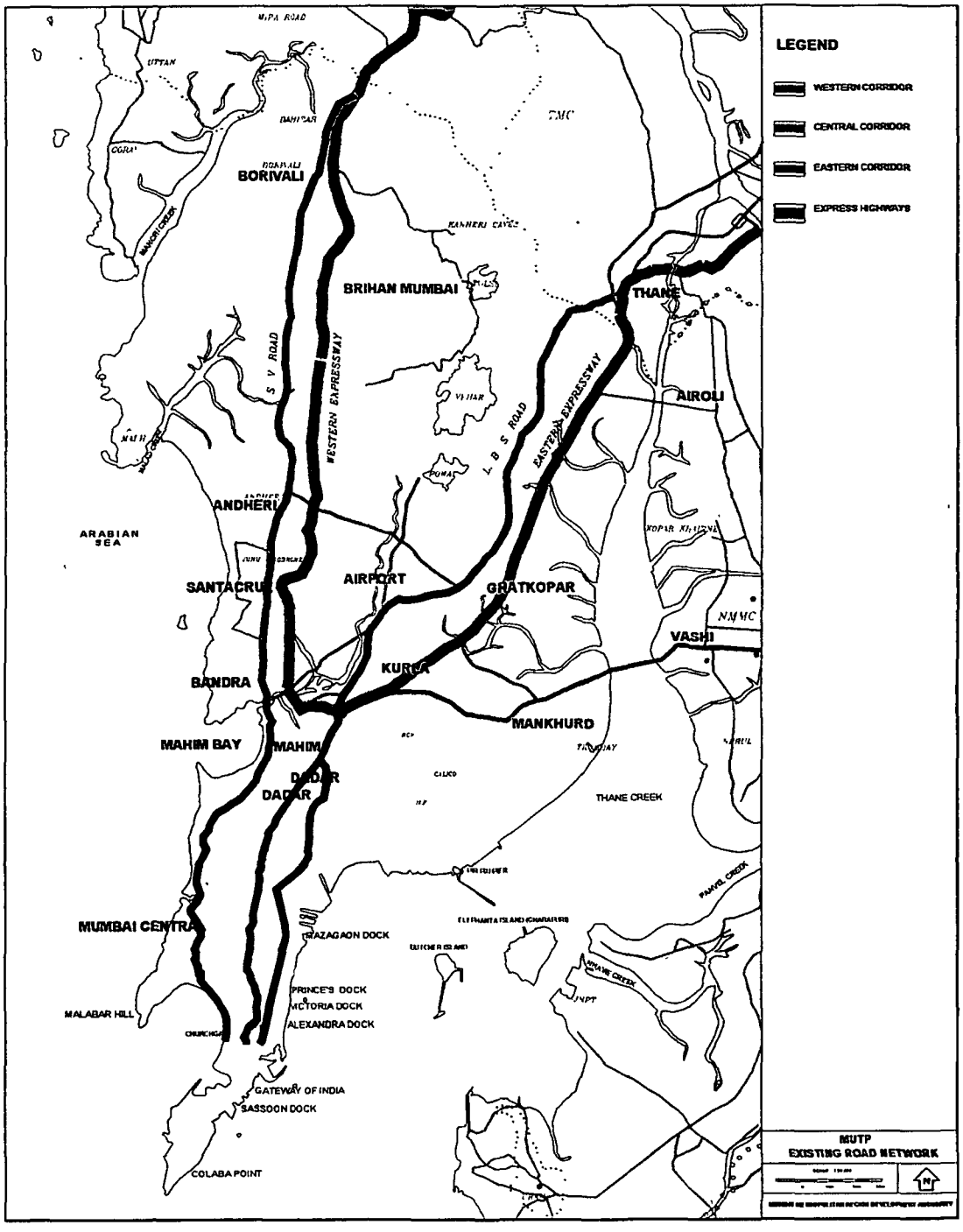
MAP 1: SUB-REGIONS OF MUMBAI METROPOLITAN REGION



MAP 2: MUMBAI: EXISTING RAIL NETWORK



MAP 3: MUMBAI: EXISTING ARTERIAL ROAD NETWORK



4 The transport challenges of Mumbai are compounded by the fact that over 50 % of Mumbai's population lives in squatter settlements These settlements are most often located on publicly owned land and land reserved for public purposes in the master plans, including the land reserved for roads, road widening and along the rail tracks Managing the resettlement and rehabilitation of a large number of households and businesses therefore becomes a critical part of most transport projects

5 In response to the emerging transport crisis, Mumbai Metropolitan Regional Development Authority (MMRDA) - the regional planning and coordinating agency- was mandated to prepare a transport sector development plan "Comprehensive Transport Strategy (CTS)" was prepared in 1994, providing a strategic framework for the transport sector of MMR Three strategic alternatives were examined to meet the projected travel demand in MMR viz (1) Public Transport - PT, (2) Public Transport with Demand Management in the Island City - PT+DM, and (3) Road Investment - RI The strategic alternative of PT+DM is found to be the optimal strategy from a number of perspectives as outlined in the environmental reports

6 The CTS clearly established the guiding principles that are still valid for transport sector today, namely that the investment priority must be accorded to public transport, particularly suburban railway, road investment should concentrate on improving east-west road links in the suburbs along with the Road Over Bridges (ROB) that replace the existing level crossings on the railways; and in the Island City where congestion is likely to be acute and there is inadequate space for expanding road network, demand management measures need to be adopted The project components proposed for implementation under the Mumbai Urban Transport Project (MUTP) have been selected within the framework of this strategy

7 Therefore on the basis of the framework developed under the CTS the following project components have been identified for implementation under MUTP·

- **Rail Transport Component**
  - Railway System - Capacity Optimization and Enhancement,
  - Setting up new corridors along existing ones, and
  - Purchase of rolling stock

- **Road Transport Component**
  - Road Transport - Traffic management (TM) and related measures, including area traffic control (traffic signal systems), bus priority and rail station area transport integration
  - Road Transport - Infrastructure, including roads and road over rail bridges
  - Road Transport - Equipment (procurement of buses)

- **Resettlement and Rehabilitation**
  - Construction or purchase of 19000 permanent dwelling units
  - Construction of 6000 transit dwelling units
  - Land acquisition and R & R assistance

Each component has related provisions for environmental protection and improvement, institutional capacity building and training

8 The total budgetary requirement of the project is estimated to be Rs. 45,264 million (US $ 943 million) Out of this the component wise costs are Rail - Rs. 30296 million (US $ 631 16 million), Road - Rs. 8290 million (US $ 172 71 million) and R & R - Rs. 4678 million (US $ 97 97 million) World Bank assistance of US $ 542 million (i.e 57.5 % of the project cost) is proposed.

9. Some of the civil works of railways that are not financed by the World Bank have begun in 2000. Similarly R & R activities for optimization of railways that required clearance of safety zone also began in 2000. However, rest of the project is proposed to be implemented during 2002 to 2008.

10 In addition to the sector-level environmental assessment, sub-project specific environmental assessments / evaluations have been carried out and Environmental Management Plans have been developed to integrate the mitigation measures with the construction activities and propose monitoring both during and after the construction phase Various studies conducted during the last few years recognize that the transport sector is the major contributor to air pollution in Mumbai. With the introduction of unleaded petrol, lead is no longer the main pollutant that causes concern. SPM and PM 10 are however the major concerns at the sector level. Similarly noise on account of rail and road traffic is also emerging as a sectoral concern. Individual subprojects are likely to have localized environmental impacts during constructions in which case mitigation measures have been integrated with construction activities. The project is likely to displace about 19000 PAH (77000 persons) who would need to resettled and rehabilitated.

11 The magnitude of displacement in this project is very large though the acquisition of private land is very limited. The project would displace mostly slum dwellers living dangerously close to the railway tracks and Right of Way of the proposed road widening corridors The acquisition of private land is limited to 60 hectares for the civil works of the main investment projects. A large part of this land will be acquired using the transfer of development rights (TDR) and the land for resettlement will be fully acquired through TDR process. Thus the impacts associated with private land are minimized to a large extent.

12 In order to respond to the resettlement of large number of persons, Government of Maharashtra adopted an R&R policy in March 1997, which was later amended to incorporate certain changes suggested by the World Bank to make the policy consistent with the Bank's Operational Directive (OD) 4 30 on involuntary resettlement. Following this, a Resettlement Action Plan (RAP) has been prepared summarizing the overall magnitude of impacts and implementation arrangements, budget and costs, and timetable, monitoring and evaluation procedures Sub-project specific Resettlement Implementation Plans (RIPs) were also prepared for four sub-projects to be implemented during the first year of project implementation and other RIPs will follow The cost of implementing the RAP is estimated to be Rs 4730 million (US $ 98 million). Because of its magnitude R & R is being treated as a separate project component.

13 Public consultation in respect of transport components and their environmental impacts has been conducted after adequate disclosure of information by keeping relevant information in Public Information Centers, MMRDA website, making available hard copies and CDs to interested NGOs and presentation of project details in well advertised workshops Project components have been revised or added in response to the suggestions received through the consultation In respect of R & R Component, consultation has been a continuous process. It began by conducting baseline surveys through NGOs and has progressed through preparation of RIPs and CEMPs, formation of cooperatives and implementation support through NGOs The grievance redressal mechanism also includes representation of NGOs In fact the entire R&R component is being implemented as a joint effort of MMRDA, NGOs and the affected Communities

TRANSPORT, ENVIRONMENTAL AND SOCIAL STUDIES

14 **TRANSPORT**: A systematic transport study of Mumbai dates back to 1962, when Wilbur Smith and Associates prepared the first long-term road development plan The Central Road Research Institute carried out similar exercise in 1978 These however did not pay adequate attention to public transport, particularly suburban railway A study carried out in late 60s of suburban railways suggested two additional corridors - the 6th and 7th corridors. The 7th corridor was to be an underground metro corridor Many of the recommendations of these studies have remained unimplemented largely due to lack of resources. MMRDA in 1994 carried out Comprehensive Transportation Study (CTS) through WS Atkins. CTS evaluated alternative ways to satisfy travel demand developed a strategy (described later) and also a sustainable program of investment Detailed feasibility and engineering studies have been carried out of the sub-projects included in the project

15 **ENVIRONMENT**: Around the same period, the World Bank, through its Metropolitan Environmental Program (MEIP) (1993) assisted GOM in preparing a comprehensive environmental improvement plan for MMR. In a separate program of URBAIR (1996) the World Bank supported formulation of action plan to help abate air pollution in Mumbai MMRDA in 1995 prepared a long term Regional Plan for the MMR covering various sectors like industry, office location, shelter, water resources, environment and transport. The CTS and MEIP studies were used as an input to the formulation of Regional Plan. The proposals of the Regional Plan are therefore consistent with the CTS and MEIP After the CTS study a study of sectoral environmental assessment was undertaken through AIC Watson, which has since been updated and is presented in the consolidated EA. In addition subproject specific EA and EMP studies have also been carried out

16 **SOCIAL**: As over 50 % of Mumbai's population lives in slums many studies have been carried out related to slums From 1985 to 1994, the World Bank, through the Bombay Urban Development Project supported slum upgrading Under this project, some baseline surveys of slum dwellers were carried out Since a large number of such slum dwellers was required to be relocated for the transport infrastructure improvements, GOM constituted a Task Force in1995 to formulate an R & R Policy. The recommendations of the Task Force have largely been reflected in the GOM formal policy. Immediately after the Task Force recommendations, MMRDA commissioned reputed NGOs to carry out baseline survey of all the households, businesses and structures that were likely to be affected by the project

Database generated through these surveys is available in MMRDA and is being actively used in preparing Resettlement Implementation Plans

A detailed list of project preparation studies is presented in **Annex 1**

ANALYSIS OF ALTERNATIVES

17 In order to deal with the increasing travel demand in an effective and financially and environmentally sustainable manner, MMRDA prepared a long-term multi-modal CTS for the MMR The CTS examined three strategic alternatives viz

- Public Transport (PT). Emphasis on investment in Public Transport - particularly railways
- Public Transport and Demand Management (PT+DM)· Priority for investment in public transport, particularly railways, with Demand Management measures such as cordon pricing and parking control in the Island City.
- Road Investment (RI) Emphasis on road projects, which would cater to and encourage private vehicle trips

In addition to considering the effectiveness of these alternatives in meeting the transport sector needs and requirements, these strategic alternatives were evaluated with reference to their comparative impact on Air Pollution, Noise, Ecology, Social Impact in terms of number of displaced households and traffic efficiency This evaluation indicated that PT+DM is the optimal alternative given the context of a transport project in a densely populated area and with large unmet demand in the public transport sector

18 The scope for considering alternative alignment for individual sub projects is however limited as the roads have to follow the right of way reserved in the city master plan since in the areas not so reserved building construction has taken place. Nevertheless, where possible alternative alignments and designs of ROBs such as at Jogeshwari and Vikroli have been adopted to significantly reduce the social impact

Induced Impacts

19 In addition to the direct impacts on the environmental parameters, the possible induced impacts were also taken into consideration. For example the widening and strengthening of east–west link roads as a part of MUTP will relieve traffic congestion at Bandra and Sion junctions and thereby reduce air pollution in these areas Similarly, improvements in the rail and bus capacities may discourage use of individual modes of transport such as auto rickshaw, scooters, etc which would also have some benefits in terms of reducing air pollution Construction of ROBs and implementation of SATIS would help to avoid "stop-go" vehicular traffic would help reduce the vehicular emissions

DESCRIPTION OF THE PROJECT

The three main project components are described below in some detail

Rail Transport Component

20 This component aims to improve capacity and performance of the suburban railway system through establishment of a Mumbai Rail Vikas Corporation (MRVC), a 50/50 joint venture of Indian Railways and the Government of Maharashtra, procurement of new rolling stock, upgrading existing rolling stock, increasing track capacity and improving signaling, electrical and telecommunication systems This component would also support studies and technical assistance to improve the maintenance capabilities of Indian Railways for their railway tracks and rolling stock, the financial management and control systems and railway safety

21 The physical works under this component which require close review of environmental and social issues depending upon the nature and scope of work, include,

- Optimization of Suburban Railway Services. This essentially involves the relocation and resettlement of squatters from the safety zone along the railway lines.
- Quadrupling of lines between Borivali and Virar viz addition of 2 lines to existing 2 lines (Borivali - Bhayendar 9.13 kms & Bhayendar - Virar 16.87 kms)
- Provision of 5th And 6th Line between Kurla and Thane
- Provision of 5th Line between Mahim - Santacruz and Borivali
- Conversion of DC to AC traction
- Increasing the distance between the two tracks by about 30 cm in Virar- Dahanu section to facilitate EMU operations, for implementation during the second year of this project

Road Transport Component:

22 This component seeks to strengthen the capacity of the MCGM for traffic management, policy and regulation, and support specific investments in traffic management, traffic signals, east-west connecting roads and rail grade separations The project will also support the Brihan Mumbai Electric supply and Transport Undertaking (BEST) in improving its efficiency and capacity of service provision through institutional reforms and procurement of environment-friendly and user-friendly buses Through this component the project would help MMRDA improve the systems for developing strategies and policies for effective traffic/transport planning for MMR including their implementation through demand management and user pricing.

23 The physical works under this component, which require review of environmental and social issues depending upon the nature and scope of work, include,

- Jogeshwari - Vikroli Link Road (JVLR) This corridor includes two flyovers being constructed by Maharashtra State Road Development Corporation (MSRDC) which are not being financed through MUTP.
- Santa Cruz - Chembur Link Road (SCLR)
- Construction of 3 ROB's at Jogeshwari – South, Jogeshwari- North and at Vikroli
- Pedestrian sub-ways, footpaths and other pedestrian facilities

- Station Area Traffic Improvement Schemes (SATIS)
- Bus Procurement

Pedestrian Underpasses and other facilities and SATIS expected to have only very limited environmental issues during construction and bus procurement will have positive impact due to environment friendly buses

Resettlement and Rehabilitation Component.

24 The main investment under this component would include the construction or purchase of about 19,000 dwelling units (225 sq ft each) to resettle those displaced by the transport project In addition, about 6000 transit houses have been built under this component to provide transit accommodation as an interim measures to those resettled on emergency situation in response to the Bombay High Court's intervention and railway safety policy. The other expenses under this component include the acquisition of limited amount of land for civil works, works (financed through the counterpart funds), reconstruction of some of the basic civic amenities for the left over population/host population and payment of compensation for economic losses and other rehabilitation benefits The technical assistance under this component would include financing of the consultancies for baseline surveys, preparation or Resettlement Implementation Plans (RIPs), supervision consultants, NGO support for implementation, training of staff/NGOs, etc The implementation of this component has already commenced So far 20 percent of affected households (3,935) have already been resettled in permanent houses with all basic amenities such as running drinking water, independent toilets and community facilities. Another 32 percent (6125 households) were shifted to the transit housing and will be shifted to permanent houses within approximately 3 years of their first move The pre-project resettlement has had a significant effect in improving the operational efficiency of running the local trains in terms of speed and frequency. So far Rs 689.10 million (US$ 14.5 million) has been spent for purchase of ready built houses, construction of transit houses and on NGO implementation support.

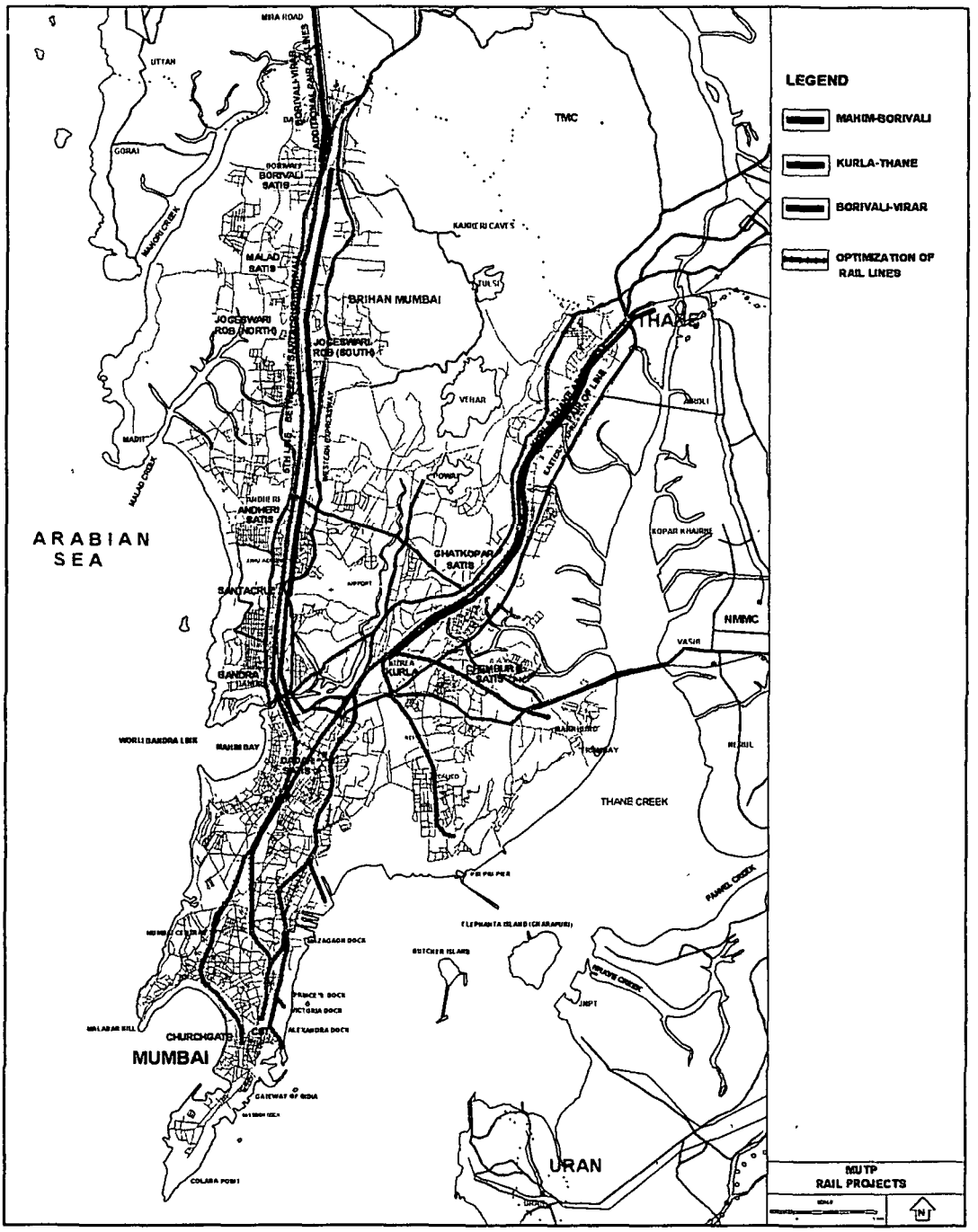
25 Environmental impact of this component is expected to be positive in terms of the improved drinking water and availability of sanitation facilities and shelter made out of permanent materials However the resettled community will have to adapt to the requirements of living in multi-storied buildings. In this context, the project proposes to support the development of Community Environmental Management Plan (CEMP) to outline priorities and procedures for environmental management.

The location of sub-projects under the Rail and Road Transport Components are shown in **Map 4** and the Resettlement sites are shown in **Map 5**

INSTITUTIONAL FRAMEWORK FOR IMPLEMENTATION

26 MUTP is to be implemented by the Government of Maharashtra (GOM) in association with Indian Railways (IR). Mumbai Metropolitan Region Development Authority (MMRDA) is the planning and coordinating agency for implementing MUTP and a Project Management Unit (PMU) has been established in MMRDA The implementation responsibilities are shown in **Table 1.**

MAP 4: MUTP: SUB-PPROJECTS OF RAILWAY TRANSPORT COMPONENT



MAP 5: MUTP: SUB-PROJECTS OF ROAD TRANSPORT COMPONENT

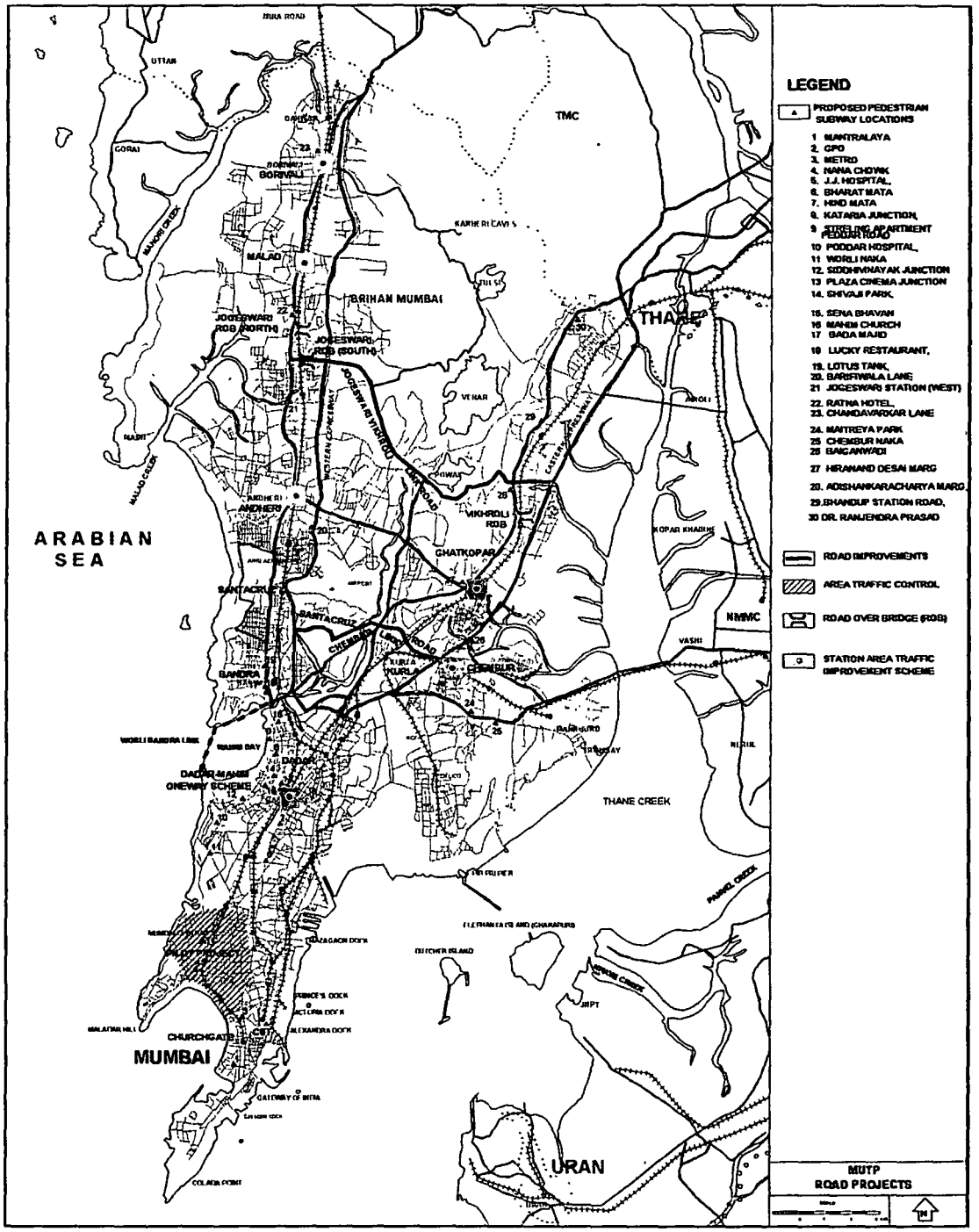


Table 1: Implementation Responsibilities

S.No.	Organization	Functions
1	MMRDA – PMU	Co-ordination and monitoring of the overall project Implementation of R & R activities for rail and road transport components
2	MRVC	Implementation of all rail projects.
3	MCGM	Construction of ROBs, traffic management, environment-air quality monitoring
4	MSRDC	Construction of roads
5	BEST	Procurement of environment and passenger friendly buses
6	MCGM for Traffic Police	Area Traffic Control System

27 In addition a High Level Steering Committee (HLSC) and Project Co-ordination Committee (PCC) have been constituted to provide policy guidance and supervise project implementation respectively. An Independent Monitoring Panel (IMP) has also been established by the GOM consisting of eminent citizens from Mumbai drawn from the fields of law, administration, journalism, and environmental engineering The main responsibility of the IMP would be to ensure that the World Bank's safeguard policies related to social and environment are followed The IMP would operate and interact at the level of HLSC It is proposed to expand the HSLC by including the Secretary to Government of Maharashtra, Home (Transport) Department and NETRA as additional members of HLSC.

COSTS AND SOURCES OF FUNDING

28 Sub-project wise details in terms of estimated cost in Rs and US $, funding from the World Bank and Counterpart Funds are given in **Annex 2**. These are summarized in **Table 2.**

Table 2: Project Costs and Sources of Funds

Component	Cost	Cost	Bank Funds	Counterpart Funds
	Rs. million	US $ million		
Rail Transport	30311	631	305	327
Road Transport	8270	172	150	22
R & R and Land Acquisition	4663	97	79	18
Incremental Operating Costs & Taxes	1808	38	0	38
PPF	144	3	3	0
Front end Fee	260	5	5	0
Total	45,264	943	542	401
			57 5%	42 5%

Principal sources of funding are the IBRD Loan proposed for the Rail and Road Transport Components and the IDA Credit proposed for the R & R Component. No other external funding is proposed The GOM and IR are sharing the cost of Rail Transport Component including the cost of related R & R in the proportion of 50.50 Consequently 50% of the counterpart funding for the component will be contributed by GOM/MMRDA. MCGM and BEST will provide for their own counterpart funds and counterpart funds for MSRDC will be provided by GOM/MMRDA

APPLICABLE INDIAN LEGAL REQUREMENTS

A brief overview of key provisions of the legal framework for this project is provided below.

Legislation Related to Environment

29. There are various Acts, Rules and Notifications applicable for different environmental components such as Air Pollution, Water Pollution, Noise Pollution, Coastal Areas, Hazardous Materials Handling and Transport, Forest and Wildlife, etc. In addition, regulatory provisions by way of environmental clearance also exist. The applicable regulations are listed below.

Environmental (Protection) Act, 1986

30 This is an umbrella act for environmental protection. Various rules and notifications are issued from time to time under the provisions of this Act. Environmental Protection Rules (2000) specify standards for ambient air quality whereas Noise Pollution (Regulation and Control) Rules, 2000 provide for the ambient noise standards in public places. These are given in **Annex- 3.** However legal mechanism to achieve these are not explicit in terms of emission at source in transport sector except for the vehicle emission norms like Euro II or Bharat II that have been prescribed. The Environmental Impact Assessment Notification, 1994 (as amended in May 1994) make environmental clearance mandatory for 29 categories of developmental projects listed in Schedule 1 of the notification. Railways are not listed in schedule 1 and hence do not need environmental clearance. For other components under MUTP, Ministry of Environment and Forests (MoEF) has confirmed that environmental clearance is not required under this notification.

Coastal Regulation Zone Notification 1991

31 The notification provides for determining certain areas between the Low Tide Line (LTL) and High Tide Line (HTL) and adjacent land ward area as the Coastal Regulation Zone and its classification into CRZ I (ecologically sensitive), CRZ II (where development has already occurred) and CRZ III (the residual area- largely rural in character). The notification also prescribes prohibited activities in CRZ and activities that can be taken up with the approval of MoEF Reclamation being a prohibited activity cannot be undertaken in CRZ I. This restricts use of such lands for R & R CRZ clearance from MoEF is required for Borivali-Virar Railway section that traverses the Vasai Creek and adjoining wetland which is a Coastal Regulation Zone though construction of such links is a permitted activity in CRZ. This clearance has been requested and is being processed. In case of Railways environmental clearance under the Environmental Impact Assessment Notification, 1994 (as amended in May 1994) is not required

The Maharashtra (Urban Areas) Preservation of Trees Act, 1975

32 GOM legislation requires every local authority to constitute a tree authority. No tree can be felled without the permission of this authority. Trees in the right of way of roads can be removed with the permission of this authority, which may prescribe transplanting or compensatory plantation. Considering a large number of trees that need to be felled, this act is applicable PIAs will, therefore, be required to obtain the permission of Tree Authority before felling of trees affected by specific sub-projects Compensatory plantation or transplanting of trees will be adopted as specified by the Tree Authority

Legislation related to R & R.

Land Acquisition Act 1894 (LA Act):

33 This act provides for compulsory acquisition of land for public purposes by paying compensation at the market rate with 30% solatium for the compulsory nature of acquisition and interest at 12 percent per annum from the date of notification

Maharashtra Regional and Town Planning Act, 1966 (MR&TP Act):

34 The Act provides for preparation of Development Plans (Master Plans). These plans designate land required for public purposes, which can then be acquired in conjunction with the provisions of Land Acquisition Act. The act also provides a statutory framework for formulation and enforcement of Development Control Regulations.

Development Control Regulations for Greater Mumbai 1991 (DCRs):

35. These regulations prepared under the MR & TP Act offer an alternative to acquisition under LA Act by way of Transfer of Development Rights (TDR). The permissible Floor Space Index (FSI) defines the development rights of every parcel of land in Mumbai. If a particular parcel of land is designated for a public purpose the landowner has an option of accepting monetary compensation under the LA Act 1894 or accept TDR (equivalent to the plot area times the permissible FSI), which can be sold in the market for use elsewhere in Mumbai The DC Regulations have been amended to provide incentives for rehabilitation (including resettlement of slum dwellers) in 1997 For landowners prepared to provide 225 sq ft. dwelling units free of cost to slum dwellers, the incentive is in the form of right to build and sell floor space equivalent to that required for slum rehabilitation subject to the maximum *in-situ* utilization of FSI of 2.5. The remainder of the total development rights can be used as TDR. In case of land designated for resettlement of slum dwellers affected by infrastructure projects, the land owner has an option of offering dwelling units to the project implementing agency free of cost and getting the benefit of maximum of TDR equivalent to floor area calculated at FSI of 3.5 (1 for land and 2.5 for the built-up area) The DCRs also set out the standards for building design and construction, provision of services like water supply, sewerage, site drainage, access roads, elevators, fire fighting etc Buildings procured for R & R have to conform to these DCRs. Up-front clearance of the entire project is however not required under the DCR. Approvals are to be obtained for individual scheme, as it gets prepared.

The Maharashtra Co-operative Societies Act 1960.

36. This act provides for establishing, registering and administering the co-operative societies Housing co-operative is a special form of co-operative society, where the land and building is owned by the co-operative and its members have occupancy rights of apartment occupied by them Sale and purchase of such units can take place only with the consent of

the society This is a common form of tenure in Mumbai's apartment buildings and is widely understood

APPLICABLE WORLD BANK POLICIES

37 Given that MUTP has been developed with the intention of mobilizing financial resources from the World Bank, project preparation has included a number of studies and assessments which have sought to address and meet the requirements of the World Bank's environmental and social policies, often referred as the 'safeguard' policies. The next paragraphs provide a summary overview of how these guidelines have been considered Several policies were found not to have been triggered and are therefore not discussed any further

38. The applicability of World Bank Safeguard Policies and key Indian legal requirements to individual sub-projects are summarized in **Table 3**.

Environmental Assessment (OP 4.01)

39 In the context of the Bank's Operational Policy (OP) 4.01 on Environmental Assessment, MUTP has been classified as category "A" project, largely on the basis of the large number of people requiring resettlement and rehabilitation. Because of the large-scale resettlement and the triggering of more than one safeguard policy the project is also classified as "S1" in terms of safeguard issues. A consolidated EA including SEA and sub project specific EAs and EMPs have been prepared in compliance with the World Bank policy.

Cultural Property (OP 4.11):

40. Mumbai with its history of nearly three hundred years is rich in cultural property particularly in the form of built heritage. GOM and MCGM are acutely aware of the need to conserve such heritage. GOM in 1995 with the involvement of NGOs listed over 600 buildings and precincts as of heritage significance. DCR 67 governs the development of these listed buildings and precincts. GOM has also constituted a Heritage Conservation Committee in 1995 to advise the Municipal Commissioner regarding development permission to be granted in case of listed buildings and precincts. No development permission can be granted of the listed buildings or within the precincts without the consent of the Heritage Committee.

Table 3: Applicability of Safeguard Policies to Sub-Projects

Sub-Projects	World bank				Indian
	Environmental Assessment OP 4.01	Cultural Property OP 4.11*	Natural Habitat OP 4.04	Involuntary Resettlement OP 4.30	Coastal Regulation
Railway Transport Component					
1 Optimization of Suburban Services	Yes	Yes	No	Yes	No
2 5th & 6th Lines – Kurla -Thane	Yes	Yes	No	Yes	No
3 5th Line Mahim-Borivali	Yes	No	No	Yes	No
4 BVQR	Yes	No	Yes	Yes	Yes
5 DC to AC Conversion	Yes	No	No	No	No
6 Procurement of Rolling Stock	No	No	No	No	No
Road Transport Component					
1 JVLR	Yes	Yes	No	Yes	No
2 ROBs	Yes	Yes	No	Yes	No
3 SCLR	Yes	To be Decided	No	Yes	No
4. Pedestrian Subways	Yes	Yes	No	No	No
5 SATIS	Yes	To be Decided	No	To be decided	No
6. ATC and TM	No	No	No	No	No
7 Procurement of Buses	No	No	No	No	No
R & R Component					
1 Transit Housing	Yes	No	No	Yes	Yes
2 Permanent Housing					
Option A	Yes	No	No	Yes	No
Option B	Yes	No	No	Yes	No
Option C	Yes	No	No	Yes	No
Overall Assessment	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

** Cultural Property assessment is done for only First year projects*

41 None of the MUTP sub-projects, except the pedestrian subways, directly or indirectly affect heritage buildings. Some of the pedestrian facilities in the Island City notably one near the CST would be located in the heritage precinct. The design consultants have been advised to take cognizance of this fact In any case the proposals will be subject to the review of the Heritage Conservation Committee

42 During the execution of works, if a "chance find " of archaeological significance occurs, the contract requires the contractor to immediately inform the employer and stop further work Employer will in turn inform the state Archaeology Department for further investigation

43 In addition to the listed buildings, there are smaller common cultural properties like shrines, small temples or mosques within the project-affected communities Thus this policy applies to the project These have been identified during the BSES and the RIPs cover their resettlement. For example, in case of JVLR Phase I there are 4 small temples, which will be relocated according to the RIP prepared in consultation with the PAHs.

Natural Habitat (OP 4.04):

44 *Natural habitats* are defined as land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions. All natural habitats have important biological, social, economic, and existence value. Important natural habitats may occur in tropical humid, dry, cloud, temperate and boreal forests. It also occurs in Mediterranean-type shrub lands, natural arid & semi-arid lands, mangrove swamps, coastal marshes and other wetlands, estuaries, sea grass beds; coral reefs, freshwater lakes, rivers and rivers, alpine and sub alpine environments, including herb fields, grasslands and paramos and tropical as well as temperate grasslands *Critical natural habitats* include existing protected areas and areas officially proposed by governments as protected areas (e.g., reserves that meet the criteria of the World Conservation Union [IUCN] classifications such as Strict Nature Reserve/Wilderness Area: protected area managed for science or wilderness protection; II-National Park: protected area managed mainly for ecosystem protection and recreation; III-Natural Monument protected area managed mainly for conservation of specific natural features; IV-Habitat/Species Management Area: protected area managed mainly for conservation through management intervention; V-Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation; and VI-Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems. The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.

45 From this perspective one of Mumbai's notable natural habitat is limited to the 103 sq.km National Park at Borivali, which is located in the northern part of the peninsula between the two rail corridors The National Park is protected under the Indian Forest Act. None of the sub-projects passes through the National Park The other important Natural Habitat is the coastal wetlands in the eastern and western suburbs and along the Vasai creek. These are protected by the Coastal Regulation Zone (CRZ) Notification of 19 February 1991 A section of 4 5 km. of the BVQR (total length 26 km.) crosses the Vasai Creek and the adjoining wetlands having degraded mangroves The area of the wetland directly affected is less than 5000 sq m. out of a total extent of wetland of 48 sq.km In case of BVQR environmental clearance under the Environmental Impact Assessment Notification, 1994

(as amended in May 1994) is not required. The construction of bridges across creeks in CRZ-I is a permissible activity under the CRZ Regulations. A section of BVQR traverses through the Vasai creek and adjoining wetland fall in CRZ-I. Based on the belated clarification received from MOEF an application for specific CRZ clearance is lodged in MOEF and is being processed. Even though the impacts on natural habitat are small, the policy applies, and has been complied with The details of compliance plan are presented in the EMPs of sub-project..

46 The eastern leg of JVLR happens to have CRZ I on either side On the southern side there are a few mangroves but rest of the CRZ has no mangroves and the land has been put to cultivation of grass This wetland once upon a time must have been a part of a larger wetland on the eastern coast of Mumbai But by constructing Eastern Express Highway during mid-sixties this pocket has already been severed from the main wetland and the JVLR has been constructed during the eighties. Thus it cannot be said that human activity has not essentially modified the area's primary ecological functions. Consequently the mere fact that JVLR has CRZ I on its either side would not trigger the Natural Habitat Policy. Nevertheless measures to promote growth of mangroves are proposed. The details of compliance measures are presented in the EMPs of sub-project.. On the the east of EEH there is a large wetland rich in mangroves. MMRDA with the support of MoEF has proposed to develop a marine mangrove park (on an area of about 144 ha.) in this area.

Similarly, the two sites where inadvertent breach of CRZ Regulations has occurred are close to a highway and railway respectively. Considerable development with human intervention has already occurred in the vicinity. Though proximity to narrow creeks may technically attract CRZ Notification, it would not be justifiable to classify them as natural habitat Nevertheless, sub-project specific CEMPs have been prepared covering the plans for restoration of wetland to the extent feasible.

Involuntary Resettlement (OD 4.30)

47. MUTP will require resettlement of about 19000 households (77000 persons). The World Bank Policy on Involuntary Resettlement is therefore applicable to the project. In compliance with to this policy an R & R Policy has been prepared and adopted by GOM for MUTP. RAP and sub-project specific RIPs are being prepared. RIPs including CEMPs have been prepared for four sub-projects scheduled for commencement in the first year as described in paragraph 66.The project is therefore in compliance with the policy.

Indigenous People: (OD 4.20)

48 About 1% of the PAHs belong to the Scheduled Tribes. A field based review was undertaken to determine if these PAHs were subject to application of this Policy since they might have originally belonged to tribal communities in the distant past. As of now they are integrated with the city life and do not have their traditional habitat or follow traditional ways of life More particularly, (a) they no longer have close attachment to ancestral territories; (b) they do not identify themselves or are identified by others as distinct cultural group, (c) they do not speak an indigenous language; and (d) they no longer belong to customary social and political institutions. There is also a general reluctance to reveal the caste or tribe particularly pronounced when data is to be kept in public domain. It was determined by the review that the social impact of the project on such people is therefore similar to that on other PAHs and thus the policy does not apply No separate Indigenous Peoples Development Plan (IPDP) has therefore been prepared.

BASELINE ENVIRONMENT

49 Before presenting the environmental assessment it would be appropriate to present the baseline data of MMR particularly of Greater Mumbai Data on following environmental component is compiled and presented below

- Geography, Climate and Land Use
- Air Quality
- Noise Levels
- Health and Safety

Air Quality

50 Major source of air pollution in Mumbai is now the Transport sector. Nearly 62% of the pollution load originates in transport sector. Industrial and commercial sectors contribute about 36%, whereas domestic sector contributes about 1 %. Following broad conclusions are drawn from baseline environmental data of air quality:

- Annual average for SO_2 varied between 6 to 36$\mu g/m^3$ in MCGM area Highest SO_2 was recorded at Tilaknagar, located north of Industrial belt of Chembur It is under the influence of higher-level emissions from industries in Chembur and fuel burning in slum area and thus shows highest SO_2 level NOx annual average was recorded between 13 to 69 $\mu g/m^3$ in MCGM area. There was no specific trend observed for NOx but at Khar and Maravali the annual values cross the limits. The higher NOx levels at Khar are attributed to heavy traffic while for Maravali it is attributed to industrial emissions in Chembur During all the three years SO_2 and NO_X values at remaining locations are well below the annual NAAQ standards (60 $\mu g/m^3$ for residential areas).
- Suspended particulate matter values varied between 154 to 388 $\mu g/m^3$. The highest values were recorded at Maravali that is located in the industrial belt near Chembur in the eastern suburbs. At all locations the SPM annual values exceeded the NAAQ annual standards i.e. 140 $\mu g/m^3$ for all the three years
- It can be seen that the ambient air quality has not changed appreciably since the year 1998 The highest concentrations were observed in 1999 for SPM, SO_2 and ammonia. Whereas, the values recorded in the years 1998 and 2000 did not vary significantly
- Annual average for PM_{10} at traffic intersections varied between 221 and 520 $\mu g/m^3$. Highest value (533 $\mu g/m^3$) was recorded in March 2000, at Andheri west. Lowest PM_{10} value was recorded in August 2000 at Mahim as 116 $\mu g/m^3$. These values are quite high and well above the PM_{10} standards for residential and industrial areas (See Table 3 2 for standards).
- Annual average of Carbon monoxide at traffic intersection is 5.4 to 11.9 $\mu g/m^3$. Highest (11 9 $\mu g/m^3$) was recorded at Andheri, which is above the standards prescribed.
- Annual average for sulfur dioxide at traffic intersections varied between 16 to 100 $\mu g/m^3$. Annual average for nitrogen oxide was between 276 and 522 $\mu g/m^3$. The highest value for N0x was recorded at Andheri in winter
- At Andheri west traffic intersection all parameters were recorded as highest through the year 2000-01 and exceeded the standards

Noise

51. Increasing population and traffic densities have led to increased levels of noise Noise is the result of a number of activities such as road traffic, aircraft, railways and industrial and commercial activities. Noise due to traffic (including hawkers) is the predominant source of irritation Noise on account of public processions, festivals, marriage parties, political meetings and such other activities is also substantial. Public places like railway platforms, bus terminals and even airport terminals are also excessively noisy Auto rickshaws, two wheelers and many diesel vehicles generate high noise levels.

Health and Safety

52 The environmental health status of Greater Mumbai is largely affected by the fact that half of its population lives in slum colonies or pavements. Slum dwellers suffer from the exposure to air pollution in form of smoke, foul smells from municipal garbage & dumping grounds, traffic pollution and noise pollution. It is observed that majority of the slum and pavement dwellers are susceptible to diarrhoea, dysentery, typhoid, jaundice, colds and coughs, flu, bronchitis and asthma. The health status of the general public has also been reported to be affected in industrial and congested traffic areas of Mumbai. Notable among these is Chembur area with heavy industries. Malaria is perceived as a major health-related problem As regards other ailments, Gastro-intestinal disorder, pregnancy related and respiratory problems are acknowledged as the more common ones The causes for the health problems are attributed to open drains mosquito menace and to air pollution Accumulated garbage is also perceived as an important factor leading to poor health Studies in Mumbai have shown that effect of gases and particulate matter from vehicles and industries is manifested in the respiratory diseases in the people either working in or staying near the source of pollution.

Apart from health, road safety is also a major concern. With large number of pedestrians and mixed vehicular traffic the incidence of road accidents is not insignificant. The project therefore supports improved accident tracking system and improvement of black spots where accidents frequently occur. The number of total road accidents including fatal, serious, slight and minor during 1991 to 2001 ranged between 23,628 to 29,808.

ENVIRONMENTAL IMPACTS

Environmental Assessment Process

53. The EA process consisted of·

- Sectoral Environmental Analysis (SLEA) of the three strategic transport options for MMR identified as part of CTS (1996-1998)
- Sub-project level Environmental Assessment was undertaken by way of
- Programmatic Level Environmental Assessment (PLEA) of generic sub-projects (1996-1998)
- Micro-Level Environmental Assessment (MLEA) of sub-projects projects with a potential for significant environmental issues. (1996-1998)
- Consolidated EA, which brings together the updated findings of the above-mentioned documents into a comprehensive document (2001 - 2002)

A flowchart of the entire process starting from developing the CTS to EA is given in **Figure 1.**

Environmental Management Plans were prepared for road projects The Environmental Audit was carried out for rail sub-projects The Community Environmental Management Plans were prepared for R&R component The Consolidated Environmental Assessment Report prepared in 2002 to consolidate sectoral and various sub-project level EAs and CEMPs prepared in 2002

Sectoral Level Impacts(SEA)

54 Environmental impacts at the sector level are expected to be as given below.

Air pollution

NOx and CO levels are predicted to decrease in spite of substantial increase in vehicle kilometers, as it is assumed that by 2011 there will be improved fuel (lead free, low sulphur) and improved engines (with catalytic converters and compliance with Euro II or Bharat II emission standards). SO_2 levels were predicted to increase in the eastern and western suburbs due to growth in population and traffic The base level values are observed to be in the range of 24 to 34 ug/m^3 These are predicted to increase to a range of 34 to 44 ug/m^3 for PT and PT+DM options and 103 ug/m^3 for RI option. The NAAQ Standard for SO2 is 80 ug.m^3 All predicted PM10 levels (1200 ug/m^3) exceed the National Ambient Air Quality Standards (NAAQS) of 100 ug/m^3 under all scenarios.

FIGURE 1 . ENVIRONMENTAL ASSESSMENT PROCESS

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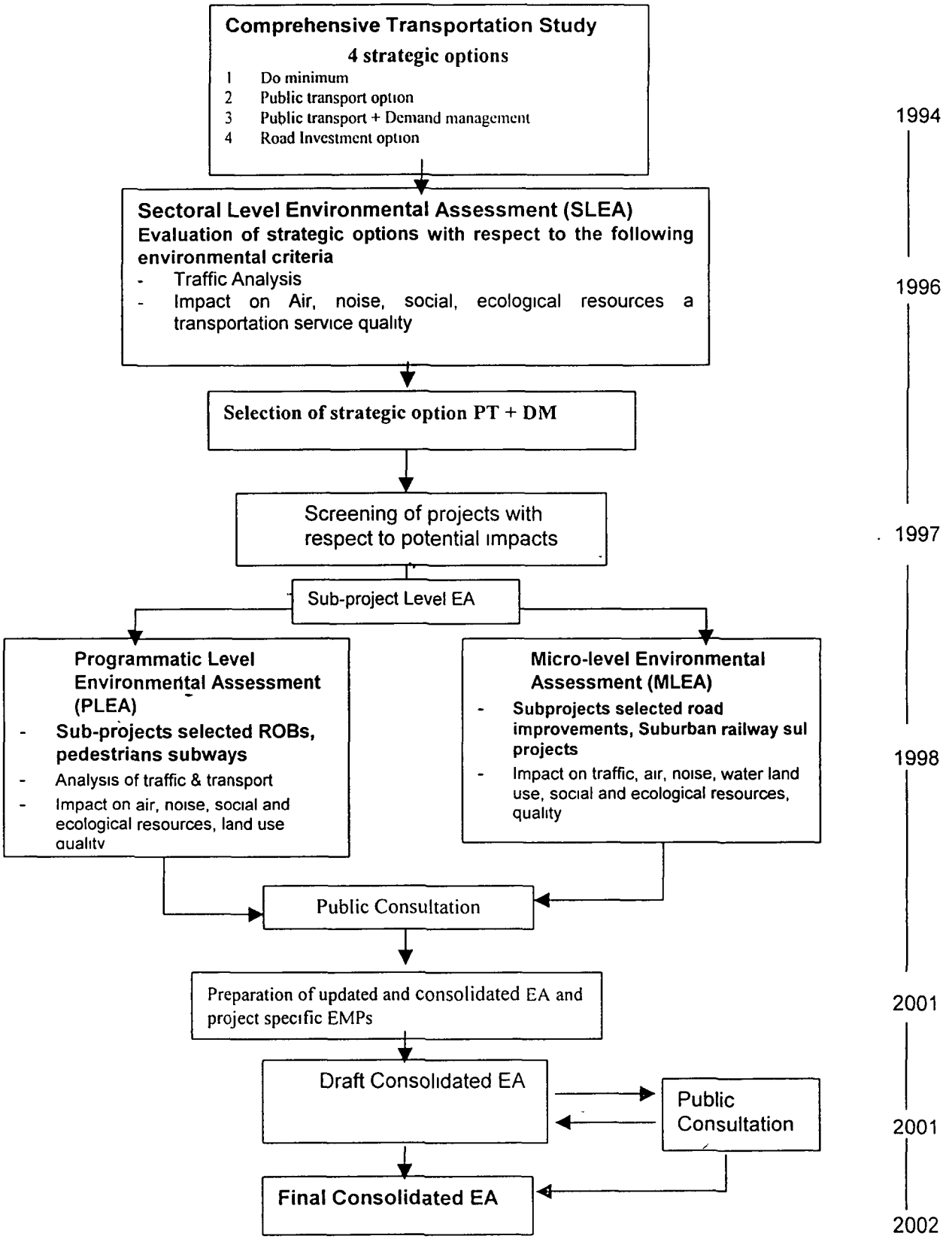


Noise Pollution

Night Time noise levels are likely to exceed the norms in areas close to transport corridors – both rail and road (69 db to 100 db as compared to the standard of 45 db)

Social Impact
Most physical improvement projects will confront a substantial resettlement problem

Sub-Project Impacts (PLEA and MLEA)

56 Typical environmental impacts of subprojects have been categorized into impacts during the construction phase and during the operation phase These impacts are expected to be in respect of the following environmental resources,

- Ambient Air Quality Deterioration
- Increase in Noise Levels
- Adverse Impacts on Ecology (Flora/Fauna)
- Population displacement
- Land degradation
- Surface and groundwater degradation
- Occupational health and safety
- Impacts on Traffic and road safety

ENVIRONMENTAL MANAGEMENT PLANS (EMP)

57 EMPs for mitigating the adverse environmental impacts are formulated at the sector level and also for the sub-projects. At the sectoral level, a variety of policy, legal and administrative measures will be used to manage and mitigate adverse environmental impacts. The formulation and implementation of some of the measures, indicated in **Annex 4**, depend upon a variety of parameters such as promulgation of rules and standards particularly by GOI, techno-economic feasibility of the suggested measures, public pressure, directives of Supreme Court and High Court, etc.

EMP IMPLEMENTATION

EMP Implementation and Monitoring at Sectoral Level

58 The success of EMPs depends upon close monitoring. Because of multiplicity of agencies coordinated monitoring and reporting is proposed to enable timely corrective actions Sectoral level monitoring plan is prepared for monitoring of environmental quality such as for monitoring ambient air quality and noise level and conditions at resettlement sites The monitoring plan includes the responsibility and frequency of monitoring The monitoring plan has three components - monitoring the implementation of mitigation measures, monitoring the environmental quality, and monitoring traffic parameters.

Monitoring of Environmental Quality

59. Environmental quality particularly with respect to air pollution and noise levels, will have to be monitored on continuous basis, as these environmental components are likely to be affected most by the transportation strategy Environmental quality monitoring shall be carried out with the objective of assessing the change in environmental quality due to the transportation strategy, so that the strategy can be updated in response to the monitored results Since the environmental quality of Greater Mumbai is also affected by factors other than transportation activities, environmental monitoring program for the transportation strategy shall be integrated with the regional environmental monitoring program

60. In addition to the SEA, sub-project specific EA and EMP are prepared for Rail Transport and Road Transport components. Similarly, for the sub-project of R&R component, Community Environmental Management Plans (CEMPs) are prepared For the sub-projects already commenced, environmental audits have been carried out and CEMPs are prepared For the sub-projects scheduled to be carried out in the first year, EA and EMPs have been prepared and the details are available in the individual sub-project reports In this chapter a sample EA/EMP and CEMP in each of respective components are presented The Status of EA, EMPs and CEMPs for various sub-projects with respect to environmental safeguard readiness is given in **Table 4.**

EMP Implementation and Monitoring at the subproject level.

61. Environmental quality particularly with respect to air pollution and noise levels, will have to be monitored on continuous basis, as these environmental components are likely to be affected most by the transportation strategy. Environmental quality monitoring shall be carried out with the objective of assessing the change in environmental quality due to the transportation strategy, so that the strategy can be updated in response to the monitored results. Since the environmental quality of Greater Mumbai is also affected by factors other than transportation activities, environmental monitoring program for the transportation strategy shall be integrated with the regional environmental monitoring program.

62. Mitigation measures against adverse impacts during construction are being integrated into construction contract with Project Management Consultant (PMC) being responsible for monitoring and reporting to Project Implementing Agency (PIA). PIA will in turn submit the report to MMRDA MMRDA will review these reports and submit them to the World Bank, IMP and HLSC and PCC for any corrective action that may be required. The proposed reporting process is described in **Annex 5**. The roles and responsibilities of various agencies are described in **Annex 6**. Environmental monitoring plans are developed for specific sub-projects, involving monitoring sites, monitoring parameters, time and frequency of monitoring and the reporting of monitored data. The objectives of the monitoring plan are:

- To record the impact of MUTP on urban environmental quality during the construction and operation phases,
- To evaluate the effectiveness of the mitigation measures during the construction and operation phases
- To satisfy the legal and community obligations
- To respond to the unanticipated environmental issues at an early stage and to verify the accuracy of environmental impact prediction

- At the project level, the vital parameters or performance indicators that will be monitored during construction and/or operation stages of the project include:
  - Ambient air quality - SO2, PM10, CO, NOx
  - Noise levels near sensitive locations
  - Re-plantation success/ survival rates
  - Traffic volume and characteristics

Methodology used for sampling and analysis will be as per prevalent requirements of Ministry of Environment and Forest and Indian Standard (IS) codes

63 In order to facilitate smooth implementation of EMPs, the PIA shall include specific obligations in respect of EMP implementation in all tender and contract documents The bidding and contract documents shall include the following information.

- EMP requirements and obligations
- Environmental Monitoring Requirements
- Reporting requirements
- Indicative EMP cost estimates

Cost Estimates for Project Specific EMP Implementation

64. Cost estimates have been prepared for EMPs related to the following tasks.

- Relocation of Utilities
- Compensatory and Road/Track Side Plantation
- Pollution control (dust, water pollution) during construction
- Noise level reduction
- Labor Camp sanitation
- Road safety
- Environmental Monitoring

Most of the above activities could be covered by the works contract except post implementation monitoring. The total cost of EMP implementation including monitoring is estimated to be Rs. 240 million (US $ 5 million). As against this therefore Rs. 108 million (Us $ 2 24 million) are separately shown in **Annex 2** including the institutional strengthening requirement of Rs. 48 million (US $ 1 million) shown in paragraph 57 below. and the remaining is covered by the works contracts.

INSTITUTIONAL STRENGTHENING

65. Apart from ensuring compliance with the EMPs formulated for MUTP, there is need to strengthen the institutions to enable them to effectively integrate the environmental considerations in sectoral policy formulations as well as design and implementation individual projects The present capacity of the institutions is limited in this regard and is proposed to be strengthened by inducting additional manpower, outsourcing expertise and training of available manpower The nature of strengthening required is indicated in **Annex 6** MMRDA has proposed co-ordination model (**Figure 2)** for promoting effective implementation of EMPs at sectoral level and project level during construction and operation phases The total cost for the training programs and institutional strengthening is estimated to be Rs 48 million (US $ 1 million)

Table 4 : Status of Sub-projects with respect to Environmental Safeguard Readiness

Sr.No.	Name of the Sub-project	PIA	Status of Sub-project and Applicable Safeguard Documents[1]	Start Date	Estimated Cost		
					Total Cost	WB (mil. US$)	GoI/GoM (mil. US$)
Rail Transport Component							
1	5th line between Santacruz and Borivali	MRVC/ WR	Ongoing work. Environmental Audit undertaken and EMP prepared	01/2002	12 30	0 00	12.30
2	5th and 6th lines between Kurla and Thane	MRVC/ CR	Ongoing works. Environmental Audit undertaken and EMP prepared.	01/2000	34 58	0 00	34 58
3	Borivali-Virar Quadrupling of Rail Lines	MRVC/ WR	Ongoing works on railway line. EA/EMP prepared in 1998 Environmental Audit done and EMP updated. Work yet to start on Virar carshed. EA / EMP yet to be prepared	01/2001 01/2004	90 83 15 21	0 00 12 40	90 83 2 81
4	DC/AC conversion	MRVC/WR /CR	Ongoing works at some stations. Total 30 in number Generic EA / EMP prepared	01/2001	79.24	24 37	54 87
5	Optimization of Western Railway	MRVC/WR	Work yet to start on New Station at Oshiwara EA / EMP yet to be prepared Work ongoing on lengthening of platform Environmental audit undertaken for similar work as part of work on Borivili-Virar. Generic mitigation measures recommended to WR.	01/2004	10 43	0 00	10 43
6	Optimization of Central Railway	MRVC/CR	Ongoing work No EA/EMP necessary Work yet to start on remodeling of Kalyan Yard EA/EMP to be prepared	01/2001 10/2002	20.73	0 00	20.73

[1] In some cases of the Rail Transport Component the sub-components which require safeguard documentation are also separately discussed .

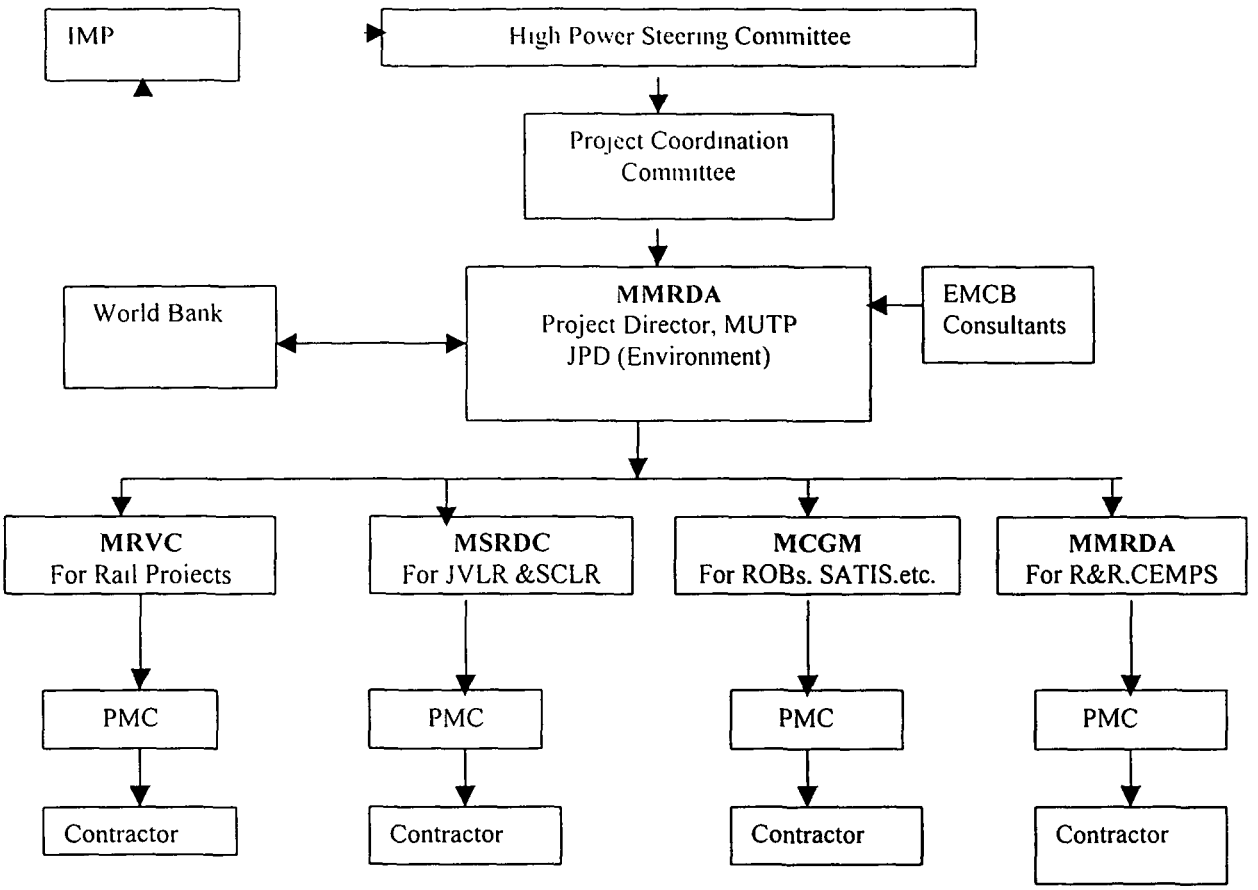
Table 4 (contd)

7	Optimization of Harbour Line	MRVC/WR /CR	Ongoing work. No EA/EMP necessary	01/2002	4 10	0 00	4 10
8	EMU maintenance facilites	MRVC/WR /CR	Work yet to start EA/EMP to be prepared	08/2002	10 41	0 00	10 41
9	New Rolling Stock	MRVC	Yet to start No EA/EMP necessary	01/2003	283 18	229 58	53 60
10	Stabling Lines	MRVC	Yet to start No EA/EMP necessary	01/2003	7 02	0 00	7 02
Road Transport Component							
1	Jogeshwari-Vikhroli Link Road	MSRDC	Phase I ready for implementation EA and EMP prepared. Phase II (middle section) under preparation EA and EMP partly undertaken – to be completed after feasibility report is submitted	12/2002 10/2004	20 20 3 7	4 04 0 74	16 16 2 96
2	Three ROBs at Jogeshwari South and North and Vikhroli	MCGM	Jogeshwari(S): ready for implementation pending R&R work EA and EMP to be ready by July 2002 Jogeshwari(N): ready for implementation pending R&R work. EA and EMP to be ready by July 2002 Vikhroli: ready for implementation pending R&R EA and EMP to be ready by July 2002.	10/2003 01/2003 01/2003	9 85 7.02 5 91	1 97 1 40 1 18	7 88 5.62 4 73
3	Santacruz Chembur Link Road	MSRDC	Engineering feasibility along with EA and EMP is under progress. Independent review of EA, EMP will be undertaken.	10/2003	26 36	5 27	21 09
4	Pedestrian grade separators schemes (subways and foot over bridges) -	MCGM	Detailed engineering along with EA / EMP is under progress. Total of 30 subprojects	01/2003	14.78	2.96	11.82

Table 4(contd.):

5	Station area traffic Improvement schemes (SATIS)	MCGM	Detailed engineering along with EA / EMP is under progress Total of 6 subprojects	01/2003	14 78	0 00	14 78
6	Area Traffic Control	Traffic Police	Ready for Implementation No EA/EMP necessary	11/2002	12 32	2 46	9 86
7	Other Traffic Management and Safety Schemes (footpath improvements, junction improvements, and other area specific schemes)	MCGM	To be prepared No EA/EMP envisaged	05/2003	11 09	2 22	8 87
8	Bus Procurement	BEST	Under preparation. No EA/EMP necessary	03/2003	22 17	0 00	22 17

Figure 2: INSTITUTIONAL MECHANISM FOR IMPLEMENTATION OF EMP[2]



2 The Institutional mechanism proposed is essentially applicable to the construction phase. The PMCs and Contractors shown in the dotted box will cease to function after the construction phase EMP implementation and monitoring during the operations phase will be guided and assisted by Environmental Management and capacity Building Consultants and then rest is applicable for operation phase

INVOLUNTARY RESETTLEMENT

Magnitude of Land Acquisition and Resettlement

66 Total land proposed to be acquired for the transport project is **59.07**ha out of which **34.80** ha is for railway projects and **24.27** ha is for road projects The total number of PAH is 19228 of which 14429 are affected by railway projects and 4749 are affected by road projects The PAHs include legal occupants of land to be acquired as well as the squatters on the land already owned by the Project Implementing Agencies (PIA) The land required for resettlement of PAHs is 47 1 Ha Most of the PAHs are squatters. The number of landowners whose land is to be acquired is 109. Sub project wise details of land to be acquired and PAH to be resettled is given in **Table 5**

Table 5: Magnitude of Land Acquisition and Resettlement

Sr. No	Sub-project	Private land to be acquired in Ha.	PAH
	Rail Transport Component	**34.80**	**14479**
1	5th Line between Mahim and Borivali	Nil	515
2	5th and 6th Lines between Kurla and Thane	0.74	2131
3	Borivali-Bhayendar-Virar additional pair of lines	34.06*	501
4	Optimization Suburban Railways	Nil	11332
	Road Transport Component	**24.27**	**4749**
1	ROB at Jogeshwari -South	20.11	901
2	ROB at Jogeshwari - North	3.06	514
3	ROB at Vikroli	Nil	173
4	Jogeshwari-Vikroli Link Road	Already with PIA	890
5	Santacruz-Chembur Link Road	1.10	2171*
6	Station Area Traffic Improvement Schemes	Nil	100*
7	Pedestrian Subways & Bridges	Nil	Nil
	Total	**59.07**	**19228**

** Provisional*

It should be noted that PAH are not necessarily located on the land to be acquired for the project In fact majority of PAH is located as squatters on land already in possession of PIA.

R & R Policy

67 GOM in March 1997 adopted an R & R Policy for the R & R of PAH affected by the MUTP The main objective of the R & R Policy is to avoid or minimize the displacement by exploring all the viable alternative designs and where unavoidable execute the resettlement action plan to enable the project affected persons to improve their living standards. The key entitlements of PAH described in the Policy are highlighted below;

Compensation for Land:

68 Landowners, whose land is acquired under the Land Acquisition Act 1894, will be entitled to monetary compensation at the market value of the land along with a 30 % solatium in view of the compulsory nature of acquisition If such landowners are also the residents of the location they would be entitled to alternate accommodation as described below.

Shelter Related Entitlement

69 Every eligible household (irrespective of his legal status) losing a dwelling place shall be entitled to a dwelling unit of minimum of 225 sq ft. at an alternate site free of cost Similarly every PAH losing a commercial structure shall be eligible for an alternate place for commercial use of equivalent area free of cost. Where the PAH is a landowner or a legal tenant he is entitled to additional floor space at the construction cost. The total floor space in such case does not exceed the area occupied prior to resettlement or 70 sq.m Whichever is less The resident land owner or the legal tenant has the option to choose cash compensation equivalent to the construction cost of 225 sq.ft Dwelling unit in lieu of free dwelling unit This is provided to top up the compensation under the Land Acquisition Act in order to provide the replacement cost As the dwelling units will be in multi-storied buildings, the tenure of the dwelling unit will be transferred to PAH as a member of the cooperative housing society. The souses of the PAH will be joint members of the co-op

Compensation for Economic Losses

70 Availability of land being the major constraint in the city, it may not always be possible to provide in the close vicinity of the existing settlement to avoid loss of access to existing employment In such cases the affected households will be eligible for the compensation for the permanent loss of employment or extra travel cost. Similarly a special package will be worked out for the vulnerable PAHs such as households below the poverty line, the women headed households, the handicapped and the aged. This special package includes to access to credit through community development fund linked with savings, allotment of ground or first floor of dwelling units, adjustments with payment of maintenance charges, special training programs for self employment, etc.

Gender Focus

71 Throughout the process of participation a gender focus has been consciously maintained. At the stage of carrying out the BSES itself, group meeting of women were held to understand their problems and also to make them aware of the R&R Policy. As a preparatory activity prior to resettlement, cooperative societies are being formed with adequate women representation. The committees on community environmental management too have specific women representation as they share a major responsibility in keeping the community clean. Mahila Milan actively supports women's self-help activities through savings and loans fund that helps income earning capacities. The housing rights in the co-operative housing society will be accorded jointly to the spouses of the PAH.

Resettlement Action Plan (RAP)

72. MMRDA has prepared RAP. This RAP contains the details on policy provisions and legal framework, magnitude of land acquisition and displacement, findings of socio-economic surveys and baseline characteristics, organizational responsibilities, the process adopted under two stage resettlement, generic time table for construction of transit and permanent housing, and consolidated costs and budgets. The RAP also identified criteria for judging the completion of R&R and monitoring indicators for physical and financial progress The RAP also describes the Community Environmental Management Plan (CEMP) The RAP

was released to the MMRDA's Public Information Center (PIC) and also SPARC's PIC in the field and the executive summary is also available in the PIC In addition, a brochure containing the key features of the project and magnitude of R&R and key features of the policy were also distributed and placed in PIC in both English and Marathi The executive summary is also placed in MMRDA's web site The Bank has placed the RAP in Bank's info shop at Washington and PIC in Bank's New Delhi Office

Procurement of Dwelling Units

73 The dwelling units required for the resettlement of the PAHs are proposed to be procured in three different ways,

Option A In this option building construction is directly contracted the PMU by following the World Bank procurement guidelines for works, on land obtained through TDR or land transferred by GOM. 7.97 ha of land has been identified for constructing about 4000 dwelling units under this option

Option B: The land and dwelling units are procured under this method by inviting competitive bids from developers against the TDR benefits that would accrue to the developers for land and the construction area (Please refer to paragraph 33 for details of TDR) Approximately 12000 dwelling units will be constructed under this option and the Executive Committee of MMRDA has approved the evaluation of bids on 22 February 2002. Work is expected to be awarded shortly.

Option C: Dwelling units already constructed by Maharashtra Housing and Area Development Authority (MHADA) are purchased in this option at a price ranging between Rs.125, 000 and Rs. 200,000 per dwelling unit depending upon the location. The TDR benefit accrues to MHADA in this case. 4000 Dwelling units under this option have already been procured

Resettlement Implementation Plans (RIP)

74 In addition to RAP, MMRDA with the assistance of NGOs (Society for Promotion of Area Resources Centers (SPARC), National slum Dwellers Federation (NSDF) and the Slum Rehabilitation Society (SRS)) will prepare RIP for each subproject. These will include subproject specific details particularly on the construction of houses and their designs, payment of compensation and allowances, specific time schedules, costs, etc. The draft was discussed with various stakeholders and the final version reflects the suggestions and views of implanting agencies, NGOs, PAHs and other stakeholders. The RIPs including CEMP have been prepared for four sub-projects to be implemented during the first year of the project (JVLR, Thane-Kurla 5th and 6th lines, Mahim-Borivali 6th line and the Optimization of Suburban Rail Services). The time table has been drawn for the preparation of the rest of the RIPs.

75 The implementation of RIPs will have significant cumulative impacts in the short and long term In the short run, the shifting of squatters along the safety zone of the railway tracks had a significant impact in the form of improved speed and frequency of the local trains, which in turn improve the efficiency of the suburban trains system in the city. This will have positive impact on 6 million rail commuters who use the trains in Mumbai. In the long run, the resettlement will translate the positive benefits to about 77,000 affected people in the form of secured housing with improved access to basic amenities and permanent places for reestablishment of about 1,500 petty business units and thereby improve overall living standards.

Community Environment Management Plan.

76 The objective of preparing CEMP is to provide access to basic urban environmental infrastructure services, and through community initiative and participation alleviate the environmental health risks of the community. The affected communities are largely squatters accustomed to a particular way of life. At the resettlement site, they will have to almost invariably adjust to the lifestyle of multi-storied buildings The communities will be trained and motivated to follow a discipline that can avoid environmental problems Separate Environmental Management Committees (EMCs) will be formed during RIP/CEMP preparation to take up this responsibility during post-resettlement stage The CEMP provides in simple non-technical local language preventive maintenance schedule for water supply, sanitation, solid waste etc The maintenance measures are translated into a simple non-technical format in the form of "Do's" and "Don'ts" in local languages for the use of the community at large.

Monitoring of Social (R&R) Component

77 A number of sub-projects will result in displacement of population. MMRDA and IMP will closely monitor the resettlement and rehabilitation process of the displaced population MMRDA in collaboration with SPARC and SRS will at regular intervals monitor the PAH concerns and perceptions through structured surveys as well as focus group discussions during the lifetime of the project It is proposed to carry out formal evaluation of achieving the objectives of R&R and the effectiveness of the process followed, 12 months after the resettlement for an individual RIP is implemented and once again on completion of the entire project This may provide feedback for the remaining R&R activities and the planning for the follow up project. Such evaluation will be carried out by an independent agency The outcomes to be monitored would cover,

- Quality of shelter
- Status of health (CEMPs will record environmental factors affecting the human health at the existing locations. However the health status is not formally covered in the BSES. Monitoring of this indicator will therefore seek data on health status during pre and post resettlement phases.)
- Employment and Income
- Access to amenities
- Participation and community empowerment
- Organizational capacities.

PRE-PROJECT RESETTLEMENT

Public Interest Litigation (PIL)

78 PIL petition was filed in August 1998 in which the petitioner prayed for the removal of encroachers along the railway tracks for ensuring safe and smooth running of the local trains The matter was discussed in the Bombay High Court on several occasions and the court had asked the government to provide a time bound plan for removing the encroachers along the safety zone of the railways track with or without resettlement. In response to this, the government had given a time frame for shifting the squatters during September 2000 According to this plan, the GOM had to shift all encroachers (about 10,000 families) by March 2001 The Additional Solicitor General subsequently verified the removal of squatters along the safety zone and in support of this showed the certificates to the court signed by the concerned railway officials The court in the final hearing in June 2001 had concluded that all encroachers have been shifted out of the safety zone except few religious

structures which will be shifted later and which require careful handling with out affecting the sentiments of the local people. Based on this information, the court concluded that the Indian Railways and GOM had complied with the court orders. Accordingly, the court has disposed the petition Subsequent to this there is one more PIL on one of the site for change in land use. However, since the government has followed the due process, the court has lifted the stay on proceeding with the construction. The resettlement entitlements and process followed during the pre-project resettlement activities are in accordance with policy provisions adopted for the project and endorsed by the World Bank

79 The implementation of resettlement program has already commenced and so far 3,935 households (20%) have relocated in 48 buildings in four different locations In addition 107 were also offered alternative shops to enable them to reestablish their petty shops. Another 6,125 (32%) are shifted to the transit housing will eventually be shifted to permanent houses within three years Because of delays in awarding of contracts, time taken for legal clearance for payment of cash supplement for construction of dwelling units using TDR, long time taken for change in land use for some of the resettlement sites and public interest litigations on change of land use for one of sites, shifting of about 3,000 households from transit to permanent houses will be eventually delayed by about 6- 9 months. The transit houses are being constructed by following the prevailing norms set by the Slum Rehabilitation Authority (SRA). The norms consist of a minimum of 120 sq. ft with common basic amenities such as one toilet seat for six families, one drinking water tap for 10 families, common washing place of 5m x 3m for 50 families, drains and individual electric connections. NGOs have supported both construction of transit houses and resettlement of the PAH to new locations.

80 There are also few instances of grievances and complaints regarding non-inclusion of some PAHs for allotment of houses. These have been dealt with in accordance with grievance redress procedure and those found eligible have been accorded the entitlements

R & R IMPLEMENTATION SCHEDULE AND THE BUDGET

81 The scale of resettlement involved is significant. However due to concerted efforts of GOM, MMRDA and the concerned NGOs it has been possible to resettle 10118 PAHs out of a total of 19228 PAHs by June 2001 (6261 in transit accommodation and 3857 in permanent dwelling units).

The target dates for the implementation program are,

- *Targets for March 2002*
  All the contracts for construction under Option B will be awarded (12000 dwelling units)
- *Targets for March 2002 to December 2002*
  Contracts for construction of permanent dwelling units under Option A will be awarded (4000 dwelling units)
- *Targets for June 2004*
  All the PAHs will begin to be resettled in permanent dwelling units
- *Targets for December 2004*
  Post resettlement rehabilitation of all the PAHs will be completed.

82 The R & R Component requires long period of resettlement because of time involved in identifying the suitable land for resettlement and process to be followed for changing the land use to resettlement, tender process, obtaining the statutory permissions for construction, time invoiced in construction, time involved in getting water, electricity etc In addition, the communities have to be prepared for living in multi storied apartments and provide them training to mange the cooperative societies The need for interim resettlement had arisen to respond to the High courts directive to shift all squatters residing on the safety zone of railway tracks on the safety considerations and improve the efficiency of railway operations in a time bound manner.

R & R Costs And Budgets

83. The total cost of resettlement is given in **Table 6.**

Table 6: Cost of R & R Component

Description	Rs. In Million	US $ million
1. Land Acquisition	460	9.58
2 R & R Assistance	34	0.71
3 Civil Works for construction of Transit and Permanent Dwelling Units for Resettlement of PAH and Relocation of Community Assets	3925	81 78
4. R & R Consultancies for RIP and CEMP preparation, impact evaluation and project management & supervision	657	13 69
7. Total	**4663**	**97.14**

Of the above budget, pre-resettlement activities have incurred Rs 689.10 million (Us $ 14.5 million) for purchase of ready built houses, construction of transit houses and implementation provided by the NGOs Out of the above costs, the World Bank will not finance cost of land acquisition and R & R Assistance Moreover the cost could vary depending upon the actual number of PAHs

CONSULTATION AND DISCLOSURE

Pubic consultation has been adopted since early stages of project preparation. The consultation process is highlighted below.

Consultations During CTS (1994)

84 Proposals of CTS were presented to various PIAs, Government agencies and NGOs who generally endorsed the strategy of PT+DM recommended by the CTS. These considerations have also reflected in the MUTP now proposed for implementation.

Consultation During Environmental Assessment (1997)

85 The findings of the Environmental Assessment carried out by the consultants were first presented in a Workshop held on 2nd June 1997. The participants included the representatives of the government departments, local authorities, project implementation agencies and the consultants in the transport and environment field The clarifications and suggestions were then incorporated in the final reports.

Consultation for R&R

86. The consultation process in case of R & R began with the BSES undertaken by the NGOs and has been a continuous process since then BSES involved explaining the GOM's policy of R & R to PAH During the formulation of RIP and CEMP, more intensive consultation takes place to decide the location of resettlement, design of building, community facilities required and the procedure to be followed for maintaining the multi-storied settlement. The main techniques used for ensuring public participation and their expected outcomes are described below Engaging NGOs and CBOs to carry out Baseline Socioeconomic surveys

through the active participation of the community identified and strengthened the local community network and motivated it to actively participate in the process of planning for resettlement Formation of cooperative societies with community willingness is the key to management of the shelter and local environment. During the preparation of CEMP, local Environmental Management Committees (EMC) were formed and trained in maintenance and management of individual service. This effort toward preparing the community to adapt to new life style in multi-storied buildings will be helpful in maintenance of the local environment and services

87 Some of the outcomes of the consultation process revealed the critical importance of reestablishing the access to public services such as ration shops that supply food under the Public Distribution System, transfer of names in the electoral rolls, admission to nearby municipal schools etc. Assistance was extended through the NGO in this regard where resettlement has taken place. At the design stage particularly where multi-storied buildings are involved the critical issue was whether the buildings should be walk-ups or with elevators Wherever possible walk-ups have been preferred Similarly a preference mechanism was also worked out for allotting the dwelling units on the ground floor to the handicapped and the aged.

88. Some sections of the society however perceive R & R Policy as a way of rewarding illegal squatting at the cost of society at large and therefore strongly resent such a policy.

Consultation on Updated EA

89 With the passage of time and substantial developments like construction of flyovers that had occurred, the EA was updated. A consultation workshop involving academia, environmental experts, consultants, NGOs and representatives of PIAs and the World Bank was organized on November 20, 2000 for presentation of updated EA

Public consultation with PAH

90. A public consultation workshop was organized predominantly for the PAH on the 13th December 2000. The response from the participants highlighted the importance of maintaining local environment - solid waste management, storm water drainage, sewerage and water supply Respondents particularly women, based on their personal experiences emphasized the importance of community efforts in keeping the buildings and the surroundings clean by timely removal of garbage. Based on this response, it is proposed to pay particular attention to solid waste disposal in preparing CEMPs as a part of preparing sub- project specific RIPs.

PUBLIC CONSULTATION ON CONSOLIDATED EA IN 2001

Public consultation workshops for cross sections of society on November 23, 24, and 30, 2001

91 A public consultation workshop was organized for cross section of the society on the 23rd November 2001. A public consultation workshop on the 24th November 2001was organized predominantly for the project-affected persons Public consultation workshop for general public was carried out on November 30, 2001 The consultation workshops were carried out following the Bank guidelines and all the basic disclosure requirements. These workshops held on November 23, and 30, 2001 were attended by representatives of leading NGOs of Mumbai such as Save Bombay Committee, Bombay Environmental Action Group, Humlog, Clean Air, Netra, SPARC, SOCLEEN etc. In addition there were representatives from the media, the private sector, R &D Institutions, Environmental Consultants, Project Implementing Agencies and also the members of the public

92. The above consultation in process is summarized in **Table 7**

Table 7 : Details of Consultation Process

DATE	VENUE	TARGET AUDIENCE	MEANS OF COMMUNICATION	RECORDS MAINTAINED
Sectoral EA				
June 2, 1997	Yashwantrao Chavan Centre Nariman Point	Representatives of the government departments, local authorities, project implementation agencies, academia and the consultants in the transport and environment field	Letters of Invitations along with Executive Summary of EA report	List of participants, Minutes of the Meeting
Updated EA				
November 20, 2000	Conference Room, MMRDA	Environmental experts, Consultants, Academia, representatives of government departments, NGOs and of project implementing agencies and the World Bank	Letters of Invitations along with Executive Summary of EA report	List of participants, Minutes of the Meeting
December 13, 2000	Office of Divisional Engineer, Mankhurd	Project Affected Households (PAHs), NGOs	▪ Public Notices in leading English and Marathi newspapers, ▪ Draft Updated EA report, Executive Summary kept at PICs, ▪ Pamphlets, Non-technical Summary of EA report in English and Marathi were distributed to PAHs through NGOs well in advance	List of participants, Minutes of the Meeting, Photographs,
December 14, 2000	Yashwantrao Chavan Centre	General public, Civil Society, NGOs, Journalists	Same as above	List of participants, Minutes of the Meeting, Photographs,

Table 7 (Contd..)

Consolidated EA				
November 23, 2001	Mumbai Marathi Patrakar Sangh, CST Mumbai	General public and civil society, NGOs, Representatives of the government departments, local authorities, project implementation agencies, World Bank, academia and the consultants in the transport and environment field, Journalists	▪ Public Notices in English, Marathi and Hindi in leading newspapers, ▪ Draft Consolidated EA report, Executive Summary in English and kept at PICs in advance ▪ Pamphlets in English, Hindi and Marathi distributed amongst the general public and in the project affected areas through environmental and social NGOs. ▪ Public Notice and Executive Summary kept on MMRDA's web site well in advance.	List of participants, Minutes of the Meeting, Photographs, e-mail messages, letters written communications received **MUTP approach was endorsed but early implementation was emphasized**
November 24, 2001	Goregaonkar English School, Goregaon (West) Mumbai	Project Affected Households (PAHs), NGOs, Representatives of the project implementation agencies, World Bank, Journalists, etc	**Same as above**	List of participants, Minutes of the Meeting, Photographs, **Need for Commuter friendly platforms was emphasized**
November 30, 2001	Maharashtra Chamber of Commerce and Industries, Kalaghoda, Mumbai	General public, civil society, NGOs, Representatives of the government departments, local authorities, project implementation agencies, World Bank, academia and the consultants in the transport and environment field, Journalists,	**Same as above. The hard and soft (CD) copies of the entire Consolidated EA report in English and the copies of Executive Summary in English and Marathi were distributed to general public and NGOs on demand.**	List of participants, Minutes of the Meeting, Photographs, **Need to provide attention to pedestrian facility and safety was emphasized**

Public Opinions, Concerns and Responses

93 From the series of public consultations organized by MMRDA on November 23, 24 and 30, 2001, it was observed that overall there is a strong support for MUTP People were more concerned about the delay in actual implementation of the project Following major issues that emerged from the three public consultation workshops held on November 23, 24, and 30, 2001 on the basis of draft consolidated EA were considered by MMRDA

94 A strong case was made for providing adequate facilities for safe movement of pedestrians Concerns were also expressed about the road maintenance and safety. The project supports a program of pedestrian grade separation facilities at busy intersections and widening and strengthening footpaths with a total provision of Rs 600 million Similarly, a provision of Rs. 450 million is proposed for traffic management schemes and road safety measures. The project emphasizes the Institutional Strengthening by supporting creation of a Traffic Management Unit (TMU) in MCGM. A provision of Rs. 50 million is made for 'Technical Assistance to TMU' and a separate provision of Rs 40 million is made for 'Accident Data Recording, Analysis and Report System'

95 Suggestions were made for making the railway platforms more user-friendly. Attention was drawn to the railway passengers' safety due to fast moving trains on the platforms Project supports a study for Station Design and Engineering, which could help provide user friendly and environmental friendly situation on the railway platforms

96 One of the concerns related to direct and indirect impact of the earthwork required for the project Large amount of earth required to be quarried may lead to degradation of the area where quarries are located. Similarly, disposal of construction debris may have adverse environmental impacts The EMPs of individual sub-projects of MUTP have been prepared which have recommended mitigation measures along with post project monitoring plan for concerned quarry areas

The project description presented earlier is a revised version that takes into account main concerns expressed during the consultation process.

PUBLIC INFORMATION CENTERS (PIC)

97 MMRDA has established two Public Information Centers, one at the MMRDA office and the other at Mankhurd, a project site. Documents and information related to MUTP Project summaries, EA reports, R&R Policy and Resettlement Action Plan RIP and CEMPs, etc are made available at these PICs. Written comments or suggestions will also be received at the PICs The PICs will receive grievances from public, in respect of implementation of mitigating measures from the concerned citizens These will be referred to the concerned PIA and reports will be obtained and kept at the PICs on the corrective actions taken.

ANNEX 1: Project Preparation Studies

Sr.No.	STUDY	AUTHOR / CONSULTANT	YEAR
TRANSPORT			
1	Comprehensive Transport Plan of MMR	WS Atkins and Associates	1994
2	Feasibility Study of Area Traffic Control	Pell Frieshmann Consultants	1996, 1998
3	Detailed Feasibility and Engineering Study of Road Components	Wilbur Smith and Associates	Jan 2002
4	Feasibility and Engineering of SCLR	Consulting Engineering Services	Completion due May 2002
5	Updating of Engineering of JVLR	Consulting Engineering Services	Completion due Feb 2002
6	Feasibility and Engineering of Pedestrian Underpasses	Multiple Consultants	Completion due March 2002
7	Feasibility and Engineering of SATIS	Multiple Consultants	Completion due March 2002
8	Railway System Simulation Study	WS Atkins	August 1997
9	Railway Institutional and Finance Study	Symonds Traverse & Morgan Ltd	April 1997
10	Specifications for EMU Rolling Stock	De Consult	March1998
11	Conversion of DC to AC Traction	IR	1998
12	Techno Economic Feasibility Studies of Rail Sub-Projects	IR and Consultants	1998
Environment			
1	Environmental Impact Assessment of MUTP	AIC Watson Pvt Ltd	1998
2	Environmental Impact of Flyover Program	TCS	1999
3	Updating EA and Preparing Consolidated EA of MUTP	Montgomery Watson, Serene Environmental Consultants.	2000 to 2002
4	Strengthening of Air Quality Monitoring in MCGM	Environmental Management Center	2001
5	Particulate Matter Reduction Plan for Greater Mumbai	NEERI	Completion due July 2002
6	EMP of ROBs	ERM India Ltd	Jan 2002
7	EMP of JVLR	ERM India Ltd.	Completion due Feb 2002
8	EMP Of Rail Transport Component	Serene Environmental Consultants	Jan 2002

ANNEX 1(contd.)

R & R			
1	Formulation Of R & R Policy	GOM Task Force	1995
2	Baseline Socio Economic Survey of PAHs PAHs – Separate reports are available foe each sub-project	SPARC & SRS	1995 to 2002
3	Resettlement Action Plan	MMRDA	2001
4	Resettlement Implementation Plans and Community Environment Management Plans Separate reports for sub-projects to be implemented in the first year are available.	SPARC	Jan 2002
5	CEMPs for the Transit and Permanent Sites	Multiple Consultants	January 2002

ANNEX 2 : MUMBAI URBANTRANSPORT PROJECT: PROJECT COSTS AND SOURCES OF FUNDS

S No	Components	Implementing Agency	Total Cost Rs million	Total Cost	Bank Fund	Counetrpart
				US$ million		
A	**Rail Transport Component**					
	Associated Infrastructure Works	MRVC	10091	210 23	-	210 23
	Maintenance - Carshed Works	MRVC	672	13 99	11 19	2 80
	Other AC-DC works	MRVC	2686	55 97	-	55 97
	TA/Studies for IS and Pre-investment	MRVC	395	8 23	8 23	-
	Maintenance carshed Consultancy	MRVC	40	0 82	0 82	-
	Refurbishing of 73 Rakes	MRVC	2246	46 80	-	46 80
	Manufacturing of 8 Rakes	MRVC	502	10 46	-	10 46
	73 Kits for RDSO Technology Rakes	MRVC	5891	122 73	122 73	-
	20 New Technology Rakes	MRVC	4838	100 78	100 78	-
	8 kits for new technology rakes	MRVC	1118	23 29	23 29	-
	DC to AC Conversion - Electrical	MRVC	807	16 81	16 81	-
	DC to AC Conversion - Signal & Telecom	MRVC	587	12 23	12 23	-
	Track Machines	MRVC	310	6 46	6 46	-
	Maintenance Carshed Equipment	MRVC	113	2 35	2 35	-
	Subtotal(Works)		13449	280 19	11 19	269 00
	Subtotal(Services)		435	9 05	9 05	-
	Subtotal(equipment)		16412	341 91	284 65	57 26
	Sub-Total Rail Transport Component		**30296**	**631.16**	**304 90**	**326.26**
B	**Road Transport Components**					
	JVLR Roads & Bridges (Phase 1)	MSRDC	970	20 20	16 16	4 04
	JVLR Roads & Bridges (Phase 2)	MSRDC	177	3 70	2 96	0 74
	Jogeswari (South) ROB	MSRDC	473	9 85	7 88	1 97
	Jogeswari (North) ROB	MSRDC	337	7 02	5 62	1 40
	Vikhroli ROB	MSRDC	284	5 91	4 73	1 18
	Santacruz - Chembur Link Road	MSRDC	1265	26 36	21 09	5 27
	Pedestrian Subways and Bridges	MCGM	710	14 78	11 83	2 96
	SATIS/Related Safety Schemes	MCGM	710	14 78	14 78	-
	(INR 300+150 m)	MCGM	532	11 09	8 87	2 22
	ATC	MCGM	591	12 32	9 85	2 46
	Equipment (IT related & others)	MMRDA	170	3 55	3 55	-
	Buses	BEST	1064	22 17	22 17	-
	Supervision consultancy for Road Works	MSRDC	65	1 34	1 34	-
	FSR and DPR for JVLR (Phase 2)	MSRDC	43	0 90	0 90	-
	Supervision services for ROBs (3 contracts)	MCGM	43	0 90	0 90	-
	ATC Supervision & Design	MCGM	108	2 24	2 24	-
	TA for TMU of MCGM and Training	MCGM	54	1 12	1 12	-
	contracts)	MCGM	54	1 12	1 12	-
	Reporting Sytem TA	MCGM	43	0 90	0 90	-
	Training	MMRDA	110	2 28	2 28	-
	Pre-investment studies	MMRDA	215	4 48	4 48	-
	Consultancy for transport strategy study	MMRDA	86	1 79	1 79	-
	Strategy	MMRDA	27	0 56	0 56	-
	Management	MMRDA	54	1 12	1 12	-
	TA for IS and reform of BEST	BEST	108	2 24	2 24	-
	Subtotal (Works/Contracts)		6048	126 01	103 76	22 25
	Subtotal (Services)		1007	20 98	20 98	-
	Subtotal (goods)		1235	25 72	25 72	-
	Sub Total. Road Transport Component		**8290**	**172.71**	**150.47**	**22.25**
C	**R & R and L.A. Components**					
	Providing permanent Houses - Option A	MMRDA	954	19 87	17 88	1 99
	Providing Permanent Houses - Option B	MMRDA	1958	40 80	36 72	4 08
	Providing Permanent Houses - Option C	MMRDA	645	13 44	12 09	1 34
	implementation support)	MMRDA	100	2 08	1 88	0 21
	Service Contract for transit tenements (stage I)	MMRDA	65	1 35	1 22	0 14
	Service Contract for transit tenements (stage II)	MMRDA	169	3 53	3 17	0 35
	Relocation of Community Assets	MMRDA	34	0 71	0 63	0 07
	R&R Assistance	MMRDA	34	0 71	-	0 71
	housing (about 8 contracts)	MMRDA	102	2 12	2 12	-
	Impact evaluation consultancy	MMRDA	34	0 71	0 71	-
	Implementation Support	MMRDA	68	1 41	1 41	-
	Training	MMRDA	56	1 17	1 17	-
	LA for R & R - Rail component	MRVC	460	9 58	-	9 58
	Subtotal(Works)		3,925	81 78	73 60	8 18
	Subtotal(Services)		753	15 69	5 40	10 29
	Subtotal(equipment)					
	Components		**4,678**	**97.47**	**79.00**	**18.47**
	Incremental Operating Cost		422	8 79	-	8 79
	Taxes on consultancy		329	6 86	-	6 86
	Taxes on equipment		882	18 38	-	18 38
D	PPF Reimbursement		144	3 00	3 00	-
E	Front-end fee		222	4 63	4 63	-
	Grand Total		**45,264**	**943.00**	**542.00**	**401.00**

ANNEX 3: National Ambient Air Quality Standards (NAAQS) and Ambient Noise Standards

Pollutants	Time Weighted Average	Concentration in ambient air			Method of measurement
		Industrial Area	Residential Rural & other areas	Sensitive Area	
Sulphur Dioxide(SO_2)	Annual Average*	80 µg/m^3	60 µg/m^3	15 µg/m^3	- Improved West and Geake Method - Ultraviolet Fluorescence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Oxides of Nitrogen (as NO_2)	Annual*	80 µg/m^3	60 µg/m^3	15 µg/m^3	- Jacob & Hochheiser Modified (Na-Arsenite) Method - Gas Phase Chemiluminescence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Suspended Particulate Matter (SPM)	Annual*	350 µg/m^3	140 µg/m^3	70 µg/m^3	High Volume Sampling, (Average flow rate not less than 1.1 m^3/minute)
	24 hours**	500 µg/m^3	200 µg/m^3	100 µg/m^3	
Respirable Particulate Matter (PM10), size less than 10 µm)	Annual*	120 µg/m^3	60 µg/m^3	50 µg/m^3	Respirable particulate matter sampler
	24 hours**	150 µg/m^3	100 µg/m^3	75 µg/m^3	
Lead (Pb)	Annual*	1.0 µg/m^3	0.75 µg/m^3	0.50 µg/m^3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m^3	1.00 µg/m^3	0.75 µg/m^3	
Carbon Monoxide (CO)	Annual*	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3	Non dispersive infra red Spectroscopy
	24 hours**	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3	
Ammonia	Annual*	100 µg/m^3	100 µg/m^3	100 µg/m^3	
	24 hours**	400 µg/m^3	400 µg/m^3	400 µg/m^3	

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval

** 24 hourly/ 8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but on two consecutive days

NOTE

1 National Ambient Air Standards The levels of air quality with an adequate margin of safety, to protect the public health, vegetation and property

2 Whenever and wherever two consecutive values exceed the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations

Ambient Noise Quality

Area	C.P.C.B. Standards	
	Day dB/A	Night dB/A
Residential	55	45
Commercial	65	55
Traffic near Industrial Area	75	70
Airport area	65	55
Silence zone	50	40

C.P.C.B – Central Pollution Control Board, GOI

ANNEX 4: Sectoral EMP Implementation Framework

Parameter	Mitigation Measures	Responsibility	Time Frame	Supervision
AIR POLLUTION				
Regulatory Measures	Stringent emission standards, Use of Clean Fuel etc.	Govt of India	Already in progress	Not Applicable
Policy Measures.	Several policy measures have been suggested for use of clean fuel, scrapping of obsolete vehicles etc. Several of such measures are pending clearance from Mumbai High Court.	GOI / GOM	Policies are in various stages of being drawn up e.g Mumbai High Court decision of October 2001 requires vehicles more than 15 years to be scrapped or convert to CNG.	Various agencies as and when policies are implemented
Administrative Measures	Strict enforcement of vehicular air emission standards.	RTO	Already in progress	GOM/ Project intends to support improved vehicle maintenance and inspection practices
	Enhancing of the current air quality-monitoring network of MCGM as per recommendation given in the study " Strengthening the Air Quality Monitoring Network Operated by MCGM" completed in year 2000.	MCGM	To commence along with MUTP project implementation	MMRDA
	To develop PM_{10} abatement strategy	Various agencies identified in the on-going study.	Study commenced by MMRDA in Sept. 2001 due for completion in June 2002	MMRDA to facilitate agreed action plan by March 2003

Annex 4 (Contd .)

Parameter	Mitigation Measures	Responsibility	Suggested Time Frame	Supervision
NOISE				
Policy Measures	Explicit policy for noise reduction from vehicle engines, exhaust, tyre and road surface.	RTO	Fixing of time frame is not possible at this point	
	Reducing traffic noise impact by placing noise barriers to the extent feasible as recommended in EMPs of road transport sub-projects	PIAs		MMRDA
Administrative Measures	Monitoring of noise levels at sensitive receptors Identifying sources of noise	MCGB & RTO	Within 1 year	MMRDA
SOCIAL IMPACT				
Policy Measures	R & R Policy and RAP prepared PIA - MMRDA is responsible for entire R& R An independent Monitoring Panel has been appointed to monitor the same	GOM	Already done	
Administrative Measures	Project affected households to be rehabilitated as per the RAP and project specific RIP, CEMP	PIA	To be done before construction	MMRDA
Ecological Impacts				
Administrative Measures	Strict enforcement of DCRs to prevent development in ecologically fragile areas, particularly in CRZ.	UD/ MCGM	Already being done	MMRDA
Traffic Management and Road Safety				
Policy	Strengthening traffic and transportation planning, traffic operation, traffic signals and signs, and area traffic control, road maintenance and road safety.	RTO, MCGM – TMU	In Progress – To be strengthened during MUTP.	MMRDA
Administrative	Modal integration outside railway station, control of on-street and off-street parking, management of traffic demand, power to collect certain parking fees and supplementary charges on road traffic.	RTO, MCGM-TMU	To be established during MUTP.	MMRDA

ANNEX 5: Monitoring and Reporting Process

Construction Stage	Reporting Parameter	Reporting Format Number	Contractor Reporting Frequency to PMC	PMC Reporting Frequency to PIA	PIA reporting Frequency to MMRDA	MMRDA reporting Frequency to World Bank	World Bank desired supervision
Pre-Construction	Trees to be removed		Monthly	Monthly	Monthly	Quarterly	--
	PAH R&R		--		Monthly	Quarterly	Half-yearly
	Relocation of utility and community resources		Monthly	Monthly	Monthly	Quarterly	
Construction	Fugitive dust mitigation		Daily	Monthly	Monthly	Quarterly	Half-yearly
	Condition of construction equipment w.r t. noise and emissions		Daily	Monthly	Monthly	Quarterly	Half-yearly
	Identification of soil erosion locations and measures taken		One time	One time	One time	--	--
	Road –side and compensatory plantation schedule		Monthly	Monthly	Quarterly	Quarterly	Half-yearly
	Plantation survival rate reporting		Monthly	Monthly	Quarterly	Quarterly	Half-yearly
	Pollution monitoring		Monthly	Monthly	Monthly	Quarterly	Half-yearly
	Debris disposal plan/locations.		Weekly	Monthly	Quarterly	Quarterly	Half-yearly

Annex 5 (Contd .)

Construction Stage	Reporting Parameter	Contractor Reporting Frequency to PIA	PMC Reporting Frequency to PIA	PIA reporting Frequency to MMRDA	MMRDA reporting Frequency to World Bank	World Bank desired supervision
Construction	Top soil Management	Monthly	Monthly	Monthly	Quarterly	
	Quarry identification and management	Monthly	Monthly	Monthly	Quarterly	Half yearly
	Occupational safety and health	Weekly	Monthly	Monthly	Quarterly	Half yearly
	Labor camp set-up and hygiene	Weekly	Monthly	Monthly	Quarterly	Half yearly
	Road safety measures	Weekly	Monthly	Monthly	Quarterly	Half yearly
	Site enhancement implementation plan at water bodies, road junctions etc	Monthly	Monthly	Monthly	Quarterly	Half yearly
Operation	Pollution monitoring schedule and reports	--	--	Monthly	Quarterly	Half-yearly

ANNEX 6: Roles/Responsibilities and Strengthening of Institutions

ORGANISATION	ROLES & RESPONSIBILITIES	STRENGTHING REQUIRED
(Mumbai Metropolitan Region Development Authority (MMRDA)	Review of implementation of Environmental Mitigation Measures (EMPs) for MUTP projects Ensure adequate Resettlement and Rehabilitation of PAH Facilitate implementation of policy directives/ emission laws etc for pollution prevention/mitigation by interacting with various the government departments like Environment Department, Urban Development Department, and RTO etc Review the environmental management capabilities of implementing agencies, particularly municipal authorities and to assist them in developing their capabilities. Obtain and analyze environmental information generated by organizations like MCGM, MPCB, and RTO etc. and factor them into short term and long term planning process for overall sustainable development of MMR.	Enhance the capabilities of the existing "Environmental Cell" of MMRDA by out sourcing whenever required Training needed in □ Environmental assessment, social impacts. □ Appreciation of Environmental impacts and EMPs identified for related MUTP projects Procedure and responsibilities for EMP implementation, monitoring and reporting etc
Municipal Corporation of Greater Mumbai (MCGB)	Monitoring of ambient air quality and noise at existing locations. Extending monitoring network to MUTP project locations for post-project monitoring. Regular report to MMRDA to enable environmental planning at a regional level.	MCGM is operating air quality monitoring network for last several years and already have trained personnel. Training in relation to Quality Assurance, data analysis and dissemination and other issues as suggested in the report "Study for Strengthening Air Quality Monitoring network of MCGM, Nov 2000) However the existing staff and monitoring equipment need to be upgraded for the additional monitoring load due to MUTP project.

ANNEX 6 (contd.)

ORGANISATION	ROLES & RESPONSIBILITIES	STRENGTHING REQUIRED
Public Works Department (PWD), Maharashtra State Road Development Corporation (MSRDC)	Ensuring implementation of EMPs for related MUTP projects through PMC/contractors Carrying out Environmental Assessments of all related on-going and future Transport Projects	Environmental appraisal capabilities of existing staff to be enhanced through training programs. Short term module type training programs needed for: □ Environmental assessment, social impacts. □ Appreciation of Environmental impacts and EMPs identified for related MUTP projects. Procedure and responsibilities for EMP implementation, monitoring and reporting etc.
Railways/Mumbai Rail Vikas Corporation (MRVC)	Ensuring implementation of EMPs for related MUTP projects through PMC/contractors Carrying out Environmental Assessments of all related on-going and future Transport Projects	Environmental appraisal capabilities of existing staff to be enhanced through training programs. Short term module type training programs needed for: □ Environmental assessment, social impacts. □ Appreciation of Environmental impacts and EMPs identified for related MUTP projects. Procedure and responsibilities for EMP implementation, monitoring and reporting etc.
Transportation Service Organizations (BEST)	Ensuring regular emission and maintenance checks on the bus fleet to ensure compliance with regulations. Good housekeeping in existing Bus-Depots to minimize water and land pollution from oil spills and waste oil disposal	Emission monitoring capabilities of the bus fleet to be strengthened. Environmental awareness training of key personnel
Enforcement/ Regulatory Organizations Regional Transport Office (RTO)	Enforcement of vehicular emission standards, with more emphasis on heavy vehicles, taxies and 3 wheelers	Environmental awareness training for its vigilance staff so that they can appreciate the importance of their role and carry out the same diligently Training also needs to include criteria and techniques for vehicle inspection and certification