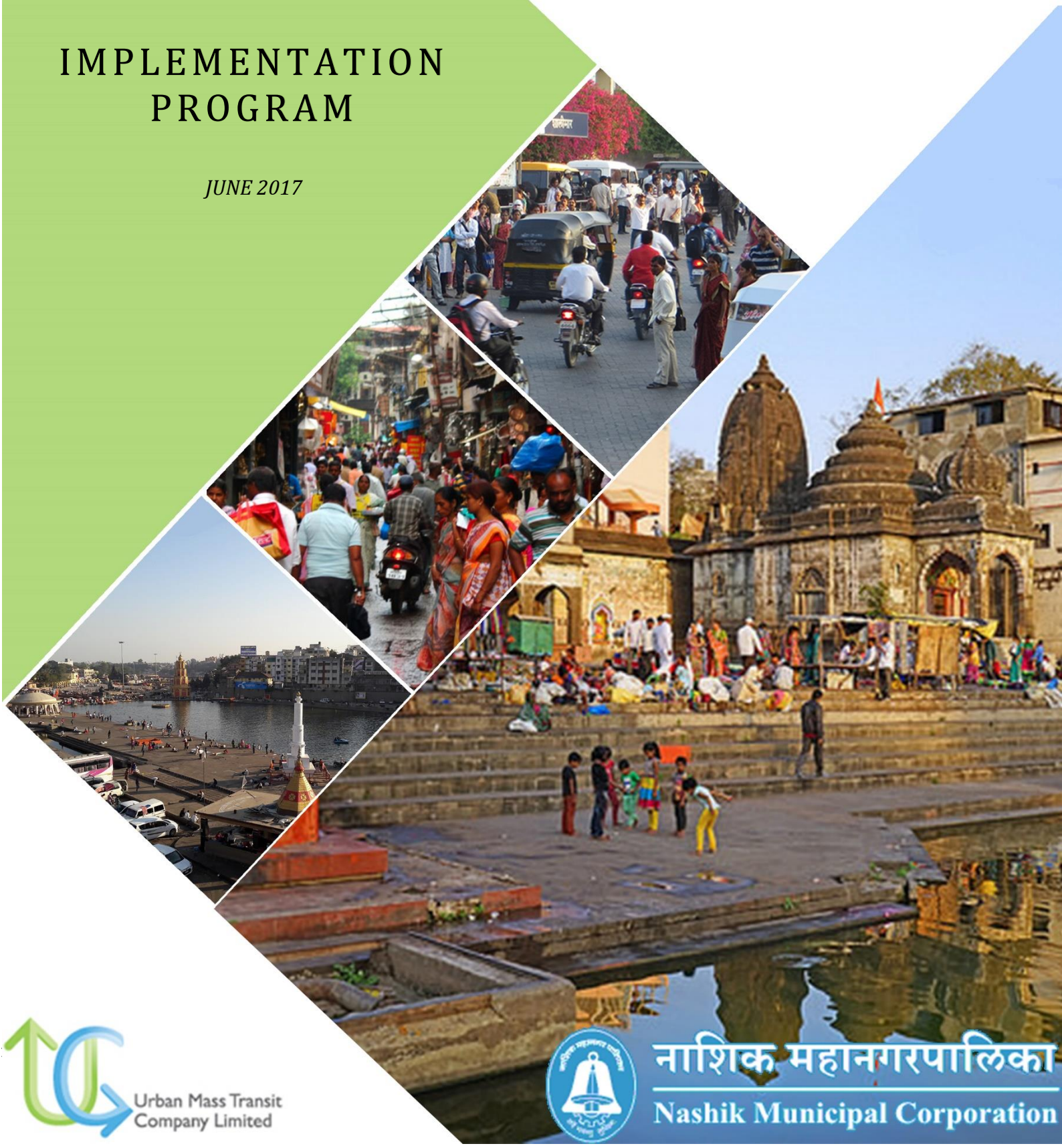
COMPREHENSIVE TRAFFIC & TRANSPORTATION PLAN FOR NASHIK

IMPLEMENTATION PROGRAM

JUNE 2017



Urban Mass Transit Company Limited

नाशिक महानगरपालिका
Nashik Municipal Corporation

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QUALITY MANAGEMENT

Revision	Date	Report Prepared By	Report Reviewed By	Report Approved By	Description
0	17th June, 2017	J S Niranjan, Mahesh Kumar Chenna, Supraja K	S Ramakrishna	N Seshadri	Implementation Program

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ABBREVIATIONS

BRT – Bus Rapid Transit

CTTP – Comprehensive Traffic and Transportation Plan

EMP-Environmental Management Plan

ITS – Intelligent Transportation Systems

LRT-Light Rail Transit

MLCP – Multi Level Car Parking

MSRTC – Maharashtra State Road Transport Corporation

NMC – Nashik Municipal Corporation

NMT – Non Motorized Transport

PPP – Public Private Partnership

PT – Public Transport

RTO – Regional Transport Office

SPV – Special Purpose Vehicle

TTMC – Traffic and Transit Management Center

UMTC – Urban Mass Transit Company Limited

UTF – Urban Transport Fund

1. INTRODUCTION

1.1 BACKGROUND

Nashik is the third largest urban area in the state of Maharashtra covering an area of about 267.48 square kilometers (i.e. 26747.75 hectares) with a population of 1.48 million as per 2011 census. Nashik Municipal Corporation includes 25 villages out of which Vihitgaon, Vadner and Pimpalgaon Khamb are partly included. With increasing migration to urban areas, increasing population brings with it rapid motorization leading to congestion and pollution.

To alleviate the existing and future transport problems of Nashik, it is essential to develop a Comprehensive Traffic and Transport Plan (CTTP) that provides a long term vision and mobility solutions for the citizens of Nashik.

Nashik Municipal Corporation (NMC) is a civic body for overseeing infrastructure projects in Nashik city. NMC has awarded the project titled "Comprehensive Traffic and Transportation Plan for Nashik Municipal Corporation" to Urban Mass Transit Company Limited vide Letter No. O.No.PWD/Desk-8/69-1/2016 dated April 27, 2016. As part of the CTTP, Groundwork, data collection-analysis, Development of scenarios and urban mobility plan were submitted in the earlier reports. The current report details out the Implementation Program for the proposed projects in Urban Mobility Plan.

1.2 OBJECTIVE OF THE STUDY

The objective of this study is to prepare a Comprehensive Traffic and Transportation Plan for NMC for the period 2016-2036 supporting the economic growth, and providing safe, affordable and clean mobility for all the residents and tourists of Nashik, which in turn improves the quality of life.

Accordingly, the overall objective of the CTTP is to provide a long term strategy, which ensures desirable mobility, safety and accessibility to people across gender and socio-economic profiles.

1.3 ORGANIZATION OF THE REPORT

This current report is organized into 7 Sections as outlined below.

Chapter 1: Introduction

Chapter 2: Costing of Proposed Projects

Chapter 3: Impact of Proposed Projects

Chapter 4: Prioritization of Projects

Chapter 5: Financing Options

Chapter 6: Institutional Framework

Chapter 7: Way Forward

2. PROJECT COSTING

The projects identified in the earlier report are divided into three categories based on future demand and requirement. Some of these evolved projects have potential to enter into Public Private Partnership (PPP); however detailed case to case project reports are required for validating feasibility. The total cost of the proposed projects is 4135.99 Crores.

It is important to highlight that the CTTP serves only to identify schemes and once these schemes are detailed for feasibility and engineering purposes, some of these costs may vary. The tentative block cost estimation is arrived at current prices of 2016.

The overall short term project cost is estimated to be 1105.59 crores. All junction improvement schemes, footpath implementation, cycle track network development, removal of encroachment will fall into this category. While implementation of ROB, developing main and sub docking station for cycle network, off-street parking / multi-storey parking will fall under medium term projects. The approximate cost of medium term projects is 724.15 crores. The long term projects will cost around 2306.25 crores. The detail costing is represented in Table 2-1.

The projects proposed are to be implemented in three phases.

Phase I - To be implemented between 2017 and 2021

Phase II – To be implemented between 2021 and 2031

Phase III - To be implemented between 2031 and 2036

TABLE 2-1: PHASE WISE COSTING OF THE PROPOSED PROJECTS

Sl. No	Projects	Unit	Total Quantity	Unit Rate (in Crore)	Total Cost (in Crores)	Project Phasing Quantities				Phasing Rs (in Crores)			
						2016-2021	2021-2026	2026-2031	2031-2036	2016-2021	2021-2026	2026-2031	2031-2036
Improvement of Road Network													
1	Upgradation of Existing Roads	Km.	176.2	2.50	440.43	6.85	27.02	34.45	107.85	17.13	67.55	86.13	269.63
2	New 4-Lane Roads (Proposed Outer Ring Road)	Km.	40.2	4.75	190.95	0.00	0.00	0.00	40.20	0.00	0.00	0.00	190.95
3	Flyover (2-Lanes)	No.	3.0	4.35	13.05	3.00	0.00	0.00	0.00	13.05	0.00	0.00	0.00
4	Flyover (4-Lanes)	No.	6.0	7.25	43.50	1.00	2.00	2.00	1.00	7.25	14.50	14.50	7.25
5	Rail Over Bridges (4-Lanes)	No.	2.0	11.50	23.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	23.00
6	Junction Improvements	No.	82.0	0.60	49.20	82.00	0.00	0.00	0.00	49.20	0.00	0.00	0.00
Total Project Cost					760.13					86.63	82.05	100.63	490.83
Improvement of Non-Motorized Transport Facilities													
1	Footpath	Km.	150.0	1.10	165.00	150.00	0.00	0.00	0.00	165.00	0.00	0.00	0.00
2	Foot Over Bridges	No.	2.0	0.80	1.60	2.00	0.00	0.00	0.00	1.60	0.00	0.00	0.00
3	Pedestrian Subway	No.	6.0	2.40	14.40	6.00	0.00	0.00	0.00	14.40	0.00	0.00	0.00
4	Shared Cycle Tracks	Km.	39.5	0.018	0.69	39.50	0.00	0.00	0.00	0.69	0.00	0.00	0.00
5	Dedicated Cycle Tracks	Km.	54.0	0.035	1.89	54.00	0.00	0.00	0.00	1.89	0.00	0.00	0.00
6	Bicycles	No.	340.0	0.001	0.31	340.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00
7	Bicycle Sub Docking Stations	No.	16.0	0.013	0.20	16.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
8	Bicycle Major Docking Stations	No.	4.0	0.035	0.14	4.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
Total Project Cost					184.23					184.23	0.00	0.00	0.00

Sl. No	Projects	Unit	Total Quantity	Unit Rate (in Crore)	Total Cost (in Crores)	Project Phasing Quantities				Phasing Rs (in Crores)			
						2016-2021	2021-2026	2026-2031	2031-2036	2016-2021	2021-2026	2026-2031	2031-2036
Improvement of Public Transport System													
1	Bus Fleet Augmentation-(Diesel & CNG Buses)	No.	761.0	0.600	456.60	404.00	100.00	118.00	139.00	242.40	60.00	70.80	83.40
2	Bus Fleet Augmentation-Electric Buses	No.	325.0	1.20	390.00	173.00	43.00	50.00	59.00	207.60	51.60	60.00	70.80
3	Bus Shelters	No.	65.0	0.09	5.85	65.00	0.00	0.00	0.00	5.85	0.00	0.00	0.00
4	Improvement of Existing Bus Terminals	No.	5.0	0.40	2.00	5.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
5	New Bus Terminal	No.	1.0	1.20	1.20	1.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
6	Bus Rapid Transit System	Km.	33.6	15.00	504.00	17.80	15.80	0.00	0.00	267.00	237.0	0.00	0.00
7	Rail based Transit System	Km.	17.8	90.00	1602.00	0.00	0.00	0.00	17.80	0.00	0.00	0.00	1602.00
Total Project Cost					2961.65					726.05	348.6	130.8	1756.2
Improvement of Freight Transportation System													
1	Upgradation of Existing Truck Terminal	Sq.m	87007.4	0.00	17.40	87007.41	0.00	0.00	0.00	17.40	0.00	0.00	0.00
2	Proposed New Truck Terminals	Sq.m	97124.6	0.001	77.70	70010.62	27113.90	0.00	0.00	56.01	21.69	0.00	0.00
Total Project Cost					95.10					73.41	21.69	0.00	0.00
Intelligent Transportation System Facilities													
1	New Signal Installations	No.	26.0	0.40	10.40	26.00	0.00	0.00	0.00	10.40	0.00	0.00	0.00
2	Area Traffic Control System	Km.	33.6	0.60	20.16	17.80	15.80	0.00	0.00	10.68	9.48	0.00	0.00

Sl. No	Projects	Unit	Total Quantity	Unit Rate (in Crore)	Total Cost (in Crores)	Project Phasing Quantities				Phasing Rs (in Crores)			
						2016-2021	2021-2026	2026-2031	2031-2036	2016-2021	2021-2026	2026-2031	2031-2036
3	ITS control Centre, PIS, Common Mobility Card, GPS, Mobile phone Applications and Surveillance Cameras)	Km.	250.0	0.40	99.99	24.65	42.82	34.45	148.05	9.86	17.13	13.78	59.22
Total Project Cost					130.55					30.94	26.61	13.78	59.22
Improvement of Parking Facilities													
1	On street Parking	Km.	34.0	0.014	0.46	34.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00
2	Off street Parking (Surface)	No.	5.0	0.052	0.26	5.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
3	Off street Parking (Multi-Level-Car-Parking)	No.	2.0	1.809	3.62	2.00	0.00	0.00	0.00	3.62	0.00	0.00	0.00
Total Project Cost					4.34					4.34	0.00	0.00	0.00
Overall Comprehensive Traffic and Transportation Plan Proposals													
Total Project Cost					**4135.99**					**1105.59**	**478.95**	**245.21**	**2306.25**

At current prices (The cost does not include land acquisition cost)

3. IMPACT OF PROPOSED PROJECTS

Projects evolved in CTTP will help to achieve sustainable development goals by means of reducing private mode share, emission levels and travel time. Anticipated impacts of the proposed projects are segregated into the following categories:

- Social Impact
- Economic Impact
- Environmental Impact

3.1 SOCIAL IMPACT

The impact of the proposed projects from the social angle is analyzed at a broader perspective. It is found that most of the projects have significantly less impact with respect to Rehabilitation and Resettlement. Land acquisition for some of the projects is inevitable. The proposed projects significantly improve mobility with reduced travel time. The broad impacts have been compiled in Table 3-1.

TABLE 3-1 SOCIAL IMPACTS OF PROPOSED PROJECTS

Project	Right of way / Land Acquisition	Requirement of Rehabilitation and Resettlement	Reduction in Travel Time	Accessibility Improvement	Mobility Improvement
Bus Fleet Augmentation	No	No	Yes	Yes	Yes
High Order Transit System	Yes	Yes	Yes	Yes	Yes
Bus Terminals/ Intermodal Stations	Yes	Yes	Yes	Yes	Yes
TTMC / Transport Hub	Yes	Yes	NA	No	Yes
Freight Terminals	No	Yes	NA	No	Yes
Bus Shelters & Bus bays	Yes	No	Yes	Yes	Yes
ROBs / New Roads/ Road Widening/ Grade Separators	Yes	Yes	Yes	Yes	Yes
Ring Roads	Yes	No	Yes	Yes	Yes
Foot Paths	No	No	NA	Yes	Yes
FOBs/Pedestrian Subways	No	No	NA	Yes	Yes
Cycle Tracks/ Public Bicycle Sharing	No	No	NA	Yes	Yes
Parking Facilities	No	No	No	Yes	Yes
Junction Improvements	No	No	Yes	Yes	Yes
Intelligent Transportation System	No	No	Yes	Yes	Yes
Area Traffic Control Centers/ Signals	No	No	Yes	Yes	Yes

Some of the broad indicators for social changes are quantified and are presented in Table 3-2.

TABLE 3-2 SOCIAL IMPACTS OF PROPOSED PROJECTS

Name of the Impact	Base Year (2016)	BAU Scenario (2036)	SUT Scenario (2036)
Walk Trips	15.8%	13.4%	14.3%
Private Transport (PVT) Trips	48.1%	61.6%	38.6%
Intermediate Public Transport (IPT) Trips	21.7%	14.6%	11.4%
Public Transport Trips	11.7%	8.6%	33.0%
Cycle Trips	2.7%	1.8%	2.7%
Avg. Network Speed (kmph)	32.9	25.1	32.1
Avg. Trip Length on Public Transport (km)	7.9	7.5	8.8
Walkability (Arterial & Sub-Arterial)	4%	4%	100%
Cyclability (Arterial & Sub-Arterial)	0%	0%	59%
Fatality Rate	12	12	6
Vehicle-km travelled (PVT) in Thousands	4463	9168	5354
Public Transport Accessibility	41%	41%	54%
Average Walk Time (km)	13.2	13.2	10
Average waiting time of a PT user (min)	12	12	5
Average travel time of a PT user (min)	23	30	20
Average distance to nearest stop from house of a PT user	1.2	1.2	0.6
Expenditure on transport (as percent of income)	8%	8%	6%
Percent of public transport vehicles that provide disability access (by public transport mode)	0	0	30%
Percent public transport stations / bus stops that provide disability access	0	0	50%
Percent length of public footpaths (km) that provide disability access	0	0	70%

3.2 ECONOMIC IMPACT

The impact of the proposed projects from the economic effects is analyzed at a broader perspective. The total expenditure for transportation between 2016 and 2036 is estimated to be Rs. 4135.99 Crore. As per the Economic Survey report of Maharashtra for 2016-17, Per-Capita Gross District Product value for Nashik at current prices is Rs. 1,32,207 crore in 2015-16. The Transport system expenditure is assessed as a fraction of GDP per capita and is presented in Table 3-3.

TABLE 3-3 TRANSPORT EXPENDITURE

Project	Transport Expenditure (Rs. Crore) at Current Prices	Transport Expenditure (% of GDP per Capita at Current Prices)
New road infrastructure costs	760.13	0.006
New public transport infrastructure costs	2961.65	0.022
New NMT infrastructure costs	184.23	0.001
Other Infrastructure costs	229.99	0.002
Overall Transportation Expenditure	4135.99	0.031
Operation and Maintenance costs for all of the above	454.33	0.003

In general, project cost consists of two main components viz. Capital cost and Operating and Maintenance (O & M) cost. These costs for the project are estimated in financial terms at base year price level of 2016 and at market prices. The economic analysis requires the conversion of financial costs into economic costs so as to take care of distortions in prices due to market imperfections, Government policies and regulations.

In the present study the estimated financial costs have been converted into economic cost by applying conversion factor of 0.85, so as to represent exclusion of taxes & duties, which are considered as transfer payments and cost relating to depreciation, interest charges.

The capital cost of transportation improvement projects is 4135.99 crore rupees to be incurred between 2016 and 2036. The details of year wise capital requirement are presented in earlier chapter.

The financial and economic cost of the project is as follows:

Financial Cost including Other Charges - Rs. 4135.99 Crore

Economic Cost with Conversion Factor of 0.85 - Rs. 3515.59 Crore

Operating and Maintenance (O & M) Cost

The estimated O & M cost of projects for different years of operation is given in Table 3-4 which also gives the year wise economic cost of O & M after the application of conversion factor of 0.85.

TABLE 3-4 ESTIMATED OPERATION AND MAINTANANCE COST (INR CRORE) OF PROJECTS

Year	O & M Cost (INR Crore)	
	Financial Cost (Crores)	Economic Cost (Crores)
2016-2021	274.78	233.56
2021-2026	46.56	39.58
2026-2031	23.83	20.26
2031-2036	83.48	70.96

* All costs at current prices.

Estimation of Economic Benefits

The transportation plan is expected to generate direct and indirect benefits. The direct economic benefits that will accrue because of the project include savings in total transport cost and travel time costs to passengers. Construction of the proposed Ring Roads and Mass Transit Systems will result in reassignment of traffic on the surrounding road network system and considerable change in the travel pattern within the study area. The following categories of benefits have been quantified in monetary values:

VOC Savings: Values of Cost benefits are those that are accrued for private vehicles due to shift to public transport which in turn reduces vehicle operating costs. Savings in the vehicle-km travelled due to improvement in transport infrastructure is converted to monetary benefits using the value of cost.

VOT Savings: Value of Time benefits are those that are accrued for all vehicles due to savings in shorter travel time which in turn is attributed to increase in speed. Savings in the vehicle-hours travelled due to improvement in transport infrastructure is converted to monetary benefits using the value of time.

Environmental Savings: After the improvements in transportation network (especially bypass to the city) the total vehicle kilometers reduces which in turn reduce the pollution loads in the project area. The monetary benefit due to reduced pollution is taken into account in economic benefit analysis.

Accident Benefits: Reduction in number of accidents is also an economic benefit to the society which should be taken into account while doing economic analysis. It has been assumed that after the improvements in transport infrastructure the fatal accidents will reduce by half and the accident cost (as per IRC SP: 30-2009) is used for estimating the accident benefits.

Comfort Benefits: Any new improvement in transport infrastructure is certain to provide or increase the quality of riding/ commuting. This comfort factor should also be taken into account in doing economic analysis. In the current study the cost of comfort benefit is taken as 10% of VOT Savings.

All the above benefits are converted into monetary costs for the entire plan period (2016-2036) and is presented in Table 3-5.

TABLE 3-5 CUMULATIVE ECONOMIC IMPACTS OF PROPOSED PROJECTS (2016-2036)

Type of Benefit	Total Cost of Benefits (Rs. In Crore)	% of Total Benefits
VOT Savings	1639.65	12.2%
VOC Savings	10459.79	77.9%
Environmental Savings	220.84	1.6%
Accident Benefits	76.69	0.6%
Comfort Benefits	1035.92	7.7%
Total Economic Benefits	13432.88	100.0%

Economic Appraisal

The annual stream of economic costs and benefits has been computed over the analysis period. The project's economic viability is assessed in terms of Economic Internal Rate of Return (EIRR) by applying the discounted cash flow (DCF) technique to the annual stream of the net benefits of the projects.

The cut off rate for the economically viable project at present is 12% as per Govt. of India and other funding agencies such as Asian Development Bank and World Bank. CTTP projects give the EIRR of 12.70%. This indicates that the projects are viable.

3.3 ENVIRONMENTAL IMPACT

The impact of the proposed projects from the environmental effects is analyzed at a broader perspective. Very few projects have significantly less impact with respect to air and noise pollution.

Some of the broad indicators for environmental impact changes are quantified and are presented in Table 3-6.

TABLE 3-6 ENVIRONMENTAL IMPACTS OF PROPOSED PROJECTS

Name of the Impact	Base Year (2016)	BAU Scenario (2036)	SUT Scenario (2036)
Local Emissions (Tonnes/day)	21.1	24.8	9.1
GHG Emissions (Tonnes/day)	451.8	668.4	324.4
Exposure to Transport Noise	>75	>75	<75
Percent of public transport fleet in compliance with Indian emissions standards	0	0	80%

Summary of Social, Economic and Environmental impacts has been presented in Table 3-7.

TABLE 3-7 SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS OF PROPOSED PROJECTS

Broad Project category	Activities / Sub Components	Impacts
Regional Hubs based on Transit Oriented Development principles	• Development of serviced land for high density development • Public transport interchange hubs	• Land acquisition • Construction activity around the highway
Pedestrian / NMT Infrastructure Improvement	• Land acquisition for road widening and creation of service lane wherever necessary	• Removal of squatters and encroachers from the footpaths • Causing livelihood losses even though they are illegal • Loss of shelter for temporary shops / residences for squatters and encroachers
	• Construction of new footpaths	• Improvement in safety of pedestrians due to measures proposed
	• Segregated Cycle Tracks	• Improvement in pedestrian safety • Slowing of traffic at the time of constructing and erecting structures across major intersections • Encourage use of NMT and hence reduction in pollution
Public Transport Planning	• Dedicated public transport network (PT exclusive Lanes/BRT/LRT)	• Land acquisition for dedicated lanes will cause Rehabilitation and Resettlement issues • Use of existing pavement width for dedicated bus lanes will cause removal of squatters and encroachments from roadsides causing loss of livelihood and loss of shelter • Construction / reconstruction / improvement of bus lanes/MRT systems will be causing construction issues as: ▪ Generation of noxious gases during construction, increasing air pollution

Broad Project category	Activities / Sub Components	Impacts
		▪ Temporary increase in noise pollution during construction ▪ Contamination of road runoff with construction material stacked on road side ▪ Traffic safety during construction ▪ Traffic diversions causing lengthening of routes increasing air emissions and exposing previously unexposed neighborhoods. to noise • Reduction of additional lane width for other traffic if existing road width is used for demarcating the dedicated bus lanes • Reduction in private vehicles causing reduction in air / noise pollution
	• Terminals/Depots/TTMC/ Transport Hubs/ Commuter Amenity Centers	• Acquisition of land for the facilities causes. Rehabilitation and Resettlement issues as loss of livelihood, loss of shelter, severance of community & social ties • Increase of noise and air pollution in the areas of terminals and depots • Improvement in approaches to the terminals and depots causing impacts on adjacent land-uses and land acquisition • Additional land acquisition, if any for the approach road improvement will lead to R and R issues along the roads and cause impacts on livelihood and shelter • Construction stage impacts include the increase in air and noise pollution • Contamination of road runoff with stacked construction materials • Improvement of traffic conditions during operation stage causing reduction in air and noise pollution
	• Bus-Stops and FOBs/Sub-ways	• Temporary interruption to traffic and increase of emissions from vehicles due to higher idling times • Temporary increase of noise levels due to idling and traffic snarls • Alternate traffic diversion routes increasing route length and consequently emissions • Alternate traffic diversion routes exposing previously low traffic routes to higher urban traffic and increasing air / noise pollution • Removal of squatters and encroachers from the footpaths causing livelihood losses at approaches to the sub-ways / FOBs

Broad Project category	Activities / Sub Components	Impacts
Others-Road Infrastructure	• Junction Improvements	• Loss of shelter for temporary shops / residences for squatters and encroachers at approaches to the sub-ways / FOBs • Contamination of runoff from road with construction material as sand / cement / silt from stacked excavated earth
		• May cause removal / displacement of squatters and encroachers. • Air and noise pollution from construction impacts • Contamination of runoff from road with construction material as sand / cement / silt from stacked excavated earth
Parking Management	• Priced, designated on-street parking space • Off- street parking development	• Reduction in urban congestion due to increase in effective carriage way width • Discouraging parking and Pricing of designated parking spaces may over the long run, result in: ▪ Discouraging private vehicle use and promote the use of Public Transport ▪ Improved speeds due to reduction in congestion
Intelligent Transportation Systems	• Automated Vehicle Location System • Variable Message Signs • ITS control Centre, PIS, Common Mobility Card, GPS, Mobile phone Applications and Surveillance Cameras	• Reduction in congestion due to reduced delays at junctions • Improved speeds on major corridors. • Improved reliability of Public Transport and comfort to the passengers • Improved safety as well as security
Freight Management	• Banning and restrictions	• Reduction in urban congestion due to banned movement of freight in the day hours • Banning of use of animals for movement of goods in the city may result in: ▪ Animal welfare and safety ▪ Improved speeds in CBD area due to reduction in congestion

Broad Project category	Activities / Sub Components	Impacts
	• Relocation of Activity and Improvement inside existing freight terminal • Creation of new freight terminal	• Resistance by operators for relocation • Improved operations due to better organized facilities
		• Acquisition of land in the peripheries • Contamination of runoff from road with construction material as sand / cement / silt from stacked excavated earth

3.4 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

3.4.1 PRELIMINARY IMPACT ASSESSMENT

This section provides a summary of the screening conducted to determine the potential environmental impacts associated with the proposed expansion of roads under comprehensive traffic and transportation plan. It covers all the major roads that come under Nashik Municipal Corporation.
Road projects can produce negative impacts. The impacts of road improvement, as the one being proposed, although usually more limited, can still be significant, not only on natural resources and systems but also on the social environment.

A wide variety of direct and indirect negative impacts have been attributed to road construction or improvement project. Though sharing a common concern over most environmental attributes, depending on their past experience in various projects, different agencies tend to lay varying emphasis on different biophysical and socio-environmental components and issues.

(i) Land Acquisition and Involuntary Relocation/Resettlement: These essentially include:

- Adverse social impacts on affected persons/households/business due to acquisition of land and property.
- Impacts due to removal of squatters and encroachers in the existing R.O.W., majority of whom might belong to economically and socially vulnerable sections of the society and thus needing rehabilitation/ compensation
- Stresses on the host community where project affected persons are relocated

(ii) Community Impacts – these include:

- Community severance
- Loss of roadside community businesses and social activities
- Bypassing of communities
- Reduced convenience of traditional modes of transport

- Gentrification effect, viz. displacement of low-income and socially vulnerable sections due to increase in market value of land/property as a consequence of improved infrastructure.

3.4.2 METHODOLOGY

This section provides an overview of the methodology employed to conduct the environmental and social impact screening.

3.4.3 STUDY AREA

Consistent with commonly accepted international standards, the screening assessment was conducted considering potential impacts on physical, biological, social/economic and cultural resources within Road of Impact (ROI). The ROI is considered adequate for the assessment of most physical and social effects arising from project development. However, it is also recognized that a number of potential (positive and negative) impacts could also have effects beyond this boundary, such as effects on road linkages, employment effects, and some community effects. These were also considered in the screening assessment.

3.4.4 DATA COLLECTION

Data was collected from a variety of sources, including published data and topographical mapping, unpublished information obtained from government agencies, information obtained from the total station survey of the proposed alignment, and field reconnaissance. At this stage in the project, the emphasis has been on published and available data. Additional primary source data will be collected in subsequent stages, in particular, information from community members, residents.

3.4.5 ASSESSMENT OF IMPACTS AND MITIGATION MEASURES TO REDUCE/ELIMINATE SIGNIFICANT EFFECTS

The environmental and social screening assessment conducted for the road rehabilitation project examined:

- The potential for direct and indirect, positive and negative impacts resulting from development and operation of the proposed road rehabilitation/expansion
- Features most likely to be impacted within the study area
- Expected duration of the impact
- Probability of the impact being experienced

- Mitigation available to reduce the significance of the impact
- The potential for the impact to be reversed; and

The assessment was conducted considering impacts during the construction stage of development (incorporating some activities that may actually occur prior to construction), and impacts anticipated during the operational phase of the project, once construction is complete.

Criteria employed for data collection and impact assessment were as follows:

Physical elements

These include Geology, Soils, Air quality, Noise levels, Surface/ground water etc.

Biological Resources (Natural Environment)

Ecological features/areas, trees etc.

Social and Economic Environment

Local residents, Road users, Safety concerns, Industrial/commercial activity, Agriculture, Land tenure/property values, Land use, Community effects etc.

Cultural Environment

These include temples, sites of cultural importance, Scared trees/groves etc.

Potential impacts were determined and measures to reduce the significance of potential impacts were identified. An assessment of the residual or net impact following consideration of mitigation was determined considering the following:

- Project Phase (construction or operation)
- Impact duration
- Likelihood of impact occurring
- Nature of the impact (direct/indirect)
- Potential for reversibility of the impact

To be considered, mitigation measures had to be reasonably available, cost effective, and practical to implement.

3.4.6 PUBLIC AND GOVERNMENT AGENCY CONSULTATION

Through the course of data collection, contacts have been made with a number of government agencies, primarily at the State and National levels. Contact with the public has

been informal and ad hoc, primarily the result of discussions with some landowners during field reconnaissance. Formalized contact with the public is currently underway in the form of resident and business surveys, being conducted as data collection for preparation of the Resettlement Plan, to be finalized in the next stage of design. Community meetings will be undertaken immediately following completion of the feasibility report.

3.4.7 ENVIRONMENTAL ASSESSMENT

The environmental Assessment was conducted following the methodology described in the previous section. The following paragraphs provide a text summary of the highlights.

Experience in other similar projects suggests that implementation of the proposed project can have potential some impacts to a variety of physical, natural, cultural and social/economic resources arising from a different aspects of road development and operation. For most impacts the magnitude is expected to be small and highly responsive to mitigation. The following paragraphs provide a discussion of potential impacts, mitigation and net environmental impacts expected for the proposed two lane road improvement/expansion project, identified during the environmental screening assessment.

Pre-Construction Stage Impacts

Site surveys and engineering investigations can potentially induce anxieties and social impacts among landholders and communities resulting from uncertainties about land acquisition and relocation, land speculation and impacts associated with potential changes to community structure and character.

3.4.8 IMPACTS ON THE PHYSICAL ENVIRONMENT

Impact on Geology and Soils

Construction Stage:

All road construction projects have a large demand for sand and aggregate materials (used for road sub-base, base and pavement construction, as well as for asphalt mixing). The volume of material required depends on the scale of the road project, the volume of material excavated during construction versus the volume of material required for fill, and the suitability/quality of the excavated soils for fill and construction material. In most large scale projects, aggregate and sand material is imported to the construction site. It is preferred that the material be obtained from already licensed and operating pits and quarries. However, distance, quality and volumes available often dictate that new quarries must be developed to supply project needs.

A preliminary material volume estimates and examination of local suppliers indicates that sufficient volumes of material may be available from existing licensed pits and quarries facilities, and new pits or quarries are considered not so necessary.

The physiography and geologic formations along the project Road are unique. The ROW will be expanded in all sections of project road. Most of this expansion will occur in commercial areas. Although the volumes of topsoil to be removed in some of the agricultural fields are not considered highly significant, it is recommended that the productive topsoil layer in all excavation, be stripped and stockpiled separately from the lower horizon materials. This productive topsoil can either be stored for use during re-forestation and construction site rehabilitation, or distributed to local farmers.

The contamination of soils from spilled fuel, engine oil, bitumen/asphalt, etc. should be prevented. When spills occur, construction personnel should be trained and adequately equipped to clean up the spill and remediate soil quality.

Operation Stage:

In general, impacts to geology, soils during the operation stage of the project are limited to the potential contamination of soils from the spill of contaminants, usually as a result of vehicle accidents. The impact of this can be significantly reduced through training of emergency personnel in the procedures of spill control and clean-up, and the provision of emergency spills equipment in selected emergency service stations.

3.4.9 IMPACT ON AIR QUALITY

Monitoring of representative areas of the study area will indicate the actual status of the ambient air quality of the particular areas and may vary from very high quality in the rural/agricultural areas, to lower quality in the urban, built-up areas. Deteriorated air quality is largely attributed to vehicle emissions of NOx, SO2 and CO. Air quality in the project area is not so fairly polluted in the Starting junction of the road, as some of the parameters monitored at this location exceed except SO2, NO2 and lead content.

Construction Stage:

Hot-mix plants will contribute substantially to the deterioration of air quality during the construction phase. High levels of SOx (sulphur oxides), NOx (nitrogen oxides), hydrocarbons and particulate matter are likely to reduce the quality of the ambient air in general and occupational exposure in particular. Bitumen production also releases volatile toxic gases through the heating process. To avoid significant localized impacts within the study area, it is recommended that asphalt material be procured from existing licensed facilities located outside the study area.

Construction vehicles will also contribute to NOx, SOx and CO emissions during the construction stage. It is therefore important that vehicles used during construction meet

established specifications for exhaust emissions, and that they are maintained throughout the construction period.

Dust will be an issue, especially during the construction period. Some sources include:

Quarrying activities including excavation and crushing of construction materials; transportation of raw materials from quarries and borrow sites to the road construction area; Site clearance (excavation) and the use of heavy vehicles and machinery/equipment; Asphalt plants produce a hot mix from different sizes of aggregates and bitumen at a desirable temperature. Dust is produced particularly in the handling and storage of aggregates and the bitumen/aggregate mixing process to produce asphalt; and through vehicle traffic over unpaved roadways.

Dust from quarry and asphalt plants cannot be avoided. However, dust impacts to residents, communities and habitats within the study area can be avoided by procuring construction materials from existing and licensed facilities outside the study area. Increase in dust levels at the site of construction will be carefully controlled through the liberal application of water.

Operation Stage:
Increased traffic volume over time will reduce air quality within the study area. In some locations it is expected that levels will eventually exceed national allowable limits without further intervention. The widening of the road could potentially reduce pollution caused by engine emissions as a result of improved pavement quality and increased roadway capacity which will reduce congestion and idling time.

3.4.10 NOISE IMPACTS

At the monitoring locations which are the representative of the project roads, noise levels will be taken to assess the actual status of the ambient noise as per prescribed limits of Central Pollution Control Board.

Construction Stage:
During the construction phase, the major sources of noise pollution will be movement of vehicles transporting construction materials to construction yards and the noise generated by activities at the yard itself. Concrete mixing, casting and material movement are primary noise generating activities in the yard which will be uniformly distributed over the entire construction period. Construction equipment will have high noise levels, which can affect the personnel operating the machines, as well as nearby residents and commercial businesses. The acceptable (average) noise level over an 8 hour shift is 90 dB(A). Impulse or impact noise (single events) should not exceed 140 dB(A) (Peak acoustic pressure). Exposure to 10,000 impulses of 120 dB(A) is permissible per day.
During the construction period, residents along project road could experience significant increases in night time noise levels if construction is conducted in the night time hours to avoid vehicle diversion difficulties. This impact will be temporary and is largely unavoidable to address through traffic issues.

Operation Stage:

Over the long term (operation phase), increased traffic volumes throughout the study area will contribute to higher vehicle noise emissions from engine noise, vibration, tire friction, and horns. The degree of increase will depend on traffic volume, roadway condition, vehicle condition and congestion. These increases will have a greater impact in areas which currently experience high ambient noise levels. However, improved pavement quality and reduced congestion from additional lane could help to reduce vehicle noise emissions from tire friction and horn blowing.

3.4.11 IMPACT ON GROUND WATER

Construction Stage:

Since the water table in the project area is not so deep, some significant impacts on ground water quality and flow pattern may be expected. However, ground water degradation can take place when contaminants are leached through surface soils into the ground water table. Contaminants such as fuel and engine oil handled in the construction staging area and during equipment re-fuelling at construction site areas can cause ground water contamination if spilled onto the ground and not properly cleaned up. In addition, poorly installed sanitary facilities can also result in contamination.

Drilling and piling could potentially cause local ground water flow modifications leading to localised deterioration of vegetation and increased susceptibility to erosion as well as water table depletion, potentially resulting in impacts to local (ground) water supplies.

Operation Stage:

In general, impacts to ground water during the operation stage of the project are limited to potential contamination (direct or indirect) from the spill of contaminants, usually as a result of vehicle accidents. The impact of this can be significantly reduced through training of emergency personnel in the procedures of spill control and clean-up, and the provision of emergency spills equipment in selected emergency service stations.

3.4.12 IMPACT ON BIOLOGICAL RESOURCES

Impacts on Flora and Fauna

The major impact on ecology is due to cutting of the existing trees which have a rich and moderate canopy. These trees will be cut / transplanted as per the instruction of the tree authority of the Maharashtra State Government. The permission from tree authority will be obtained.

Construction Stage:

The principal impact on flora involves the cutting of trees and vegetative cover for construction road works. The initial construction works at the project site involve land clearance, cutting, filling and leveling, all of which may cause loss of vegetation. The total number of trees that has to be cleared along the alignment will be identified and in

subsequent stages of environmental assessment, a roadside re-forestation plan will be developed to compensate for the trees cut as per MoEF guidelines and Concerned State Forestry Department direction.

Inevitably, there will be a short-term impact on availability of nesting sites for birds. There is no sensitive ecological area or significant natural habitat within Road of Impact of the existing road within the project road, so impacts to flora and fauna are not expected to be significant in this area. With the addition of trees, shrubs, etc. following re-forestation and landscaping, expected to exceed pre-project numbers, the short term impact of construction is expected to be reversed over the long term.

Operation Stage:

During the operation stage, it is important to ensure that all plantings from the re-forestation program are maintained, at least for the prescribed two year period. It is also important that any pruning or tree trimming be limited to within the drip-line to ensure the tree can sustain the removal of mass.

3.4.13 IMPACTS TO THE SOCIAL AND ECONOMIC ENVIRONMENT

Impacts to Residents and Road Users

There are about 26 junctions, IRR, ORR, Main Arterial Roads and Sub Arterial Roads will to be improved and proposed as a part of short, medium and long term proposals.

Construction Stage:

A number of properties (or parts of properties) will have to be purchased, and some households will have to be relocated as a result of ROW expansion. The number of residences to be relocated is more for ROW expansion, primarily which will result in the purchase and resettlement of a number of legal residences. Relocation of agricultural /industrial lands and occupations will be higher along the road, where the project road will traverse lands which are mainly commercial/residential in nature. The impact of relocation to the residents will vary, depending on family circumstances, and resettlement options available. Following the Government of India guidelines and policies for resettlement will help to ensure that property purchase and relocation will be conducted fairly and to the benefit of the land owner/occupant. It will be the objective of the resettlement plan for the project, to be developed in the next stage of project design, to meet resident expectations to the highest degree possible, in terms of relocation in a desired location, replacement of lost income, and compensation for all incidental costs, such as relocation expenses. The quality of housing to be provided should be equal to or better than the current home. Given the number of residents to be relocated, the impact of this activity could be significant, although the degree of significance would be reduced by modifying the alignment wherever possible further details of the impact of resettlement will be provided in the detailed EA to be developed in the next stage of project development.

Residents along the project road may also experience impacts from increased noise levels during the construction stage, as construction activity may have to be conducted during night time hours due to limited opportunities for traffic diversion/detour during the day. As

the current highway is only a single/two lane, construction will occupy the entire travelled portion of the road, with no opportunity to the north or the south to divert traffic. Night time construction could have a significant effect on noise levels, particularly given the very low night time ambient levels in this area which are consistent with a rural area.

The road users which are going towards and coming away from Nashik City through these Road Roads will experience delays during construction. The road users may face more challenges as the existing road is narrow and no opportunities for diversion. It may be necessary to conduct construction in these areas during the night time hours to avoid conflicts with construction and through traffic.

Other road users such as cyclists, pedestrians and slow moving vehicles may find it safer during construction as vehicle traffic will be moving slower through the construction zone. However, it will be important for the contractors to ensure proper traffic control safety issues for non-vehicle users of the road.

Operation Stage:

During the operational stage of the project, the primary impact to residents will result from a decrease in air quality (primarily from dust), and increased noise levels. These impacts will be lower for residents than they would be if traffic volumes continue to grow and the road is not rehabilitated.

Road users during the operational stage will benefit from reduced congestion, and ultimately reduced travel times. Sufficient allowance will be made in design to accommodate non-vehicle users such as cyclists, pedestrians, herders and slow moving farm machinery to avoid traffic conflicts. Typically it is necessary to accommodate these road users in the road shoulder to ensure safe passage for all road users. It will also be necessary to incorporate adequate opportunities for pedestrian crossings to ensure that they can cross the road safely during day time and night time conditions.

3.4.14 IMPACTS TO CULTURAL RESOURCES

Impacts to Religious/Community Structures

The Churches, Temples, Masjid, other religious and community structures exist along the project Road Roads. The details of these structures are provided in Section 17.5.Most is located adjacent to the road. Demolition / removal of these religious structures will hurt the religious sentiments of the people. These temples will be relocated at identified locations with the help of concerned religious group. Maximum effort has been made to save these structures.

Construction Stage:

Every effort will be made to align the roadway so as not to disturb these religious structures. However, there may be some instances where minor relocation may be required. However, no religious structure will be relocated without full community participation, in the next stage of environmental assessment.

Operations Stage:

No significant impacts are anticipated to temples during the road operation. Although there may be some increases in noise and dust levels as traffic volumes increase, this is not a result of the road project, but a result of traffic growth, that would be experienced whether the road was expanded or not. In fact, noise levels and dust levels may be lower with the project road than without, as described in earlier sections. Access to temples will not be affected.

3.4.15 PUBLIC AND GOVERNMENT AGENCY CONSULTATION

Consultation with the public and government agencies is an integral component of reflect issues or solutions identified by local residents, and a lack of government agency consultation can result in missed data and a lack of conformity with policy and guidelines, in addition to missed opportunities to share experiences and identify solutions to difficult concerns/issues.

The social and environmental assessment of the road widening and strengthening is required to include agency and community consultation. At this early stage in the process, consultation has been focused on government agencies to ensure that complete and accurate data is incorporated into the Initial Environmental assessment. Apart from this a questionnaire survey will be conducted to know the community perception about the environmental conditions of the project area. In the following stage, consultation activities with communities as well as affected households including district level representation will be conducted.

During the Initial assessment stage, community consultation will be kept limited to informal contact with local residents and landowners, undertaken on an opportunistic basis during field reconnaissance, plus a questionnaire survey will be carried with affected communities along the project road and initiation of resident and business surveys undertaken to assist with development of the resettlement action plan. These surveys/interviews will continue through the next stage of the assessment and will be reported in the detailed EA. Community meetings will also be held throughout the study area in locations which facilitate attendance by a maximum number of residents. Community meeting purpose, times and locations will be well-advertised in local newspapers and community facilities. The detailed community consultation process will be presented in the rehabilitation and Resettlement plan covering all the aspects of the community consultations.

3.5 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

3.5.1 INTRODUCTION

Environmental Management Plan recommended for the proposed Nashik City Road Improvement Project is discussed in this section. The EMP discussed below includes:

- Specific actions to be taken related to specific issues
- Responsible agencies for implementation and supervision

- Time frame for implementing mitigation measures
- Cross-reference to documents and specifications
- Project level environmental monitoring
- Cost of Mitigation Measures
- Environmental Monitoring Plan

3.5.2 ENVIRONMENTAL MITIGATION MEASURES

In order to mitigate the adverse impacts likely to crop up during construction stage and operation stage, the environmental management plan is worked out indicating the impacts, measures to be adopted and authorities' responsibility to implement during construction and operation phase of the project. This recommended project specific Environmental Mitigation measures are given in Table 3-8. Generic mitigation measures applicable to the proposed project are outlined in Tables for Pre-construction, Construction and Operational phase respectively.

3.5.3 ENVIRONMENTAL MONITORING PLAN

The environmental monitoring plan is prepared to check the effectiveness of the mitigation measures during the construction and operational phases. To ensure the effective implementation of the EMP, an appropriate environmental monitoring plan is prepared with objectives outlined below:

- To evaluate the performance of mitigation measures proposed in EMP
- To evaluate the adequacy of Environmental Impact Assessment
- To suggest improvements in management plan, if required
- To satisfy the legal and community obligations
- To respond the unanticipated environmental issues at an early stage and to verify the accuracy of environmental prediction.

At the project level, the vital parameters or performance indicators that will be monitored during construction and/or operational phases of the project include:

- Ambient air quality measures such as PM10, PM2.5 SO2, CO, NOx, HC, etc.
- Noise levels
- Traffic volume and characteristics
- Tree plantation survival rate

The recommended environmental monitoring plan is presented in Table 3-8. The methods for sampling and analysis will be as per prevalent requirements of CPCB and Indian Standard (IS) codes.

TABLE 3-8: PROJECT SPECIFIC ENVIRONMENTAL MITIGATION MEASURES

Adverse Impact	Mitigation Measures
Pre-Construction Stage	
The impact of road generated noise, which could affect residents along the road.	The road design shall provide for constructing noise barriers near residential areas. Fixing of traffic signs such as 'No Honking' etc.
The impact of road generated dust, which could affect residents along the road.	Regular air monitoring shall be done & accordingly dust suppression methods shall be applied.
Increased traffic speed as result of 4 laning &/or 2 laning of road could increase the number of accidents.	Safe pedestrian pathway shall be included.
Construction Stage	
Construction of the road to 4 laning/2 laning will affect traffic movement and generates dust due to drilling/excavation, unloading of construction materials and exposure of stored material to wind.	Construction will be taken phase-wise so that road surface is open for traffic movement and major construction work during off-peak/night hours.
	Area under construction will be covered and equipped with dust collector. Construction material shall be covered or stored in such a manner so as to avoid affected by wind direction.
	Vehicles carrying construction materials will have covered top and beds. The fall height will be kept low so that least amount of dust is airborne, during unloading of materials.
Operation of construction equipment and delivery trucks generates air & noise pollution.	Stationary construction equipment will be kept at least 500m away from residential areas.
	Idling of delivery vehicles will not be allowed at construction site

Adverse Impact	Mitigation Measures
	Construction equipment with noise level more than 70 dB (A) not to be allowed at site. Mufflers to be used to reduce the noise level.
	The operation of equipment and activities such as drilling, excavation to be restricted during night time as the site has dense residential pockets in most of the stretches of the project road.
Unplanned dumping of excavated material	The excavated material to be deposited in relatively low-lying areas away from residential areas and water bodies. Care should be taken that dumped material does not block natural drainage system.
Operation Phase	
1. Increase in traffic volume over time and pollution level and poor road surface	Strict compliance with emission standards to reduce vehicular emission load for SO_x, NOx, CO, $PM_{10.5}$ etc.
2. Increased vehicular speed due to un-interruption from pedestrian may increase road accidents	Enforcement of strict road safety measure is needed

Generic Environmental Mitigation Measures

Table 3-9: Pre-Construction Stage Mitigation Measures

S. No.	Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
					Implementation	Supervision
1	Improvement schemes suggest cutting the number of trees	Try to save the tree to the possible extent. An approval from appropriate Authority of Maharashtra is required so that new trees can be planted to maintain the ecological balance. Compensatory afforestation and additional trees for landscaping	The Maharashtra Restriction On Cutting And Destruction of Valuable Trees Rules, 2009, The Maharashtra Preservation of Trees Act, 1975	Before Start of Construction of relevant section	Nashik Municipal corporation	PIA
2	Local Traffic Arrangements	Temporary traffic arrangements during construction within ROW have to be planned. This plan shall be periodically reviewed with respect to site conditions	MoRTH:112	During site clearance and Construction	Contractor	Nashik Municipal corporation
3	Pedestrian Safety	Special considerations shall be given in the local traffic management to the pedestrian safety especially at congested locations.	MoRTH:112.2	At Congested locations	Contractor	Nashik Municipal corporation
		Adequate provisions to segregate through the local traffic.				

S. No.	Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
					Implementation	Supervision
		Guard railing all along the urban section.				
4	Land Acquisition	Acquisition of land is minimized to the maximum extent.	Land Acquisition Policy by GOI. MoRTH 201.2	Before Start of Construction of the project road	Contractor	Nashik Municipal corporation
		Land shall be acquired as per the Government Land Acquisition Policy, applicable.				
		To avoid impact of land outside ROW, construction activities shall be restricted within Row, wherever possible.				
5	Air Quality	NOC from concerned State Pollution Control Board shall be obtained.	MoRTH 111	Before start of the project road	Contractor	Nashik Municipal corporation
		Adequacy of measures shall be checked to control air pollution.				
6	Water Quality	NOC from concerned State Pollution Control Board shall be obtained.	MoRTH 111	Before start of the project road	Contractor	Nashik Municipal corporation
		Adequacy of measures shall be checked to control water pollution.				

S. No.	Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
					Implementation	Supervision
7	Noise Level	NOC from concerned State Pollution Control Board shall be obtained. Noise screening by trees plantation scheme proposed as noise barriers. Adequacy of measures shall be checked to control noise pollution.	MoRTH 111	Before start of the project road	Contractor	Nashik Municipal corporation
8	Relocation of utility lines/community utilities	Affected utilities shall be relocated with prior approval of the concerned agencies. All the R & R activities shall be reasonably completed as per RAP. All the cultural properties that have been identified as affected shall be relocated as per resettlement plan.	MoRTH 110	Before start of the project road	Contractor	Nashik Municipal corporation
9	Road Drainage	Provision of adequate size and number of cross-drainage structures (Culverts) as well as drains along the road	MoRTH 306	Throughout the project road	Design Consultant	PIA

Table 3-10: Construction Stage Mitigation Measures

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Construction site will affect traffic movement and generate dust due to drilling/excavation, unloading of construction materials and exposure of stored material to wind.	Construction will be taken phase-wise so that road surface is open for traffic movement and major construction work during off-peak/night hours	MoRTH:111.9	Entire construction phase	Contractor	Nashik Municipal corporation
	Area under construction will be covered and equipped with dust collector. Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction.	MoRTH:111.11			
	Vehicles carrying construction materials will have covered top and beds. The fall height will be kept low so that least amount of dust is airborne, during unloading of materials	MoRTH:111.12			
Operation of construction equipment and delivery trucks generates air & noise pollution	Stationary construction equipment will be kept at least 500m away from sensitive receptors	MoRTH:111.3	Entire construction phase	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
	Idling of delivery vehicles will not be allowed at construction site				
	Construction equipment's shall approved by the Statutory agencies and have environmental clearance. Mufflers to be provided to reduce the noise level.				
	The operation of equipment and activities such as drilling, excavation to be restricted during night time as the site has sensitive receptor.				
Unplanned dumping of excavated material	The excavated material to be deposited in relatively low-lying areas away from water bodies. Care should be taken that dumped material does not block natural drainage system.	Project requirement	During construction	Contractor	Nashik Municipal corporation
Barricading site	The construction site should be barricaded at all time in a day with adequate marking, flags,	MoRTH:112	During construction	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
	reflectors etc. for safety of general traffic movement and pedestrians				
Compensatory plantation	Compensatory plantation as shown in this report shall be done in line with Tree Authority guidelines	Valuable Trees Rules, 1974,	During Construction	Contractor	Nashik Municipal corporation
Ambient Air quality, Water quality & Noise level monitoring	Ambient air quality, water quality and noise level monitoring is required once every pre-monsoon and post-monsoon during the construction period. The frequency will be 24 hours/ day	Project Requirement	During Construction	Contractor	Nashik Municipal corporation
Material Spill	All vehicles delivering material to the site shall be covered to avoid material spillage	MoRTH:111.9 MoRTH:111.11 MoRTH:111.12	Entire construction phase	Contractor	Nashik Municipal corporation
Roads used for transport	Contractor shall ensure that the transport vehicles used to ferry materials and dispose debris does not create hazardous condition for	MoRTH:111.3		Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
	general traffic using the roadway				
Earthwork	All earthwork & construction materials should be stored in such a manner to minimize generation of dust and spillage on roads.	MoRTH:300	During construction phase	Contractor	Nashik Municipal corporation
Idling of vehicle	Idling of temporary trucks or other equipment should not be permitted during periods of unloading or when they are not in active use. The practice must be ensured especially near project area/commercial establishments.	MoRTH:201.2	During construction phase	Contractor	Nashik Municipal corporation
Drilling Operations	All possible and practical measures to control noise emissions during drilling shall be employed. The PIA may direct to take adequate control measures depending on site conditions	MoRTH:111	During construction phase	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Construction equipment emissions	Exhaust and noise emissions of construction equipment shall adhere to norms as laid out by CPCB	Legal Requirement	During construction phase	Contractor	Nashik Municipal corporation
Noise level near the residential areas and sensitive receptor	Construction activity induced noise level shall be mitigated at the residential and sensitive receptors. The Contractor shall employ mitigation measures such as restricted and/or intermittent activity or as directed by PMC	MoRTH:111	During construction of relevant section	Contractor	Nashik Municipal corporation
Noise due to construction activity at construction sites	Operation hours for noise generating equipments such as drilling shall be pre-approved by PIA. The PIA depending upon site conditions and as per prevailing local laws may regulate and/or restrict operational hours	Contract document	During Construction	Contractor	Nashik Municipal corporation
Exposure to loud noise	Workers exposed to loud noise (As per Factory Act requirement) shall wear earplugs/ear-mufflers	MoRTH:111.6 MoRTH:105.2	During construction phase	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Storage of Construction materials	Construction materials containing fine particles shall be stored in an enclosure such that sediments-laden water does not drain into nearby storm water drain and underground sewage pipes	MoRTH:306	During construction phase	Contractor	Nashik Municipal corporation
During construction	Debris generated from excavation activities shall be disposed such that it does not flow into nearby storm water drain or form mud puddle in the area	Project requirement	During construction	Contractor	Nashik Municipal corporation
Borrow Pits	Borrow areas shall be backfilled with rejected construction wastes and will be given vegetative cover or the excavation slopes will be smoothed and depression will be filled in such a way that it looks more or less the original ground.	MoRTH 111.3	During construction	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Sourcing quarry materials	Sand aggregates and quarry material shall be sourced from licensed quarries. Safety precautions shall be ensured during transportation of quarry material from quarry to construction sites. Stockpiling of material shall be properly planned so as to ensure smooth traffic flow on the road.	MoRTH 111.3	During construction	Contractor	Nashik Municipal corporation
Labor camps & facilities	The contractor shall abide by the contract conditions and directions of PIA with respect to sitting of labor camps, providing sanitation facilities	MoRTH:105.2	During construction	Contractor	Nashik Municipal corporation
Occupations Health & safety	The contractor is required to comply with all the precautions as required for the safety of workman as per the International Labor Organization (ILO) Convention No. 62, as far as those are applicable to contract.	MoRTH:105.2 PC Sub Clause 34.2	During construction	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Provision of safety accessories/appliances to each worker	The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff.	MoRTH:105.2 PC Sub Clause 34.2 PC Sub Clause 80	During construction	Contractor	Nashik Municipal corporation
Safety precautions	Adequate precautions shall be taken to prevent danger from electrical equipment. All machines/equipment used shall confirm to the relevant Indian Standards Code (IS) and shall be regularly inspected by the PIA	PC Sub Clause 34.2 PC Sub Clause 80	During construction	Contractor	Nashik Municipal corporation

Table 3-11: Operation Phase Mitigation Measures

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Increase in traffic volume over time and pollution level and poor road surface	Strict compliance with emission standards to reduce vehicular emission load for SO_2,NOx, Lead, SPM etc.	Project requirement	Starting immediately after completion of construction	Nashik Municipal corporation	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Increased vehicular speed due to un-interruption from pedestrian may increase road accidents	Enforcement of strict road safety measure is needed	Project requirement	Starting immediately after completion of construction	Nashik Municipal corporation	Nashik Municipal corporation
Maintenance of newly planted trees required	Nashik Municipal corporation / Tree Authority should count and maintain the growth of newly planted trees	Project requirement	Up to 2 years after project becomes operational	Nashik Municipal corporation	Nashik Municipal corporation
Ambient Air quality, Water quality & Noise level monitoring	Ambient air quality, Water quality and noise level monitoring is required once every pre-monsoon and post-monsoon for one year period. The frequency will be 24 hours day	Project Requirement	During operational phase	Pollution monitoring agency	Nashik Municipal corporation
Air quality impact	Ambient air concentration of various pollutants shall be	Project requirement	Starting immediately after	Pollution monitoring agency	Nashik Municipal Corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
	monitored as presented in project report		completion of construction		
	Vehicle emission norms of the day shall be enforced	Legal requirement	Routinely after operation phase	Competent Authority / Nashik Municipal Corporation	Nashik Municipal Corporation
Water quality	Water quality parameters shall be monitored as presented in project report	Project requirement	Starting immediately after completion of construction	Pollution monitoring agency	Nashik Municipal Corporation
Noise pollution	Monitoring of noise levels at sensitive receptors as per monitoring plan	Project requirement	Starting immediately after completion of construction	Pollution monitoring agency.	Nashik Municipal corporation
	Noise will become a major problem if congestion or bottleneck situation exist in the road. Such locations causing hindrance to traffic shall be rectified. Adequate “No Honking”	Project requirement	Starting immediately after completion of construction	Contractor	Nashik Municipal corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
	sign boards at sensitive locations shall be installed				
Storm water and drain maintenance	All drains to be maintained and cleaned periodically	Project requirement	Starting immediately after completion of construction	Nashik Municipal corporation	Nashik Municipal corporation
Traffic and safety	Traffic control measures including speed limits to be enforced strictly. Traffic volume and speed to be monitored to record benefits achieved from the project.	Project requirement	Through operation stage	Traffic Management unit of Nashik Municipal Corporation	Nashik Municipal Corporation
Survival rate of plantation	Adequate care of the compensatory plantation should be taken up so as to comply the survival rates recommended in the relevant policies of the tree authority	Project requirement	Up to 2 years after project becomes operational	Nashik Municipal Corporation	Nashik Municipal Corporation

Adverse Impact	Mitigation Measures	Cross Reference to Documents	Time Frame	Responsibility	
				Implementation	Supervision
Aesthetics and landscape	The landscaping provided shall be guarded from animals with adequate monitoring to ensure their growth	Project requirement	Up to 2 years after project becomes operational	Nashik Municipal Corporation	Nashik Municipal Corporation
Public health and safety	Provision of adequate traffic signals, signpost / road crossing etc.	Project requirement	During operation stage	Nashik Municipal Corporation/ Traffic Management unit	Nashik Municipal Corporation
Road embankment and cut section stability	Road embankment and cut section stability should be checked for erosion and rutting. Any sign of instability should warrant adequate response immediately and well before succeeding monsoon season	Project requirement	Throughout operation stage	Nashik Municipal Corporation	Nashik Municipal Corporation

Table 3-12: Environmental Monitoring Plan

Environmental Components	Project Stage	Parameters	Standard	Location	Frequency	Duration	Institutional Responsibility	
							Implementation	Supervision
Air Quality	Construction	PM_{10},$PM_{2.5}$, SO_2, NO_x, CO,HC,etc.	NAAQ of CPCB	@ 8 Locations (for upwind and downwind directions)	Three season data every –pre-monsoon & post monsoon for 24 months	24 hours/day	Contractor	Nashik Municipal corporation
Air quality	Operation	PM_{10},$PM_{2.5}$, SO_2, NO_x, CO,HC,etc	NAAQ of CPCB	@ 8 Locations (for upwind and downwind directions)	Once every –pre-monsoon & post monsoon for 24 months	24 hours per day	Nashik Municipal corporation	Nashik Municipal corporation
Water Quality	Construction	pH,TDS, Total Hardness, COD, BOD5, DO, Fluorides, Chloride, Sulphates.	CPCB water Quality standards	@ 5 Locations	Once every –pre-monsoon & post monsoon for 24 months	-	Contractor	Nashik Municipal corporation

Environmental Components	Project Stage	Parameters	Standard	Location	Frequency	Duration	Institutional Responsibility	
							Implementation	Supervision
Water Quality	Operation	pH,TDS, Total Hardness, COD, BOD5, DO, Fluorides, Chloride, Sulphates.	CPCB water Quality standards	@ 5 Locations	Once every –pre-monsoon & post monsoon for 24 months	-	Contractor	Nashik Municipal corporation
Noise Levels	Construction	Leq, L10, L15, L20,L25,L30 dB(A)	CPCB noise standards	@ 8 Locations	At start of construction activity, followed by every pre-monsoon & post-monsoon during construction period	Continuous 24 hour reading with a frequency of 10 minutes	Contractor	Nashik Municipal corporation

Environmental Components	Project Stage	Parameters	Standard	Location	Frequency	Duration	Institutional Responsibility	
							Implementation	Supervision
Noise Levels	Operation	Leq, L10, L15, L20,L25,L30 dB(A)	CPCB noise standards	@ 8 Locations	Once every pre-monsoon & post-monsoon for 2 years after operation starts.	Continuous 24 hour reading with a frequency of 10 minutes	Contractor	Nashik Municipal corporation
Soil Quality	Construction	pH, Conductivity, Moisture content, calcium , Magnesium, Potassium	CPCB Soil Quality standards	@ 5 Locations	Once every –pre-monsoon & post monsoon for 24 months	-	Contractor	Nashik Municipal corporation
Soil Quality	Operation	pH, Conductivity, Moisture content, calcium, Magnesium, Potassium.	CPCB Soil Quality standards	@ 5 Locations	Once every –pre-monsoon & post monsoon for 24 months	-	Contractor	Nashik Municipal corporation

Environmental Components	Project Stage	Parameters	Standard	Location	Frequency	Duration	Institutional Responsibility	
							Implementation	Supervision
Ecology	Operation	Survival rate of compensatory plantation	Survival rate to be at-least 70%. Below this replantation should be done	At locations of compensatory plantation	Annual	Up to two year after implementation	Nashik Municipal corporation	Nashik Municipal corporation

3.5.4 INSTITUTIONAL SETUP AND COORDINATION

The monitoring and evaluation of the EMP is a critical activity in ascertaining the effectiveness of mitigation measures and controlling the adverse environmental impact of the project.
The Project Implementation Authority (PIA) such as Nashik Municipal Corporation has the responsibility of implementing the environmental mitigation measures. The responsibility also includes the notifying the affected parties, their relocation and notifying the utility departments such as telephones, water supply, electricity etc. which use the road for providing the utility services.
PIA may get the EMP implemented through the Contractor by incorporating EMP requirements in the contractual agreement along with the provision of penalties to be levied if the contractor fails to comply with the prescribed conditions.

3.5.5 NASHIK MUNICIPAL CORPORATION

Nashik Municipal Corporation may initiate coordination process among the concerned organizations for EMP implementation. Nashik Municipal Corporation may take lead in

- Reviewing the progress of the projects and plans particularly in respect of the EMP on the basis of ECRs.
- Reviewing and discussing the salient features of the annual environmental status reports prepared by the local authorities.
- Organizing and coordinating training programs for all PIA and related organizations

3.5.6 PROJECT IMPLEMENTATION AGENCY (PIA)

The responsibility of implementing the various environmental mitigation measures lies with Nashik Municipal Corporation as PIA. The responsibility includes various tasks such as notifying various affected persons (informal vendors in this case), utility departments-government and private, which use road for providing utilities.

3.5.7 ENVIRONMENTAL MANAGEMENT & CAPACITY BUILDING CONSULTANT

Nashik Municipal Corporation should appoint a Consultant at implementation stage for Environment Management & Capacity Building (EMCB). The consultant shall be responsible for

- Reviewing institutional capacity of Nashik Municipal Corporation and PIAs vis-à-vis environmental management in general and addressing environmental issues of Nashik City Roads in particular.

- Identifying organizational needs in terms of structure, resources (facilities, and staff), roles and responsibilities in Nashik Municipal Corporation and PIA.
- Developing and planning the training programme that includes:
    1. Identification of different training modules covering various courses at different levels (initial and recurring)
    2. Identification of trainers
    3. Development of training programs for each module
    4. Development of training material for each module (slides, videos and information support material)
    5. Planning a training schedule
    6. Development of a mechanism for training feedback assessment
- Conducting or organizing the training program according to the above program and provide feedback on the effectiveness of the training.
- Coordinating the monitoring and supervision of Nashik City Roads along with Nashik Municipal Corporation and PIA's in relation to environmental issues during project implementation.

3.5.8 PROJECT CONTRACTOR

The Project Contractor is the lower most agency in the multi-level institutional arrangement. The contractor shall implement the EMP measures, enhancement measures and measures as directed by PIA / Nashik Municipal Corporation. The responsibility on the contractor for implementing the EMP measures shall be built into contractual agreement that the contractor has with PIA. As part of his responsibility, the contractor shall submit a report on compliances with environmental mitigation measure ECR (Environmental Compliance Report) periodically to the PIA / Nashik Municipal Corporation.

3.5.9 INSTITUTIONAL STRENGTHENING

The implementation of an environmentally sound transport strategy involves a number of institutions/organizations at various levels, with each organization having a distinct role to play. Introducing environmental dimensions in formulating and implementing a transport strategy would require that these institutions should have additional responsibilities for ensuring that the strategy does not result in any significant adverse environmental impacts.
In order to examine the existing capacities & identify the additional responsibilities that the concerned Organizations/Institutions may take up to address environmental issues, these Organizations are categorized in four groups – Apex Organizations, Project

Implementation Agencies, Transport Service Organizations and Regulatory Organizations.

Nashik Municipal Corporation is the apex organization and being the regional funding authority has to be regular interactions with various Project Implementing Agencies. The existing capabilities of these organizations for environmental management will have to be carefully assessed. The envisaged roles & responsibilities of these organizations and additional strengthening requirements to meet the environmental obligations are given in Table 3-13

TABLE 3-13: INSTITUTIONAL STRENGTHENING & TRAINING REQUIREMENTS

Organization	Roles & Responsibilities	Strengthening Required
Nashik Municipal Corporation	Review the Implementation of EMPs Facilitate implementation of policy directives/emission laws etc. for pollution prevention/mitigation by interacting with various Gov. Depts. Like Environment Dept., Urban Development Dept. etc. Review the environmental management capabilities of implementing agencies to assist them in developing their capabilities. Obtain and analyze environmental information generated by organizations like MSPCB (Maharashtra State Pollution Control Board), etc.	Enhance the capabilities of the Nashik Municipal Corporation by out sourcing whenever required. Training coordinated by Nashik Municipal Corporation with support of EMCB Consultants on: • Environmental assessment • Appreciation of Environmental impacts and EMPs procedure and responsibilities for EMP implementation, monitoring & reporting etc.

3.5.10 ROLE OF IMPLEMENTING AUTHORITIES IN CONSTRUCTION PHASE MITIGATION

Implementing Organizations for Construction Stage Mitigation:
The project implementing authorities like Nashik Municipal Corporation has major role in enforcement mitigation of measures during construction phase. These measures can be taken care by the contractors assigned the project under supervision of implementing authorities.

Mechanisms for Implementing Mitigation:
The project implementing agency shall include a section in their tender document for the project, which is aimed at getting the mitigation measure implemented during construction stage. Various points recommended for incorporation as:

- Construction should be scheduled in such a manner that excavated site does not remain exposed during monsoons.
- Construction should be taken up stage wise to reduce inconvenience to users.
- Covering trucks carrying construction materials which are susceptible to getting air borne.
- Enclosing the construction sites for the reasons of public safety, containment of dust and aesthetics.
- Specification of noise level for construction equipment. Values recommended are
    - Drilling 75 dB A)
    - Vibrator 75 dB (A)
    - Dumpier 75 dB (A)
- Assurance from the Contractor that noise level shall not be exceeding the ambient noise standards of 50 dB (A) during day time and 40 dB (A) as project sites have residential buildings and sensitive receptors.
- Specifications for operating construction equipment away from sensitive receptor, unless it is not feasible, in which case temporary noise shield to be used.
- Specification for the sites to be used for the disposal of the excavated material at the Nashik Municipal Corporation /PWD specified sites.

3.5.11 COST ESTIMATES FOR IMPLEMENTING EMP

The cost estimates for EMP implementation during construction and operational phase are summarized in Table 3-14. The estimate has been prepared for the task as mentioned below:

- Air Pollution monitoring during construction and operation stages
- Noise monitoring during construction and operation stages
- Water quality monitoring during construction and operation stages
- Soil Quality monitoring during construction
- Monitoring of tree survival rate(Compensatory Avenue Plantation)
- Dust Suppression at Site

TABLE 3-14: COST ESTIMATES FOR EMP IMPLEMENTATION

S. No.	Item No.	Assumption	Rate Adopted (in Rs.)	Total Cost (in Rs.)
Construction Phase				
1	Air Quality Monitoring	8 representative samples for 24 hours (Once every – pre-monsoon & post monsoon for 24 months)	6000/-per sample	1,92,000/-
2	Noise Monitoring	8 representative samples for 24 hours Once every – pre-monsoon & post monsoon for 24 months)	2,000/-per day	64,000/-
3	Water quality monitoring	5 representative samples Once every – pre-monsoon & post monsoon for 24 months)	3500/- per sample	70,000/-
4	Soil Quality testing	5 representative samples (Once every – pre-monsoon & post monsoon for 24 months)	2800/- per sample	56,000/-
5	Compensatory avenue plantation of twice the number of trees to be cut and their fencing and maintenance for two years	900 Nos	600/tree	5,40,000/-
6	Dust Suppression at Site(3 trips/day for 365 days for 2 years)	2190 nos.	500/Tanker	10,95,000
Total				**25,57,000**

Notes: Operational Phase Air quality, water quality and Noise level and Soil quality monitoring will be for one year.

3.5.12 CLEARANCES REQUIRED FOR THE PROJECTS

After reviewing the various applicable acts and statutes, as mentioned below, it is suggested that some clearances and permission are required for the project. The summary of clearances required for the present project is shown in Table 3-15.

TABLE 3-15: SUMMARY OF CLEARANCES REQUIRED FOR THE PROJECT

S. No	Subject	Authority Granting Clearance	When required	Remarks
1	Environmental Clearance	State Environmental Appraisal Committee, Govt. of Maharashtra.	Before Construction	Environmental clearance not required for this project
2	Forest Land diversion and Tree cutting	Department of Forest, Govt. of Maharashtra	Before Construction	Nashik municipality responsibility through Consultant upon confirmation of forest section along the project road and land acquisition in forest section due to proposed road design. The application for forest clearance will be submitted to Principal Chief Conservator of Forest (PCCF), Mumbai, and Maharashtra.
3	Consents under Water(P&CP) Act, 1974 & Air (P&CP)	Maharashtra Pollution Control Board	Before Construction	Nashik Municipality responsibility.
4	Permit for installation of	Maharashtra Pollution Control	Before Construction	Contractor's responsibility.
5	No Objection Certificate (NOC) for batching plant	Department of Inspectorate of Factories and Labour Department, Mumbai (Maharashtra)	Before Construction	Contractor's responsibility.
6	Clearance for establishing Asphalt Plant	Maharashtra Pollution Control Board	Before Construction	Contractor's responsibility.
7	Crossing railway lines	Indian Railways	Before Construction	Nashik municipality responsibility
8	Installation of Generators	Maharashtra Electricity company of respective regions	Before Installation	Contractor's responsibility.

S. No	Subject	Authority Granting Clearance	When required	Remarks
9	Clearance for excavation & transporting soil	Department of Mines & Geology/ Local Bodies	Before Quarrying	Contractor's responsibility.
10	Permission for extraction of boulder	Department of Mines & Geology. Government of Maharashtra	Before Quarrying	If the extraction of boulder is being Procured from the existing quarry/supplier, it shall be ensured that, requisite license/ lease has been obtained from the concerned Authority.
11	Permission for extraction of sand	Department of Mines & Geology. Government of Maharashtra	Before Quarrying	If the extraction of sand is being Procured from the existing sand quarry/supplier, it shall be ensured that requisite license/lease has been obtained from the concerned Authority.
12	License for storing diesel	Commissioner of Explosives & Maharashtra Pollution Control	During Construction	Contractor's responsibility.
13	Labour camps	District Health Officer	During Construction	Contractor's responsibility.
14	Clearance for crossing other waterways	Irrigation Department, Government of Maharashtra	During Construction at the specific site	Contractor's responsibility.
15	If water has to be taken from river / Reservoir	Concerned Water Authority	During Construction at the specific site	Contractor's responsibility.

3.6 CONCLUSION

Summary of Key Issues and Mitigation Commitments:

This section provides a summary of conclusions and recommendations drawn following completion of the Initial environmental assessment. These conclusions and recommendations are intended to provide:

- Guidance to Nashik Municipal Corporation as to policy decisions which will affect the roadway design, implementation and future planning for the CTTP.
- Direction for further environmental impact assessment work to be conducted in the stage of project development and implementation.

It is intended that the conclusions and recommendations included in this report will generate discussion, and interpretation of the environmental assessment scope of work. The following general conclusions are drawn:

- The initial Screening and scoping helped to address the probable issues that have already been, and/or are expected to be addressed in subsequent stages of road design.
- The Initial environmental assessment should be considered as a preliminary assessment. Most conclusions and recommendations require confirmation following more detailed assessment in subsequent stages of project development.
- Overall it is concluded that The CTTP can be developed without causing significant adverse environmental impacts to the natural, economic or cultural environment of the study area, assuming the mitigation measures identified in this report are incorporated into design; the most important of these are;
- The widening of the road may be limited to available RoW especially at congested locations,
- Appropriate mitigation measures as suggested in environmental assessment shall be incorporated especially in case of educational institutes, religious structures, Health care facilities, etc.
- In general, it is suggested that the choice of developing additional lanes to the right or left side of the existing carriageway, and /or the routing of re-alignments may be made so as to minimize:
- The relocation of residences, business / commercial establishments; and/or institutional facilities such as government buildings and schools,
- The relocation of cultural properties (Church, temples, masjid, etc.),
- The removal of trees and other features such as well, bore wells, hand pumps etc.

4. PRIORATISATION OF PROJECTS

"Prioritization" as an activity, identifies all individual projects that need to be executed in order to achieve the transportation goals of the city. This phase weaves the projects in one logical sequence, thus forming an "implementation program".

The implementation program outlines the following elements:

1) A sequence in which the projects should be undertaken.
   a) It should be noted that the "duration" of a project does not necessarily indicate its "priority". Some very long duration project may have to be started 5 years after the implementation of the CTTP commences whereas some short duration projects may have to be started immediately. Priorities of projects would be reflected in the suggested sequence.
2) Identification of all projects in two categories, as "Critical" and "Desirable."
   a) a) It should be noted that "Critical" does not necessarily mean "High priority", and vice versa. Also, as with priority, the duration of a project does not necessarily indicate its criticality. Some Critical projects may have to be logically started 10 or 15 years down the line, but are still critical for achieving the stated objectives of the CTTP. In other words, not implementing "Desirable" projects may have only a mild impact on achieving the transportation objectives, but not implementing "Critical" projects would severely compromise the essence of the vision and objectives of CTTP.

Each project is prioritized based on scoring it across seven criteria:

1. Mobility
2. Accessibility
3. Safety
4. Energy
5. Environment
6. CO2 Mitigation
7. Project Cost

The seven criteria in turn are weighted across sub-criteria described in Table 4-1. Each project is thus scored across multiple weighted criteria. An example of the same has been illustrated in Table 4-1.

TABLE 4-1 CRITERIA FOR PROJECT PRIORITIZATION (EXAMPLE SCORING)

Criteria	Sub-Criteria	Description	Score (1-3) e.g	Weightage	Overall Weightage	Weighted Score
1. Mobility	Promotion of Public Transport	Projects that promote public Transport should be scored higher. However some road infrastructure projects and traffic management projects too can promote Public transport.	1	0.5	0.5	**1.25**
	Impact on Reducing Traffic Congestion	This impact should be considered from the viewpoint of the entire road network of the city.	2	0.25	0.5	
	Provision of NMT tracks and pedestrian facilities	Providing NMT Tracks and Pedestrian Facilities	1	0.25	0.25	
2. Accessibility	Consistent with the strategic framework for Transport Network	Assessment of the level of Consistency with the strategic framework for Transport Network	2	1.0	2	**2**
3. Safety	Enhancement of traffic safety	Projects that enhance traffic safety scored higher.	2	1.0	2	**2**
4. Energy	Promotion of CNG Vehicles	Projects that save fuel energy resources are scored higher.	1	0.5	0.5	**1**
	Promotion of e-rickshaws		1	0.25	0.25	
	Promotion of NMT vehicles		1	0.25	0.25	
5. Environment	Promotion of Public Transport	Projects that give better environmental conditions in the city by enhancing the public transport ridership and NMT trips are given higher scores	1	0.75	0.75	**1**
	Pedestrian and NMT Tracks		1	0.25	0.25	
6. CO2 Mitigation	Promotion of Public Transport & NMT	Projects that give better healthy living condition for the users are given higher scores	1	0.5	0.5	**2**
	Road Cost Pricing		3	0.25	0.75	
	Reducing impact of Traffic Congestion		3	0.25	0.75	
7. Project Cost	Infrastructure Cost	Projects that give better infrastructure facilities to the user. Lesser the project cost, higher the score	2	1.0	2	**2**

PROPOSAL 1: PUBLIC TRANSPORT SYSTEM

Proposed Schemes	Category	Priority based on scoring	Phasing
Rail based Transit System	Desirable	High	Phase II,III
BRT/PT Exclusive Lanes	Desirable	High	Phase I,II,III
CNG BUS	Desirable	High	Phase I,II,III
Bus routes - fleet augmented	Critical	High	Phase I,II,III
Intermodal Facilities	Critical	High	Phase I,II,III
Terminals	Critical	Medium	Phase I,II
Bus Stops	Critical	High	Phase I

PROPOSAL 2: PEDESTRIAN FACILITY IMPROVEMENT

Proposed Schemes	Category	Priority based on scoring	Phasing
Footpath	Critical	High	Phase I
Table Top Crossing	Critical	High	Phase I
FOB			
Shalimar	Critical	High	Phase I
Pedestrian Subway			
CBS	Critical	High	Phase I
Datta Mandir	Critical	High	Phase I
Bytco Chowk	Critical	High	Phase I

PROPOSAL 3: NMT FACILITY IMPROVEMENT

Proposed Schemes	Category	Priority based on scoring	Phasing
Semi Segregated Cycle Track	Critical	High	Phase I
Cycle sharing stands	Critical	High	Phase I
Segregated Cycle Tracks	Desirable	Medium	Phase II
Cycle parking Stands	Critical	High	Phase I

PROPOSAL 4: PARKING MANAGEMENT PLAN

Proposed Schemes	Category	Priority based on scoring	Phasing
On street Parking	Desirable	Medium	Phase I
Off street Parking	Desirable	Medium	Phase I,II
MLCP	Desirable	Medium	Phase I,II

PROPOSAL 5: INTELLIGENT TRANSPORTATION SYSTEMS

Proposed Schemes	Category	Priority based on scoring	Phasing
Automated Vehicle Location System	Desirable	Medium	Phase I,II
Variable Message Signs	Desirable	Medium	Phase I,II
ITS control Centre, PIS, Common Mobility Card, GPS, Mobile phone Applications and Surveillance Cameras	Desirable	Low	Phase III

PROPOSAL 6: ROAD NETWORK PLAN

Proposed Schemes	Category	Priority based on scoring	Phasing
Flyovers			
CBS	Desirable	High	Phase I
Modak Point		High	Phase I
Datta Mandir Chowk		High	Phase I
Vijay Mamata Signal		High	Phase I
Khadkali Chowk		Medium	Phase II
Kathe Galli		Medium	Phase II
DGP Nagar		Medium	Phase II
Sinnar Phata		Medium	Phase II
Dwaraka		Low	Phase III
ROB			
Gadekar Mala Road to Deolali Camp Road Crossing	Critical	Low	Phase III
Vadner Dumala Gaon		Low	Phase III
New Links			
Sinnar Phata to Soubhagya Nagar	Critical	Low	Phase III
Soubhagya Nagar to Pandavlene		Low	Phase III
Bardan Phata to Makhmalabad (outside NMC)		Low	Phase III
Makhmalabad Naka to Adgaon		Low	Phase III
Adgaon to Sultanpur		Low	Phase III
Sultanpur to Panchak		Low	Phase III
Road Widening			
Mumbai-Agra Highway	Desirable	Medium	Phase II
Trimbak Road		Medium	Phase II
Nashik Pune Highway		Medium	Phase II,III
Gangapur Road		Medium	Phase II

Proposed Schemes	Category	Priority based on scoring	Phasing
Dindori Road		Medium	Phase II
Peth Road		Low	Phase III
Old Agra Road		Medium	Phase II
Tilak Road		Medium	Phase II
Amrutdham Road		Medium	Phase II,III
Ambad-Kamathwade Link Road		Medium	Phase II,III
Ambad-Satpur Link Road		Medium	Phase II
Ambad-Uttamnagar Road		Medium	Phase II
Amrutdham Road		Medium	Phase II
Ashoka Road		High	Phase I
Aurangabad Road		Medium	Phase II
ITI-Ambad Road		Medium	Phase II
Jail Road		Low	Phase III
Kamathwade-Trimurti Chowk Link Road		Medium	Phase II,III
Lam Road		Medium	Phase II
Mahatma Nagar-Untawadi Road		Medium	Phase II
Panchvati Road		Medium	Phase II
Ramdas Swami Road		Low	Phase III
Ravi Shankar Road		Medium	Phase II,III
Sri Shri Ravishankar Road		High	Phase I,III
Tikde Colony Road		Medium	Phase II
Untawadi Road		Medium	Phase II,III
Mahatma Nagar Road		Low	Phase III
Samathanagar Road		Medium	Phase II,III
Satpur MIDC Road		High	Phase I
Junctions for Geometry Improvement			
Bytco Chowk	Critical	High	Phase I
CBS		High	Phase I
Modak Point		High	Phase I
Datta Mandir Chowk		High	Phase I
Vijay Mamata Signal		High	Phase I
ITI Chowk		High	Phase I
City Center Mall Junction		High	Phase I
Shubham Park		High	Phase I
Ingale Nagar Chowk		High	Phase I
Khadkali Chowk		High	Phase I
Kathe Galli		High	Phase I
Dwaraka Chowk		High	Phase I
Peth Naka		High	Phase I
DGP Nagar		High	Phase I

Proposed Schemes	Category	Priority based on scoring	Phasing
Shivaji Putala Chowk		High	Phase I
Mico Circle		High	Phase I
Gadkari Chowk		High	Phase I
Thatte Nagar		High	Phase I

All the proposals discussed so far can be broadly grouped under three categories:

- Long Term Improvements: the usefulness of these improvements will last for more than 10-15 years
- Medium Term Improvements: the usefulness of these improvements will last for about 5-10 years
- Short Term Improvements: these are short term proposals that need to be reviewed and revised within 5 years as per the requirement.

Accordingly, long term, medium term and short term proposals for Nashik are shown in TABLE 4-2, TABLE 4-3 AND TABLE 4-4.

TABLE 4-2 SHORT TERM PROJECTS

S. No	Projects	Units	Total Qty.	Unit Rate (Crores)	Total Cost (Crores)
1	Junction Improvements	No.	82.00	0.600	49.20
2	Footpath	Km.	150.00	1.100	165.00
3	Foot Over Bridges	No.	2.00	0.800	1.60
4	Pedestrian Subway	No.	6.00	2.400	14.40
5	Shared Cycle Tracks	Km.	39.50	0.018	0.69
6	Dedicated Cycle Tracks	Km.	54.00	0.035	1.89
7	Bicycles	No.	340.00	0.001	0.31
8	Bicycle Sub Docking Stations	No.	16.00	0.013	0.20
9	Bicycle Major Docking Stations	No.	4.00	0.035	0.14
10	Bus Fleet Augmentation-(Diesel & CNG)	No.	761.00	0.600	456.60
11	Bus Fleet Augmentation-Electric Buses	No.	325.00	1.200	390.00
12	Bus Shelters	No.	65.00	0.090	5.85
13	Improvement of Existing Bus Terminals	No.	5.00	0.400	2.00
					1087.88

TABLE 4-3 MEDIUM TERM PROJECTS

S. No	Projects	Units	Total Qty.	Unit Rate (Crores)	Total Cost (Crores)
1	Upgradation of Existing Truck Terminal	Sq.m	87007.4	0.000	17.40
2	New Signal Installations	No.	26.0	0.400	10.40

S. No	Projects	Units	Total Qty.	Unit Rate (Crores)	Total Cost (Crores)
3	Area Traffic Control System	Km.	33.6	0.600	20.16
4	ITS control Centre, PIS, Common Mobility Card, GPS, Mobile phone Applications and Surveillance Cameras)	Km.	250.0	0.400	99.99
5	On street Parking	Km.	34.0	0.014	0.46
6	Off street Parking (Surface)	No.	5.0	0.052	0.26
7	Off street Parking (Multi-Level-Car-Parking)	No.	2.0	1.809	3.62
					152.29

TABLE 4-4 LONG TERM PROPOSALS

S. No	Projects	Units	Total Qty.	Unit Rate (Crores)	Total Cost (Crores)
1	Upgradation of Existing Roads	Km.	176.17	2.50	440.43
2	New 4-Lane Roads (Proposed Outer Ring Road)	Km.	40.20	4.75	190.95
3	Flyover (2-Lanes)	No.	3.00	4.35	13.05
4	Flyover (4-Lanes)	No.	6.00	7.25	43.50
5	Rail Over Bridges (2-Lanes)	No.	2.00	11.50	23.00
6	New Bus Terminal	No.	1.00	1.20	1.20
7	Bus Rapid Transit System	Km.	33.60	15.00	504.00
8	Rail based Transit System	Km.	17.80	90.00	1602.00
9	Proposed New Truck Terminals	Sq.m	97124.60	0.001	77.70
					2895.82

TABLE 4-5 TOTAL PROJECT COST

Project Priority	Cost(Crores)(INR)
Short Term Projects	**1087.88**
Medium Term Projects	**152.29**
Long Term Projects	**2895.82**
Total Cost	**4135.99**

The projects identified in the earlier section are divided into three categories based on the urgency and duration of the implementation. Some of the long term projects have potential to enter into Public Private Partnership (PPP); however case to case project reports are required for validating the feasibility of each project. The cost of all the recommended projects is **4136 Crores**. It is important to highlight that the CTTP serves only to identify schemes and the costs presented are only block cost estimates for decision makers. Detailed cost estimates need to be worked out at further stages.

5. FINANCING OPTIONS

To capture all possible sources of value for funding urban transportation projects, planning needs to be part of a city level strategy. Ideally the infrastructure planning in the city should follow Comprehensive Mobility Plan/ Comprehensive Traffic and Transportation Plan - to allocate revenues among all projects in the city. The role of CTTP in implementing any project is shown in Figure 5-1.

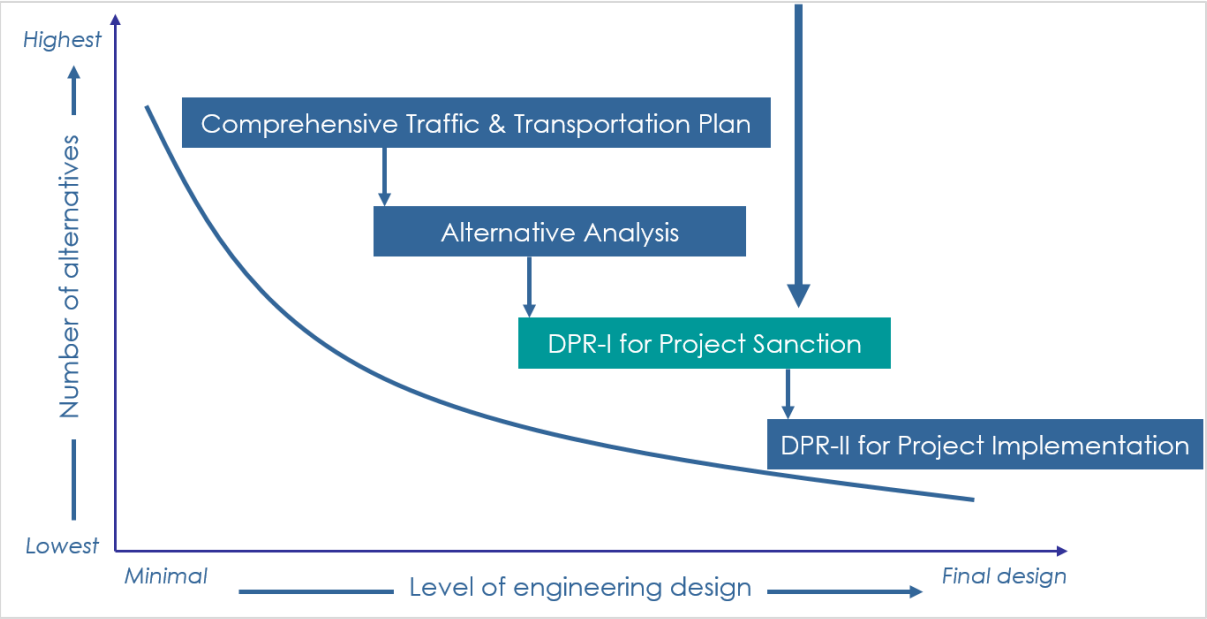

FIGURE 5-1: ROLE OF CTTP IN PROJECT IMPLEMENTATION

As per the Recommendations of Working Group on Urban Transport for 12th Five Year Plan, the financing of urban transport projects in the country has largely been confined to gross budgetary support from the government and the user charges. Due to heavy investment needs of urban transport and conflicting demands on the general exchequer, the investment in urban transport in past has not kept pace with the rapidly increasing requirement of the sector. The current level of user charges of limited urban transport facilities, do not make the system self-sustainable. At the same time, providing safe, comfortable, speedy and affordable public urban transport to all has to be a necessary goal of the governance. The key funding sources besides Gross Budgetary Support (GBS) and fare box can be dedicated levies, land monetization, recovery from non-user beneficiaries, debt and private investments. The paradigm of financing has to clearly move towards non-users pay principle and the polluters pay principle. There is a need for long-term sustainable dedicating financing mechanism to address fast worsening scenario in the field of urban transport. All the various components in which the investment would be required in the 12th Five Year Plan would need to be funded through a combination of funding from Govt. of India, State Govt./urban local body, development agencies, property development, loan from domestic and financial institutions as well as PPP. Thus, it is imperative to identify projects that are amenable to Government funding or PPP.

5.1 AMRUT FUNDING

Since cities and towns in India constitute the second largest urban system in the world and contribute over 50% of the country's GDP, they are central to economic growth. For the cities to realize their full potential and become effective engines of growth, it is necessary that focused attention be given to the improvement of infrastructure in an organized manner. According to AMRUT guidelines:

One-third of the project cost as grant from GoI for cities with a population of above 10 lakh.

Balance funding by State Governments / ULBs or through private investment.

The tender will include O & M for five years based on user charges. For the purpose of calculation of the project cost, the O&M cost will be excluded; however, the States/ULBs will fund the O&M through an appropriate cost recovery mechanism in order to make them self-reliant and cost-effective.

5.2 SMART CITY FUNDING

Nashik is one of the cities in the list of smart cities identified by GOI. Some typical features of comprehensive urban transport development in Smart Cities are described below.

- Creating walkable localities — reduce congestion, air pollution and resource depletion, boost local economy, promote interactions and ensure security. The road network is created or refurbished not only for vehicles and public transport, but also for pedestrians and cyclists, and necessary administrative services are offered within walking or cycling distance;
- Promoting a variety of transport options — Transit Oriented Development (TOD), public transport and last mile para-transport connectivity;

As part of Nashik Smart City Proposal (2016), about Rs. 690.50 Crores has been proposed towards Information and Communication Technologies in parking and traffic management.

5.3 PUBLIC PRIVATE PARTNERSHIP (PPP)

Public-Private Partnerships is cooperation between a public authority and private companies, created to carry out a specific project. They can take on a number of forms, and can be a useful method of capturing property value gains generated by transport infrastructure. In a PPP for a new transport infrastructure development project, the public authority creates a secure environment for the private sector to carry out the project, and the private partner offers its industry know-how, provides funding and shares in the project's risk. The objectives of the public and private sector partners appear to be quite different. The public sector aims to best serve the interests of taxpayers. The aim is not to use public money to obtain a return on capital investments. The private sector, on the other hand, aims to ensure a return on investment for its shareholders and to be as profitable as possible and yet these two contrasting goals can function perfectly well together in the framework of a PPP. The decision to undertake a

public-private partnership and the choice of the most suitable form of partnership greatly depends on the context and the types of project to be developed are given below:

- The project context may influence the type of PPP to be implemented. The public partner must evaluate the total cost of the project, its importance in terms of public need, the time frame, the number of actors involved and the geographic area in question. Does providing this public service require a major infrastructure? Will it require high levels of human and financial resources to provide this service? Before a decision can be made, it is necessary to fully understand the context of the proposed project.
- The cost of the project is of course a critical factor, which will weigh on the choice. Many PPP concern projects for underground systems, LRT and BRT requiring significant levels of financing which the local authorities would have difficulty assuming alone.
- A well-structured institutional framework and the local authority's experience in developing transport projects are also decisive factors. Urban transport is an industrial and commercial activity, which involves financial risk. Bringing in experienced partners is one way of compensating for a lack of certain skills in this field, though a good PPP should call upon other forms of expertise on the part of the public authority. This can sometimes facilitate obtaining a loan, in particular from international funding agencies.
- The tasks entrusted to the private sector (design, construction, development, operation, maintenance) will influence the type of contract.
- The sharing of responsibilities and risks will determine the degree of involvement of each partner and the type and clauses of the contract. There are many types of contracts but it is primarily the sharing of financial risk, which will determine the key characteristics. There are two categories of risk: commercial risk, related to trends in revenue, and industrial risk, related to the cost of construction and trends in operating and maintenance expenses. If both types of risk are covered by the public partner, then it would be a management contract in which the private partner is merely performing the work. The private partner must meet the specifications but will not be motivated to improve the service nor propose innovative techniques or management;
- If the project is not self-financing, i.e. if, at the end of the contract, the total revenues and gains do not balance out the total costs, the transit authority may be required to provide compensation, depending on the clauses of the contract.
- However, if the extreme ends of the PPP continuum are not workable in situations of crisis Government needs to develop intermediate Options of funding. These options include Viability Gap Funding,

5.4 INTERMEDIATE OPTIONS OF FUNDING

5.4.1 VIABILITY GAP FUNDING

The Government of India has established a special financing facility called "Viability Gap Funding" under the Department of Economic Affairs, Ministry of Finance, to provide support to PPP infrastructure projects that have at least 40% private equity committed to each such project. The Government of India has set certain criteria to avail this facility under formal legal guidelines. Viability Gap Funding can take various forms such as capital grants, subordinated loans, O&M support grants and interest subsidies. It will be provided in installments, preferably in the form of annuities. However, the Ministry of Finance guidelines require that the total government support to such a project, including Viability Gap Funding and the financial support of other Ministries and agencies of the Government of India, must not exceed 20% of the total project cost as estimated in the preliminary project appraisal, or the actual project cost, whichever is lower. The process of Viability Gap Funding for any project is shown in Figure 5-2.

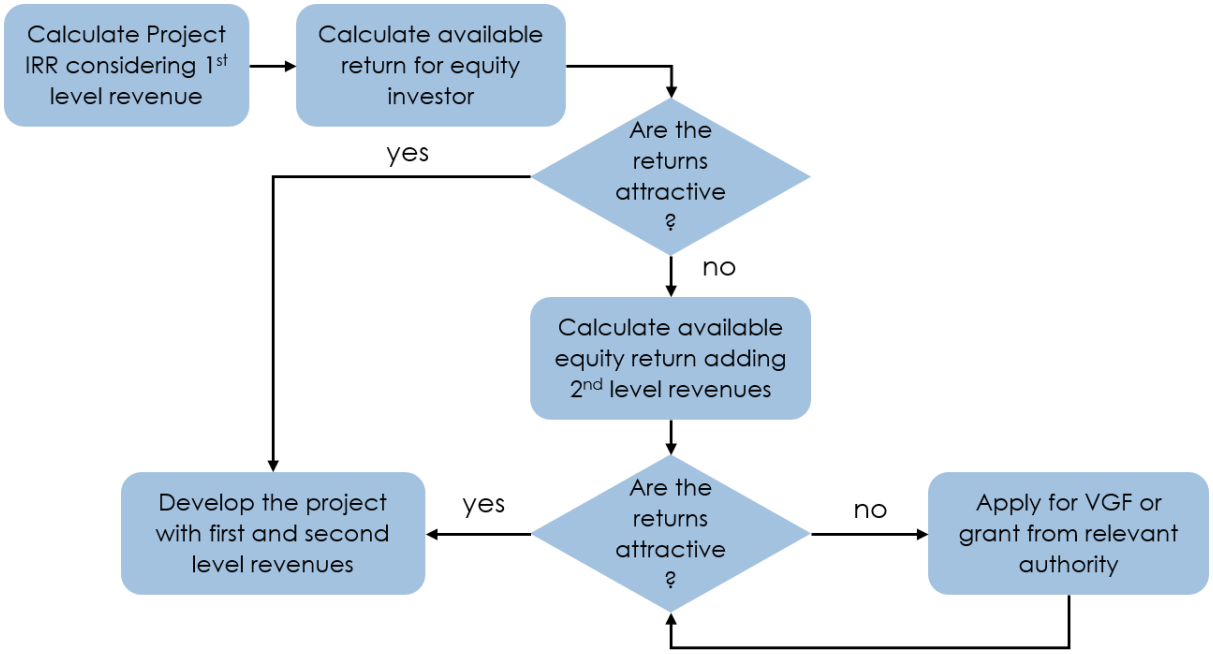

FIGURE 5-2: PROCESS OF VIABILITY GAP FUNDING

5.4.2 DEDICATED URBAN TRANSPORT FUND (DUTF) AT CITY LEVEL

For the projects, which are not admissible under viability gap funding, the alternative sources of funding that a city could avail by setting up a dedicated urban transport fund at city level.

The direct beneficiaries of an improved transportation infrastructure, include citizens/ passengers of a public transport system; vehicles using roads & flyover and businesses based on the infrastructure- i.e. advertisers on the system, vendors. The traditional revenue streams from them include fare box revenues; sale of monthly passes; advertising revenues and vendor licensing.

However, these projects have a number of indirect beneficiaries including property owners near the developed transport corridors gaining from higher potential value of property; business around the transport system- gaining from better connectivity; local Government gaining higher property taxes in the region due to escalation in property prices. These indirect beneficiaries are either usually ignored as source of value capture or it is limited.

There is a need to have a dedicated pool where all earmarked funds intended for use in development of urban transport at the city level are deposited. The rationale for having such a fund is to provide transparency for all monies allocated for purposes pertaining to urban transport. A dedicated fund, established by law, to receive revenues exclusively marked for urban transport will help ensure that these revenues are used for the intended purpose. The objectives of DUTF is to:

- Provide urban transport funding by tapping innovative sources
- Provide dedicated and sustainable funding for urban transport
- Efficient management of available funds
- Ensure transparency and accountability in fund management
- Leverage UTF revenue for raising funds from the market

Nashik Municipal Corporation has to set up an Urban Transport Fund (UTF) to fund the transportation projects. The UTF has to be managed by a SPV wholly owned by the Municipal Corporation.

Rationale for the SPV

- The SPV to be 100% owned and controlled by NMC
- Will help NMC raise long term loans (more than 12 yrs) from multilateral agencies WB and ADB
- SPV ensures focused and timely implementation, necessary for projects with borrowing
- SPV can focus on generating the revenues for the projects
- Existing employees can be deputed to the SPV, and can be given more focused role in SPV for timely implementation. Proposed structure of SPV is shown in Figure 5-3.

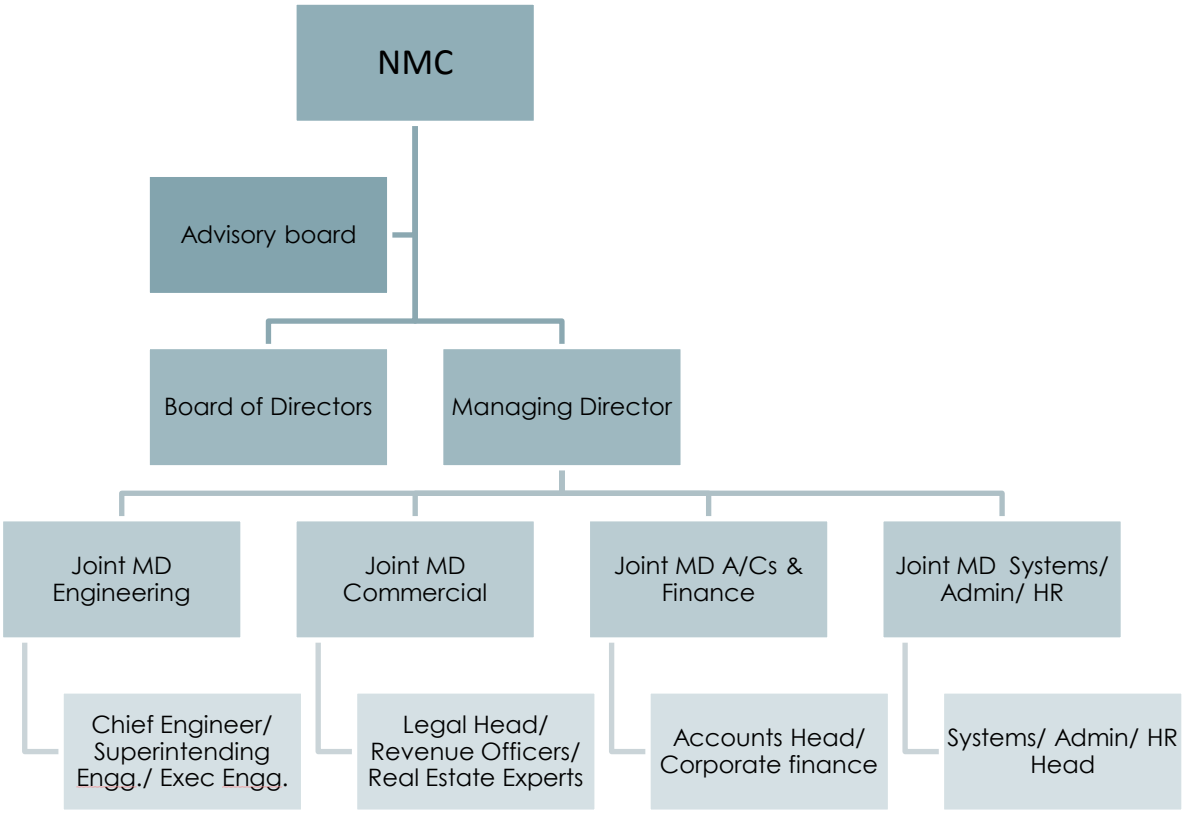

FIGURE 5-3: PROPOSED STRUCTURE OF SPECIAL PURPOSE VEHICLE (SPV)

Sources of Funds for DUTF

User charges/taxes suggested to be collected at the State shall be collected by the respective government departments and the proceeds shall be paid into the State consolidated fund and a portion shall then be transferred to UTF. Allocation of funds through the Central government schemes may directly go to UTF or be channelized through urban local bodies or the State Government. For example, under the AMRUT scheme of the GoI, funds are proposed to be allocated from the states to ULBs. Borrowings made by the SPV can directly be deposited into the UTF account. The receipts from the suggested sources of funds for UTF shall be regularly transferred to the UTF account on a monthly basis or more frequently. Figure 5-4 describes broadly the sources for UTF, segregated as Central-level, State-level, local-level and other allocations.

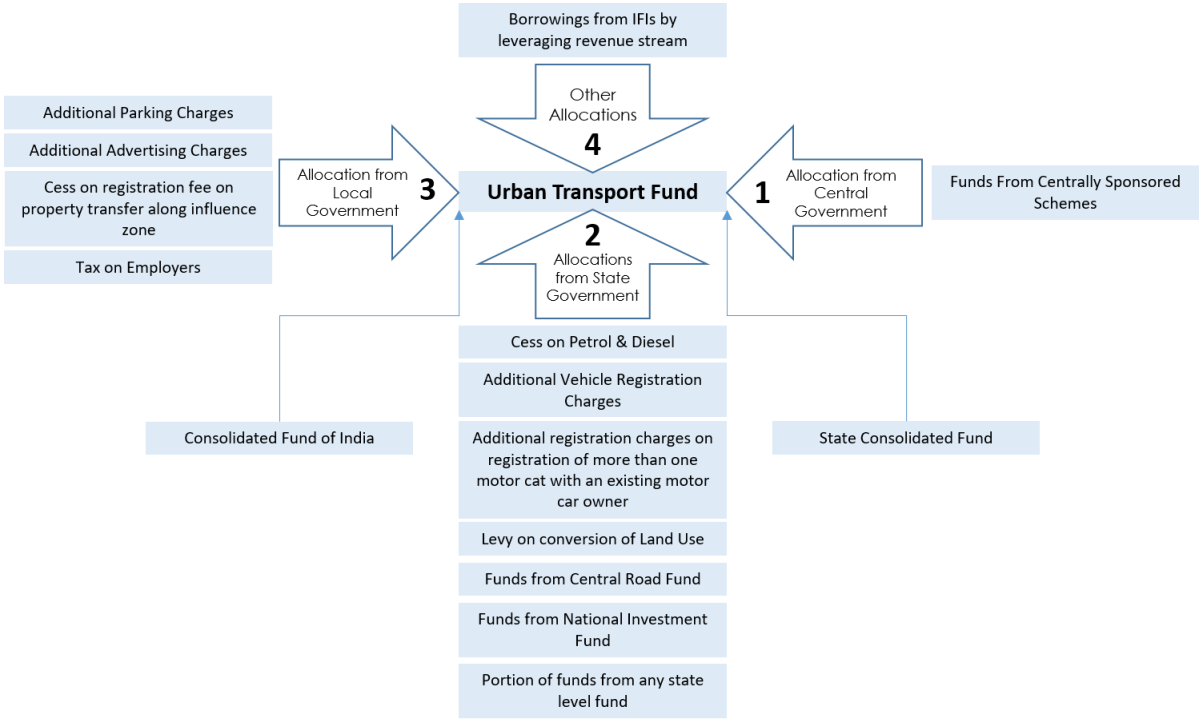

FIGURE 5-4 SOURCES OF FUNDS FOR UTF

6 INSTITUTIONAL FRAMEWORK

City transport system generally involves several organizations that look after various forms and aspects of the transport system and network and have overlapping functions and areas of work. Therefore to delineate areas and to remove ambiguity of functions an institutional framework has been proposed.

With the formation of a State level UMTA, part of the problem has been sorted out. However, this would have a macroscopic view of resolving policy issues for all urban centres within the state. There still remains a need to set up a localized organization that results in coordinated strategic level planning at the city level and deal with more day to day issues of urban transport.

6.1 PRESENT INSTITUTIONAL SETUP

There are various agencies involved in the transport sector of Nashik. Details of these agencies are as follows: **District collector** is responsible for overall administration of the district. **Nashik Municipal Corporation** is the principal agency responsible for planning and development of transport infrastructure (roads) including finance & investment of Nashik city as well as the surrounding region. **Highway Department** (NMC/PWD) is responsible for any planning and development in the road transport sector including financing and investment outside Nashik Urban area. At the same time, the **traffic Police** takes charge of traffic safety, management and operations in the town. The **Regional Transport Office** (RTO) for Nashik is responsible for licensing of vehicles and drivers in the district. **Ministry of Railways** is responsible for passenger and goods railways operations in the study region. Road based Public transport need of the town is handled by **Maharashtra State Road Transport Corporation Ltd.** (MSRTC) and private agencies. Other than RTO, there is no other agency/authority to control/manage private bus operations. **National Highways Authority of India** is responsible for construction, operation and maintenance of National Highways in the Nashik area. Issues with the Present Institutional Setup

It can be seen from the above paragraph that different organizations are involved in urban transportation in Nashik Municipal Corporation (NMC) Area, and they perform diverse functions and activities. Any issue related to urban transport needs involvement of various agencies to address the same. This multiplicity of agencies leads to confusion in responsibility for the urban transport issues. It can also be noted that there is no agency looking after only urban transport issues. Thus it is imperative that there shall be a nodal agency looking after all the issue related to urban transport. No nodal agency has any control on the accountability in ownership, performance and maintenance in transportation infrastructure. The issues emerging out of the existing situation are summarized as follows:

- Multiplicity of organizations involved in Urban Transport
- Lack of Transport Planning expertise in the organizations

- No accountability in ownership, performance and maintenance of transportation infrastructure and systems operations.
- No single apex agency regulating, facilitating and integrating operations of different modes

The Nashik Municipal Council established in the year 1864 (raised to the status of City Municipal Council in 1874) was given the status of Corporation on 7th Nov 1982. It is governed under "Maharashtra Municipalities Act – 1965". The city specific characteristics which have greater implication on city development process have been identified and on that basis the entire city has been divided into six divisions, with total 31 electoral wards/ 108 census wards. The organogram of the Nashik Municipal Corporation is shown in Figure 6-1:

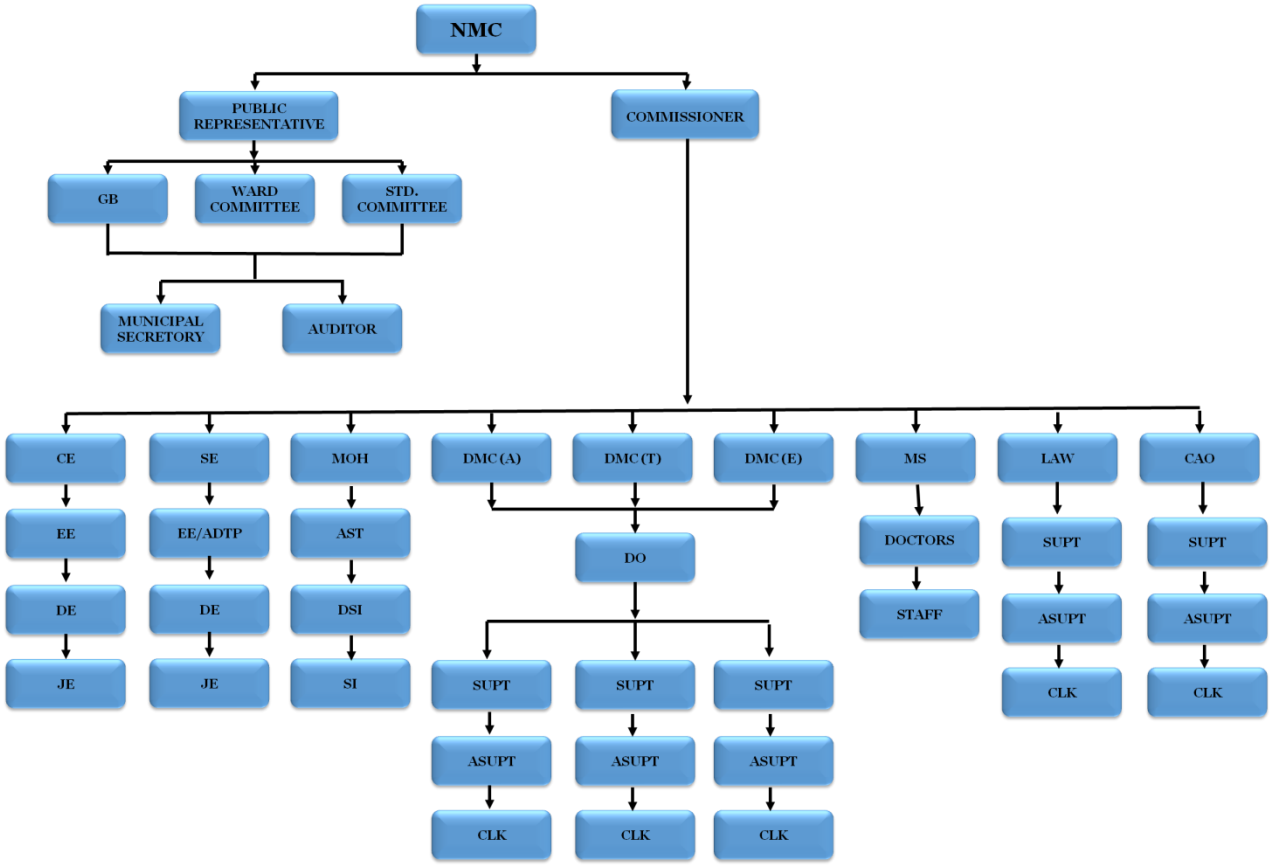

FIGURE 6-1: ORGANOGRAM (ORGANIZATION STRUCTURE) OF NASHIK MUNICIPAL CORPORATION

6.2 SUGGESTIONS

In view of bringing the institutional setup in a proper structure, it is important to understand issues with the present Institutional set up, listed below:

- No clear segregation between the planning and implementing bodies.
- Lack of coordination amongst all the departments in the urban transport sector.
- All departments related to urban transport do not function in coherence.

- Road projects are implemented in isolation with other projects which should otherwise be an integral part of road development like footpath, cycle tracks, pedestrian facilities etc.
- No control over mushrooming IPT modes in the city, which has led to issues of congestion along with competing with the buses for passengers.
- Operation issues in public transport due to poor route and service planning.
- No dedicated organization that is in charge of long term urban transport planning for the city.

Suggestions:

Implementation of a Comprehensive Traffic and Transportation Plan is an opportunity to identify and strengthen the institutions responsible for planning, development, operation and management of the city transport system and build capacity in them to take up the programmes under the short term and long term plan, policies and programmes through public institutions on/or private sector participation. The existing institutional framework should be improved for the implementation of the urban transport proposals and is discussed below.

- NMC needs to strengthen professional capacity to undertake planning, design and implementation of large scale transportation projects – the creation of Traffic and Transportation Cell is thus imperative.
- The institutional capacity of NMC to implement large projects is constrained and therefore it would invariably need support from other state level organizations such as PWD, MSRTC, RTO and Traffic Police.
- NMC should maintain the database related to urban transport and socioeconomic parameters for planning purpose.

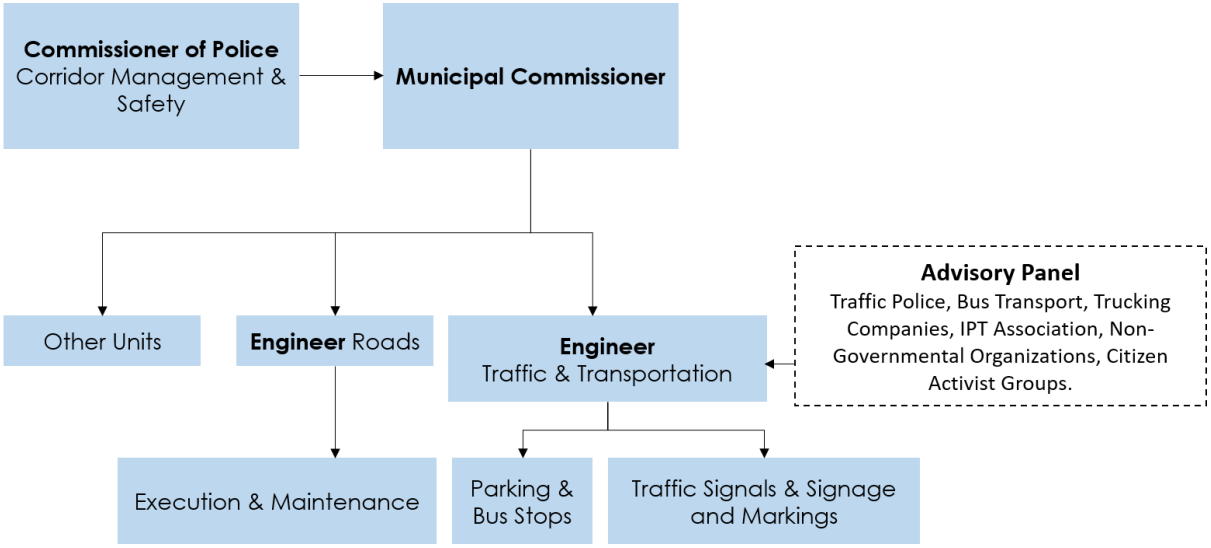

FIGURE 6-2 STRUCTURE OF TRAFFIC AND TRANSPORTATION CELL

NMC should appoint two Transport Planner/Traffic Engineer professionals who will be responsible for planning, design, implementation and co-ordination with all other organizations such as Traffic Police, MSRTC etc. that are part of the advisory panel. The responsibilities of Transport Planner/Traffic Engineer are listed below:

- to coordinate the planning and design of traffic and transport plans
- to assist in the development and implementation of local transport policies
- to plan, design and implement public transport and general traffic improvement schemes
- to draw up and implement traffic regulations concerning the utilization of road space by different vehicle types and pedestrians
- to maintain traffic signs, carriageway markings and traffic control devices
- to monitor vehicle and pedestrian movements
- to develop traffic schemes of a temporary or experimental nature

6.3 PROPOSED INSTITUTIONAL FRAMEWORK

The responsibilities for policy making, planning, investment, operations and management should be streamlined and strengthened to address the issues mentioned above. An empowered body should coordinate, over-see and regulate the entire transportation scenario. Frame work is critical for effective Public Transport. It should address all the functions, clearly assign responsibilities and be responsive to the policy concerns of all citizens (mobility needs, air quality, and traffic safety).

In this regard, the Institutional Framework suggested for Nashik is as follows;

The suggested Institutional set-up will have 'Three Tiers'. Each tier is responsible for some specific suggested functions. Co-operation among the tiers is critical in service delivery. The framework suggested is in line with the Unified Metropolitan Transport Authority proposed by Ministry of Urban Development and installed in various Metropolitan cities of India.

6.3.1 TIER I: UNIFIED METROPOLITAN TRANSPORT AUTHORITY

The Unified Metropolitan Transport Authority (UMTA) should be a statutory body as an enabling body at city level having transport professionals and representatives from all the agencies involved in transport sector as its members. The UMTA will have adequate transport planning expertise in order to study growth of urban area like Nashik Municipal Corporation and initiate preparation of perspective plans for transport and related infrastructure. It will also channel funding as per the policies of the government. All urban transport related projects need to be approved by the UMTA, for funding (Central/State) to be available to them. It will also be responsible as a regulatory authority, where it will adopt/set performance standards for bus, roadways, etc. It will also have bus/vehicle operating standards, and also be responsible for traffic and transport policies for the city. Along with this it has a very important role as a coordinator with other urban infrastructure departments, as well as the other tier in the institutional setup. UMTA will be responsible for initiating undertaking of studies and updating all transport studies, including Comprehensive Mobility Plans (CMP), every 3-5 years and Comprehensive Traffic and Transportation Plan (CTTP), every 10-15 years.

6.3.2 TIER II: NASHIK MUNICIPAL CORPORATION (NMC)

The Nashik Municipal Corporation (NMC) will be responsible in actually undertaking studies and updating all land use and transport studies, including the Master Plan, the Comprehensive Mobility Plans (CMP), every 3-5 years and the Comprehensive Traffic and Transportation Plan (CTTP), every 10-15 years. NMC will coordinate one-to-one with public transit operators (bus, BRTS, other) with respect to their plans and implementation, so that all plans are coordinated and form part of the comprehensive planning process for the city. NMC's responsibility includes preparation of the Comprehensive Mobility Plan, Traffic Impact Assessments, Traffic System Management, Travel Demand Management and other existing duties. The NMC should be made responsible for mobility and should play an active role in promoting public participation including all stakeholders to influence transport policies. NMC will need to have two different cells, one the technical cell undertaking studies and the other coordination cell coordinating the recommendations of the study with the other stakeholders.

The NMC should have a team of experienced land use/urban planners, transport planners, bus system and mass transit specialists, along with transport economist and financial specialists. The coordinating cell will need to form a Multimodal Task Group (MTG) having members from all stakeholders and the technical team to decide on Route and fare fixation, integration policy for different modes with respect to routes, fare and other facilities. This task force will also initiate a PPP policy framework to be taken up by the bus operators, and other organizations for implementation of their plans. The team determines the routes, timings and service-mix and will pay the operators by an agreed rate. At the same time, it is

at this level that decisions about the quantum and quality of para-transit services, such as auto-rickshaws, etc. are taken. This Task Force will plan for contracting with advertisers and collect such revenue to augment its financial resources to be ploughed back either as social cost reimbursement or for providing improved facilities for passengers.

6.3.3 TIER III: IMPLEMENTERS AND OPERATORS

The Municipal Corporation will be responsible for having its own comprehensive plan. It has to be coordinated and synchronized with the master plan. It will continue issuance of Building Permits, and other current existing duties. Municipal Corporation should have a small team of transport planners, transport economists and management staff in addition to representatives from other ULBs in NMC.

The city level transit problems are well known to the city authorities. Therefore, City Authority/ Special Purpose Vehicle (SPV) will be responsible for transit planning, bus service management and also a facilitator for PPP initiatives. Since the Traffic Police Department regulates traffic, an important task at this level is to ensure a forum for coordination both for mobility and for safety with the enforcement authority. The municipality will be responsible for providing the necessary infrastructure in the shape of bus stations and bus stops. Highways Department will continue as the responsible agency for construction and maintenance of roads and other road infrastructure. It is essential that Highways Department has to work in coordination with all other urban infrastructure departments. The Regional Transport Office will continue being the licensing authority. The Traffic Police will need to have co-ordination and input with respect to the city's Traffic Demand Management (TDM) Plan. It is again at this level decisions should be taken, in consultation with UMTA, on the type of buses like mini or regular buses, their desired age, passenger friendly entry and exit fitness, etc., If there are environmental and pollution-preventing measures they should be supervised by MTG. The Traffic Police will have a small team of transport and finance personnel, who will implement the overall transport plan prepared by UMTA. This team will be effectively supervised by UMTA and is constantly guided in respect of all technical guidance, while it works administratively under the Municipal Corporation.

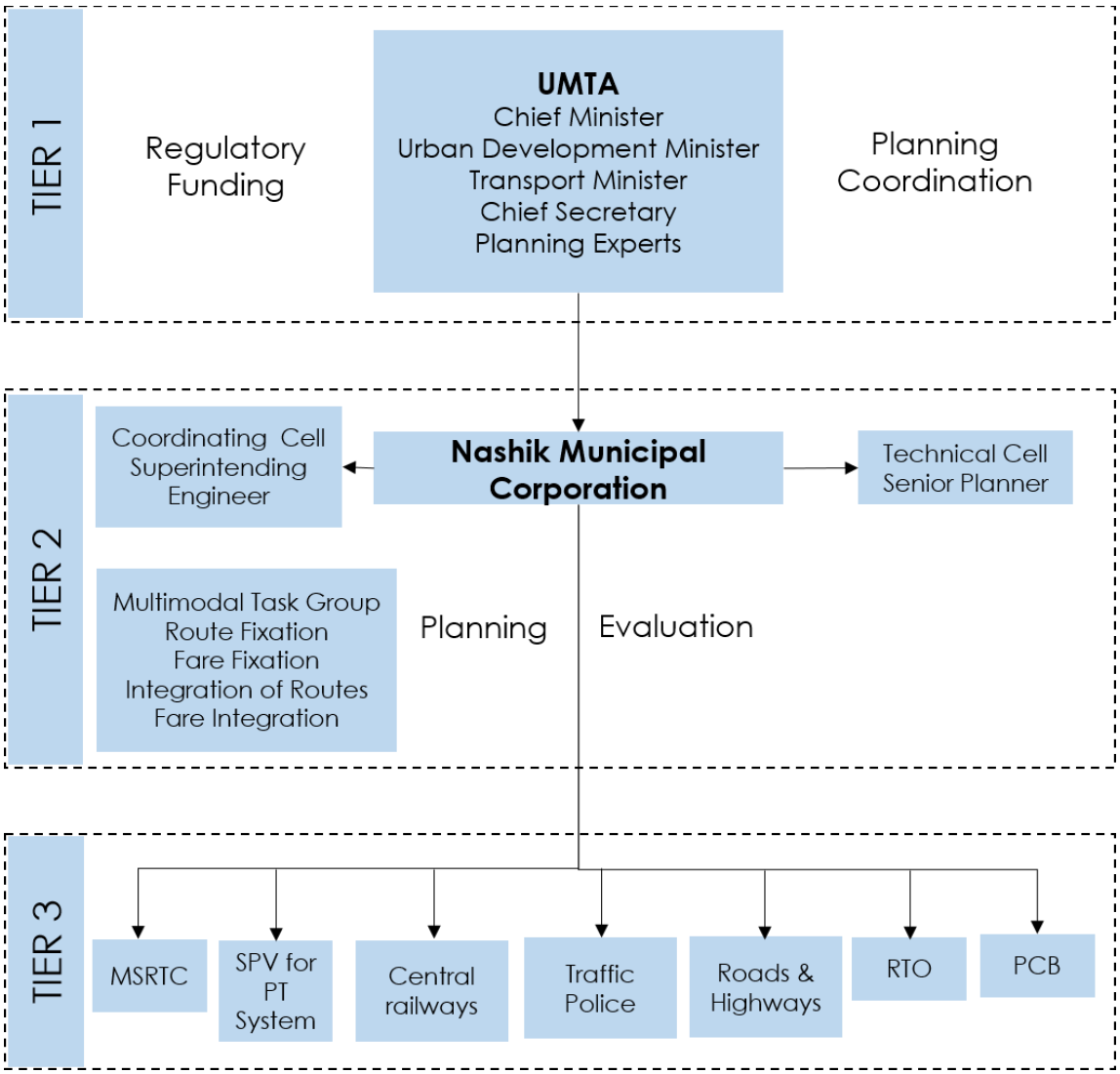

FIGURE 6-3: PROPOSED INSTITUTIONAL SET UP

6.4 IMPLEMENTING AGENCIES

Based on roles and responsibilities of various institutions, the agencies responsible for implementing the proposed projects in the CTTP are presented in TABLE 6-1.

TABLE 6-1: DETAILS OF IMPLEMENTING AGENCIES

Proposals	Proposed Schemes	Probable Funding Sources
SPV – Central Railway, Transport Department		
Public Transport system	Rail based Transit System	Central/ State Govt. funds, AMRUT
SPV – NMC, MSRTC, Transport Department, Private Operators		
Public Transport system	BRT	Central/ State Govt. funds, AMRUT

Proposals	Proposed Schemes	Probable Funding Sources
	Articulated Bus/ CNG Bus / Hybrid Buses	Central/ State Govt. funds, AMRUT
SPV – NMC, MSRTC, Transport Department, Private Operators		
Public Transport system	Bus routes -fleet size improvement	Central/ State Govt. funds, AMRUT
Municipal Corporation, PWD, PWD-NH		
Pedestrian Facility Improvement	Footpath	Municipal funds, AMRUT, DUTF
	Pelican Signals	Municipal funds, AMRUT, DUTF
	FOB	Municipal funds, AMRUT, DUTF
NMT Facility Improvement	Semi Segregated Cycle Track	Municipal funds, AMRUT, DUTF
	Segregated Cycle Track	Municipal funds, AMRUT, DUTF
	Cycle Parking Stands	Municipal funds, AMRUT, DUTF
Municipal Corporation, PPP		
Parking Management Plan	On Street Parking	Municipal funds, PPP, AMRUT
	Off Street Parking	Municipal funds, PPP, AMRUT
	MLCP	Municipal funds, PPP, AMRUT
Transport Department, MSRTC, SSP Traffic Police		
Intelligent Transport systems	Semi Actuated Signals	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Pelican Signals	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Automated Vehicle Location System	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Variable Message Signs	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	ITS Control Centre	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Public Information System	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Common Mobility Card	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Mobile Phone Application	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	Surveillance Cameras	Municipal funds, DUTF, AMRUT, Smart City (SPV)
	GPS	Municipal funds, DUTF, AMRUT, Smart City (SPV)
SPV – NMC, MSRTC, Transport Department, Private Operators		
Bus Transport	Inter-Modal facilities	PPP, Central/ State Govt. funds, AMRUT
	Bus Stops	PPP, Central/ State Govt. funds, AMRUT
Terminals	Proposed New Bus stand	PPP, Central/ State Govt. funds, AMRUT
NHAI, PWD-NH		
Road Network Improvement	Flyovers	Multi-lateral funding Agency, Central/State Govt. funds
	ROBs	Multi-lateral funding Agency, Central/State Govt. funds
PWD-NH		

Proposals	Proposed Schemes	Probable Funding Sources
Road Network Improvement	New Links	Multi-lateral funding Agency, Central/State Govt. funds
NHAI, PWD-NH		
Road Network Improvement	Road Widening	Multi-lateral funding Agency, Central/State Govt. funds
Transport Department, Traffic police, PWD/PWD-NH, LAD, Department of Health		
Road Safety policy and action plan	Accident recording, Black Spot identification	Road Safety Fund
	Roads according to road safety standards and safety features on roads	Road Safety Fund
	Upgradation of emergency care system	Road Safety Fund
	Safer vehicles and strict enforcement of road safety rules	Road Safety Fund
	Implementation of ITS and monitoring systems	Road Safety Fund

7 WAY FORWARD

Based on the proposed projects and their impacts, the implementation program has been prepared. This report has explained not only the implementation program, but also its economic evaluation.

The Consultant shall submit the final CTTP upon receiving the comments from NMC.