

GOVERNMENT OF TAMILNADU HIGHWAYS DEPARTMENT

DPR for the work of forming Peripheral Road connecting Mahabalipuram to Ennore Port (via) Singaperumalkoil, Sriperumbudur, Thiruvallur, Thamaraipakkam, Periyapalayam, Puduvoyal and Kattupalli



FINAL DETAILED PROJECT BEPORT VOLUME – V ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN



List of Contents

Sl. No.	Description	Page No.
Execu	tive Summary	
Chapt	er - 1 Introduction	
1.1	Project Background	1-1
1.2	Objectives	1-3
1.3	Scope of Services	1-3
1.4	Scope for EIA	1-5
	1.4.1 Environmental Screening and scoping	1-5
	1.4.2 Environmental Impact Assessment	1-5
	1.4.3 Environmental Management Framework	1-6
1.5	Structure of Report	1-6
Chapt	er - 2 Project Description	
2.1	Proposed Alternate Alignments for Peripheral Road	2-1
2.2	Approved Alignment of Peripheral Road	2-2
2.3	Conclusion	2-10
Chapt	er - 3 Legal Framework	
3.1	Introduction	3-1
3.2	National Constitution of India	3-1
3.3	Legal Framework	3-1
3.4	Environmental Rules and Regulations	3-1
3.5	World Bank Safeguard Policies and Environmental Requirements	3-4
3.6	Other Legislation Applicable to the Project	3-7
3.7	Environmental Clearance (EC)	3-8
3.8	Permissions and Consents to be obtained	3-9
	3.8.1 Consents from Tamil Nadu Pollution Control Board	3-9
	3.8.2 Forest Clearances	3-10
	3.8.3 Forest Clearances for Trees felling	3-10
	3.8.4 Permission of Eco Sensitive Zones	3-13
	3.8.5 Wildlife Clearance from Supreme Court In Notified Wildlife Areas	3-13
	3.8.6 CRZ Clearance for Road Construction in Coastal Regulation	3-13
	Zone (CRZ) Area	
3.9	Permissions and Clearances Required for the Project	3-13
3.10	Conclusion	3-15
Chapt	er - 4 Methodology for EIA	
4.1	Introduction	4-1
4.2	Methodology for EIA	4-2
	4.2.1 Screening	4-2
	4.2.2 Environmental Assessment	4-5

	4.2.3 Scoping	4-5
	4.2.4 Environmental Impact Assessment	4-7
	4.2.5 Assessment of Policies and Regulations	4-8
	4.2.6 Impact Prediction	4-8
	4.2.7 Analysis of Alternative	4-8
	4.2.8 Consultation Process	4-8
	4.2.9 Environmental Impacts Identification	4-9
4.3	Conclusion	4-10
	er -5 Environmental Profile of the Project Area	
5.1	Introduction	5-1
5.2	Study Area	5-1
5.3	Air Environment	5-2
	5.3.1 Meteorology	5-2
5.4	Land Environment	5-3
	5.4.1 Geography and Topography	5-3
	5.4.2 Geology	5-4
	5.4.3 Seismicity and Volcanic Activity	5-5
	5.4.4 Soil Characteristics	5-6
	5.4.5 Land Use	5-8
5.5	CRZ	5-9
5.6	Biological Environment	5-9
	5.6.1 Flora	5-9
	5.6.2 Flora Profile	5-9
	5.6.3 Trees Affected	5-11
	5.6.4 Cropping Pattern	5-11
	5.6.5 Forest Land	5-12
	5.6.6 Fauna	5-13
5.7	Social Environment	5-14
	5.7.1 Tiruvallur District demographic profile	5-14
	5.7.2 Kancheepuram District Demographic Profile	5-16
5.8	Social Impacts	5-17
5.9	Community Properties	5-17
5.10	Public Consultation Meeting	5-31
5.11	Conclusion	5-31
Chapt	er -6 Environmental Impact and Mitigation Enhancement	
6.1	Introduction	6-1
6.2	Baseline Environmental Status	6-2
6.3	Air Environment	6-9
	6.3.1 Meteorology	6-9
	6.3.2 Ambient Air Quality	6-9
6.4	Noise environment	6-10
6.5	Impact on Water Environment	6-11

	6.5.1 Impact on Surface Water Resources	6-11
	6.5.2 Impact on Ground Water Resources	6-21
	6.5.3 Impact on Surface Water Quality	6-21
6.6	Impact on Soil	6-21
	6.6.1 Loss of Land	6-21
	6.6.2 Soil Erosion	6-22
6.7	Soil Contamination	6-23
6.8	Geology	6-24
6.9	Seismology	6-24
6.10	Biological Environment	6-24
	6.10.1 Loss of Trees	6-24
	6.10.2 Forest Area	6-24
	6.10.3 Wild Life	6-26
6.11	Social Environment	6-26
6.12	Loss of Utilities and Amenities	6-26
6.13	Public Health and Safety	6-27
6.14	Removal of Cultural Property	6-28
6.15	Removal of Protected Monuments	6-29
6.16	Removal of Bus Shelters	6-32
6.17	Conclusion	6-33
Chapt	er -7 Environmental Mitigation Measures	
7.1	Introduction	7-1
7.2	Air Environment	7-1
	7.2.1 Meteorological Factors and Climate	7-2
	7.2.2 Ambient Air Quality	7-2
7.3	Noise environment	7-4
7.4	Water environment	7-5
	7.4.1 Water Resources	7-5
	7.4.2 Water Quality	7-6
	7.4.3 Drainage	7-7
7.5	Land Environment	7-7
	7.5.1 Topography and Geology	7-7
	7.5.2 Soil Contamination	7-8
	7.5.3 Productive Agriculture lands	7-9
	7.5.4 Borrowing and Quarrying	7-10
7.6	Biological Environment	7-11
	7.6.1 Loss of trees	7-11
	7.6.2 Forest Area	7-12
	7.6.3 Wild Life	7-12
	7.6.4 Fauna	7-12
7.7	Social Environment	7-12
	7.7.1 Loss of Access	7-12

	772 Safety Aspects	7-13
	7.7.2 Safety Aspects	
7.0	7.7.3 Construction Workers Camp Cultural Environment	7-13
7.8		7-14
	7.8.1 Religious and cultural places with local importance	
7.0	7.8.2 Protected monuments	7-14
7.9	Conclusion	7-18
-	er -8 Social Impact Assessment	
8.1	Social Impact Assessment	8-1
8.2	Regulatory Framework	8-1
8.3	Entitlements	8-1
8.4	Understanding the Project Area	8-1
8.5	Common Property Resources (CPRs)	8-2
8.6	Major Inferences – Social Impacts	8-2
8.7	Cut-off date	8-3
8.8	Community Participation	8-3
	8.8.1 Public Consultation Meetings	8-3
8.9	Gender Issues	8-4
8.10	Perceived Impacts	8-5
	8.10.1 Positive Impacts	8-5
	8.10.2 Negative Impacts	8-5
8.11	Resettlement Action Plan	8-5
8.12	Land Acquisition Process	8-6
8.13	R&R Costing and Budgeting	8-6
8.14	Institutional Arrangement	8-6
8.15	Grievances Redressal Mechanism	8-7
8.16	Monitoring and Evaluation	8-7
8.17	Conclusion	8-7
Chapt	er -9 Environmental Management Plan	
9.1	Introduction	9-1
9.2	Environmental Management Plan	9-1
9.3	Considerations made in the Project for Minimizing Impacts	9-2
9.4	Public Awareness	9-2
9.5	Traffic Management Measures	9-2
9.6	Sensitive Receptors Management Plan	9-4
9.7	Tree cutting and Compensatory Plantation	9-6
9.8	Use of Sustainable Green materials Management Plan	9-21
9.9	Benefits of the Project	9-21
9.10	Environmental Monitoring	9-22
9.11	Reporting System	9-24
9.12	Environmental Budget	9-26
9.12	Basis of Cost estimates	9-32
9.14	Penalty clause for Non-conformity to the EMP	9-37

9.15	Conclusion	9-38
Chapte	er -10 Community Consultation and Participation	
10.1	Introduction	10-1
10.2	Consultation and Participation	10-1
10.3	Purpose of Consultation	10-1
10.4	Introduction	10-2
10.5	Levels of Consultation	10-2
10.6	Stages of Participation	10-2
	10.6.1 Consultation Prior to Resettlement	10-3
	10.6.2 Consultation during Resettlement	10-3
	10.6.3 Consultation Post Resettlement	10-4
10.7	Stakeholders Consultation	10-4
10.8	Methodology Adopted	10-5
10.9	Details of Consultation Meetings Held	10-5
	10.9.1 Meeting No. 1 - Public Consultation Meeting at Manamathi	10-7
	Village	
	10.9.2 Meeting No. 2 - Public Consultation meeting at Oragadam	10-14
	Village	
	10.9.3 Meeting No. 3 - Public Consultation meeting at Sriperumpudur	10-20
	Village	
	10.9.4 Meeting No. 4 - Public Consultation meeting at Melnallathur	10-26
	Village	
	10.9.5 Meeting No. 5 - Public Consultation Meeting at Panchetty	10-32
	Village	
10.10	Informal Consultation Meetings	10-38
	10.10.1 First Round Consultation	10-38
10.11	Informal Consultation Meetings	10-49
10.12	Major Inferences	10-49
Chapte	er -11 Implementation Mechanism	
11.1	Introduction	11-1
11.2	Project Management Consultant (PMC) – Environmental Safeguard	11-1
	Specialist:	
11.3	Roles and Responsibility of Line Departments and Stakeholders	11-3
11.4	Grievance Redressal Mechanism	11-4
11.5	Capacity Building and Training on Environmental aspects	11-5
11.6	Conclusion	11-6

List of Tables

Table No.	Description	Page No.
3.1	Environmental Legislations / Regulations applicable to the project	3-2
3.2	Applicability of World Bank Safe Guard Policies for Project Roads	3-5
3.3	Highlights of WB Safeguard Policies	3-7
3.4	Permissions Required	3-13
4.1	List of Sensitive Environmental Components	4-4
5.1	Details of the Species of the Trees	5-10
5.2	Details of the number of Trees along with girth size likely to be affected in the entire corridor	5-11
5.2-A	Detail of Forest Stretches along the project road - Chainage wise	5-13
5.3	Detail of Fauna found along the project road	5-13
5.4	Social Impacts of Chennai Peripheral Road	5-17
5.5	Abstract of affected Common Property Resources (CPRs)	5-18
5.6	Details of affected Common Property Resources (CPRs)	5-19
6.1	Proposed Sample Location for Baseline Monitoring	6-2
6.2	Status of Baseline Environment from secondary Sources for Air, Water, Noise and Water	6-3
6.3	General Impacts on Natural Environment	6-5
6.4	General Impact on Social and Cultural Environment	6-7
6.5	Impacts on Water Resources Due to Construction Activities	6-11
6.6	Showing water bodies along the Proposed Road Corridor	6-12
6.7	Forest Area covered under the proposed project	6-25
6.8	Showing impacted Public Utilities	6-27
6.9	Showing impacted cultural properties	6-30
7.1	Potential Impacts and Mitigation measures	7-1
8.1	Details of Section for which Survey Carried	8-2
8.2	Abstract of the Census / Baseline Socio Economic Survey	8-2
8.3	Common Property Resources (CPRs)	8-4
8.4	Key Socio – Economic Indicators	8-4
8.5	Social Impacts of Chennai Peripheral Road	8-6
9.1	Reconstruction and relocation of cultural properties	9-4

Table No.	Description	Page No.
9.2	Environmental Management Plan	9-7
9.3	Environmental Monitoring Indicators	9-22
9.4	Summary Details of Reporting Formats	9-25
9.5	Overall Environmental Management Budget	9-28
11.1	Training Programme to the Contractor's Staff	11-5

List of Figures

Figures No.	Description	Page No.
2.1	Alignment of Chennai Peripheral Road	2-3
3.1	Environmental Clearance Procedures	3-11
3.2	Forest Clearance Procedures	3-12
4.1	The EIA processes in Sequences of Application	4-1
4.2	The Project Screening Process	4-2
5.1	Map showing Seismic Zones of India	5-6
10.1	Location Map of Public Consultation Meetings	10-6
11.1	Flow Chart showing Reporting Structure for EMAP	11-1

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1.0 Introduction

Chennai is the capital of Tamil Nadu and is the fourth largest metropolitan area in India with the population of over 86 lakhs (2011). The population was around 70 lakhs in 2001 has increased over 22% in a span of 10 years.

The Chennai Metropolitan Area (CMA) has an area of 1189 sq.km spread over three districts, includes the whole of Chennai District (176 sq.km), part of Tiruvallur District covering 637 sq.km and part of Kanchipuram District covering 376 sq.km.

Chennai is located on the coast of Bay of Bengal which makes the road layout in the metropolitan area is of radial pattern. There are 4 principal radial arterials, viz. NH-5, NH-205, NH-4, NH-45, to the north, north-west, west and south respectively. In addition, there are three more radial arterials,(i) along the coast on the northern side (Thiruvotriyur High Road), (ii) between NH-4 and NH-45 (Arcot Road) and (iii) along the south coast (ECR). The radial roads are congested and inadequate to handle the growing traffic need. The connecting road system, with lot of missing links, has put tremendous strain on the radial network. City has got three circumferential roads viz., Inner Ring Road, Chennai Bypass and Outer Ring Road which connects the radial roads. As the city is developing beyond the limits of these circumferential roads, a new circumferential road is required.

Chennai Airport is the third busiest airport in India. The city is served by two major ports, (i) Chennai port is the largest in Bay of Bengal and India's second busiest container hub, handling automobiles, motorcycles and general industrial cargo and (ii) Ennore Port currently handles cargo such as coal, iron ore, other bulk and rock mineral products and future expansion plans are on the anvil. Chennai city has got one more private sea port at Kattupalli near the northern town of Ennore. Road connectivity to the Ennore and Kattupalli ports needs to be provided from the radial roads without congesting the city roads.

In the face of rapid developments in the districts surrounding Chennai and the expansion of the city, a new regional planning model on the lines of National Capital Region is being examined by the Chennai Metropolitan Development Authority (CMDA) and a detailed report was prepared for the Government's consideration. For balanced regional development, better infrastructure facilities like developing a larger road network, implementing an integrated transport plan, etc will be planned besides decongesting the city.

Government of Tamil Nadu is in the process of identifying and implementing projects to bridge the huge gap in the demand and supply of infrastructure projects. One of the major projects included in VISION 2023 is Chennai Peripheral Road.

Chennai Peripheral Road is conceptualized to provide better connectivity around the city catering future traffic requirements and provide efficient commercial transportation by enhancing port connectivity. This road will facilitate container movement from southern districts to Ennore Port.

Tamil Nadu Highways Department, C & M, Chennai Circle appointed M/s. STUP Consultants Pvt. Ltd to prepare the DPR for forming the Chennai Peripheral Road.



2.0 Objectives

The main objectives of the consultancy services as per ToR is to establish the technical, economical and financial viability and prepare detailed project reports for the proposed peripheral road.

The DPR would inter-alia include highway design including bypasses/service roads, design of pavement and overlay with options for flexible or rigid pavements, design of bridges, culverts and grade separated structures, detailed working drawings, quantities of various items, cost estimates including utility shifting and land acquisition, economic and financial viability analyses, social and environmental action plans as appropriate and documents required for tendering the project on commercial basis for international/local competitive bidding.

3.0 Approved Alignment of Peripheral Road

The alignment for Chennai Peripheral Road is approved by the Steering Committee and is finalized by the Principal Secretary, Highways and Minor Ports, Government of Tamil Nadu on 09.07.2014. The approved alignment plan is given in Figure 2.1.

The Peripheral road will starts at Ennore Port and ends at Poonjeri Junction in Mahabalipuram. The proposed road will connect four National Highways – NH-5, NH-205, NH-4 and NH-45, and eight State Highways – SH-51, SH-50A, SH-50, SH-48, SH-57, SH-49B, SH-49A (OMR) and SH 49 (ECR). Length of proposed peripheral road will be around 132.871 km which is split into 5 sections.

Section 1: Northern Port Access Road - Ennore Port to Thatchur on NH-5 Section 2: Thatchur on NH-5 to Start of Thiruvallur Bypass Section 3: Start of Thiruvallur Bypass to Sriperumbudur on NH-4 Section 4: Sriperumbudur on NH-4 to Singaperumalkoil on NH-45 Section 5: Singaperumalkoil on NH-45 to Mahabalipuram

4.0 Scope for EIA

The study envisages the preparation of a detailed Environmental Impact Assessment (EIA) for the proposed road project. The scope of environmental assessment includes processes such as,

- 1. Environmental Screening and scoping,
- 2. Environmental assessment and

3. Environmental management plans (EMP) for construction and operation phases of the road project

The EA study also aims to develop a comprehensive environmental management framework for the road project.

5.0 Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations pertaining to sustenance of environment. Ministry of Environment and Forests and Climate Change (MoEFCC) serves as the administrative focal point for the planning, promotion and coordination of environmental laws and policies. The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Central Ministry of Environment Forests and Climate Change (MoEFCC) and the Central Pollution Control Board (CPCB) / State Pollution Control Board (SPCB). The following Table highlight the permission required for the project from various Statuary authorities.

Sl. No.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
1	Environmental Clearances	MoEF	Forest Area and CRZ	Construction Prior to work	TNHD
2	Forest Clearances	MoEF	Trees Felling	Construction Prior to work	TNHD
3	Consent to Establish Under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution State Pollution Control Board	For operating hot mix plants, crushers and construction camps	Construction Prior to work	Concessionaire
4	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981	Tamil Nadu Pollution State Pollution Control Board	plants,	Construction Prior to work	Concessionaire

Permissions Required

Sl. No.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
			camps		
5	Permission to store Hazardous Materials under Hazardous Waste (Management, Handling and Trans- boundary Movement) Rules 2008.	Tamil Nadu Pollution State Pollution Control Board	of Hazardous	Construction Prior to work	Concessionaire
6	Explosive license under the Explosives Act 1884 and the revised rules 1983	Chief Controller of Explosives , petroleum and Explosive safety	Storage of explosives materials	Construction Prior to work	Concessionaire
7	PUC certificate for vehicles for construction under Central Motor and Vehicle Act , 1988	Motor Vehicle department of Tamil Nadu	For all construction vehicle	Construction Prior to work	Concessionaire
8	Quarry lease deeds and license under The Mines Act, 1958	Mining and Geology Department of Tamil Nadu	Quarrying and borrowing operations	Construction Prior to work	Concessionaire
9	Consent for ground water extraction	Tamil Nadu Ground Water Authority	Ground water extraction for construction and camps	Construction Prior to work	Concessionaire
10	Permission for Labour camps	Labour Department of Tamil Nadu	Labour camps	Construction Prior to work	Concessionaire
11	NOC for Borrow area	Local Panchayat / Municipality	Borrow area	Construction Prior to work	Concessionaire
12	Consent to Operate under the Air (Prevention & Control of Pollution) Act,	Tamil Nadu Pollution State Pollution	For establishing Hot mix	Operation	Concessionaire

Sl. No.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
	1981	Control Board	plants, Crushers, construction camps and batching plants		
13	Consent to Operate under the Water (Prevention & Control of Pollution) Act, 1974	Tamil Nadu Pollution State Pollution Control Board	For discharging of domestic waste water through soak pits	Operation	Concessionaire

6.0 Environmental Impacts Identification

Based on base line data collected along with engineering and social inputs, a comprehensive study shall be undertaken to identify the possible impact on environmental attributes. An EIA document should typically include:

Project Description describing about the existing as well as proposed scenario with a mention on Right of Way (RoW), roadway improvements, cross drainage structures, community facilities, traffic projections etc.

Environmental Regulatory Framework presents the legal and administrative framework of Government of India and Government of Tamil Nadu. This section underlines various clearances applicable for the project corridor at the State / Central level.

Baseline Environmental Status, the existing environmental conditions along the corridor to be ascertained by conducting a reconnaissance survey along with collection of secondary information pertaining to the corridor. Primary data for various environmental parameters has to be generated using suitable monitoring devices. The methodology has to be strictly adhered to the guidelines stipulated by Central Pollution Control Board.

Public Consultation carried out in order to know the reactions of local population and the project affected people (PAP). Meetings held with the stake holders to record their

views on the impacts caused and the suggested remedies to be adopted for the proposed project corridor.

Analysis of Alternatives to be presented shall be carried out during feasibility stage, and the approved alternative to be discussed in detail along with environmental attributes under impact.

Environmental Impacts, addressing all the anticipated impacts on the physical and social environment of the corridors, have been identified during environmental screening exercise and environmental assessment carried out for roads under proposed project. The quanta of all the identified anticipated impacts on natural environment and social/cultural environment are presented in form of tables.

The proposed road cross sections are designed keeping in view of the following

- (i) To minimize land acquisition,
- (ii) To minimize the felling of trees for the proposed road,
- (iii) For the provision of economically feasible safety interventions and
- (iv) To minimize the environmental degradation to the surroundings.

Project Corridors Identified for Environmental Assessment are listed as follows:

Section 1	Ennore Port to NH-5		
Section 2	NH-5 to Start of Thiruvallur Bypass		
Section 3	Start of Thiruvallur Bypass to NH-4		
Section 4	NH-4 to NH-45TNRIDC project on going		
Section 5	NH-45 to Mahabalipuram		

The proposed road falls within Kancheepuram and Tiruvallur districts in Tamil Nadu.

7.0 Baseline Environmental Status

Data on baseline environment component were collected from various sources of government departments, literature and publications, websites etc. The information about the district was collected from district hand book and its official website. Details regarding the ground water were obtained from the reports of Central Ground Water Board. Baseline environmental monitoring programme for various environmental attributes will be conducted on the receipt of suitable sample locations given by MoEF

for environmental assessment clearance. Baseline environmental monitoring shall be conducted as per the guidelines of CPCB. Primary data for ambient air quality, ambient noise levels, water quality (ground and surface) and soil quality shall be generated by a NABL accredited laboratory.

Meanwhile the EIA team gathered baseline data for the project corridors through various ongoing DPR projects adjacent to the project corridors.

General Impacts on Natural Environment

Project Activity	Planning and Design Phase	Pre-constr	uction Phase	Construction Phase				Road Operation	Indirect effects of operation or Induced development	
Env. component Affected	Land acquisition	Removal of Structures	Removal of trees and vegetation	Earth works, including quarrying	Laying of pavement	Vehicle & Machine operation & maintenance	Asphalt & crusher plants	Sanitation & Waste (labour campus)	Vehicle operation	
Air	-	Dust generation during dis- mantling	Reduced buffering of air and noise pollution, Hotter, drier microclimate	Dust generation	Asphalt odour	Noise, dust, pollution	Noise, odour, dust, pollution	Odour / smoke	Noise, dust, pollution	other pollution
Land	Loss of productive Land	Generation of debris	Erosion and loss of top soil	Erosion and loss of top soil	-	Contamination by fuel and lubricants Compaction	Contamination Compaction of soil	Contamination from wastes	Spill from accidents	Change in land use pattern
Water	Loss of water sources	Siltation due to lose earth	Siltation due to lose earth	Drainage alteration Break in continuity of ditches,	Reduction of ground water re- charge area	Contamination by fuel and lubricants	Contamination by asphalt leakage or fuel	Contamination from wastes Overuse	Spill Contamination by fuel, lubricants and washing of	Increased contamination of ground water

Project Activity	Planning and Design Phase	Pre-constr	ruction Phase	Construction Phase			Road Operation	Indirect effects of operation or Induced development		
				Siltation, Stagnant water pools in quarries.					vehicles	
Noise	-	Noise Pollution	Noise Pollution due to machinery	Noise Pollution		Noise pollution	Noise Pollution	-	Noise Pollution	Noise pollution
Flora	-	Loss of Biomass		Lowered productivity Loss of ground for vegetation	-	Removal of vegetation	Lower productivity Use as fuel wood	Felling trees for fuel	Impact of pollution on vegetation Lowered productivity Toxicity of vegetation.	-
Fauna			Disturbance Habitat loss	Disturbance		Disturbance	Disturbance	Poaching	Collision with traffic	Distorted habitat

										Ор	eration
Project Activity	Planning and Design Phase	Pre-	Construction I	Phase	Construction Phase					Direct	Indirect Induced developmen t
Env. Componen t Affected	Design decisions & Implementati on policies	Land acquisitio n	Removal of Structures	Removal of trees & vegetatio n	Earth works, including quarryin g	Laying of paveme nt	Vehicle & machine operation & maintenan ce	Asphalt and crusher plants	Labour Camps	Vehicle operatio n	-
Agricultur al land	-	Change in land prices	Loss of land economic value	Loss of standing crops	Loss of productiv e land	-	-	Dust on agricultural land reduce n productivit y	-	-	Conversion of Agricultural Land
Buildings and built	-	-	Loss of structures,	-	Noise, vibration	-	Noise, vibration	Dust accumulati	-	Vibratio n and	Change in building use

General Impact on Social and Cultural Environment

STUP Consultants Pvt. Ltd

										Op	eration
Project Activity	Planning and Design Phase	Pre-0	Construction I	Phase	Construction Phase				Direct	Indirect Induced developmen t	
structures			Debris		may		may cause	on on		noise	and
			generation,		cause		dam-age to	building			characteristi
			Noise and		dam-age		structures	and			CS
			Air		to			structure			
			pollution		structure						
					S						
People	Anxiety and	-	Displaceme	Loss of	Noise	Odour	Noise and	Air and	Communit	Noise	Induced
and	fear among		nt of people	shade &	and Air	and dust	Air	noise	y clashes	pollutio	pollution
Communit	community		Psychologic	communit	pollution		pollution,	pollution	with	n, Risk	
у			al impact on	y trees,			Collision	and	migrant	of	
			people loss	Loss of			with	discomfort	labour	accident	
			of	fuel wood			pedestrians				
			livelihood	and			livestock				
				fodder,			and				
				Loss of			vehicles				
				income							

										Ор	eration
Project Activity	Planning and Design Phase	Pre-	Construction I	Phase	Construction Phase				Direct	Indirect Induced developmen t	
Cultural Assets	-	-	Displaceme nt loss of	Loss of sacred	Noise, vibration	-	Damage from	Dust accumulati	-	Damage from	-
10000			structure	trees.	may		vibration	on		vibratio	
			from RoW		cause		& air			n & air	
					dam-age to		pollution			pollutio n	
					structure						
Utilities	-	-	Interruption	-	-	-	Damage to	Dust	Pressure		-
and			in supply				utility and	accumulatio	on		
Amenities							amenities	n on water bodies	existing amenities		
									unennues		

8.0 Forest Area

The proposed construction of proposed road is passing through three reserve forests and involves forest land bound to get forest clearances.

SI. No	Forest	Type of Forest	Length (km)	District
1	Mannur	Reserve	0.2 km	Kancheepuram
2	Thirutteri	Reserve	0.5 km	Kancheepuram
3	Sirukundram	Reserve	1.26 km	Kancheepuram

Forest Area covered under the proposed project

9.0 Wild Life

No wild life crossing is found along the project corridor. Though the proposed road is not located within 10 km radius of ecological sensitive area, recommendation from NBWL is not mandatory as the project does not require environmental clearance under EIA notification and it is located away from the ecological sensitive area.

10.0 Social Environment

Impact of the proposed project on the socio-economic environment is expected to be overwhelmingly beneficial and is also one of the major objectives of undertaking these project initiatives. However, there are certain negative impacts on the socio-economic situation of the project area each of which are discussed in detail in the report.

11.0 Loss of Utilities and Amenities

Site clearances involves removal of various assets, utilities and amenities that are,

- Natural (trees, bushes, and grass lands), and
- Physical structures (public or private assets and utilities)
- Relocation of service utilities

12.0 Removal of Cultural Property

Potential impacts on religious and historic sites during the construction stage relate to the possibility for physical damage to occur to structures located close to the road works. However, it is required to relocate some cultural properties that are within the CoI. A total of 23 cultural properties is affected out of the 84 community structures. The CPRs which were completely affected will be relocated in consultation with the users and the community.

13.0 Removal of Bus Shelters

11 bus shelter likely to be affected and replaced due to the proposed road. The bus shelters shall be replaced in the same location as far as possible.

14.0 Potential Impacts and Mitigation Measures

Noise, Air and Water Levels

The Environmental factors related to Air, Noise, Water and Soil shall be mitigated during pre, post and during construction phase.

Soil Contamination

Soil contamination is likely due to the possible leakage of fuel/lubricants and dumping of construction wastes during construction stage. The contractor will be required to initiate measures to reduce/prevent waste generation from all activities.

Productive Agriculture lands

Efforts have been made to minimize the intake of productive lands. The borrow areas; construction camp locations; traffic detours and other construction sites shall be selected carefully in consultation with the Engineer to minimize the agricultural land acquisition. To conserve the productive topsoil of all areas affected due to project, mitigation measures have been proposed

Borrowing and Quarrying

Specific locations of borrow areas to be used will be identified by contractor. The selection and recommendations for borrow areas will be based on environmental as well

as civil engineering considerations. Location and source of material for embankment or sub-grade and the procedure for excavation or transport of material shall be in compliance with the environmental requirements of the MoEF, MoRTH and as specified in IRC: 10-1961.

Loss of trees

It is estimated to be a total of 4797 Nos. of trees are falling within project corridor in which 2168 trees are retained and 2629 trees will be transplanted.

15.0 Environmental Management Plan

Environmental Management Plan (EMP) is aimed at mitigating the possible adverse impact of a project and for ensuring to maintain the existing environmental quality. The EMP converses all aspects of planning, construction and operation of the project, which are relevant to environment. It is essential to implement the EMP right from the planning stage and then continuing it throughout the construction and operation stage. Therefore the main objective of the EMP is to identify the project specific activities that would have to be considered for investigation of the significant adverse impacts and the mitigation measures required.

Environmental Management Plan

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
PRE-C	ONSTRUCTION PHASE			
1	Clearances		All clearance required from other departments and Environmental aspects shall be ensured and made available before start of work. For trees identified for cutting, obtain prior permission from the respective department prior to commencement of work.	HD
2	Tree Cutting & Plantation		Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. Take adequate care to determine to root protection zone and minimize root loss. Trees shall be transplanted from the construction sites before commencement of construction. Undertake afforestation in nearby areas.	Contractor, HD
3	Utility Relocation		Identify the common utilities that would be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc.	HD /Line Departments/ Concerned departments /

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.	Contractor
			Where ever the entry and exit to houses/ establishments are affected due to construction activities, alternate temporary arrangement for crossing over shall be provided.	
4	Baseline parameters		Base line parameters shall be recorded and ensured conformance till the completion of the project.	Contractor, HD
			The contractor shall undertake periodical monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared.	
			Adequate measures shall be taken and checked to control any pollution and report be sent to the Chief Engineer.	
5	Planning of temporary Traffic arrangements		Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans shall be formulated and reviewed and modified if required, and submitted to engineers for approval, one week prior to	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			commencement of works. The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, signage, safety measures for transport of hazardous materials and arrangement of flagmen.	
			The guidance for traffic management provided in the respective Appendix of the EA report shall be referred to for preparation of the traffic plan.	
6	Debris disposal site identification		Selection of the disposal sites will be carried out in consultation with the State Pollution Control Board, in order to ensure that no natural drainage, productive lands or natural habitat is adversely impacted due to disposal. Preferably, existing debris disposal site / Yard can be used.	Contractor, HD
7	Selection of Borrow areas		Compliance to all the State norms towards operation and environmental protection of borrow areas is the sole responsibility of the Contractor.	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			HD will inspect locations intended for operation and mitigation measures will be instructed towards satisfactory redevelopment. Inspection to the borrow areas will be carried out by raising Request for Inspection (RFI) by the Contractor for each of the borrow areas and obtain subsequent approval from HD.	
8	Selection of Stone Quarries		Contractor will identify the stone quarries in consultation with the Mining Department. A comprehensive Quarry Management Plan need to be prepared incorporating Environmental and Safety Management Plan with special emphasis to Quarry redevelopment for approval from HD. refer respective Appendix for preparation of Quarry Management Plan and Redevelopment Plan.	Contractor
9	Establishment of Stone Crushers, Batching Plants, Hot-mix plants		Specifications of stone crushers, hot mix plants and batching plants to be established for the project should comply with the requirements of the relevant State/Central Pollution control Board legislations.	Contractor
10	Labour camp & facilities		Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in	Contractor

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			conformity with the Indian labour laws shall be ensured.	
			The contractor shall also guarantee the following:	
			i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction.	
			ii) The construction will commence only upon the written approval of the Engineer.	
			iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing.	
			iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities.	
			v) The sewage system for the camp shall be designed, built and operated in such a fashion that	
			no health hazards occurs and no pollution to the air, ground water or adjacent water courses take	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			place. Ensure adequate water supply is to be provided in all toilets and urinals.	
			vi) The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer.	
			vii) Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor.	
			Refer respective Appendix attached for Construction of Labour Camps and Sites.	
11	Selection of construction vehicles, machinery and equipment's	Air and noise pollution	All the vehicles, machinery and equipment's to be engaged for the construction work should be attached with the latest, advanced pollution control measures available in the country and those should conform to the relevant Indian Standards.	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies	
CONST	CONSTRUCTION PHASE				
1	Barricading site		The construction area should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.	Contractor	
2	Prevention of accidents		Prevention of accidents involving human beings, animals or vehicles falling or accidents during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc.	Contractor, HD	
			The project engineer of HD will plan and direct the contractor to execute the work progressively so that the length of the open excavated trench is minimized in order to reduce possible accidents.		
3	Excavations of borrow pits	Increased soil erosion, loss of top soil.	Borrow area rehabilitation has to be done as preventive measures for soil erosion.	Contractor	
			Top soil from borrow areas has to be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2 meters with proper covering. This shall be restored for rehabilitation of borrow pits.		
			In borrow pits, the depth of the pit should be regulated so that the sides of the excavation will		

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank.	
			The device for checking soil erosion include the formulation of sediment basins, slope drains etc. Such works and maintenance thereof will be deemed as incidental to the earthwork.	
4	Storage of materials		The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc.	Contractor, HD
			Site for storage of construction materials to be identified without affecting the traffic and other common utilities, and the quality of the construction materials.	
			Construction materials should only be stored and prepared on the site if they do not obstruct the road or any surrounding public utility.	
			Construction materials should only be transported to the worksite as and when required for construction	
5	Dust Pollution		All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall	Contractor

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			be covered & equipped will dust collector.	
			Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction.	
			Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage.	
			All precautions to reduce the level of dust emissions from the hot mix plants shall be taken. The hot-mix plants should be sited at least 500 m from the nearest habitation and from major water bodies. They should be fitted with dust extraction units.	
			Water should be sprayed on the earth mixing sites, asphalt mixing site and service roads.	
			During sub grade construction, sprinkling of water should be carried out at least twice a day on a regular basis during the entire construction period especially in the winter and summer seasons. Special attention should be given in the sections where the alignment passes through sensitive areas such as schools, hospitals and urban areas. As soon as construction is over the surplus earth should be utilized to fill up low-	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			allowed to pile up along the alignment. Air quality monitoring should be conducted as per Environmental Monitoring Plan.	
6	Protection of residential / sensitive receptors		Noisy construction operations in residential and sensitive areas should be done only between 7.30 am and 6.00 pm. Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise.	
			Provision of enclosing generators and concrete mixers at site.	
			Sound barriers shall be installed during the construction phase to protect the inhabited areas from the noise from construction activities.	
			Adequate barricading and safety measures to protect dust pollution and noise impacts on sensitive receptors like schools and hospital etc due to vehicle movement to be ensured prior to the start of work and their effectiveness to be checked during construction and operation phase.	
7	Vehicular noise pollution at residential /		Idling of temporary trucks or other equipment should not be permitted during periods of	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
	sensitive Receptors.		loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas.	
			Stationary construction equipment will be kept at least 500m away from sensitive receptors.	
			All possible and practical measures to control noise emissions during drilling shall be employed.	
			The HD may direct to take adequate controls measures depending on site conditions.	
8	Noise from vehicles, plants and equipments		Use of less noise generating cutting equipment's, provide personal protective equipment's such as ear plugs/muffs and other safety measures to labourers.	
			Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.	
			Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			Construction contract should clearly specify the use of equipment emitting noise of not greater than 90 dB(A) for the eight hour operation shift.	
			The citing of construction yards should be done leaving at least 100 m distance from any residential areas which will allow noise to attenuate.	
			The main noise producing sources such as the concrete mixers, generators, grader etc. should be provided with noise shields around them. The noise shields can be any physical barriers, which is effective in adequate attenuation of noise levels. 3m high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard.	
			For protection of construction workers, earplugs should be provided to those working very close to the noise generating machinery.	
9	Movement of Heavy Vehicles		Construction vehicles, machinery and equipment shall move, or be stationed in pre-identified designated areas only.	Contractor
10	Gaseous emission from construction vehicles		All vehicles, equipment and machinery used for construction should be fitted with latest air pollution control equipments and should be	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
	and machinery		regularly maintained to ensure that the emission levels are as per norms of PCB.	
			Idling of delivery trucks or other equipment should not be permitted during periods of unloading or when they are not in active use.	
			The human settlements should be at least 500 m down windward direction of Hot (asphalt) mix plant. The construction operations during nights, especially in the winter season should be carried out under restricted conditions.	
			Air quality monitoring should be conducted as per Environmental Monitoring Plan to detect any deterioration in air quality due to the construction activities.	
11	Pollution from Construction Wastes		All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer.	Contractor
			The engineer shall certify that all liquid wastes disposed off from the sites meet the discharge standard.	
12	Pollution from Fuel and Lubricants		The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			maintenance and refueling sites will be located at least 500 m from sensitive receptors.	
			All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer.	
			Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground.	
			Contractor shall arrange for collection, storing and disposal of oily wastes to the pre identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines.	
			Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.	
13	Flora and Chance found Fauna		The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			(plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.	
14	Chance Found Archaeological Property		All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the	
			work in the site.	
15	Disposal of oil and grease		A suitable site should be identified for safe disposal / without contaminating the source, in relatively low lying areas, away from the water	,

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			bodies etc., as approved by the Engineer & as per specific procedures.	
16	Use of water for construction		Arrangement for supply and storage of water will be made by the contractor in such a way that the water availability and supply to nearby communities remain unaffected. If a new tube- well is to be bored, proper sanction and approval by Ground Water Department is needed. The wastage of water during the construction should be minimized. In case of tapping water from community sources, consent to be obtained from local Administration for the same.	
17	Surface runoff from the construction site		No labour camps, stone crushers, hot mix plants and other heavy machinery should be located near to water bodies. No discharge from such establishments should follow their path into nearby water bodies.	
			Dumping of debris in or nearby water bodies to be strictly avoided. Waste products must be collected, stored and taken to approved disposal sites as per prevailing disposal norms.	
			Runoff from the construction site should be passed through silt traps. Pitching, stabilisation of soil and slope protection measures should be	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			taken up to reduce erosion of soils.	
			Water quality monitoring should be conducted as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution.	
18	Safety Aspects		Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the HD.	
			Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil.	
			Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc.	
			Welder's protective eye-shields shall be provided to workers who are engaged in welding works.	
			Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.	
			The contractor shall supply all necessary safety	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs.	
			The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract.	
			The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment & Conditions of Services) Act, 1996 are adhered to.	
			The contractor shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.	
19	Risk from Electrical Equipment(s)		The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that -	Contractor
			No material will be so stacked or placed as to cause danger or inconvenience to any person or	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			the public. All necessary fencing and lights will be provided to protect the public in construction zones.	
			All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	
20	First Aid		The contractor shall arrange for: A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital.	
21	Informatory Signs and Hoardings		The contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
22	Disposal of excavated material, construction and other waste.		The excavated material shall be disposed off without any accumulation. The soil excavated from the canal and river shall be tested for quality, adequately treated with methods like bioremediation and proper reuse option explored. The rest may be safely disposed.	Contractor, HD
			The disposal shall be done in the existing dump yards or any other site identified by HD.	
			The following shall be ensured during silt disposal	
			Dumping does not impact natural drainage courses.	
			No endangered / rare flora is impacted by such dumping.	
			Settlement area located at least 1.0 km away from the site.	
			Should be located in non-residential areas located in the downwind side.	
			Located at least 100m from the designated forest land. Avoid disposal on productive land.	
			Should be located with the consensus of the local community, in consultation with the engineer.	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			All vehicles delivering material to the site shall be covered to avoid material spillage.	
23	Clearing of construction camps and restoration		Contractor to prepare site restoration plans, the plan is to be implemented by the contractor prior to demobilization.	
			On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	
24	Project implementation		It shall be ensured that the Environmental, Health and Safety guidelines of World Bank are adhered to as applicable for activities during construction.	,
OPERA	TIONAL PHASE			
1	Compensatory plantation	Improved biodiversity and aesthetics	The compensatory plantation should be carried out in consultation with the Forest department. Adequate care of the compensatory plantation should be taken up so as to achieve optimum	HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			survival rate.	
			Landscaping should be done with a lag of 3 to 4 months from the start of the work on any section. The section should be deemed to be complete when the landscaping is over.	
			Survival rate of plants must be included in the contract specifications so as to ensure that the compensatory plantation achieves the objective of compensating lost trees.	
			Indigenous and endemic tree species suitable for the area should be planted at the onset of monsoon season. The plants should be provided with adequate protection from animals and proper monitoring should be carried out to ensure their growth.	
2	Air and Noise Monitoring		The air and noise level in the project area should be periodically monitored by HD. If the observed level is more than the permissible limits, suitable mitigation measures such as noise barrier should be taken.	HD
3	Maintenance		It shall be ensured by the HD that the proposed project road should be functional. The following practices should be adopted in	HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			maintaining the constructed road:	
			Road structure, at-grade roads and drains shall be regularly inspected and cleaned properly.	
			All damaged should be rectified immediately	
			Rubbish and dust on the carriageway and drains should be cleaned and should not be left alongside the road and shall be immediately disposed in pre-identified site with necessary precautions.	
			The signs, markings, signal and lighting should be maintained in good condition to ensure safe movement of vehicles.	
			If any accidents occurred in the road within the project area, the causes shall be identified and necessary mitigation measures should be taken.	

16.0 Benefits of the Project

The population in the project area will be benefited by the implementation of this project with reduction in traffic related issues.

Economic Benefits:

The project road connects all the major radial roads in Chennai peripheral network, which will carry voluminous traffic. The project road is end-route to various corporate and business places.

- Connectivity to Port shall enhanced.
- Commercial activity of the region will be improved.
- Speedy travel without congestion and choking shall be ensured for the road users

17.0 Environmental Monitoring

The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out. Broad objectives of the monitoring programme are:

- To evaluate the performance of mitigation measures proposed in the EMP
- To suggest improvements in the management plans, if required
- To satisfy the statutory and community obligations
- To provide feedback on adequacy of Environmental Impact Assessment

Sl. No	Indicator	Details	Stage	Responsibility		
A	Environmental Condition Indicators and Monitoring Plan					
1	Air Quality	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan given in the Environmental Management Plan	Construction	Contractor through approved monitoring agency		
2	Noise Levels		Construction	Contractor through approved monitoring agency		
			Operation	TNHD through approved monitoring agency		
3	Water Quality		Construction	Contractor through approved monitoring agency		
В	Environmental Management Indicators and Monitoring Plan					
1	Disposal Locations	Locations for dumping have to be identified and parameters indicative of environment in the area has to be reported	Pre- Construction Stage	Contractor		
2	Construction Camps	Location of construction camps have to be identified and	Pre- construction	Contractor		

Environmental Monitoring Indicators

Sl. No	Indicator	Details	Stage	Responsibility	
		parameters indicative of environment in the area has to be reported			
3	Borrow Areas	Location of borrow areas have to be identified and parameters indicative of environment in the area has to be reported	Pre- construction	Contractor	
4	Tree Cutting	Progress of tree removal marked for cutting is to be reported	Pre- construction	Foresters to PIU	
5	Tree Plantation	Progress of measures suggested as part of the Tree Plantation Strategy is to be reported	Construction	Foresters to PIU	
6	Top soil	Implementation of the measures suggested for top soil preservation shall be reported by Contractor to the Engineer	Construction	Contractor	
С	Management & Operational Performance Indicators				
1	Survival Rate of Trees	The number of trees surviving during each visit will be compared with the number of saplings planted	Operation	The Engineer will be responsible for monitoring upto the Defect Liability Period in any particular stretch. After this period the Forest wing of the PIU will	

Sl. No	Indicator	Details	Stage	Responsibility
				be responsible for monitoring over a period of 5 years.
2	Status Regarding Rehabilitation of Borrow Areas	The PIU will undertake site visits to determine how many borrow areas have been rehabilitated in line with the landowners request and to their full satisfaction.	Operation	The Engineer will be responsible for monitoring upto the Defect Liability Period in any particular stretch. After this period the Environmental Cell of the PIU will be responsible for monitoring over a period of 5 years

19.0 Environmental Budget

Budgetary estimates for environmental management in the project include all items envisaged as part of the EMP. The environment budget shown in the following includes provisions for various environmental management measures (other than measures considered under good engineering practices) and the environmental monitoring costs. The EMP budget accounts for Rs 1440 Lakhs.





1.1 Project Background

Chennai is the capital of Tamil Nadu and is the fourth largest metropolitan area in India with the population of over 86 lakhs (2011). The population was around 70 lakhs in 2001 has increased over 22% in a span of 10 years.

The Chennai Metropolitan Area (CMA) has an area of 1189 sq.km spread over three districts, includes the whole of Chennai District (176 sq.km), part of Tiruvallur District covering 637 sq.km and part of Kanchipuram District covering 376 sq.km.

Chennai is located on the coast of Bay of Bengal which makes the road layout in the metropolitan area is of radial pattern. There are 4 principal radial arterials, viz. NH-5, NH-205, NH-4, NH-45, to the north, north-west, west and south respectively. In addition, there are three more radial arterials,(i) along the coast on the northern side (Thiruvotriyur High Road), (ii) between NH-4 and NH-45 (Arcot Road) and (iii) along the south coast (ECR). The radial roads are congested and inadequate to handle the growing traffic need. The connecting road system, with lot of missing links, has put tremendous strain on the radial network. City has got three circumferential roads viz., Inner Ring Road, Chennai Bypass and Outer Ring Road which connects the radial roads. As the city is developing beyond the limits of these circumferential roads, a new circumferential road is required.

Chennai Airport is the third busiest airport in India. The city is served by two major ports, (i) Chennai port is the largest in Bay of Bengal and India's second busiest container hub, handling automobiles, motorcycles and general industrial cargo and (ii) Ennore Port currently handles cargo such as coal, iron ore, other bulk and rock mineral products and future expansion plans are on the anvil. Chennai city has got one more private sea port at Kattupalli near the northern town of Ennore. Road connectivity to the Ennore and Kattupalli ports needs to be provided from the radial roads without congesting the city roads.

In the face of rapid developments in the districts surrounding Chennai and the expansion of the city, a new regional planning model on the lines of National Capital Region is being examined by the Chennai Metropolitan Development Authority (CMDA) and a detailed report was prepared for the Government's consideration. For balanced regional development, better infrastructure facilities like

developing a larger road network, implementing an integrated transport plan, etc will be planned besides decongesting the city.

Government of Tamil Nadu is in the process of identifying and implementing projects to bridge the huge gap in the demand and supply of infrastructure projects. One of the major projects included in VISION 2023 is Chennai Peripheral Road.

Chennai Peripheral Road is conceptualized to provide better connectivity around the city catering future traffic requirements and provide efficient commercial transportation by enhancing port connectivity. This road will facilitate container movement from southern districts to Ennore Port.

Tamil Nadu Highways Department, C & M, Chennai Circle appointed M/s. STUP Consultants Pvt. Ltd to prepare the DPR for forming the Chennai Peripheral Road.



1.2 Objectives

The main objectives of the consultancy services as per ToR is to establish the technical, economical and financial viability and prepare detailed project reports for the proposed peripheral road.

The DPR would inter-alia include highway design including bypasses/service roads, design of pavement and overlay with options for flexible or rigid pavements, design of bridges, culverts and grade separated structures, detailed working drawings, quantities of various items, cost estimates including utility shifting and land acquisition, economic and financial viability analyses, social and environmental action plans as appropriate and documents required for tendering the project on commercial basis for international/local competitive bidding.

1.3 Scope of Services

The scope of work of the consultants as per ToR includes but is not limited to the following:

- i. Carry out the preliminary survey by using satellite or appropriate technique for fixing of suitable alignment amongst various alternatives for a peripheral road, on the basis of Technical & Financial viability, which shall be designed as partially/fully access control facility. The alignment must be got approved from the competent committee.
- ii. Review of all available reports and published information about the project road and the project influence area;
- iii. Detailed reconnaissance
- iv. Inventory and condition surveys for existing road, bridges, cross-drainage structures and drainage provisions;
- v. Traffic studies including traffic surveys and axle load survey and demand forecasting for next thirty years;
- vi. Identification of the type and the design of intersections;
- vii. Detailed topographic surveys using Total Stations and GPS;
- viii. Pavement investigations including BBD tests
 - ix. Sub-grade and sub-soil characteristics and strength for road and embankment design.

- x. Geo-technical investigations for structures
- xi. Identification of sources of construction materials;
- xii. Hydrological investigation for bridges
- xiii. Design of complete drainage system up to disposal point for storm water
- xiv. Detailed design of roads, its x-sections, horizontal and vertical alignment, design of embankment and structures (CD Works, ROB's/RUB's etc) including preparation of GAD and construction (GFC) drawings
- xv. Design of toll plaza and identification of their numbers and location and design of wayside amenities, parking areas and rest areas.
- xvi. Approval of all drawings including GAD and detail engineering drawings will be got done by the consultant from the Designs wing of Highways department, Railways and other agencies as appropriate.
- xvii. Strip plan indicating the location of all existing utility services and the scheme for their relocation, trees to be felled and planted and land acquisition requirements including schedule for LA, reports, documents and drawings, arrangement of estimates for cutting of trees and shifting of utilities from the concerned department;
- xviii. Detailed BOQ and cost estimates
- xix. Environmental Impact Assessment, Environmental Management Plan and Rehabilitation and Resettlement Studies meeting the requirements of the lending agencies like ADB/ JICA/ World Bank etc.
- xx. Consultant shall obtain 'No Objection Certificate' from Ministry of Environment and Forest.
- xxi. Consultant shall obtain all types of necessary clearances required for implementation of the project on the ground from the concerned agencies. The client shall provide the necessary supporting letters and any official fees as per the demand note issued by such concerned agencies from whom the clearances are being sought to enable implementation.
- xxii. Public consultation, including consultation with communities located along the road, NGOs working in the area and relevant Govt. departments.
- xxiii. Analysis of expected financial return through toll and other revenues, taking into account of the effect of bypass/ring/radial roads in the vicinity of the city which are either tolled or are being taken up or already taken up under PPP

mode projects. The alignment/sections of ring/radial road already undertaken/being undertaken by any other Authority shall be in harmony with this project and conflict, if any, shall be minimized

- xxiv. Prepare technical schedules with all annexure, statements, typical drawings, etc, as required for purpose of bidding for each proposed prioritized section.
- xxv. Relevant IRC, IS & MORTH specifications should be the basis for the study.

1.4 Scope for EIA

The study envisages the preparation of a detailed Environmental Impact Assessment (EIA) for the proposed road project.

The scope of environmental assessment includes processes such as

- 1. Environmental Screening and scoping,
- 2. Environmental impact assessment and
- 3. Environmental management plans (EMP) for construction and operation phases of the road project

The EA study also aims to develop a comprehensive environmental management framework for the road project.

1.4.1 Environmental Screening and Scoping

Environmental screening for the proposed road was carried out to facilitate inputs on environmental considerations, to evaluate the adverse environmental impacts due to the proposed project. Further, this report also provides scoping inputs in determining the major environmental issues and defines the scope of work for conducting environmental assessment. As per the recommendation of the Environmental Screening report, detailed Environmental Impact Assessment has been carried out for the project roads. The scoping exercise defines geographical boundaries for the project roads for impact assessment as well as defining the project influence area to assess the impacts due to project activities.

1.4.2 Environmental Impact Assessment

Environmental assessment for project roads includes establishing environmental baseline in the study area, conducting organized stakeholder consultation, identify the range of environmental impacts, specify the measures to avoid, minimize, and mitigate negative impacts and maximize positive impacts and integrate possible environmental enhancement measures. The proposed measures will be formulated in the form of an environmental management plan with necessary budget and institutional roles for effective implementation. Separate EMPs have to be prepared for individual project roads and integrated in to project implementation agreements, including construction contract documents.

1.4.3 Environmental Management Framework

An Environmental Management Framework will be designed for the implementation of the project. The environmental management framework shall consists of overall framework which will be developed as a guidance document providing environmental planning and design criteria for of the current as well as future project roads, generic environmental management measures, institutional mechanism for implementation, capacity building and training process, and resource material to function adequately to mainstream the environmental management.

1.5 Structure of Report

The EIA report is prepared in accordance with the stipulation of the Environmental Impact Assessment Notification 2006, World Bank Operational Policy 4.01. This EIA report has been structured as follows: The introduction chapter highlights the scope of the report and its component of EIA/EMP.

- Chapter 1Introduction, Project details, scope of work, objectives of the work, EIAscope and process and structure of the EMP report.
- Chapter 2 Project Description description of the project, such as, the type of project, need for the project, project location, highway alignment, utilities, implementation schedule and the estimated cost of the project.
- .Chapter 3 Policy, Legal and Institutional Framework presents a review of the existing policies, legislations and institutional framework relevant to the project, at the National and the State levels.
- Chapter 4 Environmental Impact Assessment –Methodology and Process
- Chapter 5 Environment Profile of the Project Area
- **Chapter 6** Environment Impacts along the Project Corridors

- Chapter 7 Environmental Mitigation arrangements
- Chapter 8 Social impact Assessment
- Chapter 9 EMP Environmental Management Plan and EMP Costing Mitigation Measures and Cost presents an elaborate listing of the nature of impacts on each of the environmental components and the avoidance and mitigation measures and associated cost suggested thereof
- Chapter 10 Community Consultation and Participation
- Chapter 11 Implementation Arrangements

CHAPTER - 2 PROJECT DESCRIPTION

CHAPTER - 2 PROJECT DESCRIPTION

2.1 Proposed Alternate Alignments for Peripheral Road

The alignment proposed by Government of Tamil Nadu was assessed and the findings are given below.

- Start of project is within Mahabalipuram town, the World Heritage site, where the improvements are not permitted by Archaeological Survey of India.
- Proposed Sriperumbudur bypass is through built-up sections and water spread area of Sriperumbudur lake.
- Proposed Thiruvallur bypass starts/passing through built-up sections and industrial area.
- New alignment from NH-5 in Thatchur to Ennore Port

For identification of best alignment, the project road is divided into five sections as follows;

- 1. Ennore Port to NH-5
- 2. NH-5 to Start of Thiruvallur Bypass
- 3. Start of Thiruvallur Bypass to NH-4
- 4. NH-4 to NH-45
- 5. NH-45 to Mahabalipuram

Various alignment options for each section were prepared using satellite imagery, Divisional Road Map and Topo sheets.

As per the ToR, three level committees were set up to review, examine and monitor the work of preparation of DPR and also recommend the actions/decisions on the issues that will arise during the course of study. The Steering Committee to steer in terms of policy issues and strategies, and the Technical and Sub-technical Committee to guide in technical matters.

The alignment options for each section of Peripheral Road, options for interchanges at major road crossings and road configuration of each section of the road were reviewed by the Technical Sub-Committee, Technical Committee and Steering Committee based on technical and financial viability.

2.2 Approved Alignment of Peripheral Road

The alignment for Chennai Peripheral Road is approved by the Steering Committee and is finalized by the Principal Secretary, Highways and Minor Ports, Government of Tamil Nadu on 09.07.2014. The approved alignment plan is given in Figure 2.1.

The Peripheral road will starts at Ennore Port and ends at Poonjeri Junction in Mahabalipuram. The proposed road will connect four National Highways – NH-5, NH-205, NH-4 and NH-45, and eight State Highways – SH-51, SH-50A, SH-50, SH-48, SH-57, SH-49B, SH-49A (OMR) and SH 49 (ECR). Length of proposed peripheral road will be around 132.871 km which is split into 5 sections.

Section 1: Northern Port Access Road - Ennore Port to Thatchur on NH-5 (24.60 km) Section 2: Thatchur on NH-5 to Start of Thiruvallur Bypass (26.40 km) Section 3: Start of Thiruvallur Bypass to Sriperumbudur on NH-4 (30.60 km) Section 4: Sriperumbudur on NH-4 to Singaperumalkoil on NH-45 (23.80 km) Section 5: Singaperumalkoil on NH-45 to Mahabalipuram (27.471 km)

Section - 1: Northern Port Access Road from Ennore Port to Thatchur on NH-5

The proposed Northern Port Access Road (NPAR) is an important link to the fast growing Ennore Port which handles major cargo movements. This will also cater to the needs of the recently developed L & T Ship Yard.

The proposed new road will connect the Northern Gate of Ennore Port and NH-5 near Thatchur and with an additional spur road for connecting to the Thiruvottiyur-Ponneri-Pancheti (TPP) road.

The detailed feasibility report for this project was originally prepared by NHAI and handed over the report to State Government to take the project forward. GoTN appointed TNRDC as Managing Associate for the project and modified the alignment with additional access provisions as per the requirements of major stakeholders. TNRDC's updated alignment starts at Ennore Port and ends at km 30.270 of NH-5.

In order to avoid built-up section, HT lines and to accommodate the interchange at NH-5, the end of project road is shifted southwards to km. 29/000 of NH-5. As the alignment of NPAR from Ch. 17+300 to NH-5 is modified, the length of NPAR will be 20.900 km against the original length of 21.120 km. The proposed NPAR will have 4-lane divided carriageway plus paved shoulder with 2lane service roads on both sides. The proposed RoW is 100m to accommodate various utilities in-between the main carriageway and service road. There are 5 vehicular underpasses and 1 light vehicular underpass are proposed in NPAR. The project section crosses Chennai-Gummudipoondi Railway line, for which a new RoB is proposed.

The proposed TPP link road starts at Ch. 6+200 of NPAR and ends at km 13/950 of TPP road. Length of this link road is 4.21km. The last 2 km stretch of TPP Link Road is passing through densely developed built-up area which affects about 166 buildings (out of 222 buildings affected in Section-1 of CPR). People affected by the TPP Link Road objected to the acquisition of their properties for laying the new road and staged protests.

In the Public hearing conducted by TNPCB, as part of environmental clearance process, at Tamaraipakkam on 12.07.2018 the affected people of link road conveyed their concern about exposure to pollution due to forming new road through residential area and requested to shift the alignment. Considering the requests by the project affected people and intensity of social impact, Highways Department studied alternate alignment options and finalized to shift the end point of link road to km 15/400 of TPP road where the Chennai Outer Ring Road ends with social impacts of 20 assets.

This revised alignment (named as CORR-CPR Link Road) is an extension of ORR upto NPAR to reach Ennore Port. Total length is 3.70 km in which the old TPP Link Road alignment is followed for 1.30km from NPAR and thereafter deviates from the original alignment to reach ORR.

The starting 1.30km stretch will be in at-grade road with 4-lane carriageway and 2-lane service roads on both sides with 100m RoW. After that, elevated road (2 x 3 lanes) is proposed for a length of 2.85 km (including 0.45km length of approach inside ORR) upto ORR i.e. starts before Pudupedu village road junction, crossing village roads, railway lines, TPP road and ends in ORR. Service roads are proposed under the deck of elevated road. Proposed Row is 45m. An entry/exit ramp is proposed in-between TPP road and Railway line to facilitate turning traffic movements of project road.

As per the above modifications, the length of CORR-CPR Link Road is 3.70km against the original TPP Link Road length of 4.21 km.

Hence, the total length of Section 1 is 24.60 km covering 20.900 km of NPAR and 3.70km of CORR-CPR link road.

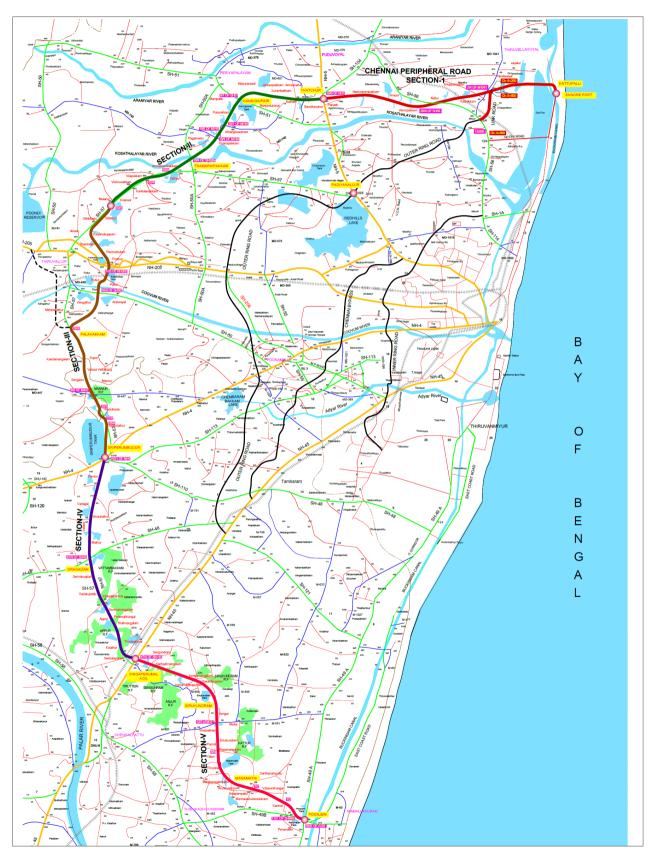
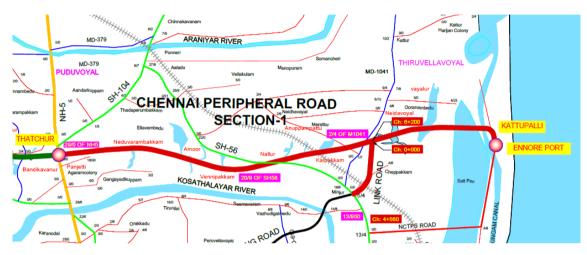


Figure 2. 1 Alignment of Chennai Peripheral Road

The NPAR crosses Buckingham Canal near Kattupalli, for which a major bridge is proposed. As the project section is developed as access controlled facility, entry/exit ramps from Service road to Main carriageway are proposed on both sides of the project road.



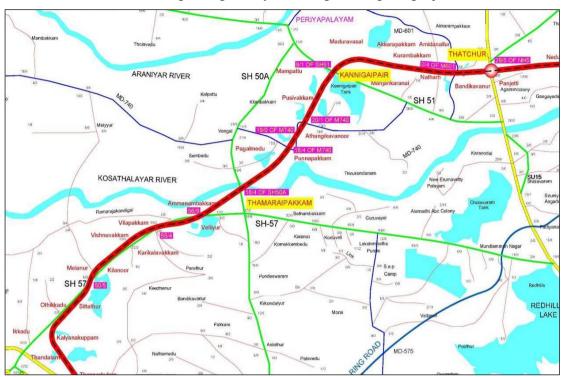
Section - 2: NH-5 at Thatchur to Start of Thiruvallur Bypass

The entire section will be new alignment from km 29/000 of NH-5 near Thatchur to km 50/500 of SH-57 near Othikkadu Village. The length of section is 26.40 km. The alignment will cross SH-51 at km 9/100 and SH-50A at km 18/400. As the SH-57 from km 50/500 to km 56/900 is passing through 6 villages, to avoid social impact new alignment is proposed parallel to SH-57, behind the settlements, from km 56/900 near Velliyur Village to end of project section (i.e. km 50/500 of SH-57).

The project road will have 6-lane with paved shoulder carriageway with 2-lane service road on both sides. Proposed right of way is 60m.

Cloverleaf type interchange is proposed for NH-5 junction at km 29/000. Underpasses are proposed at important junctions and built-up sections. There are 6 vehicular underpasses and 3 light vehicular underpasses proposed in this section. The project section crosses Kosathalai River near Thamaraipakkam. There are 2 major bridges and 6 minor bridges proposed in this section.

As the project section is developed as access controlled facility, entry/exit ramps from Service road to Main carriageway are proposed on both sides of the project road.



This section is passing entirely through Thiruvallur district covering two taluks of Thiruvallur and Uthukottai passing nearly 20 villages along the project section.

Section - 3: Start of Thiruvallur Bypass to Sriperumbudur

This section starts at km 50/500 of SH-57 i.e. start of Thiruvallur bypass and ends at km 42/250 of NH-4 in Sriperumbudur. Total length of this section is 30.60 km in which 9.6 km is improvement of existing SH-57 and balance is in new alignment.

Bypasses are proposed for Thiruvallur and Sriperumbudur towns and a realignment is proposed for Thodukkadu built-up area. Thiruvallur bypass starts at km 50/500 of SH-57, crosses NH-205 at km 51/650 and SH-50 at km 16/900 and ends at km 38/900 of SH-57. Length of this bypass will be around 15.7 km. The realignment of Thodukkadu village is from km 27/600 to km 30/300 of SH-57, for a length of 2.85 km. In order to avoid the built-up area of Sriperumbudur town, a new alignment is proposed along the Sriperumbudur tank bund from km 26/600 of SH-57 to km 42/250 of NH-4, for a length of 1.6 km.

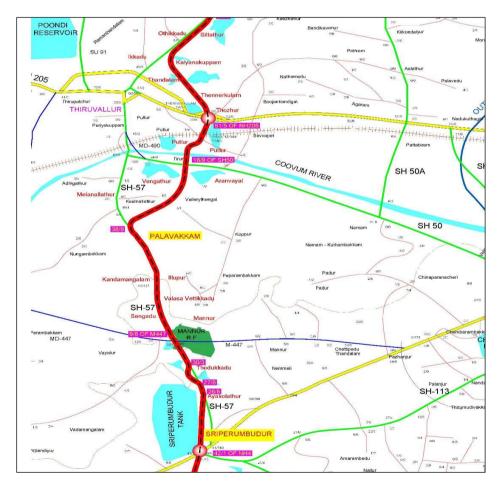
The project road will have 6-lane with paved shoulder carriageway with 2-lane service road on both sides. Proposed right of way is 60m.

Cloverleaf type interchanges are proposed for NH-205 junction at km 51/650 and NH-4 junction at km 42/250. Underpasses are proposed at important junctions and built-up

sections. There are 6 vehicular underpasses and 1 light vehicular underpasses proposed in this section. The project section crosses Chennai-Arakonam Railway line, for which a new RoB is proposed. The project section crosses Coovam River near Thiruvallur, for which a major bridge is proposed.

As the project section is developed as access controlled facility, entry/exit ramps from Service road to Main carriageway are proposed on both sides of the project road.

This section of the road is passing through two districts namely Kanchipuram and Thiruvallur. The road transverses through Sriperumpudur, and Thiruvallur Taluks and covers 11 settlements. The land use pattern observed was predominantly agricultural fields all along the road with few commercial establishments. Thiruvallur Bypass mostly runs along the agricultural fields. Most of the developments along the road were clearly developed outside the Right of Way (RoW) and few settlements inside the Row.



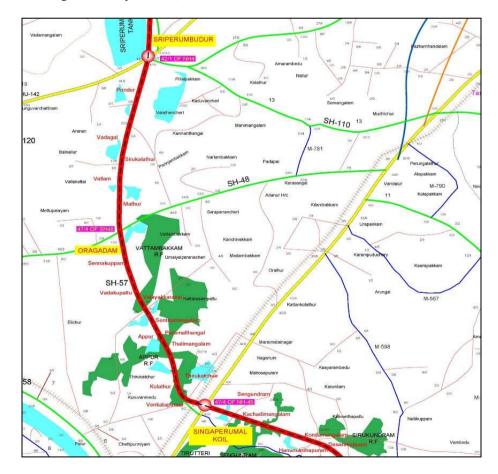
Section - 4: Sriperumbudur to Singaperumalkoil

This section is stretch of SH-57 from NH-4 in Sriperumbudur to NH-45 in Singaperumalkoil. Tamil Nadu Road Infrastructure Development Company Ltd.

(TNRIDC), is widening this stretch of SH-57 to 6-lanes with service roads (except forest stretches). Projects wing of Highways Department, Government of Tamil Nadu is constructing a ROB (in lieu of LC 47) with interchange (elevated roundabout) on NH-45 at start of SH-57. Total length of this section is 23.80 km.

As this stretch of SH-57 is under widening to 6-lanes by TNRIDC, no further widening/modifications/CD structures are proposed to avoid land acquisition. To improve the road safety, 9 vehicular underpasses and 3 light vehicular underpasses are proposed in this section within the available land.

This section of the road passes entirely through Kanchipuram district covering two taluks Chengalpattu and Sriperumpudur and passes through 20 settlements. Land use pattern observed was predominantly Industrial fields along the road with commercial establishments. Most of the developments along the road were clearly taken place outside the Right of Way (RoW).



Section - 5: Singaperumalkoil to Mahabalipuram

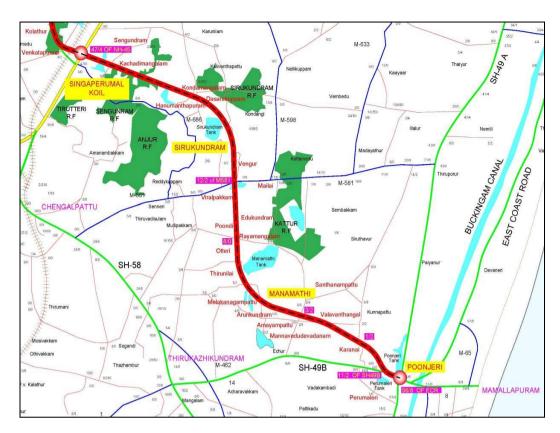
This section starts at km 47/400 of NH-45 in Singaperumalkoil, where the Interchangecum-ROB is under construction and ends at Poonjeri Junction in Mahabalipuram. Total length of this stretch is 27.471 km in which 2.0 km is improvement of existing SH-49B and balance is new alignment.

The project section starts as new alignment from km 47/400 of NH-45 where a Interchange-cum-ROB is under construction at end of Section - IV. In order to incorporate this additional approach and to increase the weaving length, it is proposed to change the shape of elevated roundabout from circular to elliptical shape. The existing SH-49B from km 11/200 to km 13/200 will be widened as per the proposed configuration.

The project road will be 4-lane with paved shoulder carriageway with 2-lane service road on both sides. Proposed right of way is 60m.

At-grade rotary intersection is proposed for Poonjeri junction where the OMR also ends at ECR. Underpasses are proposed at important junctions and built-up sections. There are 6 vehicular underpasses and 7 light vehicular underpasses proposed in this section. There are 1 major bridge proposed in this section. As the project section is developed as access controlled facility, entry/exit ramps from Service road to Main carriageway are proposed on both sides of the project road.

The road passes entirely through Kanchipuram district and falls under the Chengalpattu and Thirukalukundram Taluk covering around 28 settlements. The land use pattern observed was predominantly agricultural fields/ vacant and barren land all along the road.



2.3 Conclusion

The Project description provided a clear overview of the project corridors and its features. The following chapter enable the PIU to understand the need for EIA and its components.

CHAPTER - 3 LEGAL FRAME WORK

CHAPTER - 3 LEGAL FRAMEWORK

3.1 Introduction

A review of the existing institutions and legislation relevant to the environmental issues in this project at the National and State levels is presented in the following section. A regulation concerning procedures and requirements which may directly concern the projects has been addressed in this chapter.

3.2 National Constitution of India

Article 48A and 51A of Indian Constitution

As a sequel to the UN Conference on the Human Environment (1972), Indian Parliament in 1976 amended the Constitution of India by introducing articles 48A and 51A. These articles incorporated environmental concerns into the Directive Principles of state policy and postulated as a fundamental duty of all citizens to preserve and protect the environment.

3.3 Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations pertaining to sustenance of environment. Ministry of Environment and Forests and Climate Change (MoEFCC) serves as the administrative focal point for the planning, promotion and coordination of environmental laws and policies. The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Central Ministry of Environment Forests and Climate Change (MoEFCC) and the Central Pollution Control Board (CPCB) / State Pollution Control Board (SPCB).

3.4 Environmental Rules and Regulations

In order to understand the extent of the environmental and social assessment for the proposed improvement works, applicable laws, legislation and policies have been reviewed. A summary of environmental legislations / regulations relevant to the project is furnished in Table 3.1.

S.No	Policy/Act/Rule	Year	Purpose	Responsible Institution	Applicability
1	Environment (Protection) Act.	1986	To protect and improve the overall environment	MoEF & CC	Yes
2	Environmental Impact Assessment Notification and Amendments	2006, 2009 and 2013	Toprovideenvironmentalclearancetonewdevelopmentactivitiesfollowingenvironmentalimpact assessment	MoEF & CC	No
3	Notification on use of fly ash	2007	To mandate the reuse of fly ash in large quantities of fly ash from the Thermal plants within 100 km from development project activities.	MoEF & CC	Yes
4	Wildlife Protection Act	1972	To protect wild animals and birds through the creation of National Parks and Sanctuaries.	MoEF & CC	No
5	The Forest (Conservation) Act	1980	To protect and manage forests by restricting conversion of forest area into non- forest areas and to check deforestation	Forest Department GoTN/ MoEF/CC	Yes
6	The Scheduled Tribes and Other Traditional Forest (Recognition of Forest rights Act)	2006	To recognize and vest the forest rights and occupation in forest land in forest dwelling STs and other traditional forest dwellers		No
7	Biological Diversity Act	2000	Disclosure of species survey or collection activities to the National Biodiversity Authority	MoEF & CC	Yes
8	Water (Prevention and	1974	To provide for the prevention and control of water pollution	ТМРСВ	Yes

S.No	Policy/Act/Rule	Year	Purpose	Responsible Institution	Applicability
	ControlofpollutionandamendmentsAct		and the maintaining or restoring of wholesomeness of water		
9	Air (Prevention and Control of Pollution) Act (and subsequent	1981	To provide for the prevention, control and abatement of air pollution and for the establishment of Boards to carry out these purposes	TNPCB	Yes
10	Hazardous Waste (Management , Transboundary Rules , 2008	2008	Authorization for handling, storage, transportation and disposal of hazardous wastes	ТМРСВ	Yes
11	Municipal Solid Waste (Management Handling) Rules, 2000	2000	Segregation, Handling & safe disposal of domestic solid waste	Local Body	Yes
12	Batteries (Management and Handling) Rules 2001	2001	Safe recycling of lead acid batteries	TNPCB	Yes
13	Public Liability and Insurance Act, 1991	1991	Protection from hazardous materials and accidents	CC /PIU	Yes
14	Minor Minerals and Development Conservation Rules , 2010	2010	For opening new quarry	District Collectorate and Mining & Geology Department	Yes
15	ExplosiveAct1984andExplosiveRules2008	2008	Safe transportation, Storage and use of explosive materials	Chief Controller of Explosives	Yes
16	TamilNaduMinorMinerals	1956	For opening new quarry	District Collectorate	Yes

S.No	Policy/Act/Rule	Year	Purpose	Responsible Institution	Applicability
	and Concession Rules, 1956			Mining & Geology Department	
17	Coastal Regulation Zone Act (CRZ) Notification	2011	For construction of road in Coastal Regulation Zone Notification Area	MOEF / CRZ State Board	Yes, Start of project road at Ennore fall under CRZ.
18	Central Motor Vehicle Act, 1988 ,Central Motor Vehicle Rules 1989	1988/ 1989	To control vehicular air and noise pollution . To regulate development of the transport sector, check and control vehicular air and noise pollution.	Regional Transport Office	Yes
19	Noise Pollution (Regulation and Control) rules , 2000	2000	Noise pollution regulation and controls noise pollution	TNPCB	Yes
20	The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act),2010.	2010	To protect and prevent the Ancient Monuments and Archaeological remains from damage and loss.	Department of Archaeology	No, as no ASI sites has been identified.

Source: GoI, MoEF&CC and GoTN

3.5 World Bank Safeguard Policies and Environmental Requirements

In addition to the national and state policies, acts and rules, the World Bank policies and directives on Environmental and social safeguards need to be adhered to in the present assignment. The applicability of the relevant policies pertaining to the corridors that are undergoing upgradation (strengthening and widening) are summarized in Table 3-2.

Applicability of Various WB Safeguard Policies

The World Bank has ten safeguard policies; the details and applicability of the safeguard policies to the Project road are provided in the following Table.

Environmental requirements of the World Bank are specified in detail in its Operational Policy (OP) 4.01 and other related Operation Policies. In instances in which the procedural and regulatory requirements differ, the more stringent applies. The World Bank environmental requirements are based on a three-part classification system.

- Category A- requires a full Environmental Assessment (EA).
- Category B- projects require a lesser level of environmental investigation.
- Category C- projects require no environmental analysis.

On the basis of data and information collected during field survey and discussion with local experts and visualized potential associated impacts, consultant has categorized this project as category-A, which requires a full Environmental Assessment. Accordingly, a full Environmental Assessment has been carried out for both the project roads

WB Safe Guard Policy	Subject Category	Triggered or Not	Reason For Its Applicability	Mitigation Measures	Documentation
	Environmental Assessment	Triggered	Umbrella policy	All necessary mitigation measures will be incorporated during environmental assessment	EIA and EMP required.
OP 4.02	Environment Action Plan	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.03	Performance standards for Private Sector	Not Triggered	Not Applicable	Not Applicable	Not Applicable

Table 3. 2 Applicability of World Bank Safe Guard Policies for Project Roads

WB Safe Guard Policy		Triggered or Not	Reason For Its Applicability	Mitigation Measures	Documentation
OP 4.04	Activities Natural Habitats	Not Triggered	Eco-sensitive- Forestry and wildlife related issues	Not Applicable	Not Applicable
OP 4.07	Water Resources Management	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.09	Pest Management	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.12	Involuntary Resettlement	Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.10	Indigenous people	Not Triggered	No separate Indigenous people development Plan is required for the Project.	There are no indigenous people along both the roads	Not applicable
OP 4.11	Physical Cultural Resources	Triggered	A number of temples, shrines, churches, etc are located adjacent to road and RoW. Cultural property rehabilitation will be plan prepared.	Adequate mitigation measures if affected.	EMP & RAP are prepared to minimize any adverse effect on the cultural properties
OP 4.20	Gender and Development	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.36	Forestry	Not Triggered	No forest land will be required	Not Applicable	Not Applicable
OP 4.37	Safety of Dams	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 7.50	International Waterways	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 7.60	Disputed Area	Not Triggered	Not Applicable	Not Applicable	Not Applicable

WB Safe Guard Policy	Policy objectives
OP 4.01 Environmental Assessment	Help to ensure the environmental and social soundness and sustainability of Investment projects. Support integration of environmental and social aspects of projects in the decision- making process
OP 4.36 Forests	Helps to protect forest areas. The policy is also meant to steer World Bank investments into forests in accordance with the World Bank's wider strategy related to forests. This strategy is principally aimed at expanding the area of tropical forests.
OP 4.12 Involuntary Resettlement	Avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
OP 4.11 Physical cultural resources (PCR)	Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.

Table 3. 3 Highlights of WB Safeguard Policies

3.6 Other Legislation Applicable to the Project

Environmental issues during road construction stage generally involve equity, safety and public health issues. The road construction agencies require complying with laws of the land, which include inter alia, the following:

Workmen's Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment;

Contract Labour (Regulation and Abolition) Act, 1970: The Act provides for certain welfare measures to be provided by the contractor to contract labour;

Minimum Wages Act, 1948: The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act;

Payment of Wages Act, 1936: It lays down as to by what date the wages are to be paid, when it will' be paid and what deductions can be made from the wages of the workers;

Equal Remuneration Act, 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees;

Child Labour (Prohibition and Regulation) A; 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry;

Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979:

The inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.;

The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace, etc.;

3.7 Environmental Clearance (EC)

EIA notification of the MoEF & CC dated 14th September 2006, categorizes all projects and activities into two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and manmade resources. Environmental Impact Assessment Notification, amendment in 2009, states that "all state highways and state highways undergoing expansion in hilly terrain (above 1000m AMSL) and / or ecological sensitive area" should obtain environmental clearance from State Environmental Impact Assessment Authority (SEIAA). The selected corridors identified under the project roads are not passing through hilly terrain (above 1000m AMSL) and / or ecological sensitive area".

Therefore, EIA Notification 2006 as amended in 2009 is not applicable and environmental clearance is not required for any selected corridors. In case environmental clearance is required for any corridor procedure given in the EIA Notification 2006 and subsequent amendments shall be followed as shown in Fig. 3.1.

All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification; All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification.

3.8 Permissions and Consents to be obtained

3.8.1 Consents from Tamil Nadu Pollution Control Board

The project corridors shall require obtaining '*Consent to Establish*' and '*Consent to Operate*' from Tamil Nadu Pollution Control Board for establishment and operation of Hot Mix Plant (HMP), WMM, Crushers and Constructors Labour Camps (as per Schedule-I), under Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981) and authorization under Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, as amended.

3.8.2 Forest Clearances

The project requires forest land of around 10.23 ha in 3 stretches.

- The Section 3 is passing through Mannur Reserve Forest (RF) for a length of 200m i.e. from Ch. 69+700 to Ch. 69+900 (existing km 31/840 to km 32/040) which requires forest clearance (0.28 ha).
- Even though some stretches of Section 4 is passing through reserve forest, the required clearance are obtained by TNRIDC for improvement of this section.
- The Section 5 is passing through Thirutteri Reserve Forest (RF) for a length of 500m i.e. from Ch. 103+700 to Ch. 104+200 (2.56 ha) and Sengundram Reserve Forest for a length of 1260m i.e. from Ch. 104+690 to Ch. 105+950 (7.39 ha), which requires forest clearance.

Forest clearance will be required under the Forest (Conservation) Act, 1980 for diversion of forest land. As per the Forest (Conservation) Act, 1980, Form 'A' needs to be filled by the project proponent and has to be submitted along with the necessary enclosures to the District Forest Office, further stages of forest clearance (*as per IRC* – *SP-93-2011*) procedures is shown in the following Figure 3-2. (Formats for the same is given in Annexures)

3.8.3 Forest Clearances for Trees felling

In Tamil Nadu state, road plantations along the MDR, ODR and State Highways (SH) are not declared as Notified Protected Forest (NPF), under Forest (conservation) Act 1980. Hence, in the identified corridors, including strengthening and widening activity would not attract Forest clearance for road side trees felling.

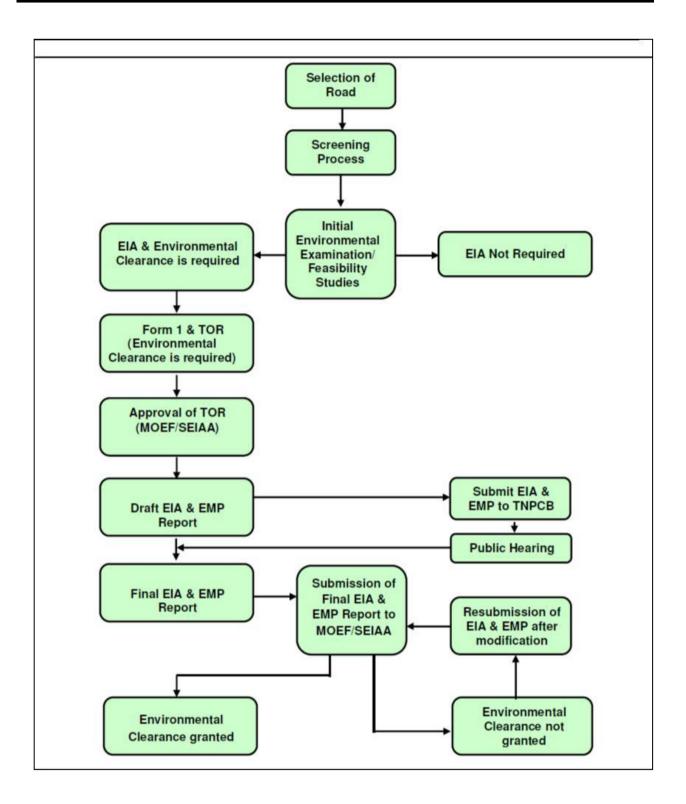


Figure 3. 1 Environmental Clearance Procedures

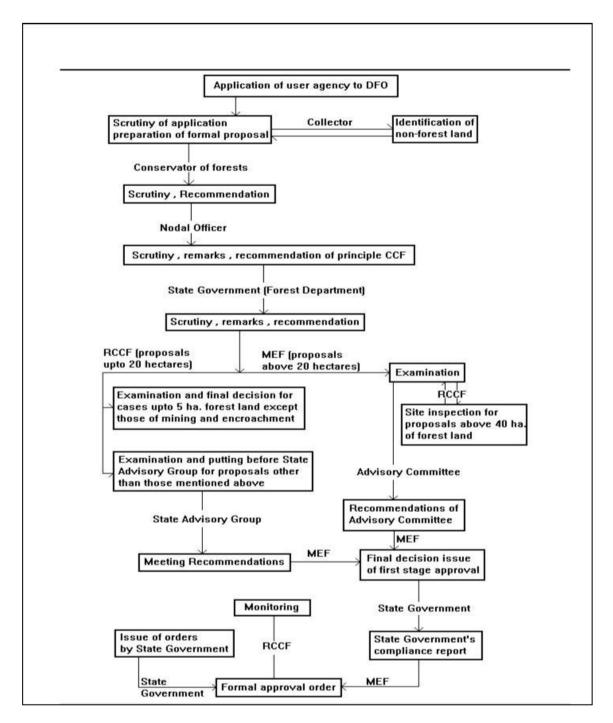


Figure 3. 2 Forest Clearance Procedures

3.8.4 Permission of Eco Sensitive Zones

In the Tamil Nadu State, there are 8 wildlife sanctuaries, 12 Bird Sanctuaries, 5 National Parks, 3 Tiger Reserves, 4 Elephant Reserves and 3 Biosphere Reserves for protection and conservation of wild fauna and flora. These are considered ecological protected areas. In case any such protected area is located with the 10 km distance from the project road corridor, prior permission from National Board for Wildlife (NBWL) will be required under Environmental (Protection) Act, 1986 to start the construction of the project road corridor. No such permissions will be required for the project, as the project road do not fall under any of the Eco Sensitive Zones.

3.8.5 Wildlife Clearance from Supreme Court In Notified Wildlife Areas

The project road do not passes through a protected area, like, a national park, wildlife sanctuary, bird sanctuary, Tiger Reserve or biosphere reserve, No prior wildlife clearance will be required.

3.8.6 CRZ Clearance for Road Construction in Coastal Regulation Zone (CRZ) Area

The section 1 is start at Ennore Port and cross Buckingham Canal which is falling in CRZ. Hence, the starting stretch of Section 1 requires CRZ clearance from competent authority as per provisions of Coastal Regulation Zone (CRZ) Notification 2011 and subsequent amendments in 2013.

3.9 Permissions and Clearances Required for the Project

The following Table highlight the permission required for the project from various Statuary authorities.

SI.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
1	Environmental Clearances incl. CRZ clearance	MOEF / CRZ State Board	Forest Area	Construction Prior to work	Highways Department
2	Forest Clearances	MoEF	Trees Felling	Construction Prior to work	Highways Department e
3	Consent to Establish Under the Air (Prevention	Tamil Nadu Pollution State	For operating hot mix	Construction Prior to work	Concessionaire

Table 3. 4 Permissions Required

		Statutory			
Sl.	Type of Clearance	Authority	Applicability	Project Stage	Responsibility
	& Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Pollution Control Board	plants, crushers and construction camps		
4	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981	Tamil Nadu Pollution State Pollution Control Board	construction	Construction Prior to work	Concessionaire
5	Permission to store Hazardous Materials under Hazardous Waste (Management, Handling and Trans- boundary Movement) Rules 2008.	Tamil Nadu Pollution State Pollution Control Board	Materials and	Construction Prior to work	Concessionaire
6	Explosive license under the Explosives Act 1884 and the revised rules 1983	Chief Controller of Explosives , petroleum and Explosive safety	Storage of explosives materials	Construction Prior to work	Concessionaire
7	PUC certificate for vehicles for construction under Central Motor and Vehicle Act , 1988	Motor Vehicle department of Tamil Nadu	For all construction vehicle	Construction Prior to work	Concessionaire
8	Quarry lease deeds and license under The Mines Act, 1958	Mining and Geology Department of Tamil Nadu	Quarrying and borrowing operations	Construction Prior to work	Concessionaire
9	Consent for ground water extraction	Tamil Nadu Ground Water Authority	Ground water extraction for construction and camps	Construction Prior to work	Concessionaire
10	Permission for Labour camps	Labour Department of	Labour camps	Construction Prior to work	Concessionaire

SI.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
		Tamil Nadu			
11	NOC for Borrow area	Local Panchayat / Municipality	Borrow area	Construction Prior to work	Concessionaire
12	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981	Tamil Nadu Pollution State Pollution Control Board	For establishing Hot mix plants, Crushers, construction	Operation	Concessionaire
13	Consent to Operate under the Water (Prevention & Control of Pollution) Act, 1974	Tamil Nadu Pollution State Pollution Control Board	through soak	Operation	Concessionaire

3.10 Conclusion

Understanding of the legal provisions and policy framework enables the PIU to consider the statutory requirements for obtaining clearances, consents and permissions prior, during the project and shall promote the PIU team to complete the project on time.

CHAPTER - 4 METHODOLOGY FOR EIA

CHAPTER - 4 METHODOLOGY FOR EIA

4.1 Introduction

The Environmental Management Framework (EMF) available with TNRSP shall be adopted for the proposed project, once the need/justification of a project is finalized based on the engineering parameters (like traffic, economic and financial analysis, screening of the project road) to ascertain the category of Environmental Assessment as the first step.

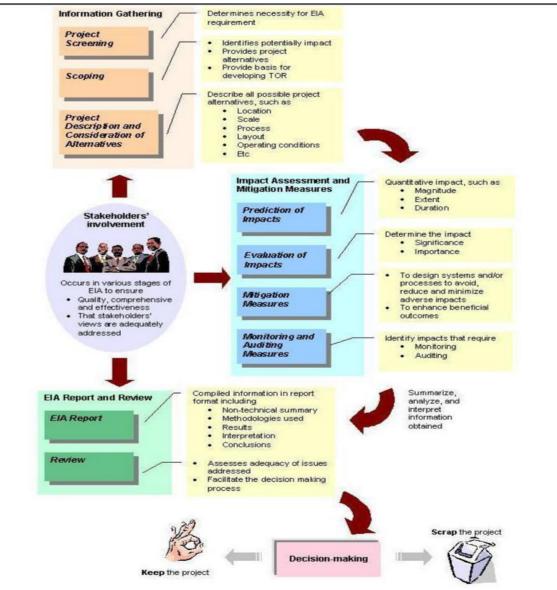


Figure 4. 1 The EIA processes in Sequences of Application

Source: The manual in perspective, EIA Training Resource Manual, United Nations Environment Programme, 2002.

4.2 Methodology for EIA

4.2.1 Screening

Screening is the process by which the appropriate level and type of EA is determined for a given project on the basis of its likely environmental impacts. For identification of sensitive sub-projects with respect to the environmental and social issues, a screening and review process was carried out. This exercise has been useful to identify the environmental and social issues, and integrate them into the project preparation, and not as an exclusion criterion for avoiding environmental and social impacts. The DPR consultant carried out screening exercise for the proposed road in order to determine the subsequent stages of the project prior to initiation of the DPR activities.

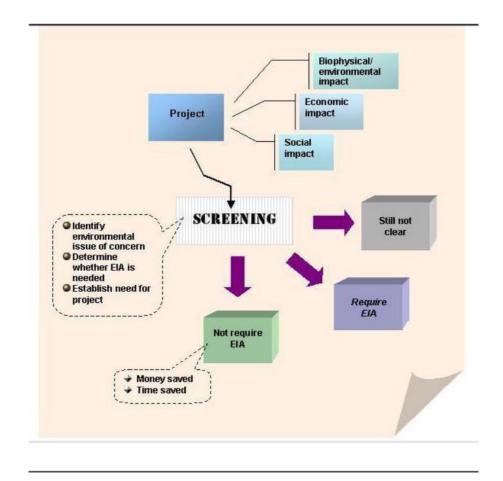


Figure 4. 2 The Project Screening Process

The screening criteria include:

- Environmental factors, including:
 - Sensitive areas, natural habitats, protected areas o Felling of trees outside the protected areas;
 - Clearance of vegetative cover;
 - Loss of productive agricultural land;
 - Cuts across perennial streams or surface water bodies Vulnerability to natural hazards, landslides/slips and
 - Environmental features as marshy areas, sand dunes etc.
- Social factors, including:
 - Land availability
 - Loss of structures o Loss of livelihood
 - Impacts on Indigenous population
 - Impacts on common property resources, and
 - Demand from communities for the road

The methodology for screening includes Desk study, Reconnaissance survey and review based on available literature.

Desk Study:

Involves collection of secondary information and then chalk out the methodology for carrying out EA study and fix responsibilities of EA team members for preparing a complete Environmental Management Plan, EMP addressing all issues.

- Gathered and review the existing environmental data (Secondary Data) relevant to the proposed development, in the form of topo sheets, physical maps, thematic maps showing details of soil type, geology, seismic activity, hydrology etc.
- Collected various environmental and engineering studies conducted earlier in project influence area.

Reconnaissance Survey:

Involves collection of the firsthand information about the project area and develop a perspective of the entire team and revise the methodology and work Programme.

• Verifying the data collected during desk study, assessing the likely impacts, identifying the major/main issues and preparing the methodology for detailed investigation.

Screening Statement:

Involves compiling of the collected primary & secondary data, and checking with the legal framework of State and National level thereby suggesting the requirement/category of Environmental Assessment Required. There are usually three possible outcomes (categories) of a screening process:

a. Environmental Category:

- As per Environmental Impact Assessment Notification 2006, and subsequent amendments, the national and State highways only require clearances whereas the project road is not falling in these categories. Hence Environmental Clearance is not required for the project road.
- For the purpose of this project, a detailed analysis of the locations (as listed in the Table 4-1) where sensitive environmental components are found shall be conducted to ensure that these components are not affected due to the project. In the projects where these environmentally sensitive components exist and are likely to be impacted, the Categorization will be correspond to the Categorization of projects funded by the World Bank. In such cases, a detailed EA in line with the project ToR for EA shall be initiated.

Sl.No.	Sensitive Environmental Component
1	Religious, heritage historic sites and cultural properties
2	Archaeological monuments/sites
3	Scenic areas
4	Hill resorts/Mountains/ Hills
5	Health resorts
6	Biosphere reserves / Wetland / Beel
7	National park and Wildlife sanctuaries and reserves
8	Natural lakes, Swamps Seismic zones tribal Settlements

 Table 4. 1 List of Sensitive Environmental Components

Sl.No.	Sensitive Environmental Component
9	Areas of scientific and geological interests
10	Defense installations, especially those of security importance and sensitive to pollution
11	Border areas (international)
12	Tiger reserves/Elephant reserve/Turtle nestling grounds
13	Habitat for migratory birds
14	Lakes, Reservoirs, Dams
15	Streams/Rivers/Estuary/Seas

4.2.2 Environmental Assessment

The assessment process shall constitute a systematic approach to the evaluation of a project in the context of the natural, regulatory and environment of the area in which development is proposed.

4.2.3 Scoping

The next step in the EA will be to define the proposed project activities and the natural, regulatory (*i.e.* legal) and environment of the area in which development will occur. This shall be achieved through Scoping. Scoping shall identify the activities that have a potential to interact with the environment. Scoping will be conducted early in the EA process so that a focus on the priority issues (i.e. those that have the greatest potential to affect the natural and/or environment) can be established for the rest of the EA process.

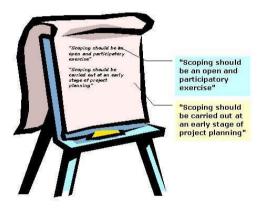
Key elements/inputs to the scoping exercise will be as follows:

- Gathering and reviewing existing environmental data like land width, encroachment, congestion area, bye-pass/ realignment requirement, land use pattern along bypass / realignment, drainage pattern, Major River and waterways, cultural heritage sites and eco sensitive areas.
- Identifying project stakeholders; including PAP, Government and nongovernment agencies (utilities) Forest Department, Irrigation Department, Pollution Control Board, etc.
- Assemble and review relevant legislative requirements, environmental standards and guidelines(national and international) associated with the

proposed development as well as World Bank's operational policies and standards.

- Gathering existing information sources and local knowledge;
- Informing stakeholders of the project and its objectives and get input on the EA;
- Identifying the key environmental concerns (community and scientific) related to a project and the relative importance of issues;
- Defining/preparing the EA work program, including a plan for public and stakeholder involvement;
- Carrying out monitoring of natural environment incl. air, water, soil, noise, etc
- Defining the range of project alternatives to be considered.
- Determining/freezing the spatial and temporal boundaries for the EA studies.

The main focus of Scoping will be pertaining to the collection and analysis of pertinent data and the assessment of significant environmental attributes. The end result will be a work program which is well focused and costeffective. The following issues shall be addressed through Scoping, but will not be limited to.



- To improve the quality of EA information by focusing scientific efforts and EA analysis on truly significant issues;
- To ensure environmental concerns identified and incorporated early in the project planning process, at the same time as cost and design factors are considered;
- To ensure research efforts are not wasted on insignificant issues, rather focused on core issues.
- Reducing the likelihood of overlooking important issues;
- Thinning the chance of prolonged delays and conflicts later in the EA process by engaging stakeholders in a constructive participatory process early in the EA process;
- Establish Terms Of Reference (TOR) for EIA study.

4.2.4 Environmental Impact Assessment

Following Scoping, legislative requirements, engineering, environmental and socioeconomic data shall be assessed in greater detail to ensure that all the proposed activities and their consequences / likely impacts are considered completely.

Primary data/monitoring shall define characteristics of the existing natural environment including soil, water, air, noise, land use, cultural properties and flora & fauna.

In order to identify any potential impact and potential changes to the natural and socioeconomic environments, the existing baseline environmental data are to be collected. Baseline data shall include but not limited to following:

- 1. To provide a description of the status and trends of environmental factors (e.g., air pollutant concentrations) against which predicted changes can be compared and evaluated in terms of importance.
- 2. To provide a means of detecting actual change by monitoring once a project has been initiated.

Monitoring to be carried at critical locations

- Identification of residential, commercial, industrial and forest areas for monitoring
- Air and Noise Monitoring at Junctions, settlements, school and hospitals etc.
- Water Monitoring at river/streams/ponds ground water sources near major settlements.
- Soil Monitoring at major settlements, near surface water bodies.
- Tree inventory to be carried out, in consultation with Forest Department.
- Inventory of Cultural Property Resources shall be done along with measurements, details and photographs; consultation shall be done for gathering public opinion.

Secondary Data to define meteorology, geology, seismicity, quarries, borrow areas, disposal sites etc.

- Details of quarry and borrow areas that are likely to be used shall be collected.
- Meteorological data from IMD, Topo-sheets and maps from Survey of India, geological and soil data from GSoI.

• Social data including ownership pattern, identification of tribal, vulnerable social groups, land estimates etc.

4.2.5 Assessment of Policies and Regulations

Regulatory and administrative framework at the national and state level, applicable World Bank requirements are presented in Chapter 3: Legal Framework.

4.2.6 Impact Prediction

Impact prediction being the most challenging and controversial stage of the EA process it is necessary that it should be dealt with utmost care. Reliable methods available for predicting some environmental parameters, e.g. air quality impacts should be used, whereas other predictions should be based on professional judgement as these shall be qualitative and there are no reliable models existing for quantification of the predicated impacts e.g. impacts arising due to construction activity on flora/ fauna.

4.2.7 Analysis of Alternative

An analysis of various alternative options for the project are to be assessed for varying level of impacts and their addressable shall be part of the EA/ SA. The best fit alternative with respect to the engineering economic, social and environmental aspects are to be considered for implementation. Various alternatives that could be considered are as below:

- With or without the project.
- Analysis criteria to include environmental, social, technical/design and economic options.
- Alignment options within existing RoW
- Alternatives of Bypass
- Other engineering alternatives.

4.2.8 Consultation Process

Stakeholder consultations are an integral part of the project design process. The stakeholders are to be consulted in the initial stage of the project conceptualization. Various stages in the consultation process are outlined as below.

- Identification of stakeholders both primary as well as secondary
- Primary stakeholders include people having direct impact.
- Secondary Stakeholders includes village representatives, women's group, Voluntary organizations NGOs, experts, field level officers and staff, other government officials.



4.2.9 Environmental Impacts Identification

Based on base line data collected along with engineering and social inputs, a comprehensive study shall be undertaken to identify the possible impact on environmental attributes. An EIA document should typically include:

Project Description describing about the existing as well as proposed scenario with a mention on Right of Way (RoW), roadway improvements, cross drainage structures, community facilities, traffic projections etc.

Environmental Regulatory Framework presents the legal and administrative framework of Government of India and Government of Tamil Nadu. This section underlines various clearances applicable for the project corridor at the State / Central level.

Baseline Environmental Status, the existing environmental conditions along the corridor to be ascertained by conducting a reconnaissance survey along with collection of secondary information pertaining to the corridor. Primary data for various environmental parameters has to be generated using suitable monitoring devices. The methodology has to be strictly adhered to the guidelines stipulated by Central Pollution Control Board.

Public Consultation carried out in order to know the reactions of local population and the project affected people (PAP). Meetings held with the stake holders to record their views on the impacts caused and the suggested remedies to be adopted for the proposed project corridor.

Analysis of Alternatives to be presented shall be carried out during feasibility stage, and the approved alternative to be discussed in detail along with environmental attributes under impact.

Environmental Impacts, addressing all the anticipated impacts on the physical and social environment of the corridors, have been identified during environmental screening exercise and environmental assessment carried out for roads under proposed project. The quanta of all the identified anticipated impacts on natural environment and social/cultural environment are presented in form of tables.

The proposed road cross sections are designed keeping in view of the following

- (i) To minimize land acquisition,
- (ii) To minimize the felling of trees for the proposed road,
- (iii) For the provision of economically feasible safety interventions and
- (iv) To minimize the environmental degradation to the surroundings.

4.3 Conclusion

Professional approaches and methodology were adopted and recommended for the EIA exercises and in imparting mitigation measures for the same. The scientific approach enable the project unit to set standards at global level and thereby to implement the project addressing all its major components with great passion and best practices

CHAPTER – 5 ENVIRONMENTAL PROFILE OF THE PROJECT AREA

CHAPTER - 5 ENVIRONMENTAL PROFILE OF THE PROJECT AREA

5.1 Introduction

Baseline environment involves collection of data on the existing status of the environment which helps in identification and assessment of impacts due to the proposed road and during various phases of project cycle.

The environmental baseline includes investigation of physical, chemical, biological and socioeconomic parameters. This section deals with the description of existing environmental setting in the study area. The baseline data has been compiled for:

- Air Environment
- Noise Environment
- Land Environment
- Water Environment
- Ecological Environment
- Socio-Economic Environment

Data on baseline environment component were collected from various sources of government departments, literature and publications, websites etc. The information about the district was collected from district hand book and its official website.

Details regarding the ground water were obtained from the reports of Central Ground Water Board. Baseline environmental monitoring programme for various environmental attributes will be conducted in near future.

Baseline environmental monitoring shall be conducted as per the guidelines of CPCB. Primary data for ambient air quality, ambient noise levels, water quality (ground and surface) and soil quality will be carried out by a NABL accredited laboratory.

5.2 Study Area

To study the baseline environmental profile of the project area, the project impact zone has been classified into two:

- Direct Impact Zone and
- Indirect Impact Zone

- Direct Impact Zone (DIZ): This consists of the RoW and a strip of land within 50 m on either side of the RoW of the proposed alignment. Detailed inventory of environmental features has been carried out in this zone.
- Indirect Impact Zone (IIZ): This consists of a strip of land within 10 Km aerial distance on either side of the proposed RoW.

Project Corridors Identified for Environmental Assessment are listed as follows:

Section 1	Ennore Port to NH-5	Almost the entire alignment passes through vacant lands and hence the environmental issues are minimal.
Section 2	NH-5 to Start of Thiruvallur Bypass	
Section 3	Start of Thiruvallur Bypass to NH-4	
Section 4	NH-4 to NH-45	TNRDC project on going
Section 5	NH-45 to Mahabalipuram	

The proposed road falls within Tiruvallur and Kancheepuram districts in Tamil Nadu.

5.3 Air Environment

5.3.1 Meteorology

Rainfall and Climate – Tiruvallur District

The Annual Normal Rainfall is 1152.8 mm. The average temperature of the district is

- Maximum 7.9°C
- Minimum 18.5°C

Rainfall and Climate- Kanchipuram District

The district has normal weather during winter but very hot in the summer. Rainfall depends mainly on the North East Monsoon. The pre-monsoon rainfall is almost uniform throughout the district. The coastal taluks get more rains rather than the interior regions.

This district is mainly depending on the seasonal rains, the distress conditions prevail in the event of the failure of rains. Northeast and Southwest monsoon are the major donors with 54% and 36% contribution each to the total annual rainfall.

- Normal 1213.3mm
- Maximum 1133.0mm

The months between April and June are generally hot with temperatures going up to an average maximum of 36.6° C. In winter (December - January) the average minimum temperature is 19.8° C.The climate of the district shows a maximum of 36.6° C and a minimum of 19.8° C.

5.4 Land Environment

The land environment primarily consists of physiography, geology, minerals, soils, land use pattern and seismicity. The components of land environment discussed in this section includes,

- Geography and Topography
- Geology
- Seismicity
- Soil Characteristics
- Land Use

5.4.1 Geography and Topography

Geographical location of the Tiruvallur district

Thiruvallur district, a newly formed district bifurcated from the erstwhile Chengalpattu district (on 1st January 1997), is located in the North Eastern part of Tamil Nadu between 12°15' and 13°15' North and 79°15' and 80°20' East. The district is surrounded by Kancheepuram in the South, Vellore in the West, Bay of Bengal in the East and Andhra Pradesh in the North. The district spreads over an area of about 3422 sq.km The district comprises 9 taluks, 14 blocks, 5 municipalities and 10 town panchayats.

Geographical location of the Kancheepuram district

Kanchipuram district is situated on the Northern East Coast of Tamil Nadu and is bounded in the West by Vellore and Thiruvannamalai districts, in the North by Tiruvallur district and Chennai district, in the South by Villuppuram district and in the East by the Bay of Bengal. It lies between 11° 00' to 12° 00' North and 77° 28' to 78° 50' East. The district has a total geographical area of 4,393.37 sq.km and coastline of 57 km Kanchipuram, the temple town is the district headquarters. This district is flat and having small hills in Chengalpattu and Mathuranthagam Taluks

5.4.2 Geology

Geology of Tiruvallur

Geology of Tiruvallur district is characterized by coastal region is mostly flat while certain areas in Tiruttani and Pallipattu taluks are undulated and even hilly.

Geology of Kanchipuram

Geology of Kanchipuram district is characterized by hard rock predominantly charnocites Gneiss with Gondwana formations. These are overlain by laterites and alluvium.

Mineral Resources

Mineral Resources - Tiruvallur district

Minor Minerals

Lime Shell	:	Pulicat Lake, Sunnambukulam, Annamalaicherry	
Silica Sand	:	Elavoor, Eravanoor, Ennore, Gummidipoondi and	
Ponneri Taluks			
Stoneware Clay	:	Adhigathur, Odhapai, Gudapakkam Kandigai	
Major Minerals			
River Sand	:	Kosasthalaiyar, Araniar Kallar, Nandi, Coovum	
Blue Metal	:	Pallipattu and Tiruttani Taluks	
Gravel	:	Ponneri and GummidipoondiTaluks	
Brick Clay	:	Thiruvallur	

Mineral Resources - Kanchipuram district

Granite, stone quarry, Sand quarry, silica sand and clay are the minerals available in Kanchipuram district.

Name of Mineral	Estimated Availability
Silica Sand	. 6,00,000
White Clay	5,00,000
Black Granite	3,75.000
Stone	75,00,000
Sand	45,00,000

Mineral distribution

Source:- Dept. of Mines and geology

Topography

Topography – Tiruvallur district

Apart from seasonal rivers like Kosasthalaiyar, Araniar, Nandi, Kallar, Coovum and Buckhingham Canal there is no perennial river in the district. Since these seasonal rivers are not sufficient, irrigation through tanks, tube wells and open wells are very common.

Topography – Kanchipuram district

River Palar is the main river in the district, which is not perennial. Cheyyar and Vegavathy rivers are tributaries of Palar and join it at Thirumakkudal

5.4.3 Seismicity and Volcanic Activity

Seismicity / Effect due to earthquake has been accounted for by considering the seismic load in longitudinal and transverse direction. For the purpose of determining the seismic forces the country is divided into four zones (Zone II to Zone V) based on the intensity of earthquakes that a particular area may be subjected to, with Zone V comprising of areas which have been subjected to severe earthquakes & Zone-II comprising liable areas least earthquakes to (source: http://www.imd.gov.in/section/seismo/static/seismo-zone.htm). The seismic loads are calculated using Response Spectrum method as per Modified clause of IRC 6: 2010. The seismic force depends upon several factors like zone factor, Period of vibration, Soil type etc. The seismic load in longitudinal and transverse direction is found out separately. As per the seismic zone classification of India, the proposed road project falls within Tiruvallur and Kancheepuram districts and fall in zone III of seismic map (Figure 5.1) and relevant provisions in IRC-6:2010 have been adopted in the design.

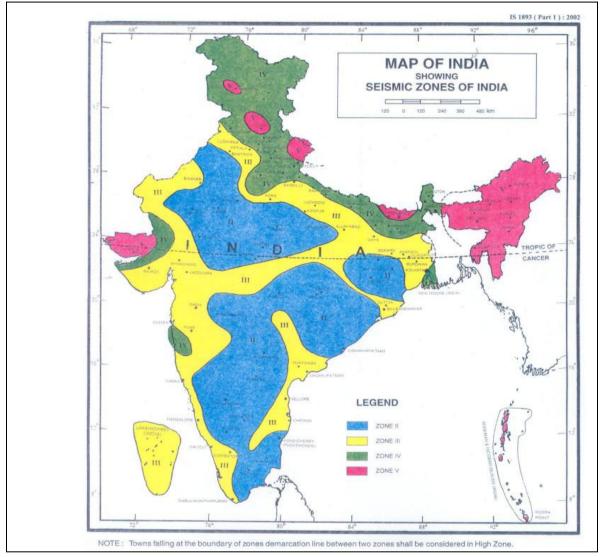


Figure 5. 1 Map showing Seismic Zones of India

5.4.4 Soil Characteristics

The physical and chemical characters of the parent rock, physiography, altitude, climatic condition and plants and animals of the surrounding region influence the process of soil formation. The major soil groups of Tamil Nadu are: Red soils, (62 per cent), Black soils (12 per cent), Laterite soils (3 per cent) and Coastal soils (7 per cent).

Soil Characteristics – Tiruvallur District

The types of soil, predominantly found are red non calcareous and coastal alluvial. The soil found in the coastal region is of the erinaceous type (sandy), suitable for casuarina

plants. The other soil types are sand and sandy loams which are found in all taluks with red loam in part of Tiruthani Taluk. Saline and alkaline soils are also noticed in some patches of Ambathur, Ponneri and Tiruvallur Division.

Type of Soil	Blocks
Red Loam	R.K. Pet, Pallipet, Ambattur & Puzhal
Sandy Coastal Alluviam	Minjur & Gummidipoondi
Red Sandy Soil	Tiruttani & Tiruvalangadu
Sandy Loam and Clay Loam	Kadambathur & Ellapuram
Sandy Loam	Poondi & Poonamallee
Clay Soil	Tiruvalangadu, Gummidipoondi, Minjur &Sholavaram

Soil Characteristics – Kanchipuram District

The soil in Kancheepuram district have been classified into 1) clayey soil, 2) red sandy or red loamy soil 3) Red sandy brown clayey soil and 4) Alluvial soil. Of the above soils brown clayey soil is the most predominant, covering more than 71 percent of the areal extent of Kancheepuram district. Alluvial soils are found on the banks of Palar, Cheyyar and other rivers. The river alluvium is transported and is seen in coastal area of this district. Sandy coastal alluvial (arenacious soil) occurs along the seacoast as a narrow belt.

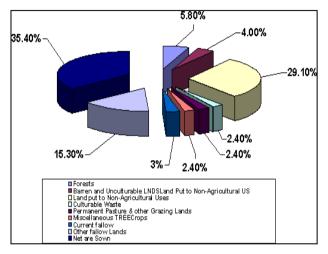
Type of Soil	Places in District
Read Loam	Kancheepuram, Uthiramerur Blocks
Lateritic Soil	Pleatus in the district
Black Soil	Spread in all Blocks
Sandy Coastal Alluviam	Thirukazhukundram, Thiruporur, St. ThomasMount.
Red Sandy Soil	Kancheepuram, Urban Blocks

In order to establish the soil characteristics of the project area, soil samples will be taken and analysed for all important parameters at pre-selected locations.

5.4.5 Land Use

Land Use – Tiruvallur District

The total geographical area of the district is 3,42,243 hectares of which not sown area constitute 35% whereas forest covers 5.8% of the total area.



Land Use – Kanchipuram District

The district has a spread of 4393.37 Sq.Km, out of which 1364.89 Sq.Km was sown area, 1236.28Sq.Km irrigated area and 426.57 Sq.Km contributes forest area. The district shows 1553.47 Sq.km of Poromboke area and 82.57 Sq.Km of Town area.

Category	Area in Sq.Km
Total Area	4393.37 Sq.Kms.
Net Sown Area	1364.89 Sq.Kms.
Net Irrigation Area	1236.28 Sq.Kms.
Forest Area	426.57 Sq.Kms.
Poromboke Area	1553.47 Sq.Kms.
Town Area	82.57 Sq.Kms.

Area Distribution

5.5 CRZ

The section 1 is start at Ennore Port and cross Buckingham Canal which is falling in CRZ. Hence, the starting stretch of Section 1 requires CRZ clearance from competent authority.

5.6 Biological Environment

5.6.1 Flora

Forest resources – Tiruvallur District

Forests occupy 5.8% of the total area. The total extent of Reserved Forests and Reserve lands are 19,791 ha About 1,800 ha of Reserve Lands, notified under section 26 of Tamil Nadu Forest Act is also under active consideration for declaration as Reserve Forest. These Lands are in bits and pieces spread over the district. The total number of blocks is 108. The forest types available in the district are tropical in nature and they fall under dry thorn and dry evergreen types. Much of the natural forests have been converted into man-made forests since the late 1950s. However, chunks of natural forests still exist.

However, chunks of natural forests still exist in Sirukundram R.F, and parts of KatturR.F in Kancheepuram district and Mannur R,F in Tiruvallur district which still support the original vegetation.

Forest resources – Kanchipuram District

The total forest area in the Kanchipuram district is 23,586 ha spread in the interior regions of the district. In this 366.675 ha are Reserved Land. Much of the natural forests have been converted into man-made forests since the late 1950s.

5.6.2 Flora Profile

Rich woody species are found along most of the roadways and shrubs and other types of flora were observed in the study area and are presented as follows:

Name of the Species	Vernacular Name		
Acacia auriculformis	Golden shower		
Albizia lebbek	Vakai		
Annona squamosa	Seethapal		
Areca catechu L	Pakkumara		
Artocarpus integrifolia	Jack		
Azadirachta indica	Veppa maram		
Banhinia purpurea	Mandari		
Butea monosperona	Flame of the forest		
Calotropis gigantea R.Br.	Erukku		
Carica papaya			
Carica papaya L.	Pappalimaram		
Cascabela thevitia	Arali Psidium guajava		
Cassia fistula L.	konrai		
Casuarina equisetifolia Forst.	Cavukkumaram		
Ceiba pentandra L.) Gaertn	. Ilavam		
Citrus limonia Thespenia populnea	Puvarasam		
Cocos nucifera L.	Tennaimaram		
Delonix regia.	Gulmohar		
Emblica officinalis	Indian gooseberry		
Eucalyptus lanceolatus			
F. Religiosu	Arasa Maram		
Ficus benghalensis	Ala maram		
Hibiscus spp.,	Sembaruthi		
Jatropha	Kattamanakku		
Mangifera indica	Mango		
Phoenix sp	Palmyra		
Pithecellobium dulce	Kodukka puli		
Polyathia longifolia	Ashoka		
Pongamia glabra	Poonga		
Punicia granatum	Pomegranate		
Spathodea campanulata	Tulip tree		
Tamarindus indica	Puliya maram		
Cocos nucifera	Thennai		

Table 5. 1 Details of the Species of the Trees

5.6.3 Trees Affected

The details of trees affected along with girth size details are presented in the following table.

Sl. No.	Description	Section 1 - NPAR	Section 1 - CORR- CPR Link Road	Section 2	Section 3	Section 4	Section 5	Total
1	Girth above 300mm & upto 600 mm	124	1	180	897	-	442	1644
2	600 mm to 900mm	273	8	293	816	-	957	2347
3	900 mm to 1800mm	21	1	17	181	-	37	257
4	Girth above 1800 mm	158	1	1	380	-	9	549
	Total	576	11	491	2274	-	1445	4797

Table 5. 2 Details of the Number of Affected Trees





5.6.4 Cropping Pattern

Cropping pattern along the section in Tiruvallur district

Major crops grown are maize, mango plantation, few commercial crops etc., all along the road.

Cropping pattern along the section in Kancheepuram district

Major agricultural activities are coconut plantation, vegetables and few commercial crops like jasmine etc., all along the road. Agricultural fields are irrigated with channels and open wells at private properties.



Mango tree at the new alignment section Agriculture land at project section

Agricultural field along the corriodor

5.6.5 Forest Land

Forest land under Kancheepuram district

In Section 3, the existing road which will be widened, is passing through forest land at Mannur, for a length of around 200m.

Even though some stretches of Section 4 is passing through reserve forest, the required clearance are obtained by TNRIDC for improvement of this section.

The Section 5 is passing through Thirutteri Reserve Forest (RF) for a length of 500m and Sengundram Reserve Forest for a length of 1260m.



Reverse Forest Area

The detailed list of forest stretches in the study area is shown in the following table.

S. No	Forest	Type of Forest	Distance from project road (Aerial)	District
1	Mannur	Reserve	0.2 km	Kancheepuram
2	Thirutteri	Reserve	0.5 km	Kancheepuram
3	Sirukundram	Reserve	1.26 km	Kancheepuram

Table 5. 2-A Detail of Forest Stretches along the project road - Chainage wise

5.6.6 Fauna

The different species of fauna identified in this region are listed below.

Zoological Name Local Name				
Reptiles				
Bangarus caerulus	Krait			
Calotes versicolor	Garden lizard			
Chameleon sps	Pachonthi			
Dryophis sps	Eye plucker			
Enhydrina valakadayan	Water snakes			
Hemidactylus brooki	House lizard			
Naja naja	Cobra			
Tropidonotus sp	Water snake			
Pantherophis obsoletus	Rat Snake			
Varanus	Monitor Lizard			
Birds				
Alcedomeninting	Wood-pecker			
Bulbulcus ibis	Cattle egret			
Columba livia	Pigeon			
Corvus splendens	Crows			
Gyps bengalensis	White backed vultures			
Milvus migrans	Pariah kite			
Neophron percnopterus	White scavenger vulture			
Passer domesticus	Indian house sparrow			
Pelicanus sps	Water bird			
Phoenicopterusroseus	Poomarai			
Psittacula eupatria	Indian parakeet			
Mammals				
Bandicota indica	Larger bandicoot rat			
Funambulus palmarum	Indian palm squirrel			

Table 5. 3 Detail of Fauna found along the project road

Zoological Name	Local Name
Mus cervicolour	Fawn-coloured mouse
Mus musculus	House mouse
Mus platithrix	Indian brown spiny mouse
Orytolagus cuniculus	Rabbit
Pteropus madius	Bat
Sus Scrofa	Pig

5.7 Social Environment

5.7.1 Tiruvallur District demographic profile

Demographic Profile: According to 2011 census, Thiruvallur district had a population of 3,728,104 with a sex-ratio of 987 females for every 1,000 males, much above the national average of 929. A total of 405,669 were under the age of six, constituting 208,449 males and 197,220 females. Scheduled Castes and Scheduled Tribes accounted for 22.04% and 1.27% of the population respectively. The average literacy of the district was 74.88%, compared to the national average of 72.99%. The district had a total of 946,949 households.

Description	2011
Actual Population	37,28,104
Male	18,76,062
Female	18,52,042
Population Growth	35.33%
Area Sq. Km	3,394
Density/km2	1,098
Proportion to Tamil Nadu Population	5.17%
Sex Ratio (Per 1000)	987
Child Sex Ratio (0-6 Age)	946
Average Literacy	84.03
Male Literacy	89.69
Female Literacy	78.32
Total Child Population (0-6 Age)	4,05,669
Literates	27,91,721
Male Literates	14,95,711
Female Literates	12,96,010
Child Proportion (0-6 Age)	10.88%

Work Force: The workforce in the district shows, the rural workers are employed in agriculture and allied activities, the urban workforce is employed in industries. There were a total of 1,538,054 workers, comprising 60,436 cultivators, 173,150 main agricultural labourers, 41,742 in house hold industries, 972,590 other workers, 290,136 marginal workers, 13,008 marginal cultivators, 97,436 marginal agricultural labourers, 16,498 marginal workers in household industries and 163,194 other marginal workers.

Languages: The languages spoken in the district are Tamil, Telugu, Hindi, Malayalam and Urdu. The district is dominated by the Hindus while people belonging to other religions are also present.

Health Facilities: The total district is well equipped with 14 Government Hospitals and 469 private health providers. The entire district is catered through 44 PHCs and 303 sub centers to cover even the remote area.

S. No	Description	Nos
1	Government Hospital	14
2	Private Hospitals	469
3	Primary Health Center	44
4	Health Sub - Centers	303

Education: Since this district is adjacent to the city of Chennai, there are remarkable number of Educational Institutions in the district. Many professional institutions particularly the veterinary university add honour to this district is the field of education. The literacy rate is about 68% of the total population as per 2001 census (provisional).The list of educational Institutions are given below.

Universities		1
Arts a	Arts and Science Colleges	
Colleg	ges for Professional Education	
1	Medicine (Allopathic)	3
2	Engineering and Technology	23
3	Polytechnic	12
Primary Schools		1397
Middle Schools		264
High and Higher Sec. School		602
Teacher's Training Institute		1

5.7.2 Kancheepuram District Demographic Profile

Demography: According to 2011 census, the District had population of 39.90 lakh, which is about 5.53% of the total State population. The total population of the District was 39, 90,897, in which 20, 10,309 were Male & 19, 80,588 were Female. In rural 14, 53,072 & in Urban it was 25, 37,825.

Category	Total
Total Population	39,90,897
Rural Population	14,53,072
Urban Population	25,37,825
Male Population	20,10,309
Female Population	19,80,588

Demograph	y
Demograph	J

Scheduled Caste Population: According to 2011 census, the schedule caste and schedule tribe population shows 2, 31,254 and 10,163 of the population is scheduled tribe.

Scheduled Caste Population

Category	Rural	Urban	Total
Scheduled Caste	1,34,451	96,803	2,31,254
Scheduled Tribe	6,707	3,456	10,163

Density of Population: According to 2011 census, the density of population is 927/ Sq.Km.

Workers Classification: The total main workers of the District was 16,73,814 persons forming 41.9% of total population in the District. Of this, 11,81,308 were male workers & 4,92,506 were Female workers & 6,78,251 were from rural & 9,95,563 were from Urban & 89,343 were of cultivators & 2,72,514 of Agricultural laborers & 54,732 of Household industry and rest in other activities ie 12,57,225. Percentage of workers to the total population is 41.9%.

Growth Rate: The growth rate shows the decadal population growth shows growth rate of 38.69% from 2001 to 2011.

Literacy Rate: The Literacy rate shows that 85% of the population of Kanchipuram is Literate. The details given in following table; Literacy rate is calculated excluding children in the age group of 0-6.

Description	Numbers	Percentage
Literacy	30,13,382	85.29%
Male Literacy	16,11,461	90.34 %
Female Literacy	14,01,921	80.17%

Literacy	Rate
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Education

The district provides education to the entire population through the following channels:

Description	Numbers
Primary School	68
Middle School	300
Secondary & Senior Secondary School	638
Arts and Science College	34
Engineering College	52
Technical University	4

Education Facilities

5.8 Social Impacts

Section	Total Assets Affected	Nos. of Public utilities Affected		
Section 1	76	11		
Section 2	81	4		
Section 3	495	58		
Section 4	TN	RIDC project on going		
Section 5	150	11		
Total	802	84		

5.9 Community Properties

The impact on the common property resources (CPRs) shows that 84 CPRs are likely to be affected. The details of the impact is given below;

S. No.	Description	Nos.
1	Burial Ground	2
2	Bus Stop	11
3	Church	4
4	Govt / Inst. Building	11
5	Pump House	25
6	School	2
7	Temples	17
8	Water Tank	5
9	Well	1
10	OHT	3
	ICDS centre	1
	Tomb	2
	Total	84

 Table 5. 5 Abstract of affected Common Property Resources (CPRs)

Source: Census and Baseline Socio- Economic Survey, June, 2016

The details of the 84 CPRs and sample photos were given below

SI. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
1		Moolathanga l	Tiruvallur	Temple	Temple fully affected	Major		
2		Moolathanga 1	Tiruvallur	ICDS/ School	ICDS /School fully affected	Major		
3		Moolathanga l	Tiruvallur	Tomb	Tomb fully affected	Major	Replacemen t not required	
4		Amoor	Tiruvallur	Temple	Temple fully affected	Major		
5		Amoor	Tiruvallur	Temple	Temple fully affected	Major		
6		Amoor	Tiruvallur	VAO Office	VAO Office fully affected	Major		
7		Amoor	Tiruvallur	Ration shop	Ration shop fully affected	Major		
8		Thatchur	Tiruvallur	Tomb	Tomb fully affected	Major	Replacemen t not required	
9		Panchetty	Tiruvallur	School	School fully affected	Major		
10		Panchetty	Tiruvallur	VAO Office	VAO office fully affected	Major		

Table 5. 6 Details of affected Common Property Resources (CPRs)

SI. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
11		Panchetty	Tiruvallur	Govt Building	Govt Building/ community centre fully affected	Major		
12	L	Section 2	Kelanur	Tiruvallur	Temple	Temple fully affected	Major	Replace
13	L	Section 2	Vishnuvakkam	Tiruvallur	Pump House	Pump house full	Major	Replace
14	L	Section 2	Thangalmedu	Tiruvallur	O.H.Tank	Over Head Tank Full	Major	Replace
15	R	Section 2	Agaram	Uthukottai	Agri. Center	Agri Business Center fully affected	Major	Replace
16	L	Section 3	Erikkarai	Sriperumputhur	Temple	Poorana Shivushasa Deva Sabai	Minor	Replace
17	L	Section 3	Erikkarai	Sriperumputhur	Well	Open well	Major	Replace
18	L	Section 3	Thodukadu	Tiruvvallur	Pump House	Pump house	Major	Replace
19	L	Section 3	Parasangapuram	Tiruvvallur	Bus Stop	Bus stop	Major	Replace
20	L	Section 3	Parasangapuram	Tiruvvallur	Temple	Pillayar Koil	Major	Replace
21	L	Section 3	Sengadu	Sriperamputhur	Water Tank	Overhead tank	Major	replace
22	L	Section 3	Sengadu	Sriperamputhur	Water Tank	Sintex water tank	Major	replace
23	L	Section 3	Sengadu	Sriperamputhur	Temple	Mariamman temple	Major	replace
24	L	Section 3	Gandhi nagar	Sriperamputhur	Bus Stop	Bus Stop fully affected	Major	replace

Sl. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
25	L	Section 3	Gandhi nagar	Sriperamputhur	Bus Stop	Bus Stop fully affected	Major	replace
26	L	Section 3	Gandhi nagar	Sriperamputhur	Pump House	Pump House fully affected	Major	replace
27	L	Section 3	Gandhi nagar	Sriperamputhur	Pump House	Pump House fully affected	Major	replace
28	L	Section 3	Chattiram	Thiruvallur	Pump House	Pump House fully affected	Major	replace
29	L	Section 3	Chattiram	Thiruvallur	Pump House	Pump House fully affected	Major	replace
30	L	Section 3	Chattiram	Thiruvallur	Temple	Nagammal temple	Major	replace
31	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Dharma Sasdha Iyappan temple	Major	replace
32	L	Section 3	Chattiram	Thiruvallur	Water tank	Sintex tank with bore fully affected	Major	replace
33	L	Section 3	Chattiram	Thiruvallur	Bus Stop	Bus Stop fully affected	Major	replace
34	L	Section 3	Chattiram	Thiruvallur	Bus Stop	Bus Stop fully affected	Major	replace
35	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Selva Vinayager & Sri Durgai temple	Major	replace
36	L	Section 3	Athikulam	Thiruvallur	Pump House	Pump House fully affected	Major	replace
37	L	Section 3	Athikulam	Thiruvallur	Water Tank	Sintex tank with bore fully affected	Major	replace
38	L	Section 3	Thanneerkulam	Tiruvallur	Burial ground	Common Burial ground	Major	

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Sl. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
39	L	Section 3	Thanneerkulam	Thiruvallur	Pump House	Pump house with bore	Major	replace
40	L	Section 3	Thanneerkulam	Thiruvallur	O.H.Tank	Over Head Tank	Major	replace
41	L	Section 3	Athikulam	Thiruvallur	Burial Ground	Burial ground fully affected	Major	replace
42	R	Section 3	Sriperumpudur	Sriperumpudur	Pump House	Pump house	Major	Replace
43	R	Section 3	Sriperumpudur	Sriperumpudur	Govt Building	Ration shop	Major	Replace
44	R	Section 3	Sriperumpudur	Sriperumpudur	Church	Church	Major	Replace
45	R	Section 3	Sriperumpudur	Sriperumpudur	Others	Security room College building	Major	Replace
46	R	Section 3	Thodukadu	Tiruvallur	Temple	Sei Ponniammman Temple,Pond,	Major	Replace
47	R	Section 3	Parangasupuram	Tiruvallur	Temple	Ponniamman temple	Major	Replace
48	R	Section 3	Parangasupuram	Tiruvallur	Church	Church fully affected, Compound wall	Major	Replace
49	R	Section 3	Parangasupuram	Tiruvallur	Church	Church Toilet	Major	Replace
50	R	Section 3	Parangasupuram	Tiruvallur	Pump House	Pump house	Major	Replace
51	R	Section 3	Parangasupuram	Tiruvallur	Pump House	Pump House full affected	Major	Replace
52	R	Section 3	Parangasupuram	Tiruvallur	Pump House	Pump House full affected	Major	Replace
53	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace

Sl. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
54	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
55	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
56	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
57	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
58	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
59	R	Section 3	Kattukuttu road	Sriperumpudur	Temple	Sri Bakthra kali amman koil	Major	Replace
60	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
61	R	Section 3	Kattukuttu road	Sriperumpudur	Bus Stop	Bus Stand full Affected	Major	Replace
62	R	Section 3	Kattukuttu road	Sriperumpudur	Water Tank	Water Tank Fully affected	Major	Replace
63	R	Section 3	Mannur	Sriperumpudur	Electric Room	Electric Room full	Major	Replace
64	R	Section 3	Mannur	Sriperumpudur	Pump House	Pump house	Major	Replace
65	R	Section 3	Sengadu	Sriperumpudur	Bus Stop	Bus Stop fully affected	Major	Replace
66	R	Section 3	Chathram	Thiruvallur	Govt primary school	Class Rooms, Library, Toilet, Kitchen,	Major	Replace
67	R	Section 3	Polivakkam	Thiruvallur	Bus Stop	Bus stop fully affected	Major	Replace
68	R	Section 3	Polivakkam	Thiruvallur	Temple	Nagamman temple	Major	Replace

SI. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
69	R	Section 3	Polivakkam	Thiruvallur	Pump House	pumb house	Major	Replace
70	R	Section 3	Aathikulam	Thiruvallur	Bus Stop	Bus Stand full Affected	Major	Replace
71	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
72	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
73	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
74	L	Section 5	Pooncheri Juction	Tirukalukundra m	TNRDC Shed	TNRDC Ambulance shed	Major	Replace
75	L	Section 5	Pooncheri Juction	Tirukalukundra m	Toll Plaza	TNRDC Tool Plaza	Major	Replace
76	L	Section 5	Ambal Nagar	Tirukalukundra m	Bus Stop	Ambal Nagar Bus stop	Major	Replace
77	L	Section 5	Ambal Nagar	Tirukalukundra m	Temple	Temple at present not in use	Major	No
78	L	Section 5	Ambal Nagar	Tirukalukundra m	Temple	Temple at present not in use	Major	No
79	L	Section 5	Perumal Eri	Tirukalukundra m	Training center	Sri M V Arunachalam Technology	Minor	Replace
80	L	Section 5	Melakannagapatt u	Tirukalukundra m	Bus Stop	Bus Stop - Melakannagapattu	Major	Replace

Sl. No.	R/L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remark s
81	L	Section 5	Melakannagapatt u	Tirukalukundra m	Church	Prayer Hall Tiru sabai	Major	Replace
82	R	Section 5	Ambal Nagar	Tirukalukundra m	Temple	Nagathamman temple	Major	Replace
83	R	Section 5	Karanai	Tirukalukundra m	Pump House	Pump House, Karanai Village	Major	Replace
84	R	Section 5	Melakannagapatt u	Tirukalukundra m	O.H.Tank	Over Head Tank	Major	Replace

Source: Census and Baseline Socio- Economic Survey, June, 2016

Section 1 1 38 Temple – Amoor Tomb – Moolathangal Temple – Moolathangal **Govt Building Panchetty** Govt Building Panchetty(VAO Office) **Temple under construction – Amoor**

Common Property Resources – Photo Gallery









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Church (Melakanagapattu)

TNRDC Toll Plaza (Pooncheri Junction)



Over Head Tank (Melakanagapattu)

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5.10 Public Consultation Meeting

Thus, after the submission of the Screening Report, a public consultation was conducted to disseminate the course of the study. This will allow the study team to incorporate the suggestions made in the project and continue with the drafting of the project. The dissemination process consisted in holding several meetings with the public, where the proposals of the project were presented as well as the impacts by the study team. As per the ToR, the consultation meetings addressed to local public were conducted on 21st to 31st July 2014 at 5 locations. The number of meeting points, outcomes and affected PAHs perceptions were captured and detailed in coming chapter's related to public consultation. (Detailed report on Public consultation is detailed Chapter -10). In addition, as per the requirements of JICA, two rounds of Public consultation meetings were conducted for Section 1 of CPR during April and May 2018.

5.11 Conclusion

Understanding of the environmental profile and status of the project corridor enable the PIU / implementing agencies to ascertain the standards to be provided and baseline for monitoring progress.

CHAPTER – 6 ENVIRONMENTAL IMPACTS AND MITIGATION ENHANCEMENT

CHAPTER - 6

ENVIRONMENTAL IMPACTS AND MITIGATION ENHANCEMENT

6.1 Introduction

Baseline environment involves collection of data on the existing status of the environment which helps in identification and assessment of impacts due to the proposed road and during various phases of project cycle. The environmental likely impacts on various environmental components due to the road project have been identified, assessed and presented in this chapter.

This chapter assesses the nature, type and magnitude of the potential impacts likely on the various relevant physical, biological and cultural components along the project corridor. The assessment of impacts as discussed in Chapter -5 is based on the information from primary and secondary data collection, previous EA document and supplemented by field surveys collected for the purpose.

Direct and Indirect Impacts

The environmental impacts could be direct as well as indirect. The direct area of influence includes the Corridor of Impact and the construction sites for the project. The indirect area of influence includes areas with potential indirect impacts, for example areas impacted from sediment-loaded runoff or areas impacted due to location of labour camps. The impacts on various environmental components can occur at any of the following stages of the project planning and implementation:

- (i) Planning and design stage;
- (ii) Construction stage; and
- (iii) Operation stage.

The description and magnitude of impacts for the various environmental components of the project are presented in the following sections. Major factors influencing the environmental factors are:

- Settlement Pattern
- Topography / terrain
- Land use pattern agricultural, built-up (residential, commercial, industrial) etc.
- Other physical features

Tables given below presents the general environmental impacts expected due to the proposed road. Impacts have been assessed based on the information collected from the screening & scoping of environmental attributes. The quanta of all the impacts on Natural Environment are discussed in details in subsequent paragraphs.

6.2 Baseline Environmental Status

Data on baseline environment component were collected from various sources of government departments, literature and publications, websites etc. The information about the district was collected from district hand book and its official website. Details regarding the ground water were obtained from the reports of Central Ground Water Board. Baseline environmental monitoring programme for various environmental attributes will be conducted on the receipt of suitable sample locations given by MoEF for environmental assessment clearance.

Baseline environmental monitoring shall be conducted as per the guidelines of CPCB. Primary data for ambient air quality, ambient noise levels, water quality (ground and surface) and soil quality shall be generated by a NABL accredited laboratory.

The samples shall be collected on an average of once in 7 to 8 Kms. The proposed sample locations were listed below.

Sl. No.	Project Corridor	No of Sample Locations	Proposed Sample Location	
	Section 1. Engage Dout to		1. Kattupalli	
1	Section 1: Ennore Port to NH-5	3	2. Vellampakkam	
	111-5		3. Vannipakkam	
			1. Thatchur	
2	Section 2: NH-5 to Start of Thiruvallur Bypass	3	2. Thamaraipakkam	
	Tilluvalul Dypass		3. Tiruvallur	
			1. Tiruvallur	
3	Section 3: Start of	4	2. Palavakkam	
3	Thiruvallur Bypass to NH-4	4	3. Thozhur	
			4. Sriperumpudur	
			1. Singamperumalkoil	
4	Section 5:NH-45 to Mahabalipuram	3	2. Viralpakkam	
	wanabanputani		3. Poonjeri	

 Table 6.1 Proposed Sample Location for Baseline Monitoring

Meanwhile the EIA team gathered baseline data for the project corridors through various ongoing DPR projects adjacent to the project corridors. The details thereof is presented in subsequent sections.

Sl.	Project	Nearby Location	Source of Information	Status of Baseline
No.	Section			Indicators
1	Section 1	Manali / Ennore	Preparation of DPR for	Baseline Monitors such
			Integrated ROB for Level	as Air, Water, Noise
			Crossing 2A and 2B for	and Soil were within
			Ennore High Road for	Significant limits.
			GCC	
2	Section 1 & 2	Thatchur	Preparation of DPR for the	Baseline Monitors such
			proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
3	Section 2	Thamaraipakkam	Preparation of DPR for the	Baseline Monitors such
			proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai for	and Soil were within
			TNHD.	Significant limits.
4	Section 3	Tiruvallur	Preparation of DPR for the	Baseline Monitors such
			proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
5	Section 3	Sriperumpudur	Preparation of DPR for the	Baseline Monitors such
			proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
6	Section 4	Sriperumpudur	Preparation of DPR for the	Baseline Monitors such
			proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
7	Section 4	Singamperumal	Preparation of DPR for the	Baseline Monitors such
		Koil	proposed 27 Grid Roads	as Air, Water, Noise
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
8	Section 5	Singamperumal	Preparation of DPR for the	Baseline Monitors such
		Koil	proposed 27 Grid Roads	as Air, Water, Noise

Table 6.2 Status of Baseline Environment from Secondary Sources

Sl.	Project	Nearby Location	Source of Information	Status of Baseline
No.	Section			Indicators
			connecting Chennai ORR	and Soil were within
			for TNHD.	Significant limits.
9	Section 5	Poonjeri	Preparation of DPR for the	Baseline Monitors such
			proposed corridor along Old	as Air, Water, Noise
			Mahabalipuram Road –	and Soil were within
			Phase II – Siruseri to	Significant limits.
			Mahabalipuram for	
			TNRDC.	

Project Activity	Planning and Design Phase	Pre-constr	ruction Phase	Construction Phase			Road Operation	Indirect effects of operation or Induced development		
Env. component Affected	Land acquisition	Removal of Structures	Removal of trees and vegetation	Earth works, including quarrying	Laying of pavement	Vehicle & Machine operation & maintenance	Asphalt & crusher plants	Sanitation & Waste (labour campus)	Vehicle operation	
Air	-	Dust generation during dis- mantling	Reduced buffering of air and noise pollution, Hotter, drier microclimate	Dust generation	Asphalt odour	Noise, dust, pollution	Noise, odour, dust, pollution	Odour / smoke	Noise, dust, pollution	other pollution
Land	Loss of productive Land	Generation of debris	Erosion and loss of top soil	Erosion and loss of top soil	-	Contamination by fuel and lubricants Compaction	Contamination Compaction of soil	Contamination from wastes	Spill from accidents	Change in land use pattern
Water	Loss of water sources	Siltation due to lose earth	Siltation due to lose earth	Drainage alteration Break in continuity of ditches, Siltation,	Reduction of ground water re- charge area	Contamination by fuel and lubricants	Contamination by asphalt leakage or fuel	Contamination from wastes Overuse	Spill Contamination by fuel, lubricants and washing of vehicles	Increased contamination of ground water

Table 6.3 General Impacts on Natural Environment

Project Activity	Planning and Design Phase	Pre-constr	uction Phase		Construction Phase			Road Operation	Indirect effects of operation or Induced development	
				Stagnant water pools in quarries.						
Noise	-	Noise Pollution	Noise Pollution due to machinery	Noise Pollution		Noise pollution	Noise Pollution	-	Noise Pollution	Noise pollution
Flora	-	Loss of Biomass		Lowered productivity Loss of ground for vegetation	-	Removal of vegetation	Lower productivity Use as fuel wood	Felling trees for fuel	ImpactofpollutiononvegetationLoweredproductivityToxicityofvegetation.	-
Fauna			Disturbance Habitat loss	Disturbance		Disturbance	Disturbance	Poaching	Collision with traffic	Distorted habitat

										Op	eration
Project Activity	Planning and Design Phase	Pre-	Construction P	hase		Construction Phase					Indirect Induced development
Env. Component Affected	Design decisions & Implementation policies	Land acquisition	Removal of Structures	Removal of trees & vegetation	Earth works, including quarrying	Laying of pavement	Vehicle & machine operation & maintenance	Asphalt and crusher plants	Labour Camps	Vehicle operation	-
Agricultural land	-	Change in land prices	Loss of land economic value	Loss of standing crops	Loss of productive land	-	-	Dust on agricultural land reduce n productivity	-	-	Conversion of Agricultural Land
Buildings and built structures	-	-	Loss of structures, Debris generation, Noise and Air pollution	-	Noise, vibration may cause dam-age to structures	-	Noise, vibration may cause dam-age to structures	Dust accumulation on building and structure	-	Vibration and noise	Change in building use and characteristics
People and Community	Anxiety and fear among community	-	Displacement of people Psychological impact on people loss of livelihood	Loss of shade & community trees, Loss of fuel wood and	Noise and Air pollution	Odour and dust	Noise and Air pollution, Collision with pedestrians	Air and noise pollution and discomfort	Community clashes with migrant labour	Noise pollution, Risk of accident	Induced pollution

Table 6.4: General Impact on Social and Cultural Environment

										Operation	
Project Activity	Planning and Design Phase	Pre-	Construction P	hase		Construction Phase					Indirect Induced development
				fodder, Loss of			livestock and vehicles				
				income							
Cultural	-	-	Displacement	Loss of	Noise,	-	Damage	Dust	-	Damage	-
Assets			loss of	sacred	vibration		from	accumulation		from	
			structure	trees.	may cause		vibration &			vibration	
			from RoW		dam-age		air pollution			& air	
					to					pollution	
					structure						
Utilities	-	-	Interruption	-	-	-	Damage to	Dust	Pressure on		-
and			in supply				utility and	accumulation	existing		
Amenities							amenities	on water	amenities		
								bodies			

6.3 Air Environment

6.3.1 Meteorology

The various stages of the proposed road project such as planning, construction or operation do not involve major or long term impacts on the macro climate and meteorology of the area. This may be due to the construction of road. However, temporary changes during the project operation would mostly be attributed to micro climatic changes due to addition of hard surfaces and related induced development. This would contribute to marginal rise in temperatures in the vicinity of the project corridor and is a permanent impact but it is localized. The project will have a comprehensive plantation programme and avenue plantation. This could provide shade and canopy to larger areas. This could reverse if any minor or negligible impacts do exists due to the proposed road corridor.

6.3.2 Ambient Air Quality

The ambient air quality of the project influence area will be affected during preconstruction, construction and operation phases. Pre-Construction and construction phase impacts will be intermittent in nature and will change from location to location as construction progress continues.

Preconstruction Phase

The preconstruction stage activities include site clearance, shifting of utilities, removal of trees present in the corridor of impact (CoI), transportation of man and material, construction of accommodations, construction of stock yards, installation of construction plants, and construction of office buildings. Dust generating activities would be predominant during pre-construction stage particularly if preconstruction tasks are performed during dry weather.

The impacts due to the preconstruction are temporary and localized and the corridor of impact is limited. Quantification of impacts at the preconstruction stage is very difficult as these are very temporary and localized.

Construction Phase

Vehicular emissions are one of the major sources of impact on air quality during the construction phase of the project.

Impact on air quality during the construction phase of the project will be considerable as the phase involves number of activities, but the possible impacts will be short term only. However, provision of adequate air pollution control equipment, like dust filters and measures like dust suppression by water sprinkling and planting of green belt may further help to significantly reduce the impact.

Emission of CO_2 and NOx due to the combustion of diesel will be a principal cause of air pollution during the construction phase. However being a short duration, the impact will be less.

Various construction activities would result in increase of SPM levels during construction phase. But it has been observed that the air quality in the region found to be well within the ambient air quality standards. However the operation of the construction machineries will be planned in such a manner to make least numbers working at the same time to ensure the background SPM levels.

But the project will have beneficial impact on air quality of the region during its operation phase as the proposed project is to provide road corridor which will ensure smooth and fast traffic flow.

The road stretch pass through various sensitive receptors places like schools, hospitals and religious places as listed in the sensitive receptors section. These will be the potential receptors of air pollution during the operational phase of the project.

6.4 Noise environment

The major sources of noise pollution during the construction phase of the project would be the piling activities, vehicular movement and mixing, casting and material movement.

These activities will last for the entire construction period. Construction activities are expected to produce noise levels in the range of 80 - 95 dB (A).

The high noise levels arising from these activities can affect the personnel operating the machines. Use of proper Personal Protective Equipment (PPE) such as earmuffs will mitigate any adverse impact of the noise generated by such activities/machineries.

The activities such as excavation, loading and transportation of material would generate noise in the range of 90 to 105 dB (A) and this can occur only when all the equipment

operate together and simultaneously. This is however, is a remote possibility. The workers in general are likely to be exposed to an equivalent noise level of 80 to 90 dB (A) in an 8-hour shift, for which all statutory precautions should be taken into consideration. However, careful planning of machinery selection, operations and scheduling of operations can reduce these levels.

The operation of the proposed project would result in uninterrupted movement of heavy and light vehicles at high speeds and this may cause increase in ambient noise levels along the project corridor. It may have negative environmental impact on the sensitive receptors close to the project road.

6.5 Impact on Water Environment

Due to the proposed project, there will be some direct and indirect long-term impacts on the water resources. Table below presents the major adverse impacts on the water resources and the indicators chosen to assess the impacts for the study.

Impacts Due To Construction	Indicators
Alteration of drainage, run off, flooding	No. of cross drainage channels
Depletion of Ground Water recharge	Area rendered impervious
Use of Water Supply for Construction	Quantum of water used
Contamination from fuel and lubricants	Nature and quantum of contaminators
Contamination from improper sanitation and Waste Disposal in Construction Camps	Area of camp / disposal site and, proximity to water bodies / channels

Table 6.5 Impacts on Water Resources Due to Construction Activities

6.5.1 Impact on Surface Water Resources

During the construction phase of the project, some impacts are anticipated on the water quality of the water bodies located along the corridor. During the construction, stockpiles pollute the nearby water bodies. The impact will be direct, low significance, site-specific to local and short term in nature.

Disposal of other construction debris and soil erosion from the embankments may contaminate the nearby water bodies. Spillage of petroleum and other hazardous materials used during construction may pollute the nearby water bodies. Lack of adequate sanitary facilities, drainage and appropriate refuse collection and disposal system in the camps of the construction workers during construction may pollute the nearby water bodies.

SI. No.	Water Body Name	Village Name	Chainage	Section	Remarks
Cross	ing of Lake and Pond			I	•
1	Kannigaiper Lake	Kannigaiper	27+600	II	Nearest one
2	Poorivakkam Lake	Poorivkkam	29+800	II	Nearest one
3	Athangi Kavanoor Canal	Athangi Kavanoor	30+800	II	Crossing the road
4	Pagalmedu Lake	Pagalmedu	32+400	II	Nearest one
5	Velliyur Lake	Velliyur	40+900	II	Nearest one
6	Vishnuwakkam canal	Vishnuwakkam	44+100	II	Crossing the road
7	Kelanur Pond	Kelanur	45+000	II	Crossing the road
8	Kelanur Canal	Kelanur	45+000	II	Crossing the road
9	Melanur Canal	Melanur	46+500	II	Crossing the road
10	Kelanur Lake	Kelanur	46+800	II	Crossing the road
11	Kalayanakuppam Lake	Kalyanakuppam	50+900	III	Crossing the road
12	Thanneerkulam Lake	Thaneerkulam	53+700	III	Crossing the road
13	Thanneerkulam Pond	Thanneerkulam	54+600	III	Crossing the road
14	Thozhvur Lake	Thozhuvur	55+600	III	Nearest one
15	Puttulur Pond	Puttlur	56+000	III	Nearest one
16	Puttlur Lake	Puttlur	57+000	III	Nearest one
17	Vengathur Lake	Vengathur	58+300	III	Nearest one
18	Aranvoyal Lake	Aranvoyal	58+300	III	Nearest one
19	Athikulam Lake	Athikulam	63+000	III	Crossing the road
20	Chattram canal	Chattram	65+100	III	Crossing the road
21	Parangusapuram Lake	Parangusapuram	70+600	III	Crossing the road
22	Panithangal Lake	Panithangal	71+600	III	Nearest one
23	Thodukadu Lake	Thodukadu	72+200	III	Crossing the road
24	Thodukadu Pond	Thodukadu	72+100	III	Crossing the road

Table 6.6 Showing water bodies along the Proposed Road Corridor

STUP Consultants Pvt. Ltd

Sl. No.	Water Body Name	Village Name	Chainage	Section	Remarks
25	Sriperumputhur Canal	Sriperumputhur	75+000	III	Crossing the road
26	Sripeumputhur Lake	Sriperumputhur	76+800	III	Crossing the road
27	Poonjeri Lake	Poonjeri	129/166	V	Nearest one
28	Mammalla Lake	Poonjeri	129/166	V	Nearest one
29	Perumal Eri	Perumal Eri	127/800	V	Nearest one
30	Manampathy Lake	Manampathy		V	Nearest one
31	Sirukundram Lake	Sirukundram		V	Crossing the one
32	Senkundram Lake	Senkundram	23/100	V	Crossing the one
33	Dasarikuppam Lake	Dasarikuppam	20/300	V	Crossing the one
34	Hanumanthapuram Pond	Hanumanthapuram		V	Nearest one
Cross	ing of River		I	L	1
1	Buckingham Canal	Kattupalli	0+800	Ι	
2	Kosathalaiyar river	Tamaraipakkam	36+900	II	
3	Krishna River (Canal)	Thanneerkulam	53+700	II	
4	Coovum River	Puttlur	57+800	III	
5	Coovum River(Canal)	Janappachatram	74+000	III	
6	Kunnappattu River	Kunnappattu		V	Nearest one







TNHD









6.5.2 Impact on Ground Water Resources

The impacts due to the construction phase of the project will be over exploitation of the ground water. A number of groundwater sources such as open wells, bore wells and hand pumps are located along the proposed project route. The proposed road will not affect any of the ground water sources. Therefore, eventual impact of the proposed project may only be marginal.

Water requirements for the project will be sourced from surface water bodies. In these water bodies, pumping will be allowed only from the surface without boring of any tube wells within surface water bodies. In the absence of availability of surface water for construction, ground water will be used after obtaining the necessary clearances from the Ground water department. The extraction will not be permitted within the grey, dark and over-exploited blocks.

6.5.3 Impact on Surface Water Quality

No permanent impact is anticipated on water quality due to the highway project. Construction activities will temporarily deteriorate surface water quality near the alignment in terms of its turbidity.

Increase in Run off

The proposed construction of road will result in increased surface run off. The addition of concrete surface, which essentially increase paved impervious surface, will cause increased surface runoff along the roadsides. Increase in surface run-off is due to the creation of impervious surfaces that prevent the flow of water into the ground.

Impacts due to surface runoff include increased soil erosion and local flooding or water logging. However, as the proposed project has been designed with drains to take care of runoff, surface runoff shall be drained to the nearest cross drainage structure. The engineering design includes design of cross drainage structures, which shall take care of the increased runoff.

6.6 Impact on Soil

6.6.1 Loss of Land

One of the major local impacts due to highway project is upon the local land resources required for the proposed road project. Land acquisition for the project is to extent

possible is minimized as it is constructed over the agriculture land. While loss of productive land is the most direct negative impact, other significant indirect negative impacts can also occur.

6.6.2 Soil Erosion

Erosion of top-soil can be considered a moderate, direct and long-term negative impact resulting from the construction of roads. The potential for soil erosion is high and pervasive during the construction stage. Starting with clearing and grubbing of trees vegetation is stripped away, exposing raw soil. The construction of new fill slopes for grading and bridge-end fills also exposes large areas to erosion, if protection methods are not implemented. Finally, during the operation or maintenance phase of highway development, erosion can continue to occur in areas not vegetated. Fills are exposed to long-term exposure to water and wind. Although soil erosion occurs sporadically on highway corridors, the sites most affected are generally bridge end fills and over-steep banks. As this project is on the plain terrain, no soil erosion is anticipated.

a) Road slopes and spoils

Erosion problems may occur on newly constructed slopes and fills depending on soil type, angle of slope, height of slope and climatic factors like wind (direction, speed and frequency) and rain (intensity and duration). Since slope protection methods (re-vegetation or stone pitching) form part of good engineering practice, and have been incorporated into the detailed design for the roads, erosion concerns should be minimized. However, failure to maintain soil erosion protection can reduce the security of high road embankments and add siltation to the rivers during the monsoon season.

b) Improvement and construction of bridges and culverts

Construction of road corridor involves excavation of river bed and banks for the construction of the foundation and piers at crossing locations. If the residual spoil is not properly disposed of, increased sedimentation downstream of the bridge may take place during the monsoon. Also, the bridge-end fills require armoring to ensure gullying and slumping are minimized.

c) Quarries and borrow areas

The excavation of quarries and borrow pits used for obtaining soil and aggregate materials for road construction can cause direct, and indirect long-term major adverse impacts on the environment. While loss of productive soil is the most direct negative impact, other significant indirect negative impacts can also occur.

Since most of the construction materials would be available from existing quarries nearby, relatively few new borrow areas will be required.

One of the long-term residual adverse impacts of borrow pits not reclaimed is the spread of malaria. Mosquitoes breeding and multiplying in stagnant water that collects in these pits can affect humans in villages and towns close to the features.

6.7 Soil Contamination

Construction Phase

Soil contamination would take place to a small extent due to spillage of construction material, oil, fuel, grease and asphalt around the construction yards. Especially at vehicle & DG sets fueling areas, where soil contamination occurs predominantly. Dumping of scarified materials to the adjacent agricultural land may lead to contamination of top soil.

Operational Phase

During the operation stage, soil may get contaminated with similar reasons, as mentioned above, during routine and periodical maintenance of the project road. The implications of accidental discharge are potentially disastrous. But, it must be emphasized that the probability of such an accident is quite low, as one of the objectives of the design is the enhancement of road safety.

6.8 Geology

As the proposed road passes through flat plain terrain, no significant impact on geology is anticipated from activities involved in construction of proposed road. However, road construction from activities will require supply of road building materials, which should be collected from approved quarry sites. Likely impact on the geology is due to the uncontrolled blasting in the quarries supplying aggregates for construction at these sites. As these quarries are licensed, the prevalent rules on blasting will be adhered to. Hence, the impact on general geology of the region is insignificant. At the construction sites, no blasting is envisaged.

6.9 Seismology

The project corridor traverses through Seismic Zone II as defined by the vulnerability zoning system, i.e., Low Damage Risk Zone (i.e. areas with a probable seismic intensity of VI on the Modified Mercalli Intensity Scale). Thus the project does not have any significant impact on the seismic stability of the area.

6.10 Biological Environment

6.10.1 Loss of Trees

It is estimated to be a total of 4797 Nos. of trees are falling within project corridor in which 2168 trees are retained and 2629 trees will be transplanted.

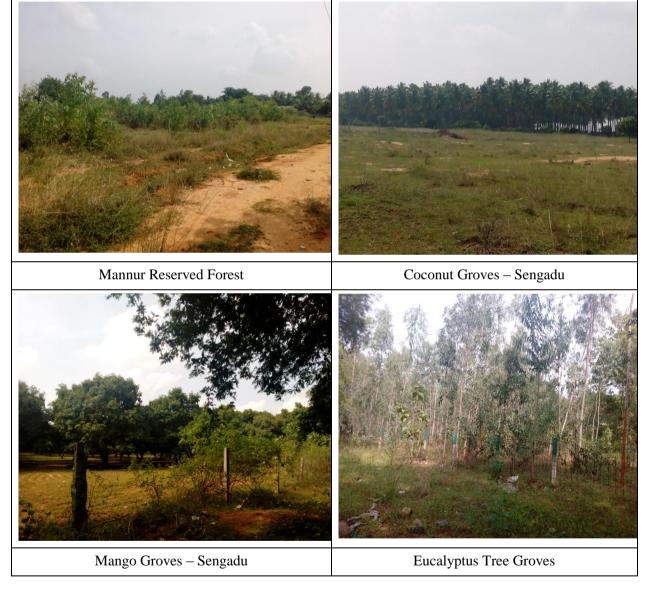
		Original	ly Affecto	ed Trees		Retained Trees (by accommodate within non-motor- able areas and by modifying the road proposal)					Transplanted
CPR Section	Girth: 300 to 600 mm	Girth: 600 to 900 mm	Girth: 900 to 1800 mm	Girth: above 1800 mm	Total	Girth: 300 to 600 mm	Girth: 600 to 900 mm	Girth: 900 to 1800 mm	Girth: above 1800 mm	Total	Trees
	1	2	3	4	5	6	7	8	9	10	(5-10)
Ι	125	281	22	159	587	64	125	12	49	250	337
II	180	293	17	1	491	34	56	0	1	91	400
III	897	816	181	380	2274	696	571	107	208	1582	692
IV	Sripermbudur on NH 4 to Singaperumalkoil on NH-45 (23.80 km) already laid by TNRIDC - This road will be as such used n the Peripheral road. No tree cutting is involved in this section.										
V	442	957	37	9	1445	55	187	3	0	245	1200
Total	1644	2347	257	549	4797	849	939	122	258	2168	2629

6.10.2 Forest Area

The proposed construction of proposed road is passing through three reserve forests and involves forest land bound to get forest clearances.

SI. No	Forest	Type of Forest	Length (km)	District
1	Mannur	Reserve	0.2 km	Kancheepuram
2	Thirutteri	Reserve	0.5 km	Kancheepuram
3	Sirukundram	Reserve	1.26 km	Kancheepuram

Table 6.7 Forest Area covered under the proposed project	Table 6.7 Forest	Area covered	l under the pr	oposed project
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6.10.3 Wild Life

No wild life crossing is found along the project corridor. Though the proposed road is not located within 10 km radius of ecological sensitive area, recommendation from NBWL is not mandatory as the project does not require environmental clearance under EIA notification and it is located away from the ecological sensitive area.

6.11 Social Environment

Impact of the proposed project on the socio-economic environment is expected to be overwhelmingly beneficial and is also one of the major objectives of undertaking these project initiatives. However, there are certain negative impacts on the socio-economic situation of the project area each of which are discussed in detail in the following sections.

6.12 Loss of Utilities and Amenities

Site clearances involves removal of various assets, utilities and amenities that are,

- Natural (trees, bushes, and grass lands), and
- Physical structures (public or private assets and utilities)
- Relocation of service utilities

For people dependent on the above, this constitutes economic loss for some time before these are restored to their previous status.

Sl. No.	Description	Section 1	Section 2	Section 3	Section 5	Total
1	Telephone poles	3	1	29	28	61
2	Low Tension Electric	180	196	322	296	
Z	line poles		186		290	984
3	Transformers	4	1	9	18	32
4	OFC Cable Stones	2	0	65	14	81
5	Electric Box	0	5	26	8	39
6	Lamp Pole	33	4	25	60	122
7	Hand Pump/Water tap	4	5	36	8	53
8	Well	10	18	24	64	116
9	Over Head Tank	0	2	3	1	6
10	High Tension Towers	16	3	3	1	23

Table 6.8 Showing impacted Public Utilities



6.13 Public Health and Safety

Impacts on Public health and safety may arise during the phases of pre-construction, construction and operation phases. During the pre-construction and construction phases, dismantling of the structures for CoI clearance and road construction activities may result in the following health hazards:

- Dismantling of properties has psychological impacts on their owners and others associated with them
- \circ $\;$ Debris generated on account of the above mentioned activities.

Labour Camps during construction period can bring the following problems.

• In the case of non-local labour, labour camps are set up at one or more sites adjacent to the alignment, and at some ancillary sites, like aggregate quarries.

These labours hired from outside can have clashes with the local population on account of cultural and religious differences. The influx of a large work force to an area can impose additional stress on facilities such as medical services, power, water supply, etc.

- If alternative fuels are not made available to the workforce, there is a likelihood that trees will be cut down for cooking or heating purposes.
- Insanitary conditions in the labour camps might also result in impact on health of labours as well as the local population. Transmission of diseases is also facilitated by the migration of people.

Allied activities during construction period may cause local disruption.

- Allied activities like quarrying and crushing operations, traffic diversions, etc., may cause disruption of social and economic life of the local population of the nearby areas.
- Dust and noise generated in crushing and blasting operations may cause nuisance to the nearby communities.
- Traffic jams and congestion, loss of access and other road accident risks, as a result of diversion of traffic and construction work on road.
- There will be some impact on land during construction, limited mainly to temporary acquisition to cater to road diversion or traffic detours and establishment of labour camps.

6.14 Removal of Cultural Property

Potential impacts on religious and historic sites during the construction stage relate to the possibility for physical damage to occur to structures located close to the road works. However, it is required to relocate some cultural properties that are within the CoI. A total of 23 cultural properties located in project area affected. 84 community structures such as Temple, School, ICDS, Government buildings, etc., were enlisted to be affected. The CPRs which were completely affected will be relocated in consultation with the users and the community.



Vengal Kuppam Primary School

Athangi Kavanoor Middle School

6.15 Removal of Protected Monuments

There are no monuments of historical or archeological significance within the influence area of the project corridor as per the Archaeological Protection Act. Hence, no impacts on these properties are anticipated due to the project.

Sl. No.	R or L	Name of road	Village	Taluk	Type of CPR	Description of Loss
1	L	Section 1	Mooalthangal	Tiruvallur	Temple	Temple fully affected
2	L	Section 1	Amoor	Tiruvallur	Temple	Temple under construction is fully affected
3	L	Section 1	Amoor	Tiruvallur	Temple	Temple fully affected
4	L	Section 2	Kelanur	Tiruvallur	Temple	Temple fully affected
5	L	Section 3	Erikkarai	Sriperumputhur	Temple	Poorana Shivushasa Deva Sabai
6	L	Section 3	Parasangapuram	Tiruvvallur	Temple	Pillayar Koil
7	L	Section 3	Sengadu	Sriperamputhur	Temple	Mariamman temple
8	L	Section 3	Chattiram	Thiruvallur	Temple	Nagammal temple
9	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Dharma Sasdha Iyappan temple
10	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Selva Vinayager Temple & Sri Durgai Amman temple
11	R	Section 3	Sriperamputhur	Sriperamputhur	Church	Church
12	R	Section 3	Thodukadu	Tiruvallur	Temple	Sei Ponniammman Temple,
13	R	Section 3	Parangasupuram	Tiruvallur	Temple	Ponniamman temple
14	R	Section 3	Parangasupuram	Tiruvallur	Church	Church fully affected, Compound wall, Trees
15	R	Section 3	Parangasupuram	Tiruvallur	Church	Church Toilet
16	R	Section 3	Kattukuttu road	Sriperamputhur	Temple	Sri Bakthra kali amman koil
17	R	Section 3	Polivakkam	Thiruvallur	Temple	Nagamman temple

Table 6.9 Showing Impacted Cultural Properties

Sl. No.	R or L	Name of road	Village	Taluk	Type of CPR	Description of Loss
18	L	Section 5	Ambal Nagar	Tirukalukundram	Temple	Temple at present not in use
19	L	Section 5	Ambal Nagar	Tirukalukundram	Temple	Temple at present not in use
20	L	Section 5	Melakannagapattu	Tirukalukundram	Church	Penteshgo Tiru sabai
21	R	Section 5	Ambal Nagar	Tirukalukundram	Temple	Nagathamman temple
22	L	Section 2	Kelanur	Tiruvallur	Temple	Temple fully affected
23	L	Section 3	Erikkarai	Sriperumputhur	Temple	Poorana Shivushasa Deva Sabai



6.16 Removal of Bus Shelters

11 bus bays affected in the project, out of this 2 in section V and 9 in section III, the same shall be replaced in original locations by the main contractors. These have been further discussed in RAP.



6.17 Conclusion

Understanding of the environmental impacts enable the implementing agency to promote mitigation measures prior to the construction shall prevent delays and to promote feasible mitigation strategies for the same.

CHAPTER – 7 ENVIRONMENTAL MITIGATION MEASURES

CHAPTER - 7 ENVIRONMENTAL MITIGATION MEASURES

7.1 Introduction

Prevention or avoidance of impact is better than mitigation of impact. Hence avoidance and reduction of adverse impacts approaches were adopted during the design stage through continued interaction between the design and environmental teams. This is reflected in the designs of the horizontal & vertical alignment, cross sections adopted, construction methods and construction materials. In-depth site investigations have been carried out so that sensitive environmental resources are effectively avoided, leading to the environmentally best-fit alignment option. As a result many of the trees, cultural properties, water bodies etc. have been avoided at the design stage itself.

7.2 Air Environment

Motor vehicles have emerged as one of the major sources of air pollution especially in urban areas. As the proposed road is aimed at enhancing the efficiency of road transport system, the number of vehicles plying on this road will be increased overtime.

Summary of potential impact and mitigation measures proposed is mentioned below.

S. No.	Item	Intensity of Impact	Reason for Impact	Mitigation/Enhancement
1	Meteorological factors and climate	Marginal impact	Due to production and laying of hot bituminous mix.	 Avenue plantation Plantation in realignment sections
2a	Air quality emissions Pre- construction stage	Temporary and location specific (Dust Generation)	 shifting of utilities, removal of trees & vegetation, transportation of material installation of construction plants 	 Sprinkling of Water Fine materials to be completely covered, during transport & stocking. Plant to be installed in downwind direction from nearby settlement.
2b	Air quality - emissions Construction Stage	Moderate impact (Gaseous pollutants &	 clearing and grubbing materials dumping brushing of the surface access roads to borrow areas 	 Air pollution Norms will be enforced, Laborers will be provided mask. Local people will be educated

 Table 7. 1 Potential Impacts and Mitigation measures

S. No.	Item	Intensity of Impact	Reason for Impact	Mitigation/Enhancement
		Dust generation)	 hot mix plants, Crushers paving of asphalt layers Labour Camps 	on safety and precaution on access roads, newly constructed embankment etc.
2c	Air quality - emissions Operation Stage	Moderate impact (Gaseous pollutants)	 air pollutants from traffic dust emission from tyres 	 compliance with future statuary regulatory requirements auto-technology, vehicular fuel quality- improvement
3	Air quality - monitoring		 Effectiveness / shortfall (if any) Any unforeseen impact. 	• Measures will be revised & improved to mitigate/ enhance environment due to any unforeseen impact.

7.2.1 Meteorological Factors and Climate

Construction Phase

Felling of trees, laying of pavement and other construction activity may cause temporary impact on micro climate of the project influence area. No other significant impacts are envisaged in climatic parameters.

Operation Phase

The objective of the present project is only to widen and strengthen the existing road. Hence, no changes in climatic conditions are anticipated. If any minor impacts do exist due to the proposed project, it will be mitigated by compensatory and additional afforestation and avenue plantation.

7.2.2 Ambient Air Quality

Construction Phase

During construction stage, the asphalt plants, crushers and the batching plants will be sited at least 1 km in the downwind direction from the nearest human settlement. All precautions to reduce the level of dust emissions from the hot mix plants, crushers and batching plants and other transportation of materials will be taken up including:

- Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on existing roads
- Water will be sprayed on earthworks, temporary haulage and detour roads on a regular basis. During and after compaction of the sub-grade, water will be sprayed at regular intervals to prevent dust generation.
- The hot mix plant will be fitted with dust extraction units.
- It shall be ensured that the dust emissions from the crusher and vibrating screen from the stone quarries do not exceed the standards.

To ensure the control of exhaust gas emissions from various construction activities, the contractor shall take up the following mitigation measures:

- An adequate cyclone/scrubber to control emissions from the stack of hot mix plants will be provided in the event of the emissions exceeding the SPCB norms.
- To ensure the efficiency of the mitigation measures suggested, air quality monitoring shall be carried out at least once every season during the period for which the plant is in operation.
- All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the pollution emission levels conform to the SPCB norms. A vehicle management schedule prepared by the contractor and approved by the Engineer shall be adhered to.

Operation Phase

Development of landscape along the road can reduce concentration of pollutants. It is, therefore, recommended that the area available on both sides of the road be used to develop a green belt with dense canopy to minimize the air quality impacts in the downwind regions. Such development will also improve the general aesthetics in the region.

The periodic monitoring of the ambient air quality at pre-designated locations will be conducted to ensure further improvement /modification in the design methodology.

7.3 Noise environment

Construction Phase

Noise and vibration during construction is a significant impact especially around settlements and inhabited areas. The following mitigation measures need to be worked out by the contractor for the noise impacts associated with the various construction activities:

- Noise standards will be strictly enforced for all vehicles, plants, equipment, and construction machinery to avoid and minimize excessive noise and vibration and ensure environmental safety of workers. All construction equipment used for an 8-hour shift will conform to a standard of less than 90 dB (A).
- To avoid and minimize excessive vibration and deformations, it is recommended to use alternative methods of drilling.
- Machinery and vehicles will be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum. Workers in the vicinity of high noise levels must wear earplugs, helmets and be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90dB(A) per 8-hour shift.
- Construction camps shall not be located 1000 m from settlement areas. No hot mix, batching and aggregate crushing plants shall be located within 1000 m of sensitive land uses as schools, hospitals etc.
- The main noise producing sources such as the concrete mixers, generators, grader etc. should be provided with noise shields around them. The noise shields can be any physical barriers, which is effective in adequate attenuation of noise levels. A 3 m high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard.
- For protection of construction workers, earplugs should be provided to those working very close to the noise generating machinery.

- To avoid significant impacts on human health, it is being recommended to avoid construction work at certain sections during night times and ensure that only minimum required machinery is deployed on the site. At construction sites within 150 m of human settlements, noisy construction should be stopped during nights
- Noise level monitoring should be conducted as per Environmental Monitoring Plan given in EMP.

Operation Phase

Mitigation of the noise effects during the operation of the project can be effected by the following options:

- Development of greenbelt with high canopy along the project road for attenuation of noise.
- Noise barriers: The impacts due to high noise levels will be critical at various urban locations and due to the larger number of receptors and their continuous exposure to high noise levels from the traffic.
- Noise monitoring should be conducted as per Environmental Monitoring Plan. Noise barriers should be provided at vulnerable stretches.

7.4 Water environment

7.4.1 Water Resources

Necessary measures will be taken not to dispose the slurry in to the water bodies by providing barrier with sand bags constructed around the piling location and the slurry can be stored in it so that the clear supernatant will flow out and the sludge will be settled at bottom. The sludge can be removed periodically and disposed at sites identified for debris disposal. The contractor will arrange for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected.

Wastage of water during the construction will be minimized. While working across or close to perennial water bodies, the Contractor will not impede or block any flow of water. If for any bridgework, containment of flow is required, the Contractor will seek approval of the Engineer.

Construction over and close to any non-perennial streams shall be carried out in the dry season. Construction over irrigation canals will be undertaken with permission with the Department of Irrigation. Care should be taken to minimize any disruption to the flows and to ensure that a high quality of water is maintained.

The Contractor may use the natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources will be his responsibility.

7.4.2 Water Quality

- The Contractor will take all precautionary measures to prevent the waste water generated during construction from entering into streams, water bodies.
- Oil interceptor will be provided at plant site and truck parkings.
- All wastes arising from the project will be disposed off, as per SPCB norms, so as not to block the flow of water in the channels. The wastes will be collected, stored and transported to the approved disposal sites.
- Construction work close to the streams or water bodies will be avoided during monsoon.
- Construction labourers camps will be located at least 1000m away from the nearest habitation.
- Construction of temporary or permanent devices to prevent water pollution due to increased siltation and turbidity shall be ensured.
- It will be ensured that no sanitary wastes from the labour camps are discharged into the nearby watercourses. Wastewater arising from domestic use in labour camps will be sent to septic tank and soak pit.
- The location of all fuel storage and vehicle cleaning area will be at least 300 m from the nearest drain/ water body. In addition, the maintenance and repairs of vehicles will be carried out in a manner such that contamination of water bodies and drainage channels can be avoided.
- The slopes of embankments leading to water bodies will be modified and rechanneled to prevent entry of contaminants into the water body.

 During the construction stage periodical water sampling and laboratory analysis shall be implemented to examine possible pollution of surface and underground flows.

7.4.3 Drainage

Proper drainage measures will be taken along the road corridor like:

- Drainage arrangements to be in tune with the site condition and include forming of drainage layer, longitudinal and cross drains, etc
- Wherever required, suitable sub surface drains shall be provided for full width of formation
- During construction period, suitable barrier will be used to protect the adjoining water bodies from the falling earth materials and dust raised to avoid sedimentation.
- The contractor will remove obstructions that may cause temporary flooding of local drainage channels, during construction. In sections along water courses, and close to cross-drainage channels, earth, stone or any other construction materials must be properly disposed off so as not to block the flow of water.
- All necessary measures will be taken to prevent earthwork, stonework and other debris from impeding cross-drainage at rivers, streams and water canals.
- Project road has drains on both sides which should be maintained well from collection to dispose of runoff.

7.5 Land Environment

7.5.1 Topography and Geology

 Care shall be taken during embankment construction and cutting process, so that the natural drainage pattern in the areas will not be affected and adjacent flora should not be affected.

- Rehabilitation of borrow area and quarry area shall be carried out in order to control the water logging problem and to avoid the soil erosion and landslides of the adjacent area.
- Existing licensed quarry will be used as source of coarse and fine aggregates.
 It will be ensured that the aggregates procured during construction stage will be from the authorized or licensed suppliers only.

7.5.2 Soil Contamination

Soil contamination is likely due to the possible leakage of fuel/lubricants and dumping of construction wastes during construction stage. The contractor will be required to initiate measures to reduce/prevent waste generation from all activities. The measures would include

- Identifying landfill sites for disposal of debris and a plan for disposal needs to be prepared by the contractor with approval of Construction Supervision Consultant
- Undertake measures for minimization of waste and recycling of surplus materials for use by local communities
- Follow established procedures for storage of hazardous goods and chemicals
- Prepare plans for cleanup of any accidental spillage
- Checks for ensuring erosion control structures are in place before earthworks are started

All arrangement for transportation during construction including provision, maintenance, and clearing debris, where necessary will be considered incidental to the work and should be planned and implemented by the contractor as approved and directed by the Engineer. Disposal of all waste materials is responsibility of the contractor.

At various construction sites, the vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil. It will be ensured that the fuel storage and refueling sites are kept away from drainage channels and important water bodies. At the wash down and refueling areas, "oil interceptors" shall be provided. All spills and petroleum products shall be disposed off

in accordance to the SPCB guidelines. Fuel storage and fuelling areas will be located at least 300m from all cross drainage structures and significant water bodies. In all fuel storage and refueling areas located on agricultural lands or productive lands, the topsoil preservation shall be carried out.

To minimize the dumping of construction wastes from the project, the debris generated due excavation and site preparation shall be suitably reused in the proposed construction, subject to the suitability of the material and the approval of the Engineer.

Unusable debris material shall be suitably disposed off by the contractor at predesignated disposal locations, subject to the approval of the Engineer. The bituminous wastes shall be dumped in secure landfill sites only. At such locations dumping will be carried out over a 60 mm thick layer of rammed clay so as to eliminate any chances of leaching. The identification of such landfill sites shall be carried out by the Contractor (before start of construction activity) and duly approved by the concerned department and the PIU.

Impacts are anticipated only in case of accidents involving large spillover of hazardous materials or petroleum products. Monitoring shall be done at the locations where these have occurred and further course of action to reduce the pollution shall be worked out.

7.5.3 Productive Agriculture lands

Efforts have been made to minimize the intake of productive lands. The borrow areas; construction camp locations; traffic detours and other construction sites shall be selected carefully in consultation with the Engineer to minimize the agricultural land acquisition. To conserve the productive topsoil of all areas affected due to project, the following measures have been proposed:

- The topsoil from all areas to be permanently covered shall be stripped to a specified depth of 150mm and stored in stockpiles. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil
- The stockpile shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2m
- Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum and shall be covered with gunny bags or tarpaulin

- It shall be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles
- To prevent any compaction of soil in the adjoining productive lands, the movement of construction vehicles, machinery and equipment will be restricted to CoI

The stored topsoil will be utilized for:

- Covering all disturbed areas including for the redevelopment of borrow areas
- Filling up of tree pits, proposed as part of compensatory plantation

The contractor shall be responsible for working out haul roads with the minimal loss of productive soils, in consultation with the Engineer.

7.5.4 Borrowing and Quarrying

Specific locations of borrow areas to be used will be identified by contractor. The selection and recommendations for borrow areas will be based on environmental as well as civil engineering considerations. Location and source of material for embankment or sub-grade and the procedure for excavation or transport of material shall be in compliance with the environmental requirements of the MoEF, MoRTH and as specified in IRC: 10-1961. Redevelopment of the borrow areas to mitigate the impacts will be the responsibility of the contractor. The contractor shall evolve site-specific redevelopment plan for each borrow area location, which shall be implemented after the approval of the Engineer.

Precautionary measures as the covering of vehicles will be taken to avoid spillage during transport of borrow materials. The unpaved surfaces used for the haulage of borrow materials will be maintained properly. The haul roads and borrow areas will be managed and maintained by the contractor. Since dust rising is the only impact along the haul roads sprinkling of water will be carried out twice a day along such roads during their period of use.

Borrowing of earth shall be avoided on productive lands and within 1 km of settlement areas. However, in the event of borrowing from productive lands, under circumstances as described above, topsoil shall be preserved in stockpiles. At such locations, the depth of borrow pits shall not exceed 45 cm and it may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside. At locations where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 2 m or up to the level of surrounding fields.

Though no major impacts on geological profile of the project area are anticipated, requirement of construction material from quarries will induce pressure on the local geological deposits. The contractor is to ensure procurement of the construction material from licensed quarries only. It is envisaged that no new quarries will be proposed.

The quarries that would be used for procuring construction material should be established under "The Tamil Nadu Mines and Mineral Concession Rules, 1959". The act lays down guidelines for establishing quarries and obtaining quarry lease. It also specifies the conditions to be maintained for operating the quarry or for obtaining renewal of quarry lease. In respect of quarrying in environmentally sensitive areas certain restrictions have been imposed to avoid any detrimental impact due to irresponsible quarrying. The rules lay down various precautionary measures during blasting, safety of workers, management measures within quarries, approval of the village heads prior to material leaving the village, precautionary measures to avoid spillage during transport of quarry materials.

The contractor should obtain material from quarries which are already operational with the relevant clearances and compliance to environmental requirements. In case the whole quarry is taken up by the contractor then the contractor will be responsible for closure of the quarry. A quarry area rehabilitation plan is to be submitted by the contactor to the engineer for its approval prior to acquiring material from the quarry.

7.6 Biological Environment

7.6.1 Loss of trees

The tree felling will be compensated by planting trees at 1:10 ratio in the existing road in the available space. Moreover out of the 4210 identified trees likely to be removed. It has been considered to save and protect 3585 trees below 900mm girth size shall be transplanted along the same corridor along the PRoW. (out of the 3585 trees below 900 mm, 1519 of them were less than 600 mm girth size and hence the chance for survival

rate shall be more). Only 625 trees need to fell down due to the proposed roads which shall be compensated for 10 times of new saplings in around the project corridors.

Plantation at Enhancement Sites

A number of Government offices, schools, hospitals, and cultural properties exist along the project corridor. Trees such as Nettilingam, Neem is proposed for planting sensitive receptor's premises,

7.6.2 Forest Area

There is a requirement for forest land diversion as proposed road is passing through and adjacent to the reserved/protected/revenue forest, hence mitigation measures are warranted.

7.6.3 Wild Life

No wild life habitat/wild life crossing has been observed along the proposed road corridor. Signboards depicting name and distance of reserve forest shall be displayed at start of the forest zones.

7.6.4 Fauna

The construction and operation phase of the project doesn't possess threat to the fauna population available in the project area. There are no endangered species reported in the site and hence, no impacts are anticipated and mitigation measures are not required.

7.7 Social Environment

7.7.1 Loss of Access

The contractor shall provide safe and convenient passage for vehicles and pedestrians to and from side roads and property accesses connecting the project road. The construction activities that affect the side roads and existing access to individual properties shall not be undertaken without providing adequate provisions.

The construction works will not interfere with the convenience of the public or the access to use and occupation of public or private roads, railways and any other access footpaths to or of properties, whether public or private.

7.7.2 Safety Aspects

The Contractor will take all necessary measures for safety of traffic during construction. He shall provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the road under improvement.

Safety measures during construction phase

- Safety measures for construction workers
- Safety measures for road users
- Safety measures for the public

Safety measures during Operation Stage

Traffic safety measures are inbuilt into the project design and specifications. These would take care of the safety aspects in the operation stage. Following components are provided with safety aspects in view.

- Foot paths are provided through out the cross section
- Non-motorized vehicles are stream lined to travel in a separate lane
- Local traffic will be stream lined to travel in service road
- Specify Speed Limit and De-restriction Signs (RS12 & RS13) at the entry and exit to each urban or village area, which has street lighting. These signs will be shown on the road plans and will be subject to local agreement or modification prior to erection.
- Provide cattle crossings where there is a need for a cattle crossing.
 (Detailed Safety guidelines in enclosed in appendix).

7.7.3 Construction Workers Camp

Layout of Construction Camp

The contractor based on the following guidelines shall identify the location of the construction site. The construction site shall be located

- A minimum of 1 km away from any major settlement or village
- A minimum of 300m of any major surface water course or body

- A minimum of 500m away from any Reserve Forest/Wild life Sanctuary/Ecologically sensitive areas
- On non agricultural lands, as far as possible

Facilities at Workers Camps

- Accommodation
- Sanitation Facilities
- Shelter at Workplace
- Canteen Facilities
- Health Care Facilities
- Day Crèche Facilities

(Detailed Guideline for workers camps).

7.8 Cultural Environment

7.8.1 Religious and cultural places with local importance

Out of the 84 CPRs identified, 23 cultural properties like Worship places and shrines were identified need to be relocated. The contractor and the PIU should consult the community and finalize a suitable location for relocation. The relocated structure should be equivalent to or bigger in size and precincts to the structure that is being acquired. Necessary facilities as were present in the original structure should be provided in the relocated site as well.

7.8.2 Protected monuments

As none of the monuments of historical or archeological significance within the influence area of the project corridor as per the Archaeological Protection Act are getting impacted no mitigation measures are suggested.

7.9 Conclusion

The identified mitigation strategies shall ensure the environmental safety and safeguards the impacts related to environment and public.

CHAPTER – 8 SOCIAL IMPACT ASSESSEMENT

CHAPTER - 8 SOCIAL IMPACT ASSESSMENT

8.1 Social Impact Assessment

The social impact assessment enables to understand the project area and understanding the project affected household and impacts and their intense and highlights the major observations of the social components of the project area.

8.2 Regulatory Framework

The projects that are meant for infrastructure development and has impact on livelihood loss of the people needs to be consistent and complied with and meet the requirements of the following applicable acts, notifications, and policies. The compensation and assistance provided to the project affected will be based on the applicable acts, legislations, regulations besides the Operational Policies of the World Bank.

Relevant National and State level laws and policy

- The Tamil Nadu Highways Act, 2001
- The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013
- The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014
- Environmental and Social Safeguard Policy
- Resettlement Policy Framework (Adopted from TNRSP)

8.3 Entitlements

Entitlement Matrix has been developed, that summarizes the types of losses and the corresponding nature and scope of entitlements; and is in compliance with National Laws and World Bank OP. Entitlements was worked out for various affected target groups and proposed to mitigate the Title holders, Squatters, Tenants, Encroachers and workers.

8.4 Understanding the Project Area

Detailed study on the project area (Kanchipuram and Thiruvallur districts) was made through site visit and secondary data.

To understand the magnitude of impacts with respect to the affected buildings and their assets, a census survey was carried out. Socio-Economic survey was also carried out for

the affected structures, to ascertain the loss of asset, livelihood and standard of living of the PAH and to identify vulnerable families who were affected due to proposed project.

8.5 Common Property Resources (CPRs)

The impact on the common property resources (CPRs) shows that 84 CPRs are likely to be affected.

8.6 Major Inferences – Social Impacts

Based on the assessment of project sections, the no. of structures and public utilities affected were observed and resultant analyses are given in the following Table.

Section	Description	Total Assets Affected	Total Nos. of Public utilities Affected
Section - 1	Ennore Port to NH-5 at Thatchur	76	11
Section - 2	NH-5 at Thatchur to Start of Thiruvallur Bypass	81	4
Section - 3	Start of Thiruvallur Bypass to NH-4 at Sriperumbudur	495	58
Section - 4	NH-4 at Sriperumbudur to NH-45 at Singaperumalkoil	TNRIDC imj	proving this Section
Section - 5	NH-45 at Singaperumalkoil to Mahabalipuram	150	11
	Total	802	84

Table 8. 1 Social Impacts of Chennai Peripheral Road

802 assets are likely to be affected with 1041 families , out of which 900 families were likely to be displaced.Based on the magnitude of the Social Impacts, proposed project road sections are ranked as below:

- Section 3: Start of Thiruvallur Bypass to NH-4 at Sriperumpudur ranked 1st in terms of magnitude of the Social Impact on affecting Structures and Public utilities.
- Section 5: NH-45 at Singaperumalkoil to Mahabalipuram stands 2nd in terms of magnitude of the Social Impact on affecting Structures and Public utilities
- Section 2: NH-5 at Thatchur to Start of Thiruvallur Bypass ranked 3rd in terms of magnitude of the Social Impact on affecting Structures and Public utilities.

- Section 4: NH-4 at Sriperumpudur to NH-45 at Singaperumalkoil stands 4th in terms of magnitude of the Social Impact as this has been covered major portion with ongoing TNRIDC project.
- Section 1: Ennore Port to NH-4 at Thatchur stands 5th in terms of magnitude of the Social Impact is almost Nil as it is new formation predominantly through barren land.

8.7 Cut-off date

The cut-off date for the project road will be the date of completion of the Census Survey. The structures enlisted during the survey is the final one, any structures build up after the Census survey shall not be eligible for compensation and assistance. Hence it is closed the cut –off date for project road is 30.07.2016. For the new alternate alignment ORR -NPAR Road the cut off date is 10th July 2018.

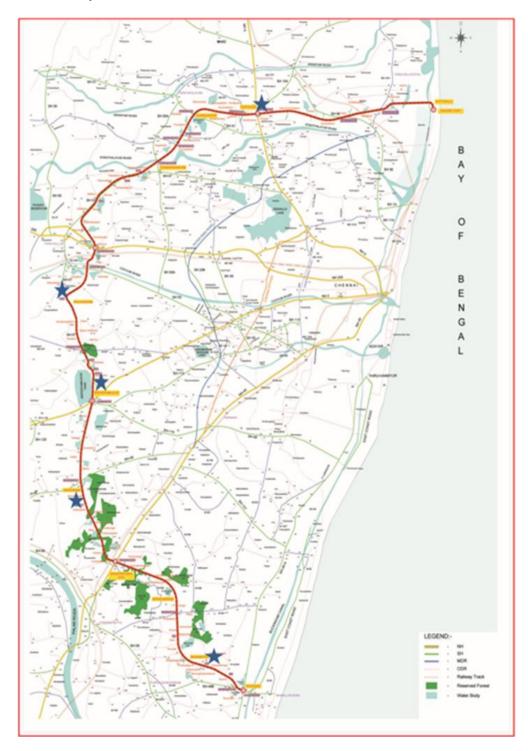
8.8 Community Participation

8.8.1 Public Consultation Meetings

Thus, after the submission of the Screening Report, a public consultation was conducted to disseminate the course of the study. This will allow the study team to incorporate the suggestions made in the project and continue with the drafting of the project. The dissemination process consisted in holding several meetings with the public, where the proposals of the project were presented as well as the impacts by the study team. As per the ToR, the consultation meetings addressed to local public were conducted on 21st to 31st July 2014 at the following 5 locations. The number of meeting points and their locations along with schedule were finalized in consultation with the respective Divisional Engineers of Highways Department.

- 1. Thirupadalambigai Thirumanamandabam, Manamathi Village
- 2. Grama Sabha Place, Near Eshvaran Temple, Oragadam Village
- 3. Ariya Vaisya Peri Chettiyar Chathiram, Chinnakkadai Sadhukkam, Sriperumbudur
- 4. The Panchayath Office, Melnallathur Village
- 5. The Sports Ground, Government School, Panchetty Village

During April and May 2018, four consultation meetings were held to brief the Social and Environmental components of the project. Two meetings held at Minjur and two at Panchetty.



8.9 Gender Issues

The gender issues are also address in the RAP through focus group discussions (FGDs).

8.10 Perceived Impacts

8.10.1 Positive Impacts

The accessibility and connectivity will increase, thus, the time of travel between these places shall reduce significantly. With the advent of road the vehicle operating and maintenance cost is expected to go down substantially. These benefits can be attributed to smooth and even roads and low congestion. Saving in fuel consumption can be attributed to low congestion and relatively less travel time due to proposed road.

During the construction stage of the project, both skilled and unskilled labours will be employed from the nearby villages to enhance the livelihood and economic standard of the people.

8.10.2 Negative Impacts

The proposed construction of road would involve impact on agricultural land, commercial and residential buildings, public utilities, community resources such as religious structures.

8.11 Resettlement Action Plan

The SIA delivers the need for RAP, principles, legal frame work, Entitlements definition, issue of ID cards, procedure for preparing entitlement policies and institutional mechanism and R&R cost and budget. This also includes the various allowances and assistances to be given to the affected PAHs.

R&R Implementation Schedule

- Appointment of NGOs and Evaluation and Monitoring Agency
- Training of R&R Officers
- Joint Verification of properties of PAPs
- Issue of ID cards
- Preparation and approval of Entitlement Matrix
- Consultation and disclosure
- Resettlement and rehabilitation of PDs
- Relocation of CPRs
- Training of PAPs

8.12 Land Acquisition Process

The project road is predominantly in new alignment which requires acquisition of private land and alienation of government land, except in Section-4 where the improvements are proposed within existing RoW. The project road will involve acquisition of around 665 ha of private land and alienation of around 135 ha of government land.

Private land required for the project should be acquired in accordance with the provisions of Tamil Nadu Highways Act, 2001 and the compensation will be determined in accordance with the RFCTLARR Act, 2013. The process for acquisition, estimation of compensation and R&R award are elaborated.

Transfer proposal will be submitted to District Collector for initiating the transfer of all government land. The District Collector's no objection or enter upon permission will be obtained prior to handing over of the lands to the contractors. Land alienation will be completed as soon as possible after obtaining enter upon permission.

A separate Government Order has to be issued nominating the Special District Revenue Officer(s) of TNHD as competent authority for land acquisition and award pronouncement under the Tamil Nadu Highways Act, 2001. The process of land acquisition for private land is elaborated in RAP report.

8.13 **R&R** Costing and Budgeting

The R&R budget includes the cost of structural compensation, R&R assistance, social manager and environmental specialist remuneration, training cost for capacity building of staff, monitoring and evaluation cost and contingency for the project. The R&R budget is estimated to be Rs.8463.4 lakhs.

8.14 Institutional Arrangement

To expedite land acquisition and implement the provisions of the road-project RPs, regional levels Land Acquisition Rehabilitation and Resettlement Units (LARRU) have to be constituted. These units will be headed by a Special District Revenue Officers (Spl DRO) and will be supported by a Resettlement Officer (RO) for RP implementation support and Tahsildar(s) for support in land acquisition.

The implementation of the R&R provisions will be carried out by NGOs with experience in similar development projects. The NGOs to be engaged will have proven experience in carrying out resettlement and rehabilitation activities and community development and consultations in projects of similar nature in Tamil Nadu.

The HD wing, engineers officers, R&R cells and Social Manager will receive training prior to implementation and the capacity building will be accomplished prior to commencement of civil works. As the R&R work requires a great level of expertise, hence training and capacity building need to be taken care. The RAP training shall be delivered in different modules for different target groups and different training needs.

8.15 Grievances Redressal Mechanism

Grievance Redressal Committee (GRC) will be established at two-levels, at division and regional level, to receive, evaluate and facilitate the resolution of displaced persons concerns, complaints and grievances. The GRC will provide an opportunity to the DPs to have their grievances redressed prior to approaching the Jurisdictional LARR Authority.

8.16 Monitoring and Evaluation

Monitoring and Evaluation are critical activities in involuntary resettlement. Monitoring involves periodic checking to ascertain whether activities are going according to the plan. By contrast, evaluation is essentially a summing up, the end of the project assessment of whether those activities actually achieved the intended aims.

The RAP includes provision for initial monitoring, mid-term and end term evaluation by an external consultant. The NGO involved in the implementation of the RAP will be required to supply all information and documents to the external evaluation consultant.

8.17 Conclusion

The Social Impact Assessment highlight the need for preparation of Resettlement Action Plan for the affected Project affected Households. Accordingly, the RAP is prepared for the project.

STUP Consultants Pvt. Ltd

CHAPTER – 9 ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER - 9 ENVIRNMENTAL MANAGEMENT PLAN

9.1 Introduction

To mitigate the identified impacts an Environmental Management Plan and Environmental Management Cost has been prepared. The likely adverse impacts on various environmental components, viz., Land, Air, Water, Biodiversity and Social & Aesthetic have been assessed. Based on the identified impact's potential, the management practice to be followed for minimizing and mitigating the impacts on the surround environment, the activity wise Environment Management Plan is drawn.

In summary, the expected impacts are of small scale, temporary and site specific depending on the implementation of the project and will not exceed the construction and major environmental norms. The EMP will be form part of the contract document.

9.2 Environmental Management Plan

Effective implementation of the environmental measures suggested based on the baseline environmental conditions and environmental impact assessment requires robust procedures. Implementation could be ensured only when a pragmatic approach for environmental management is adopted. There are two stages for which the implementation arrangement is required i.e during project construction and operation. Some of the environmental tools which are applicable for this project for effective implementation of environmental measures are discussed in this chapter.

Environmental Management Plan (EMP) is aimed at mitigating the possible adverse impact of a project and for ensuring to maintain the existing environmental quality. The EMP converses all aspects of planning, construction and operation of the project, which are relevant to environment. It is essential to implement the EMP right from the planning stage and then continuing it throughout the construction and operation stage. Therefore the main objective of the EMP is to identify the project specific activities that would have to be considered for investigation of the significant adverse impacts and the mitigation measures required.

9.3 Considerations made in the Project for Minimizing Impacts

The basic objective of the provision of the three project component is to avoid the traffic congestion and frequent choking of the traffic, which improve the traffic situation in the project area.

The alignment of the proposed road is designed along the existing roads to minimize the requirement of additional land. At the crossing point of the River, forest, canal and water bodies longer span is proposed for the structure to avoid disturbance to the river and green cover. As the existing roads storm water drainage facility, proper drainage system is proposed to enhance the existing drain facility to avoid flooding.

9.4 Public Awareness

Public play a major role in the successful implementation of proposed project component. Awareness programs have been proposed to deal with the various aspects that are to be considered to improve the local public awareness by involving individually or with the voluntary organization groups.

9.5 Traffic Management Measures

During the construction stage of various components, traffic diversion or management is required. Temporary traffic diversion plan shall be prepared by the contractor prior to construction phase, which can be modified during construction to avoid/minimize the impact on road users and environment. The construction of project will be taken up in phased manner. Accordingly the project stretch will be closed during construction. Only local traffic will be allowed on the stretch by providing barricading to separate the construction area and necessary road safety furniture like sign boards, reflectors lightings, etc. The access to the adjoining properties and cross streets should be ensured during construction of project components.

During construction, the through traffic will be diverted through parallel roads and adjacent roads. This de-touring length will be planned to ensure the level best minimum distance than existing route.

Planning the works

The complexity of traffic diversion or management differs from scheme to scheme but the main objective is to maximize the safety of work force, publics living nearby and the travelling public and the second objective is to keep traffic flowing as freely as possible. So the traffic management should be a safe system of work for both operatives and road users. During the planning stage of works the following points should be noted.

- Intimation to the public living or shops available adjoining the construction site.
- Attention must be paid to the needs of pedestrians. This applies especially in the vicinity of bus stops, shops, where larger numbers of people with physical/mental impairments may be expected.
- Construction works should be undertaken in the minimum time, taking up the minimum of road space, but without compromising safety. Where practicable, additional resources or time- reducing techniques should be considered.
- There must always be liaison with the Authority concerned to avoid concurrent works in close proximity.
- Transport authorities to be informed to plan their stops and routes if diverted
- There should be always liaison with traffic police and other emergency services

Designing Traffic Management

- Before execution minimum lateral (sideways) clearance should be given between moving traffic and work space
- Outer boundary of work space should be provided with barricading as specified in the SoR of TNHD.
- Barricading should be visible in day and night and also adjacent to running traffic lane should be lined with traffic cones.
- Access to the adjoining properties should be ensured through temporary arrangements.
- Adequate working space should be provided around the work place to allow temporary works
- Proper diversion board indicating the "Road ahead is closed" the nature of work going ahead with authority name should be placed before the entrance of road with advance warning of diversion should be placed before 100m of diversion with arrow sign for diversion.

9.6 Sensitive Receptors Management Plan

The project needs to develop measures for the rehabilitation of cultural properties that will be affected by the road improvement program. This could be made a part of the broad R&R Principle and Policy Framework. The Environmental Budget within the EMP will undertake the environmental enhancement where as any land acquisition and rehabilitation will be part of the Resettlement Action Plan

Direct Impacts:

The direct impacts to the cultural properties are of the following category.

- 1. Only Compound wall affected
- 2. Compound wall and part of the compound affected
- 3. Part of structure affected
- 4. Complete cultural property affected
- 5. Loss of access/entrance, if the existing access is from the project roadside.

Project Approach:

In all cases, the mitigation actions are framed unique to that particular situation with respect to the available space, the unique characteristics of the religious structure affected and the local public and religious judgment. In other words, the project policy is unique to consider the widely varying situations for each cultural property.

Impact Mitigation:

The loss of land and assets of the cultural properties will be treated on par with the loss of other land and assets for the purpose of compensation and assistance. However, the project will, in addition, strive to enhance benefits to the affected cultural properties in consultation with their respective management/ Owners.

Strategy for restoration, reconstruction and relocation of cultural properties

Table 9. 1 Reconstruction and relocation of cultural properties

Sl.No	Description of loss	Mitigation Measures
1	Only Compound wall and land beneath	1. Reconstruction of wall parallel to the present compound wall.
	affected	2. Loss of land compensated.
		3. Access/entrance provided through one of the

Sl.No	Description of loss	Mitigation Measures
		sides
2	Compound wall and part of compound affected	 Reconstruction of wall parallel to the existing wall. Loss of land compensated.
		3. If land is available adjacent to the property, will be purchased.
3	Structure affected	Alternate structure constructed and all pre-status restored.
4	Statue affected	Complete structure reconstructed and all pre-status restored.
5	Only land affected	Compensation for land and if possible alternate land provided.
6	Complete cultural property affected	Relocation of site identified by the cultural property authorities and rebuilding of the property.
7	Schools	 No Horn Zone Tree plantation serve as noise barriers Loss of compound walls shall be reconstructed.
8	Hospital	 Silent Zone Loss of building shall be relocated with new building in the same place or alternate site shall be identified for relocation. Tree plantations
9	Water bodies	 Tree plantation along the bunds. Desilting or deepening of the area proportionate to the area acquired for road works.

Design changes made to save cultural properties:

Accordingly some of the cultural properties have been saved.

Relocation necessary: In few cases some land acquisition will also be necessary.

Environmental Enhancement and landscaping: At least in many cases cultural property enhancement measures are necessary.

9.7 Tree cutting and Compensatory Plantation

- The vulnerable trees to be felled during construction activity are estimated as 4797 Nos. It is proposed to retain 2168 trees which falling in median, divider, footpath, etc and transplant the remaining 2629 trees within available land.
- Adequate precaution shall be taken during implementation to keep the tree survival at maximum.
- The transplanting of trees shall enable the PIU to save endangered species and speedy growth of the same.
- However, if any tree needs to be cut, note with necessary details on the project and trees & species with girth and justification for tree cutting shall be submitted by the Highways Department to the respective Forest department for obtaining permission.
- Tree cutting shall be carried out by the Forest Department of the GoTN prior to start of work. Provision has been made in the cost estimate for plantation at ten times the number of vulnerable trees. HD has proposed to carryout compensatory plantation after completion of the road construction, through its nursery wing which will also carry out the maintenance activities of the plantation.
- Suggested species of trees for the compensatory plantation are honey suckle, yellow gulmohar, netilingam, neem, etc. Tree guards will be provided for saplings, and the recommended height of the saplings will be more than 2 m.
- The aesthetic landscape appearance of the project road shall also remain the same with scenic beauty and green cover.

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies		
PRE	PRE-CONSTRUCTION PHASE					
1	Clearances		All clearance required from other departments and Environmental aspects shall be ensured and made available before start of work. For trees identified for cutting, obtain prior permission from the respective department prior to commencement of work.	HD		
2	Tree Cutting & Plantation		Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. Take adequate care to determine to root protection zone and minimize root loss. Trees shall be transplanted from the construction sites before commencement of construction. Undertake afforestation in nearby areas.	Contractor, HD		
3	Utility Relocation		Identify the common utilities that would be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc. Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts. Where ever the entry and exit to houses/ establishments are affected due to construction activities, alternate temporary arrangement for crossing over shall be provided.	HD /Line Department s/ Concerned department s / Contractor		
4	Baseline parameters		Base line parameters shall be recorded and ensured conformance till the completion of the project. The contractor shall undertake periodical monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared.	HD		

Table 9. 2 Environmental Management Plan

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			Adequate measures shall be taken and checked to control any pollution and report be sent to the Chief Engineer.	
5	Planning of temporary Traffic arrangements		Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans shall be formulated and reviewed and modified if required, and submitted to engineers for approval, one week prior to commencement of works. The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, signage, safety measures for transport of hazardous materials and arrangement of	Contractor, HD
			flagmen. The guidance for traffic management provided in the respective Appendix of the EA report shall be referred to for preparation of the traffic plan.	
6	Debris disposal site identification		Selection of the disposal sites will be carried out in consultation with the State Pollution Control Board, in order to ensure that no natural drainage, productive lands or natural habitat is adversely impacted due to disposal. Preferably, existing debris disposal site / Yard can be used.	
7	Selection of Borrow areas		Compliance to all the State norms towards operation and environmental protection of borrow areas is the sole responsibility of the Contractor. HD will inspect locations intended for operation and mitigation measures will be instructed towards satisfactory redevelopment. Inspection to the borrow areas will be carried out by raising Request for Inspection (RFI) by the Contractor for each of the borrow areas and obtain subsequent approval from HD.	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
8	Selection of Stone Quarries		Contractor will identify the stone quarries in consultation with the Mining Department. A comprehensive Quarry Management Plan need to be prepared incorporating Environmental and Safety Management Plan with special emphasis to Quarry redevelopment for approval from HD. refer respective Appendix for preparation of Quarry Management Plan and Redevelopment Plan.	Contractor
9	Establishmen t of Stone Crushers, Batching Plants, Hot- mix plants		Specifications of stone crushers, hot mix plants and batching plants to be established for the project should comply with the requirements of the relevant State/Central Pollution control Board legislations.	Contractor
10	Labour camp & facilities		Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp shall be	Contractor
			v) The sewage system for the camp shall be designed, built and operated in such a fashion	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals. vi) The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer. vii) Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor. Refer respective Appendix attached for Construction of Labour Camps and Sites.	
11	Selection of construction vehicles, machinery and equipment's	Air and noise pollution	All the vehicles, machinery and equipment's to be engaged for the construction work should be attached with the latest, advanced pollution control measures available in the country and those should conform to the relevant Indian Standards.	Contractor, HD
CON	STRUCTION I	PHASE		
1	Barricading site		The construction area should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.	Contractor
2	Prevention of accidents		Prevention of accidents involving human beings, animals or vehicles falling or accidents during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc. The project engineer of HD will plan and direct the contractor to execute the work progressively so that the length of the open excavated trench is	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			minimized in order to reduce possible accidents.	
3	Excavations of borrow	Increased soil erosion,	Borrow area rehabilitation has to be done as preventive measures for soil erosion.	Contractor
	pits	loss of top soil.	Top soil from borrow areas has to be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2 meters with proper covering. This shall be restored for rehabilitation of borrow pits.	
			In borrow pits, the depth of the pit should be regulated so that the sides of the excavation will have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank.	
			The device for checking soil erosion include the formulation of sediment basins, slope drains etc. Such works and maintenance thereof will be deemed as incidental to the earthwork.	
4	Storage of materials		The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc.	Contractor, HD
			Site for storage of construction materials to be identified without affecting the traffic and other common utilities, and the quality of the construction materials.	
			Construction materials should only be stored and prepared on the site if they do not obstruct the road or any surrounding public utility.	
			Construction materials should only be transported to the worksite as and when required for construction	
5	Dust Pollution		All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall be covered & equipped will dust collector.	Contractor
			Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction.	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage. All precautions to reduce the level of dust emissions from the hot mix plants shall be taken. The hot-mix plants should be sited at least 500 m from the nearest habitation and from major water bodies. They should be fitted with dust extraction units. Water should be sprayed on the earth mixing sites, asphalt mixing site and service roads. During sub grade construction, sprinkling of water should be carried out at least twice a day on a regular basis during the entire construction period especially in the winter and summer seasons. Special attention should be given in the sections where the alignment passes through sensitive areas such as schools, hospitals and urban areas. As soon as construction is over the surplus earth should be utilized to fill up low- lying areas. In no case, loose earth should be allowed to pile up along the alignment. Air quality monitoring should be conducted as per Environmental Monitoring Plan.	
6	Protection of residential / sensitive receptors		 Noisy construction operations in residential and sensitive areas should be done only between 7.30 am and 6.00 pm. Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. Provision of enclosing generators and concrete mixers at site. Sound barriers shall be installed during the construction phase to protect the inhabited areas from the noise from construction activities. Adequate barricading and safety measures to protect dust pollution and noise impacts on sensitive receptors like schools and hospital etc 	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			due to vehicle movement to be ensured prior to the start of work and their effectiveness to be checked during construction and operation phase.	
7	Vehicular noise pollution at residential / sensitive Receptors.		Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. Stationary construction equipment will be kept at least 500m away from sensitive receptors. All possible and practical measures to control noise emissions during drilling shall be employed.	
			The HD may direct to take adequate controls measures depending on site conditions.	
8	Noise from vehicles, plants and equipments		Use of less noise generating cutting equipment's, provide personal protective equipment's such as ear plugs/muffs and other safety measures to labourers. Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum. Construction contract should clearly specify the use of equipment emitting noise of not greater than 90 dB(A) for the eight hour operation shift. The citing of construction yards should be done leaving at least 100 m distance from any residential areas which will allow noise to attenuate. The main noise producing sources such as the	Contractor

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			concrete mixers, generators, grader etc. should be provided with noise shields around them. The noise shields can be any physical barriers, which is effective in adequate attenuation of noise levels. 3m high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard. For protection of construction workers, earplugs should be provided to those working very close to the noise generating machinery.	
9	Movement of Heavy Vehicles		Construction vehicles, machinery and equipment shall move, or be stationed in pre-identified designated areas only.	Contractor
10	Gaseous emission from construction vehicles and machinery		All vehicles, equipment and machinery used for construction should be fitted with latest air pollution control equipments and should be regularly maintained to ensure that the emission levels are as per norms of PCB. Idling of delivery trucks or other equipment should not be permitted during periods of unloading or when they are not in active use. The human settlements should be at least 500 m down windward direction of Hot (asphalt) mix plant. The construction operations during nights, especially in the winter season should be carried out under restricted conditions. Air quality monitoring should be conducted as per Environmental Monitoring Plan to detect any deterioration in air quality due to the construction activities.	Contractor
11	Pollution from Construction Wastes		All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer. The engineer shall certify that all liquid wastes disposed off from the sites meet the discharge standard.	Contractor
12	Pollution		The contractor shall ensure that all construction	Contractor

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
	from Fuel and Lubricants		 vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from sensitive receptors. All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer. Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Contractor shall arrange for collection, storing and disposal of oily wastes to the pre identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws. 	
13	Flora and Chance found Fauna		The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.	Contractor, HD
14	Chance Found Archaeologic al Property		All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.	
15	Disposal of oil and grease		A suitable site should be identified for safe disposal / without contaminating the source, in relatively low lying areas, away from the water bodies etc., as approved by the Engineer & as per specific procedures.	Contractor, HD
16	Use of water for construction		Arrangement for supply and storage of water will be made by the contractor in such a way that the water availability and supply to nearby communities remain unaffected. If a new tube- well is to be bored, proper sanction and approval by Ground Water Department is needed. The wastage of water during the construction should be minimized. In case of tapping water from community sources, consent to be obtained from local Administration for the same.	Contractor
17	Surface runoff from the construction site		No labour camps, stone crushers, hot mix plants and other heavy machinery should be located near to water bodies. No discharge from such establishments should follow their path into nearby water bodies. Dumping of debris in or nearby water bodies to be strictly avoided. Waste products must be collected, stored and taken to approved disposal sites as per prevailing disposal norms. Runoff from the construction site should be passed through silt traps. Pitching, stabilization of soil and slope protection measures should be taken up to reduce erosion of soils. Water quality monitoring should be conducted	Contractor, HD

Sl. No.	Activity	Potential Impact	8					
			as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution.					
18	Safety Aspects		Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the HD.	Contractor				
			Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc.					
			Welder's protective eye-shields shall be provided to workers who are engaged in welding works. Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing,					
			compaction, or concrete mixing operation. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs.					
			The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract.					
			The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment & Conditions of Services) Act, 1996 are adhered to.					
			The contractor shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of					

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			painting with products containing lead in any form.	
19	Risk from Electrical Equipment(s)		The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	Contractor
20	First Aid		The contractor shall arrange for: A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital.	Contractor
21	Informatory Signs and Hoardings		The contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	Contractor, HD
22	Disposal of excavated material, construction and other waste.		The excavated material shall be disposed off without any accumulation. The soil excavated from the canal and river shall be tested for quality, adequately treated with methods like bioremediation and proper reuse option explored. The rest may be safely disposed. The disposal shall be done in the existing dump yards or any other site identified by HD. The following shall be ensured during silt	Contractor, HD

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			 disposal Dumping does not impact natural drainage courses. No endangered / rare flora is impacted by such dumping. Settlement area located at least 1.0 km away from the site. Should be located in non-residential areas located in the downwind side. Located at least 100m from the designated forest land. Avoid disposal on productive land. Should be located with the consensus of the local community, in consultation with the engineer. All vehicles delivering material to the site shall be covered to avoid material spillage. 	
23	Clearing of construction camps and restoration		Contractor to prepare site restoration plans, the plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	Contractor
24	Project implementati on		It shall be ensured that the Environmental, Health and Safety guidelines of World Bank are adhered to as applicable for activities during construction.	Contractor, HD
OPE	RATIONAL PH	HASE	1	1
1	Compensator y plantation	The compensatory plantation should be carried out in consultation with the Forest department. Adequate care of the compensatory plantation should be taken up so as to achieve optimum survival rate. Landscaping should be done with a lag of 3 to 4	HD	

Sl. No.	Activity	Potential Impact	Mitigation Measures	Responsible Agencies
			months from the start of the work on any section. The section should be deemed to be complete when the landscaping is over. Survival rate of plants must be included in the contract specifications so as to ensure that the compensatory plantation achieves the objective of compensating lost trees. Indigenous and endemic tree species suitable for the area should be planted at the onset of monsoon season. The plants should be provided with adequate protection from animals and proper monitoring should be carried out to ensure their growth.	
2	Air and Noise Monitoring		The air and noise level in the project area should be periodically monitored by HD. If the observed level is more than the permissible limits, suitable mitigation measures should be taken.	HD
3	Maintenance		It shall be ensured by the HD that the proposed project road should be functional. The following practices should be adopted in maintaining the constructed road: Road structure, at-grade roads and drains shall be regularly inspected and cleaned properly. All damaged should be rectified immediately Rubbish and dust on the carriageway and drains should be cleaned and should not be left alongside the road and shall be immediately disposed in pre-identified site with necessary precautions. The signs, markings, signal and lighting should be maintained in good condition to ensure safe movement of vehicles. If any accidents occurred in the road within the project area, the causes shall be identified and necessary mitigation measures should be taken.	

9.8 Use of Sustainable Green materials Management Plan

GO GREEN Strategies

The following arrangements have been included in the preparation of environment management plan schemes, in order to make road projects as a sustainable system.

Sustainable/"Green" Materials

All paving materials, should be finished as anti-skid, non - slip, unglazed material. Since most road projects are redevelopment projects, reusing /recycling existing the road materials removed during construction (debris) materials. This practice is preferable and advisable. Materials which have some recycled content or that can be recycled after use should be preferred. Example:

• Recycled Asphalt, Recycled Rubber, Recycled stone or other miscellaneous construction materials, Recycled components in Concrete.

Permeable Pavement

Permeable pavement is a paving system which allows the rainfall to percolate into an underlying soil or aggregate storage reservoir, where storm water is stored and infiltrated to underlying sub grade, or removed by an overflow drainage system.

Permeable pavements are helpful for encouraging ground water recharge, and will help reducing pollution load in storm water runoff.

9.9 Benefits of the Project

The population in the project area will be benefited by the implementation of this project with reduction in traffic related issues.

Economic Benefits:

The project road connects all the major radial roads in Chennai peripheral network, which will carry voluminous traffic. The project road is end-route to various corporate and business places.

- Connectivity to Port shall enhanced.
- Commercial activity of the region will be improved.
- Speedy travel without congestion and choking shall be ensured for the road users

9.10 Environmental Monitoring

The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out. Broad objectives of the monitoring programme are:

- To evaluate the performance of mitigation measures proposed in the EMP
- To suggest improvements in the management plans, if required
- To satisfy the statutory and community obligations
- To provide feedback on adequacy of Environmental Impact Assessment

The monitoring programme contains monitoring plan for all performance indicators, reporting formats and necessary budgetary provisions. Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs). The Performance Indicators shall be evaluated under three heads as:

- Environmental condition indicators to determine efficacy of environmental management measures in control of air, noise, water and soil pollution;
- Environmental management indicators to determine compliance with the suggested environmental management measures.
- Operational performance indicators have also been devised to determine efficacy and utility of the mitigation/enhancement designs proposed.

Sl. No	Indicator	Details	Stage	Responsibility
Α	Environmental (Condition Indicators and Monito	ring Plan	
1	Air Quality	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan given in the Environmental Management Plan	Construction	Contractor through approved monitoring agency
2	Noise Levels		Construction	Contractor through approved monitoring agency
			Operation	TNHD through approved monitoring agency
3	Water Quality		Construction	Contractor through approved monitoring agency
В	Environmental N	Aanagement Indicators and Mor	nitoring Plan	
1	Disposal Locations	Locations for dumping have to be identified and parameters indicative of environment in the area has to be reported	Pre- Construction Stage	Contractor
2	Construction Camps	Location of construction camps have to be identified and parameters indicative of environment in the area has to be reported	Pre- construction	Contractor
3	Borrow Areas	Location of borrow areas have to be identified and parameters indicative of environment in the area has to be reported	Pre- construction	Contractor
4	Tree Cutting	Progress of tree removal marked for cutting is to be reported	Pre- construction	Foresters to PIU
5	Tree Plantation	Progress of measures suggested as part of the Tree Plantation	Construction	Foresters to PIU

Table 9. 3: Environmental Monitoring Indicators

Sl. No	Indicator	Details	Stage	Responsibility
		Strategy is to be reported		
6	Top soil	Implementation of the measures suggested for top soil preservation shall be reported by Contractor to the Engineer	Construction	Contractor
С	Management &	Operational Performance Indica	itors	
1	Survival Rate of Trees	The number of trees surviving during each visit will be compared with the number of saplings planted	Operation	The Engineer will be responsible for monitoring upto the Defect Liability Period in any particular stretch. After this period the Forest wing of the PIU will be responsible for monitoring over a period of 5 years.
2	Status Regarding Rehabilitation of Borrow Areas	The PIU will undertake site visits to determine how many borrow areas have been rehabilitated in line with the landowners request and to their full satisfaction.	Operation	The Engineer will be responsible for monitoring upto the Defect Liability Period in any particular stretch. After this period the Environmental Cell of the PIU will be responsible for monitoring over a period of 5 years

9.11 Reporting System

Reporting system for the suggested monitoring program operates at two levels as:

- Reporting for environmental condition indicators and environmental management indicators (except tree cutting indicator)
- Reporting for operational performance indicators at the PIU level

Contractor and Engineer operate the reporting system for environmental condition and environmental management indicators (except tree cutting). The Environmental Cell of PIU will operate the reporting system for environmental management tree cutting indicator and operation performance indicators. The PIU will set the targets for each activity envisaged in the EMP beforehand and all reports will be against these targets. Contractor will report to the Engineer on the progress of the implementation of environmental conditions and management measures as per the monitoring plans. The Engineer will in turn report to the PIU on a quarterly basis which will be reviewed. Along with these reports, forestry wing of the PIU shall report progress of tree cutting, compensatory plantation, landscaping and survival rate as per the monitoring plan. The PIU will also send periodical compliance report to the concerned authority as per the conditions of clearance granted for the project after receiving the report from the contractor and duly verified by the Engineer. Reporting formats have been prepared, which will form the basis of monitoring, by the Engineer and/or the Environmental Cell as required and presented as part of the EMP. The details of reporting formats prepared for the project is presented in Table 9.4.

SI.			Contractor	Forest Wing	Superv Consultan Concessi	Project Implementati on Unit (PIU)	
No.	Item	Stage	Implementation & Reporting to SC	Implementation & Reporting to PIU	Supervision Reportin g to PIU		Oversee / Field Compliance Monitoring
1	Identification of Dumping Locations	Pre- Construction	One Time	-	One Time	One Time	One Time
2	Setting up of Construction Camp	Pre- Construction	One Time	-	One Time	One Time	One Time
3	Borrow Area Identification	Pre- Construction	One Time	-	One Time	One Time	One Time
4	Tree Cutting	Pre- Construction	-	Monthly	-	-	Quarterly
5	Tree Plantation	Construction		Monthly			Quarterly
6	Top Soil Monitoring	Construction	Quarterly		Continuous	Quarterly	Quarterly

 Table 9. 4 Summary Details of Reporting Formats

SI.			Contractor	Superv Consultan Concessi	Project Implementati on Unit (PIU)		
No.	Item	Stage	Implementation & Reporting to SC	Implementation & Reporting to PIU	Supervision	Reportin g to PIU	Oversee / Field Compliance Monitoring
7	Pollution Monitoring	Pre Construction / Construction / Operation	As Per Monitoring Plan	-	Quarterly	Quarterly	Quarterly
8	Pollution Monitoring	Operation	-	-	-	-	As Per Monitoring Plan
9	Survival Rate of Trees	Operation	-	Quarterly	-	-	Quarterly
10	Status Regarding Rehabilitation of Borrow Areas	Operation	-	-	-	-	Half Yearly

In addition to these formats, to ensure the environmental provisions are included at every activity of the implementation by the contractor, it is suggested that the approval of the environmental personnel of the engineer is required in the Request for application to proceed or other similar reporting formats used by the contractor. These will not only ensure that the environmental provisions are addressed but also link the satisfactory compliance to environmental procedures prior to approval of the Interim Payment Certificate (IPC) by the Engineer. The activities by the contractor that can impact the environment will be identified based on discussions between the Environmental personnel of the Engineer. The decisions will be communicated to the contractor prior to the start of the construction activities.

9.12 Environmental Budget

Mitigation measures proposed in the EMAP will be implemented by the Concessionaire. The works to be undertaken by the Concessionaire have been quantified and the quantities included in the respective BOQ items such as earth works, slope protection, road safety features and tree plantation. More general environmental management measures to be followed by the Concessionaire have been included in the specifications and this EMAP. The budgetary provisions for the implementation of the environmental management plan and enhancement measures for the Project road are presented in the following Table. The EMP budget has been incorporated as BOQ in the total project cost estimates (DPR).

Budgetary estimates for environmental management in the project include all items envisaged as part of the EMP. The environment budget shown in Table 9.5 includes provisions for various environmental management measures (other than measures considered under good engineering practices) and the environmental monitoring costs. The EMP budget accounts for Rs 1400 Lakhs.

Table 9. 5 Overall Environmental Management Budget

Initial condition of the section o	Sl. No.	Description	Unit	Uint Rate			Quantity					Amou	ınt (Rs)			Total Amount
1.1 Oil Increptors Nos. 4000 3 3 4 3 4 12000 16000 12000 16000 68000 1.2 Recharge Pits Nos. 19000 29 29 29 29 551000 551000 551000 551000 551000 551000 551000 200000 2000000 1.3 Decepting of Ponds / Enhancement of Water bodies Nos. 500000 10 10 10 16 10 500000 500000 500000 500000 2000000 2000000 1.4 proper signage for avoiding traffic congestion including traffic congestincluding traffic congestraffic congestincongestion including traf	51. 190.	Description	Umt		Section 1	Section 2	Section 3	Section 4	Section 5	Section 1	Section 2	Section 3	Section 4	Section 5	Total	in Lakhs
1.2 Recharge Pits Nos. 1900 29 29 29 29 29 551000 551000 551000 551000 2755000 1.3 Deepening of Ponds / Enhancement of Water bodies Nos. 50000 10 10 16 10 10 500000 500000 500000 500000 500000 28000000 1.4 provision of temporary barriers and provision provis	1	Mitigation Measures														
1.3Deepening of Ponds / Enhancement of Water bodiesNos.50000010101016101050000050000050000050000050000028000001.4proper signage for avoiding traffic congestion including traffic management measuresNos.5000001010161010500000500000500000050000005000000280000001.4proper signage for avoiding traffic congestion including traffic management measuresIncluded in the BoQ of Civil WorksIncluded in the Condition of ContractIncluded in the Condition of C	1.1	Oil Interceptors	Nos.	4000	3	3	4	3	4	12000	12000	16000	12000	16000	68000	0.68
1.3 Water bodies Nos. 300000 10 10 16 10	1.2	Recharge Pits	Nos.	19000	29	29	29	29	29	551000	551000	551000	551000	551000	2755000	27.55
1.4 proper signage for avoiding traffic management measures Included in the BoQ of Civil Works Included in the BoQ of C	1.3		Nos.	500000	10	10	16	10	10	5000000	5000000	8000000	5000000	5000000	28000000	280.00
1.5Lead and lift for debris up to dumping areaIncluded in the BoQ of Civil WorksIncluded in the Condition of ContractIncluded Included Included Included Included Included Inclu	1.4	proper signage for avoiding traffic congestion including traffic														
1.7Dewatering during construction phaseIncluded in the Rate of EarthworkIncluded in the Rate of Earthwork	1.5	Lead and lift for debris up to dumping				Included in the BoQ of Civil Works										
2Tree Plantation and ProtectionImage: state of the state of th	1.6	Dust arresting measures				Includ	led in the Co	ndition of Co	ontract							
2.1Safeguarding trees including O&MNos.180025091158202454500001638002847600044100039024002.2Transplanting Trees (Transplanting and Maintanence)Nos.80003374006920120026960003200000553600009600000210320003Monitoring of Environmental Attributes during Pre-Construction and PostConstruction Phase- Baseline Monitoring for five locationsImage: Safety	1.7	Dewatering during construction phase				Incl	uded in the R	ate of Earthy	work							
2.1maintenance during O&MNos.180025091158202454500001638002847600044100039024002.2Transplanting Trees (Transplanting and Maintanence)Nos.80003374006920120026960003200000553600009600000210320003Monitoring of Environmental Attributes during Pre-Construction, Construction and PostConstruction StagesNo.80003374006920120026960003200000553600009600000210320003.1Pre Construction Phase- Baseline Monitoring for five locationsNo.	2	Tree Plantation and Protection														
2.2 and Maintanence) Nos. 8000 337 400 092 0 1200 2696000 3200000 5536000 0 9600000 21032000 3 Monitoring of Environmental Attributes during Pre- Construction, Construction and PostConstruction Stages No. Image: Construction and PostConstruction Phase-Baseline Monitoring for five locations Image: Construction Phase-Baseline Monitoring for five locat	2.1	Safeguarding trees including maintenance during O&M	Nos.	1800	250	91	1582	0	245	450000	163800	2847600	0	441000	3902400	39.024
3 Attributes during Pre- Construction, Construction and PostConstruction Stages Pre- Stages 3.1 Pre Construction Phase- Baseline Monitoring for five locations Image: Construction Phase- Baseline Monitoring	2.2	Transplanting Trees (Transplanting and Maintanence)	Nos.	8000	337	400	692	0	1200	2696000	3200000	5536000	0	9600000	21032000	210.32
^{3.1} Monitoring for five locations	3	Attributes during Pre- Construction, Construction and PostConstruction Stages														
Air quality Nos. 2000 5 5 5 5 5 100000 100000 100000 100000 500000	3.1															
		Air quality	Nos.	20000	5	5	5	5	5	100000	100000	100000	100000	100000	500000	5.00

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Sl. No.	Description	Unit	Uint Unit Rate –			Quantity					Amou	unt (Rs)			Total Amount
SI. INO.	Description	Umt	(Rs)	Section 1	Section 2	Section 3	Section 4	Section 5	Section 1	Section 2	Section 3	Section 4	Section 5	Total	in Lakhs
	Noise quality	Nos.	20000	5	5	5	5	5	100000	100000	100000	100000	100000	500000	5.00
	Water quality	Nos.	20000	5	5	5	5	5	100000	100000	100000	100000	100000	500000	5.00
	Soil quality	Nos.	20000	5	5	5	5	5	100000	100000	100000	100000	100000	500000	5.00
3.2	Construction Phase- for four seasons for 3 years for five locations														
	Air quality	Nos.	20000	60	60	60	60	60	1200000	1200000	1200000	1200000	1200000	6000000	60.00
	Noise quality	Nos.	20000	60	60	60	60	60	1200000	1200000	1200000	1200000	1200000	6000000	60.00
	Water quality	Nos.	20000	60	60	60	60	60	1200000	1200000	1200000	1200000	1200000	6000000	60.00
	Soil quality	Nos.	20000	60	60	60	60	60	1200000	1200000	1200000	1200000	1200000	6000000	60.00
3.3	Post Construction Phase- for four seasons for one year for five locations														
	Air quality	Nos.	20000	20	20	20	20	20	400000	400000	400000	400000	400000	2000000	20.00
	Noise quality	Nos.	20000	20	20	20	20	20	400000	400000	400000	400000	400000	2000000	20.00
	Water quality	Nos.	20000	20	20	20	20	20	400000	400000	400000	400000	400000	2000000	20.00
	Soil quality	Nos.	20000	20	20	20	20	20	400000	400000	400000	400000	400000	2000000	20.00
4	At Hot Mixing Plant / Plants														
4.1	Monitoring Air Quality - 4 times/year for 2 years for 2 locations	Nos.	20000	16	16	16	16	16	320000	320000	320000	320000	320000	1600000	16.00
4.2	Monitoring Noise Quality - 4 times/year for 2 years for 2 locations	Nos.	20000	16	16	16	16	16	320000	320000	320000	320000	320000	1600000	16.00
4.3	Monitoring Water Quality - 4 times/year for 2 years for 2 locations	Nos.	20000	16	16	16	16	16	320000	320000	320000	320000	320000	1600000	16.00
4.4	Monitoring Soil Quality - 4 times/year for 2 years for 2 locations	Nos.	20000	16	16	16	16	16	320000	320000	320000	320000	320000	1600000	16.00

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SI No	. No. Description Unit R		Uint Rate			Quantity				_	Amou	nt (Rs)			Total Amount in Lakhs
51. 110.			(Rs)	Section 1	Section 2	Section 3	Section 4	Section 5	Section 1	Section 2	Section 3	Section 4	Section 5	Total	
5	Enhancement of Cultural Properties				Inclue	led in the R&	&R Cost								
6	Forest Land Acquisition				Inclu	ided in the L	A Cost								
7	Monitoring of Management & Operational Performance Indicators (for four seasons for 3 years)														
7.1	Trees	Nos.	10000	12	12	12	12	12	120000	120000	120000	120000	120000	600000	6.00
7.2	Status of Redevelopment of Borrow Areas	Nos.	10000	12	12	12	12	12	120000	120000	120000	120000	120000	600000	6.00
7.3	Waste Management Quality Monitoring	Nos.	10000	12	12	12	12	12	120000	120000	120000	120000	120000	600000	6.00
8	Monitoring Environmental parameters	Nos.	10000	12	12	12	12	12	120000	120000	120000	120000	120000	600000	6.00
I	Total Cost for Environmental Parameters and Monitoring								16830500	16988000	28246500	14123000	22590000	98778000	987.78
9	Instituional Strengthening														
9.1	Monitoring and Evaluation External Agency								2000000	2000000	2000000	2000000	2000000	10000000	100.00
9.2	Appointment of Environmental Officer (PIU)								2000000	2000000	2000000	2000000	2000000	1000000	100.00
10	Training and Development														
10.1	Conducting Capacity building Workshops								300000	300000	300000	300000	300000	1500000	15.00
10.2	Public Awareness Campaigns								400000	400000	400000	400000	400000	2000000	20.00
II	Total Cost for Institutional Arrangements								4700000	4700000	4700000	4700000	4700000	23500000	235.00
III	Cost for obtaining clearance for Coastal Regulation Zone								5000000	0	0	0	0	5000000	50.00

Sl. No.	Description	Unit	Uint Rate			Quantity					Amou	unt (Rs)			Total Amount
51. 110.	Description	Umt	(Rs)	Section 1	Section 2	Section 3	Section 4	Section 5	Section 1	Section 2	Section 3	Section 4	Section 5	Total	in Lakhs
IV	Total Cost for Environmental Works (I+II+III)								26530500	21688000	32946500	18823000	27290000	127278000	1272.78
	Contingency 10% of Total Cost (IV)								2653050	2168800	3294650	1882300	2729000	12727800	127.28
	Total EMP Budget								29183550	23856800	36241150	20705300	30019000	140005800	1400.06

9.13 Basis of Cost estimates

Tree Felling Cost

Tree felling permission will be obtained, if any tree is to be cut, from District Collector. The cost for the same has been included in project costs.

Utility Shifting

The cost of existing utility shifting is taken under separate Head.

Mitigation measures other than Good Engineering Practices

This section includes the costs for the mitigation measures during the construction other than those included in the Engineering Budget. It covers the following items:

Oil Interceptors

The unit cost of Oil & Grease Interceptors (Influent handling capacity 20 L/hr) has been considered as per prevalent market rates.

Recharge pits for urban drains

The unit cost of Recharging Pits for roadside drains (2 m below the bottom of the catch pit) has been worked out as per prevalent market rates.

Soak pits for hand pumps

The unit cost of soak pit made of brick masonry/concrete rings, filled with brick bats and pebbles, as per market rate. Cost for this item has been considered under utility shifting of water sources.

Tree Plantation and Protection

The transplantation item includes costs for the transplanting the trees, the unit cost of transplanting each tree is estimated as Rs 8000 per tree. (The cost is derived from the successful case study of Gujarat State Road Project with 50% additional provision). It includes the cost of the digging, transplanting, manuring and maintenance for 5 years. The transplanting shall be chosen by the contractor based on the species and its survival rates.

The safeguarding trees item includes costs for the tree protection and maintenance for 5 years which is estimated as Rs 1800 per tree. It includes the cost of the manuring and

maintenance for 5 years; cost of replacing of casualties is also included. Tree fencing will be provided for the saplings.

Monitoring Environmental Attributes during Pre -Construction Phase

Air Quality

The cost for continuous 24 hour monitoring for PM10, PM2.5, SO2, NOx & CO as per prevalent market rates. (For 25 locations and for one time will be carried out by the DPR consultant during baseline monitoring for EIA report).

Noise Level

The cost for noise level monitoring on dB(A) scale (readings to be taken at 15 second interval for 15 minutes every hour for a total period of 24 hours) as per prevalent market rates.

(For 25 locations and for one time will be carried out by the DPR consultant during baseline monitoring for EIA report).

Water Quality

Water quality will be monitored for the following parameters:

□ pH, BOD, COD, TDS, Pb, Oil & Grease and Detergents for surface water

□ pH, TDS, Total Hardness, Sulphate, Chloride, Fe, Pb and Coliform count for ground water

Cost for one time monitoring of water quality as per prevalent market rates.

(For 25 locations and for one time will be carried out by the DPR consultant during baseline monitoring for EIA report).

Soil Quality

Cost for one time monitoring of soil quality for Pb, Sodium Absorption Ratio & Oil & Grease as per prevalent market rates. Provisions have also been included in the budget to monitor the soil quality in event of any major accident/spillage during bulk transport of hazardous material. Costs are incorporated for monitoring at such locations. (For 25 locations and for one time will be carried out by the DPR consultant during baseline monitoring for EIA report).

Monitoring Environmental Attributes during Construction Phase

Air Quality

The cost for continuous 24 hour monitoring for PM10, PM2.5, SO2, NOx & CO as per prevalent market rates. (For 25 locations and for four times for 3 years will be carried out by the contractor during construction stage). (For hot mix plants and additional monitoring location during construction, samples will be collected at 10 locations for four seasons for 2 years)

Noise Level

The cost for noise level monitoring on dB(A) scale (readings to be taken at 15 second interval for 15 minutes every hour for a total period of 24 hours) as per prevalent market rates.

(For 25 locations and for four times for 3 years will be carried out by the contractor during construction stage). (For hot mix plants and additional monitoring location during construction, samples will be collected at 10 locations for four seasons for 2 years)

Water Quality

Water quality will be monitored for the following parameters:

□ pH, BOD, COD, TDS, Pb, Oil & Grease and Detergents for surface water

□ pH, TDS, Total Hardness, Sulphate, Chloride, Fe, Pb and Coliform count for ground water

Cost for one time monitoring of water quality as per prevalent market rates.

(For 25 locations and for four times for 3 years will be carried out by the contractor during construction stage). (For hot mix plants and additional monitoring location during construction, samples will be collected at 10 locations for four seasons for 2 years)

Soil Quality

Cost for one time monitoring of soil quality for Pb, Sodium Absorption Ratio & Oil & Grease as per prevalent market rates. (For 25 locations and for four times for 3 years will be carried out by the contractor during construction stage). (For hot mix plants and additional monitoring location during construction, samples will be collected at 10 locations for four seasons for 2 years)

Monitoring Environmental Attributes during Operation / Post-Construction Phase Air Quality

The cost for continuous 24 hour monitoring for PM10, PM2.5, SO2, NOx & CO as per prevalent market rates. (For 25 locations and for four times for one year will be carried out by the contractor during post -construction stage on BOT basis).

Noise Level

The cost for noise level monitoring on dB(A) scale (readings to be taken at 15 second interval for 15 minutes every hour for a total period of 24 hours) as per prevalent market rates.

(For 25 locations and for four times for one year will be carried out by the contractor during post -construction stage on BOT basis). Noise barriers should be provided at vulnerable stretches.

Water Quality

Water quality will be monitored for the following parameters:

□ pH, BOD, COD, TDS, Pb, Oil & Grease and Detergents for surface water

□ pH, TDS, Total Hardness, Sulphate, Chloride, Fe, Pb and Coliform count for ground water

Cost for one time monitoring of water quality as per prevalent market rates.

(For 25 locations and for four times for one year will be carried out by the contractor during post -construction stage on BOT basis).

Soil Quality

Cost for one time monitoring of soil quality for Pb, Sodium Absorption Ratio & Oil & Grease as per prevalent market rates. (For 25 locations and for four times for one year will be carried out by the contractor during post -construction stage on BOT basis).

Enhancement Proposal

Enhancement measures for Temples/Churches/Schools

Enhancement or replacement of 84 identified Common Property Resources (CPR),will be covered under RAP.

Enhancement/Mitigation measures for water bodies

Water bodies have been identified along the project road for enhancement which covers the following enhancement;

- RCC retaining wall to protect the bund along the road
- Provision of 2 m high and on average of 120m long stone wall
- Grass sodding along road slope for average of 80m length

Waste Bins

It is proposed to provide waste collection bin at every bus bay/shelter These dimensions and cost shall be included in bus shelter replacement cost.

Signboards for the Reserve forest

It is proposed to provide informatory sign board regarding the location of Reserve forests (If the buffer zone is located at about 5km distance from project road). Signboards shall be displayed at the start of identified forest zones of project road's stretch falling within 5 km. The cost shall be included under the cost for display boards and highways sign boards.

Monitoring and Management Measures

The monitoring cost for the inspection of Trees plantation and survival, Borrow land areas, labor camps, waste/ debris removal and other components has been derived based on the prevailing rates.

Monitoring and Evaluation Specialist and PMC expert

The cost towards the appointment of Environmental expert for the PIU and the PMC environmental specialist has been made based on the remuneration fixed by multilateral funding agencies for EMP implementation in road projects. (Rs 1,00,000 for 10 months for each sub projects).

Training and Capacity Building

The cost towards the training and capacity building component has been derived at the rate of one lakh for a training programme.

Programme	Particulars	Duration	Participants
Orientation	Concessionaire's	One day	Engineers including
Programme	Responsibility as per bid document / Reporting System in EMAP		ESE
Awareness	General Awareness on	One day	Skilled and unskilled
programme	Environment		laborers
	General Awareness on Safety		
	aspects		
Orientation	Concessionaire's	One day	Engineers and staff
Programme	Responsibility as per bid		of the contractor
	document		office and PMC staff
	Reporting System in EMAP		

Information dissemination and Awareness creation

The cost towards sensitivity and information dissemination of environmental issues to the public shall be delivered through any consulting firms or NGOs during the implementation stage. Four workshops, campaigns shall be planned at the cost of one lakh each for three sub projects.

9.14 Penalty clause for Non-conformity to the EMP

The Concessionaire shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP Report. Any lapse in implementing the same shall attract the penalty clause as detailed below:

- 1. All lapse in obtaining clearances / permissions under statutory regulations and violations of any regulations with regard to eco-sensitive areas shall be treated as a major lapse.
- 2. Any complaints of public, within the scope of the Concessionaire, formally registered with the IE, or with the TNHD complaint cell and communicated to the Concessionaire, which is not properly addressed within the time period intimated by the IE / PIU shall be treated as a major lapse.
- 3. Non-conformity any of the mitigation measures stipulated in the EMP Report (other than stated above) shall be considered as a minor lapse.
- 4. On observing any lapses, IE shall issue a notice to the Concessionaire, to rectify the same.

- 5. Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after one month from the original notice date and first reminder date respectively. Any minor lapse, which is not rectified, shall be treated as a major lapse from the date of issuing the second reminder.
- 6. If a major lapse is not rectified upon receiving the notice, IE shall invoke the penalty clause, in the subsequent interim payment certificate.
- 7. Penalty for major lapses shall be with-holding of 10% of the interim payment certificate, subject to a maximum limit of Rs. 30 lakhs
- 8. If the lapse is not rectified within three months after withholding the payment, the amount withheld shall be forfeited

9.15 Conclusion

The Environmental Management Plan shall be followed in all the stages of the project and necessary mitigations shall be taken if the project cause adverse impacts to the environment.

CHAPTER – 10 COMMUNITY CONSULTATION AND PARTICIPATION

CHAPTER - 10 COMMUNITY CONSULTATION AND PARTICIPATION

10.1 Introduction

Public consultations have acquired a very important role in the planning process for development projects. Globally, the practice of involving communities in the planning process has been recognized as an effective tool for mitigating the negative impacts due to the projects and ensuring its timely completion. The effectiveness of participation and consultation is directly related to the degree of involvement of the affected groups. The project requires detail planning to ensure that likely project affected persons, local community, interested groups, non-governmental organizations, civil society organizations; local government, line departments, etc are consulted regularly at different stages.

10.2 Consultation and Participation

Consultation with PAHs is the starting point to address involuntary resettlement issues concerning land acquisition and resettlement. People affected by resettlement may be apprehensive that they will lose their livelihoods and communities. Participation in planning and managing resettlement helps to reduce their fears and gives PAH's an opportunity to participate in key decisions that affect their lives. The initial step for consultation and participation is to identify the primary and secondary stakeholders and sharing information with the affected PAHs.

Public information and consultation was carried out during the project preparation stage in the form of public meeting, focus group discussion, in-depth interviews and individual consultations. The consultation process ensured that the likely project affected households (PAHs), local community and other stakeholders were informed in advance to participate and consult actively. This serves to reduce the insecurity among local community and likely PAHs opposition for the project because of transparency in the consultation process.

10.3 Purpose of Consultation

The purpose of consultations was to inform people about the project, their issues, concerns and preferences, and allow them to make meaningful choices. Consultations will be carried out during the implementation, monitoring and evaluation stage. Concerns, views and suggestions expressed by the participants during these

consultations have been presented in the following sections. The outcomes of consultations have been shared with design team to incorporate in design wherever possible.

10.4 Introduction

The main objective of the consultation process is to inform the PAHs about the anticipated benefits, negative impacts and mitigation measures of the project. The objectives of public consultation as part of this project are:

- Promote public awareness and improve understanding of the potential impacts of proposed project;
- Identify alternative sites or designs and mitigation measures;
- Solicit the views of affected communities I individuals on environmental and social problems;
- Improve environmental and social soundness;
- Clarify values and trade-offs associated with different alternatives;
- Identify contentious local issues which might jeopardize the implementation of the project;
- Establish transparent procedures for carrying out proposed works;
- Create accountability and sense of local ownership during project implementation.

10.5 Levels of Consultation

There are various levels of Public participation and Consultation as follows:

- Dissemination of information;
- Ensuring public participation;
- Listening to public opinion and PAPs preferences; and
- Involving PAPs in decision making process

10.6 Stages of Participation

The Public Consultation process requires three different levels of public involvement:

- Prior to resettlement (short term);
- During implementation and
- Post resettlement (long term)

10.6.1 Consultation Prior to Resettlement

The Public Consultation prior to the resettlement envisages two broad aspects as follows:

- Rapport with the PAPs / Direct discussion with PAPs;
- Information Dissemination

Preliminary public meetings with the PAPs and the general public enable the project team to develop the scope for direct discussion with the affected community. The details of the major components of the project related road design, likely losses, R&R policy, components of entitlements framework and implementation process were explained and discussed. The details of the minutes of the meeting reported in the coming sections for the different Road stretches. Suggestions and comments of the public were invited and greater efforts were presented to incorporate those recommendations in the report. PAPs were facilitated to raise queries and get clarified. The meetings were conducted at strategic locations which is convenient for people to attend. Local leaders / community leaders/ elected representative were informed in advance to attend the meetings. Various Stakeholders of the road project such as District administration, Highways Engineers, Revenue, and Police, Forest department, NGOs and media persons were given stake to participate in the meetings. Any major issues which need modification in the DPR will be considered and relevant changes will be incorporated. These meetings were documented. (Details given in Annexure on Public Consultation).

10.6.2 Consultation during Resettlement

The Public Consultation during resettlement will be a focused one targeting the Project affected persons. The Highways and DPR Consultant team will highlight the features of the RAP and the Entitlements matrix. There will be periodical meetings so that the concerns addressed rapidly. The Focused consultations in this regards shall highlight the following:

- Details of Land parcel
- Extent and Impact of Loss
- Details of Entitlements

- Schedule of resettlement
- Schedule of construction activities
- Displacement and resettlement
- R&R cash assistance disbursement
- Grievances redressal mechanism

The process of the three public consultations shall be organized followed more or less the same processes:

- Rapport with the local leaders and persons who were located in the project area during the baseline survey.
- Rapport with the officers at the local and district level and as well the HD.
- Established procedure of the meeting and convenient place and date in discussion with the people.
- Once the common convenient meeting time and place was fixed and agreed by the officials, the community was informed in advance.
- Finally, the meetings were held

10.6.3 Consultation Post Resettlement

The Public Consultation primarily long term the continued consultation with the PAPs to assess whether the RAP has been successfully implemented in time and improved the standard of living of the area.

10.7 Stakeholders Consultation

- ⇒ Project description: Need for the project, alternative options and alignment changes and benefits of the project, etc.
- ⇒ Social and Environmental Assessment vis-a-vis GoTN requirement;
- ⇒ The extent and nature of negative social and environmental impact and the need for rehabilitation and resettlement in the project. Avoidance, mitigation and enhancement aspects in the project;
- ⇒ Dissemination of R&R policy formulated for the project prescribing various R&R options; and

⇒ People's participation in planning, implementation and monitoring & evaluation stage.

Following issues were discussed and suggestions made:-

- \Rightarrow Trees within proposed RoW should only be cut when it is very much essential.
- ⇒ Cross roads should be provided with speed breakers as per guidelines of IRC, so that chances of accident are minimized.
- ⇒ Existing culverts on existing roads should be also upgraded. Culverts should be provided at close interval in new alignments.
- \Rightarrow The new alignment should be away from residential areas to avoid pollution.

10.8 Methodology Adopted

Different techniques of consultation with stakeholders were used during project preparation, viz., in-depth interviews, public meetings, group discussions, Individual Consultations etc. to understand the socio-economic profile of the community and the affected families, structured questionnaires were used and information was collected from the individuals on one-to-one basis. The consultations have also been carried out with special emphasis on the vulnerable groups. The key informants during the project preparation phase included both individuals and groups namely:

- Heads and members of households likely to be affected
- Groups/clusters of PAHs
- Village Panchayat, elected representatives and members
- Local voluntary organizations and NGO
- Government agencies and departments such as local revenue authority
- Other project stakeholders with special focus on PAHs belonging to the vulnerable group.

10.9 Details of Consultation Meetings Held

Thus, after the submission of the Screening Report, a public consultation was conducted to disseminate the course of the study. This will allow the study team to incorporate the suggestions made in the project and continue with the drafting of the project. The dissemination process consisted in holding several meetings with the public, where the proposals of the project were presented as well as the impacts by the study team. As per the ToR, the consultation meetings addressed to local public were

conducted on 21st to 31st July 2014 at the following 5 locations. The number of meeting points and their locations along with schedule were finalized in consultation with the respective Divisional Engineers of Highways Department.

- 1. Thirupadalambigai Thirumanamandabam, Manamathi Village
- 2. Grama Sabha Place, Near Eshvaran Temple, Oragadam Village
- 3. Ariya Vaisya Peri Chettiyar Chathiram, Chinnakkadai Sadhukkam, Sriperumbudur
- 4. The Panchayath Office, Melnallathur Village
- 5. The Sports Ground, Government School, Panchetty Village

The Social Impact Assessment report covered the outcome of the aforementioned consultation session with the General public.

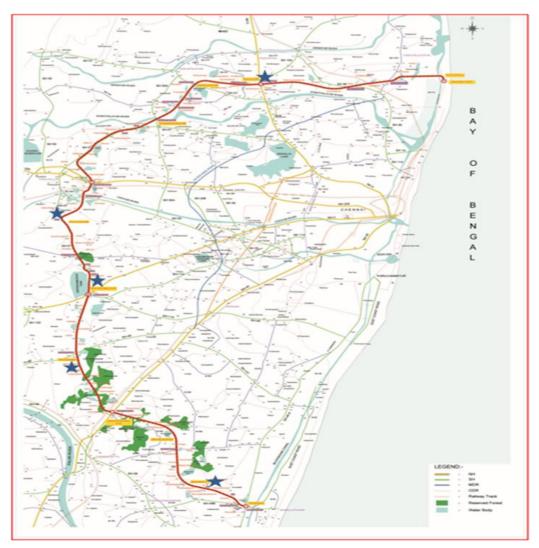


Figure 10.1 Location Map of Public Consultation Meetings

10.9.1 Meeting No. 1 - Public Consultation Meeting at Manamathi Village

Organising the Meeting

Public consultation meeting was organized at the Thirupadalambigai Thirumanamandabam, Manamathi Village on 3.00 pm of 21st July 2014.

A notice inviting for the meeting was issued to the local people residing in the project area, the commuters on the project area, NGOs, Government departments and general public three days prior to the meeting. The MLA of Thiruporur Constituency and the Village Panchayat Presidents of villages along/adjacent to the proposed alignment from Mahabalipuram to Singaperumalkoil were also invited for the meeting.

The information on the meeting was published in the local news papers.

The information regarding the consultation meeting was displayed at entrance of the venue in a flex banner.

Consultation Meeting

The public consultation meeting was convened by the Divisional Engineer (H), C&M, Chengalpattu Division and Government of Tamil Nadu.

The Assistant Divisional Engineer (H), C&M, Chengalpattu, The Assistant Divisional Engineer (H), C&M, Thirukazhukundram, representatives from NGOs and Government Departments and the General Public were attended the meeting.

The meeting was attended by representatives from the following 19 villages/ hamlets: Sirungundram, Manamathi, Kulipanthandalam, Amayampattu, Santhaimedu, Kottivakkam, Viraspalayam, Vengoor, Karumpakkam, Mullipakkam, Kankulam, Agaram, Siruthavur, Thasarikuppam, Rayamangalam, Karanai, Sengalunirodai, Mailai and Singaperumalkoil.

Presentation of the Project

The Alignment Map, Typical Cross Section drawings and salient features of the project were displayed in the hall. Brief note on the tasks performed during the meeting is listed below:

• The project background, alignment, project features and facilities, benefits like travel time savings, safety, etc and impacts like land acquisition,

environmental/social impacts, etc were explained by the Consultants in the meeting in local language (Tamil).

- After presentation, an interaction session was carried out, in which attendees have given their suggestions and raised few questions regarding the project.
- Participant's attendance were recorded and given in the Annexure.
- A feedback form was distributed to the audience of the meeting to give their suggestions and comments on the project. The format of feedback form was finalized in consultation with Highways Department. The questionnaire was formulated in a view to provide full freedom for the stakeholders to register their comments/suggestions.

The entire consultation meeting was video documented and photographs were taken.





Proceedings of the Meeting

The Divisional Engineer welcomed the participants and introduced the study team, thereby commencing the dissemination meeting.

- Senior Social Development Specialist from the study team addressed the participants and informed them about the purpose of the dissemination meeting and also provided snap shot of proposed project and invited Divisional Engineer to explain in detail about the proposed alignment and project specific information's.
- The Divisional Engineer, explained the participants about the proposed alignment, villages passing through, proposed RoW and facilities proposed under this project.
- On completion of briefing of the project, the participants were invited to ask their clarifications and suggestion on the proposed project. Feedbacks from the participants were recorded in a feedback form and videography was also done for the entire dissemination meeting.
- Around 70 public representatives from various villages were participated and about 57 participants were recorded their feedback in the form circulated during the meeting.
- The dissemination meeting end with a thanking note and the Divisional Engineer appreciated the contributions of participants and assured that comments/ feedback received during the meeting will be duly considered during finalization of the project.
- In general, public opinioned that the proposed project will improve the connectivity in the neighboring villages.

Following Table highlights the key suggestion/ comments raised during the meeting:

Sl. No.	Suggestions/Comments	Reply to Comments
ENGIN	NEERING ASPECTS	
01	Whether the project is a Toll road.	The proposals on tolls will be finalised at the subsequent stages by the government.
02	Whether the proposed Sub-way across railway line at Singaperumalkoil will be affected by this project.	No. It is proposed to modify the geometry of ROB under construction at Singaperumalkoil.
SOCIA	L ASPECTS	
01	Representative wanted to know the number of villages is proposed to be passing through the project road.	Study team listed the name of villages through which the project road is passing through in this section.
02	Representatives enquired about the compensation for affected agricultural lands in the project.	Compensation will be determined as per latest LA & RR act '2013.
03	People also enquired about the compensation for affected wells in the agricultural lands.	Compensation will be determined as per latest LA & RR act '2013.
04	Representative wanted to know the strategies going to be adopted for payment of compensation to the losses.	The compensation package matrix for the losses will be prepared as per the latest LA & RR act '2013 and disclosed by the project authority.
05	Entire cultivation land is likely to be affected due to this project which has been the only source for livelihood. Hence requested the team to mitigate LA over cultivable lands.	Project alignment is finalised in view of minimising social and environmental impacts. Compensation will be paid for the affected land as per latest LA & RR act '2013.
06	Representative wanted to know whether the project affects the commercial stretches at Karanai and wanted the RS Nos. of all the likely affected areas.	It is replied that, no commercial stretches would be affected. Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS
07	Wanted to know is there a provision for alternate cultivable land for the loss of same.	Possibilities of providing alternate land will be evaluated and compensation packages will be determined as per latest LA & RR act '2013

Feedback from the Stakeholders

- After the meeting, the attendees were requested to fill in the feedback forms delivered in the dissemination session. All the forms received from the participants are documented.
- Totally 57 feedback forms were received and analyzed from the meeting. Every query, suggestion or concern of the participants from the meeting and feedback form shall be considered in the subsequent stages of the assignment.

The comments collected from the feedback forms are summarized in the following Table:

Sl. No.	Suggestions/Comments	Reply to Comments
ENGIN	IEERING ASPECTS	
01	Revenue survey numbers along the proposed alignment	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS.
02	Details about the proposed alignment and request a copy of alignment plan for the public.	The alignment plan is displayed in the hall. The same will be available at Highways Division/Sub-division offices for reference.
03	Necessity of the project.	Provide connectivity around Chennai and access to Ennore Port from all radial roads.
04	Are there any future development potentials for the nearby villages?	Proposed project provide connectivity and accessibility for the nearby villages.
05	Is there any alternate alignments evaluated for this proposal?	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view.
06	Is there any provision for cross roads in the project?	Underpasses proposed for the cross roads.
07	Are there any possibilities for by-pass to	Final alignment is selected after

SI. No.	Suggestions/Comments	Reply to Comments
	avoid impacts to our area?	evaluating various alternate alignments based on techno, economic, environmental and social point of view. Modification will cause major impact on other areas.
08	Widening of existing road to avoid land acquisition.	Project road will be developed with 60m right of way. Widening of existing roads requires land acquisition on both sides which will cause major social impacts on the adjoining villages.
09	Project should not affect the existing rural link roads, water resources, channels & other irrigation system	Service road is proposed on both sides to provide access and underpasses are proposed for crossing the project road. Necessary cross drainage structures are proposed waterway crossings.
10	Provide address of government departments involved in the process of implementation of the project to obtain clarity before buying any lands along the project area.	The alignment plan is available at the Highways Divisional/Sub-division offices for reference.
11	Provision for cross roads and link roads	Service road is proposed on both sides to provide access and underpasses are proposed for crossing the project road.
12	Thiruporur and neighbouring villages should be linked with the proposed road	These areas can be accessible from the project road through existing roads like OMR, Thiruporur-Chengalpattu Road, Thiruporur-Thirukazhukundram Road, etc
13	Tolls should not be proposed in this project	Proposals on tolls will be finalised at the subsequent stages by the government.
14	Requested to upload the proposed alignment in the website for public viewing.	The alignment plan is available at the Highways Divisional/Sub-division offices for reference.
15	Families living at Sirukundram want to	The proposed alignment is on the

Sl. No.	Suggestions/Comments	Reply to Comments
	propose the road on the southern part of the hill so that agricultural based activities and livelihood will not be affected.	southern part of the hill only.
16	Poromboke land in the Vengoor village should not be affected.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Modification will cause major impact on other areas.
17	In Karani village, the alignment should be planned to pass through poromboke lands so as to avoid impact to patta lands	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Modification will cause major impact on other areas.
18	Bus stands/ bus stops should be provided under this project	Bus bays with shelter proposed on the service road near villages and important road crossings.
ENVIR	CONMENTAL ASPECTS	
01	How about trees affected along the alignment	Tree cutting is unavoidable. New tress will be planted at a ratio of 1:10. Wherever possible trees will be replanted.
02	Road alignment should not affect the water bodies such as lakes, pond, etc	Adequate care has been taken to avoid impacts to water courses.
SOCIA	L ASPECTS	
01	Is there any Government job for the PAFs?	At present, there is no provision made by the authority.
02	Requested to implement the project without affecting the houses and properties.	The alignment is finalized in view of minimising social impact. Utmost care will be taken to minimising the impact on the house and properties during

Sl. No.	Suggestions/Comments	Reply to Comments
		implementation.
03	Requested to provide higher compensation to the patta lands	Compensation for the PAFs will be made as per latest LA & RR act '2013.
04	Requested to provide compensation more than the government fixed rate for the lands.	Compensation for the PAFs will be made as per latest LA & RR act '2013.
05	Project shall be implemented without affecting properties in the Manamathi village	The alignment is finalized in view of minimising social impact. Care will be taken to minimise the impact in Manamathi village during implementation.
06	Compensation should be more than the current market value	Compensation for the PAFs will be made as per latest LA & RR act '2013.
07	Whether any alternate land for the affected agricultural land will be given?	Possibilities of providing alternate land will be evaluated and compensation packages will be determined as per latest LA & RR act '2013
08	Whether direct employment opportunities will be given to the PAFs?	Job opportunities would be given to the PAFs during construction of the project.
09	Requested to enhance compensation packages.	Compensation for the PAFs will be made as per latest LA&RR act '2013.
10	It is opinion that proposed project will affect small farmer's livelihood.	Adequate care will be taken to minimise the impact.

10.9.2 Meeting No. 2 - Public Consultation meeting at Oragadam Village

Public consultation meeting was organized at the Grama Sabha Place, near Eshvaran Temple, Oragadam Village on 3.00 pm of 23rd July 2014.

A notice inviting for the meeting was issued to the local people residing in the project area, the commuters on the project area, NGOs, Government departments and general public three days prior to the meeting. The MLA of Sriperumbudur Constituency and the Village Panchayat Presidents of villages along/adjacent to the proposed alignment from Singaperumalkoil to Sriperumpudur were also invited for the meeting.

The information on the meeting was published in the local newspapers. The information regarding the consultation meeting was displayed at entrance of the venue in a flex banner.

Consultation Meeting

The public consultation meeting was convened by the Divisional Engineer (H), C&M, Chengalpattu Division and Government of Tamil Nadu.

The Assistant Divisional Engineer (H), C&M, Sriperumpudur, representatives from NGOs and Government Departments and the General Public were attended the meeting.

The meeting was attended by representatives from the following 7 villages/ hamlets: Sriperumpudur, Vallakottai, Chennakupppam, Oragadam, Mathur, Kolathur and Vallam.

Presentation of the Project

The Alignment Map, Typical Cross Section drawings and salient features of the project were displayed in the hall.

Brief note on the tasks performed during the meeting is listed below:

- The project background, alignment, project features and facilities, benefits like travel time savings, safety, etc and impacts like land acquisition, environmental/social impacts, etc were explained by the Consultants in the meeting in local language (Tamil).
- After presentation, an interaction session was carried out, in which attendees have given their suggestions and raised few questions regarding the project.
- Participant's attendance were recorded and given in the Annexure related to consultation.
- A feedback form was distributed to the audience of the meeting to give their suggestions and comments on the project. The format of feedback form was finalized in consultation with Highways Department.

• The questionnaire was formulated in a view to provide full freedom for the stakeholders to register their comments/suggestions.

The entire consultation meeting was video documented and photographs were taken.



Proceedings of the Meeting

The Divisional Engineer welcomed the participants and introduced the study team, thereby commencing the dissemination meeting.

- Senior Social Development Specialist from the study team addressed the participants and informed them about the purpose of the dissemination meeting and also provided snap shot of proposed project and invited Divisional Engineer to explain in detail about the proposed alignment and project specific information's.
- The Divisional Engineer, explained the participants about the proposed alignment and facilities proposed under this project. As the SH-57 from Singaperumalkoil to Sriperumbudur, which is a part of Peripheral Road, is

under widening to 6-lane configuration, no further widening is proposed. Only additional features including underpasses are proposed on this stretch.

- On completion of briefing of the project, the participants were invited to ask their clarifications and suggestion on the proposed project. Feedbacks from the participants were recorded in a feedback form and videography was also done for the entire dissemination meeting.
- Around 25 public representatives from various villages were participated and about 16 participants were recorded their feedback in the form circulated during the meeting.
- The dissemination meeting end with a thanking note and the Divisional Engineer appreciated the contributions of participants and assured that comments/ feedback received during the meeting will be duly considered during finalization of the project.
- In general, public opinioned that the proposed project will improve the safety of road users.

Sl. No.	Suggestions/Comments	Reply to Comments
ENGI	NEERING ASPECTS	
01	What are the likely land acquisitions in this section?	As this section is under widening to 6- laning, no further land acquisition is proposed. Minor land acquisition may be required for improvements like construction of underpasses, etc.
02	Requested for a separate meeting at Sriperumpudur town.	Exclusive meeting will be conducted at Sriperumpudur town giving prior information.
03	Is there any option to reduce the proposed road width of 100 m?	Proposed right of way is 60m whereas it is reduced at this project section and stretch along Sriperumpudur lake to avoid social impact. Proposed road width is different for each section based on the traffic requirements.

Following Table highlights the key suggestion/ comments raised during the meeting:

Sl. No.	Suggestions/Comments	Reply to Comments
04	What type of improvement works suggested in this section?	In order to improve the safety, underpasses are proposed at built-up sections and important junction.
05	Crossing facility is required at this section.	Vehicular underpasses are proposed wherever required in this section.
06	Bus Stop is required at Oragadam junction.	Bus bays are proposed as part of improvement of this section.
10	Vehicular underpass is required at Vallakottai temple road.	Underpass is proposed at this location as part of improvement of this section.
ENVI	RONMENTAL ASPECTS	
01	The proposed alignment can be within the Sriperumpudur lake to avoid social impact.	In order to avoid impact on water body, the alignment is proposed along the bund of Sriperumpudur lake which may cause minor social impact.
02	Irrigation supply channels should not be blocked due to road formation.	Necessary cross drainage structures are proposed on the new alignment sections. The existing structures should be maintained on existing road sections.
SOCI	AL ASPECTS	
01	Requested to implement the project without affecting public.	As this section is under widening to 6- laning, no further land acquisition is proposed. Minor land acquisition may be required for improvements for which compensation will be made as per latest LA & RR act '2013.
02	In village natham area, lands are registered but patta is not available. How compensation will be paid to the affected land owners?	Land ownership will be verified in natham area and procedure will be adopted in consultation with revenue department.

Feedback from the Stakeholders

• After the meeting, the attendees were requested to fill in the feedback forms delivered in the dissemination session. All the forms received from the participants are documented.

• Totally 16 feedback forms were received and analyzed from the meeting. Every query, suggestion or concern of the participants from the meeting and feedback form shall be considered in the subsequent stages of the assignment.

The comments collected from the feedback forms are summarized in the following Table:

Sl. No.	Suggestions/Comments	Reply to Comments
ENGI	NEERING ASPECTS	
01	Alignment should be planned in such a way that it should not affect D.K.Naidu Nagar at Sriperumpudur	Proposed alignment is along Sriperumpudur tank bund without affecting D.K.Naidu Nagar.
02	Bypass may be proposed to provide better facilities for the devotes to reach Vallakkottai Murugan Temple.	Improvement of existing road leading to the temple is under study in another project. Hence no bypass is required.
03	People living in Chennakuppam have to walk about 2km to reach bus stop at Oragadam due to construction of bridge along this stretch. Hence requested to provide bus stand facility in this locality.	Bus bays are proposed at required locations as part of improvement of this section.
04	Link roads/ service roads, pedestrian crossings, bus shelters need to be provided wherever necessary along the alignment especially near the settlement areas.	Underpasses for crossing the project road and bus bays are proposed as part of improvement of this stretch.
05	Revenue survey numbers along the proposed alignment	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS.
06	Underpass is required for the pedestrian crossing at Vallam village.	Underpass is proposed on both sides of Vallam village in this study.
07	At Oragadam section, heavy vehicle traffic is more hence proper road with adequate width is required.	The existing road is under widening to 6- lane with service roads at this stretch.
08	Sub way is required at Oragadam.	Underpasses are proposed at this location as part of improvement of this stretch.

Sl. No.	Suggestions/Comments	Reply to Comments			
09	Provide adequate access to the agricultural lands along both sides of the proposed road.	Underpasses for crossing the project road are proposed as part of improvement of this stretch.			
10	Requested not to widen immediately the already implemented recent project. Suggested to implement this project without affecting the public.	No further land acquisition is proposed except minor acquisition for construction of underpasses.			
ENVIRONMENTAL ASPECTS					
01	Action may be taken to avoid any impact to the reserve forest lands in Kolathur.	No further land acquisition is proposed in the forest stretch.			
02	Provision may be provided to the various water sources to reach Esa lake at Vallam. This lake is used as a ayacut for more than 700 acres of cultivable land.	Existing cross drainage structures will be maintained as it is.			
SOCIA	SOCIAL ASPECTS				
01	Project shall be implemented without having major impact to the public.	No further land acquisition is proposed except minor acquisition for construction of underpasses.			
02	Compensation for land affected in Mathur village should be 4 times of current value.	Compensation for the PAFs will be made as per latest LA & RR act '2013.			
03	As the project alignment is likely to affect the Vinayagar Temple at Mathur, hence requested to construct new temple.	This may be considered in the on-going road widening scheme.			

10.9.3 Meeting No. 3 - Public Consultation meeting at Sriperumpudur Village

Organising the Meeting

Public consultation meeting was organized at the Ariya Vaisya Peri Chettiyar Chathiram, Chinnakkadai Sadhukkam, and Sriperumpudur Village on 11.00 am of 31st July 2014.

A notice inviting for the meeting was issued to the local people residing in the project area, the commuters on the project area, NGOs, Government departments and general public three days prior to the meeting. The MLA of Sriperumpudur Constituency and the Village Panchayat Presidents of villages along/adjacent to the proposed alignment from Singaperumalkoil to Sriperumpudur were also invited for the meeting.

The information on the meeting was published in the local newspapers. The information regarding the consultation meeting was displayed at entrance of the venue in a flex banner.

Consultation Meeting

The public consultation meeting was convened by the Assistant Divisional Engineer (H), C&M, Chengalpattu Sub-division and Government of Tamil Nadu.

The representatives from NGOs and Government Departments and the General Public were attended the meeting.

The meeting was attended by representatives from the following areas in and around Sriperumbudur: Chokkan street, Mannur road, Vaniyar street, Cheekadi street, Erikarai area, Veerasamy Sanadhi street, Veerasamy Pillai street, D.K.Naidu Nagar, Bhakathavachalam Nagar, Nusrath Nagar, V.R.P street, Sri Ramanujar Nagar, T.V.R salai, ThiruMangai Ashwar street, Thanthondri Amman Nagar, Nandhagopal Nagar, Ganapathy Nagar, Mustafa Nagar, and Thodukaddu.

Presentation of the Project

The Alignment Map, Typical Cross Section drawings, Detailed Plan drawing along Sriperumbudur Lake in Google Images and salient features of the project were displayed in the hall.

Brief note on the tasks performed during the meeting is listed below:

- The project background, alignment, project features and facilities, benefits like travel time savings, safety, etc and impacts like land acquisition, environmental/social impacts, etc were explained by the Consultants in the meeting in local language (Tamil).
- After presentation, an interaction session was carried out, in which attendees have given their suggestions and raised few questions regarding the project.
- Participant's attendance were recorded and given in the Annexure.

• A feedback form was distributed to the audience of the meeting to give their suggestions and comments on the project. The format of feedback form was finalized in consultation with Highways Department. The questionnaire was formulated in a view to provide full freedom for the stakeholders to register their comments/suggestions.

The entire consultation meeting was video documented and photographs were taken.



Proceedings of the Meeting

The Assistant Divisional Engineer welcomed the participants and introduced the study team, thereby commencing the dissemination meeting.

- Senior Social Development Specialist from the study team addressed the participants and informed them about the purpose of the dissemination meeting and also provided snap shot of proposed project and invited the Assistant Divisional Engineer to explain in detail about the proposed alignment and project specific information's.
- The Assistant Divisional Engineer, explained the participants about the proposed alignment and facilities proposed under this project. The project road

will be along the bund of Sriperumpudur lake with 40m right of way to minimize the social impacts.

- On completion of briefing of the project, the participants were invited to ask their clarifications and suggestion on the proposed project. Feedbacks from the participants were recorded in a feedback form and videography was also done for the entire dissemination meeting.
- Around 250 public representatives from various villages were participated and about 235 participants were recorded their feedback in the form circulated during the meeting.
- The dissemination meeting end with a thanking note and the Assistant Divisional Engineer appreciated the contributions of participants and assured that comments/ feedback received during the meeting will be duly considered during finalization of the project.
- In general, public opinioned that the proposed project will improve the safety of road users.

Sl. No.	Suggestions/Comments	Reply to Comments			
ENGE	ENGINEERING ASPECTS				
01	Representative requested the proposed right of way of project road.	Proposed right of way is 60m whereas it is reduced to 40m at the stretch along Sriperumbudur lake to avoid social impact. No further land acquisition is proposed for the existing road stretch from Singaperumalkoil to Sriperumbudur except interchange and underpass locations.			
02	When this scheme will be commenced.	DPR is under preparation. On approval of the report, implementation will be decided by the Government.			
03	What is the distance from lake bund to the proposed project road?	The project road will be road adjacent to the lake bund.			

Following Table highlights the key suggestion/ comments raised during the meeting:

Sl. No.	Suggestions/Comments	Reply to Comments			
04	What is width of the proposed RoW in the section along lake?	Proposed RoW will be around 40m from the lake bund.			
05	What is the proposed width of each carriageway along the Lake?	Each carriageway will be 4 lane configuration.			
06	Suggested to construct bridge on the Sriperumbudur Lake to avoid impact to residences in the town.	In order to avoid impact on water body, alignment is proposed along the bund.			
07	Suggested to implement by-pass to the town without affecting public.	The proposed alignment will be a bypass for the town. Due to the presence of lake and ribbon development along NH-4, other alternatives were dropped to avoid environmental and social impact.			
SOCIA	SOCIAL ASPECTS				
01	Requested to clarify on the residences affected in the Sriperumpudur area.	No pacca buildings were affected on the stretch along Sriperumpudur Lake bund. Some properties around NH4-SH57 junction will be affected due to construction of Interchange.			
02	Suggested that, no public should be affected in the Sriperumpudur area.	Minor social impact will be there i.e. encroachments on Sriperumpudur Lake bund and buildings around NH4-SH57 junction.			
03	Livelihood of people living along the lake bund need to be protected and hence requested for by-pass road.	No pacca buildings were affected on the stretch along Sriperumpudur Lake bund. Encroachments will be affected. Modification of alignment will cause major impact on other areas. Compensation will be made as per latest LA & RR act '2013.			
04	What about impact to the residential buildings near the lake bund?	As the project road will have no major impact on the residential building along lake bund.			

Feedback from the Stakeholders

- After the meeting, the attendees were requested to fill in the feedback forms delivered in the dissemination session. All the forms received from the participants are documented.
- Totally 235 feedback forms were received and analyzed from the meeting. Every query, suggestion or concern of the participants from the meeting and feedback form shall be considered in the subsequent stages of the assignment.
- The comments collected from the feedback forms are summarized in the following Table:

Sl. No.	Suggestions/Comments	Reply to Comments		
ENGINEERING ASPECTS				
01	Requested for alternate route/ by-pass road in this section of the project	The proposed alignment will be a bypass for the town. Due to the presence of lake and ribbon development along NH-4, other alternatives were dropped to avoid environmental and social impact.		
02	Suggested to construct bridge along the Sriperumbudur Lake to avoid impact to residences in the town	In order to avoid impact on water body, alignment is proposed along the bund.		
03	Suggested to construct high-level bridge to avoid impact to residences in the town	Road proposed along the bund to avoid impact on pacca buildings.		
	SOCIAL ASPECTS			
01	Suggested to identify alternate alignment in order to avoid impact to the residences in Sriperumpudur town	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view.		
02	Opinioned that livelihood of the local public will be affected due to this project.	No Pucca buildings were affected on the stretch along Sriperumpudur Lake bund. Encroachments will be affected. Compensation will be made as per latest LA & RR act '2013.		
03	Requested to implement the project without affecting houses in the locality	No Pucca buildings were affected on the stretch along Sriperumpudur Lake bund.		

10.9.4 Meeting No. 4 - Public Consultation meeting at Melnallathur Village

Organising the Meeting

Public consultation meeting was organized at the Panchayat Office, Melnallathur Village on 11.00 am of 26th July 2014.

A notice inviting for the meeting was issued to the local people residing in the project area, the commuters on the project area, NGOs, Government departments and general public three days prior to the meeting. The MLA of Thiruvallur Constituency and the Village Panchayat Presidents of villages along/adjacent to the proposed alignment from Sriperumpudur to Ikkadu were also invited for the meeting.

The information on the meeting was published in the local newspapers. The information regarding the consultation meeting was displayed at entrance of the venue in a flex banner.

Consultation Meeting

The public consultation meeting was convened by the Divisional Engineer (H), C&M, Thiruvallur Division and Government of Tamil Nadu.

The Assistant Divisional Engineer (H), C&M, Thiruvallur Sub-division, representatives from NGOs and Government Departments and the General Public were attended the meeting.

The meeting was attended by representatives from the following 7 villages/ hamlets: Ekkadu Kandigai, Polivakkam, Melnsallathur, Putlur, Vengathur, Ayakulathur and Kilnallathur.

Presentation of the Project

The Alignment Map, Typical Cross Section drawings and salient features of the project were displayed in the hall. Brief note on the tasks performed during the meeting is listed below:

• The project background, alignment, project features and facilities, benefits like travel time savings, safety, etc and impacts like land acquisition, environmental/social impacts, etc were explained by the Consultants in the meeting in local language (Tamil).

- After presentation, an interaction session was carried out, in which attendees have given their suggestions and raised few questions regarding the project.
- Participant's attendance were recorded and given in the Annexure.
- A feedback form was distributed to the audience of the meeting to give their suggestions and comments on the project. The format of feedback form was finalized in consultation with Highways Department. The questionnaire was formulated in a view to provide full freedom for the stakeholders to register their comments/suggestions..

The entire consultation meeting was video documented and photographs were taken.





Proceedings of the Meeting

The Divisional Engineer welcomed the participants and introduced the study team, thereby commencing the dissemination meeting.

• Senior Social Development Specialist from the study team addressed the participants and informed them about the purpose of the dissemination meeting and also provided snap shot of proposed project and invited Divisional Engineer

to explain in detail about the proposed alignment and project specific information's.

- The Divisional Engineer, explained the participants about the proposed alignment, villages passing through, proposed RoW and facilities proposed under this project.
- On completion of briefing of the project, the participants were invited to ask their clarifications and suggestion on the proposed project. Feedbacks from the participants were recorded in a feedback form and videography was also done for the entire dissemination meeting.
- Around 53 public representatives from various villages were participated and about 28 participants were recorded their feedback in the form circulated during the meeting.
- The dissemination meeting end with a thanking note and the Divisional Engineer appreciated the contributions of participants and assured that comments/ feedback received during the meeting will be duly considered during finalization of the project.
- In general, public opinioned that the proposed project will improve the connectivity in the neighboring villages.

Sl. No.	Suggestions/Comments	Reply to Comments
ENGI	NEERING ASPECTS	
01	Representative from Putlur village requested the details of survey numbers along the proposed road alignment and the ongoing surveys for NABARD work at the adjoining river side /land.	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS. ADE explained them about on-going NABARD scheme.
02	Representative from Melnallathur village requested the department to widen the existing road to avoid frequent fatal accidents.	The peripheral road have a bypass proposal for Thiruvallur which reduces the traffic on the existing internal roads. Widening of existing roads will be considered in the separate project.

Following Table highlights the key suggestion/ comments raised during the meeting:

Sl. No.	Suggestions/Comments	Reply to Comments
03	Details about the proposed alignment and request a copy of alignment plan for the public.	The alignment plan is displayed in the hall. The same will be available at Highways Division/Sub-division offices for reference.
04	Tentative time line fixed to commence and complete the project.	DPR is under preparation. On approval of the report, implementation will be decided by the Government.
ENVI	RONMENTAL ASPECTS	
01	Requested the project authority to protect the settlements at river bund and lake bund.	Project alignment is finalised in view of minimising social and environmental impacts.
SOCIA	AL ASPECTS	
01	Details of LA and Compensation packages are to be informed to the public in advance.	Compensation for the PAFs will be made as per latest LA & RR act '2013.
02	Details on LA strategy to be informed to the public.	Compensation packages will be determined as per latest LA & RR act '2013

Feedback from the Stakeholders

- After the meeting, the attendees were requested to fill in the feedback forms delivered in the dissemination session. All the forms received from the participants are documented.
- Totally 28 feedback forms were received and analyzed from the meeting. Every query, suggestion or concern of the participants from the meeting and feedback form shall be considered in the subsequent stages of the assignment.

The comments collected from the feedback forms are summarized in the following Table:

Sl. No.	Suggestions/Comments	Reply to Comments		
ENGIN	ENGINEERING ASPECTS			
01	Extent of land affected along the proposed road need to be informed in advance with revenue survey numbers.	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS.		
02	As there are schools, commercial complexes, shops, Ration shops etc, along the road side at Melnallathur. Hence, Road Safety measures should be planned.	The peripheral road have a bypass proposal for Thiruvallur which reduces the traffic on the existing internal roads. Safety measures on existing roads will be considered in the separate project.		
03	Safety for the school goers, Lakes, cattle breeding activities at the neighbouring villages should be taken care.	The project road will have wider footpath on both sides and underpasses proposed for crossing the road.		
04	Melnallathur road is used by hundreds of vehicles from industries around this area. Requested to widen the existing road to help the commuters.	The peripheral road have a bypass proposal for Thiruvallur which reduces the traffic on the existing internal roads. Widening of existing roads will be considered in the separate project.		
05	A representative expressed that this is a good project and looking forward anxiously, this will be an added strength to the Hon'le CMs' Vision 2023. All the welfare oriented projects will have some problems during process of planning and implementation, but the implementer should do it by overcoming the problems and ensure that the project is successfully completed. This project should be executed at the earliest.	DPR is under preparation. On approval of the report, implementation will be decided by the Government.		
ENVIF	ENVIRONMENTAL ASPECTS			
01	Project should not delink the agricultural water supply channels as the pump sets and cultivable lands are situated indifferent places. This issue should be taken into consideration at the time of LA.	Necessary cross drainage structures are proposed waterway crossings.		

Sl. No.	Suggestions/Comments	Reply to Comments	
02	If the project propose to pass through the Putlur lake which is located on the western side of Putlur or through the Tholuvur lake which is located on the eastern side of Putlur.	Proposed alignment is on the western bank of Tholuvur lake.	
	SOCIAL ASPECTS		
01	Compensation towards LA should be paid as per the latest Act enacted by the GOI.	Compensation will be made as per latest LA & RR act '2013.	
02	The existing road at Melnallathur is prone for frequent fatal accidents, hence the proposed CPPR may pave ways to reduce fatal road accidents around the project area. At the same time the project authority also should pay much attention to protect the agricultural land.	The peripheral road have a bypass proposal for Thiruvallur which reduces the traffic on the existing internal roads which in-turn reduces accidents. Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view.	
03	Alignment shall be planned such a way that it is not affecting houses and agricultural assets.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as per latest LA & RR act '2013.	
04	Requested to implement the project without affecting houses in Melnallathur village.	The peripheral road have a bypass proposal for Thiruvallur which is away from Melnallathur. Hence no social impact on this area.	
05	Laymen's livelihood should be protected.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as per latest LA & RR act '2013.	

10.9.5 Meeting No. 5 - Public Consultation Meeting at Panchetty Village

Organising the Meeting

Public consultation meeting was organized at the Sports Ground, Government School, Panchetty Village on 4.00 pm of 24th July 2014.

A notice inviting for the meeting was issued to the local people residing in the project area, the commuters on the project area, NGOs, Government departments and general public three days prior to the meeting. The MLA of Ponneri Constituency and the Village Panchayat Presidents of villages along/adjacent to the proposed alignment from Ikkadu to Kattupalli were also invited for the meeting.

The information on the meeting was published in the local newspapers. The information regarding the consultation meeting was displayed at entrance of the venue in a flex banner.

Consultation Meeting

The public consultation meeting was convened by the Assistant Divisional Engineer (H), C&M, Ponneri Sub-division and Government of Tamil Nadu.

The representatives from NGOs and Government Departments and the General Public were attended the meeting.

The meeting was attended by representatives from the following 8 villages/ hamlets: Panjetty, Amoor, Neduvarampakkam, Chennivakkam, Athipedu, Vishnuvakkam, Vannipakkam and Minjur.

Presentation of the Project

The Alignment Map, Typical Cross Section drawings and salient features of the project were displayed in the hall. Brief note on the tasks performed during the meeting is listed below:

• The project background, alignment, project features and facilities, benefits like travel time savings, safety, etc and impacts like land acquisition, environmental/social impacts, etc were explained by the Consultants in the meeting in local language (Tamil).

- After presentation, an interaction session was carried out, in which attendees have given their suggestions and raised few questions regarding the project.
- Participant's attendance were recorded and given in the Annexure.
- A feedback form was distributed to the audience of the meeting to give their suggestions and comments on the project. The format of feedback form was finalized in consultation with Highways Department. The questionnaire was formulated in a view to provide full freedom for the stakeholders to register their comments/suggestions.

The entire consultation meeting was video documented and photographs were taken.



Proceedings of the Meeting

The Assistant Divisional Engineer welcomed the participants and introduced the study team, thereby commencing the dissemination meeting.

• Senior Social Development Specialist from the study team addressed the participants and informed them about the purpose of the dissemination meeting and also provided snap shot of proposed project and invited Divisional Engineer

to explain in detail about the proposed alignment and project specific information's.

- The Assistant Divisional Engineer, explained the participants about the proposed alignment, villages passing through, proposed RoW and facilities proposed under this project.
- On completion of briefing of the project, the participants were invited to ask their clarifications and suggestion on the proposed project. Feedbacks from the participants were recorded in a feedback form and videography was also done for the entire dissemination meeting.
- Around 51 public representatives from various villages were participated and about 33 participants were recorded their feedback in the form circulated during the meeting.
- The dissemination meeting end with a thanking note and the Assistant Divisional Engineer appreciated the contributions of participants and assured that comments/ feedback received during the meeting will be duly considered during finalization of the project.
- In general, public opinioned that the proposed project will improve the connectivity in the neighboring villages.

Sl. No.	Suggestions/Comments	Reply to Comments
ENGIN	EERING ASPECTS	
01	Service road is essential for this section.	Service road with foot path is proposed throughout the project road.
02	Boundary stones are laid already along the section from NH-5 to Ennore Port. Whether the same will be adopted for the project.	The boundary stones were laid already for NPAR project which will be part of Peripheral road. First 3km length of NAPR alignment only will be modified as per the alignment of Peripheral road
03	Village roads need to be linked with this new road.	Service road is proposed on both sides to provide access and underpasses are

Following Table highlights the key suggestion/ comments raised during the meeting:

Sl. No.	Suggestions/Comments	Reply to Comments
		proposed for crossing the project road.
04	At km 29/000 of NH-5, what is proposed area required for construction of Interchange? Is there any option to shift this?	Exact plan showing the Interchange with proposed RoW and affected buildings are displayed. The location cannot be shifted due to the site condition.
05	List of survey nos. Affected due to this project is need to be informed.	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS.
06	Requested to use the already available roads under this project.	Project road will be developed with 60m right of way. Widening of existing roads requires land acquisition on both sides which will cause major social impacts on the adjoining villages.
SOCIA	L ASPECTS	
01	Vinayagar temple is along this proposed road, suggested to utilise the vacant land without affecting the temple.	As per the proposed alignment, the temple is not affected.
02	What is the compensation for agricultural lands?	Compensation will be made as per latest LA & RR act '2013.
03	Market value should be considered for LA.	Compensation will be made as per latest LA & RR act '2013.
04	What is the compensation for the buildings affected at Vishuvakkam?	No buildings are affected at this locality, only lands are affected and adequate compensation will be made as per latest LA & RR act '2013.

Feedback from the Stakeholders

• After the meeting, the attendees were requested to fill in the feedback forms delivered in the dissemination session. All the forms received from the participants are documented.

• Totally 33 feedback forms were received and analyzed from the meeting. Every query, suggestion or concern of the participants from the meeting and feedback form shall be considered in the subsequent stages of the assignment.

The comments collected from the feedback forms are summarized in the following Table:

way that it should not affect residential areas.evaluating various alternate alignme based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.02People in the locality are dependent on agricultural activities, hence requested to change the alignment.Final alignment is selected a evaluating various alternate alignme based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.03Extent of land affected along the proposed road need to be informed in advance with revenue survey numbers.Land plan schedule is under preparati Affected RS Nos. will be dissemina after completion of LPS.04Vannipakkam village road need to be linked with the proposed road.Improvement/formation of link ro will be evaluated in the separate study06Requested to connect MDR road to NH in Minjur village.Improvement/formation of link ro will be evaluated in the separate study01Action need to be made to protect the alignment. Also requested for alternate alignment. Also requested for alternate arrangements for project affected areas.Final alignment is selected a evaluating various alternate alignment based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.01Action need to be made to protect the alignment. Also requested for alternate alignment and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.021Action need to be made to project affected areas.Final alignment is selected a evaluating various alternate alignme based	Sl. No.	Suggestion/Comment	Reply to Comments	
way that it should not affect residential areas.evaluating various alternate alignme based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.02People in the locality are dependent on agricultural activities, hence requested to change the alignment.Final alignment is selected a evaluating various alternate alignme based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.03Extent of land affected along the proposed road need to be informed in advance with revenue survey numbers.Land plan schedule is under preparati Affected RS Nos. will be dissemina after completion of LPS.04Vannipakkam village road need to be linked with the proposed road.Improvement/formation of link ro will be evaluated in the separate study06Requested to connect MDR road to NH in Minjur village.Improvement/formation of link ro will be evaluated in the separate study01Action need to be made to protect the alignment. Also requested for alternate arrangements for project affected areas.Final alignment is selected a evaluating various alternate alignment a social point of view Compensation will be made to PAPs per latest LA & RR act '2013.SOCIAL ASPECTS	ENGINEERING ASPECTS			
agricultural activities, hence requested to change the alignment.evaluating various alternate alignment based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.03Extent of land affected along the proposed road need to be informed in advance with revenue survey numbers.Land plan schedule is under preparati Affected RS Nos. will be dissemina after completion of LPS.04Vannipakkam village road need to be linked with the proposed road.Improvement/formation of link ro will be evaluated in the separate study06Requested to connect MDR road to NH in Minjur village.Improvement/formation of link ro will be evaluated in the separate study01Action need to be made to protect the bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas.Final alignment is selected a evaluating various alternate alignment based on techno, econor environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.SOCIAL ASPECTS	01	way that it should not affect residential	evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as	
road need to be informed in advance with revenue survey numbers. Affected RS Nos. will be dissemina after completion of LPS. 04 Vannipakkam village road need to be linked with the proposed road. Improvement/formation of link ro will be evaluated in the separate study 06 Requested to connect MDR road to NH in Minjur village. Improvement/formation of link ro will be evaluated in the separate study 01 Action need to be made to protect the bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Final alignment is selected a 	02	agricultural activities, hence requested to	evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as	
linked with the proposed road. will be evaluated in the separate study 06 Requested to connect MDR road to NH in Minjur village. Improvement/formation of link rowill be evaluated in the separate study ENVIRONMENTAL ASPECTS 01 Action need to be made to protect the bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Final alignment is selected a evaluating various alternate alignment environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013. SOCIAL SOCIAL	03	road need to be informed in advance with	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS.	
Minjur village. will be evaluated in the separate study ENVIRONMENTAL ASPECTS 01 Action need to be made to protect the bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Final alignment is selected a evaluating various alternate alignment arrangements for project affected areas. ENVIRONMENTAL ASPECTS Evaluating various alternate alignment is selected areas. Bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013. SOCIAL ASPECTS	04		Improvement/formation of link roads will be evaluated in the separate study.	
01 Action need to be made to protect the bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Also requested for alternate arrangements for project affected areas. Compensation will be made to PAPs per latest LA & RR act '2013.	06	-	Improvement/formation of link roads will be evaluated in the separate study.	
bore wells/ open wells along the alignment. Also requested for alternate arrangements for project affected areas. Environmental and social point of view Compensation will be made to PAPs per latest LA & RR act '2013.	ENVIR	ONMENTAL ASPECTS		
	01	bore wells/ open wells along the alignment. Also requested for alternate	evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as	
01 A person from Panjetty village has Final alignment is selected a	SOCIAL ASPECTS			
	01	A person from Panjetty village has	Final alignment is selected after	

Sl. No.	Suggestion/Comment	Reply to Comments
	recorded that, in the RS no.181/3A & 181 about 10 cents of land has been already taken for NH 4. Remaining land has been used as his livelihood. Hence, it is requested to change the alignment without affecting the remaining portion of his properties.	evaluating various alternate alignments based on techno, economic, environmental and social point of view. Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS. Compensation will be made to PAPs as per latest LA & RR act '2013.
02	It is felt that in Amoor village, major extent of cultivable lands is affected by this project which is the main source of livelihood. Hence, requested to change the alignment.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Compensation will be made to PAPs as per latest LA & RR act '2013.
03	A person from Amoor, who has been cultivating in the temple land on lease basis has recorded that his livelihood will be totally affected by this project, hence, requested the project authority to change the alignment.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Modification will cause major impact on other areas. Compensation will be made to PAPs as per latest LA & RR act '2013.
04	Resident at Panjetty is living for generations and land has been acquired under the widening works of NH 4 (about 5 cents). Recently house is also built in the remaining land. Hence, requested the project authority to change the alignment.	Final alignment is selected after evaluating various alternate alignments
05	As the project alignment is likely to affect the land used for cultivation purposes at an extent of 3.5 acres. Livelihood is affected due to this project.	Land plan schedule is under preparation. Affected RS Nos. will be disseminated after completion of LPS. Compensation will be made to PAPs as per latest LA & RR act '2013.

Sl. No.	Suggestion/Comment	Reply to Comments	
06	In Atthipedu village, various facilities such as school building, panchayat office, burial ground, and residential houses are affected due to the project. Hence requested to change the alignment.	e, evaluating various alternate alignment based on techno, economic	
07	Welcoming the project and compensation for land affected should be 4 times current value.	Compensation for the PAPs will be made as per latest LA & RR act '2013.	
08	Already portion of land is utilised for HT tower lines and remaining land is affected due to this project. Hence requested to change the alignment.	Final alignment is selected after evaluating various alternate alignments based on techno, economic, environmental and social point of view. Modification will cause major impact on other areas.	

10.10 Consultation Meetings in Section 1

In addition to the above 5 public consultation meeting, two rounds of Public Consultation meetings conducted at two locations in Section 1 of CPR, as per JICA requirements.

Sl. No.	Description	Location 1	Location 2
1	Date	09.04.2018	10.04.2018
2	Venue	Block Development Office, Minjur	Village Panchayat Office, Panchetty
3	Officials present	 Mr. Daisaku Kiyota, Environmental & Social Expert of JST SM, TNRDC ADE(H), Ponneri & Thiruvallur STUP 	 SM, TNRDC ADE(H), Ponneri & Thiruvallur STUP
4	No. of Participants	More than 250 people and NGOs	More than 90 persons and NGOs
5	Attendance signed	145	47
6	Feedback form filled	131	33

10.10.1 First Round Consultation

Sl. No.	Name	Queries/Suggestions	Replies
1	Mr.Vinayagamoorthi, PattamandhiriVillage.	Ensure the environmental safeguards during project implementation.	The EMP is prepared and the same will be implemented.
2	Mr. Aathiseshan Mathura Nagar	The local residential area need not be displaced or relocated.	The project designed in such a way that the identified impacts are minimized to the greater extent possible.
3	MrVivekanandhan Pattamandhiri Village	The formation of link road results in loss of residential assets which is objectionable.	The objections are noted.
4	MrRajendran Pattamandhiri Village	The compensation for the affected assets will not be sufficient. The school going children shall not be affected due to sudden relocation / displacement. The formation of link road results in loss of residential assets.	R&R benefits and fair compensation for the affected assets will be disclosed in the next meeting. The project affected families will not be disturbed without prior intimation. The objections were noted.
5	MrSadheshan Poongamedu Village	The improvement of the existing road is well appreciated, rather forming a new link road which displacing huge number of residents and commercial units.	The objections are noted.
6	MrsSujatha Mathura Nagar	PRoW for the proposed road should be informed well in advance.	PRoW boundary stones are laid already which will be the proposed boundary for the project.
7	MrTamilselvan Kollatti Village	The guideline value for LA will not be sufficient considering the present cost of	LA compensation shall be paid in accordance with the LARR Act, 2013. The details will be

Location 1: Minjur - Suggestions of Stakeholders and Replies

Sl. No.	Name	Queries/Suggestions	Replies
		construction materials.	disclosed in the next meeting.
8	MrKarimullah Nandiampakkam Village	Whether the ORR and CPRR are same project?	No. Both are separate projects.
9	MrSekar Siruvakkam Village	The information related to consultation meeting has not reached all the villages.	The DPR team explained , posters displayed in all the project villages at strategic locations and VAOs have been contacted and informed to widely inform the meeting details.
10	MrAnandham Anupampattu Village	What will be the proposed road width? What will be the LA process period and project completion period?	The proposed road width is 100 mts. The LA process will be completed in 12 months and project completion will be nearly 3 years.
11	MrGowrisankar Kesavapuram	Formation of link road results in loss of residential assets.	The objections are noted.
12	MrBalaji Nandiampakkam Village	The project details shall be disclosed in the website of respective Government departments.	The project details and other information shall be disclosed in the website in near future.
13	MrsNariyini Environmental Expert	What mitigation is proposed for the impacted water bodies and affected trees.	Bridges proposed for water body crossings and compensatory trees will be planted at the rate of 1:10 for affected trees.
14	MrUmapathy Ramanaa Nagar	The co-ordination with line departments in road project found to be poor in some of the on-going projects.	As the CPR project is a major project, coordination team with all line departments will be formed for smooth progress.

Sl. No.	Name	Queries/Suggestions	Replies
15	MrElumalai Pattamandiri	The environmental status of the region will get affected due to the project.	EMP is prepared which will be implemented to mitigate/ minimise the impacts.
18	MrVenkateshwaralu Nandiampakkam Village	What will be compensation paid for the affected assets? Whether compensation will be for other assets like compound wall, water sump, septic tank and EB box.	The structural compensation for all the assets likely to be affected shall be paid in accordance with the policy framework.
19	MrJeyavel Pattamandiri	The loss of residential assets by link road in Poongamedu and Pattamandhiri villages shall make more vulnerable and lead for suicidal attempts.	The objections are noted.
20	Secretary, Residential Association + residents Poongamedu	The formation of link road results in loss of residential assets.	The objections are noted.
21	Secretary, Residential Association + residents Pattamandhiri	The formation of link road results in loss of residential assets.	The objections are noted.

Location 2: Panchetty - Suggestions of Stakeholders and Replies

Sl. No.	Name	Queries/Suggestions	Replies
1	Mr.Babu, Athipedu Village.	Whether the existing utilities will be relocated by acquiring additional land.	
2	Mr Panchu Naidu Athipedu Village.	The newspaper 'The Hindu; published a news 15/04/2015 that, the width of the road has been revised. Is it so?	

Sl. No.	Name	Queries/Suggestions	Replies
3	Mr.Krishnakumar Sriperumpudur	Lot of public consultation meetings held for CPRR project in the past couple of years. When the project is likely to be commenced and disclose likely project completion period.	More number of public consultation meetings held to improve the project and avoid/ minimise impacts. The project is likely to be commenced soon after the LA completion and the construction period shall be three years.
4	Mr.Satyanarayanan Kattur Village	Explain the entire CPRR and its sections details.	The details of CPR and its five sections were explained in detail.
5	Mr.Venkatesan Panchetty Village.	The proposed interchange at NH-5 is likely to affect his entire industrial unit and as well the agricultural activities. This will affect livelihood of several workers in the factory. What will be the R&R compensation and benefits for the affected person.	The loss of livelihood and assets shall be mitigated as per R&R policy framework.
6	Mr.Paneerselvam Panchetty Village	Whether subway/ pedestrian road crossing facilities will be provided at appropriate locations.	The project includes underpasses at appropriate locations.
7	Mr Rakesh Panchetty Village	The villagers of Panchetty will not be inclined to welcome the project, as there will be huge impacts to assets and land.	The objections are noted.
8	Mr.Manikandan Athipedu Village	The agricultural land will be affected and loss of livelihood for the local people, will result in resistance to the proposed project. The project seems to be affecting the agricultural activities of the region.	As the project is a linear one, not much impact on agricultural activities. Culverts are proposed at 150m (approximately) interval for facilitating agricultural activities.

Sl. No.	Name	Queries/Suggestions	Replies
9	Mr VenkateshwaraRao Ponneri	Whether the proposed road shall improve the connectivity to schools located at Ponneri, so that the neighbouring school goers shall be benefited.	The service roads proposed on both sides which connects al the cross roads. This will improve the connectivity and accessibility of the project area.
10	Mr Damodaran Alenchavakkam	What is the status of Maduravoyal elevated road	The status of Maduravoyal elevated road is not related to the proposed CPRR.
11	Mr VetrivelAnandan Amur Village	What are all the survey numbers affected and LA compensation shall be paid without any delays	The affected survey numbers and LA compensation shall be disclosed in the next meeting.
12	Mr Babu Athipedu Village	What arrangements will be made for relocating cultural properties.	The cultural properties shall be relocated within the same location.

10.10.2 Second Round Consultation

Sl. No.	Description	Location 1	Location 2
1	Date	11.05.2018	12.05.2018
2	Venue	Block Development Office,	Village Panchayat Office,
		Minjur	Panchetty
3	Officials present	• Mr. Nawaz, JST	• SM, TNRDC
		• SM, TNRDC	• ADE(H),
		• ADE(H), Ponneri	Ponneri&Thiruvallur
		• STUP	• STUP
4	No. of Participants	More than 200 people and	More than 75 persons and
		NGOs	NGOs
5	No of Women	17	1
6	Attendance signed	63	22
7	Feedback form filled	53	7

Sl. No.	Name	Queries/Suggestions	Replies
1	Mr.Vinayagamoorthi, Pattamandhiri Village.	TPP link road proposal affects lots of houses. What is the response from the GoTN for the objections raised by the residents of Poongamedu, Pattamandhiri and Mathura Nagar to drop the TPP Link Road proposal.	The outcome of the meeting held on 09/05/2018 at Minjur has been submitted to the department and the decision will be intimated to the residents as soon as the decision taken by GoTN.
2	Mr. Aathiseshan, Mathura Nagar.	The residents constructed houses in CMDA approved land. No communication is made to the Public about the proposed road alignment at local/CMDA level during approvals.	The 15(2) notifications are issued already for 9 villages and will be issued to remaining villages within 2 months.
3	Mr. Kannan, Pattamandhiri Village	Re-examine the possibility of removing or realigning the TPP link road.	The suggestions are noted.
4	Mrs Buvaneshwari, Pungamedu Village	The proposed TPP Link road affects my house which cause suffering with mental depression, insecure state of mind and sleepless nights.	The objections communicated already to the department. The decision on link road proposal will be communicated to the public at the earliest.
5	Mr. Sakthikumar, Pungamedu Village	The GoTN is not responding properly to the public's demand on dropping the TPP link road proposal. What is the action taken by GoTN for the collective agitation shown during previous meeting held in April 2018. What will be the actual land compensation value.	The objections raised by people in the consultation meeting held in April 2018 were communicated to the Department. The decision will be intimated to the residents as soon as the decision taken by GoTN. The draft hand book on policy framework for compensation to losses are issued to PAHs in the meeting and the same is explained in the meeting.

Location 1: Minjur - Suggestions of Stakeholders and Replies

Sl. No.	Name	Queries/Suggestions	Replies
6	Mr. Mohan, Ganga Nagar, Nandiampakkam Village	The project has been discussed three years back but till now no improvement found on implementation. Who is responsible for the LA in the proposed CPRR. In what way the rights of the Project Affected Households will be secured? Which cost will be considered for arriving LA cost.	The project is in final shape now and will be implemented at the earliest. The institutional arrangements are given in the hand book which is explained in the meeting. PAHs rights will be safeguard through the appointed Social Safeguard Specialist and NGO. Moreover the JICA funded projects shall primarily focus on safeguarding the rights of the PAHs and ensure no one shall be dislocated without paying compensation. As per the LARR Act, LA cost will be the highest of guideline value and market value.
7	Mr. Karthik, Pungamedu Village	Affected house is constructed on CMDA approved plot by investing all the hard earned money from Dubai. The family has 6 females and all are now feeling insecure. The family is hesitate to send the Head of the household for the job in Dubai due to this project. If they asked to displace during the absence of head of family, the entire family setup will get collapsed. TPP link road shall be dropped considering socio- economic condition of PAH.	The objections are noted and communicated already to the department. The decision on link road proposal will be communicated to the public at the earliest. The PAHs shall not be displaced without any prior intimation.
8	Mrs. Sujatha, Retd.Teacher,	What is the action taken by GoTN for the collective agitation shown during	The objections raised by people in the consultation meeting held in April 2018 were

Sl. No.	Name	Queries/Suggestions	Replies
	Pattamandhiri Village	previous meeting held during April 2018. The residential asset was constructed by investing all hard earned income and facing difficulty in repaying the loan amount. The TPP link road proposal shall be dropped considering the socio-economic condition of the PAHs.	communicated to the Department. The decision will be intimated to the residents as soon as the decision taken by GoTN.
9	Mr. Mohan Kumar, Pungamedu Village	We have received phone calls about the social surveys. As we are not accepting the project, why should we participate in the surveys.	The social surveys are conducted to understand the socio-economic profile of PAhs which will be useful to arrive better compensation. It is not compulsory or the HD never force any PAHs to provide socio-economic details.
10	Mr. Ramalingam, Nandiampakkam Village	TPP link road proposal should be dropped.	The objections are noted.

Location 2: Panchetty - Suggestions of Stakeholders and Replies

Sl. No.	Name	Queries/Suggestions	Replies
1	Mr.Viswanathan, Panchetty Village.	The land to be acquired for construction of NH-5 has high commercial value. Various infrastructure projects within the vicinity of the area affects lots of people in and around Panchetty. When will the 15(2) notification will be issued.	The technical feasibility determines the requirement for an intersection at the crossing point in NH-5. The 15/2 notification is issued already to 9 villages. The notification for remaining villages will be issued within 2 months. The objections are noted.

Sl. No.	Name	Queries/Suggestions	Replies
2	Mr. Kiran Kumar, Panchetty Village.	Insisted to explain in Telugu language. Also asked to show the ID cards of the team. The land on NH-5 is to be acquired for the interchange. How can the GoTN implement the project without getting consent from 75% of PAHs. The alignment can be changes through open lands in Kaverapettai village. How the affected irrigation source will be compensated.	The villagers in Amur, Moolathangal, etc are welcomed the project, as the proposed road will improve connectivity and access to school, market and health facilities. The alignment of CPR is finalized considering all the options. The irrigation source like open well, bore well, etc will be paid as per PWD SOR rate without depreciation.
3	Mr. Mahesh, Panchetty Village	Who is the prime beneficiary of the project? The General Public or Private Ports in Ennore.	The project will decongest the traffic within CMA and provide connectivity to the villages along the alignment. The Ennore Kamarajar Port connectivity will accelerate the economic growth of the state.
4	Mr. Satyamurthy, Arakonam Taluk	Whether the CPR is passing through Arakonam Taluk in Vellore district.	The project transverses through Tiruvallur and Kanchipuram districts only.
5	Mr. Paneerselvam, Panchetty Village	Whether subway/ pedestrian road crossing facilities will be provided at appropriate locations.	The project includes vehicular underpasses and light vehicular underpasses at appropriate locations.
6	Mr. Manikandan, Athipedu Village	The agricultural land is affected by the project which in-turn loss of livelihood for the local people. The project seems to be affecting agricultural activities of the region.	As the project is a linear one, not much impact on agricultural activities in the region. Culverts are proposed at 150m (approximately) interval for facilitating agricultural activities.

Sl. No.	Name	Queries/Suggestions	Replies
8	Mr. Venkatesan, Panchetty Village	The people in this locality lost already considerable land in GAIL project, TNEB HT line and NHAI projects. What happened to the queries raised during last consultation meeting to avoid intersection proposal at Panchetty location. How the livelihood loss of the commercial units will be mitigated.	The objections are noted. The objections raised by people in the consultation meeting held in April 2018 were communicated to the Department. The decision made will be intimated to the residents as soon as the decision taken by GoTN. The compensation to losses will be made as per the act. Moreover the JICA funded projects shall primarily focus on safeguarding the rights of the PAHs and ensure compensating the livelihood
9	Mr. Palayam, Moolathangal Village	What arrangements will be made for relocating cultural properties. What will be the relocation arrangements for the affected school and Temple at Moolathangal Village	The cultural properties and schools will be relocated within the same village.
10	Mr, Abubakkar, Media Reporter, Panchetty Village	What arrangements will be made to assess the environmental condition and how it will be protected during construction phase.	Baselineenvironmental monitoring has been carried out for Air, Noise, Soil, Water parameters and the same will be checked during and post construction stages.EnvironmentalManagement Plan has been prepared to mitigate any issues observed during construction.JICA assisted projects shall considerSocial and Environmentalsafeguardsas major componentsmajorcomponents in road project.

10.11 Informal Consultation Meetings

Further informal group discussions were also held with women groups, agriculture owners, labours and road side dwellers.



Discussion with village people

10.12 Major Inferences

Concerns raised by the Villagers w.r.to Environmental issues

- Cutting of trees falling within RoW along the road side shall be minimized.
- Planting of more trees, as compensatory planting.
- Safety measures shall be enforced during road construction.
- Access to hospitals and schools shall be provided during construction phase.
- To prevent more noise in the site during civil works.
- Relocation of CPRs
- Measures to prevent air dust and water sprinklings shall be assured.
- Bus shelters shall be replaced in previous locations.

• To enhance the accident zones and sufficient traffic and signs boards shall be display.

However, consultation has been done at different locations at stages as required in the project stretch. Information collected during consultation has been shared with environmental and technical team. Suggestion obtained from people and their representatives have been analyzed on technical and economic merits. Final decisions of engineering design team on alternative alignments, location of pedestrian crossing, location of enhancement of community properties are conveyed to the people.

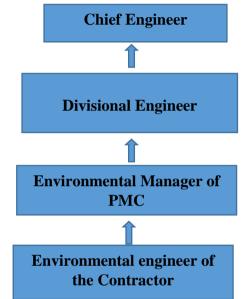
CHAPTER – 11 IMPLEMENATATION MECHANISM



11.1 Introduction

The Environmental Management Plan identified for the construction will be included in the bid documents for ensuring implementation of the environmental safeguards. The management measures identified for the operation phase will be taken up by the highways department, upon completion of construction activities.

Figure 11. 1 Flow Chart showing Reporting Structure for EMAP



11.2 Project Management Consultant (PMC) – Environmental Safeguard Specialist

The HD has proposed to appoint Environmental and Social Safeguards Specialists, for overseeing environmental and social safeguards compliance, in all the projects of the department. The E&S Safeguard specialists will directly report to the Chief Engineers (HD) or authorized official. The Environmental specialist shall submit monthly reports to the reporting authority (HD), on the status of compliance with the Environmental requirements.

The roles and responsibilities of the Environmental officer / Manager (EO/EM) is given below;

 All matters related to environmental and social activities within the ROW such as latest EIA, SIA, RAP and other related documents should be available to the EO immediately after mobilization. The Forest, environmental clearance, Tamil Nadu Pollution Control Board's clearance conditions and other approval status should be specified. A status report prepared by HD would be required for the EO to start the work.

- The Environmental Officer (EO) should be mobilized during the early stages of Construction. This is to help the Contractor in identifying environmentally sound locations for Construction camps, hot mix plant, WMM plant and all other issues according to the Environmental Management Action Plan (EMAP).
- The important role of EO during construction is to ensure the smooth implementation of EMAP and to address direct and indirect social issues arising out of implementation of the RAP.
- The EO should visit incomplete construction work sites where there are no contractor's current activities, active construction work sites and completed areas of the work sites and conduct regular meetings with the contractor in identifying gaps pertaining to both environment and construction safety. The EO will also visit the hot mix plant; quarries and crushers, borrow areas and others as per the necessity. EO has to ensure appropriate corrective and preventive action to the identified gaps in construction site in environmental aspects. Conduct regular meeting on environmental aspects.
- The EO will assist the Engineer to ensure environmentally sound engineering practices. In addition, other specialists of the engineers' team may also act and report on road safety related issues.
- The EO will carry out consultation with the Contractor, contractor's men, local Project Affected People (PAPs) and interest groups. The EO will also consult with NGOs to consider any problems (e.g. access problem to school, buildings, houses and business establishments) arising from construction activities.
- The EO will assist in the compliance with various labour laws including the payment of minimum wages to the individual contract laborer's especially 'unskilled illiterate migrant laborers'. This has a direct bearing on the health and safety of the workers.
- The EO will assist the Contractor, and the Highway Department in all matters related to public contacts including consultation, training and public relations.
- The EO will prepare standard formats (if available they may be obtained from other projects that are being implemented or are completed recently) for the compliance of the environmental and social requirements.

- The EO will ensure the procurement of materials that are included in the Bill of Quantities relating to environmental and social mitigation costs.
- The EO will assist the HD and the Contractor in all training activities during construction period.
- The EO will prepare and submit regular reports to the CE of HD.
- The EO will assist the various Environmental monitoring activities of the Contractor.
- The EO will be responsible to confirm whether the contractor has received all Certifications in different sectors from the concerned authority to precede the work.
- The EO in co-operation with the EO of Contractor and Superintending Engineer will make sure the issuing of timely Work order for the Nurseries to be raised according to the 'Landscaping, Tree planting and Environmental Enhancement Plan'. This will allow one year for the plants to attain the required size.

11.3 Roles and Responsibility of Line Departments and Stakeholders

The role and responsibility of the organizations are mentioned below.

State Pollution Control Board (SPCB): The State Pollution Control Board will be responsible for any matters related to air, water and noise pollution during construction and operational stages. Any matters related to this may be brought under their notice for solution.

Forest Department: Any matters related to social forestry, forests, wildlife and trees etc should be consulted with the local DFO or Forest Range Officer, Forest Department depending upon the advice required.

HD : HD is responsible for implementation and supervision of the Road works.

Final Design Consultant: Preparation of final road designs and contract documentation based on the preliminary road designs, and formulation of the Environmental Management Plan and Environmental Management Action Plan recommendations.

Environmental Specialist of HD: ES will be responsible for all matters of environmental monitoring and inter-Governmental co-ordination.

Traffic Police and State Police: Any matters related to traffic and violation of traffic and other law and order issues may be taken up with the traffic police and State Police.

Tamil Nadu Water Supply and Drainage Board (TWAD): TWAD will be responsible for any matters relating to water supply, water taps, bore wells and tube wells along the sides of the roads.

Local Bodies (Municipal Authorities/ Village Administration): Village Administration/ Municipal authorities will be responsible for local bus waiting sheds, Panchayat and municipal public wells etc.

Motor Vehicle Department: The motor vehicle department will be responsible for issue and matters relating to Pollution under Control Certificates, driving licenses etc.

Fire Force and Fire Station: The matters relating to safety especially relating to fire safety may be taken up with the Fire force.

Archaeological Department: All matters relating to ancient archaeological structures and historical monuments that may encounter during construction works or identified during preconstruction stage.

Mining and Geology Department: All matters relating to quarry and sand materials may be referred to State Mining and Geology Department.

11.4 Grievance Redressal Mechanism

The set up GRC shall have the system of records keeping, contact details of complainant, date of the complaint received, nature of grievance etc. for the project road and shall take necessary action against the complaint. The GRC will determine the merit of each grievance, and resolve grievances within an outer time limit of three months of receiving the complaint.

Complaints register with Contractor:

The contractor shall keep and maintain a complaint register report at his site office along the project road as well as project facilities like construction camp, labour camp etc., for public to register their complaints. The Contractor, after taking necessary action based on the complaint, will also incorporate the same in the complaint register. This report will also be part of the monthly report, for HD to monitor and take necessary action, if needed. It has to be noted that, inaction upon the complaint of the public will be considered as a major lapse from the side of the contractor, leading to invoking of penalty clause which is given in bid document/ EMP. The HD will have the following mechanism to address the grievances of the persons affected by the project:

Appellate Level Grievance Redressal Committee, (ALGRC)

ALGRC with the following members, will function effectively, to redress the grievances of the affected persons:

- Chief Engineer (HD)
- Superintend Engineer (SE)

Project Level Grievance Redressal Committee, (PLGRC)

A Project Level Grievance Redressal Committee will be set up, and the members are as follows (preferably one of them as woman):

- The Divisional Engineer
- One Elected representative
- A person who is publicly known in the local area, and
- Superintending Engineer (Convener)

11.5 Capacity Building and Training on Environmental aspects

Training is an investment made on the human resource of the organization to provide and tone the competencies, required to do an existing job well and also to perform for future needs. The general awareness on environment and safety will be imparted to the educational institutes that are present in the project corridor by the contractor.

Programme	Particulars	Duration	Participants
Orientation Programme	Contactor's Responsibility as per bid document Reporting System in EMAP	One day each	Engineers including ESE
Awareness programme	General Awareness on Environment	One day each	NGOs / Schools / Residential Welfare Associations

11.6 Conclusion

The Environmental Management Action Plan (EMAP), which is an integral part of the Environmental Management Plan, identify the detailed impacts, propose the mitigation actions and mention the implementing organization and monitoring organization. Until the responsibility for the implementation of EMP is assigned to a number of parties, each with specific responsibilities the implementation shall not be made scientific and accountable. Hence the above description on the institutional arrangements enable the HD official and contractors to implement the project with ease. The cost for these arrangements is budgeted for each components and included in the EMP cost.



ANNEXURES - I LIST OF PERMISSIONS TO OBTAINED BY THE CONCESSIONAIRE

ANNEXURE NO- 1 - LIST OF PERMISSIONS TO BE OBTAINED BY THE CONCESSIONAIRE

SI.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
1	Environmental Clearances	MoEF	Forest Area	Construction Prior to work	Concessionaire
2	Forest Clearances	MoEF	Trees Felling	Construction Prior to work	Concessionaire
3	Consent to Establish Under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution State Pollution Control Board	construction	Construction Prior to work	Concessionaire
4	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981	Tamil Nadu Pollution State Pollution Control Board	construction	Construction Prior to work	Concessionaire
5	Permission to store Hazardous Materials under Hazardous Waste (Management, Handling and Trans- boundary Movement) Rules 2008.	Tamil Nadu Pollution State Pollution Control Board	Materials and	Construction Prior to work	Concessionaire
6	Explosive license under the Explosives Act 1884 and the revised rules 1983	Chief Controller of Explosives , petroleum and Explosive safety	Storage of explosives materials	Construction Prior to work	Concessionaire
7	PUC certificate for vehicles for construction under Central Motor and Vehicle Act, 1988	Motor Vehicle department of Tamil Nadu	For all construction vehicle	Construction Prior to work	Concessionaire
8	Quarry lease deeds and license under The Mines Act, 1958	Mining and Geology Department of Tamil Nadu	Quarrying and borrowing operations	Construction Prior to work	Concessionaire
9	Consent for ground water extraction	Tamil Nadu Ground Water Authority	Ground water extraction for construction and camps	Construction Prior to work	Concessionaire
10	Permission for Labour camps	Labour Department of Tamil Nadu	Labour camps	Construction Prior to work	Concessionaire
11	NOC for Borrow area	Local Panchayat /	Borrow area	Construction	Concessionaire

SI.	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
		Municipality		Prior to work	
12	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981	Tamil Nadu Pollution State Pollution Control Board	batching	Operation	Concessionaire
13	Consent to Operate under the Water (Prevention & Control of Pollution) Act, 1974	Tamil Nadu Pollution State Pollution Control Board	through soak	Operation	Concessionaire

ANNEXURES - II LIST OF SENSITIVE RECEPTORS / CULTURAL PROPERTIES

ANNEXURE 2- List of Sensitive Receptors / Cultural properties

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
1		Moolathang al	Tiruvallur	Temple	Temple fully affected	Major		
2		Moolathang al	Tiruvallur	ICDS/ School	ICDS /School fully affected	Major		
3		Moolathang al	Tiruvallur	Tomb	Tomb fully affected	Major	Replaceme nt not required	
4		Amoor	Tiruvallur	Temple	Temple fully affected	Major		
5		Amoor	Tiruvallur	Temple	Temple fully affected	Major		
6		Amoor	Tiruvallur	VAO Office	VAO Office fully affected	Major		
7		Amoor	Tiruvallur	Ration shop	Ration shop fully affected	Major		
8		Thatchur	Tiruvallur	Tomb	Tomb fully affected	Major	Replaceme nt not required	
9		Panchetty	Tiruvallur	School	School fully affected	Major		
10		Panchetty	Tiruvallur	VAO Office	VAO office fully affected	Major		
11		Panchetty	Tiruvallur	Govt Building	Govt Building/	Major		

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
					community centre fully affected			
12	L	Section 2	Kelanur	Tiruvallur	Temple	Temple fully affected	Major	Replace
13	L	Section 2	Vishnuvakkam	Tiruvallur	Pump House	Pump house full	Major	Replace
14	L	Section 2	Thangalmedu	Tiruvallur	O.H.Tank	Over Head Tank Full	Major	Replace
15	R	Section 2	Agaram	Uthukottai	Agri. Center	Agri Business Center fully affected	Major	Replace
16	L	Section 3	Erikkarai	Sriperumputhu r	Temple	Poorana Shivushasa Deva Sabai	Minor	Replace
17	L	Section 3	Erikkarai	Sriperumputhu r	Well	Open well	Major	Replace
18	L	Section 3	Thodukadu	Tiruvvallur	Pump House	Pump house	Major	Replace
19	L	Section 3	Parasangapura m	Tiruvvallur	Bus Stop	Bus stop	Major	Replace
20	L	Section 3	Parasangapura m	Tiruvvallur	Temple	Pillayar Koil	Major	Replace
21	L	Section 3	Sengadu	Sriperamputhu r	Water Tank	Overhead tank	Major	replace
22	L	Section 3	Sengadu	Sriperamputhu r	Water Tank	Sintex water tank	Major	replace

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
23	L	Section 3	Sengadu	Sriperamputhu r	Temple	Mariamman temple	Major	replace
24	L	Section 3	Gandhi nagar	Sriperamputhu r	Bus Stop	Bus Stop fully affected	Major	replace
25	L	Section 3	Gandhi nagar	Sriperamputhu r	Bus Stop	Bus Stop fully affected	Major	replace
26	L	Section 3	Gandhi nagar	Sriperamputhu r	Pump House	Pump House fully affected	Major	replace
27	L	Section 3	Gandhi nagar	Sriperamputhu r	Pump House	Pump House fully affected	Major	replace
28	L	Section 3	Chattiram	Thiruvallur	Pump House	Pump House fully affected	Major	replace
29	L	Section 3	Chattiram	Thiruvallur	Pump House	Pump House fully affected	Major	replace
30	L	Section 3	Chattiram	Thiruvallur	Temple	Nagammal temple	Major	replace
31	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Dharma Sasdha Iyappan temple	Major	replace
32	L	Section 3	Chattiram	Thiruvallur	Water tank	Sintex tank with bore fully affected	Major	replace
33	L	Section 3	Chattiram	Thiruvallur	Bus Stop	Bus Stop fully affected	Major	replace
34	L	Section 3	Chattiram	Thiruvallur	Bus Stop	Bus Stop fully affected	Major	replace
35	L	Section 3	Chattiram	Thiruvallur	Temple	Sri Selva Vinayager & Sri	Major	replace

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
						Durgai temple		
36	L	Section 3	Athikulam	Thiruvallur	Pump House	Pump House fully affected	Major	replace
37	L	Section 3	Athikulam	Thiruvallur	Water Tank	Sintex tank with bore fully affected	Major	replace
38	L	Section 3	Thanneerkulam	Tiruvallur	Burial ground	Common Burial ground	Major	
39	L	Section 3	Thanneerkulam	Thiruvallur	Pump House	Pump house with bore	Major	replace
40	L	Section 3	Thanneerkulam	Thiruvallur	O.H.Tank	Over Head Tank	Major	replace
41	L	Section 3	Athikulam	Thiruvallur	Burial Ground	Burial ground fully affected	Major	replace
42	R	Section 3	Sriperumpudur	Sriperumpudur	Pump House	Pump house	Major	Replace
43	R	Section 3	Sriperumpudur	Sriperumpudur	Govt Building	Ration shop	Major	Replace
44	R	Section 3	Sriperumpudur	Sriperumpudur	Church	Church	Major	Replace
45	R	Section 3	Sriperumpudur	Sriperumpudur	Others	Security room College building	Major	Replace
46	R	Section 3	Thodukadu	Tiruvallur	Temple	Sei Ponniamman Temple,Pond,	Major	Replace
47	R	Section 3	Parangasupura m	Tiruvallur	Temple	Ponniamman temple	Major	Replace
48	R	Section 3	Parangasupura m	Tiruvallur	Church	Church fully affected, Compound wall	Major	Replace

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
49	R	Section 3	Parangasupura m	Tiruvallur	Church	Church Toilet	Major	Replace
50	R	Section 3	Parangasupura m	Tiruvallur	Pump House	Pump house	Major	Replace
51	R	Section 3	Parangasupura m	Tiruvallur	Pump House	Pump House full affected	Major	Replace
52	R	Section 3	Parangasupura m	Tiruvallur	Pump House	Pump House full affected	Major	Replace
53	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
54	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
55	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
56	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
57	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
58	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
59	R	Section 3	Kattukuttu road	Sriperumpudur	Temple	Sri Bakthra kali amman koil	Major	Replace
60	R	Section 3	Kattukuttu road	Sriperumpudur	Pump house	Pump House full affected	Major	Replace
61	R	Section 3	Kattukuttu road	Sriperumpudur	Bus Stop	Bus Stand full Affected	Major	Replace
62	R	Section 3	Kattukuttu road	Sriperumpudur	Water Tank	Water Tank Fully affected	Major	Replace
63	R	Section 3	Mannur	Sriperumpudur	Electric	Electric Room full	Major	Replace

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
					Room			
64	R	Section 3	Mannur	Sriperumpudur	Pump House	Pump house	Major	Replace
65	R	Section 3	Sengadu	Sriperumpudur	Bus Stop	Bus Stop fully affected	Major	Replace
66	R	Section 3	Chathram	Thiruvallur	Govt primary school	Class Rooms, Library, Toilet, Kitchen,	Major	Replace
67	R	Section 3	Polivakkam	Thiruvallur	Bus Stop	Bus stop fully affected	Major	Replace
68	R	Section 3	Polivakkam	Thiruvallur	Temple	Nagamman temple	Major	Replace
69	R	Section 3	Polivakkam	Thiruvallur	Pump House	pumb house	Major	Replace
70	R	Section 3	Aathikulam	Thiruvallur	Bus Stop	Bus Stand full Affected	Major	Replace
71	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
72	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
73	R	Section 3	Vengathur	Thiruvallur	Pump house	Pump house	Major	Replace
74	L	Section 5	Pooncheri Juction	Tirukalukundr am	TNRDC Shed	TNRDC Ambulance shed	Major	Replace
75	L	Section 5	Pooncheri Juction	Tirukalukundr am	Toll Plaza	TNRDC Tool Plaza	Major	Replace
76	L	Section 5	Ambal Nagar	Tirukalukundr am	Bus Stop	Ambal Nagar Bus stop	Major	Replace
77	L	Section 5	Ambal Nagar	Tirukalukundr	Temple	Temple at present not in use	Major	No

Sl. No.	R /L	Section	Village	Taluk	Type of CPR	Description of Loss	Impact	Remar ks
				am				
78	L	Section 5	Ambal Nagar	Tirukalukundr am	Temple	Temple at present not in use	Major	No
79	L	Section 5	Perumal Eri	Tirukalukundr am	Training center	Sri M V Arunachalam Technology	Minor	Replace
80	L	Section 5	Melakannagapa ttu	Tirukalukundr am	Bus Stop	Bus Stop - Melakannagapattu	Major	Replace
81	L	Section 5	Melakannagapa ttu	Tirukalukundr am	Church	Prayer Hall Tiru sabai	Major	Replace
82	R	Section 5	Ambal Nagar	Tirukalukundr am	Temple	Nagathamman temple	Major	Replace
83	R	Section 5	Karanai	Tirukalukundr am	Pump House	Pump House, Karanai Village	Major	Replace
84	R	Section 5	Melakannagapa ttu	Tirukalukundr am	O.H.Tank	Over Head Tank	Major	Replace

ANNEXURES - III LIST OF WATER BODIES ALONG THE PROJECT ROAD

ANNEXURE NO- 3 LIST OF WATER BODIES ALONG THE PROJECT ROAD

Cross	ing of Lake and Pond				
1	Kannigaiper Lake	Kannigaiper	27+600	II	Nearest one
2	Poorivakkam Lake	Poorivkkam	29+800	Π	Nearest one
3	Athangi Kavanoor Canal	Athangi Kavanoor	30+800	Π	Crossing the road
4	Pagalmedu Lake	Pagalmedu	32+400	II	Nearest one
5	Velliyur Lake	Velliyur	40+900	II	Nearest one
6	Vishnuwakkam canal	Vishnuwakkam	44+100	Π	Crossing the road
7	Kelanur Pond	Kelanur	45+000	Π	Crossing the road
8	Kelanur Canal	Kelanur	45+000	Π	Crossing the road
9	Melanur Canal	Melanur	46+500	Π	Crossing the road
10	Kelanur Lake	Kelanur	46+800	Π	Crossing the road
11	Kalayanakuppam Lake	Kalyanakuppam	50+900	III	Crossing the road
12	Thanneerkulam Lake	Thaneerkulam	53+700	III	Crossing the road
13	Thanneerkulam Pond	Thanneerkulam	54+600	III	Crossing the road
14	Thozhvur Lake	Thozhuvur	55+600	III	Nearest one
15	Puttulur Pond	Puttlur	56+000	III	Nearest one
16	Puttlur Lake	Puttlur	57+000	III	Nearest one
17	Vengathur Lake	Vengathur	58+300	III	Nearest one
18	Aranvoyal Lake	Aranvoyal	58+300	III	Nearest one
19	Athikulam Lake	Athikulam	63+000	III	Crossing the road
20	Chattram canal	Chattram	65+100	III	Crossing the road
21	Parangusapuram Lake	Parangusapuram	70+600	III	Crossing the road
22	Panithangal Lake	Panithangal	71+600	III	Nearest one
23	Thodukadu Lake	Thodukadu	72+200	III	Crossing the road
24	Thodukadu Pond	Thodukadu	72+100	III	Crossing the road
25	Sriperumputhur Canal	Sriperumputhur	75+000	III	Crossing the road
26	Sripeumputhur Lake	Sriperumputhur	76+800	III	Crossing the road
27	Poonjeri Lake	Poonjeri	129/166	V	Nearest one

Detailed Project Report for Chennai Peripheral Road -Environmental Impact Assessment (EIA) & Environmental Management Plan(EMP) Report

28	Mammalla Lake	Poonjeri	129/166	V	Nearest one
29	Perumal Eri	Perumal Eri	127/800	V	Nearest one
30	Manampathy Lake	Manampathy		V	Nearest one
31	Sirukundram Lake	Sirukundram		V	Crossing the one
32	Senkundram Lake	Senkundram	23/100	V	Crossing the one
33	Dasarikuppam Lake	Dasarikuppam	20/300	V	Crossing the one
34	Hanumanthapuram Pond	Hanumanthapuram		V	Nearest one
Cross	ing of River		1		
1	Buckingham Canal	Kattupalli	0+800	Ι	
2	Kosathalaiyar river	Tamaraipakkam	36+900	II	
3	Krishna River (Canal)	Thanneerkulam	53+700	II	
4	Coovum River	Puttlur	57+800	III	
5	Coovum River(Canal)	Janappachatram	74+000	III	
6	Kunnappattu River	Kunnappattu		V	Nearest one

ANNEXURES - IV LIST OF UTILITIES TO BE SHIFTED

Sl. No.	Description	Section 1	Section 2	Section 3	Section 5	Total
1	Telephone poles	3	1	29	28	61
2	Low Tension Electric	180	186	322	296	
	line poles					984
3	Transformers	4	1	9	18	32
4	OFC Cable Stones	2	0	65	14	81
5	Electric Box	0	5	26	8	39
6	Lamp Pole	33	4	25	60	122
7	Hand Pump/Water tap	4	5	36	8	53
8	Well	10	18	24	64	116
9	Over Head Tank	0	2	3	1	6
10	High Tension Towers	16	3	3	1	23

ANNEXURE NO- 4 LIST OF UTILITIES TO BE SHIFTED

ANNEXURES - V FORMATS FOR ENVIRONMENTAL CLEARANCES

ANNEXURE -5 FORMATS FOR ENVIRONMENTAL CLEARANCES

FORM – 'A'

Form for seeking prior approval under section 2 of the proposals by the State Governments and other authorities

PART-I

(to be filled up by user agency)

1. Project details:

- (i) Short narrative of the proposal and project/scheme for which the forest land is required.
- (ii) Map showing the required forest land, boundary of adjoining forest on a 1:50,000 scale map.
- (iii) Cost of the project:
- (iv) Justification for locating the project in forest area.
- (v) Cost-benefit analysis (to be enclosed).
- (vi) Employment likely to be generated.
- 2. Purpose-wise break-up of the total land required:
- 3. Details of displacement of people due to the project, if any:
 - (i) Number of families.
 - (ii) Number of Scheduled Castes/Scheduled Tribe families
 - (iii) Rehabilitation plan. (to be enclosed)
- 4. Whether clearance under Environment (Protection) Act, 1986 required? (Yes/No).
- 5. Undertaking to bear the cost of raising and maintenance of compensatory afforestation and/or penal compensatory afforestation as well as cost for protection and regeneration of Safety Zone, etc. as per the scheme prepared by the State Government (undertaking to be enclosed).
- 6. Details of Certificates/documents enclosed as required under the instructions.

Signature (Name in Block letters)

Designation Address (of User Agency) Date:-____

Place:-____

State serial No. of proposal_____

(To be filled up by the Nodal Officer with date of receipt)

PART-II

(To be filled by the concerned Deputy Conservator of Forests)

State serial No. of proposal_____

- 7. Location of the project/Scheme:
 - (i) State/Union Territory
 - (ii) District.
 - (iii) Forest Division
 - (iv) Area of forest land proposed for diversion (in ha.)
 - (v) Legal status of forest
 - (vi) Density of vegetation.
 - (vii) Species-wise (scientific names) and diameter class-wise enumeration of trees (to be enclosed. In case of irrigation / hydel projects enumeration at FRL, FRL-2 meter & FRL-4 meter also to be enclosed.)
 - (viii) Brief note on vulnerability of the forest area to erosion.
 - (ix) Approximate distance of proposed site for diversion from boundary of forest.
 - (x) Whether forms part of National Park, wildlife sanctuary, biosphere reserve, tiger reserve, elephant corridor, etc. (If so, the details of the area and comments of the Chief Wildlife Warden to be annexed).
 - (xi) Whether any rare/endangered/unique species of flora and fauna found in the area- if so details thereof.
 - (xii) Whether any protected archaeological/heritage site/defence establishment or any other important monument is located in the area. If so, the details thereof with NOC from competent authority, if required.
- 8. Whether the requirement of forest land as proposed by the user agency in col. 2 of Part-I is unavoidable and barest minimum for the project. If no, recommended area item-wise with details of alternatives examined.
- 9. Whether any work in violation of the Act has been carried out (Yes/No). If yes, details of the same including period of work done, action taken on erring officials. Whether work in violation is still in progress.

- 10. Details of compensatory afforestation scheme:
 - (i) Details of non forest area/degraded forest area identified for compensatory afforestation, its distance from adjoining forest, number of patches, size of each patch.
 - (ii) Map showing non-forest/degraded forest area identified for compensatory afforestation and adjoining forest boundaries.
 - (iii) Detailed compensatory afforestation scheme including species to be planted, implementing agency, time schedule, cost structure, etc.
 - (iv) Total financial outlay for compensatory afforestation scheme.
 - (v) Certificates from competent authority regarding suitability of area identified for compensatory afforestation and from management point of view. (To be signed by the concerned Deputy Conservator of Forests).
- 11. Site inspection report of the DCF (to be enclosed) especially highlighting facts asked in col. 7 (xi, xii), 8 and 9 above.
- 12. Division/District profile:
 - (i) Geographical area of the district.
 - (ii) Forest area of the district.
 - (iii) Total forest area diverted since 1980 with number of cases.
 - (iv) Total compensatory afforestation stipulated in the district/division since 1980 on (a) forest land including penal compensatory afforestation,
 (b) non-forest land.
 - (v) Progress of compensatory afforestation as on (date) _____ on(a) forest land
 - (b) non-forest land.
- 13. Specific recommendations of the DCF for acceptance or otherwise of the proposal with reasons.

Signature

Name

Official Seal

Date:

PART-III

(To be filled by the concerned Conservator of Forests)

- 14. Whether site, where the forest land involved is located has been inspected by concerned Conservator of Forests (Yes/No). If yes, the date of inspection & observations made in form of inspection note to be enclosed.
- 15. Whether the concerned Conservator of Forests agree with the information given in Part-B and the recommendations of Deputy Conservator of Forests.
- 16. Specific recommendation of concerned Conservator of Forests for acceptance or otherwise of the proposal with detailed reasons.

Signature

Name

Official Seal

Date:-			

PART-IV

(To be filled in by the Nodal Officer or Principal Chief Conservator of Forests or Head of Forest department)

17. <u>Detailed opinion and specific recommendation of the State Forest Department for acceptance of otherwise of the proposal with remarks.</u>

(While giving opinion, the adverse comments made by concerned Conservator of Forests or Deputy Conservator of Forests should be categorically reviewed and critically commented upon).

Signature

Name & Designation

(Official Seal)

Date:-____

PART- V

(To be filled in by the Secretary in charge of Forest Department or by any other authorised officer of the State Government not below the rank of an Under Secretary)

18. <u>Recommendation of the State Government:</u>

(Adverse comments made by any officer or authority in Part-B or Part-C or Part-D above should be specifically commented upon)

Signature

Name & Designation

(Official Seal)

Date:-____

INSTRUCTIONS

INSTRUCTIONS (for Part-I):-

- The project authorities may annex a copy of the approved project/plan in addition to filling Col. 1 (i) e.g. IBM approved mining plan for major minerals/CMPDI plan with subsidence analysis reports, etc.
- 2. Map has to be in original duly authenticated jointly by project authorities and concerned DCF

– Col. 1 (ii).

- 3. Complete details of alternative alignments examined especially in case of project like roads, transmission lines, railway lines, canals, etc. to be shown on map with details of area of forest land involved in each alternative to be given Col. 1 (iii).
- 4. For proposals relating to mining, certificate from competent authority like District Mining Officer about non-availability of the same mineral in surrounding/nearby non-forest areas.
- 5. In case the same company/individual has taken forest land for similar project in the State, a brief detail of all such approvals/leases be given as an enclosure along with current status of the projects.
- 6. The latest clarifications issued by the Ministry under Forest (Conservation) Act, 1980 may be kept in mind. In case such information do not fit in the given columns, the same shall be annexed separately.

GENERAL INSTRUCTIONS:-

- 1. On receipt of proposal, Nodal Officer shall issue a receipt to the user agency indicating therein the name of the proposal, user agency, area in hectare, serial number and date of receipt.
- 2. If the space provided above is not sufficient to specify any information, please attach separate details/documents.
- 3. While forwarding the proposal to the Central Government, complete details on all aspects of the case as per Form prescribed above read with the clarifications issued by the Ministry of Environment and Forests, Government of India, New Delhi should be given. Incomplete or deficient proposals shall not be considered and shall be returned to the State Government in original.
- 4. The State Government shall submit the proposal to the Central Government within stipulated time limits. In case of delay while forwarding, the reasons for the same to be given in the forwarding/covering letter.



APPENDIX - I GUIDELINES FOR EMP COMPONENTS

APPENDIX No -1 Guidelines for EMP Components

Guidelines Description

Guidelines -1: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF CONSTRUCTION CAMPS 2
Guidelines – 2: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF LABOUR CAMPS
Guidelines – 3: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF QUARRYING AND STONE CRUSHING OPERATIONS
Guidelines – 4: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF BORROW AREAS 22
Guidelines- 5: GUIDELINES FOR SITING AND MANAGEMENT OF DEBRIS DISPOSAL SITE
Guidelines -6: GUIDELINES FOR PREPARING COMPREHENSIVE WASTE MANAGEMENT PLAN
Guidelines -7: GUIDELINES FOR TOP SOIL CONSERVATION AND REUSE
Guidelines -8: GUIDELINES FOR PROVISION OF NOISE BARRIERS
Guidelines -9: GUIDELINES TO ENSURE WORKER'S SAFETY DURING CONSTRUCTION
Guidelines -10: GUIDELINES FOR PREPARATION OF TRAFFIC MANAGEMENT PLAN
Guidelines -11: GUIDELINES FOR STORAGE, HANDLING, USE AND EMERGENCY RESPONSE FOR HAZARDOUS SUBSTANCES
Guidelines -12 -GUIDELINES FOR LANDSCAPING, TREE PLANTING AND ENVIRONMENTAL ENHANCEMENT PLAN
Guidelines -13-GUIDELINES For CULTURAL PROPERTIES REHABILITATION MEASURES

Guidelines -1: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF CONSTRUCTION CAMPS A. OVERVIEW

Construction camp accommodates a mix of activities, which are highly polluting in nature causing considerable environmental impact and its proper siting, management and redevelopment is crucial to avoid, minimize and mitigate those impacts. The EMAP clearly distinguishes between various impacts that may occur at various stages of the camp like (i) siting, (ii) setting up, (iii) operation and (iv) closure / redevelopment and provide respective mitigation measures to some extent. In addition to that, this guideline has been prepared to provide the Concessionaire with comprehensive and systematic information on various steps to be undertaken during these four stages, so that she/he can execute his/her role in an aNNthis guideline so that it serves as a single and stand alone document for the Concessionaire.

B. CRITERIA FOR SITING THE CAMP

To the extent, possible barren land or wastelands shall be preferred during site selection and fertile land and agricultural land shall be avoided. All such sites must be above the HFL with adequate drainage facility. In areas prone to floods, cyclones, cloudbursts or heavy rainfall, selection of the site should be made keeping in mind the safety of the camp and the workers. In addition, the Concessionaire should take care of the following criteria for locating the site:

- [□] A minimum of 250 m away from any major settlement or village in downwind direction.
- [□] A minimum of 200 m of any major surface water course or body
- [□] Not within 500 m from ecologically sensitive areas like wild life sanctuary, mangroves etc.
- [□] Sufficiently wide access roads (at least 5.5 m Wide) for heavy vehicle movements

After identification of the site the Concessionaire should fill up the prescribed reporting format and submit the same for approval to the IE without which any activity shouldn't be started on the site.

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Concessionaire should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the IE. Environmental Officer of IE shall approve the selected site/s, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the IE. Any consequence of rejection prior to the approval shall be the responsibility of the Concessionaire and shall be made good at his own cost. After obtaining a written approval from the IE for the selected site, the Concessionaire has to enter into an agreement with the landowner to obtain his/her consent before commencing any operation / activities in the land. The agreement

should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. DESIGNING OF CAMP / PREPARATION OF LAYOUT PLAN

The Concessionaire should design a layout plan of the camp with adequate space for (i) site office along with store room, rest area and sanitary facilities, (ii) plants, machineries, (iii) workshops, (iv) vehicle washing area, (v) fuel handling area, (vi) room for raw material unloading and stocking, (vii) space for storage and handling of solid wastes (viii) security cabin etc. The laying out of these should be undertaken in such a manner that it facilitates smooth functioning of both man and machine. Fuel pumps, storage facility for inflammable and hazardous chemicals/ materials shall be provided inside the camp, but at a safe distance from office. Electric safety practices shall be integrated/ incorporated during the lay-out plan preparation.

Prevailing wind direction shall be kept in mind while planning out the lay-out of internal facilities. Cutting of trees should be minimum and the existing ones need to be integrated into the lay-out plan with proper planning. The roads within the camp should be well planned with adequate space for movement of vehicles and their parking.

E. SETTING UP OF CONSTRUCTION CAMP

(i) Site preparation: The stripping, stacking and preservation of top soil will be mandatory in case of farm lands and fertile areas and absolutely no material stacking or equipment installment or vehicle parking or any other activity should be allowed prior to the satisfactory completion of this activity as per guidelines in EMP. Thereafter, the site should be graded and rendered free from depressions such that the water does not get stagnant anywhere. A compound wall of 2.4 m height should be constructed all around the camp to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and as detailed in the EMP, it should be integrated with storm water drain and sedimentation trenches. No. of trees planted should not be less than ten times the number of trees cut (as per the approved norms of World Bank). The approved layout plan should be strictly adhered to while setting up the camp.

(ii) Setting up of plants and machineries: Adequate arrangements should be made for avoiding fugitive emissions from plants and camp premises. This will include (i) control of air pollution through provision of in-built dust extraction systems like bag filter, damper and cyclone filter for bitumen hot mix plant, (ii) a chimney of appropriate height (as per SPCB guideline) from ground level attached with dust extraction system and scrubber for the hot mix plant, (iii) a chimney of appropriate height for the DG set (iv) water sprinkling facilities for the concrete batching plant, wet mix macadam plant as well as in the camp premises and (v) garden net to prevent fugitive emissions from storage place of cement and aggregates... It has to be also ensured that effluent from the sludge tank of the scrubber is recycled and reused and the sludge is used for land filling with top soil spread on it.

To ensure that noise levels are within the limit, all plants and machineries should have their own silencers or any other noise control devices. All pollution control devices should be provided with backup power. Following conditions should be complied regarding the sound level conditions:

- The sound level (Leq) measured at a distance of 1 m from the boundary of the site shall not exceed 55dB (A) during day time (6am 6pm) and 45 dB (A) during night time (6 pm 6am).
- o The total sound power level of the DG set shall be less than 96+10 log 10(KVA) dB (A) where
- o KVA is the nominal power rating of DG set.
- o The DG set shall be provided with acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB (A).
- o The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25dB (A).
- o A proper, routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer.
- o Concrete flooring with slope drains and oil interceptors should be proposed for hot mix plant area and workshop, vehicle washing and fuel handling area as per EMP, so that oil and lubricants that may spill on the floor does not contaminate any soil or water body. In case of any oil spills, it should be cleaned properly. There shall also be provisions for storage of used oil until it is disposed as per comprehensive waste management plan prepared by Concessionaire and approved by IE.

(iii) Sanitation Facilities: Adequate no. of toilets shall be provided separately for males and females (depending on their strength), screened from those of men and provided with markings in vernacular language. All such facilities must have adequate water supply with proper drainage and effluent treatment system like septic tank with soak pit. Soak pit should have a sealed bottom, honey comb wall and 75 cm. thick, 2 mm sand envelope around that. The sewage system for the camp must be properly sited, designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the construction camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site.

(iv) Waste Disposal: While preparing the layout plan, the Concessionaire should allocate adequate space for storage and handling of various wastes generated until they are disposed off in pre-identified disposal sites. The Concessionaire should provide separate garbage bins for biodegradable, non-biodegradable and domestic hazardous wastes in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Concessionaire. The disposal of any biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags,

paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling. POL (petroleum, oil and lubricants) waste shall be disposed off by transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board. Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

(v) First aid / safety facilities: At every camp site, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances should be provided. Workplaces which are remote and far away from regular hospitals should have indoor health units with one bed for every 250 workers. Details of nearest clinics as well as major hospitals like their location, distance from camp, phone nos. facilities offered by the hospital should be displayed in the camp office at clearly visible location in a legible manner. Suitable transport should be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal protective equipments and fire fighting equipments as detailed out in EMP should be made available in the camp and provided to the staff / workers. Operation manuals and training should be provided to machine operators. Warning signs should be placed at accident prone areas as well as at the entrance of the site.

(vi) Training to workers: Workers shall be trained in smooth operation of plants and machines, their regular maintenance and various safety measures to be followed as well as about the need for adherence to these measures.

(vii) Information dissemination: There should be a sign board of size 6' x 4' mentioning the project details and Concessionaire's details to disseminate the information to the public. There should be a second sign board displaying the latest air and noise monitoring data against the standards specified.

Warning signboards should be set up at the entrance gate for the public as well as at other required places for the workers to alert them about the nature of operation being undertaken at those respective places.

Once the construction camp is set up, the date of commissioning of the camp should be intimated to the Head Office and concerned District Office of the SPCB.

F. OPERATION OF CONSTRUCTION CAMP

During the operation phase of the camp it is important to ensure that all vehicles and machineries are maintained regularly and their PUC certificates are renewed at regular intervals. All pollution control devices should be monitored and maintained properly at regular intervals. In case of process disturbance/ failure of pollution control equipments, the respective units should be shut down and should not be restarted until the control measures are rectified to achieve the desired

efficiency. All units should operate only between 6 am and 10 pm. or as specified by SPCB in the consent letter.

Oil and grease waste generated from garages in construction camps should be drained out through oil interceptors and they should be maintained properly. Necessary arrangements should be made for regular sprinkling of water for dust suppression. Raw materials and products should be transported with proper cover to prevent spreading of dust.

Hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and iv) appropriate waste management practices. While it is of utmost importance to ensure that fire fighting equipments like fire extinguishers are in working condition, it should also be monitored that construction workers use the personal protective equipments provided to them and they are replaced when necessary. All these facilities should be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

Environmental monitoring should be undertaken by the Concessionaire as stipulated in the EMP. If any standard is set by SPCB for hot mix plant emissions, the Concessionaire should collect samples of emission from all the chimneys and analyze for the parameters at least once in a month. The CTE certificate from SPCB should be renewed at regular intervals and the same should be intimated to IE.

A register should be maintained at the site office which provides (i) a one page format for each migrant laborer which will give their personal profile (including name, age, sex, educational qualification, address, blood group and any major illness), along with a copy of any ID proof and an original photograph, (ii) a copy of the ID card of local laborers. A copy of the details of the migrant laborers should be submitted to the local police station.

G. PREPARATION OF CONSTRUCTION CAMP MANAGEMENT AND RE- DEVELOPMENT PLAN

After the site for the construction camp has been finalized and approved by IE, the Concessionaire should prepare a construction camp management plan to be submitted to IE for approval prior to setting up of the camp and it should comprise the following details:

Section-1: Details of site:

Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that will be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of plants / machineries to be set up within the camp like hot mix plant, batching plant, DG set etc., including type and no of each equipment and machinery, list of other facilities to be provided like site office, store room, rest room, toilet room, material stocking yard etc, layout plan showing all these details along with vehicular movement path, green belt etc. Species wise no. of trees to be cut shall be provided.

Section-4: Mitigation measures that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out here.

Sectoin-5: Other details: Any other relevant detail like list of trainings to be provided to

workers, details of information dissemination, date of CTE certificate from SPCB, its validity, additional conditions laid down in it etc. should be included.

Section 6: Re-development plan, which should indicate the following points: (i) List of structures to be demolished and list of the cleanup activities that needs to be undertaken, (ii) Proposed use of the land after de-mobilizing and (iii) Presence of facilities that could be put in use by the land owner if it is a leased out private land or community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of plants, generators, master switch boards etc. and plumbing drawing showing the network of water supply lines, sewerage line and drainage line, (b) Copy of certificates / permissions obtained from regulatory authorities / local governing body / community etc. as applicable, (c) Copy of agreement entered with the owner of the site if it is a leased out land.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The construction camp management plan should be submitted to the IE for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The IE shall carefully examine the proposals considering the specific conditions of each site as well as various EMP and regulatory provisions and provide suggestions, as necessary to the Concessionaire who shall incorporate it in the management plan.

Concessionaire needs to prepare this document for each different site identified and IE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

H. DE-MOBILIZATION AND RE-DEVELOPMENT OF THE SITE

The Concessionaire should clear all temporary structures; dispose all building debris, garbage, night soils and POL waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. All the areas within the camp site should be leveled and spread over with stored top soil. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage.

Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Concessionaire's expense, to the entire satisfaction of landowner and IE. These activities should be completed by the Concessionaire prior to demobilization. Once the Concessionaire finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re- developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the IE by the Concessionaire:

- Copy of approved site identification report
- Photographs of the concerned site _before' and _after' setting up the camp.
- Certificate from the owner stating his/her satisfaction about status of re-development of the site.

IE shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Concessionaire mentioning the same before the _works completion certificate is issued/recommended. The PIU shall ensure through site inspection that the Concessionaire and IE have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Concessionaire and submitted to Supervision Consultant and PIU.

Guidelines – 2: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF LABOUR CAMPS

A. OVERVIEW

Staff-quarters include accommodation for Engineers / Supervisors and labor camp include accommodation for workers / laborers along with other basic amenities such as kitchen, potable water supply, sanitation (toilets, bathrooms, washing areas and water supply for such needs), first aid room as well as garbage collection and disposal facility. Staff quarters shall be provided with additional facilities of drawing room. The guidelines outlined here aims to facilitate the Concessionaire in implementing the measures in the EMP there by reducing the impact on the environment.

B. CRITERIA FOR LOCATING THE SITE/S

Following criteria should be followed in the siting of labor camps:

- To the extent possible it should be in waste lands and barren $ands^2$.
- It should be 500m away from the sensitive areas like schools & other community areas etc.

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Concessionaire should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the IE. The selected site/s shall be approved by Environmental Officer of IE, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the IE. Any consequence of rejection prior to the approval shall be the responsibility of the Concessionaire and shall be made good at his own cost. After obtaining a written approval from the IE for the selected site, the Concessionaire has to enter into an agreement with the landowner to obtain his/her consent before commencing any operation / activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. DESIGNING AND SETTING UP OF LABOUR CAMP

Following facilities should be provided in a labor camp to ensure safe, clean and hygienic accommodation for the workers.

(i) Site preparation: The site should be graded and rendered free from depressions such that the water does not get stagnant anywhere. Fencing should be constructed all around the camp to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and as detailed in the EMP, it should be integrated with storm water drain and sedimentation trenches.. No. of trees planted should not be less than three times the number of trees cut. The approved layout plan should be strictly adhered to while setting up the camp.

(ii) Accommodation: Concessionaire will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp. The height of

the worker's and labor accommodation shall not be less than 3mt. from floor level to the lowest part of the roof. The camps shall be floored with concrete; shall be kept clean, with proper cross ventilation, and the space provided shall be on the basis of one sq m per head or as per the relevant regulation, whichever is higher. Fire and electrical safety pre-cautions shall be adhered to. Cooking, sanitation and washing areas shall be provided separately. The Concessionaire will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labor) in functional and hygienic manner.

The site must be graded and rendered free from depressions such that water does not get stagnant anywhere. The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and it should be integrated with storm water drain and sedimentation trenches to reduce the surface run off as per clauses in EMAP. No. of trees planted should not be less than three times the number of trees cut.

(iii) Drinking Water: The Concessionaire should provide potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. All potable water storage facilities will be on a safely raised platform that is at least 1m above the surrounding ground level. Such facilities shall be regularly maintained from health and hygiene point of view. If necessary, water purifier units shall be installed for providing potable water.

As far as possible, shallow wells should not be used as potable source of water. However, if water is drawn from any existing well, irrespective of its location from any polluting sources, regular disinfection of the water source (which may include application of lime, bleaching power and potassium permanganate solution) has to be ensured at weekly/fort nightly interval. All open wells will be entirely covered and will be provided with a trap door to prevent accidental fall and contamination from dust, litter etc. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. A reliable pump will be fitted to each covered well. A drain shall be constructed around the well to prevent flow of contaminated water into the well from road, camp or other sources. Water quality testing of all potable water sources will be done every six months as per parameters prescribed in IS 10500:2012.

(iv) Sanitation Facilities: Adequate no. of toilets shall be provided separately for males and females (depending on their strength), screened from those of men and provided with markings in vernacular language. All such facilities must have adequate water supply with proper drainage and disposal facility. They shall be maintained, cleaned and disinfected daily using proper disinfectants. Location and design of soak pit should be in such a way that it doesn't pollute the ground water. Drains and ditches should be treated with bleaching powder on a regular basis. The

sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the main camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site. All these facilities shall be inspected on a weekly basis to check the hygiene standards. **Waste Disposal:** The Concessionaire should provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Concessionaire. Separate bins shall be provided for biodegradable, non-biodegradable and domestic hazardous wastes. The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. The Concessionaire may use the compost from such wastes as manure in the plantation sites. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling.

(v) Day Crèche Facility: At every construction site, provision of a day crèche shall be made so as to enable women to leave behind their children while going to work. At least one attendant shall be provided to take care of the children at the crèche. At construction sites where 20 or more women are employed, there shall be at least one shelter for use of children under the age of 6 years belonging to such women.

Shelters shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Such areas shall be safely barricaded (no sharp sheets or barbed wires that may injure a child) from rest of the camp for the safety of children. Shelters shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision to keep the place clean. The size of a crèche may vary according to the number of children on a camp site.

(vii) Mess and Kitchen Facilities: The Concessionaire shall adhere to the sanitary/hygiene requirements of local medical, health and municipal authorities at all times. Adopt such precautions as may be necessary to prevent soil and water pollution at the site while operating mess or kitchen facilities.

(viii) First aid facilities: At every workplace, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances should be provided. Workplaces remote and far away from regular hospitals should have indoor health units with one bed for every 250 workers. Suitable transport should be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal protective equipments and fire fighting equipments as detailed out in EMP should be made available in the camp and provided to the staff / workers.

(ix) Health Care Facilities: Health problems of the workers should be taken care of by providing basic health care facilities. If there is no hospital or clinic, which can be accessed in half an hour's time, then a temporary health center should be set up for the construction camp. The health centre should have at least a doctor and a nurse, duty staff, medicines and minimum medical facilities to tackle first aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses or critical cases.

The health centre should have MCW (Mother and Child Welfare) units for treating mothers and children in the camp. Apart from this, the health centre should be provided with regular vaccinations required for children. The health centre should carryout quarterly awareness programme of HIV – AIDS with the help of AIDS control society as well as about community living and hygiene practices in day to day living. Posters should be exhibited in the health care clinic.

E. OPERATION OF LABOUR CAMP

Throughout the functioning period of the camp, hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and iv) appropriate waste management practices. While it is of utmost importance to ensure that fire-fighting equipments like fire extinguishers are in working condition, it should also be monitored that construction workers use the personal protective equipments provided to them and they are replaced when necessary. All these facilities should be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

F. PREPARATION OF LABOUR CAMP MANAGEMENT AND RE-DEVELOPMENT PLAN

After the site for the labor camp has been finalized and approved by IE, the Concessionaire should prepare a labor camp management and redevelopment plan to be submitted to IE for approval prior to setting up of the camp and it should comprise the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of facilities to be provided along with its details like area, no of people to be accommodated and a layout plan showing the plan of the site with all the facilities planned like quarters, labor camps, mess, common facilities, toilet facilities and the vehicular and pedestrian movement paths.

Section-4: Mitigation measures that should be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out here

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. should be included.

Section 6: Re-development plan: which should indicate following points: (i) List of structures to be demolished and list of the cleanup activities that needs to be undertaken, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of generators, master switch boards etc. and plumbing drawing showing the network of water supply lines, water tank, drainage facilities etc. (b) Copy of permissions obtained from local governing body / community etc. as applicable, (c) Copy of agreement entered with site owner, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The labor camp management plan should be submitted to the IE for a written approval before any physical work is undertaken on a particular site. The IE will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Concessionaire who shall incorporate it in the management plan. Concessionaire shall be responsible for satisfactory and timely completion of these EMP requirements.

Concessionaire needs to prepare this document for each different site identified and IE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

G. RE DEVELOPMENT OF THE LABOUR CAMP

The Concessionaire should clear all temporary structures; dispose all building debris, garbage, night soils and any other waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Concessionaire's expense, to the entire satisfaction of landowner and the IE.

These activities should be completed by the Concessionaire prior to demobilization. Once the Concessionaire finishes his job, he needs to obtain a certificate from the owner, stating that the

site has been re- developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the IE by the Concessionaire:

- Copy of approved site identification report
- Photographs of the concerned site _before' and _after' setting up the camp.
- Certificate from the owner stating his/her satisfaction about status of re-development of the site.

IE shall ensure, through site verification that all clean-up and restoration operations are completed

Satisfactorily and a written approval should be given to the Concessionaire mentioning the same before the _Works completion' certificate is issued/recommended. The PIU/IE shall ensure through site inspection that the Concessionaire have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Concessionaire, Supervision Consultant.

Guidelines – 3: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF QUARRYING AND STONE CRUSHING OPERATIONS

A. OVERVIEW

A quarry is a type of open-pit mine from which rock or minerals are extracted for building materials, such as dimension stone, construction aggregate, riprap, sand, and gravel. Quarrying causes lot of environmental damages like air and noise pollution, water logging etc. and requires permission from regulatory authorities like mining department. It requires a careful approach in the site selection process, scientific method of quarrying and appropriate measures to redevelop it.

B. CRITERIA FOR LOCATING THE SITE/S

The selection of a quarry is sole responsibility of the Concessionaire and should be undertaken in adherence to the rules & regulations of the authorities. Following criteria should be followed while selecting a quarry site:

- To the extent possible barren land or waste lands shall be preferred during site selection and fertile land and agricultural land shall be avoided.
- There shall be no quarrying of sand in any river bed or adjoining area or any other area which is located within 500 meters radial distance from the location of any bridge, water supply system, infiltration well or pumping installation of any of the local bodies or Central or State Government Department or any area identified for locating water supply schemes by any of the Government Department or other bodies.
- Quarry site shall be located at a minimum distance of: 500 m from any human settlements, public road, railway line, national highway, state highway or major district road.
- Stone quarry shall be located at a minimum distance of 50 m from any water body.
- Locate the quarry and crusher at a min. distance of 500 m. away from forests / wildlife habitats / mangroves / ecologically sensitive areas.
- The minimum distance between two stone crushers should be 1 km to avoid dust pollution influence of one over the other.
- Stone crushing unit should be distanced for 500 m from the NH or SH or residential area or places of public and religious interests.
- Access roads to quarry sites must be wide enough for heavy vehicle movement without inconvenience to local traffic.

After identification of the site, Concessionaire should fill up the prescribed reporting format and submit the same for approval to the IE without which any activity shouldn't be started on the site.

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Concessionaire should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the IE. The selected site/s shall be approved by Environmental Officer of IE, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s (in case of a leased or rented out

land) prior to receipt of a written approval from the IE. Any consequence of rejection prior to the approval shall be the responsibility of the Concessionaire and shall be made good at his own cost. After obtaining a written approval from the IE for the selected site, the Concessionaire has to enter into an agreement with the land owner.

D. SETTING UP OF QUARRYING AND STONE CRUSHER

Quarrying involves not only extraction of material (rock) but also crushing and screening that makes the rock suitable for use as construction material. Following are the major parameters to be considered before the start of quarrying and stone crushing operations:

(i) Site preparation: The stripping, stacking and preservation of top soil will be mandatory and absolutely no activity should be allowed prior to the satisfactory completion of this conservation measure as per guidelines in EMAP. The boundary of the quarry should be demarcated using barbed wire fencing in order to avoid the future dispute over land as well as to avoid accidental trespassing of people. There should be recorded documents of exact no of trees cut. Green belt should be provided all along the quarry site to function as both noise attenuators and dust collectors and number of trees planted should not be less than three times the number of trees cut. Contour trenches should be dug along the borrow area boundary and at any other appropriate places considering the topography to reduce the surface run off and conserve soil and water. Side slopes shall be constructed with slope drains at applicable locations, to provide drainage and avoid any landslides. All the drainage constructed should be linked to existing drainages in order to avoid flooding and water logging.

(ii) Setting up of a quarry site: The layout of a quarry should provide a gravity flow of material from the face to the crusher, from the crusher to the storage bin and from the bin to the hauling equipment. Adequate arrangements should be made for avoiding fugitive emissions from quarry and crusher premises. This will include (i) housing the noise and dust producing units of the crusher unit in a building with wall of minimum 23 cm thickness and with suitable roofing, (ii) control of air pollution through provision of in-built dust extraction systems in the crusher unit and all transfer points, (iii) a chimney of appropriate height for the DG set (as specified by SPCB), (iv) water sprinkling facilities for the camp premises, (v) facilities to store water required for 3 days use.

Consent to operate the crusher unit should be obtained from SPCB under Air (Prevention and Control of Pollution) Act, 1981 before starting the operation.

(iii) Safety aspects: Blasting timings in quarry should be fixed avoiding the rush hours and these timings should be adhered to in order to avoid the conflict between the surrounding communities or population. Provide warning sirens 10 before each explosion as a warning alarm to people in and outside the quarry. Damaged explosives must be disposed off in a safe manner away from the operational area. Speed of the vehicles around the quarry should be restricted to a low speed in order to reduce the noise pollution and dust generation. Workers should not be exposed to sound of more than 85 - 90 DB for more than eight hours a day and shall be provided with adequate

safety wears and personal protective equipments like ear muffs / plugs etc as detailed out in EMP. Fire extinguishers should be provided in the site office.

Traffic movements should be restricted along the access road around times that children walk to and from school. Proper first aid facilities should be provided within the site office and in case of an accident, quick access to nearby hospital /clinic should be provided.

(iv) Facilities for workers: Potable drinking water should be provided in the site office in a hygienic environment sufficient for all the people. Adequate no. of toilets shall be provided for the workers with adequate water supply, proper drainage and effluent treatment system like septic tank with soak pit. Soak pit should have a sealed bottom, honey comb wall and 75 cm. thick, 2mm sand envelope around that. The sewage system for the camp must be properly sited, designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

(v) Waste Disposal:

The Concessionaire should provide separate garbage bins for biodegradable, nonbiodegradable and hazardous wastes in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Concessionaire. The disposal of any biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be used or reused only after obtaining permission from State Pollution Control Board and valid registration from the Central Pollution Control Board. Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

Quarry areas should be protected from illegal dumping of waste by third parties. The overburden should be kept as minimum to maximize the commercial efficiency of the quarry, it can be utilized for creating earth bunds to mitigate the noise and visual impacts and also for the site rehabilitation process. No quarry waste shall be dumped within a 100 m on either side of the road. The overburden should be reused or disposed properly. Site for overburden disposal should be planned within the quarry site or any other appropriate site.

(vi) Training to workers: Workers shall be trained in smooth and safe operation of plants and equipments, their regular maintenance and various safety measures to be followed as well as about the need and importance for adherence to these measures. All the drivers should be trained about safe driving and should be made aware about the need to observe caution while plying through access roads, especially during the time when children walk to and from school. Conduct education programs with the locals regarding the potential impacts of blasting, blasting warning systems, schedules etc.

(vii) Information dissemination: There should be a sign board of size 6' x 4' mentioning the project details and Concessionaire's details to disseminate the information to the public. There

should be a second sign board displaying the latest air and noise monitoring date and data against the standards specified. Warning sign boards should be set up at the entrance gate for the public as well as at other required places for the workers to alert them about the nature of operation being undertaken.

Other mitigation measures:

The quarry should not damage any building, work, property or rights of other persons. The quarry should not alter any right of way, well or tank. Roads inside the crusher premises should be tarred or concreted. Water course, if any, from a higher slope should be properly drained out. Strom water drainage shall be provided to prevent water logging and flooding in and around the area. The possibility of collecting the storm water in a pit or a tank should be explored so that it can be reused for dust suppression and the dependence on other water sources could be reduced. If this is not possible, the water should be safely channeled out of the quarry without disturbing any nearby Human settlement. A register should be provided in the camp site for public to record their grievances if any. Environmental monitoring should be conducted as per suggested frequency.

The concerned authority - IE/ PIU should regularly review the environmental, health and safety aspects. If any adverse effect on environment, habitat and concern of safety is noticed, appropriate measures should be taken as suggested by IE or should arrange an alternative for road construction materials. In the case of existing quarries and additional quarries, the Concessionaire has to ensure that all actions in these quarries are in compliance with EMP.

E. OPERATION OF QUARRY SITE AND STONE CRUSHING UNIT

No quarrying operation shall be done without the approval from the concerned authority. The equipment used in quarry should be wear faced, which extends the equipment life and reduce the demand for spare parts. Adopt controlled blasting techniques and conduct quarrying in a skillful, scientific and systematic manner. All units should operate only between 6 am and 10 pm. or as specified by SPCB in the consent letter.

Accessory facilities to be provided in the quarry includes sprinklers to spray water for dousing the dust generation, noise suppressers and rubberized mounting to reduce noise and vibration and tarpaulins or covers over material transporting vehicles. Provide sufficient water storage facility for 2 days' use. Measures have to be taken to reduce the dust generation during drilling operation. Deep wetting of drilling zones also to be done by water sprinkling and drilling machine shall be fitted with dust suppression, collection and disposal arrangements. In case of blasting, the storage and the operation should be as per the regulations. To avoid spillage of fuel and lubricants, the vehicles and equipment should be properly maintained and repaired. Maintenance should be carried out on impervious platforms with spill collection provisions.

Following conditions regarding sound generation should be complied with in a quarry / crusher unit:

• The sound level (Leq) measured at a distance of 1 m from the boundary of the site shall not exceed 55 dB(A) during day time (6am - 6pm) and 45 dB(A) during night time (6 pm - 6am).

- The DG set shall be provided with exhaust muffler /acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB(A) and its emission levels should be within relevant SPCB guidelines.
- A proper, routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer.

F. PREPARATION OF QUARRY MANAGEMENT AND REDEVELOPMENT PLAN

The Concessionaire after getting approval from the competitive authority for the selected site should submit a detailed Quarry Management Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of facilities to be set up within the site like site office, store room, rest room, sanitation facilities etc. and a layout plan showing all these details along with vehicular movement path, green belt, locations were digging of contour trenches should be undertaken etc.

Section-4: Mitigation measures that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out.

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. date of quarry license obtained from Dept of Mines, its validity, additional conditions laid down in it etc. should be included in the quarry management plan. Species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i) List of structures to be demolished and list of the cleanup activities that needs to be undertaken, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of generators, master switch boards etc. (b) Copy of permissions obtained from local governing body / community etc. as applicable, (c) Copy of agreement entered with site owner, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The quarry and crusher unit management plan should be submitted to the IE for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The IE will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Concessionaire who will implement it within the stipulated time period.

Concessionaire needs to prepare this document for each different site identified and IE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

G. REDEVELOPMENT OF QUARRY AREA

The main objective of the redevelopment of quarries is to make the area a safe and secure place and adapt it to a suitable land use like leisure place or fishing place etc. which is suitable for the physical environment as well as for the community around. Along with the preparation of quarry and crusher management plan the Concessionaire should also prepare a re-development plan, which will be submitted for approval to IE who in turn will be responsible for approving and monitoring these plans. The redevelopment plan should indicate following points:

- List of structures to be demolished and list of the cleanup activities that needs to be undertaken.
- Presence of existing facilities that could be put in use by the land owner, if it is a leased out private land, or community, in case of a public property.
- The proposed use of the quarry site with a layout plan showing the proposed facilities / improvement measures, list of local plant species that could be planted etc
- Photographs of the site before, during and after the quarrying process.

Possible re-development options include the following:

- Re-vegetation of the quarry to merge with surrounding landscape with reuse of top soil mixed together with farm yard manure.
- Development of exhausted quarries as water bodies, where the quarry pit is developed into pond or a rainwater harvesting structure.
- Pits created as a result of blasting could be filled with over burden which are removed and stockpiled in other areas or with construction debris. Top soil should be spread back and trees should be planted along the boundary.

• Tree plantation where ever possible depending on the proposed use, erosion control measures etc should be taken up as part of the redevelopment plan.

The Concessionaire should clear all temporary structures; dispose all debris, garbage, night soils and any other waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Concessionaire's expense, to the entire satisfaction of land owner and the IE.

These activities should be completed by the Concessionaire prior to demobilization. Once the Concessionaire finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re- developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the IE by the Concessionaire:

- Copy of approved site identification report
- Photographs of the concerned site _before 'and _after 'setting up the camp.
- Certificate from the owner stating his/her satisfaction about status of re-development of the site, this is applicable only in the case of a site to be returned to the owner.

IE shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Concessionaire mentioning the same before the _works completion'certificate is issued/recommended. The PIU shall ensure through site inspection that the Concessionaire and IE have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Concessionaire and submitted to, Supervision Consultant and PIU.

Guidelines – 4: GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF BORROW AREAS

A. BORROW AREA SELECTION

A borrow describes an area where material (usually soil or sand) has been dug for use at another location, for example, soil might be excavated to fill an embankment for a highway. In some cases, the borrow pits may become filled with ground water posing a danger to the surrounding community. If properly redeveloped, it can be turned into recreational areas or sustainable wildlife habitats. In other cases, borrow pits may be used for landfill and waste disposal also.

B. CRITERIA FOR SITE SELECTION

The Concessionaire in addition to the established practices, rules and regulation shall also use the following criteria before finalizing the locations of borrow areas:

- The borrow area should not be located in agriculture areas especially in paddy fields unless unavoidable i.e. Barren land is not available. In case borrowing needs to be done on an agricultural land, top-soil stripping, stacking and preservation is a must.
- Borrow pits shall not be located within a distance of 100 mt. from any NH, SH or other roads. Site shall be located 30m away from toe of the embankment along road side.
- Site should be located not less than 30m from the toe of the bank along the river side or irrigation tank bund.
- Borrow area shall be located at a minimum distance of 30m from the toe of the irrigation tank bund.
- Borrow site shall be located at a minimum distance of 500 m in down-wind direction of villages and settlements.
- No borrow pits shall be located within 250 m. from schools, colleges, playgrounds, religious structures and health centers.
- No borrow area shall be opened within 500 m. from a reserved or protected forest area/sites, wildlife movement zone and cultural heritage site.
- Loss of vegetation shall be almost nil or minimum.
- Borrow area near any surface water body will be at least 100mts. away from the toe of the bank or high flood level, whichever is maximum. After identification of borrow area location/s, the Concessionaire will fill the prescribed reporting format and submit the same for approval to the —Site Engineer at least 7 working days before commencement of earth works. A written approval from SC shall be necessary before any activity/work is commenced.

• Borrow pit location shall be located at least 0.8 km from villages and settlements. If unavoidable, they should not be dug for more than 30 cm and should be drained.

C. Finalization of the selected area

After identification of the site, the Concessionaire should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the IE. The s elected site/s shall be approved by Environmental Officer of IE, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s (in case of a leased or rented out land) prior to receipt of a written approval from the IE. Any consequence of rejection prior to the approval shall be the responsibility of the Concessionaire and shall be made good at his own cost. After obtaining a written approval from the IE for the selected site, the Concessionaire has to enter into an agreement with the land owner to obtain his / her consent before commencing any operation/ activity.

D. BORROW AREA MANAGEMENT

Before the start of operations, the area to be borrowed shall be marked by the Concessionaire with wooden or stone pegs to ensure that the land required for slope stabilization or bund creation is maintained. Supervision Consultant has to ensure that this marking is done on the ground to avoid issues at a later date. Any disregard of this condition shall be made good at the Concessionaire's and/or consultant's own expense.

After receiving the approval, the Concessionaire will begin operations keeping in mind the following points.

Top soil conservation is to be undertaken only if its reuse is envisaged for the proposed activity in the borrow area rehabilitation. Top soil that cannot be re-used in rehabilitation of borrow areas shall be used in the plantation belt/zone along the road.

Damage to productive and fertile areas has to be minimum. This includes appropriate planning of haul roads.

No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Concessionaire should be permitted to remove acceptable material form the site to suit his operational procedure, and then be shall make good any consequent deficit of material arising there from.

Where the excavation reveals a combination of acceptable and un-acceptable materials, the Concessionaire shall, unless otherwise agreed by the Engineer, carryout the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.

The Concessionaire shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.

The following principles shall be adhered to during borrow area operations:

- A 15 cm topsoil layer will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area with a height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- Borrowing of earth will be allowed up to a depth of 1.5 mtr from the existing ground level only. Ridges of not less than 8m width will be left at intervals not exceeding 300m.Small drains will be cut through the ridges, if necessary, to facilitate drainage.
- \circ The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).
- Rehabilitation shall be satisfactorily undertaken immediately after the use has ceased and at least three weeks prior to monsoon.
- If the rehabilitation plan envisages re-use of top soil, then preserved top soil has to be spread uniformly over the land used as a borrow area.
- Bunds and temporary fencing (using barbed wire) along with plantation should be provided in case the borrow area is developed as a pond to ensure safety of the residents and the cattle. However, the depth shall not exceed 1.5 m.

E. Preparation of Borrow Area Management and Redevelopment Plan

The Concessionaire after getting approval from the competitive authority for the selected site should submit a detailed Borrow Area Management and Redevelopment Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Layout plan: A layout plan showing all these details along with vehicular movement path, green belt, locations were digging of contour trenches should be undertaken etc.

Section-4: Mitigation measures that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out.

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. date of quarry licence obtained from Dept of Mines, its validity, additional conditions laid down in it etc. should be included in the quarry

management plan. Species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i)proposed use of the land in the post construction phase, (ii) preferences of land owner with respect to redevelopment, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property, (iv) Extent of community involvement.

Section-7: Annexure-(a) Copy of permissions obtained from local governing body / community etc. as applicable, **(b) Copy of agreement entered with site owner**, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The management plan should be submitted to the IE for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The IE will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Concessionaire who will implement it within the stipulated time period.

Concessionaire needs to prepare this document for each different site identified and IE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures as demanded by the features of the specific site and its surroundings.

F. REHABILITATION OR RE-DEVELOPMENT OF BORROW AREAS

The objective of the borrow area rehabilitation is to return the borrowing sites to a safe and environmentally sound condition. The concept entails enhancing benefits (including those linked to livelihood) for the community and individuals. Top soil preservation (and its re-use) and proper stabilization of slopes are the fundamental requirements of the rehabilitation process. Redevelopment plan shall be prepared and submitted along with reporting format by the Concessionaire before the borrowing operation is permitted by the IE. The redevelopment is to be prepared in consultation with land owner/s (whether public, private or institutional) and by within the environmental and safety requirements of the EMP. Some key points on borrow area rehabilitation are presented in the table provided below. However, the Concessionaire is free to prepare other rehabilitation scheme/s subject to the approval by the Environmental Officer of the Supervision Consultant.

Rehabilitation works shall be undertaken immediately upon the exhaustion of the approved quantity and shall not be delayed. The Supervision Consultant shall take appropriate action in case delays are observed. Once the Concessionaire finishes his job, he needs to obtain a certificate

from the owner, stating that the site has been re- developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the IE by the Concessionaire:

- Copy of approved site identification report
- Photographs of the concerned site _before' and _after' setting up the camp.
- Certificate from the owner stating his/her satisfaction about status of re-development of the site.

IE shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Concessionaire mentioning the same before the Works completion 'certificate is issued/recommended. The PIU shall ensure through site inspection that the Concessionaire and IE have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Concessionaire, Supervision Consultant and PIU.

Guidelines- 5: GUIDELINES FOR SITING AND MANAGEMENT OF DEBRIS DISPOSAL SITE

A. OVERVIEW

Construction of highways generates huge quantity of building debris, which needs to be disposed off in previously identified sites suitable for such an activity. This process entails close scrutiny of the sites with respect to their location and this section details out the criteria to be followed in doing so. Moreover, it also guides the Concessionaire as to how to prepare the site without causing much impact on the surrounding environment.

B. CRITERIA FOR LOCATING THE SITE/S

The locations of waste disposal have to be selected such that:

- The said site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- Debris disposal site shall be at least 200 m away from surface water bodies³. No residential areas shall be located within 100 m downwind side of the site.
- The site is minimum 250 m. away from sensitive locations like settlements, ponds/lakes or other water bodies, wetlands, protected areas, forests, wildlife habitats / Mangroves / Ecologically sensitive areas, seasonal streams, rivers, canals, flood plains, educational institutions, medical centers, religious sites, cultural or heritage sites and play grounds.

The local governing body and community shall be consulted while selecting the site.

The selected site shall meet with the local regulatory requirements (including those of SPCB

Municipalities etc.). The site shall preferably be owned by government so that there is no need to acquire the land for the same.

After identification of the site the Concessionaire should fill up the prescribed reporting format and submit the same for approval to the IE. Any activity on the site can be initiated only after obtaining permission from the IE.

C. FINALIZATION OF SELECTED SITE/S

The selected site/s shall be approved by IE and PIU, after considering compliance with the EMP clauses and this guideline. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the IE and PIU. Any consequence of rejection prior to the approval shall be the responsibility of the Concessionaire and shall be made good at his own cost.

D SETTING UP OF DEBRIS DISPOSAL SITE

Following steps has to be undertaken while setting up a debris disposal site:

- Top soil conservation has to be undertaken as per the guidelines given in EMP.
- Considering the topography of the site contour trenches as detailed in EMP should be made along the site boundary to prevent soil erosion
- Fencing should be provided for the debris disposal site to prevent trespassing of humans and animals into the area as well as to prevent spread of the waste material through action of wind, water, scavengers or rag pickers.
- No of trees cut should be recorded and three times the same should be planted as green belt development or elsewhere as part of the project.
- Provide proper drainage facility so that the runoff from the site doesn't contaminate any nearby water sources or rivers.

E PREPARATION OF DEBRIS DISPOSAL SITE MANAGEMENT AND

REDEVELOPMENT PLAN

The Concessionaire after getting approval from the competitive authority for the selected site should submit a detailed Debris Disposal Site Management and Redevelopment Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements within the site: A layout plan showing the existing trees, green belt, locations were contour trenches should be dug etc.

Section-4: Mitigation measures that will be undertaken as per the EMP while preparing the site and dumping the waste should be separately listed out.

Sectoin-5: Other details: Any other relevant details like copy of approvals / clearances obtained, species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i) species wise no of tree to be planted, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public

property and (iv) Other site specific mitigation measures to be undertaken as recommended by the IE.

Section-7: Annexure-(a) Copy of permissions obtained from local governing body / community etc. as applicable, (c) Copy of agreement entered with site owner, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The debris site management plan should be submitted to the IE for a written approval before any physical work is undertaken. The IE will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Concessionaire who will implement it within the stipulated time period.

Concessionaire needs to prepare this document for each different site identified and IE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures as demanded by the features of the specific site and its surroundings.

F. REDEVELOPMENT OF WASTE DISPOSAL SITES

Along with the format seeking permission/approval for the disposal site/location from the Engineer/Supervision Consultant, the Concessionaire shall also submit a rehabilitation plan for the area. Following points have to be kept in view while undertaking the rehabilitation measure:

- The dump sites shall be suitably rehabilitated by planting local species of shrubs and other plants. The species (region specific) shall be chosen from the list suggested in the EA/EMP. Local species of trees should be selected so that the landscape is coherent and is in harmony with the surrounding environment.
- Rehabilitation can also include conversion into farm land, playground, parking area, block plantation area etc.
- Some of the dumpsites could be used either for plantation or for growing agricultural products such as ginger, turmeric or oranges etc.
- Care should always be taken to maintain the hydrological flow in the area.

Guidelines -6: GUIDELINES FOR PREPARING COMPREHENSIVE WASTE MANAGEMENT PLAN

A. OVERVIEW

A comprehensive waste management plan shall be prepared by the Concessionaire prior to initiation of any works. The purpose of the plan is to provide standardized procedures for the clearance, removal and disposal of debris caused by major debris / waste generated during the construction work as well as to establish the most efficient and cost effective methods to resolve debris disposal issues.

B. PREPARATION OF COMPREHENSIVE WASTE MANAGEMENT PLAN

The Concessionaire should prepare a Comprehensive Waste Management Plan to be submitted to IE for approval prior to setting up of construction and labor camp and it should comprise the following details:

- Categorization of waste into degradable, biodegradable and hazardous categories and list of different types of waste that falls in each of these categories.
- Estimates about the quantity of waste generated in each category and type of storage units required.
- Detail the provisions for storage and handling of waste until disposed. A plan of the respective camps / areas like construction camp, labor camp etc. to be attached indicating in it the space allocated for storage and handling of wastes.
- Detail the precautions to be taken while storing, handling and disposing each type of waste, trainings to be imparted to workers to create awareness about waste management.
- Details of each debris disposal site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the debris disposal sites, site, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

C. TRAINING FOR PROJECT STAFF AND WORKERS

All staff and workers involved in the highway construction should be imparted training about comprehensive waste management plan including the need for such a plan, its components and measures adopted by the Concessionaire for implementing it. In addition, all personnel involved should be made aware about various steps and measures each of them has to follow so as to ensure the compliance to the comprehensive waste management plan.

D. PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS/WASTE MATERIAL

The Concessionaire shall take the following precautions during transportation and disposal of debris/waste material:

- A register should be kept for recording the details of the waste generated and their disposal.
- The pre-designated disposal sites should be a part of Comprehensive Solid Waste Management Plan and should be identified as per the EMP clauses prior to initiation of any work on a particular section of the road.
- The Concessionaire will take full care to ensure that public or private properties are not damaged /affected during the site clearance for disposal of debris and the traffic is not interrupted.
- All arrangements for transportation during dismantling and clearing debris, considered incidental to the work, will be implemented by the Concessionaire in a planned manner as approved and directed by the IE.
- In the event of any accidental spill or spread of wastes onto adjacent parcels of land, the Concessionaire will immediately remove all such waste material/s and restore the affected area to its original state to the satisfaction of IE.
- Concessionaire should ensure that any spoils/materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests etc. pasture; eroded slopes; and in ditches, which may pollute the surrounding including water sources.
- Concessionaire should ensure effective water sprinkling during the handling and transportation of materials where dust is likely to be created.
- Materials having the potential to produce dust will not be loaded beyond the side and tail board level and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after discussion with the local body and as approved by IE.
- During the debris disposal, Concessionaire will take care of surrounding features and avoid any damage to trees and properties.
- Surplus fly ash, bottom ash and lime, if any, transported for use on this corridor shall not be left open and dumped at any disposal site. Concessionaire shall take care of such residual materials for use at any other location/s of new embankment construction work with proper protection measures
- No hazardous and contagious waste material shall be disposed at such locations.

E. WASTE DISPOSAL IN CONSTRUCTION CAMP

Concrete flooring and oil interceptors should be provided for hot mix plant area, workshops, vehicle washing and fuel handling area.

POL (petroleum, oil and lubricants) waste shall be stored safely in separate containers and should be disposed of by transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board.

Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

Water separated and collected from oil interceptor should be reused for dust suppression.

There should be a register to record the details of the oil wastes generated at the workshops and oil storage areas. The Concessionaire will provide separate garbage bins in the camps and ensure that these are regularly emptied and disposed off in safe and scientific manner as per the Comprehensive Solid Waste Management Plans approved by the IE.

No incineration or burning of wastes shall be carried out.

Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold/given out for recycling.

Septic tank must be provided for toilets and the sludge should be cleared by municipal exhausters.

F. WASTE DISPOSAL IN LABOUR CAMP

The Concessionaire should provide separate garbage bins in the camps for bio-degradable, nondegradable and domestic hazardous waste and ensure that these are regularly emptied and disposed off in safe and scientific manner.

The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site to avoid smell and pests. The Concessionaire may use the compost from such wastes as manure in the plantation sites.

Non-biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or should be sold /given out for recycling.

No incineration or burning of wastes should be carried out.

Effluent treatment system like septic tank with soak pits provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Soak pits must be provided to collect waste water from bathrooms and kitchen.

G. DISPOSAL OF BITUMINOUS WASTE

The bituminous waste should be used for development of roads inside the construction camps, haul roads or for filling pot holes in rural roads.

At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water.

The Concessionaire will suitably dispose of unutilized non-toxic debris either through filling up of borrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of IE.

Debris generated from pile driving or other construction activities along the rivers and streams drainage channels shall be carefully disposed in such a manner that it does not flow into the surface water bodies or form puddles in the area.

H. DISPOSAL OF NON BITUMINOUS WASTE

Non-bituminous wastes other than fly ash may be dumped in borrow pits (preferably located in barren lands) where such borrow pits are not suitable to be re-developed as an economic source like pisci-culture or a source of irrigation. Such borrow pits can be filled up with non-bitumen wastes and then covered with a minimum 30cm layer of the soil, where plantation of trees and shrubs will be taken-up by the Concessionaire as a part of site rehabilitation.

Local tree species suitable for such re-habitation work shall be selected in consultation with local community.

I. REUSE OF DEBRIS GENERATED FROM DISMANTLING STRUCTURES AND ROAD SURFACE

Debris generated due to the dismantling of existing road will be suitably reused in the proposed construction as follows:

- Eighty percent (80%) of the sub-grade excavated from the existing road surface, excluding the scarified layer of bitumen, shall be reused in the civil works after improving the soil below the subgrade through addition of sand and suitable cementing material for qualitative up-gradation.
- The dismantled scraps of bitumen will be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the corridor or in any other manner approved by the Environmental Officer of SC.

Guidelines -7: GUIDELINES FOR TOP SOIL CONSERVATION AND REUSE

The top soil from all sites including road side widening and working area, cutting areas, quarry sites, construction camps, labor camps, haul roads in agricultural fields (if any) and areas to be permanently covered shall be stripped to a specified depth of 15 cm and stored in stock piles for reuse. A portion of temporarily acquired area and/or RoW edges will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of environmental officer of SC. The following precautionary measures will be taken by the Concessionaire to preserve the stock piles till they are re-used:

- Stockpiles will be such that the slope doesn't exceed 1:2 (vertical to horizontal), and height is restricted to 2 m.
- To retain soil and allow percolation of water, the edges of pile will be protected by silt fencing. Multiple handling kept to a minimum to ensure that no compaction occurs.
- Such stockpiles shall be covered with empty gunny bags or will be planted with grasses to prevent the loss during rains.
- Such stockpiled topsoil will be utilized for:
- Covering reclamation sites or other disturbed areas including quarry areas. Top dressing and raising turfs in embankment slopes
- Filling up of tree pits
- For developing compensatory a forestation plantation

In the agricultural fields of farmers, acquired temporarily that needs to be restored.

Residual top soil, if there is any, shall be utilized for the plantations works along the road corridor. The utilization as far as possible shall be in the same area from where top soil was removed. The stripping, preservation and reuse shall be carefully inspected, closely supervised and properly recorded by the SC.

Guidelines -8: GUIDELINES FOR PROVISION OF NOISE BARRIERS

Mitigating the impact of increased noise levels at the sensitive receptor locations includes posting of signs prohibiting the use of horns, constructing a sound insulating wall and, to the extent possible, planting appropriate trees to serve as green noise barriers. Attenuation of sound can be achieved considerably by the combined effect of sound insulating walls and green barriers. Nevertheless the putting of green barriers requires at least 2-5m additional space between the solid barrier and the receptor. Principle of the designed barrier is explained in the design sections. Proposed project mitigation actions are cost effective when compared to the generally recommended expensive double glazed windows.

A. SOUND INSULATING WALLS FOR SILENCE ZONES

The design of a sound insulating wall comprises 23 cms. Thick brick wall which will act as a sound barrier. The typical cross section for the same is given in Figure 1. This can be provided adjacent to the road corridor where hospitals, medical centre, schools and other educational institutions are affected by the traffic noise.

B. GREEN BARRIERS FOR SILENCE ZONES

These are simply a thick layer of green plantation with limited foliage (eg. Ashoka Tree) acting as noise absorbers. These trees may be planted just inside and adjacent to the wall. While Concessionaires will be responsible for the implementation of the civil work, tree plantation will be carried out by the Forest department under the tree-planting scheme of the project. The implementation aspects are provided in the EMP. In addition to the noise mitigation, the thick green layer will act as an air quality filter for traffic emission. A typical green barrier of 100m lengths will have 200 trees in 4 rows.

Noise mitigation techniques will be employed as may be warranted at each of the sensitive receptor sites. Definitive noise levels will be empirically determined at each site and selection of the mitigation technique will be made on a site- specific basis in consultation with property owners. Co-ordination and implementation will be the responsibility of the Environmental officer of the supervision consultants (SC). Mitigation cost has been estimated as a part of the environmental costs of the project.

Guidelines -9: GUIDELINES TO ENSURE WORKER'S SAFETY DURING CONSTRUCTION

In order to ensure worker's safety while undertaking various operations / stages of construction many safety measures needs to be followed, which are listed down below:

A. TREE FELLING

- Use hard hats during tree felling
- Ensure safe use and storage of tools such as axes, power chain saw and hand saw of different types, HDPE ropes of approved thickness to drag felled trees and logs.
- Keep the saw blades in proper lubrication and sharpened state for efficient workability.
- Determine proper foot and body position when using the implements for felling, cutting and dragging.
- Wear appropriate foot protection Avoid cutting branches overhead. Keep first aid kits ready at the site.
- Determine possible hazards in the area, e.g. electrical or telephone or other utility lines, buildings, vehicles and domestic cattle that may create unsafe work situations.
- Prior to felling, determine the safest direction of fall and orient fixing of ropes and Cutting positions accordingly.
- Determine the proper hinge size before directing the fall.
- Keep machineries and workers ready for speedy removal of the tree from the main traffic movement area.
- Keep flag men and warning signal signage at either end of felling area to control movement of traffic and warn passers-by.
- Use loud noise signals for warning by-standers and workmen about the impending fall, so as they move away from the direction of fall.

B. PLANT SITES, CONSTRUCTION CAMP AND QUARRY AREAS

- Install perimeter fencing.
- Ensure good visibility and safe access at site entrances.
- Provide adequate warning signs at the entrance and exit, as necessary.
- Provide adequate space/area for loading and unloading, storage of materials, plant and machinery.
- Display emergency procedure and statutory notices at conspicuous locations.
- Provide areas for collecting garbage and other waste material, and also arrange for their regular/periodic disposal.

- Arrange appropriate storage, transportation and use of fuel, other flammable materials and explosives in line with the license requirements obtained from concerned authorities.
- Provide defined access roads and movement areas within the site.
- Ensure availability of first aid facilities and display notices at various work places showing the location of first aid facilities and emergency contact numbers. Provide and enforce use of PPE at plant and quarry sites.

C. HOUSE KEEPING PRACTICES

- Provide proper slope in kitchen, canteens, washrooms, toilets and bathrooms for easy and immediate draining of water.
- Keep all walkways and circulation areas clear and unobstructed at all times.
- Ensure that spillages of oil and grease are avoided and in case of accidental spills, these are immediately collected.
- Use metal bins for collection of oily and greasy rags.
- Stack raw materials and finished products out of walkways.
- Do not leave tools on the floor or in any location where they can be easily dislodged. Keep windows and light fittings clean.
- Maintain the workplace floors dry and in a non-slippery condition
- Provide and maintain proper drainage system to prevent water logging and unhygienic conditions.
- Ensure that protruding nails in boards or walls are moved or bent over or removed so that they do not constitute a hazard to people.
- Store all flammable materials in appropriate bins, racks or cabinets with proper cover and labels- as required for various products.
- Make sure that hazardous/dangerous chemicals are kept in the goods stores with the appropriate labeling, display of the material-safety-data-sheet (MSDS) and other precautionary measures.
- Display _no smoking' signs in areas with high risks of fire, (eg. near fuelling areas, diesel/oils/lubricant/paint storage area, hessians, rubber, wood and plastic etc.) in and around working area.

D. TRAFFIC SAFETY AND ROADS WORKS

• Delineate advance warning zones, transition zones and construction zones at both ends of a work front. Use devices such as regulatory signs, delineators, barricades,

cones, pavement markings, lanterns and traffic control lights, reflectors and signal men in appropriate manner round the clock.

- No work front should be _touched' without putting appropriate safety measures in place. SC will be responsible to ensure that the permission for any activity is not given without the required safety plan and practices in place.
- Put signage at appropriate locations as per the road construction activity plan to warn the road users, construction vehicles/equipment operators, pedestrians and local residents about the work in progress, speed controls, hindrances/ blockages, diversions, depressions etc. in lines with contract requirements and IRC guidelines.
- Express a regret signage for the inconvenience caused and alert about the dangers ahead on account of construction activity.
- Signage has to be: (i) simple, easy-to-understand and should convey only one message at a time; ii) has florescent and reflective properties of the paints; iii) broad, prominent and with appropriate size of letters and figures; (iv) placed at the appropriate _point/s' as specified in the IRC guidelines to allow proper stoppage/reaction time to approaching vehicles.
- Different sign boards shall have a mix of pictorial signs and messages in local language, Hindi and English.
- While using barricades, ensure that traffic is kept away from work areas and the road user is guided to the safe, alternative movement track.
- Ensure that excavation sites are provided with effective barriers and reflecting signage to prevent any accidental approach by vehicles during the day or night.
- Prevent entry of cattle and wildlife through proper fencing/barricading around the excavation sites.
- Provide proper uniform (light reflecting garments) to flagmen engaged in traffic control at diversions so that they can be singled out from the moving traffic.
- Provide wide red and green flags or red and green lights to flagmen for controlling traffic.
- In high traffic zones and congested areas, use of wireless communication devices with protective headgear and shoes by flagmen has to be ensured to prevent confusion and minimize the risk of accidents.

E. SAFETY DURING EXCAVATION

The risk of accidents involving people and vehicles remains high in excavated sites. All pits or excavations shall to be barricaded to warn the road users and residents and to avoid any unauthorized entry of persons, children, domestic cattle or wildlife. For deep excavations and

culvert construction sites, painted GI sheets, delineators, lamps (as required) and retro-reflective signage shall be used.

For excavation in soft loose & slushy soil (above 2.00 m depth where sliding of earth or collapsing of sides may occur)

Excavation more than 1.5 m. is to be done in steps of minimum 500 mm offsets with plank and stuttering support, as required under contract clauses.

For excavation in slippery or water logged area (labour or machinery may slip or get caught in slush)

Try to dewater the area and spread minimum 150 mm thick sand layer to avoid slipping.

For excavation in rock where chiseling is involved (and hammer or stone pieces may fall and injure the hand, eyes or legs).

Only experienced and skilled labor should be employed. Chisel should be held with a tight fitting grip. Goggles and leg cover should be provided to protect the labor.

Excavation in rock where blasting is involved (risk of injury to workers and passer-by)

Blasting is to be carried out where absolutely necessary following all explosive handling regulations with mines safety principles including use of hooters, signage, protective gear, safety fuse, detonators, ignition coils and wires, exploder dynamo etc. The danger zone has to be vacated at least 20 minutes before the actual firing. Sufficient warning through positioning of red flags, dander signs, painted drums and sirens for safety of men at work and for any passer-by is to be provided. After a lapse of minimum 15 minutes when a clear signal is given by the site-in-charge through use of whistle or horn or light, the blasting charge should be ignited. After blasting a minimum of 30 minutes gap is to be given for the rocks and earth or blocks of loose boulders to fall off so that safety and security of the staff at the operation zone is ensured. Heavy charges shall not be used in fragile rock systems, where rock disintegrating machinery could be brought to use.

The entire operation shall be conducted under the strict supervision of qualified staff and in the presence of safety officers.

For excavation for drain or manhole (risk of a passer-by falling into the excavated portion). The area should be properly barricaded with sign boards and illumination/lamps for night time safety. In congested stretches, watchmen/guards can also be placed for vigil.

Snake bites or Scorpion Stings during excavation

In areas with vegetation, tall grasses and forest cover, the Concessionaire shall provide the labor with gum boots and gloves. He shall also make snake antidotes available on site. Emergency vehicles should also be kept ready to rush the patient to the nearest hospital.

F. SAFETY DURING SOME TYPICAL CONSTRUCTION WORK

Centering and scaffolding (risk of framework collapse while construction, concreting or just before concreting especially when wooden bellies are used).

Many a times bellies joined together give away due to weak joints. Use of metal scaffolding and centering plates with metal fasteners are the safest and highly recommended materials for use in all road construction works for ensuring safety, stability and casting of structures. All such scaffolding should be placed on a firm and a level base on the ground for ensuring stability. No wooden scaffolding or bamboo scaffolding is to be used for any casting of heavy (RCC) structural construction as the risk to safety of workers is higher.

Railings are to be provided along working platforms and ladders for better safety. Nets shall be hung below the scaffolding or structures where work is on-going to prevent fall of debris, stones, bricks, equipments and other heavy objects and even workmen, which could be fatal.

Form-work for small/light beams and slabs

The collapse of bottom of the beam that may bring down the slab as well is a risk in such operations, which may injure the labor or supervision staff. Slender bellies without bracing are not be allowed for such works. No concreting should be allowed without bracing at 300 mm above ground and at mid way for normal beams and slabs. The bracings should be for the support of beams as well as the slabs. Direct bellies support from the ground and the practice of tying planks with binding wire to the steel reinforcement shall not be allowed. A temporary railing and properly based working platforms along the periphery of slab reduces risk to the life of labor and supervision staff.

Dismantling of Scaffoldings

Dismantled materials may fall on passer-by and workers. Workers could also get injured during the removal of such materials. Prior to dismantling of scaffoldings/working platforms, the area of operation should be closed for all outsiders. No one should be allowed within 50 mt. from the place of demolition. Helmets, safety belts and other PPE must be worn by all the workers engaged in such a work. This work requires careful handling by an experienced supervisor/work force and should be executed with utmost caution. Gradual dislodging and use of PPE is required.

Column Reinforcements

The tendency of bar-benders is to tie the vertical steel with coir rope or 8 mm steel rods as ties on all four sides of the column reinforcements. Reinforcement to columns shall be by welding MS rods with metal scaffolding to keep it in position till the final casting of RCC is done.

Fall of Objects or Debris from a Height

At bridges construction sites (or in work areas at a height above ground level) thick nylon net or hessian barriers shall be used to prevent any splinter, debris, mortar or concrete from falling onto the passersby or workmen around.

Water Storage Tanks (for General Use, Curing etc.)

A child of a worker or that of a near-by resident falling into the water tank is also a risk associated with construction sites. The water tanks therefore shall be provided with protective cover/lid with locking arrangement at every site of activity to prevent accidental drowning.

Site Cleaning

Throwing of waste materials, broken concrete pieces, brick bats, sand etc. straight from the top of a structure onto the ground can injure a worker or a passerby. Such materials should be brought to the ground with the help of lift or the use of rope over pully with a bucket.

G. OPERATION OF EXCAVATORS

- Ensure that excavators are operated by authorized persons who have been adequately trained. Prevent any unauthorized use of the excavators.
- Ensure that only experienced and competent persons are engaged in supervising all excavations and leveling activity.
- Check and maintain as per the manufacturer's manual.
- Issue relevant information, including that related to instructions, training, supervision and safe system of work in writing and provides expert supervision for guidance.
- Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of the mechanics, service engineers or other safety personnel during periodic maintenance, inspection and examination.
- During tipping or running alongside the trenches, excavators must be provided with stop blocks. Avoid operating the machine too close to an overhang, ditch or hole, potential carving in edges, falling rocks and landslides, rough terrain with undulating obstacles.
- Excavators must be rested on firm ground after field operation away from the road
- Locate and identify underground services including telephone cables, OFC cables, sewerage and drainage lines, water supply, electrical cables etc by checking with all concerned underground utility providers.
- When reversing or in cases where the operator's view is restricted, adequate supervision and signaling arrangements shall be provided.

- Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
- Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator and ensure replacement/ repair to avoid mishap and break down.
- Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use improper linkage pins.
- Never dismount from or mount on a moving machine.

H. OPERATION OF TRUCKS AND DUMPERS

- Ensure that only trained, authorized and licensed drivers operate the vehicles. Enlist help of another worker before reversing the vehicle.
- Switch-off the engine when not in use to save fuel, prevent accidents and unnecessary noise and air pollution.
- Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall by fixing a sturdy support below.
- Carryout periodic servicing as per the manufacturer's requirements. All records of maintenance and repairs should be in writing and available for verification.
- Keep the vehicle tidy and the cabin free from clumsy utilities, which might obstruct the controls and create hazards.
- Follow safe driving principles including speed limits as per traffic signage.
- Avoid carrying additional passengers in the cabin or on the body of the dumper, while in field operation other than the connected workers.
- Provide stop blocks when the vehicle is tipping into or running alongside excavations or when it is parked.
- Do not overload the vehicle.
- Carry only well secured loads and use proper covers and fasteners.

I. Manual Handling and Lifting

- Avoid manual handling of heavy and hazardous objects and chemicals.
- Pre-assess the actual requirement of manpower in case of emergency situations.
- The hazardous and poisonous materials should not be manually handled without proper equipments/gears and prior declaration of the risks needs to be made to the involved workers.
- All concerned persons shall be trained in proper methods of lifting and carrying.
- In all manual operations where groups of workers are involved, a team leader with necessary training to handle the entire work force in unison has to be provided for.
- Watch and ward to control/supervise/guide movement of equipments and machineries, loading and unloading operations, stability of the stockpiled materials and irregularly shaped objects have to be provided for safety and security of workers.
- Carriageway used by the workers must be free from objects, which are dangerous. Loading and unloading from vehicles shall be under strict supervision.

J. ELECTRICAL HAZARDS IN CONSTRUCTION AREAS

Statutory warning leaflets/posters are to be distributed/displayed by the Concessionaire in the vicinity of work sites for the benefit of all workers, officers and supervisors as well as the public, indicating the do's and don'ts and warning related to electrical hazards associated with operations to be executed/in progress.

- All wires shall be treated as live wires.
- Report about dangling wires to the site-in-charge and do not touch them. Only a qualified electrician should attempt electrical repairs.
 - Train all workers about electrical safety.
 - Shut down the equipment that is sparking or getting over heated or emitting smoke at the time of operation, if it is not the normal way of working of such machines.
 - Inform technical person/s for required maintenance. Never used damaged wires for electrical connection.
 - Demolition, tree felling and removal of overhead transmission lines shall be undertaken with strong, efficient and closely monitored arrangements to avoid accidents.

K. USE AND STORAGE OF GAS (LPG)

Store filled gas/LPG cylinder in a secure area – mark this as a no smoking area.
 Transport, store, use and secure cylinders in upright position.

- Ensure proper ventilation at the ground level in locations where LPG is in use.
 Avoid physical damage to the cylinders.
- Never weld near the cylinder.
- Store empty cylinders secured and upright.
- Make sure that the cylinder is closed immediately after use. Investigate immediately if there is the smell of LPG or gas. Never use destenched gas/LPG on site.
- Make sure that there is no other unrelated fire in the vicinity of the cylinder.

L. GAS WELDING

The welders and welding units should follow all the basic principles of welding for safety and security.

- Use face shield to protect the eyes.
- Use goggles, particularly when chipping slag and cutting strips.
- Use gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation hazards.
- Use high-top boots/gum boots to prevent sparks, splinters, sharp edges of metal and hot welded strips, welding rods, electric cables etc. from injuring the legs.
- Avoid inhaling the noxious fumes and gasses from burning electrodes by using gas masks and screen of the work area to prevent the glair moving outside it.
- Keep the key hung from the regulator control for split seconds operations to stop the valve in case of any accidental damage or leakage to supply pipeline that may catch fire and cause accidents in case acetylene or LPG cylinder.
- The welding area should have sufficient openings with fixed exhaust ventilators or adequate air flow openings to remove poisonous fumes and gases.
- Take precautions of wearing hard hats or fiber helmets to prevent injury due to fall of any object and accidental injury from projections while welding.
- Welders operating above ground should have adequate safety belt secured to stable platform to prevent accidental fall or injury from the scaffold. All electrical and gas connection lines up to the welder should be sufficiently insulated and protected from sharp edges and sharp objects. These shall not come into contact with hot metal.
- Do not use gas cylinders for supporting work or as rollers.
- While using LPG or CNG cylinders for welding, follow all safety precautions as has been prescribed by the supplier company.

- Avoid fire hazards and accidents by posting safety supervisors to oversee the activities of workers.
- Do not store explosives, high inflammable materials, loose hanging overhead objects, hot welded strips etc. near gas cylinders.
- Close all valves, switches and circuits while leaving the work place under proper lock and key. In case of mobile units, proper carriage procedure has to be followed for safety and security of men and materials.

M. FIRE SAFETY PRACTICES

- Before fire breaks out Designate fire officers.
- Store flammable material in proper areas having adequate fire protection systems.
 Display sufficient warning signs.
- Install fire alarm wherever required and test regularly.
- Inspect fire extinguishers regularly and replace as necessary. Train selected personal on use of fire extinguishers
- Fire escape route should be kept clear at all times and clearly indicated Display escape route maps prominently on each side.
- Provide sufficient exit signs at prominent locations for directing people to the escape staircases and routes.
- Train workers about the escape route and assembly point/s. Carryout fire drill periodically.

When fire breaks out

- Alert all persons through fire alarms or other methods.
- Put off the fire with appropriate fire extinguishers only when you are sure that you are safe to do so.
- Escape if you are in danger through the fire escape route to assembly point. Call-up Fire Service.
- Fire officers to carryout head count at the assembly point.

NOISE HAZARDS AND ITS CONTROL

Plan camp lay-out in a manner that ensures barriers/buffers between residential/ office units and high noise generating zones.

Use sound meters to measure the level of noise and if it exceeds 75 dB(A), then ensure preventive measures.

Make personnel aware of noisy areas by using suitable warning signs and insist on use of ear protectors/ear plugs to prevent excess noise affecting the workmen.

Reduce noise at source by: use of improved equipments; regular and proper maintenance of the machinery as per the manufacturer's manual; by replacing rickety and noisy equipments and machineries. Screening locations with noise absorbing material; making changes in the process/equipment; controlling machine speeds; ensuring that two noisegenerating machines are not running at the same time close to each other at same location; using cutting oils and hydraulic noise breakers; providing vibration and noise absorbing platform and firm embedding of equipments with fasteners.

Appoint a competent person to: carryout a detailed noise assessment of the site; designate ear protection zone/s; give training/instructions on the necessary precautionary measures to be observed by site personnel including using suitable type of ear protection equipments.

N. PERSONAL PROTECTIVE EQUIPMENT

- Provision of personal protective equipment has to be made over and above all measures taken for removing or controlling safety hazards on a work site.
- Ensure that sufficient personal protective equipments are provided and that they are readily available for every person who may need to use them.
- The Concessionaire's Project Manager shall ensure that all persons make full and proper use of the personal protective equipment provided.
- Provide instruction/s and training for the proper use and care of personal protective equipment. Ensure that the personal protective equipments are in good condition.
- Train workers to report unintentional damages for replacement and to always keep the personal protective equipment clean.
- PPE includes, but may not be limited to, hard hats, goggles, ear plugs, gloves, air filters/masks, boots, ropes etc.

Eye Protection

• Road construction work sites, quarries and crushers are full of dust particles, sand, splinter, harmful gases, bright light and welding arc lights, which are injurious for

the eyes. Therefore, eye protection and adequate lighting in work areas is required. All workers, supervisors and inspection officers and dignitaries coming over for study of works should be compelled to wear

• eye protecting glasses/goggles properly fitting the eye sockets to prevent damage due to dust, gases and other particles.

Head Protection

- Hard hats are compulsory for all workers, supervisors and managers/officials while working and/or inspecting a work sites.
- Hard hat areas shall be demarcated clearly. Hearing Protection
- Provide ear plugs or ear muffs to the workers and to those who need to get in and out of a high noise area frequently. Use re-usable earplugs when the reduction required (15-25 dBA) is not excessive. Use earmuffs where a large attenuation of upto 40 dBA is demanded.
- Do not use dry cotton wool for hearing protection because it doesn't provide any such protection.
- Provide disposable ear plugs for infrequent visitors and ensure that these are never re-used.
- Replenish ear plugs from time to time for those who need to work continuously for a long period in a high noise area/s.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs.
- Use soap and water or the recommended solvent for cleaning ear muffs. Respiratory (Protective) Equipment ,Wear suitable masks for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags, working at crusher sites etc.
- Provide training to all persons using the masks/respirators for their correct fitting, use, limitations and symptoms of exposure.
- Clean and inspect all respirators before and after use. Store respirators properly when not in use.

Safety Footwear

• Wear suitable footwear for work

- Use safety footwear on site or in other dangerous areas.
- Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.
- All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.
- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
 - Keep shoelace knots tight. Hand Protection
 - Wear suitable gloves for selected activities such as welding, cutting and manual handling of materials and equipment.
 - Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
 - Wash hands properly with disinfectant soap and clean water before drinking or eating.
 - Wash hands immediately after each operation on site when the situation warrants.

P. FIRST AID

- Provide first aid boxes at every work site in a cool and shaded place.
- Ensure that training on the use of the first aid box is provided to at least every supervisor on the site.
- Display the list of persons along with their contact numbers who are trained on providing first aid.
- Ensure that every first aid box is marked "First Aid" in English and in local language. Check for expiry dates and replace the contents, as necessary.
- Maintain a register on health records including injuries/accidents.

Q. ACCIDENT INVESTIGATIONS

- Carryout the investigation/s as quickly as possible.
- Investigation should be carried out both internally as well as through third party.
- Conduct interviews with as many witnesses as necessary including the affected persons and supervising officials.

- Do not rely on any one/limited source of evidence.
- Check all the log books, stock registers, issue registers, movement registers on site safety regulations, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio-visual and electronic medium for presenting an evaluation of the incident/s.
- After completion of the investigation/enquiry, a summary of the facts recorded, sequence of happenings, persons-in-charge, persons examined, equipments and machineries tested, follow-up of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations etc. to be prepared with a comparative analysis for proper assessment.

Guidelines -10: GUIDELINES FOR PREPARATION OF TRAFFIC MANAGEMENT PLAN

The Concessionaire shall at all times carry out work on the road in manner creating least interference to the flow of traffic with the satisfactory execution. For all works involving improvements to the existing state highway, the Concessionaire shall, in accordance with the directives of the IE, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the state highway. The Concessionaire shall take prior approval of the IE regarding traffic arrangements during construction.

A. ENSURING TRAFFIC SAFETY AND CONTROL

Where subject to the approval of the Engineer the execution of the works requires temporary closure of road traffic use, the Concessionaire shall provide and maintain temporary traffic diversions. The diversions shall generally consist of 200 mm thickness of gravel 4.5 meters wide laid directly upon natural ground and where any additional earthworks are required for this purpose that will be provided under the appropriate payment items.

Where the execution of the works requires single-lane operation on public road, the Concessionaire shall provide and maintain all necessary barriers, warning signs and traffic control signals to the approval of the Engineer.

With the exception of temporary traffic arrangements or diversions required within the first 4 weeks of the Contract, the Concessionaire shall submit details of his proposals to the Engineer for approval no less than 4 weeks prior to the temporary arrangement or diversion being required. Details of temporary arrangements or diversions for approval as soon possible after the date of the Letter of Acceptance.

The colour, configuration, size and location of all traffic signs shall be in accordance with the code of practice for road sign. In the absence of any detail or for any missing details, the signs shall be provided as directed by the Engineer (IE).

The Concessionaire shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as may be required by the Engineer for the formation and protection of traffic approaching or passing through the section of the road under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic or closer of traffic on the road shall be drawn up in consultation with the SE.

At the points where traffic is to deviate form its normal path (whether on temporary diversion or part width of the Carriageway) the lane width path for traffic shall be clearly marked with the

aid of pavement markings, painted drums or a similar device to the directions of the SE. At night, the passage shall be delineated with lanterns or other suitable light source.

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

On both sides, suitable regulatory / warnings signs as approved by the SE shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of design and of reflectory type, if so directed by SE.

Upon completion of the works for which the temporary traffic arrangements or diversions have been made, the Concessionaire shall remove all temporary installations and signs and reinstate all affected roads and other structures or installations to the conditions that existed before the work started, as directed by the Engineer.

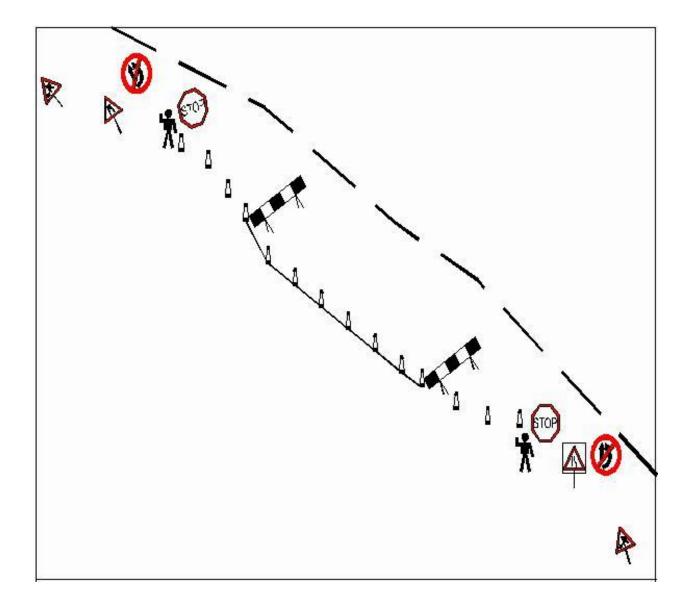
B. MAINTENANCE OF DIVERSIONS AND TRAFFIC CONTROL DEVICES

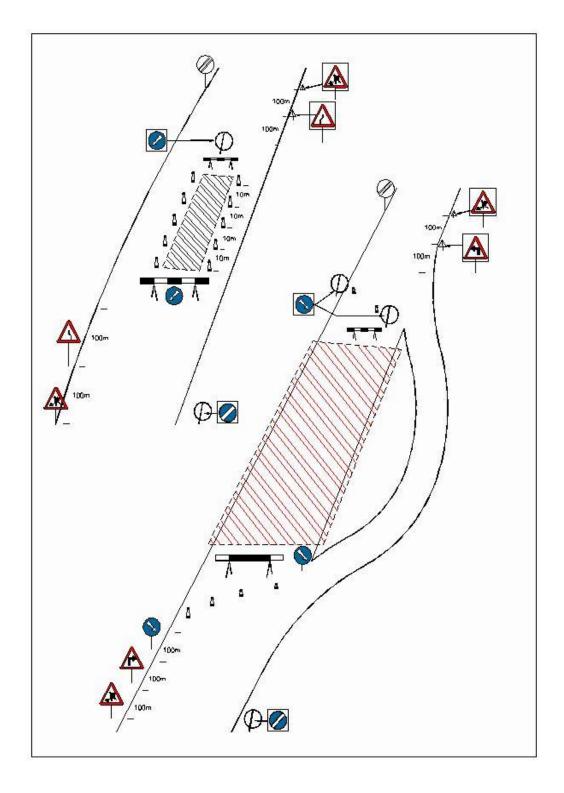
Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversion shall be maintained in a satisfactory condition till such time they are required as directed by the SE. The temporary traveled way shall be kept free of dust by frequent applications of water, if necessary. The signages and devices required include the following:

- Barricading Men at work
- Keep Left Go slow
- Flag men
- Narrow signs
- Lantern(Amber Blinker)
- Traffic control Lights Cones
- Safety jackets and helmets should be provided to all the workers/ Engineers working on the road.
- Fixed mobile solid barricades must be placed between the workmen and traffic or pedestrian and traffic.

All the safety signs should be according to IRC: 67 and IRC: SP: 55: 2001Examples of some good

practice in traffic control during construction are shown in the figures below.





Guidelines -11: GUIDELINES FOR STORAGE, HANDLING, USE AND EMERGENCY RESPONSE FOR HAZARDOUS SUBSTANCES

A. HANDLING HAZARDOUS SUBSTANCES (INCLUDING CHEMICALS)

- As far as practicable the hazardous materials will be stockpiled under proper mechanical loading, unloading and stacking aided by manual labor where necessary.
- Exercise great care in the storage and use of chemicals because they may be explosive, poisonous, corrosive or combustible.
- Separate different chemicals physically and store accordingly after proper labeling.
- Stock taking of all hazardous will be mandatory together with enforcement of manufacturer's or supplier's safety standard/s and drill exercises.
- New and less known chemicals and building materials, for which toxicological studies are wanted, need to be properly evaluated prior to their inclusion in the materials list.
- All containers should be clearly labeled to indicate contents.
- Maintain the Material Safety Data Sheet of all chemicals for reference on safety precautions to be taken and the use of suitable PPE.
- Ensure use of correct personal protective equipment before allowing workers to handle chemicals.
- When opening containers, ensure holding of a rag over the cap/lid or use of safety gloves, as some volatile liquids tend to spurt up when released.
- Eye fountain, emergency shower and breathing apparatus should be available near the workplace. Ensure immediate medical attention in case of spill/splash of a chemical.
- Safety instructions for handling emergency situations shall be displayed prominently at both the storage and use locations.

B. TRANSPORTATION, REFUELING AND MAINTENANCE PROCEDURE

- Truck or suitable containers will bring in all fuel and fluids.
- There will be no storage of fuel, oil or fluids within 200m of a water line
- Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment.
- Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.

- All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities.
- Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 100m (or 50m) wide area.

C. EMERGENCY SPILL PROCEDURE

Should a spill occur, either through accidental spillage or equipment failure, the applicable emergency spill procedure as outlined in sections below and/or as directed by the manufacturer/supplier shall be followed:

Spill Procedure (Inside a Stream)

In the case of a spill, overflow or release of fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, while sending SOS for help from the technical wings and fire brigade or any other govt. agency.

Stop the flow

- Stop the release into the waterway Shut down the equipments
- Close valves and pumps.
- Plug leaking of damage hosepipes or containers with suitable sealants or temporary plugs at the holes.
- Remove Ignition Sources
- Cut off the supply sources and shut down the sources of power supply.
- Cordon up the area and salvage the spilled materials for recycling or disposal as would be suggested by the technical experts or as per the manufacturer's guidelines for the product. In case of inflammable materials, mobile phones, electrical switches and heat generating machines, sparking electrodes etc. shall not be operated.
- Portable fire extinguishers need to be kept handy in such vehicles for immediate use as a damage control measure.

Clean-up and Disposal

Emergency Services shall be engaged for the containment, clean-up and disposal of contaminants released into the environment.

Reporting

The Concessionaire's Environmental Officer will document the event and submit the reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board.

Procedure Review

The Engineer will review the report, determine if changes are required to be incorporated in the plan of activity under the revised guidelines and recommendation/s that have been suggested by the technicians/manufacturer/ supplier /fire brigade /SPCB /environment officer of the PIU, as the case may be.

Spill Procedure (On Land)

All types of spills are hazardous - whether liquid or amorphous or solid and accordingly the spill has to be dealt with. For liquids, sealing the leakage or emptying the container into another empty vessel may be considered. For solid or semi-solid or viscous products, special salvage equipments are to be used. For fine particles and water soluble chemicals, neutralizing or scraping the affected soil from the area has to be resorted to with mechanical removal and depositing at a safe site as would be recommended by experts.

Notification

All legal authorities such as civil administration including the district Collector, the sub-divisional officer, Tehsildar, the local SHO of the police station, the SP, Divisional Forest Officer, the Inspector of Factories and Boiler, the SPCB authority monitoring the pollution in the area, site engineer/supervision consultant and environmental officer of PIU, local gram panchayat and people's representatives have to be informed about the incident, the probable damage, current and after effects, precautionary measures to be taken and already taken and restrictions imposed on movement of men, material, live stock etc in an around the site of spill.

Cleanup and Disposal

The Engineer's Environmental Officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.

Reporting

The Concessionaire's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board(s).

Procedure Review

The Engineer will review the report; determine, if changes are required to procedures and; recommend implementation of all required changes.

Guidelines -12 -GUIDELINES FOR LANDSCAPING, TREE PLANTING AND ENVIRONMENTAL ENHANCEMENT PLAN

1. INTRODUCTION

In Tamil Nadu the pedestrian movements along the highways are very high but usually confined to village/ town and their movement is mostly from the house to the local market, schools, offices and back. Now the priority of Tamil Nadu should be to have wider safer roads with more attention to road safety.

Public owned trees- unlike north Indian roads, very few trees exist on Tamil Nadu Roads. However along old roads, the numbers of large specimen trees is higher. These trees have been protected wherever possible with suitable changes in the design. Wherever such changes cannot be effected it may be necessary to remove them.

Private owned trees- The number of private owned trees to be acquired outside the right of way will be high compared to the public trees within the right of way. The private trees that will be affected during widening and improvement will be subjected to compensation at the appropriate market rates. In addition to this the project will plant three trees for every tree removed as a compensatory tree planting measure irrespective of the size, species etc.

ROAD SIDE AVENUE PLANTATION

In the TNHD project corridors, there is no continuous avenue plantation. The trees within the available corridors are surveyed and tabulated in the respective management plans and summarized tree removal list for the proposed roads under TNHD will be presented in Chapter V. The common tree species found along the TNHD link roads are Banyan trees, Tamarind, Jamun, Vaaka, Mahagony and Mango trees.

The total number of trees to be removed from the existing roadside is estimated at about 4210 numbers.

BENEFITS OF AVENUE PLANTING ALONG ROAD SIDES

The following is an analysis to develop a Tamil Nadu specific tree planting plan.

One of the objectives of planting trees on the roadsides is to produce a softer greener landscape, which is not relevant for Tamil Nadu. This is mainly because; just outside the right of way (ROW) the same type of thick vegetation exists on private property, almost continuously along the roadsides.

The Second objective is to give shade to travelers. Thick vegetation already exists on private property and this need will be met to some extent, otherwise there shall be a determined effort to raise trees on the land-bordering the roadsides.

The Third objective can be to absorb excessive noise. This is also not applicable in general as there is thick lush green vegetation all over Tamil Nadu along almost all roadsides.

The Fourth objective is to raise social forestry; this is redundant in Tamil Nadu, as Tamil Nadu is covered by thick lush green vegetation. This coverage of trees has increased rapidly in the last 10 years, as the paddy cultivating lands turn evergreen (coconut, plantain, arecanut, mango, guava etc) instead of seasonal green (Paddy cultivation). When the Paddy fields are converted a small percentage of the total area is actually

Converted to buildings but the remaining areas mostly support plantain, coconut, arecanut etc. Most important is to uncompromisingly protect the remaining actual natural forest areas (flora and Fauna) and also to aggressively plant trees in any barren areas within the forest areas and also immediately adjacent to forest areas.

The Fifth objective is to act as a natural filter to the traffic emissions. The roadside trees already exist outside of the right of way (RoW) and will act as the natural filter, hence this argument also not valid for Tamil Nadu.

Tree planting control soil erosion and provide increased slope stability. This is true in the case of elevated areas of Tamil Nadu. This can be achieved by other engineering techniques such as retaining walls, gabions, grass sods etc. The fact that most of the existing roads are already stabilized after years of monsoons is also not very much in favour of planting trees.

COMPENSATORY TREE PLANTING

The compensatory tree planting strategy is based on the survival rate. The survival rate in Tamil Nadu is very high due to the favorable climatic conditions as evidenced by the existing biomass of the State.

Public trees The project will plant at least thrice the number of trees that will be removed from the TNHD road corridor as in the case of TNHD corridors. The compensatory planting for Maintenance of project roads will also be considered.

As an environmental enhancement measure the project will also aim to plant shrubs in and around the identified parking areas and Puramboke land.

SELECTION OF LOCATIONS FOR AVENUE PLANTATION

Criteria adopted for selection of locations for avenue tree plantation is based on availability of land margin within TNHD road boundary. Proposed RoW of this link road varies from min. 12m to max. 20m depending on the land use pattern of the corridor.

SELECTION OF TREE SPECIES FOR PLANTING

The distance and the space available is also a problem in Tamil Nadu. Further, the two species of Banyan trees i.e. the Ficus religosa and Ficus bengalansis are generally not recommended due to its irregular uncontrolled growth and also because of its religious association. Actually religious association is an environmental friendly positive aspect against tree cutting. Over a period of time if the road authority wanted to widen the road it may be difficult to remove religious trees. The situation is better in Tamil Nadu, as the attitude of the public is different.

The fruit bearing trees are usually attracted by children and hence could lead to accidents. The other side is that with the development going faster the fruits and nuts available for the birds and animals like squirrel are very less. The roadside fruit bearing trees normally helps the birds, animals, and leads to a nesting of birds etc. For this to be effective there shall not be any harvesting in certain declared areas. In these areas the Indigenous species are always preferred against the exotic species. The recommended species are the same as that of the occurring species except the Peepal and banyan trees. The indigenous species recommended are shown in following table.

GUIDELINES FOR TRANSPLANTATION OF TREES

If trees are not very old, they can be transplanted easily. The percentage of survival can be hundred percent if the work is done properly and during the rainy season. The following steps are involved:

1. The sites where the trees are to be shifted should be selected first. The sites should be free of overhead

Telephone or power lines. Large pits should be dug at these sites to comfortably accommodate the tree roots ball of earth.

- 2. Distance between pits depends on the variety. Since less than 30 cm girth size trees are proposed to be transplanted, the distance of 3 m should be considered.
- 3. When pits are dug at the selected sites, their sizes would depend on the dimensions/ age of the tree. For trees of medium size the pit size will be around 8 feet in diameter and 5 feet deep. The actual pit size for different trees can be adjusted with experience. The point to be kept sight of is that _trees roots' ball of earth should fit in comfortably with at least 6 to 12 inches clearance all around. Usually the pit size in feet should be directly proportional to the girth of the trees in inches
- 4. Adequate quantity of soil and manure mixture @ 4:1 is necessary for each pit. A little bone meal can also be added. To start with only about 60cm soil mixture is to be filled in each pit and watered well to form a puddle before the actual transplantation. The total quantity of soil and manure required for all the pits should be mixed and arrange before the start of the actual operation.
- 5. Before transplantation, the trees should be _extensively pruned'. That is, the foliage should be completely removed and all the branches should be cut off with a pruning saw. The cut surfaces should be painted with non-synthetic white paint to anaesthetize these portions. _Extensive pruning _ helps in easier _replanting balance' and handling, thereby reducing the shock effect. This also aids the plant roots in recovering and adhering to the new soil and reduces transpiration and/or loss of moisture.
- 6. The trees are now ready for lifting or uprooting. A deep trench of at least up to 5 feet in depth is to be dug around the base of the tree at least 2 to 3 feet away from the trunk in the case of trees with a girth of up to 60cm. The depth of the trench and its distance from the trunk would therefore vary with the size of the tree. The trench should be dug to gradually converge towards the base of the tree so that _tree roots' ball of earth can ultimately be detached from the ground.
- 7. The empty space in this pit is to be filled with the previous prepared mixture of soil, bone meal and manure and thoroughly rammed in tightly, so that no air gaps are left inside the soil. Air gaps could result in fungal infection to the roots. Sand can also be added which will fill up the air gaps when watered.
- 8. The trunk can now be sprayed with Blytox, a copper sulphate compound whose action is anti- fungicidal in nature.
- 9. The transplanted tree should be watered heavily at the base.
- 10. Guy ropes, angle iron or bamboos should be used for a few days to secure the tree till the soil hardens around the transplanted tree to hold it erect.
- 11. Four to five days after transplantation the trunk can be sprayed with potassium nitrate solution for facilitating the initiation of new shoots.
- 12. If rains are inadequate watering should continue for three months.
- 13. The heavily pruned transplanted tree is not a pretty sight, but this should not deter the optimist, as the chances of survival are maximum without the branches and foliage.

B) COMPENSATORY PLANTATION

As per the recent High Court order, ten saplings should be planted against each tree felled. The TNRSP will bear the cost of such plantation. To minimize loss of trees, clearance of only those trees identified from the design will be removed. Endangered species, if found during construction, will be transplanted as detailed in above section. For compensatory plantation, 10-times plantation against each felled tree of >30 cm girth size has been considered. Tree fencing will be provided.

GUIDELINES FOR SELECTION OF TREE SPECIES

Road side plantation may be of various species, some of which are not appropriate. There may be giant trees with strong stems and horizontally spreading roots or trees which branch out early and have short stems or trees without deep roots system overturn when old in rain or wind.

TREES TO BE SELECTED: On the other hand, some trees are appropriate for highway landscaping. These include trees, which have thinner stem but dense foliage; that absorb/ retain dust and other atmospheric pollutants; those, which erosion resistant species, etc. Moreover, the species, which are native to this area, should be preferred for replanting. These trees include:

DUST RESISTANCE: Many of the species resists pollution. Almost all trees have capability to absorb dust. Available data (from CPCB) shows that different species have different dust collection efficiency, although dust collection depends on the total leaf area.

PLANTATION AT ENHANCEMENT SITES

A number of cultural/ community properties exist along the project corridors. Landscape design has been worked out to enhance the aesthetic beauty of selected sites, wherever possible. A total of around 90 saplings can be planted as an enhancement, details are as below:

As part of the enhancement measure, 90 nos. of saplings (two row plantation with 5m c/c spacing) will be planted on the outer slope of earthern embankment of existing pond, Ornamental and fruit bearing trees like *Sesbania grandiflora*, *Delonix elata*, *Morinda tomentosa*, *Psidium guajava* may be planted in such places.

D) AVENUE PLANTATION

Avenue plantations will be initiated once the construction is complete. The objective behind such plantation is to cover/ re-vegetate the areas within the RoW that are presently barren.

Avenue plantation will be considered as compensatory plantation for the impacted trees. The selection of the plants for greenery development is to be made as per the following criteria:

- Plants should be fast growing & have dense canopy cover Preferably with large leaf area
- Indigenous species
- Species resistant to air pollutants
- Should help to maintain the ecological and hydrological balance of the region

COMPLETION

On completion, the ground shall be formed over and left tidy. Special Conditions and Particular Specifications:

- 1. Wherever applicable, work shall be done according to P.W.D. specifications
- 2. At the time of invitation of tender.
- 3. Water shall be made available, near the tube well at one point. Concessionaires shall make their own arrangement for drawing water from there. Water charges as per the value of work done shall be deducted from the Concessionaires Bills.

4. If electricity is required for the works, the same shall be made available at one point within the site of works, for which recovery at the prevailing rate per unit shall be deducted from the Concessionaires' bill.

- 5. The work mentioned in the schedule of Quantities include grassing as well as planting of trees and saplings. 'Concessionaires' quoted rates shall include execution of these works at different levels. No extra cost shall be paid for any item, for working at these levels.
- 6. The Concessionaire shall provide all facilities to sub Concessionaire (plantation) / Environment Officer / or his authorized representatives to make frequent inspection of their Nursery and ascertain the
- 7. The site of work may be handed over to the Concessionaires for execution of work in phases, as soon as the same are available. Nothing extra shall be payable for such phased execution of work.
- 8. While excavating / executing the work the Concessionaires shall ensure that existing cables / pipe lines / structures / fittings are not damaged.
- 9. The Concessionaire shall co-ordinate his work with other agencies employed by the Clients and ensures that the work of other agencies is not hampered in any way during the duration of contract.
- 10. The Concessionaire shall keep the site of works neat and clean during the execution of the work.
- 11. The Concessionaires shall, without any additional charge to the clients, renew or replace any dead or Defective plants/grass and shall fully maintain the whole landscape for a period of 12 months after the certified date of completion
- 12. Saplings/small tree shall be of minimum length straight and symmetrical with a crown and having a persistent main stem. The size of crown shall be in good overall proportion to the height of the tree.

Guidelines -13-GUIDELINeS For CULTURAL PROPERTIES REHABILITATION MEASURES

The project needs to develop measures for the rehabilitation of cultural properties that will be affected by the road improvement programme. This could be made a part of the broad R&R Principle and Policy Framework. The Environmental Budget within the EMP will undertake the environmental enhancement and landscaping where as any land acquisition and rehabilitation will be part of the Resettlement Action Plan. The TNHD has been guided by the Bank's Draft Operational Policy 4.11, which exclusively deals with the cultural properties, in its handling of the affected cultural properties due to the project. Further, as desired by the Bank, this section of the EMP and RAP has been prepared as a separate safeguard measures exclusively for the Tamil Nadu Highway Department.

What Does Cultural Property Mean?

The United Nations term —Cultural Propertyl includes sites having archaeological (prehistoric), paleontological, historical, religious, and unique natural values. Cultural Property, therefore, encompasses remains left by previous inhabitants, for example, middens, shrines, and battlegrounds) and unique natural environmental features such as canyons and waterfalls. The rapid loss of cultural property in many countries is irreversible and often unnecessary. Detailed background information on all aspects of this note are contained in the technical paper of the same title, available from the office of Environmental and Scientific Affairs, Project Policy Department of UN, which is ready to provide assistance on request. Source: world Bank Draft OP 4.11

1. TYPES OF RELIGIOUS PROPERTIES IDENTIFIED IN THE PROJECT LOCATION

The environmental and social surveys and the detailed social impact studies have identified all cultural properties that will be affected by this project road under TNHD improvement. Their magnitude of being affected widely varies.

The following types of cultural properties are found on the project roads:

- 1. Temple
- 2. Church
- 3. Mosque
- 4. Shrines of all the three major religions
- 5. Tree shrines/sacred groves
- 6. Roadside hyundi (money collection box) of all the three religions

Direct Impacts: The direct impacts to the cultural properties are of the following category.

- 1. Only Compound wall affected
- 2. Compound wall and part of the compound affected
- 3. Part of structure affected
- 4. Sanctum sanatorium affected can be categorised as the complete structure affected
- 5. Only land affected
- 6. Complete cultural property affected
- 7. Loss of access/entrance, if the existing access is from the project roadside.

Project Approach: In all cases, the mitigation actions are framed unique to that particular situation with respect to the available space, the unique characteristics of the religious structure affected and the local public and religious judgment. In other words, the project policy is unique to consider the widely varying situations for each cultural property.

Impact Mitigation: The loss of land and assets of the cultural properties will be treated on par with the loss of other land and assets for the purpose of compensation and assistance. However, the project will, in addition, strive to enhance benefits to the affected cultural properties in consultation with their respective management/ Owners.

The Project has a clear strategy to take people and affected parties in to confidence before taking any decision on shifting of structures especially religious structures. In general there would not be any involuntary shifting or relocation especially in the case of cultural properties. An outline benefits enhancement for the cultural properties is shown in the following Table 1.0.

TABLE .STRATEGY FOR RESTORATION, RELOCATION OR RECONSTRUCTION OF

CULTURAL PROPERTIES

	EXTENT OF IMPACT ON		
	Cultural Properties	IF CONSULTATION CONDUCTED CONSENSUS	Benefit
SL NO.		Obtained	ENHANCEMENT
			Access/entrance
	Only Compound wall and land	Reconstruction of wall parallel to the present	provided through
1	beneath affected	Compound wall. Loss of land compensated.	one of the sides
		Reconstruction of wall parallel to the existing	
		Wall. Loss of land compensated. If land is	
	Compound wall and part of	Available adjacent to the property, will be	
2	compound affected	purchased.	- Do -
		Alternate structure constructed and all pre-status	
3	Structure affected	Restored.	- Do -
		Alternate land provided, preferably, if available,	
4	Only land affected	Adjacent to the existing location.	-Do-
	Complete cultural property	Relocation of site identified by the cultural	
5	affected	property authorities and rebuilding	-Do-

3. OTHER IMPACTS TO CULTURAL PROPERTIES INCLUDE:

Indirect/Induced impacts: The construction of road or realignments or bypasses sometime will result in induced impacts obstructing the cultural properties in various ways. In the instances of such events the highway authority will assist through consultation and other means (Highway Protection Act, 2000) restoring the importance of the shrine. This will be mostly applicable along the new alignments.

4. CULTURAL PROPERTY REHABILITATION ACTION PLAN

The Rehabilitation Action Plan include environmental enhancement, design changes to save the structure from being affected. The initial project team had visited the site to ascertain type of the impacts and also to devise typical designs for cultural property enhancement. It was also planned to make design changes or adjustments to save the cultural properties from being affected.

APPENDIX - II REPORTING FORMATS

APPENDIX – No 2 - REPORTING FORMATS

REPORTING FORMAT - 1: REPORTING FORMAT FOR IDENTIFICATION OF CONSTRUCTION CAMP SITE
REPORTING FORMAT -2- REPORTING FORMAT FOR IDENTIFICATION OF SOURCES OF WATER
REPORTINGFORMAT -3- REPORTING FORMAT FOR IDENTIFICATION OF QUARRY AND STONE CRUSHER SITE4
REPORTINGFORMAT -4 -REPORTING FORMAT FOR IDENTIFICATION OF BORROW AREAS
REPORTING FORMAT -5- REPORTING FORMAT FOR IDENTIFICATION OF DEBRIS DISPOSAL SITE
REPORTING FORMAT -6- FORMAT FOR REGISTER OF COMPLAINTS AND IT'S REPORTING
REPORTING FORMAT -7- FORMAT FOR REGISTER OF SITES OPENED AND CLOSED AND IT'S REPORTING9
REPORTING FORMAT -8- REPORTING FORMAT FOR WORK FORCE MANAGEMENT
REPORTING FORMAT -9- REPORTING FORMAT FOR OCCUPATIONAL HEALTH AND SAFETY MEANS
REPORTING FORMAT -10- REPORTING FORMAT FOR TOP SOIL CONSERVATION
REPORTING FORMAT -11- REPORTING FORMAT FOR WATER SPRINKLING
REPORTING FORMAT -12- REPORTING FORMAT FOR ROAD SAFETY MEASURES DURING CONSSTRUCTION . 16
REPORTING FORMAT -13- REPORTING FORMAT FOR ACCIDENTS
REPORTING FORMAT -14- REPORTING FORMAT FOR ENVIRONMENTAL QUALITY MONITORING
REPORTING FORMAT -15- REPORTING FORMAT FOR EHANCEMENT AND MITIGATION OF CULTURAL PROPERTIES
REPORTING FORMAT -16- REPORTING FORMAT FOR NOISE BARRIER CONSTRUCTION
REPORTING FORMAT -17- REPORTING FORMAT FOR ENHANCEMENT MEASURES OTHER THAN CULTURAL PROPERTIES
REPORTING FORMAT -18- REPORTING FORMAT FOR TREE PLANTATION

REPORTING FORMAT - 1: REPORTING FORMAT FOR IDENTIFICATION OF CONSTRUCTION CAMP SITE

A	Project Details	Date of reporting:			
1.	Name of project stretch and link				
2.	Name and address of the Concessionaire				
3.	Contract date and duration				
4.	Status of completion of the project				
B	Site Details				
1.	Place Name		Landmark		
2.	Name of Panchayath / Municipality	Revenue . Village			
3.	Taluk		District		
4.	Nearest Chainage (km)		location	LHS/ RHS	
5.	Area of site		Current Land use		
6.	Ownership of the land	Owned / leased	Survey no.		
7.	If leased / rented, Name and Address of e	owner	1	I	
8.	Distance* from any major settlement or	village			
9.	Distance from any major surface water c	ourse			
10.	Distance from ecologically sensitive area	as and distance from re	oad		
11.	No of Trees and Girth size				
12.	No of Trees to be felled				

All distances are to be measured from the boundary of the site.

REPORTING FORMAT -2- REPORTING FORMAT FOR IDENTIFICATION OF SOURCES OF WATER

Α	Project Details	Date of Repo	orting:
1.	Name off project stretch and link no		
2.	Name and address of the Concessionaire		
3.	Contract date and duration		
4.	Status of completion of the project		
В	Site Details		
1.	Place Name	Landmark	
2.	Name of Panchayath / Municipality	Revenue Village	
3.	Taluk	District	
4.	Nearest Chainage (km) of the project road	location	LHS/ RHS
5.	Type of water body (River / Canal / lake)		
6.	Existing users		
7.	Ownership of the water body		
8.	Authority responsible for giving permission		
9.	If private, details of owner contact address and name		
10.	Distance from project road		
11.	Width and type of access road		
List of enclos	Location map		
ure:	Photographs of the site		

REPORTINGFORMAT -3- REPORTING FORMAT FOR IDENTIFICATION OF QUARRY AND STONE CRUSHER SITE

Α	Project Details	Date of reporting:					
1.	Name of project stretch and link no						
2.	Name and address of the Concessionaire						
3.	Contract date and duration						
4.	Status of completion of the project						
В	Site Details						
1.	Place Name		Landmark				
2.	Name of Panchayath / Municipality		Revenue				
3.	Taluk		District				
4.	Nearest Chainage (km) of the project road		location	LHS/ RHS			
5.	Area of site		Current land				
6.	Ownership of the land	Owned / leased	Survey no.				
7.	If leased, name, address of the owner	1					
8.	Type of material available and its quantity						
9.	Distance* of the site from:						
	(i) any major settlement or village						
	(ii) any major surface water course or body	(ii) any major surface water course or body					
	(iii) any bridge, water supply system, infilt installation	ration well or pumping	5				
	(iv) any public road						
	(v) ecologically sensitive areas						
	(vi) nearest quarry / stone crusher						
10.	Distance from project road		1				

REPORTINGFORMAT -4 -REPORTING FORMAT FOR IDENTIFICATION OF BORROW AREAS

A	Project Details		Date of re	porting:	
1.	Name of project stretch and	d link no			
2.	Name and address of the C	oncessionaire			
3.	Contract date and duration				
4.	Status of completion of the	e project			
В	Site Details				
1.	Place Name		Landmark		
2.	Name of Panchayath		Revenue vi	llage	
3.	Taluk		District		
4.	Nearest Chainage (km)		location		LHS/ RHS
5.	Area of site		Current la	nd use	
6.	Ownership of the land	Owned / leased		Survey no.	
7.	If leased, name, address an	d contact details of	f owner		
8.	Distance* from any major	settlement or villag	ge		
9.	Distance from any major su	urface water course	or body		
10.	Distance from ecologically	sensitive areas			
11	Distance from the Project 1	road			
12	Width and type of access r	oad			
13	No of trees with girth> 0.3	m			
14	No of trees to be cut				
15	Is top soil conservation req	uired (Yes/ No)			
	Location Map				
	Layout Plan				
	Photographs of the site				

C. Submission Details	
Submitted by	Approved / Rejected by
(Environment & Safety Engineer of Concessionaire)	(Environmental Officer of IE)
Signature & date	
Name	
Designation	
Remarks by IE	
* All distances are to be measured from the bounda	ry of the site.
Note: Concessionaire has to fill and submit this f each borrow area. Subsequently, the EO of IE has site with reasons. The EO of IE has to give a cop after his approval / rejection with remarks. On app to prepare the Management and Redevelopment F given in EMP and submit to IE for approval.	to visit the site and approve / reject th y of this format to the Concessionair proval of a site, the Concessionaire ha

REPORTING FORMAT -5- REPORTING FORMAT FOR IDENTIFICATION OF DEBRIS DISPOSAL SITE

	ANNEXURE 3. 16. REPORTING FORMAT FOR IDENTIFICATION OF DEBR DISPOSAL SITE									
A	Project Details		Date of Reporting	;:						
1.	Name of project strete	ch and link no								
2.	Name and address of	the Concessionaire								
B	Site Details									
1.	Place Name			Landmark						
2.	Name of Panchayath	/ Municipality		Revenue Village						
3.	Taluk			District						
4.	Nearest Chainage (kr	n)		Location	LHS/ RHS					
5.	Area of site			Current land use						
6.	Ownership of the lan	d	Owned / leas	sed Survey no.						
7.	If leased, name, addre	ss and contact details	s of owner		L					
8.	Distance* from any r	najor settlement or v	illage							
9.	Distance from any ma	ajor surface water co	urse or body							
10	Distance from ecolog	gically sensitive areas	5							
11	No. of trees to be cut									
12	Is top soil conservation	on required (Yes/ No))							
Li	st of enclosure:	Location map	Layou	it Plan/ Layout Plan						

REPORTING FORMAT -6- FORMAT FOR REGISTER OF COMPLAINTS AND IT'S REPORTING

А.	Project Details Information				
1	Name and address of the Concessionaire				
	Contract date and duration				
	Details of Complaint Received		Site Name		
Sl.No	Date of Complaint	Name and address of person with contact details	Complaint	Action taken with date	Signature of ESE of Concessionaire

A register in this format shall be maintained at each site office of the Concessionaire. This same format shall be used to compile and report the details of complaints received at all sites to the IE along with the Monthly Report of the Concessionaire. The EO of IE has to give instruction to the Concessionaire, if any further action has to be taken on any complaint.

REPORTING FORMAT -7- FORMAT FOR REGISTER OF SITES OPENED AND CLOSED AND IT'S REPORTING

A.	Project Details	Information				
1.	Name of project stretch and link no.					
2.	Name and address of the Concessionaire					
3.	Contract date and duration					
В.	Site Details					
1		Address of the Address of the Owner Dwner List of Clerances Required	Issue Date of each Clearance Expiry date of each Clearance	Site Closing date Redevel	opment Status Remarks	Signature of ESE of Concession aire
2						

* Construction Camp / Labour camp / Quarry Area and Stone Crusher Unit / Borrow Area / Debris Disposal Site / Water Source.

A site should be opened only after submitting the Management and Redevelopment Plan prepared as per the Guidelines given in EMP and got it approved by the EO of the IE. A

register in this format (preferably in A3 size paper) should be maintained by the Concessionaire for each road. This same format shall be used to report the details of sites opened and closed to the.

REPORTING FORMAT -8- REPORTING FORMAT FOR WORK FORCE MANAGEMENT

Α	Proj	ect Details						Date	e of Report	ing:			
1.		e of project ink no.	stretch										
2.		e and addre oncessiona											
3.	Cont durat	ract date an ion	d										
4.		s of comple roject	etion of										
5.		e of Work S sl. no. in re es											
B.	Statu	s of work f	force										
SI.		gory of force	Work the Pro	force in evious	Work the	x force adde	ed in	Wor the	k Force le	ft in		al work ce in the	
No.			Month	(No.)	repor	ting month	(No.)	repo	rting mon	th (No.)		orting 1th (No.)	
1.	Unski Labou												
2.	Skille labou												
3.	Super	visors	-										
4.	Engin	ieers											
5.	Offic	e Staff			I								
	Sub 7	Total											
	Gran	d Total											
No. yrs.		dren (0-6		No. (yrs.)		dren (7-18			No. of adults				
Mal	e	Female	Total	Male	e	Female	Tota	I	Male	Fema	le	Total	

C.	Categorization of work f	orce									
SI.	Category of work force	Mal	le	Femal	e	Emp Stat	oloyment us	Resid Statu	lential s	Accom	modation
		< 18 yrs.	> 18 yrs.	< 18 yrs.	> 18 yrs.	Regular	Temporary	Migrant	Local	Staying in	Others
1.	Unskilled Labourers										
2.	Skilled labourers										
3.	Supervisors										
4.	Engineers										
5.	Office Staff										
	Sub Total										
	Grand Total										
Sul	omitted by Approved by	7	I	(E)	nviro	iment	al Officer	of IE)	I	<u>II</u>	
(Er	wironmental & Safety Er	ngine	er of	Conces	ssiona	ire)					
-	Signature & date Name					Designation					

REPORTING FORMAT -9- REPORTING FORMAT FOR OCCUPATIONAL HEALTH AND SAFETY MEANS

Α	Project Details	Date of Reporting:	
1.	Name of project stretch and link no.		
2.	Name and address of the Concessionaire		
3.	Contract date and duration		
4.	Status of completion of the project		
В	Implementation Status of Health and Safety Measures		
SI.	Health and Safety Measures	Implementation	Remar ks
No.		Status (Yes /	
1	Appointment of qualified Environment and Safety Engineer		
2	Approval for Construction Safety Management Plan by the Engineer.		
3	Provision for flags and warning lights for potential hazards		
4	Provision of adequate staging, form work and access (ladders with handrail) for		
5	Provision of adequate shoring / bracing / barricading / lighting for all deep excavations of more than 3.0 m depth.		
6	Provision for sufficient lighting especially for night time work		
7	Construction Workers safety - Provision of personnel protective equipments		
	A. Helmets		
	B. Safety Shoe		
	C. Dust masks		
	D. Hand Gloves		
	E. Safety Belts		

	Remarks by IE		
	Signature & Date		
	Submitted by (Environment & Safety Engineer of Concessionaire)	Approved by (Environmental Officer of IE)	
13	Ensuring the insurance coverage		
12	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camps		
11	Regular health checkup for labour/ Concessionaire's personnel		
10	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound		
9	All vehicles are provided with reverse horns.		
8	Workers engaged in welding work shall be provided with welder protective shields		
	G. Earplugs for labour		
	F. Reflective Jackets		

Note: Concessionaire has to fill and submit this format to the IE along with the Monthly Report. The IE has to visit the s mitigation measures, if

required, can be suggested by the IE. The EO of IE has to give back a copy of this format to the Concessionaire after his approval with remarks.

REPORTING FORMAT -10- REPORTING FORMAT FOR TOP SOIL CONSERVATION

Α	Project Details	Date of Reporting:				
1.	Name of project stretch and link no.					
2.						
	Name and address of the Concessionaire					
3.	Contract date and duration					
4.	Status of completion of the project					
5.	Name of Site with sl. no. in register of sites					
B	Top Soil Conservation Details					
SI.	List of Activities	Status	Remarks			
1.	Whether the location was pre-identified?					
2.	Whether the slope is $< 1:2$?					
3.	Whether height is less than 2 mts?					
4.	Whether edges of pile are protected by silt fencing ?					
5.	Whether multiple handling is kept to a minimum					
6.	Whether measures are taken to prevent the loss during rains.?					
7.	Whether any other measure are provided? If yes, What is it?					

REPORTING FORMAT -11- REPORTING FORMAT FOR WATER SPRINKLING

A	Proj	ect Detai	ls															
1.	Name of project stretch and link no.																	
2.	Name	e and add	ress of	the C	Con	cession	naire			I								
3.	Cont	ract date	and du	ratior	1													
4.	Statu	s of com	pletion	of th	e pi	roject												
5.	Location of water sprinkling																	
B	Water Sprinkling Details																	
Par	ticula	rs																
			1	2		3	4	5	6	7	8	9	10	11	12	13	14	15
No.	. of tri	ps / day																
		of orinked																
If n	ot	Reasons																

REPORTING FORMAT -12- REPORTING FORMAT FOR ROAD SAFETY MEASURES

DURING CONSTRUCTION

А	Project Details	Date of Reporting:				
1.	Name of project stretch and link no.					
2.	Name and address of the					
3.	Contract date and duration					
4.	Status of completion of the project					
В	Details of Safety Measures					
S.No	Safety Measures	Compliance Status (Yes / No)				
a.	General					
1	A qualified Environment and Safety Engineer should be appointed					
2	A Traffic Management Plan should be prepared in accordance with IRC: SP: 55-2001 and got approved by the Engineer					
3	Maintenance of existing road stretches handed over to the Concessionaire should be carried out					
b.	Details of Construction Zone					
1	Length of transition sub zone should be min 50 m for a speed of 50km/hr					
2	Length of work sub zone in urban stretch should be<2 km					
3	Length of work sub zone in rural stretch should be 5-10 km					

Signage's in construction zones

- 1 Sign saying _Men at Work' should be kept 1 km ahead of Transition sub zone
- 2 Supplementary sign saying Diversion 1 km should be provided
- 3 Sign saying _Road Closed ahead' should be provided
- 4 Compulsory Tum Right/Left sign should be provided
- 5 Detour sign should be placed
- 6 Sharp Deviation sign should be placed at end of advance warning sub zone
- 7 Signage should be provided in Transition Sub Work Zone

- 8 Signage saying _Keep Right/Left should be provided
- 9 Signage should be placed in work sub zone
- 10 Hazard Marker should be placed where railing for CD structure on diversion starts
- 11 Barricade should be provided on either side of work sub zone
- 12 Flag persons should be provided for traffic control
- 13 Flags and warning lights should be provided at Construction zones
- 14 Metal drum /empty bitumen drum delineator, painted in circumferential strips of alternate black and white

Safety Arrangements

- Arrangements should be made for controlled access and entry to Construction zones
- Plastic crash barriers should be provided
- Demarcations (fencing, guarding and watching) should be provided at bridge / culvert construction sites
- Regular Inspection of Work Zone Traffic Control Devices should be carried out by authorized Concessionaire personnel
- All vehicles should be provided with reverse horns
- Speed of construction vehicles should be controlled through road safety training of drivers

Signage in Termination sub zone

• Sign for indication of end of work zone should be placed 120m from end of termination sub zone

Road Delineators

- 1 Roadway indicators should be provided
- 2 Hazard markers should be provided
- 3 Object markers should be provided

A	Project Details							
1.	Name of project stretch and link no.							
2.	Name and address of the Concessionaire							
3.	Contract date and duration							
4.	Status of completion of the project							
B	Details of Accident and People Involved in Accident							
	Name of site where accident occured							
	Name and address of people involved in accident							
	Whether Concessionaire's personnel or							
	General public							
	Details of Injury							
	Details of treatment given							
	Details of compensation given							
С	Type of Accident ($$)							
	Fall of person from a height							
	Slip, trip or fall on same level	Fire						
	Struck against fixed objects	Contact with hot or corrosive substance						
	Struck by flying or falling objects	Contact with poisonous gas or toxic						
	Struck by moving objects	Contact with poisonous gas or toxic						
	Struck / caught by cable	Hand tool accident						
	Stepping on hail etc.	Vehicle / Mobile plant accident						
	Handling without machinery	Machinery operation accident						
	Crushing / burying	Other (please specify)						
	Drowning or asphyxiation							

REPORTING FORMAT -13- REPORTING FORMAT FOR ACCIDENTS

Machinery	
Portable power appliance	
Vehicle or associated equipment /machinery	
Material being handled, used or stored	
Gas, vapor, dust, fume or oxygen	
Hand tools	
Floor edge	
Floor opening/ Left shaft	
Operating without authority	
Failure to secure objects	
Making safety devices	
Working on moving or hazard tools	
Using un-safety equipment	
Adopting unsafe position or posture	
Operating or working at unsafe speed	
Unsafe loading, Placing, mixing	
Failure to use helmet	
Lack of Safety Measures Relevant	
No protective gear	
Defective protective gear	
Improper dress / footwear	
Improper guarding	
Improper ventilation/ illumination	
	Portable power appliancePortable power applianceVehicle or associated equipment /machineryMaterial being handled, used or storedGas, vapor, dust, fume or oxygenHand toolsFloor edgeFloor opening/ Left shaftOperating without authorityFailure to secure objectsMaking safety devicesWorking on moving or hazard toolsUsing un-safety equipmentAdopting unsafe position or postureOperating or working at unsafe speedUnsafe loading, Placing, mixingFailure to use helmetLack of Safety Measures RelevantNo protective gearImproper dress / footwearImproper guarding

REPORTING FORMAT -14- REPORTING FORMAT FOR ENVIRONMENTAL QUALITY MONITORING

A	Project Details			Date of Reporting:		
1.	Name of project stretch	and link no.				
2.	Name and address of th Concessionaire	e				
3.	Contract date and duration					
4.	Status of completion of	f the project				
В	Environmental Moni Details	toring				
SI.	Details of Monitoring Location	Monitoring Period	Details of values exceeding stds	Reasons for pollution	Details of Corrective actions	Remarks
a.	Air Monitoring					
1.						
2.						
b.	Water Monitoring					
1.						
2.						
C.	Noise Monitoring					
1.						
2,						
D.	Soil Monitoring					
1.						
2,						

* Noise monitoring along the road will be done by the IE, using the Noise Meter of IU. The IE has to give the monitoring results to the Concessionaire for corrective actions, if any, required and including in this report.

Note: The Concessionaire has to conduct Environmental Monitoring through a NABL approved Laboratory as per the Environmental Monitoring Plan given in the EMP, fill this format and submit to the IE along with the Monthly Report, if monitoring was due in that month.

REPORTING FORMAT -15- REPORTING FORMAT FOR EHANCEMENT AND MITIGATION OF CULTURAL PROPERTIES

Α	Project Details	Date of reporting:
1.	Name of project stretch and link no.	
2.	Name and address of the concessionaire	
3.	Contract date and duration	
4.	Status of completion of the project	

B	Details	ails of Enhancement and Mitigation of Cultural Properties								
Sl.	Locati	on with		% work	Re	marks and reason	s for delay, if any.			
No.	chaina	ige		completed						

С	Submis	sion Details			
		Submitted by		Approved by	
		(Environment	& Safety Engineer of	(Environmental	Officer of IE)
		Concessionaire	e)		
Signa	ture &				
Nam	e				
Desig	nation				
Ren	narks by	' IE			

Note: The Concessionaire has to fill the details of cultural properties for which enhancement and mitigation measures were carried out during the reporting month in this format and submit to the IE along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The IE has to visit the sites and verify the details. Additional mitigation measures, if required, can be suggested by the IE. The EO of IE has to give back a copy of this format to the Concessionaire after his approval with remarks.

REPORTING FORMAT -16- REPORTING FORMAT FOR NOISE BARRIER CONSTRUCTION

Α	Project Details		Date of reporting:
1.	Name of project stretc	h and link no.	
2.	Name and address of t	he Concessionaire	
3.	Contract date and dura	ation	
4.	Status of completion o	f the project	
4. Status of completion of the project			
В	Details of Noise Barrier	s Constructed	
SI.	Location with chainage% work		Remarks and reasons for delay, if any.

С	Submission Details	
	Submitted by	Approved by
	(Environment & Safety Engineer of	(Environmental Officer of IE)
	Concessionaire)	

Signature

Name

Designation

Remarks by IE

Note: The Concessionaire has to fill the details of Noise Barriers constructed during the reporting month in this format and submit to the IE along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The IE has to visit the sites and verify the details. The EO of IE has to give back a copy of this format to the Concessionaire after his approval with remarks.

REPORTING FORMAT -17- REPORTING FORMAT FOR ENHANCEMENT MEASURES OTHER THAN CULTURAL PROPERTIES

A Project Details 1. Name of project stretch and link no. 2. Name and address of the Concessionaire 2. Contract date and duration 3. Contract date and duration 4. Status of completion of the project B Details of Enhancement Measures Sl. Location with % work completed a Raising embankment height b Public water sources		Date of reporting:		
1.	Name of project stretch and	nd link no.		
2.				
3.				
4.	Status of completion of th	e project		
В	Details of Enhancement	Measures		
SI.	Location with		Remarks and reasons for delay, if any.	
a	Raising embankment h	eight		
b	Public water sources			
c	Bus stops and bus bays			
d	Water Bodies			
e				
f	Sign Boards/ KM Stones			

Note: The Concessionaire has to fill the details of enhancement measures carried out for amenities / facilities other than cultural properties during the reporting month in this format and submit to the IE along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report.

REPORTING FORMAT -18- REPORTING FORMAT FOR TREE PLANTATION

Α	Project Details	Date of reporting:
1.	Name of project stretch and link no.	
2.	Name and address of the	
3.	Contract date and duration	
4.	Status of completion of the project	
В	Details of Trees Planted	

SI.	Location with Chainage	No. of % work		Remarks and reasons for delay, if any			
С	Submission Details						_
C	Submission Details			 Appro	ved by		_
	(Environment	t & Safety En	gineer of	(Envir	onmenta	l Officer of IE)	-
Rem	arks by IE						

Note: The Concessionaire has to fill the details of Trees planted during the reporting month in this format and submit to the IE along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The IE has to visit the sites and verify the details. The EO of IE has to give back a copy of this format to the Concessionaire after his approval with remarks.

REPORTING FORMAT -19- OVERALL MONTHLY REPORTING FORMAT FROM CONTRACTOR TO IE

Α	Project Details	Period of Reporting:
1.	Name of project stretch and link	
2.	Name and address of the	
3.	Contract date and duration	
4.	Status of completion of the	
В.	Physical Progress Report	

SI.	Enhancement Measures	Physical Target	Units carried over from Previous month	Units started in	Units completed	Units carried to next month	Cumulative	% target	Remarks
1.	Noise barrier								
2.	Hand pumps								
3.	Bus Shelter								
4.	Sign Boards								
5.	cultural properties								
6	Trees Planted								
7	Others Utilities								

C.	Details of Sites for Project A	ncillary facilities					
SI.	Type of camp / site	Cumulative No of	f No of site	es operational	Cumulative	Cumulative	Remarks
No.		sites opened			No of sites redeveloped	No of sites closed*	
1.	Construction camp						
2.	Labour camp						
3.	Quarry & stone crusher						
4.	Borrow Area						
5.	Debris disposal site						
6.	Water sources				NA		
*A sit	e will be considered closed after	redeveloping and ob	taining closure certifi	cate from IE.	·	·	·
D.	Summary of machinery and	equipment available					
SI.	Type of equipment / machin	ery / vehicles		Nos. available	Validity dat	te of PUC	Remarks
No.					certificate (a	as applicable)	
1.							
Е.	Details of lapses and notices				I		1
SI.	Details of notices issued by 1	E Date of notice	Type of lapse	Notice No. *	Corrective		Remarks
No.			(Major / Minor)		actions taken	l	

Appendix No -2

REPORTING FORMAT -20- OVERALL MONTHLY REPORTING FORMAT FROM CONTRACTOR TO PIU/HD

SL. NO	REPORTING FORMAT	YES/NO	SL. NO	REPORTING FORMAT	YES/NO
	Format for Register of sites opened and closed			Reporting Format for Register of Accidents and	
1	and its reporting		8	it's Reporting	
	Format for Register of complaints and its			Reporting Format for Enhancement and	
2	reporting		9	Mitigation of Cultural Properties	
3	Reporting Format for Work Force Management		10	Reporting Format for Noise Barrier	
	Reporting Format for Occupational Health and			Reporting Format for Enhancement Measures	
4	Safety Measures		11	Other than Cultural Properties	
5	Reporting Format for Top Soil Conservation		12	Reporting Format for Tree Plantation	
	Reporting Format for Water Sprinkling for Dust			Reporting Format for Environmental Quality	
6	Suppression		13	Monitoring	
	Reporting Format for Road Safety Measures				
7	During Construction		-	-	-

B.	Physical Progress Report								
Sl. No.	Enhancement Measure	target	Units carried over from previous month	Units started in reporting month	Units completed in reporting month	Units carried over to next month	Cumulative units completed till end of reporting month	% target complet ed	Remarks / reasons for delay
			(a)	(b)	(c)	(d=a+b-c)			
1.	Noise barrier								
2.	Hand pumps								
3.	Bus Shelter								
4.	Sign Boards								
5	the cultural properties								
6.	Constructing new well								
7.	providing new water taps								
8.	Parking space for auto								
9.	Planting trees along road								
10.	Planting trees on inner side								
11.	Providing 1.2 mt. high fencing under via duct								
12.	Concrete flooring with slope drains and oil interceptors								

•

C.	Details of Sites for 1	Details of Sites for Project Ancillary facilities								
SI. No.	Type of camp / site		No of sites operationa l	Cumulative No of sites redeveloped	Cun tive of si clos					
1.	Construction camp									
2.	Labour camp									
3.	Quarry & stone crusher									
4.	Borrow Area									
5.	Debris disposal site									
6.	Water sources	-		NA						

D.	Summary of machinery and equipment available						
SI. No.	Type of equipment / machinery / vehicles	/ Nos. available	Validity dat PUC certific (as applicab				
1.							

Е.	Details of lapses fo	Details of lapses for which notices were issued during the previous rep							
Sl. No.	Details of notices issued by IE	Date of notice	Type of lapse	Notice No.	Corrective actions	Rem			

F.	Details of major l month	apses for which notices	were issued during the current
SI. No.	List of major lapses	Date of issuing notice	Whether invoking penalty clar from next interim payment certificate is recommended?
1			
2			

G.	Details of minor lapses	Details of minor lapses for which notices were issued during the current reporting month						
		Da	ate of issuing	notice	Whether invoking penalty clause from next interim payment certificate is recommended?			
		Original	First	Second				
SI. No.	List of minor lapses	notice	Reminder	Reminder				

H	Reporting / Monitoring formats to be annexed with this monthly	y report b	y the IE	
SI. No.	Reporting / Monitoring format	Yes/No	Sl. No	Reporting / Monitoring format
1	Format for Register of sites opened and closed and its reporting		13	Reporting Format for Environmental Quality Monitoring
2	Format for Register of complaints and its reporting		14	Checklist For Monitoring Of Construction Camp Management
3	Reporting Format for Work Force Management		15	Checklist For Monitoring Of Labour Camp Management
4	Reporting Format for Occupational Health and Safety Measures		16	Checklist For Monitoring Of Quarry And Stone Crusher Management
5	Reporting Format for Top Soil Conservation		17	Checklist For Monitoring Of Borrow Area Management
6	Reporting Format for Water Sprinkling for Dust Suppression		18	Checklist For The Monitoring Of Debris Disposal Site Management

7	Reporting Format for Road Safety Measures During Construction	19	Check List For Monitoring Of Redevelopment Of Construction Camp Site
8	Reporting Format for Register of Accidents and it's Reporting	20	Check List For Monitoring Of Redevelopment Of Labour Camp Site
9	Reporting Format for Enhancement and Mitigation of Cultural Properties	21	Check List For Monitoring Of Redevelopment Of Quarry And Stone Crusher Site
10	Reporting Format for Noise Barrier Construction	22	Check List For Monitoring Of Redevelopment Of Borrow Areas
11	Reporting Format for Enhancement Measures Other than Cultural Properties	23	Check List For Monitoring Of Redevelopment Of Debris Disposal Site
12	Reporting Format for Tree Plantation		

APPENDIX - III CHECKLISTS FOR EMP COMPONENTS

Appendix No-3

Checklists for EMP Components	
CHECKLIST -1- CHECKLIST FOR MONITORING OF CONSTRUCTION CAMP MANAGEMENT	2
CHECKLIST -2-CHECKLIST FOR MONITORING OF LABOUR CAMP MANAGEMENT	4
CHECKLIST -3- CHECKLIST FOR MONITORING OF QUARRY AND STONE CRUSHER MANAGEMENT	6
CHECKLIST -4- CHECKLIST FOR MONITORING OF BORROW AREA MANAGEMENT	9
CHECKLIST -5 -CHECKLIST FOR THE MONITORING OF DEBRIS DISPOSAL SITE MANAGEMENT	1

CHECKLIST -1- CHECKLIST FOR MONITORING OF CONSTRUCTION CAMP MANAGEMENT

Project Details	Date of Monitoring:	
Name of project stretch and link no.		
Name and address of the Concessionaire		
Contract date and duration		
Status of completion of the project		
Name of Construction Camp with sl. no. in Register of Sites		
	Name of project stretch and link no. Name and address of the Concessionaire Contract date and duration Status of completion of the project	Name of project stretch and link no. Image: Contract date and duration Name and address of the Concessionaire Image: Contract date and duration Status of completion of the project Image: Contract date and duration

SI.		IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
No	Environmental Management Measures			
1	Whether concrete flooring and oil interceptors are provided for hot mix plant area and work shop, vehicle washing and fuel handling area?			
2.	Are all the first aid facilities provided in the camp?			
3.	Whether the plant is located in such a way that there are no residences, public institutions or hospital with in a radius of 250 M from the centre of the plant?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5	Does water in cross drainage channels block?			

6	Whether all the plant and machineries are well maintained and regularly serviced?			
0				
7	Whether all the drains and channels are covered?			
8	Whether a green belt is provided along the periphery of camp?			
9	Whether water is stored for dust suppression in the camp?			
10	Whether sanitation facilities are provided for male and female?			
11	Whether separate garbage bins are provided to collect the garbage?			
12	Whether septic tanks with soak pits are provided?			
13	Whether the location of soak pit is in such away that it does not pollute the ground water?			
14	Whether a qualified safety officer is appointed for ensuring safety?			
15	Whether noise barriers near sensitive receptors are provided?			
16	Whether personal protective equipments are provided?			
17	Whether warning sign boards are set up at the entrance gate for the public?			
18	Whether all applicable clearances are obtained and valid till date?			

Note: The Environmental Officer of the IE has to use this format to monitor the implementation of Environmental Management Measures for each Construction Camp Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Concessionaire. IE has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Concessionaire.

CHECKLIST -2-CHECKLIST FOR MONITORING OF LABOUR CAMP MANAGEMENT

Α	Project Details	Date of Monitoring:	
1.	Name of project stretch and link no.		
2.	Name and address of the Concessionaire		
3.	Contract date and duration		
4.	Status of completion of the project		
5.	Name of Labour Camp with sl. no. in register of sites		

Sl. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1	Whether the camps are floored with concrete?		rr	
1.	whether the camps are noored with concrete?			
2.	Are all the first aid facilities provided in the camp?			
3.	Whether the camp is located in such a way that there are no residences, public institutions or biosensitive area with in a radius of 500 M from the camp?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5	Whether LPG for cooking is provided?			
6	Whether safe drinking water is provided?			
7	Whether all the drains and channels are covered?			

Sl. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
	Whether a green belt is provided along the periphery of camp?			
9	Whether day care centres are provided with in the camp?			
	Whether sanitation facilities are provided separately for male and female?			
11	Whether separate garbage bins are provided to collect the garbage?			
12	Whether septic tanks with soak pits are provided?			
13	Whether the location of soak pit is in such a away that it does not pollute the ground water?			
	Whether a qualified safety officer is appointed for ensuring safety?			
15	Whether proper fencing of the camp is done?			
	Whether the workers are well aware of cleanliness, hygiene, community livings, AIDS etc.?			
17	Whether all applicable clearances are obtained and valid till date?			
	Signature of Environment and Safety Engineer (ESE) of the date	e Concessionaire with	Signature of Environmental Officer o	f the IE with date

CHECKLIST -3- CHECKLIST FOR MONITORING OF QUARRY AND STONE CRUSHER MANAGEMENT

Project Details	Date of Monitoring:	
Name of project stretch and link no.		
Name and address of the Concessionaire		
Contract date and duration		
Status of completion of the project		
Name of Quarry & Crusher with sl. no. in register of sites		
	Name of project stretch and link no. Name and address of the Concessionaire Contract date and duration Status of completion of the project	Name of project stretch and link no. Name and address of the Concessionaire Contract date and duration Status of completion of the project

SI. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1	Whether the crusher units and/or other dust-producing units are housed in a building with a wall of minimum 23 cm thickness and with suitable roofing?			
2	Whether quarry site is located at a distance of minimum 500 mts. from human settlement, railway line, national highway, state highway, eco-sensitive area or district road?			
3	Whether stone quarry is located at a minimum distance of 50mts. from a water body ^{4?}			
4	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5	Whether a dust extraction with collection system is provided in the crusher unit and all transfer points?			

SI. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
6	Whether safe drinking water is provided for the workers?			
7	Whether safe drinking water is provided for the workers?			
8	Whether a dust extraction unit with collection system is provided in the crusher unit and all transfer points?			
9	Whether a green belt is provided along the periphery of quarry?			
10	Whether adequate systems with water spray and sprinkling is provided for dust suppression?			
11	Whether the roads inside the crusher premises is tarred or concreted?			
12	Whether separate garbage bins are provided to collect the garbage?			
13	Whether the crusher, impactor and other connecting unit working time is restricted to day time (6 am to 6 pm)?			
14	Whether dust sealing arrangement is provided to avoid fugitive emission?			
	Whether the ambient sound level (Leq) at a distance of			
15	1 m away from the boundary of the site is with in 55 dB(A)?			
16	Whether the occupier is conducting air monitoring on the suggested frequency?			
17	Whether contour trenches are made to control soil erosion?			
18	Whether workers are properly trained?			
19	Whether sign boards of size 6' x 4' mentioning the project details and Concessionaire's details are placed for public?			

SI. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
20	Whether the stack height of the D.G set is adequate?			
	Whether arrangement made for avoiding fugitive emission from plants/ premises are adequate?			
	Whether natural drainage patterns are kept clear without not alteration or blockage?			
23	Whether top soil conservation has been undertaken?			
24	Whether all applicable clearances are obtained and valid till date?			
			Signature of Environ the IE with date	mental Officer of
	Signature of Environment and Safety Engineer (ESE) of the Concessionaire with date			

⁴ If this is not possible, given the topographical features of the region, pl specify the reasons clearly.

Note: The Environmental Officer of the IE has to use this format to monitor the implementation of Environmental Management Measures for each Quarry & Crusher Quarterly.

Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Concessionaire. IE has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Concessionaire.

CHECKLIST -4- CHECKLIST FOR MONITORING OF BORROW AREA MANAGEMENT

Α	Project Details	Date of Monitoring:	
1.	Name of project stretch and link no.		
2.	Name and address of the Concessionaire		
3.	Contract date and duration		
4.	Status of completion of the project		
5.	Name of Borrow Area with sl. no. in register of sites		

Sl. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1.	Whether the work at night is fully avoided?			
2.	Whether the approach road to the borrow area well maintained?			
3.	Whether the necessary traffic sign board is kept to control the traffic flow?			
4.	Whether any record is kept for the number of trees cut?			
5.	Whether a record on total quantity of earth evacuated is maintained?			
6.	Whether all waste materials from the borrow area is properly disposed?			
7.	Whether the relaying of the preserved top soil is carried out?			

Sl. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
8.	Whether required signages for the protection of the works or safety and convenience of public provided?			
9.	Whether effective measures are taken to control nuisance and disturbance arising from the execution work?			
10.	Whether the excavation is carried out in such a manner that the activity will not damage adjacent properties or cause contamination of nearby stream or other water bodies?			
11.	Whether the land is leveled after completion of work?			
12	Whether the borrow pits are redeveloped?			
13	Whether water logging is avoided?			
14	Whether arrangements are made for regular sprinkling of water?			

CHECKLIST -5 -CHECKLIST FOR THE MONITORING OF DEBRIS DISPOSAL SITE MANAGEMENT

Α	Project Details	Date of Monitoring:
1.	Name of project stretch and link no.	
2.	Name and address of the Concessionaire	
3.	Contract date and duration	
4.	Status of completion of the project	
5.	Name of Debris Disposal Site with sl. no. in register of sites	
D	Mentionine Details	

Sl. No	Environmental Management Measures	IE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1.	Whether the construction operations are carrying out in such a manner that no waste material is dumped or disposed off in an unhealthy manner that causes any environmental hazard?			
2.	Whether the debris forming work close to the streams and water bodies are generally avoided during the monsoon period?			
3.	Whether the debris disposal site is at least 200 meter away from the surface water body?			
4	Whether the debris disposal site is at least 500 meter away from the ecologically sensitive are, residential area or main road?			
5	Whether the debris disposal along the water courses and close to the drainage channels are in such a manner that it do not cause any			

Detailed Project Report for Chennai Peripheral Road - EIA & EMP

blockage to the flow of water? Whether the bituminous waste is used as a surfacing material to the access roads to base camps, quarries, borrow area, temporary diversion, haulage 6 routes etc.? Whether the waste disposal details are submitted to the IE in the 7 prescribed format? Whether the spoils from excavation of the river bed are disposing off 8 at specified area suggested by the engineers? Whether the debris generated due to dismantling of existing permanent 9 structure is reused in the temporary diversion? Whether the preserved topsoil is used for redevelopment of the area? 10 Whether green belt is developed ? 11 Whether all applicable clearances are obtained and valid till date? 12 Signature of Environment and Safety Engineer (ESE) of the Concessionaire with date Signature of Environmental Officer of the IE with date

Note: The Environmental Officer of the IE has to use this format to monitor the implementation of Environmental Management Measures for each Debris Disposal Site Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Concessionaire. IE has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

12

Appendix No -3