



**CAPITAL REGION  
DEVELOPMENT PROJECT-II**  
Government of Kerala

**ESIA FOR PROPOSED**

**OUTER RING ROAD**

(Northern Ring: Navaikulam-  
Thekkada)

**Thiruvananthapuram,  
Kerala**

**Proposed ToR**

October 2021

Prepared By



**L&T Infra Engineering**

**NABET ACCREDITED**

C1181309  
RP001, Rev.0







## TABLE OF CONTENTS

<b>1</b>	<b>Proposed Terms of Reference for ESIA/EIA Study .....</b>	<b>1-1</b>
1.1	Introduction to Project .....	1-1
1.2	Details of the Project .....	1-1
1.3	Site Analysis .....	1-3
1.4	Methodology .....	1-3
1.4.1	Baseline Environmental Monitoring .....	1-3
1.4.2	Establishment of Baseline Environmental Conditions .....	1-6
1.4.3	Identification, Prediction and Evaluation of Impacts .....	1-6
1.4.4	Environmental Monitoring Programme .....	1-6
1.4.5	Project Benefits .....	1-6
1.4.6	Environmental Management Plan .....	1-6
1.4.7	Structure of EIA Report .....	1-6
1.4.8	Standard ToR .....	1-7

## LIST OF FIGURES

Figure 1-1:	Northern Ring of ORR Alignment (showing Project Influenced Panchayaths) .....	1-2
Figure 1-2:	Proposed Monitoring Network along the alignment .....	1-5



# 1 Proposed Terms of Reference for ESIA/EIA Study

Proposed Terms of Reference (ToR) for ESIA/EIA study are drawn keeping in view the ESIA/EIA Notification, 2006 (as amended) of Ministry of Environment and Forests and Climate Change (MoEF&CC) and the EIA Guidance Manual on Highways released by MoEF&CC. ESIA/EIA study will follow the Standard ToR for Highway Projects as prescribed by MoEF&CC. Standard ToR is provided as **Section 1.4.8**.

## 1.1 Introduction to Project

Government of Kerala (GoK) in order to meet future growth requirements of Thiruvananthapuram is undertaking several initiatives for sustainable improvement of urban environment. As part of this effort, it has initiated the Capital Region Development Project (CRDP) for Thiruvananthapuram City.

GoK, with this intent, under CRDP proposes to develop an Outer Area Growth Corridor project. GoK proposes to develop an approximately **77.773 km long 4 lane highway (expandable to 6 lane)/ Outer Ring Road (ORR)** as the principle project component along with designated planned development zones in the outer area at select locations which are earmarked for specific zones such as Logistic Zones, Economic & Commercial (IT/ITES/Media Businesses), Residential Zone, Health & Education, etc. The ORR is bifurcated into Northern Ring (29.800 km) and Southern Ring (47.973 km). This Form 1 & ToR application is for the Northern Ring section of the proposed ORR project.

In this regard, CRDP has appointed L&T Infrastructure Engineering Limited (LNTIEL) as consultants for carrying out the services required for an Environmental and Social Impact Assessment (EIA/ESIA) of the Northern Ring with a view to identify the critical concerns in the construction for the proposed development as per EIA Notification 2006 (as amended). The scope also includes the task of obtaining the Environmental Clearance for development of the project.

## 1.2 Details of the Project

GoK intends to develop an Outer Area Growth Corridor (OAGC) consisting of 4 lane highway (expandable to 6 lane) for a length of 29.800 km. Proposed corridor will run mainly across Greenfield areas in the outer area and interconnect all major highways leading to the city. The corridor alignment is from Navaikulam to Thekkada extending the Southern Ring around Thiruvananthapuram city. The Northern part of Outer Ring Road alignment is shown as **Figure 1-1**.

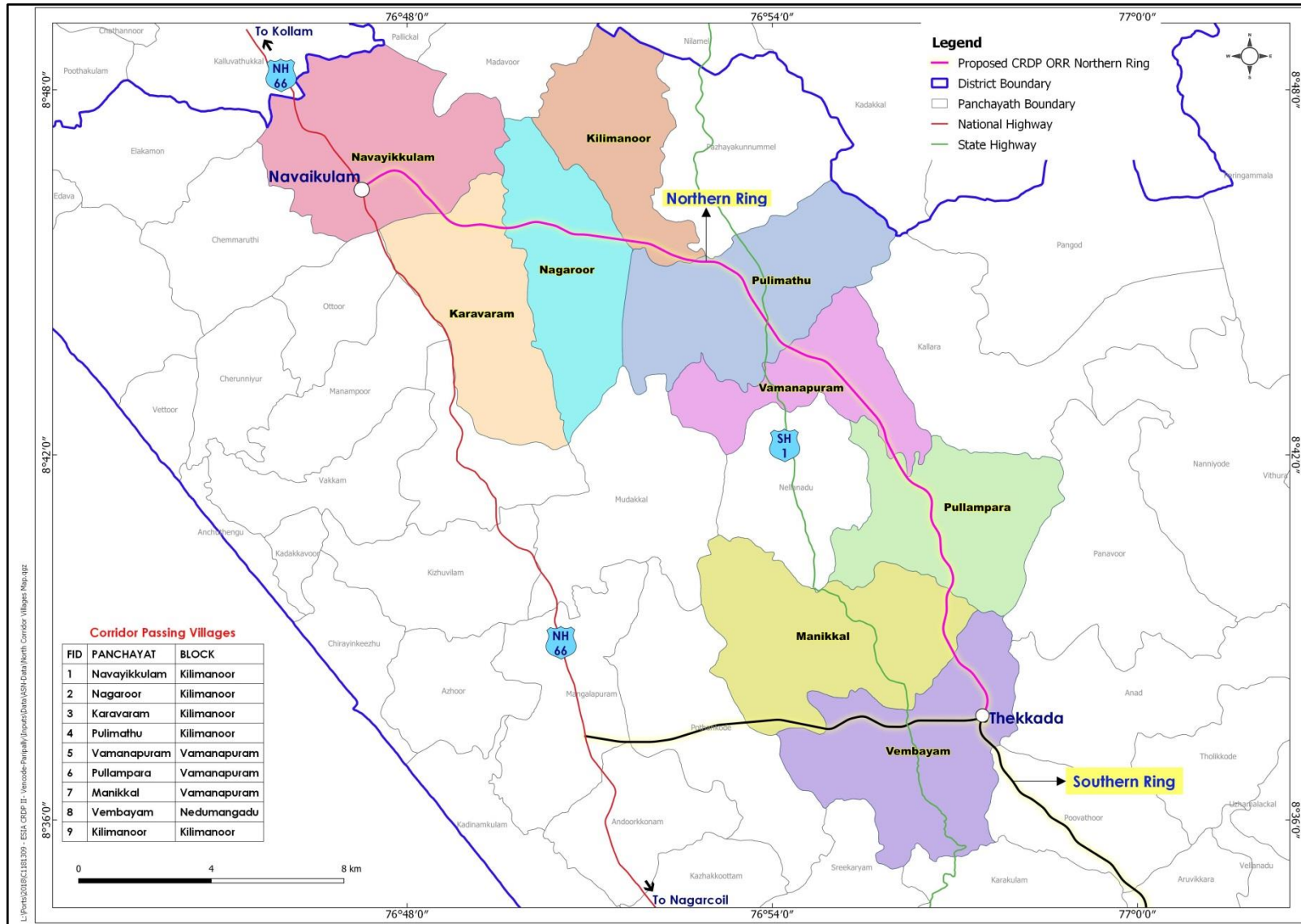


Figure 1-1: Northern Ring of ORR Alignment (showing Project Influenced Panchayaths)

### 1.3 Site Analysis

The project is located in Thiruvananthapuram District, Kerala. It is 29.800 km long stretch starting from Navaikulam and ends at Thekkada. The proposed alignment passes through the villages of Navayikulam – Karavaram – Nagaroor – Kilimanoor – Pulimathu – Vamanapuram – Pullampara – Manikkal - Vembayam.

Project area comprises of Midland and few parts of Highland as per standard classification of terrain in Kerala State. There will be cutting and filling of earth materials involved in development through undulating stretches. Planned corridor passes through stretches of plantations (Rubber, Coconut, Banana) and some areas of paddy fields. Proposed development will also need relocation of structures (mostly residential and some commercial) as these areas will need to be acquired for proposed development. Also, alignment crosses Vamanapuram River and irrigation canals.

### 1.4 Methodology

Methodology to carry out the ESIA/EIA study involves the following stages:

- Reconnaissance survey and site visit
- Review of available literature
- Compliance to statutory requirements
- Baseline environmental monitoring
- Stakeholder/Community consultations
- Identification and Prediction of Impacts
- Environmental Management Plan

#### 1.4.1 Baseline Environmental Monitoring

The baseline environmental studies will be carried out covering the terrestrial and socio-economic environments. The studies will be a combination of desk studies (compiling information from secondary/published data) and field surveys to address the key issues related to the projects.

**Study Period:** The study shall cover a period of **One Season** (other than monsoon season) and is proposed to be carried out during the period of November/December 2021 – January 2022.

**Study Area:** Primary baseline data will be collected from the core Study Area which will be an area falling within 500 m on either side of the proposed right of way along the alignment. An area of up to 15 km on either side of the alignment will be considered for secondary data collection.

The methodology to be adopted for the baseline environmental studies is as follows:

##### 1.4.1.1 Terrestrial Environment

#### **Meteorology**

Meteorological parameters such as wind speed, direction, relative humidity, rainfall, temperature etc., will be recorded by using automatic weather monitoring station in the study area at **One (1) location** during the study period. In addition, the general meteorological data from Climatological Tables of Indian Meteorological Department (IMD) shall be used to establish the baseline meteorological conditions of the site.

### **Ambient Air Quality**

The ambient air quality monitoring will be carried out as per CPCB/MoEF guidelines. The ambient air quality monitoring locations will be identified with regard to the predominant wind direction, topography, population, sensitive locations, and possible impact zones. Representative Ambient Air Quality (AAQ) shall be monitored at **Three (03)** locations in the study area with twice/thrice a week frequency during the study period.

Ambient air quality shall be measured as per the CPCB NAAQS Notification dated 18<sup>th</sup> November 2009 for all the twelve (12) parameters. The measurement shall be carried out for establishing 24-hourly background concentrations for all parameters except Carbon Monoxide (CO) and Ozone (O<sub>3</sub>), which shall be measured on eight hourly basis on each monitoring day.

### **Ambient Noise Levels**

Noise levels will be measured at **Three (03)** locations within the study area. Intensity of the noise levels (Peak noise and Equivalent noise levels) in the study area will be measured at hourly intervals for 24-hours once during the study period. Representative noise level measurement will be carried out as per the IS: 4954-1968 as adopted by CPCB, CPCB/IS: 4954-1968 and the CPCB/ OSHA Standards using a precision noise/sound level meter.

### **Inland Water Quality**

The study area will first be inventoried to identify the sources of water i.e. both surface and groundwater sources. Water samples will be collected at the identified sources based on the type of the source, its relevance and number of upstream and downstream users. Water quality will be monitored at **Five (05)** locations within the study area. Representative water samples will be collected and analysed, once during the study period for physico-chemical and biological characteristics. Water Quality will be monitored adopting procedures as per IS: 3026 and relevant guidelines of MoEF/CPCB.

### **Soil Quality/Land Environment**

The soil types in the study area will be identified based on the review of the available data supported with information gathered from reconnaissance survey. Representative soil samples will be collected at **Three (03) locations** for various types of soils in the study area. The collected samples will be analysed once during the season for physico-chemical characteristics.

A map showing the proposed monitoring network for air quality monitoring, noise monitoring, water quality sampling and soil sampling is given in **Figure 1-2**.

### **Terrestrial Ecology**

Vegetation pattern will be identified based on literature survey and field investigation. A list of flora and fauna of terrestrial ecosystem will be prepared. Endangered and dominant plant species area, if any, will be identified.

**Flora and Fauna:** Flora and fauna in study area will be assessed by primary surveys and collecting secondary information from sources like Forest Department and other agencies involved in similar studies.

#### *Floral Diversity and Species Inventory*

Sampling of vegetation will be done using selected samples of 100 m x 10 m belt transects for tree species, 10 m x 10 m quadrants for shrub species and 1 m x 1 m quadrants for herb species.

*Faunal Diversity and Species Inventory (Vertebrates)*

Inventory of animal species will be prepared based on following methodology:

- Direct observation during field visits
- Interviewing local villagers and forest officials
- Secondary sources such as published literature on fauna.

Bio-diversity index and relative index of different types of flora will be established. Cover of trees in different areas will be established. Canopy cover of trees in different areas will also be established. Terrestrial flora and fauna survey will be carried out as per standard practice.



**Figure 1-2: Proposed Monitoring Network along the alignment**

1.4.1.2 Demography and Socio-economics

The socio-economic conditions in study area shall be established through collection and review of available secondary/published data and socio-economic data. This shall include

- Demographic structure covering total households, total population, population density, sex ratio, schedule caste and schedule tribe, literacy and employment
- Health status
- Cultural and aesthetic attributes in study area including places of historical and archaeological importance
- Inventory of places of historical, cultural and religious importance in the study area
- Details of various economic activities shall be collected

### 1.4.2 Establishment of Baseline Environmental Conditions

The information gathered from secondary/published data and primary surveys will be used for presenting the baseline environmental and social conditions. The baseline levels will be compared with the existing standards prescribed by the MoEF&CC/CPCB or KSPCB. Any critical issues in the baseline environmental conditions will be identified and adequately addressed in the EIA Report.

### 1.4.3 Identification, Prediction and Evaluation of Impacts

The likely environmental impacts due to the construction and operation phases of proposed project shall be identified and addressed in the EIA Study. Appropriate mitigation measures for the potential impacts shall be discussed during the study and presented in the EIA Report.

### 1.4.4 Environmental Monitoring Programme

Environmental Monitoring Programme covering the technical aspects (including methodology, parameters, frequency, location, etc., and budgetary estimates) of monitoring to check the effectiveness of mitigation measures during construction and operation phases of the proposed redevelopment activities will be prepared.

### 1.4.5 Project Benefits

The project benefits in terms of improvements in the physical infrastructures and social infrastructure, employment potential and other tangible benefits will be discussed in detail in the EIA Report.

### 1.4.6 Environmental Management Plan

An Environmental Management Plan (EMP) will be formulated for the proposed road development project. EMP will address mitigation measures for each area i.e. air, water, soil, water environment, solid waste, socio-economic, etc. separately, covering all relevant aspects as per the recommendations and requirement of MoEF&CC. Based on the identified potential impacts associated with the project, an EMP will be framed for the construction and operation phases of the project, which will include:

- Pollution abatement and adequacy of control measures
- Recommendations of measures for noise measurement
- Analysis of the various mitigation measures and recommendation of feasible measures
- Environmental monitoring programme during construction and operation phases
- Environmental enhancement measures
- Budgetary estimates for mitigation measures and its implementation
- Institutional Mechanism for implementation of EMP

### 1.4.7 Structure of EIA Report

The EIA report will be prepared following the guidelines provided in Appendix III of the EIA Notification, 2006 (as amended) and as given below.

**Chapter I: Introduction** – describes the introduction to project, background of study, scope and objectives of study and approach adopted to carry out the study

- Chapter II: Project Description** – describes the basic features of project, basis and considerations, project operations
- Chapter III: Analysis of Alternatives** – shall discuss site/location analysis
- Chapter IV: Anticipated Environmental Impacts & Mitigation Measures** – potential impacts due to project activities on environment and their mitigation measures
- Chapter V: Description of Environment** – describes the baseline environmental status
- Chapter VI: Environmental Monitoring Programme** – describes the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, frequency, location, and budget)
- Chapter VII: Additional Studies** – shall discuss additional studies that will be carried out
- Chapter VIII: Project Benefits** – discusses the project benefits
- Chapter IX: Environmental Management Plan** – discusses the administrative aspects of ensuring the mitigative measures that are going to be implemented
- Chapter X: Summary and Conclusion** – overall justification for implementation of the project, impact evaluation and mitigation and project benefits
- Chapter XI: Disclosure of Consultants Engaged** – provides details of the consultants engaged with their brief profile and nature of consultancy rendered

#### 1.4.8 Standard ToR

##### **STANDARD TERMS OF REFERENCE [TOR] FOR EIA / EMP REPORT FOR HIGHWAY PROJECTS REQUIRING ENVIRONMENT CLEARANCE UNDER EIA NOTIFICATION, 2006**

- 1) Examine and submit a brief description of the project, project name, nature, size, its importance to the region/state and the country.
- 2) In case the project involves diversion of forests land, guidelines under OM dated 20.03.2013 may be followed and necessary action taken accordingly.
- 3) Details of any litigation(s) pending against the project and/or any directions or orders passed by any court of law/any statutory authority against the project to be detailed out.
- 4) Submit detailed alignment plan, with details such as nature of terrain (plain, rolling, hilly), land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, mangroves, notified industrial areas, sand dunes, sea, river, lake, details of villages, tehsils, districts and states, latitude and longitude for important locations falling on the alignment by employing remote sensing techniques followed by ground truthing and also through secondary data sources.
- 5) Describe various alternatives considered, procedures and criteria adopted for selection of the final alternative with reasons.
- 6) Submit Land use map of the study area to a scale of 1: 25,000 based on recent satellite imagery delineating the crop lands (both single and double crop), agricultural plantations, fallow lands, waste lands, water bodies, built-up areas, forest area and other surface features such as railway tracks, ports, airports, roads, and major industries etc. and submit a detailed ground surveyed map on 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archeological & religious, monuments etc. if any.

- 7) If the proposed route is passing through any hilly area, examine and submit the stability of slopes, if the proposed road is to pass through cutting or embankment / control of soil erosion from embankment. Landslide, rock fall protection measures to be indicated.
- 8) If the proposed route involves tunnelling, the details of the tunnel and locations of tunnelling with geological structural fraction should be provided. In case the road passes through a flood plain of the river, the details of micro drainage, flood passages and information on high levels flood periodicity at least of last 50 years in the area should be examined.
- 9) The projects if located within 10km. of the sanctuary, a map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon should be furnished at the stage of EC.
- 10) Study regarding the Animal bypasses / underpasses etc. across the habitation areas shall be carried out. Adequate cattle passes for the movement of agriculture material shall be provided at the stretches passing through habitation areas.
- 11) The information should be provided about the details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees. Animal and wild life crossings to be provided in areas inhabited by wild life.
- 12) Necessary green belt shall be provided on both sides of the highway with proper central verge and cost provision should be made for regular maintenance.
- 13) If the proposed route is passing through a city or town, with houses and human habitation on the either side of the road, the necessity for provision of bypasses/diversions/under passes shall be examined and submitted. The proposal should also indicate the location of wayside amenities, which should include petrol station/service centre, rest areas including public conveyance, etc. Noise reduction measures should also be indicated.
- 14) Submit details about measures taken for the pedestrian safety and construction of underpasses and foot-over bridges along with flyovers and interchanges. If any.
- 15) Assess whether there is a possibility that the proposed project will adversely affect road traffic in the surrounding areas (e.g. by causing increases in traffic congestion and traffic accidents). Specific care be also taken to ensure that by passes have a sufficient buffer to prevent unwanted obstructions defying the purpose of the by pass
- 16) Examine and submit the details of use of fly ash in the road construction, if the project road is located within the 100 km from the Thermal Power Plant.
- 17) Examine and submit the details of sand quarry, borrow area and rehabilitation.
- 18) Explore the possibilities of utilizing the debris/ waste materials available in and around the project area.
- 19) Submit the details on compliance with respect to Research Track Notification of MoRTH
- 20) Examine and submit the details of sand quarry and borrow area as per OM no.2-30/2012-IA-III dated 18.12.2012 on 'Rationalization of procedure for Environmental Clearance for Highway Projects involving borrow areas for soil and earth" as modified vide OM of even no. dated March 19, 2013.

- 21) Climate and meteorology (max and min temperature, relative humidity, rainfall, frequency of tropical cyclone and snow fall); the nearest IMD meteorological station from which climatological data have been obtained to be indicated.
- 22) The air quality monitoring should be carried out as per the new notification issued on 16th November, 2009.
- 23) Identify project activities during construction and operation phases, which will affect the noise levels and the potential for increased noise resulting from this project. Discuss the effect of noise levels on nearby habitation during the construction and operational phases of the proposed highway. Identify noise reduction measures and traffic management strategies to be deployed for reducing the negative impact if any. Prediction of noise levels should be done by using mathematical modeling at different representative locations.
- 24) Examine the impact during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials and prediction of impact on ambient air quality using appropriate mathematical model, description of model, input requirement and reference of derivation, distribution of major pollutants and presentation in tabular form for easy interpretation shall be carried out.
- 25) Also examine and submit the details about the protection to existing habitations from dust, noise, odour etc. during construction stage. IRC guidelines to be followed for traffic safety while passing through the habitat.
- 26) If the proposed route involves cutting of earth, the details of area to be cut, depth of cut, locations, soil type, volume and quantity of earth and other materials to be removed with location of disposal/dump site along with necessary permission.
- 27) If the proposed route is passing through low lying areas, details of fill materials and initial and final levels after filling above MSL, should be examined and submit.
- 28) Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.
- 29) Examine and submit details of water quantity required and source of water including water requirement during the construction stage with supporting data and also categorization of ground water based on the CGWB classification.
- 30) Examine and submit the details of measures taken during constructions of bridges across river/canal/major or minor drains keeping in view the flooding of the rivers and the life span of the existing bridges. Provision of speed breakers, safety signals, service lanes and foot paths should be examined at appropriate locations throughout the proposed road to avoid the accidents.
- 31) If there will be any change in the drainage pattern after the proposed activity, details of changes shall be examined and submitted.
- 32) Rain water harvesting pit should be at least 3 - 5 m. above the highest ground water table. Provision shall be made for oil and grease removal from surface runoff.
- 33) If there is a possibility that the construction/widening of road will cause impact such as destruction of forest, poaching, reductions in wetland areas, if so, examine the impact and submit details.

- 34) Submit the details of road safety, signage, service roads, vehicular under passes, accident prone zone and the mitigation measures.
- 35) IRC guidelines shall be followed for widening & upgradation of road.
- 36) Submit details of social impact assessment due to the proposed construction of road.
- 37) Examine road design standards, safety equipment specifications and Management System training to ensure that design details take account of safety concerns and submit the traffic management plan.
- 38) Accident data and geographic distribution should be reviewed and analyzed to predict and identify trends - in case of expansion of the existing highway and provide Post accident emergency assistance and medical care to accident victims.
- 39) If the proposed project involves any land reclamation, details to be provided for which activity land to reclaim and the area of land to be reclaimed.
- 40) Details of the properties, houses, businesses religious and social places etc. activities likely to be effected by land acquisition and their financial losses annually.
- 41) Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the project specific
- 42) Submit details of Corporate Social Responsibility (CSR/CER). Necessary provisions should be made in the budget.
- 43) Estimated cost of the project including environmental monitoring cost and funding agencies, whether governmental or on the basis of BOT etc and provide details of budget provisions (capital & recurring) for the project specific R&R Plan.
- 44) Submit environmental management and monitoring plan for all phases of the project viz. construction and operation.
- 45) Details of blasting if any, methodology/technique adopted, applicable regulations/permissions, timing of blasting, mitigation measures proposed keeping in view mating season of wild life.
- 46) In case of river/ creek crossing, details of the proposed bridges connecting on either banks, the design and traffic circulation at this junction with simulation studies.
- 47) Details to ensure free flow of water in case the alignment passes through water bodies/river/ streams etc.
- 48) In case of bye passes, the details of access control from the nearby habitation/habitation which may come up after the establishment of road.
- 49) Bridge design in eco sensitive area / mountains be examined keeping in view the rock classification hydrology etc.
- 50) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 51) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 52) In case of alignment passing through coastal zones

- a) HTL/LTL map prepared by authorized agencies superimposed with alignment and recommendation of Coastal Zone Management Authority
  - b) Details of CRZ-I (I) areas, mangroves required to be removed for the project along with the compensatory afforestation, area and location with budget
  - c) Details of road on stilt in CRZ-I areas, design details to ensure free tidal flow
  - d) Details of Labour camps, machinery location,
- 53) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Highways>".





*L&T Infra Engineering*

**L&T Infrastructure Engineering Limited**

6-3-1192/1/1, 5<sup>th</sup> Floor, Block No.3,  
White House, Kundan Bagh, Begumpet, Hyderabad – 500 016  
Ph: 91-040-40354444; Fax: 91-040-40354430