



**PUBLIC WORKS DEPARTMENT  
GOVERNMENT OF KERALA**

**KERALA STATE TRANSPORT PROJECT - II**

**EIA and EMP for  
Punalur – Ponkunnam – Thodupuzha Road**

**Executive Summary of Environmental Impact  
Assessment (EIA) and Environmental Management  
Plan (EMP) Report**

**December 2012**

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**EXECUTIVE SUMMARY OF EIA AND EMP****E.1. INTRODUCTION**

Government of Kerala (GoK), is implementing Kerala State Transport Project (KSTP) in two phases, Phase – I consisting of approximately 260 km roads was taken up for implementation with the assistance of World Bank and has been completed by 2011 and Phase – II comprising 600 km of high priority roads taken up now aims to upgrade critical sections of the State's road network and is supported by the International Bank for Reconstruction and Development (IBRD/World Bank). **Figure 1** shows the regional setting of KSTP II roads. This executive summary presents the summary of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) of the Link 84 – Punalur – Ponkunnam - Thodupuzha road.

**E.2. PROJECT DESCRIPTION**

The Punalur – Ponkunnam - Thodupuzha road (Link 84) is situated in Kollam, Pathanamthitta, Kottayam and Idukki districts of Kerala State. **Figure 2** shows the location map of the project road.

The project stretch, classified as State Highway No. 8 (SH 8) starts at Punalur (Chainage – 0/000) and ends at Thodupuzha (Chainage – 132+220), having a total length of 132.220 km. The project road passes through towns such as Pathanapuram, Konni, Ranni, Manimala, Ponkunam, and Pala.

General philosophy followed in formulating the improvement proposals are;

- Limit the improvements within the land identified for the project.
- Introduce transition to all the curves along the alignment
- Utilize the available Right of Way to the maximum so as to avoid additional land acquisitions
- Retain the geometric properties of finalized alignment during the study carried out in 2002
- Improve and introduce the project facilities
- Improvement of road safety features

Accordingly, the following optimum level of improvements is proposed:

- Widening of the project roads;
- Strengthening/reconstruction of the existing pavement for the entire length;
- Provision of footpath cum built-up drain at built up and industrial locations;
- Improving / redesigning sharp curves;
- Widening/ reconstruction of existing culverts and provision of additional culverts depending on the cross drainage requirements;
- Junction improvements;
- Provision for Pedestrian crossing facilities; traffic signs, road furniture and bus shelters

Summary of improvement proposal for the project road is presented in **Table E.1**.

**Table E.1. Summary of Improvement Proposals**

| Sl No | Particulars                  | Details  | Remarks   |
|-------|------------------------------|--|---|
| 1     | Starting chainage            | Km 0+000   | T.B.Road Junction, Punalur  |
| 2     | Ending chainage              | Km 132+950   | Bus stand Junction, Thodupuzha  |
| 3     | Length                       | 131.171 kms  |   |
| 4     | Classification               | SH 8   | State Highway   |
| 5     | Proposed Carriage Way width  | Cross Section  | Urban/ built-up sections: Two lane + Paved shoulders + footpath cum drains<br>Semi-Urban/ built-up section: Two lane carriageway + Paved shoulders + concrete drains<br>Rural Sections: Two Lane + Paved Shoulders + Earthen shoulders<br>Existing four lane stretches: Four Lane+5.5/6.5m service roads+footpath cum drains  |
| 6     | Proposed RoW                 | Built-up Areas   | 10m wide (Main built ups)<br>Existing four Lane stretches retained with new 5.5m service roads on both sides  |
|       |                              | Rural Areas  | 10m   |
| 7     | Pavement Details             | Overlay Composition: The entire section is overlaid with 25 SDBC+ PCC<br>Widening Composition: 25 SDBC + 65 DBM+ 250 WMM+200 GSB |   |
| 8     | Drains                       | 142.3 km (Including Both sides)  |   |
| 9     | Footpath                     | 37.5 km including both sides(as per cross section)   |   |
| 10    | Passenger Shelter            | 118 Nos  | (including both sides)  |
| 11    | Metal beam crash barrier     | 6200 m   | High embankment location & bridges and RuB approaches   |
| 12    | Pedestrian guard rail        | 20064 m  | Proposed foot path locations, major junctions and near schools and other institutions   |
| 13    | Proposed parking spaces      | 15 Nos   | Existing Auto, Jeep Taxi stands at 40 locations retained. (Not included in costing)<br>New parking spaces proposed at 15 locations at km 4/900, 12/930, 16/620, 18/710, 29/220, 29/250, 29/300, 53/580, 57/870, 63/600, 66/800,96/540,96/670,113/050,133/900  |
| 14    | Number of Oxbow Lands        | 38 Nos   |   |
| 15    | Bridge / Culvert             | 495 Nos  | <ul style="list-style-type: none"> <li>Major Bridge – 5 No's<br/>Additional/Reconstruction – 2 No @ km 35+940, 67+870<br/>Retained– 3No at km 51+460, 104+810, 132+860</li> <li>Minor bridge – 15 No's<br/>Additional/Reconstruction – 8 No @km 2+530, 13+265, 18+205, 28+385, 31+800, 69+200, 113+190, 130+370<br/>Widening – 1 No @ km 93+225<br/>Retained– 6No at km 9+510, 16+185, 24+935, 105+700, 112+785, 117+330</li> <li>RUB – 1 No<br/>Retained– 1No at km 0+263</li> <li>Aqueduct – 2 No<br/>Retained– 2No at km 17+100, 46+640</li> <li>Culverts – 472 No's<br/>Cleaning &amp; Widening – 87 No's<br/>Cleaning – 5 No's<br/>New construction due to realignment – 29 No's<br/>Reconstruction – 347 No's<br/>New proposal on existing road – 9 No's</li> </ul> |
| 16    | Traffic Signs / Road Marking | Provided at appropriate locations as per standards   |   |
| 17    | Noise Barrier                | 59 Locations   |   |
| 18    | Protection                   | Retaining wall- 44 km (including both sides)   |   |

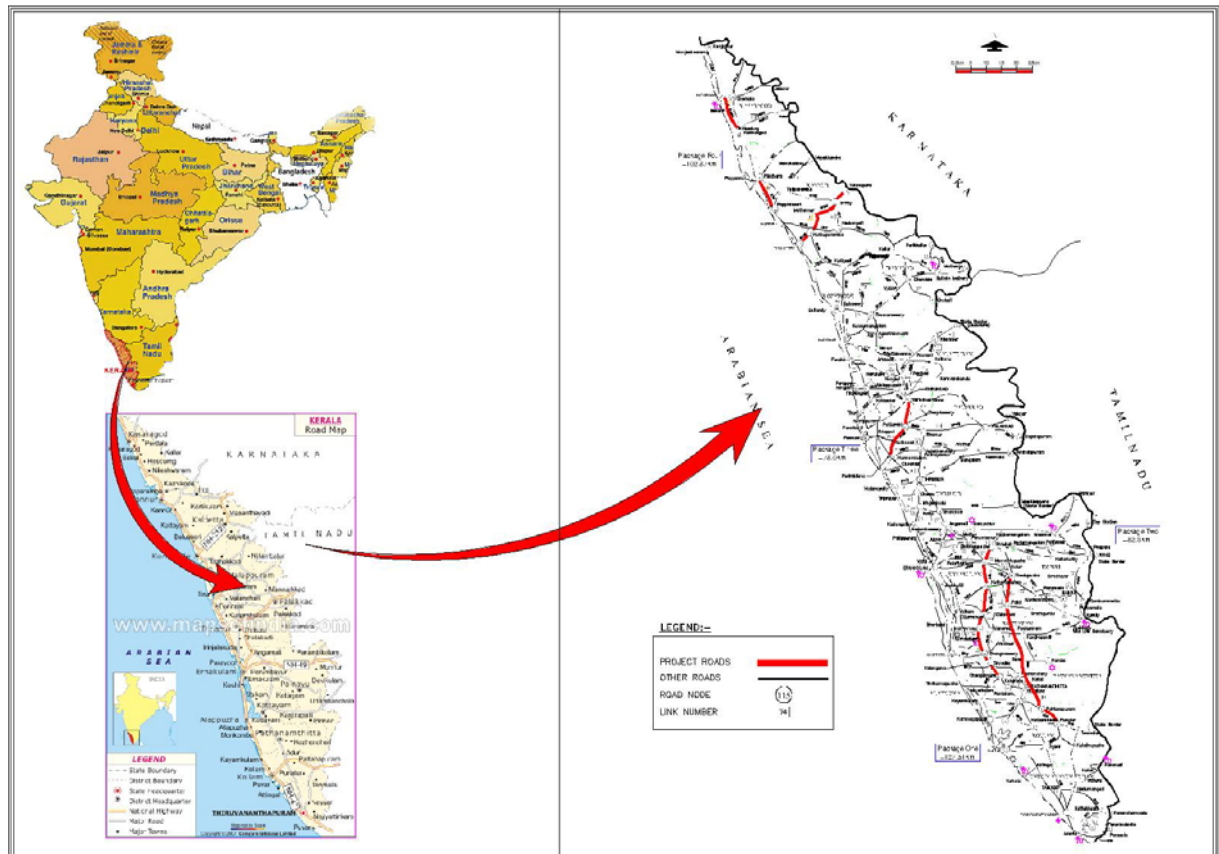


Figure E.1. Location Map of KSTP II Roads



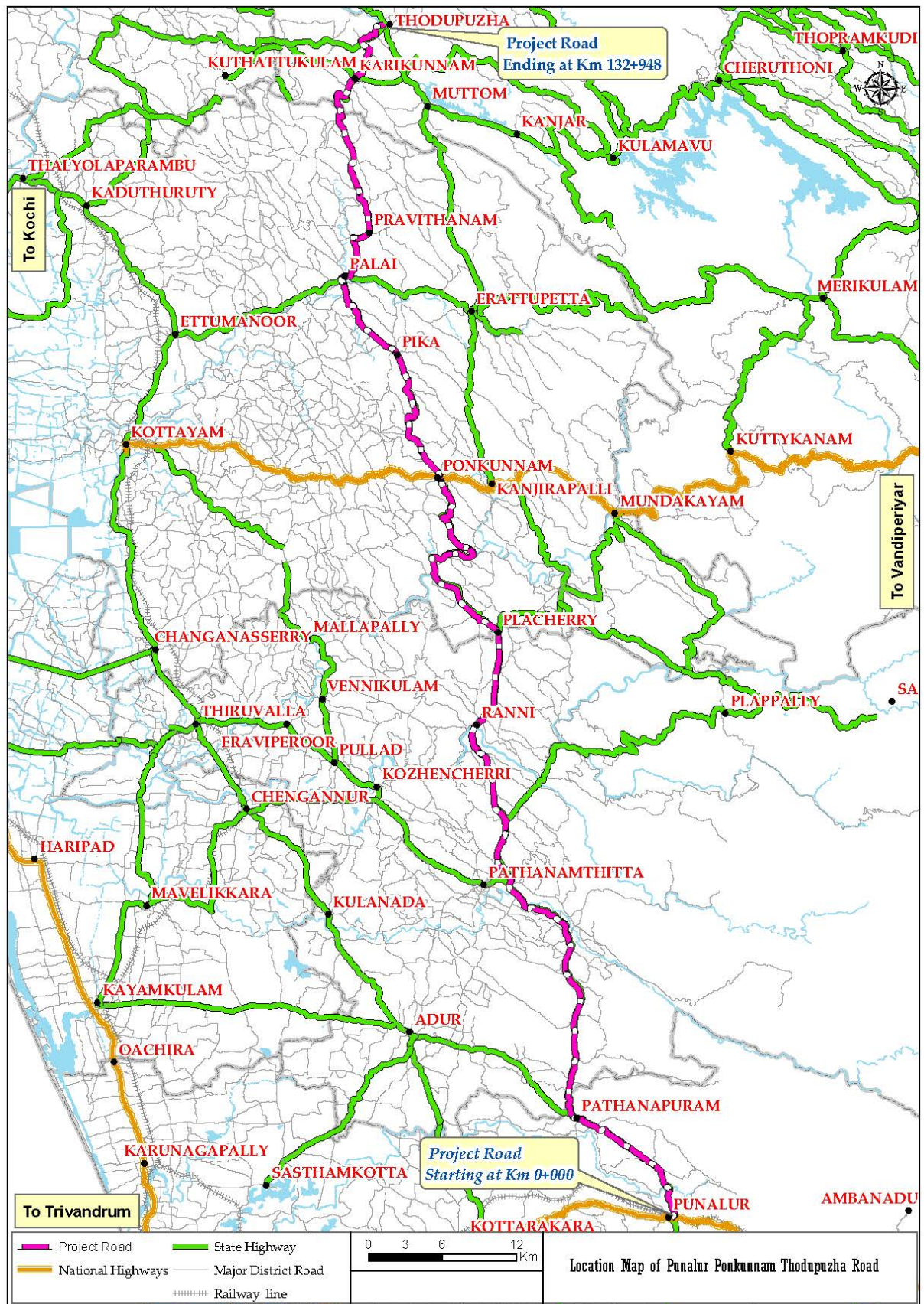


Figure E.2. Location Map of Punalur – Ponkunnom – Thodupuzha Road

### E.3. POLICY, LEGAL & ADMINISTRATIVE FRAME WORK

**Government of India (GoI)/Government of Kerala (GoK) Requirements.** Environmental clearance under the EIA Notification 2006 is not applicable to the project. However, tree cutting permission from the Kerala State Forest Department and Consent to Establish under Water Act and Air Act from Kerala State Pollution Control Board (KSPCB) are required. No other environmental clearances are required for the project. GoI legislations relevant to the project include Noise Pollution (Regulation and Control) Rules, 2000, The Motor Vehicles Act, 1988, The Public Liability Insurance Act, 1991, and Contract Labour (Regulation & Abolition) Act, 1970. State acts & policies applicable for the project include Kerala Highway Protection Act, 1999, Protection of River Banks and Regulations of Removal of Sand Policy, 2002, and Kerala Road Development Policy, 2009-21.

Prior to work initiation, Concessionaire has to obtain Consent to Establish and Consent to Operate for operating hot mix plants, crushers and construction camps from KSPCB under Water Act and Air Act, permission to store hazardous materials from KSPCB under Hazardous Waste (Management and Handling) rules and explosive license from Chief Controller of Explosives, Petroleum & Explosive Safety Organization. Other permissions to be obtained by the Concessionaire include Pollution under Control (PUC) certificate for vehicles from Motor Vehicle Department, Quarry license from Mining and Geology Department and permission for extraction of ground water from Central ground Water Authority.

**World Bank (WB) requirements.** The WB requirements are largely governed by the Operational Policies. World Bank has 10 safe guard policies, out of which, 3 policies are applicable for the project which are OP 4.01 Environmental Assessment, OP 4.30 Involuntary resettlement and OP 4.11 Cultural Property. The Environmental Assessment for the project has been conducted in line with the requirements of OP 4.01 and Cultural Property Impact and Rehabilitation Measures are a part of the EA, while the Rehabilitation Action Plan (RAP) prepared by KSTP addresses the issues of Involuntary Resettlement in line with OP 4.30.

### E.4. APPROACH & METHODOLOGY

EIA Report for this project was originally prepared in 1999. It was revised in 2004 based on an independent review conducted in 2003. Presently, the EIA Report has been reviewed and revised again. The present EIA report has been prepared and presented as per requirements of the Environmental Impact Assessment notification, 2006 of Ministry of Environment and Forests (MoEF) under the Environment Protection Act, 1986 and World Bank Operational Policy 4.01. The guidelines of the Indian Road Congress (1989) and Environmental guidelines for Rail / Road / Highway projects of MoEF have also been followed. The preparation of EIA/EMP documents for the project road has followed customary techniques employed for the collection of baseline techniques, impacts and identification of mitigation measures. These techniques include site investigations, secondary data collection, primary data generation and public participation and consultation.

A totally new Environmental Management Plan (EMP) has been prepared suggesting various mitigation measures to avoid or minimize the impacts of the project on the environment during the pre-construction, construction and operation phases. This EMP also draws from the review of implementation of EMP for KSTP Phase – I, conducted by Wilbur Smith Associates in 2010 and has incorporated measures to ensure efficient implementation of EMP. These measures include (i) a penalty clause in the contract document, (ii) training for awareness generation and skill development among Concessionaire's staff, (iii) simplified reporting and monitoring system with shared responsibility between Concessionaire and IE, (iv) Specific guidelines are added to enable the Concessionaire implement the EMP very effectively.

Two sets of guidelines were prepared and incorporated in the Generic EMP table of EMP report to enable the Concessionaire to implement the project with least impact upon the environment– (i) Guidelines for entire project stretch with regard to aspects like waste management, top soil conservation traffic management, worker's safety and management of hazardous substances and (i) Guidelines exclusively for siting, management and restoration of project facilities like camps and sites.

The EIA and EMP are prepared as two separate volumes. EIA is presented as Part I and EMP is Part II.

## **E.5. BASE LINE ENVIRONMENT, IMPACTS AND MITIGATION & AVOIDANCE**

The baseline environmental aspects, impacts and mitigation measures are summarised in following sections.

### **E.5.1. PHYSICAL ENVIRONMENT**

The project road is passing through predominantly mid land region and highland region and hence, it passes through two physiographic regions.

Base line air, water, and noise monitoring was carried out during May 2012 and the ambient air, water and noise data are found to be well within the standards set by Central Pollution Control Board.

**Impacts and avoidance.** The high intensity storms during the monsoon months result in heavy discharges in all rivers, submerging vast stretches of low lying lands. Hence, many sections of the road are prone to flooding, while the many areas along the project corridor is erosion prone on a minor scale while the highland is susceptible to land slides and land slips.

In order to avoid major environmental and social impacts, the project has restricted the widening to a maximum width of 15m. The avoidance of the road widening to any highway design standard (e.g. IRC standard width is 30m RoW compared to the KSTP width of 15m RoW) was one of the major environmental and social consideration in the project. For geometric correction of acute curve areas, 37 realignments have been considered along the project road.

**Mitigation measures:** At low lying areas and flood prone locations, it has been proposed to raise the pavements and widening and reconstruction of existing culverts and provision of additional culverts have been incorporated to take care of the huge quantity of flood water. In order to ensure slope stability and prevent soil erosion different types of protection measures are undertaken depending upon the embankment height and soil strata.

Where ever, embankment height varies from 1 to 3 m, turfing or seeding of grass with a slope of 1.5 horizontal to 1 vertical has been proposed, where as for embankment height more than 3 m, stone pitching with a slope of 1.5 H: 1 V has been proposed. Rubble masonry breast walls and slope cutting of ground with shotcrete treatment has been proposed for hill cutting. Further, several project specific environmental enhancement measures have been proposed to enhance the environment along the project roads.

### **E.5.2. FLORA, FAUNA AND ECOSYSTEMS**

Tree species present along project road are mostly indigenous in nature, like mangoes, tamarind, jackfruit tree and occasional banyan trees within the available corridor are surveyed and it has been found that around 1340 trees need to be cut along the road among which 36 are coconut trees. No widening or acquisition is proposed along the forest area.

#### **Mitigation measures**

Plantation of thrice the number of trees to be cut will be carried out with the help of State Forest and Department and an afforestation plan has been proposed for the same. A forest fire management plan has been proposed as part of the EMP. The loss of trees and vegetation at the sites of ancillary project facilities like borrow areas, quarry areas, labour camps, construction camp etc. will also be mitigated according to the measures adopted in the Environmental Management Plan. Apart from this, tree plantation will be carried out at realignment/ oxbow location.

### **E.5.3. SOCIO-ECONOMIC ENVIRONMENT**

Details of the shrines, churches, temples and mosques in the immediate vicinity of the Right of Way and needing to be protected are shown in the link specific EMP. These include Temples, Mosques, Churches, Cremation ground, Hundi and shrine (very small religious place). Alignment has been finalised avoiding and minimising the impact on these cultural properties. The Cultural Property Rehabilitation Measures proposed in Link Specific EMP details out the impact on cultural properties and strategy for their restoration, relocation or reconstruction.



The extent of socio-economic impact has been assessed and the compensatory measures are detailed out in the Rehabilitation Action plan..

**Mitigation measures:** The project has prepared a Cultural Property Rehabilitation Measures (CPRM) to ensure the mitigation and enhancement plan for the temples, mosques, churches and shrines. The Resettlement Action Plan (RAP) prepared by KSTP for the KSTP II up-gradation component largely governs the mitigation on social aspects. The RAP has been prepared for all KSTP II project roads to address land acquisition, compensation and resettlement and rehabilitation. No archaeological structures will be impacted due to the proposed improvement of the three project roads.

#### **E.6. SUMMARY OF ENVIRONMENTAL & SOCIAL ISSUES**

The project road pass through the vegetation-covered midland and highland. Many sections of the project road are prone to flooding, while the entire project corridor is erosion prone on a minor scale while the highland is susceptible to land slides and land slips. Tree species present along project road are mostly indigenous in nature, like mangoes, tamarind, jackfruit tree and occasional banyan trees. Alignment has been finalised avoiding and minimising the impact on these cultural properties.

Further the project road passes through forest areas, hence, construction activities should be carried out with all precautionary measures as presented in EMAP. An expected increase in traffic during Sabarimala pilgrimage season will be the second major issue. The other minor issues are land acquisition problems, disturbance to the forest areas etc. The remaining issues are similar to that of any road-widening project such as dust, road safety, traffic disruption, construction and operational noise, tree cutting, borrow and quarry area issues etc.

#### **E.7. ANALYSIS OF ALTERNATIVES**

It is customary to include a 'No Action alternative' in order to confirm that the project up gradation is a requirement of the people of Kerala and hence need to be implemented. The project road is an important highway for the overall development of the State. The 'no action alternative' will not allow any of these improvements therefore cannot be acceptable to the local people.

Two bypasses are proposed for the road, but as they are implemented as a separate package of PWD, they were not considered in this report. There are thirty seven realignments considered along the project road.

The 'no action alternative' will not resolve this issue; on the other hand, due to the standard improvements to the project road it is most likely that the project road will serve as a much safer road for the tourists/pilgrims. Considering the land use, environmental features, road geometry etc. Optimum levels of improvements have been proposed for the project as listed out in section E.2. Further, the project has undergone a road safety audit and a number of junction alternatives were necessary to include in the project.

#### **E.8. ENVIRONMENTAL MANAGEMENT PLAN**

The Environmental Management Plan (EMP) prepared for the project is a separately bound volume supporting the EIA report. The main component of this document is Environmental Management Action Plan (EMAP) prepared for the project road clearly describing activity wise mitigation measures for various impacts upon each environmental attribute like land, air, water, noise, flora and fauna and human habitats. EMAP has been further divided into two parts. The generic EMAP describes mitigation measures common for all roads and link specific EMAP describes mitigation and enhancement measures specific to link roads. The EMAP provides various institutional arrangements for understanding 'who is doing what' including PMT, IE and the Concessionaires, by assigning responsibility for implementation and its monitoring. It also cross refers the relevant document applicable for each mitigation measure like engineering drawing volume for relevant drawings, BOQ for cost of the item, and Contract clauses nos. in the contracting document as applicable. The Concessionaire has to adhere to the various EMP requirements; Independent Engineer (IE) will be monitoring various implementation arrangements and PMT will be handling overall project management.

## E.9. ENVIRONMENTAL ENHANCEMENTS

Several measures have been proposed for enhancing the environment and social aspects. These measures include planting of trees and shrubs beyond that is required according to the law, construction of retaining walls and guardrails, bus bays, parking areas, bus shelters with kiosk, cultural property enhancement, landscaping of oxbow lands, providing sign boards, preserving and landscaping cultural properties etc.

## E.10. ENVIRONMENTAL MITIGATION COSTS

The BOQ 11, which provides environmental mitigation and enhancements costs and BOQ 2 & 3, which gives several provisions for environmental mitigation (eg. Top soil preservation) are also reproduced in EMP report.

The environmental mitigation and enhancement costs are included in the BOQ for Concessionaire for ensuring the implementation of all mitigation and environmental enhancement measures. The estimated environmental mitigation and enhancement cost is Rs. 104.22 million rupees.

## E.11. PUBLIC PARTICIPATION & CONSULTATION

A series of FGDs were arranged jointly by KSTP officials and the consultants along the project roads on 3<sup>rd</sup> and 4<sup>th</sup> of October, 2012. Altogether the team met 160 persons representing various segments of society such as drivers, merchants, and pedestrian passengers. During public consultation, two types of queries or concerns were raised by the public - **general queries** like concerns on RoW of the road, traffic management system during construction phase, compensation for land, road safety of passengers and pedestrians during construction phase, speed limits during and after construction, access to road side buildings, mechanism to ensure the construction quality etc. and **specific queries** included concerns such as provisions for road safety measures such as foot paths, cycling paths, road furnitures, tree plantation at safe distance from road, land margin for utilities, slope protection measures at high lands, vacating the land acquisition cases in court, traffic congestion at RUB location etc.

All the above environmental queries raised by the community during the FGD were suitably addressed by the KSTP officials during the consultation and incorporated to the extent possible in the project preparation. As part of the proposed future consultations, follow up public consultations for the Phase II roads at the project road link level are proposed to be organised during the construction period till the completion of the project.

## E.12. PENALTY CLAUSE

To ensure that EMP is implemented effectively, a penalty clause has been introduced into the bid document under Sub-Clause 14.6 (Protection of the Environment) as follows:

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 will 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 PWD complaint cell and communicated to the Concessionaire, which is not properly addressed within the time period intimated by the IE / PMT shall be treated as a major lapse.
3. Non-conformity to 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 three reminders were given and still not rectified shall be treated as a major lapse.
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.

If the lapse is not rectified within three months after withholding the payment, the amount withheld shall be forfeited.

### **E.13. MONITORING AND REPORTING PROCEDURES**

A robust monitoring and reporting system is mandatory to ensure compliance to EMAP by the Concessionaire. The monitoring and reporting system evolved for KSTP-II is integrated into EMAP table and its annexures. It comprises following three parts:

- (A) Monitoring and reporting of environmental management measures for project related facilities like construction camp, labour camp, quarry area, borrow area and debris disposal site,
- (B) Monitoring and reporting of environmental management measures for overall project, and
- (C) Monitoring and reporting of quality of environmental parameters like air, water and noise.

This monitoring and reporting system attempts to pre-empt much of the environmental issues created during construction and post construction stages and provides the necessary feedback for IE / PMT to make sure that EMAP is implemented in full spirit. Instead of a linear reporting system, this system works on a two way basis – initial reporting by Concessionaire followed by monitoring by IE based on Concessionaire's reports. Responsibilities for monitoring will rest with the Environmental Officer of the IE reporting to the PMT and EMU at KSTP.

### **E.14. PUBLIC DISCLOSURE**

The wider dissemination of information to public shall be undertaken by PMT through the disclosure of EIA / EMP reports in the website of PMT. At the project site, i.e. the direct impact zone, information boards shall be displayed at critical and pre-identified locations to disseminate the project details. Such information boards shall display project name, Concessionaire's name, concerned official's name in Concessionaire's office with his designation and contact no., name and contact details of an authorised official in local PWD divisional office. These information boards shall also mention the availability of a complaint register with the Concessionaire. Under the Right to Information (RTI) Act, 2005, Concessionaire is also duty bound to share any information demanded by the public, pertaining to any aspect of the project, as and when it is demanded.